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MIXERS

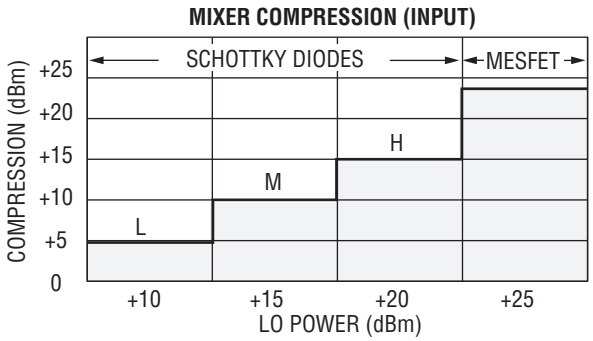
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SCHOTTKY/MESFET PRODUCTS

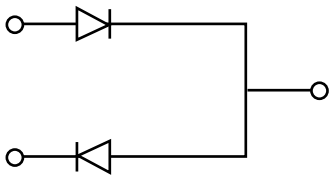
This detailed, double-sideband mixer section summarizes the important input, output and transfer characteristics of these devices. This catalog is also published on our web site: http://www.miteq.com. We look forward to helping you choose the best mixer from our increasing core of state-of-the-art products, so that your system will be more competitive in today's demanding marketplace. Most importantly, we are committed to satisfying not only the written technical specifications of any new product, but to ensure that the product satisfies its intended application requirements.

DOUBLE-SIDEBAND MIXER APPLICATION GUIDELINES

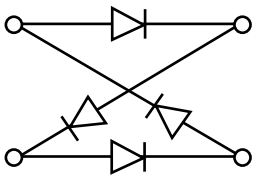
CRITICAL SPECIFICATIONS	BEST MODELS	CIRCUIT DESCRIPTION
Low cost	DB0218, TB0218	2 to 18 GHz double/triple balanced
Limited LO power, < 0 dBm, good RF VSWR	SBB0218	Biasable 2 to 18 GHz bridge mixer -10 to +10 dBm LO
+5 dBm 1 dB input RF compression	DB/DM, "L" option diode	Double balanced +10 dBm typical LO Schottky diodes
+15 dBm 1 dB input RF compression	TB...H option diode	Triple balanced +20 dBm typical LO Schottky diodes
+23 dBm 1 dB input RF compression	SBF	Double balanced +23 dBm typical LO MESFETS
Highest IP^3 termination insensitive, +36 dBm input	DBF	Double balanced MESFET, LO = +26 dBm typical
Even harmonic (1/2 LO)	SBE	Back-to-back ring quads
Low DC output offset for demodulator applications	DB, DM	Double balanced tapered or tuned balun
High single-tone m x n rejection	TB, DM "H" diode	Triple balanced, Schottky diode
High LO AM noise rejection, low conversion loss	DM octave units	Double balanced, 40 dB typical LO-to-RF isolation
System mismatch immunity	TIM	Quadrature coupled Schottky
Phase or amplitude-matched multichannel wide IF bandwidth	M	Double-balanced



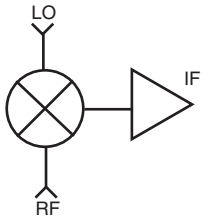
SINGLE-, DOUBLE-BALANCED AND MIXER WITH IF AMPLIFIER



SBW
Single Balanced Waveguide



DB, DM
Double Balanced

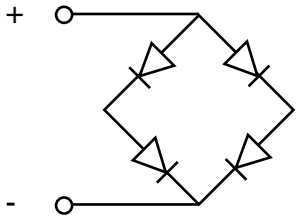


DA
Mixer with IF Amplifier

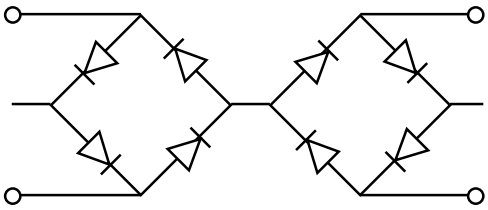
MODEL NUMBER	FREQUENCY RANGE RF AND LO (GHz)	FREQUENCY RANGE IF (MHz)	NOMINAL LO POWER (dBm)	CONVERSION GAIN (dB, Typ.)	LO-TO-RF ISOLATION (dB, Min.)	NOISE FIGURE (dB, Typ.)	DC BIAS (Volts/mA) (Typ.)	NOTES	PAGE
DOUBLE BALANCED – WITH IF AMPLIFIERS									
DA0204LR5	2 – 4	10 – 250	10 – 13	23	20	9.5	+12 / 50		23
DA0408LR5	4 – 8	10 – 250	10 – 13	23	20	9.5	+12 / 50		25
DA0812LR5	8 – 12	10 – 250	10 – 13	23	20	9.5	+12 / 50		27
DA1218LR5	12 – 18	10 – 250	10 – 13	23	20	9.5	+12 / 50		29
DA0218LR5	2 – 18	10 – 250	10 – 13	23	20	9.5	+12 / 50		31

MODEL NUMBER	FREQUENCY RANGE RF AND LO (GHz)	FREQUENCY RANGE IF (GHz)	NOMINAL LO POWER (dBm)	CONVERSION LOSS (dB) (Typ./Max.)	LO-TO-RF ISOLATION (dB) (Typ./Min.)	RF-TO-IF ISOLATION (dB) (Typ.)	INPUT IP^3 (dBm) (Typ.)	NOTES	PAGE
DOUBLE BALANCED – ULTRA BROADBAND									
DB0118LA2	1 – 18	DC – 0.5	10 – 13	8.5 / 9	30 / 23	15	15		33
DB0218LW2	2 – 18	DC – .75	7 – 13	6.5 / 8.5	30 / 22	30	15		35
DB0418LE1	4 – 18	DC – 2	7 – 13	7 / 8.5	30 / 22	25	13		37
DB0418LW1	4 – 18	DC – 2	7 – 13	6.5 / 8.5	25 / 20	20	10		39
DB1218LW1	12 – 18	DC – 2	7 – 13	6.5 / 8.5	25 / 20	20	10		41
DB0226LA1	2 – 26	DC – .5	7 – 13	9 / 10	30 / 20	20	15		43
DB0426LW1	4 – 26	DC – 2	7 – 13	7.5 / 9.5	25 / 20	20	15		45
DB1826LW1	18 – 26	DC – 2	7 – 13	7.5 / 9.5	25 / 20	20	15		47
DB0130LA2	1 – 30	DC – 0.5	10 – 13	8.5 / 9.5	30 / 18	15	15		49
DB0440LW1	4 – 40	DC – 2	10 – 15	9 / 10	25 / 20	30	15	V Connectors Available	51
DB0250LW1V	2 – 50	DC – 2	13 – 17	10 / 15	20 / 18	20	15		53
DOUBLE BALANCED – HIGH ISOLATION									
DM0052LA2	.5 – 2	DC – 0.5	7 – 13	6.5 / 8.5	40 / 30	30	13		55
DM0104LA1	1 – 4	DC – 1	7 – 13	5.5 / 7	40 / 30	30	13		57
DM0204LW2	2 – 4	DC – 1	7 – 13	4.5 / 7	40 / 35	35	13		59
TIM0206HI2	2 – 6	DC – 2	17 – 26	8 / 10	35 / 25	30	26	Term. Insensitive	61
DMX0207L	2 – 7	DC – 2	7 – 13	6 / 8	40 / 30	30	13		63
DM0208LW2	2 – 8	DC – 2	7 – 13	7 / 8	40 / 30	30	13		65
DM0408LW2	4 – 8	DC – 2	7 – 13	5 / 6	40 / 30	30	13		67
DM0412LW2	4 – 12	DC – 4	7 – 13	6 / 7	40 / 30	30	15		69
DM0416LW2	4 – 16	DC – 4	7 – 13	7 / 8	40 / 30	40	15		69
DM0812LW2	8 – 12	DC – 4	7 – 13	4.5 / 6	35 / 30	30	13		71
DMX0716L	7 – 16	DC – 4	7 – 13	5 / 8	35 / 20	35	13		73
DMX0418L	4 – 18	DC – 4	7 – 13	6 / 9	35 / 20	35	13		73
DMX0518L	5 – 18	DC – 7	7 – 13	6 / 8	35 / 20	35	13		75
DMX0618L	6 – 18	DC – 7	7 – 13	5 / 7	35 / 20	35	13		75
DM0818LW1	8 – 18	DC – 7	7 – 13	5 / 7	35 / 30	40	10		77
DM0520LW1	5 – 20	DC – 7	7 – 13	6 / 9	35 / 30	40	10		77
DOUBLE BALANCED – WIDE IF BANDWIDTH									
M0205W1	2 – 5	DC – 3	13 – 17	8 / 10.5	40 / 30	10	15		79
M0408W1	4 – 8	DC – 3	13 – 17	8 / 9.5	35 / 28	12	15		80
M0618W1	6 – 18	DC – 6	17 – 23	10 / 13	25 / 20	12	22		81
M0520W1	5 – 20	DC – 3	17 – 23	10 / 13	30 / 25	15	20		82
M1826W1	18 – 26	DC – 8	10 – 15	9 / 12	35 / 25	20	14		83
M2640W1	26 – 40	DC – 12	10 – 15	10 / 12	35 / 28	25	18		84

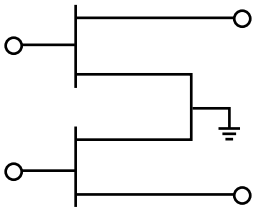
DOUBLE-BALANCED, BIASABLE, TRIPLE-BALANCED AND MESFET MIXERS



SBB
Single Balanced
Biasable



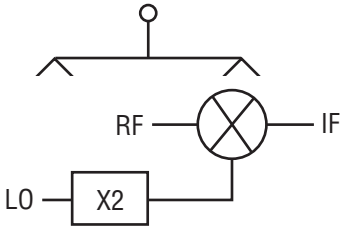
TB, TBR
Triple Balanced



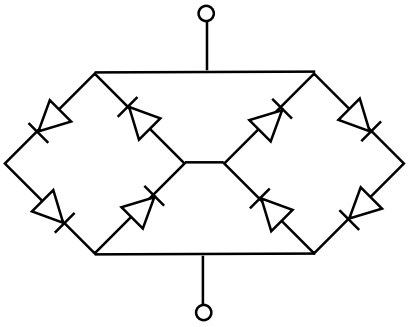
SBF
Single Balanced
MESFET

MODEL NUMBER	FREQUENCY RANGE RF AND LO (GHz)	IF (GHz)	NOMINAL LO POWER (dBm)	CONVERSION LOSS (dB) (Typ./Max.)	LO-TO-RF ISOLATION (dB) (Typ./Min.)	RF-TO-IF ISOLATION (dB) (Typ.)	INPUT IP3 (dBm) (Typ.)	NOTES	PAGE
DOUBLE BALANCED – SURFACE MOUNT									
M0205W3	2 – 5	DC – 3	13 – 17	8 / 11	40 / 30	10	15		85
M0205W8	2 – 5	DC – 3	13 – 17	8 / 11	40 / 30	10	15		85
M0408W3	4 – 8	DC – 3	13 – 17	8 / 10	35 / 28	12	15		86
M0408W8	4 – 8	DC – 3	13 – 17	8 / 10	35 / 28	12	15		86
M0618W3	6 – 18	DC – 6	17 – 23	10 / 13.5	25 / 20	12	22		87
M0618W8	6 – 18	DC – 6	17 – 23	10 / 13.5	25 / 20	12	22		87
M0520W3	5 – 20	DC – 3	17 – 23	10 / 13.5	30 / 25	15	20		88
M0520W8	5 – 20	DC – 3	17 – 23	10 / 13.5	30 / 25	15	20		88
TRIPLE BALANCED									
TB0208LW2	2 – 8	0.5 – 8	10 – 15	7 / 9	25 / 20	20	15		89
TB0208LA1	2 – 8	0.5 – 8	10 – 15	7 / 9	25 / 20	20	15		89
TB0218LW2	2 – 18	0.5 – 8	10 – 15	7.5 / 9.5	25 / 20	20	15		91
TB0218LA1	2 – 18	0.5 – 8	10 – 15	7.5 / 9.5	25 / 20	20	15		91
TBR0218LW2	2 – 18	.05 – 3	10 – 15	6.5 / 8.5	25 / 20	20	15		93
TBR0218LA1	2 – 18	.05 – 3	10 – 15	6.5 / 8.5	25 / 20	20	15		93
TB0418LW1	4 – 18	0.5 – 8	10 – 15	8.5 / 9.5	25 / 20	20	15		95
TBR0618HA1	6 – 18	.05 – 5	17 – 21	6 / 8	30 / 25	20	23		97
TBR0618HA1G	6 – 18	.05 – 5	17 – 21	6 / 8	30 / 25	20	23		97
TB0226LW2	2 – 26	0.5 – 8	10 – 15	10 / 12	25 / 20	20	15		99
TB0226LA1	2 – 26	0.5 – 8	10 – 15	10 / 12	25 / 20	20	15		99
TBR0226LW2	2 – 26	.05 – 3	10 – 15	10 / 12	25 / 20	20	15		101
TBR0226LA1	2 – 26	.05 – 3	10 – 15	10 / 12	25 / 20	20	15		101
TB0426LW1	4 – 26	0.5 – 8	10 – 15	10 / 12	25 / 20	20	15		103
TB0440LW1	4 – 40	0.5 – 20	10 – 15	10 / 12	20 / 18	30	15		105
BIASABLE – LOW LO POWER									
SBB0218LR5	2 – 18	0.01 – 0.5	-10 – +10	9 / 11	25 / 20	15	0	Biasable, +15V	107
SBB0226LR5	2 – 26	0.01 – 0.5	-10 – +10	10 / 14.5	25 / 20	15	0	Biasable, +15V	109
MESFET – HIGH DYNAMIC RANGE									
DBF1800W3	1.7 – 1.9	.02 – 2	23 – 26	8.5 / 9.5	28 / 20	20	36	Surface Mount	111
SBF0208LW2	2 – 8	DC – 1	10 – 20	7 / 9	15 / 10	12	27		113
SBF0810HI3A	8 – 10	0.2 – 1.2	20 – 23	8 / 9	30 / 20	30	30		115
SBF0810HI3B	8 – 10	1.4 – 2	20 – 23	8 / 9	30 / 20	30	30		115
SBF0618LW2	6 – 18	DC – 3	10 – 16	7.5 / 9	15 / 10	12	23		117

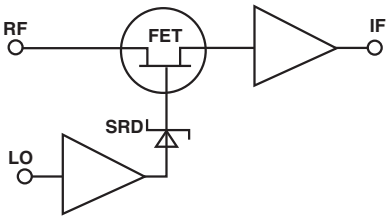
SUB-HARMONIC AND SPECIALTY MIXERS



SYSMM
Active Multiplier Mixer



SBE
Single Balanced Even Harmonic



SRD
Sampling Mixer

MODEL NUMBER	FREQUENCY RANGE RF AND LO (GHz)	IF (GHz)	NOMINAL LO POWER (dBm)	CONVERSION LOSS (dB) (Typ./Max.)	LO-TO-RF ISOLATION (dB) (Typ.)	2LO-TO-RF ISOLATION (dB) (Typ./Min.)	INPUT IP3 (dBm) (Typ.)	NOTES	PAGE
EVEN HARMONIC – 1/2 LO									
SBE1015LM2	10 – 15 / 5 – 7.5	DC – 1	13 – 15	9 / 10	35	60 / 40	7		119
SBE0818LA1	8 – 18 / 4 – 9	DC – 1	13 – 15	10 / 11	35	60 / 40	7		119
SBE0818LM2	8 – 18 / 4 – 9	DC – 1	13 – 15	10 / 11	35	60 / 40	7		119
SBE0440LW1	4 – 40 / 2 – 20	DC – 1.5	10 – 15	10 / 12	20	40 / 30	10		121
ME2640W1	26 – 40 / 13 – 20	2 – 4	10 – 14	12 / 15	30	40 / 35	15		123

MODEL NUMBER	FREQUENCY RANGE RF AND LO (GHz)	IF (GHz)	NOMINAL LO POWER (dBm)	CONVERSION LOSS (dB) (Typ./Max.)	LO FUNDAMENTAL LEAKAGE @ RF (dBm, Typ.)	LO-TO-RF LEAKAGE @ nLO (dBm) (Typ., Max.)	INPUT IP3 (dBm) (Typ.)	NOTES	PAGE
ACTIVE MULTIPLIER MIXER									
SYSMM2X2335	23 – 35 / 11 – 17	DC – 0.23	13 – 15	11 / 12	-50	-20 / -15	10	LO X2	124
SYSMM3X2934	29 – 34 / 9 – 10	DC – 3	13 – 15	9 / 12	-70	-25 / -15	10	LO X3	125

MODEL NUMBER	FREQUENCY RANGE RF AND LO (GHz)	IF (GHz)	NOMINAL LO POWER (dBm)	CONVERSION LOSS (dB) (Typ./Max.)	LO-TO-RF ISOLATION (dB) (Typ./Min.)	RF-TO-IF ISOLATION (dB) (Typ.)	INPUT IP3 (dBm) (Typ.)	NOTES	PAGE
WAVEGUIDE									
SBW2226LG1	22 / 26	DC – 2	7 – 10	5.5 / 7.5	30 / 20	30	10	WR42	127
SBW3337LG2	33 / 37	DC – 4	5 – 1 3	7.5 / 8.5	25 / 18	25	10	WR28	129

MODEL NUMBER	FREQUENCY RANGE RF AND LO (GHz)	IF (GHz)	NOMINAL LO POWER (dBm)	CONVERSION LOSS (dB) (Typ./Max.)	LO-TO-RF ISOLATION (dB) (Typ./Min.)	RF-TO-IF ISOLATION (dB) (Typ.)	INPUT IP3 (dBm) (Typ.)	NOTES	PAGE
LO AMPLIFIED									
MA2640W1	26 / 40	DC – 12	0 – +5	10 / 12	20 / 15	25	18		131

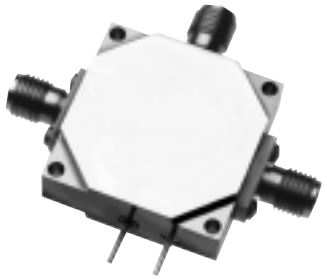
MODEL NUMBER	FREQUENCY RANGE RF (GHz)	LO (GHz)	IF (GHz)	NOMINAL LO POWER (dBm)	CONVERSION GAIN (dB) (Typ./Max.)	SINGLE TONE IM PRODUCTS (@ -10 dBm INPUT) (2/3 RF, dBc/Typ.)	LO-TO-RF ISOLATION (dB) (Typ.)	NOTES	PAGE
SAMPLING MIXER									
SRD0218LW4	2 – 18	0.8 – 1.3	0.1 – 0.4	10 – 17	0/+3	30 / 50	25		133

2 TO 4 GHz MIXER/IF AMPLIFIER

MODEL: DA0204LR5

FEATURES

- **Double-balanced mixer with integrated IF amplifier**
- **RF/LO coverage..... 2 to 4 GHz**
- **IF operation..... 10 to 250 MHz**
- **LO power range..... +10 to +13 dBm**
- **Packaging..... Hermetically sealed**



MITEQ's DA Series combines our double-balanced mixer with a low noise IF amplifier to provide an integrated converter module. This design is particularly well suited to broadband downconverter receiver applications such as ESM and ELINT systems or test equipment applications requiring flat RF to IF amplitude and phase characteristics (e.g., FMCW or narrow pulse systems).

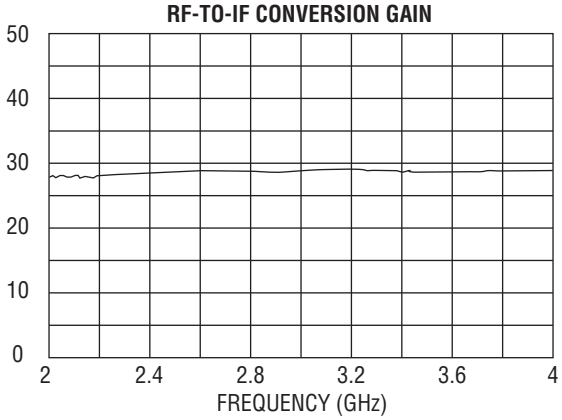
ELECTRICAL SPECIFICATIONS

INPUT PARAMETERS	CONDITION	UNITS	MIN.	TYP.	MAX.
RF frequency range		GHz	2		4
RF VSWR	50 ohm reference	Ratio		2.5:1	
LO frequency range		GHz	2		4
LO power range		dBm	+10		+13
LO VSWR	50 ohm reference	Ratio		2.5:1	
DC bias	+12 volts	mA		50	
TRANSFER CHARACTERISTICS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
Conversion gain		dB	20	23	
Single-sideband noise figure		dB		9.5	
LO-to-RF isolation		dB	20		
LO-to-IF isolation		dB		20	
RF-to-IF isolation		dB		25	
Output power at 1 dB compression		dBm	+5		
OUTPUT PARAMETERS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
IF frequency range		MHz	10		250
IF VSWR	50 ohm reference	Ratio		2:1	

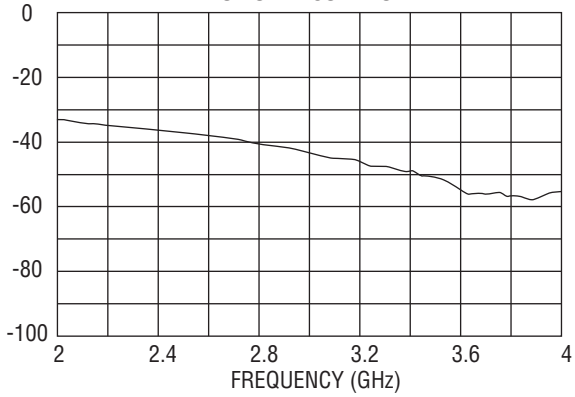
DA0204LR5 TYPICAL TEST DATA

Test at 100 MHz IF with an LO of +10 dBm

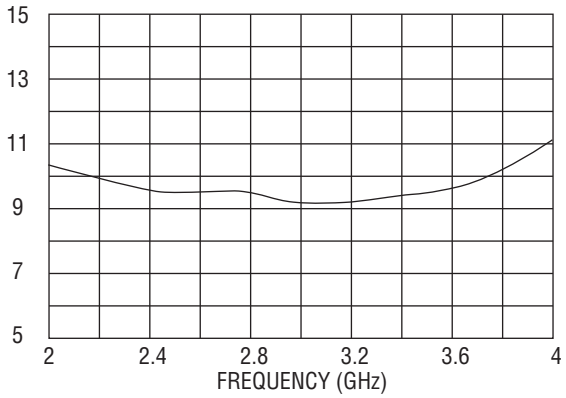
RF-TO-IF CONVERSION GAIN



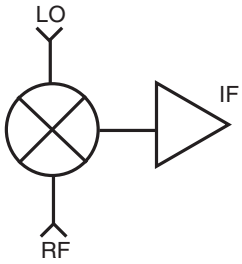
LO-TO-RF ISOLATION



NOISE FIGURE



BLOCK DIAGRAM

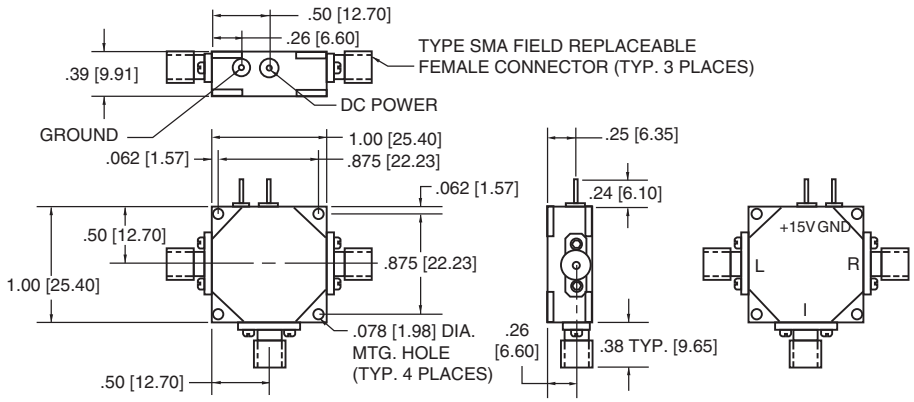


MAXIMUM RATINGS

Specification temperature ..... +25°C
Operating temperature ..... -54 to +85°C
Storage temperature ..... -65 to +125°C

NOTE: Test data supplied at 25°C; conversion gain, LO-to-RF isolation, noise figure and bias.

OUTLINE DRAWING



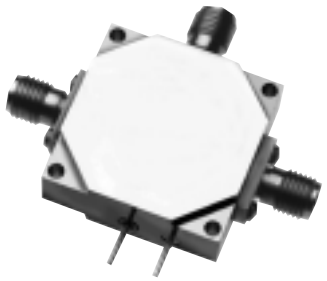
NOTE: All dimensions shown in brackets [ ] are in millimeters.

4 TO 8 GHz MIXER/IF AMPLIFIER

MODEL: DA0408LR5

FEATURES

- **Double-balanced mixer with integrated IF amplifier**
- **RF/LO coverage..... 4 to 8 GHz**
- **IF operation..... 10 to 250 MHz**
- **LO power range..... +10 to +13 dBm**
- **Packaging..... Hermetically sealed**



MITEQ's DA Series combines our double-balanced mixer with a low noise IF amplifier to provide an integrated converter module. This design is particularly well suited to broadband downconverter receiver applications such as ESM and ELINT systems or test equipment applications requiring flat RF to IF amplitude and phase characteristics (e.g., FMCW or narrow pulse systems).

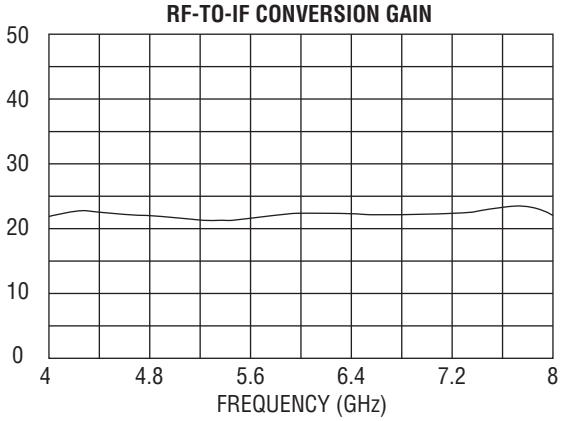
ELECTRICAL SPECIFICATIONS

INPUT PARAMETERS	CONDITION	UNITS	MIN.	TYP.	MAX.
RF frequency range		GHz	4		8
RF VSWR	50 ohm reference	Ratio		2.5:1	
LO frequency range		GHz	4		8
LO power range		dBm	+10		+13
LO VSWR	50 ohm reference	Ratio		2.5:1	
DC bias	+12 volts	mA		50	
TRANSFER CHARACTERISTICS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
Conversion gain		dB	20	23	
Single-sideband noise figure		dB		9.5	
LO-to-RF isolation		dB	20		
LO-to-IF isolation		dB		20	
RF-to-IF isolation		dB		25	
Output power at 1 dB compression		dBm	+5		
OUTPUT PARAMETERS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
IF frequency range		MHz	10		250
IF VSWR	50 ohm reference	Ratio		2:1	

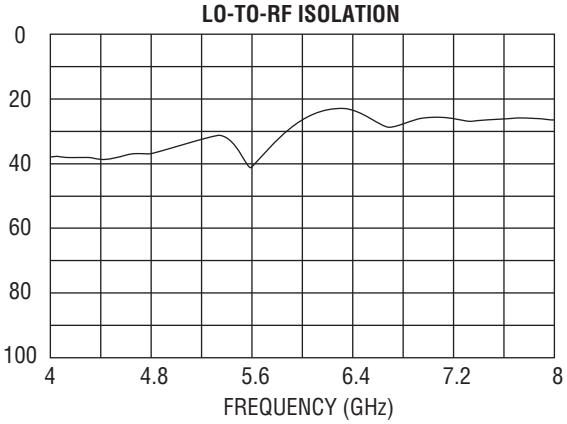
DA0408LR5 TYPICAL TEST DATA

Test at 100 MHz IF with an LO of +10 dBm

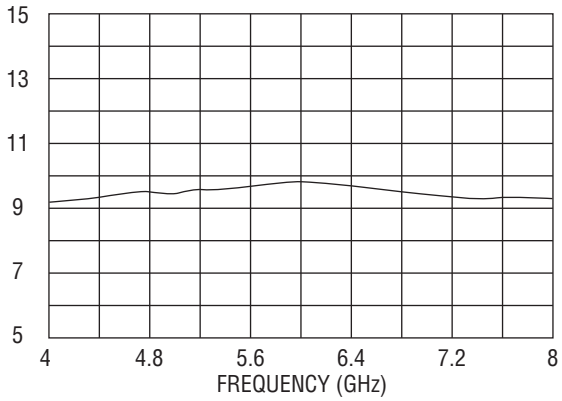
RF-TO-IF CONVERSION GAIN



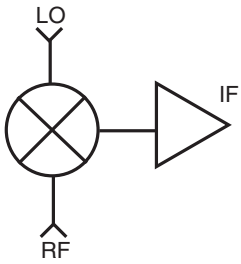
LO-TO-RF ISOLATION



NOISE FIGURE



BLOCK DIAGRAM

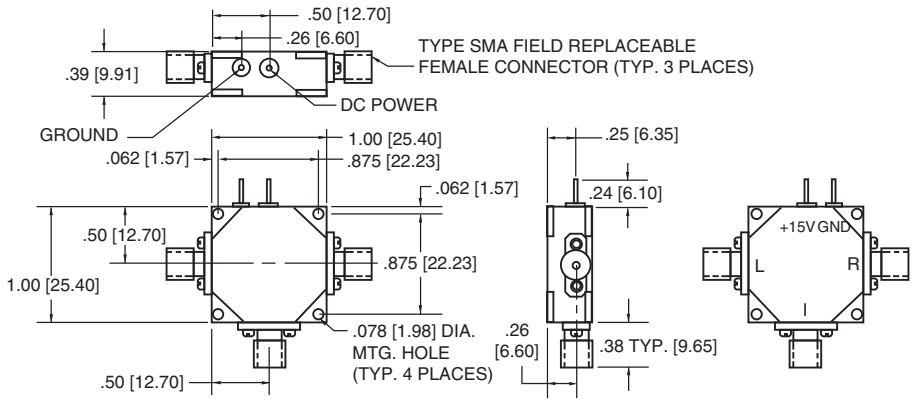


MAXIMUM RATINGS

Specification temperature ..... +25°C
Operating temperature ..... -54 to +85°C
Storage temperature ..... -65 to +125°C

NOTE: Test data supplied at 25°C; conversion gain, LO-to-RF isolation, noise figure and bias.

OUTLINE DRAWING



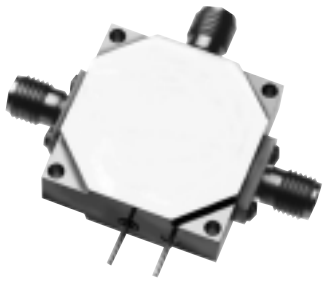
NOTE: All dimensions shown in brackets [ ] are in millimeters.

8 TO 12 GHz MIXER/IF AMPLIFIER

MODEL: DA0812LR5

FEATURES

- **Double-balanced mixer with integrated IF amplifier**
- **RF/LO coverage..... 8 to 12 GHz**
- **IF operation..... 10 to 250 MHz**
- **LO power range..... +10 to +13 dBm**
- **Packaging..... Hermetically sealed**



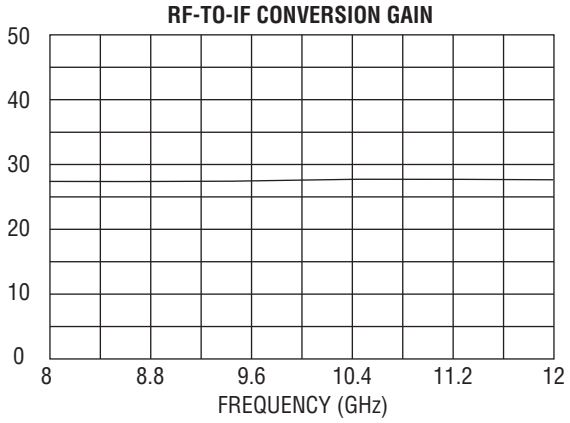
MITEQ's DA Series combines our double-balanced mixer with a low noise IF amplifier to provide an integrated converter module. This design is particularly well suited to broadband downconverter receiver applications such as ESM and ELINT systems or test equipment applications requiring flat RF to IF amplitude and phase characteristics (e.g., FMCW or narrow pulse systems).

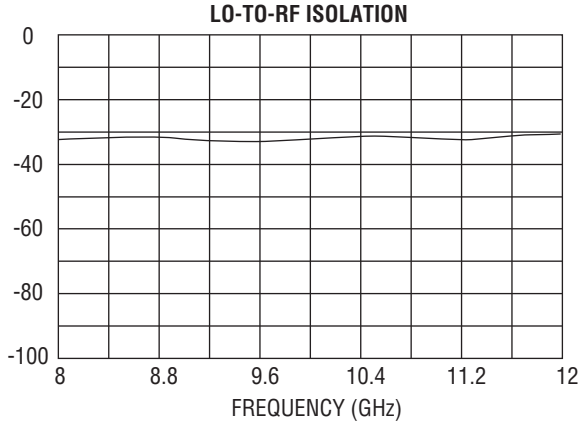
ELECTRICAL SPECIFICATIONS

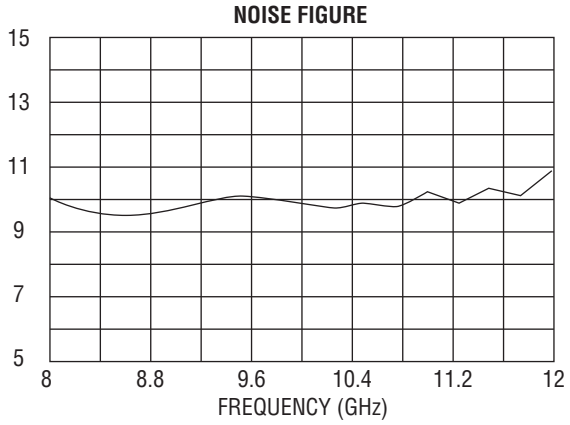
INPUT PARAMETERS	CONDITION	UNITS	MIN.	TYP.	MAX.
RF frequency range		GHz	8		12
RF VSWR	50 ohm reference	Ratio		2.5:1	
LO frequency range		GHz	8		12
LO power range		dBm	+10		+13
LO VSWR	50 ohm reference	Ratio		2.5:1	
DC bias	+12 volts	mA		50	
TRANSFER CHARACTERISTICS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
Conversion gain		dB	20	23	
Single-sideband noise figure		dB		9.5	
LO-to-RF isolation		dB	20		
LO-to-IF isolation		dB		20	
RF-to-IF isolation		dB		25	
Output power at 1 dB compression		dBm	+5		
OUTPUT PARAMETERS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
IF frequency range		MHz	10		250
IF VSWR	50 ohm reference	Ratio		2:1	

DA0812LR5 TYPICAL TEST DATA

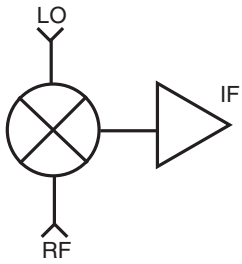
Test at 100 MHz IF with an LO of +10 dBm







BLOCK DIAGRAM

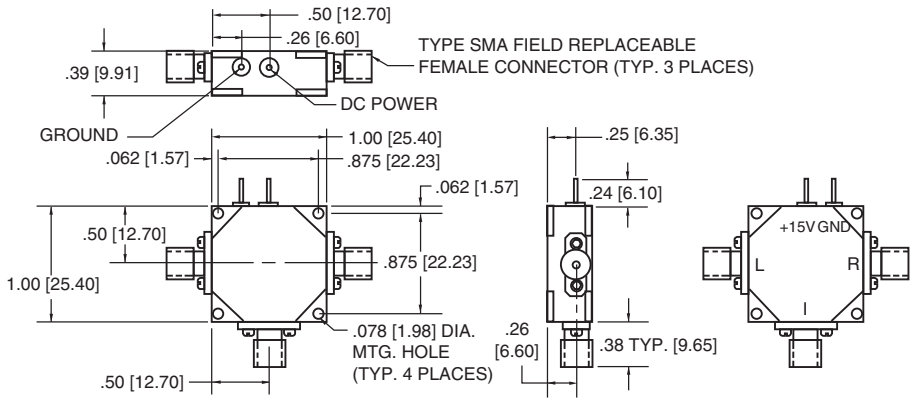


MAXIMUM RATINGS

Specification temperature ..... +25°C
Operating temperature ..... -54 to +85°C
Storage temperature ..... -65 to +125°C

NOTE: Test data supplied at 25°C; conversion gain, LO-to-RF isolation, noise figure and bias.

OUTLINE DRAWING



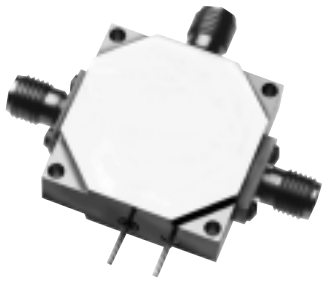
NOTE: All dimensions shown in brackets [ ] are in millimeters.

12 TO 18 GHz MIXER/IF AMPLIFIER

MODEL: DA1218LR5

FEATURES

- **Double-balanced mixer with integrated IF amplifier**
- **RF/LO coverage..... 12 to 18 GHz**
- **IF operation..... 10 to 250 MHz**
- **LO power range..... +10 to +13 dBm**
- **Packaging..... Hermetically sealed**



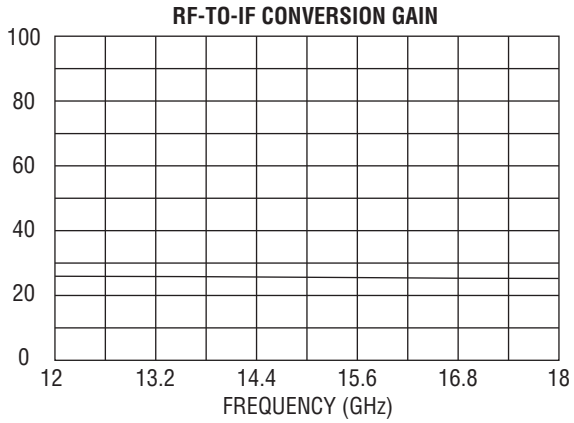
MITEQ's DA Series combines our double-balanced mixer with a low noise IF amplifier to provide an integrated converter module. This design is particularly well suited to broadband downconverter receiver applications such as ESM and ELINT systems or test equipment applications requiring flat RF to IF amplitude and phase characteristics (e.g., FMCW or narrow pulse systems).

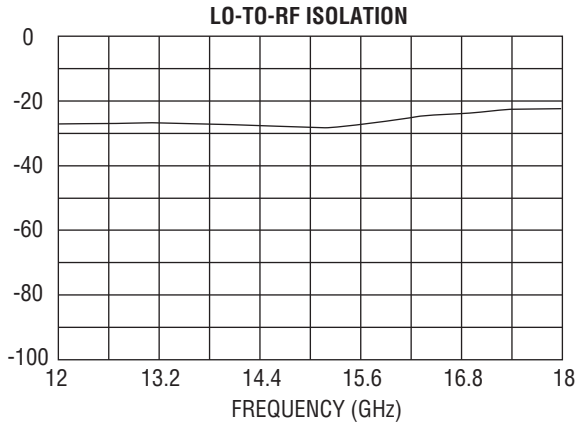
ELECTRICAL SPECIFICATIONS

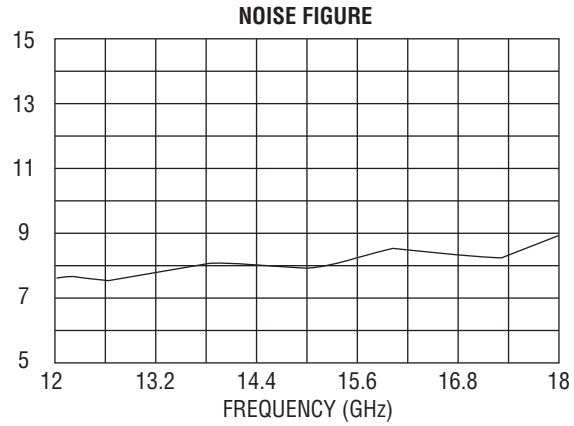
INPUT PARAMETERS	CONDITION	UNITS	MIN.	TYP.	MAX.
RF frequency range		GHz	12		18
RF VSWR	50 ohm reference	Ratio		2.5:1	
LO frequency range		GHz	12		18
LO power range		dBm	+10		+13
LO VSWR	50 ohm reference	Ratio		2.5:1	
DC bias	+12 volts	mA		50	
TRANSFER CHARACTERISTICS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
Conversion gain		dB	20	23	
Single-sideband noise figure		dB		9.5	
LO-to-RF isolation		dB	20		
LO-to-IF isolation		dB		20	
RF-to-IF isolation		dB		25	
Output power at 1 dB compression		dBm	+5		
OUTPUT PARAMETERS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
IF frequency range		MHz	10		250
IF VSWR	50 ohm reference	Ratio		2:1	

DA1218LR5 TYPICAL TEST DATA

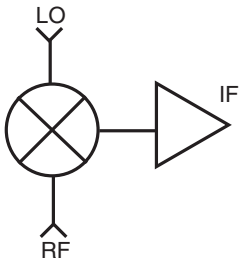
Test at 100 MHz IF with an LO of +10 dBm







BLOCK DIAGRAM

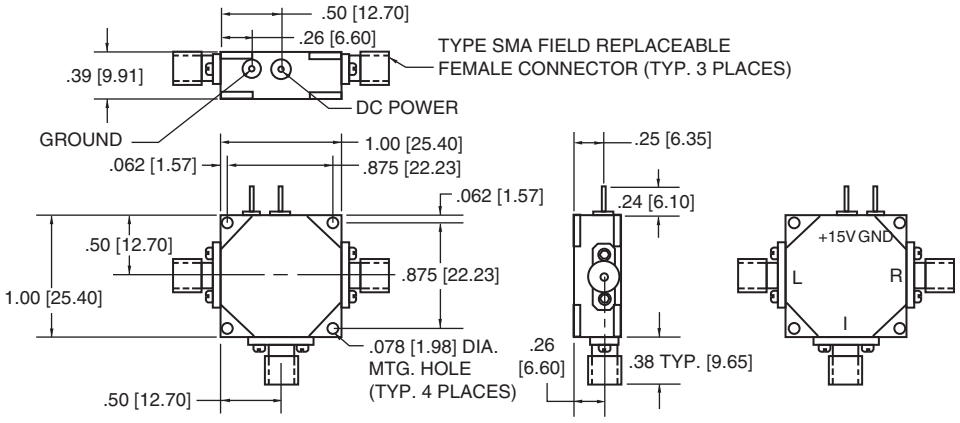


MAXIMUM RATINGS

Specification temperature ..... +25°C
Operating temperature ..... -54 to +85°C
Storage temperature ..... -65 to +125°C

NOTE: Test data supplied at 25°C; conversion gain, LO-to-RF isolation, noise figure and bias.

OUTLINE DRAWING



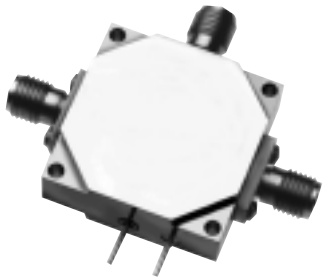
NOTE: All dimensions shown in brackets [ ] are in millimeters.

2 TO 18 GHz MIXER/IF AMPLIFIER

MODEL: DA0218LR5

FEATURES

- **Double-balanced mixer with integrated IF amplifier**
- **RF/LO coverage..... 2 to 18 GHz**
- **IF operation..... 10 to 250 MHz**
- **LO power range..... +10 to +13 dBm**
- **Packaging..... Hermetically sealed**



MITEQ's DA Series combines our double-balanced mixer with a low noise IF amplifier to provide an integrated converter module. This design is particularly well suited to broadband downconverter receiver applications such as ESM and ELINT systems or test equipment applications requiring flat RF to IF amplitude and phase characteristics (e.g., FMCW or narrow pulse systems).

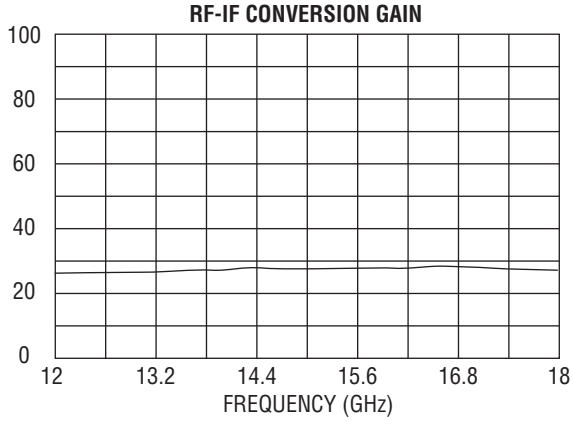
ELECTRICAL SPECIFICATIONS

INPUT PARAMETERS	CONDITION	UNITS	MIN.	TYP.	MAX.
RF frequency range		GHz	2		18
RF VSWR	50 ohm reference	Ratio		2.5:1	
LO frequency range		GHz	2		18
LO power range		dBm	+10		+13
LO VSWR	50 ohm reference	Ratio		2.5:1	
DC bias	+12 volts	mA		50	
TRANSFER CHARACTERISTICS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
Conversion gain		dB	20	23	
Single-sideband noise figure		dB		10	
LO-to-RF isolation		dB	20	9.5	
LO-to-IF isolation		dB		20	
RF-to-IF isolation		dB		25	
Output power at 1 dB compression		dBm	+5		
OUTPUT PARAMETERS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
IF frequency range		MHz	10		250
IF VSWR	50 ohm reference	Ratio		2:1	

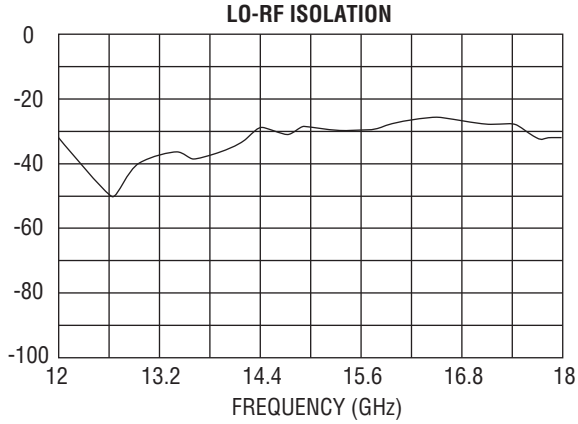
DA0218LR5 TYPICAL TEST DATA

Test at 100 MHz IF with an LO of +10 dBm

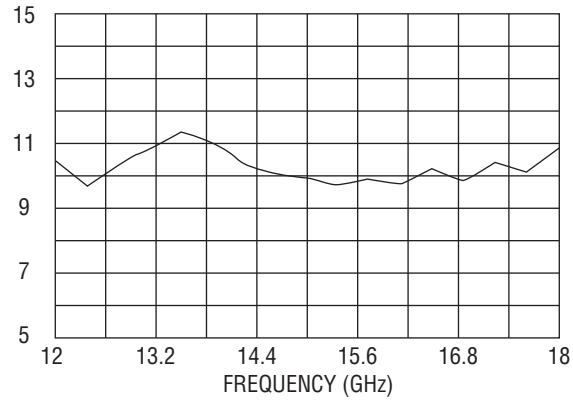
RF-IF CONVERSION GAIN



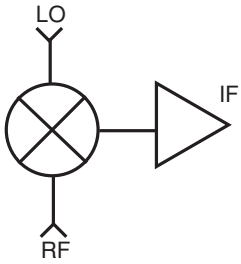
LO-RF ISOLATION



NOISE FIGURE



BLOCK DIAGRAM

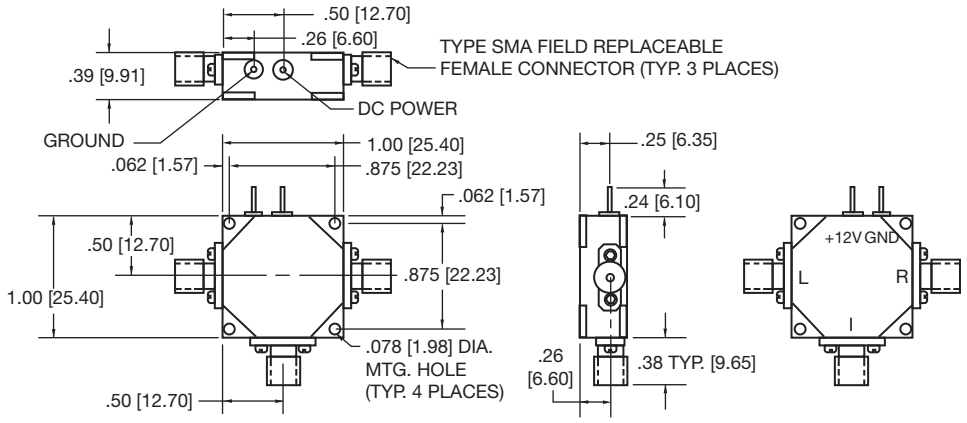


MAXIMUM RATINGS

Specifications taken at ..... +25°C
Operating temperature ..... -54 to +85°C
Storage temperature ..... -65 to +125°C

NOTE: Test data supplied at 25°C. Conversion gain, LO-RF isolation, noise figure, bias.

OUTLINE DRAWING



NOTE: All dimensions shown in brackets [ ] are in millimeters.

Revised: 09/21/11

1 TO 18 GHz DOUBLE-BALANCED MIXER

MODEL: DB0118LA2

FEATURES

- **RF/LO coverage..... 1 to 18 GHz**
- **IF operation..... DC to 500 MHz**
- **Ultra-broadband frequency coverage**
- **Operational as fundamental and third order harmonic mixer**



MITEQ's double-balanced DB Series provides the industry's broadest frequency span in a single device. The extended performance baluns and efficiently matched diodes provide four octaves of instantaneous frequency coverage. This unit is ideal for instrumentation requirements of converting broad frequency ranges to a common IF frequency. This device performs as an up- or downconverter.

ELECTRICAL SPECIFICATIONS

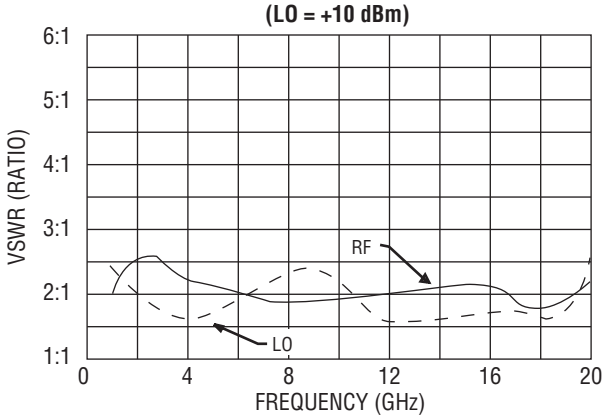
INPUT PARAMETERS	CONDITION	UNITS	MIN.	TYP.	MAX.
RF frequency range		GHz	1		18
RF VSWR (RF = -10 dBm, LO = +10 dBm)	1 to 18 GHz	Ratio		3:1	
LO frequency range		GHz	1		18
LO power range		dBm	+10		+13
LO VSWR (LO = +10 dBm)	1 to 18 GHz	Ratio		3:1	
TRANSFER CHARACTERISTICS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
Conversion loss (IF = 100 MHz, LO = +10 dBm)	1 to 18 GHz	dB		8.5	9.5
Single-sideband noise figure	1 to 18 GHz	dB		9	
LO-to-RF isolation	1 to 18 GHz	dB	23	30	
LO-to-IF isolation	1 to 18 GHz	dB		15	
RF-to-IF isolation	1 to 18 GHz	dB		15	
Input power at 1 dB compression		dBm		+5	
Input two-tone third-order intercept point		dBm		+15	
OUTPUT PARAMETERS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
IF frequency range	3 dB bandwidth	GHz	DC		0.5
IF VSWR (IF = -10 dBm, LO = +13 dBm)		Ratio		2.5:1	

100 Davids Drive, Hauppauge, NY 11788 • TEL: (631) 439-9220 • FAX: (631) 436-7430 • **www.miteq.com**

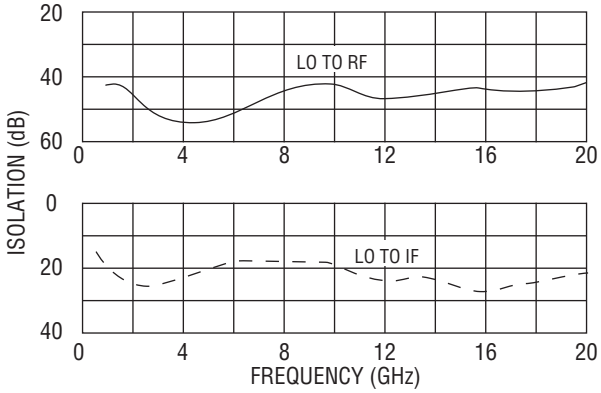
Revised: 11/15/12

DB0118LA2 TYPICAL TEST DATA

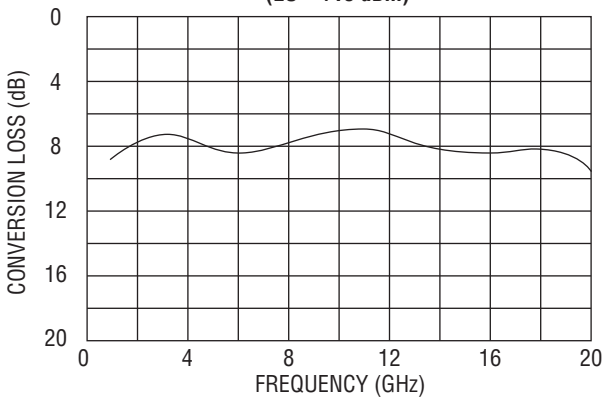
VSWR
(LO = +10 dBm)



ISOLATION



CONVERSION LOSS (IF = 100 MHz)
(LO = +10 dBm)



SINGLE-TONE (m) RF x (n) LO RELATIVE SPUR LEVEL (dBc)
TO REF (RF = -10 dBm, LO = +13 dBm)

RF HARMONIC (m)						
5	94	100	100	104	95
4	81	84	82	88	83
3	59	72	57	80	55
2	43	54	43	50	50
1	REF	30	10	37	18
	1	2	3	4	5

LO HARMONIC (n)

MAXIMUM RATINGS

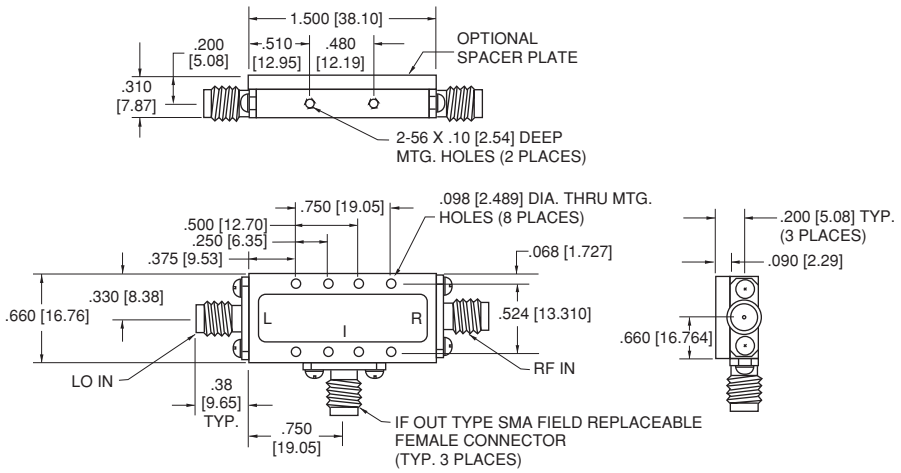
Specification temperature ..... +25°C
Operating temperature ..... -54 to +85°C
Storage temperature ..... -65 to +125°C

AVAILABLE OPTIONS

Medium/high dynamic range options
M (LO = +13 to +17 dBm), (IP^3 = +18 dBm typ.)
H (LO = +17 to +20 dBm), (IP^3 = +23 dBm typ.)
Conversion loss = 10 dB max.

NOTE: Test data supplied at 25°C; conversion loss and LO-to-RF isolation.

OUTLINE DRAWING



NOTE: All dimensions shown in brackets [ ] are in millimeters.

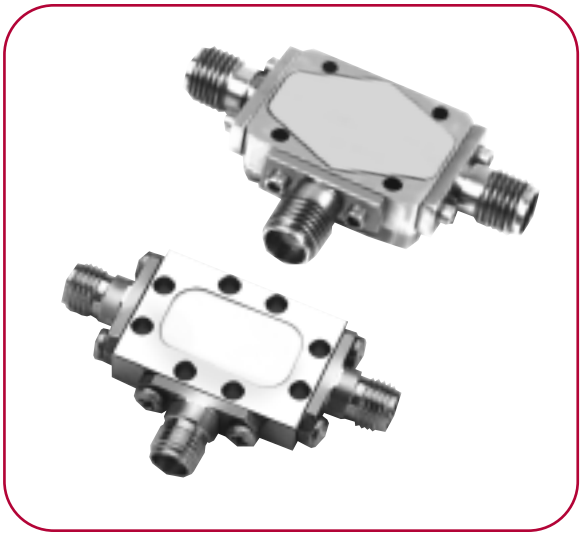
Revised: 11/15/12

2 TO 18 GHz DOUBLE-BALANCED MIXER

MODELS: DB0218LW2 AND DB0218LA1

FEATURES

- **RF/LO coverage ..... 2 to 18 GHz**
- **IF operation ..... DC to 750 MHz**
- **LO power range ..... +7 to +13 dBm**
- **Conversion loss..... 6.5 dB typical**
- **Packaging..... Hermetically sealed**



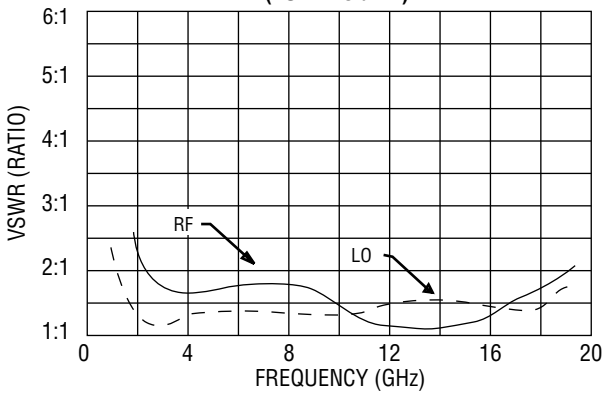
MITEQ's DB0218LW2 mixer is constructed of a balanced diode quad fed by microstrip RF and LO baluns and a DC-coupled IF structure. The construction, coupled with the hermetic packing, provides for high inherent reliability and performance over an extremely broad frequency range. This device performs as an up- or downconverter covering most EW bands, utility testing and breadboard applications.

ELECTRICAL SPECIFICATIONS

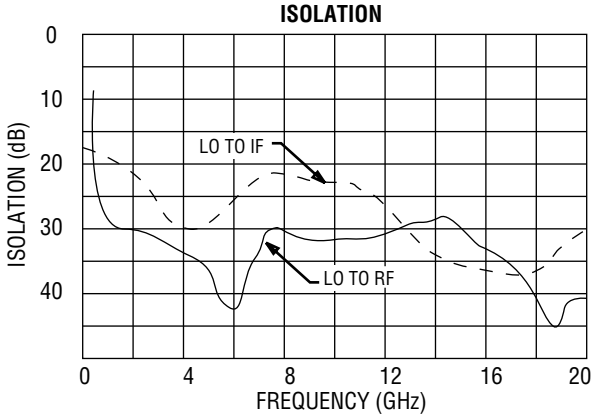
INPUT PARAMETERS	CONDITION	UNITS	MIN.	TYP.	MAX.
RF frequency range		GHz	2		18
RF VSWR (RF = -10 dBm, LO = +10 dBm)	2 to 18 GHz	Ratio		1.5:1	
LO frequency range		GHz	2		18
LO power range		dBm	+7	+10	+13
LO VSWR (LO = +10 dBm)	2 to 18 GHz	Ratio		1.5:1	
TRANSFER CHARACTERISTICS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
Conversion loss (IF = 100 MHz, LO = +10 dBm)	2 to 18 GHz	dB		6.5	8.5
Single-sideband noise figure	2 to 18 GHz	dB			9
LO-to-RF isolation	2 to 18 GHz	dB	22	30	
LO-to-IF isolation	2 to 18 GHz	dB		20	
RF-to-IF isolation	2 to 18 GHz	dB		30	
Input power at 1 dB compression	LO = +10 dBm	dBm		+5	
Input two-tone third-order intercept point	LO = +10 dBm	dBm		+15	
OUTPUT PARAMETERS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
IF frequency range	3 dB bandwidth	GHz	DC		0.75
IF VSWR (IF = -10 dBm, LO = +10 dBm)		Ratio		1.5:1	

DB0218LW2/A1 TYPICAL TEST DATA

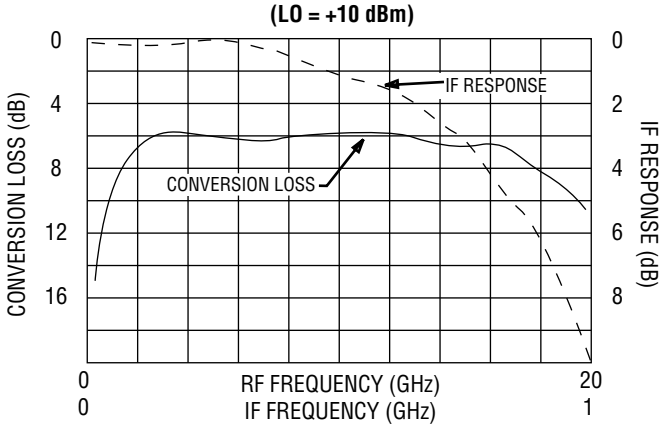
VSWR
(LO = +10 dBm)



ISOLATION



CONVERSION LOSS (IF = 100 MHz)
RELATIVE IF RESPONSE
(LO = +10 dBm)



SINGLE-TONE (m) RF x (n) LO RELATIVE SPUR LEVEL (dBc)
TO REF (RF = -10 dBm, LO = +10 dBm)

RF HARMONIC (m)	LO HARMONIC (n)				
5	> 85	> 85	> 85	> 85	> 85
4	75	75	80	85	80
3	45	60	55	65	55
2	43	49	50	50	60
1	REF	30	11	33	20
	1	2	3	4	5

MAXIMUM RATINGS

Specification temperature ..... +25°C
Operating temperature ..... -54 to +85°C
Storage temperature ..... -65 to +125°C

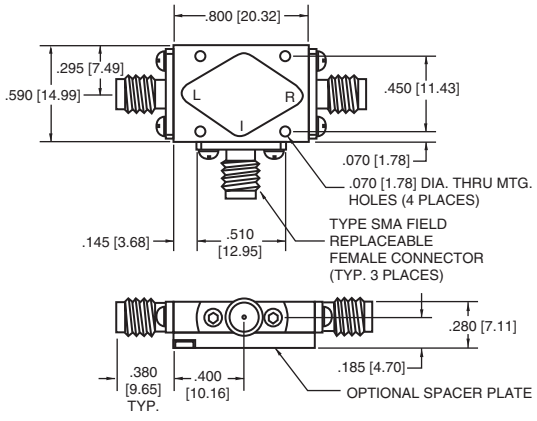
AVAILABLE OPTION

Medium/high dynamic range options
M (LO = +13 to +17 dBm), (IP^3 = +18 dBm typ.)
H (LO = +17 to +20 dBm), (IP^3 = +22 dBm typ.)
Conversion loss = 9.5 dB max.

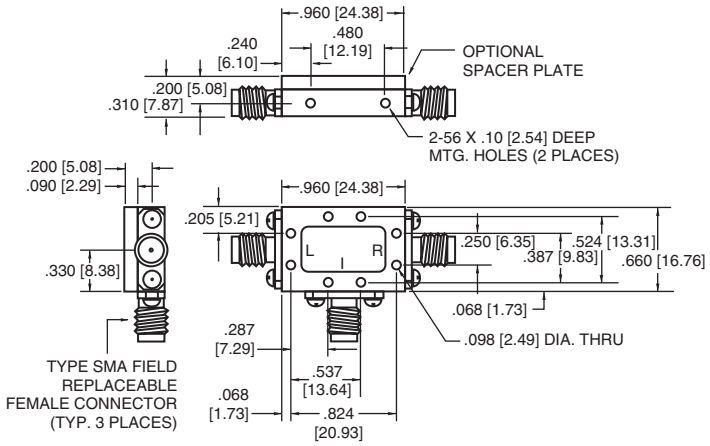
NOTE: Test data supplied at 25°C; conversion loss and LO-to-RF isolation.

OUTLINE DRAWINGS

W2 HOUSING



A1 HOUSING



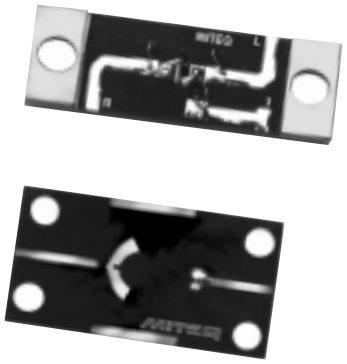
NOTE: All dimensions shown in brackets [ ] are in millimeters.

4 TO 18 GHz DROP-IN DOUBLE-BALANCED MIXER

MODELS: DB0418LE1, DB0418LW6, DB0418HE1 AND DB0418HW6

FEATURES

- **RF/LO coverage..... 4 to 18 GHz**
- **IF operation..... DC to 2 GHz**
- **LO power range**
  - **L..... +7 to +13 dBm**
  - **H ..... +17 to +23 dBm**
- **Conversion loss (midband RF) ..... 5 dB typical**
- **Lowest cost**



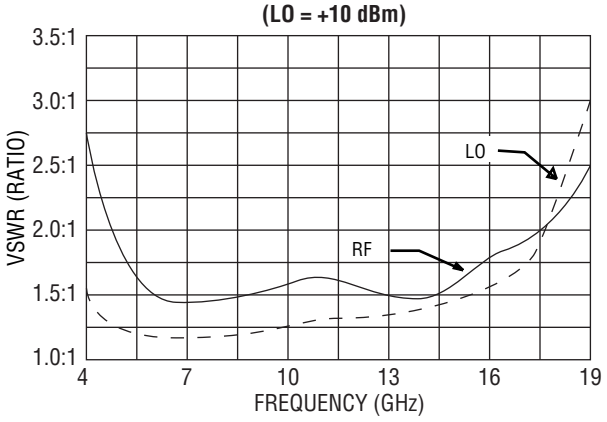
MITEQ's Special Mixer Products Department offers the industry's smallest microstrip-compatible mixer covering the specified frequency range from 4 to 18 GHz with performance operating to 20 GHz. The design achieves low RF input VSWR, while also maintaining a strong solderable interface connection on 0.030 inch wide 1 1/2 ounce copper lines. The deck to microstrip height of 0.039 inch (1 mm) is consistent with a very small ground ledge inductance for a superior microstrip interface. This device performs as an up- or downconverter.

ELECTRICAL SPECIFICATIONS

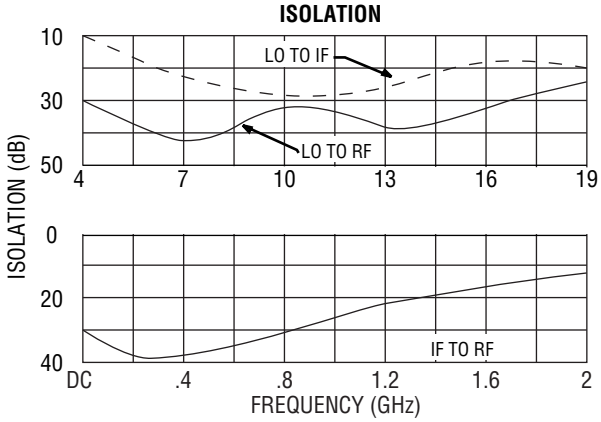
INPUT PARAMETERS	CONDITION	UNITS	MIN.	TYP.	MAX.
RF frequency range		GHz	4		18
RF VSWR L (RF = -10 dBm, LO = +10 dBm) H (RF = -10 dBm, LO = +20 dBm)	4 to 18 GHz 4 to 18 GHz	Ratio Ratio		1.5:1 1.5:1	
LO frequency range		GHz	4		18
LO power range L H		dBm dBm	+7 +17	+10 +20	+13 +23
LO VSWR	4 to 18 GHz	Ratio		1.25:1	
TRANSFER CHARACTERISTICS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
Conversion loss (IF = 1 GHz, LO = +10 dBm) (IF = 1 GHz, LO = +20 dBm)	RF = 4 to 18 GHz	dB dB		7 8	8.5 9.5
Single-sideband noise figure (LO = +10 dBm)	4 to 18 GHz	dB		7.5	9
LO-to-RF isolation	4 to 18 GHz	dB	22	30	
LO-to-IF isolation	4 to 18 GHz	dB		20	
RF-to-IF isolation	4 to 18 GHz	dB		25	
Input power at 1 dB compression L/H	LO = +10/+20 dBm	dBm	0/+10	+3/+13	
Input two-tone third-order intercept point L/H	LO = +10/+20 dBm	dBm	+10/+20	+13/+23	
OUTPUT PARAMETERS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
IF frequency range	3 dB bandwidth	GHz	DC		2
IF VSWR (IF = -10 dBm, LO = +10 dBm)		Ratio		2:1	

DB0418LE1 TYPICAL TEST DATA

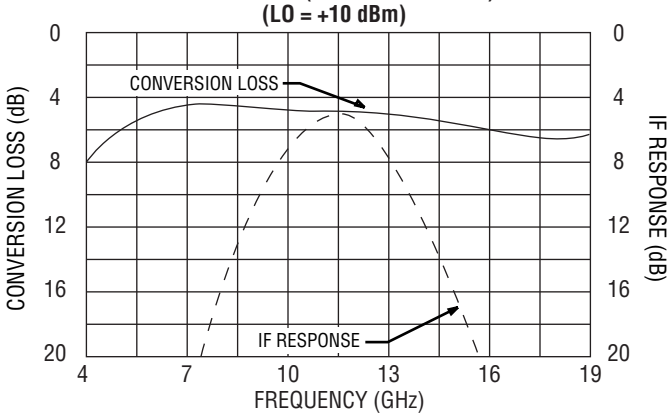
VSWR
(LO = +10 dBm)



ISOLATION



CONVERSION LOSS (IF = 100 MHz)
IF RESPONSE (11.5 GHz FIXED LO)
(LO = +10 dBm)



SINGLE-TONE (m) RF x (n) LO RELATIVE SPUR LEVEL (dBc)
(AVERAGE MIDBAND RF, LO, IF FREQUENCIES,
RF = -10 dBm, LO = +10 dBm (L), +20 dBm (H))

SPUR (m) RF x (n) LO	RF TEST FREQ. (GHz)	LO TEST FREQ. (GHz)	SPUR LEVEL (dBc) L	H
1 x 1	10.5	11.5	0	0
1 x 2	14	7.5	-26	-25
1 x 3	15	5.3	-15	-12
2 x 1	6.5	1.4	-45	-53
2 x 2	10.5	11	-53	-60
2 x 3	13	9	-48	-48
3 x 1	5.3	17	-50	-57
3 x 2	8.3	13	-50	-68
3 x 3	10	10.3	-50	-55

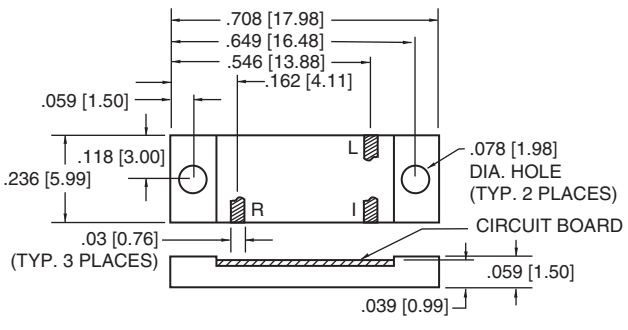
MAXIMUM RATINGS

Specification temperature ..... +25°C
Operating temperature ..... -54 to +85°C
Storage temperature ..... -65 to +125°C

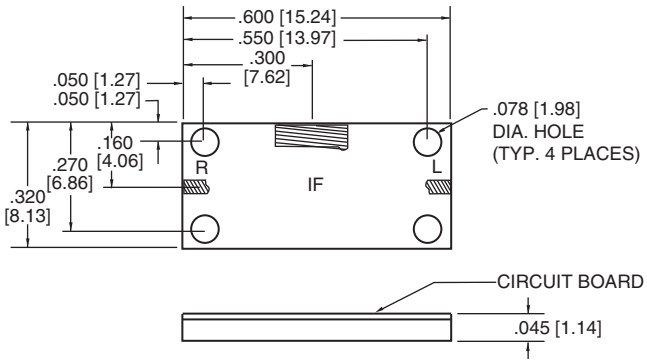
NOTE: Test data supplied at 25°C; conversion loss and LO-to-RF isolation.

OUTLINE DRAWINGS

E1 HOUSING



W6 HOUSING



NOTE: All dimensions shown in brackets [ ] are in millimeters.

4 TO 18 GHz DOUBLE-BALANCED MIXER

MODELS: DB0418LW1 AND DB0418HW1

FEATURES

- **RF/LO coverage..... 4 to 18 GHz**
- **IF operation..... DC to 2 GHz**
- **LO power range**
  - **L..... +7 to +13 dBm**
  - **M..... +13 to +16 dBm**
  - **H ..... +17 to +23 dBm**
- **Input 1 dB compression**
  - **L..... 0 dBm**
  - **M..... +5 dBm**
  - **H ..... +10 dBm**
- **Packaging ..... Hermetically sealed**



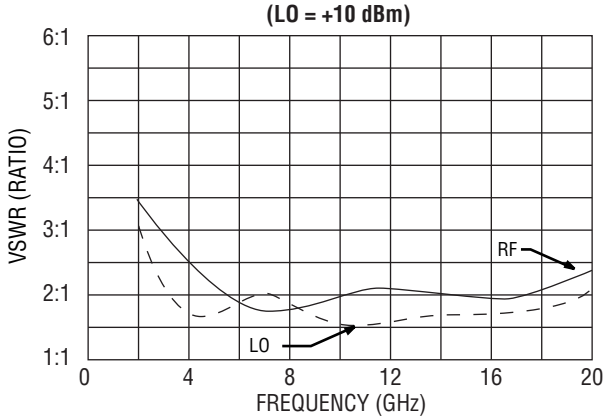
MITEQ's double-balanced DB0418 Series provides multioctave RF and LO coverage with high IF frequency operation. The miniature coaxial package is ideal for dense integration or drop-in interface. This device performs as an up- or downconverter.

ELECTRICAL SPECIFICATIONS

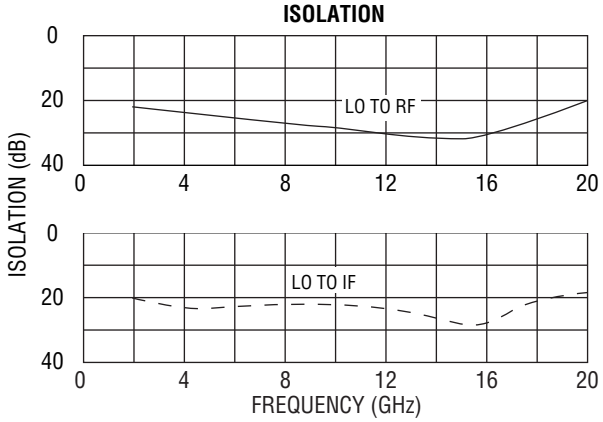
INPUT PARAMETERS	CONDITION	UNITS	MIN.	TYP.	MAX.
RF frequency range		GHz	4		18
RF VSWR (RF = -10 dBm, LO = +10 dBm)	4 to 18 GHz	Ratio		2.75:1	
LO frequency range		GHz	4		18
LO power range L H		dBm dBm	+7 +17	+10 +20	+13 +23
LO VSWR (LO = +10 dBm)	4 to 18 GHz	Ratio		2.75:1	
TRANSFER CHARACTERISTICS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
Conversion loss L (IF = 100 MHz, LO = +10 dBm) H (IF = 100 MHz, LO = +20 dBm)	4 to 18 GHz 4 to 18 GHz	dB dB		6.5 7.5	8.5 9.5
Single-sideband noise figure L H	4 to 18 GHz 4 to 18 GHz	dB dB			9.5 10.5
LO-to-RF isolation	4 to 18 GHz	dB	20	25	
LO-to-IF isolation	4 to 18 GHz	dB		20	
RF-to-IF isolation	4 to 18 GHz	dB		20	
Input two-tone third-order intercept point L H	LO = +10 dBm LO = +20 dBm	dBm dBm		+10 +20	
OUTPUT PARAMETERS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
IF frequency range	3 dB bandwidth	GHz	DC		2
IF VSWR (IF = -10 dBm, LO = +10 dBm)		Ratio		2.5:1	

DB0418LW1 TYPICAL TEST DATA

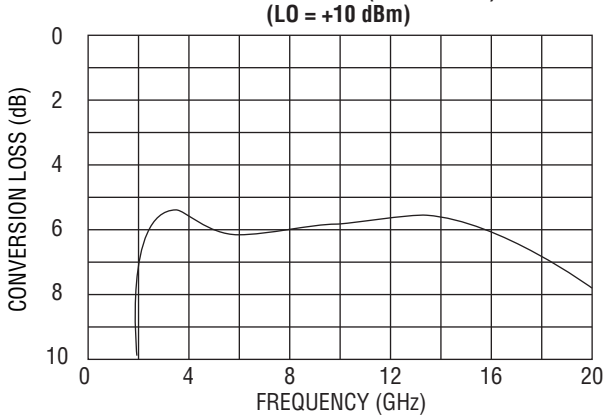
VSWR
(LO = +10 dBm)



ISOLATION



CONVERSION LOSS (IF= 100 MHz)
(LO = +10 dBm)



SINGLE-TONE (m) RF x (n) LO RELATIVE SPUR LEVEL (dBc)
(AVERAGE MIDBAND RF, LO, IF FREQUENCIES,
RF = -10 dBm, LO = +10 dBm)

SPUR (m) RF x (n) LO	RF TEST FREQ. (GHz)	LO TEST FREQ. (GHz)	SPUR LEVEL (dBc)
1 x 1	18	17.9	0
1 x 2	18	8.95	30
1 x 3	18	5.97	10
2 x 1	9	17.9	43
2 x 2	9	8.95	54
2 x 3	9	5.97	43
3 x 1	6	17.9	59
3 x 2	6	8.95	72
3 x 3	6	5.97	57

MAXIMUM RATINGS

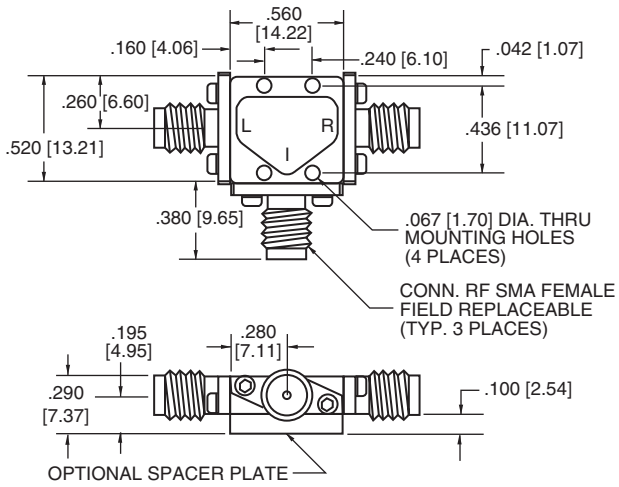
Specification temperature ..... +25°C
Operating temperature ..... -54 to +85°C
Storage temperature ..... -65 to +125°C

AVAILABLE OPTION

Medium dynamic range option
M (LO = +13 to +16 dBm), (IP^3 = +15 dBm typ.)
Conversion loss = 9.5 dB

NOTE: Test data supplied at 25°C; conversion loss and LO-to-RF isolation.

OUTLINE DRAWING



NOTE: All dimensions shown in brackets [ ] are in millimeters.

12 TO 18 GHz DOUBLE-BALANCED MIXER

MODELS: DB1218LW1 AND DB1218HW1

FEATURES

- **RF/LO coverage ..... 12 to 18 GHz**
- **IF operation ..... DC to 2 GHz**
- **LO power range**
  - **L ..... +7 to +13 dBm**
  - **M ..... +13 to +16 dBm**
  - **H ..... +17 to +23 dBm**
- **Input 1 dB compression**
  - **L ..... 0 dBm**
  - **M ..... +5 dBm**
  - **H ..... +10 dBm**
- **Packaging ..... Hermetically sealed**



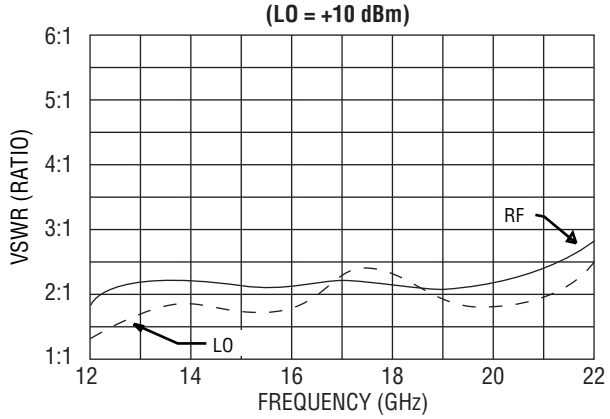
MITEQ's double-balanced DB1218 Series provides octave RF and LO coverage with high IF frequency operation. The miniature coaxial package is ideal for dense integration or drop-in interface. This device performs as an up- or downconverter.

ELECTRICAL SPECIFICATIONS

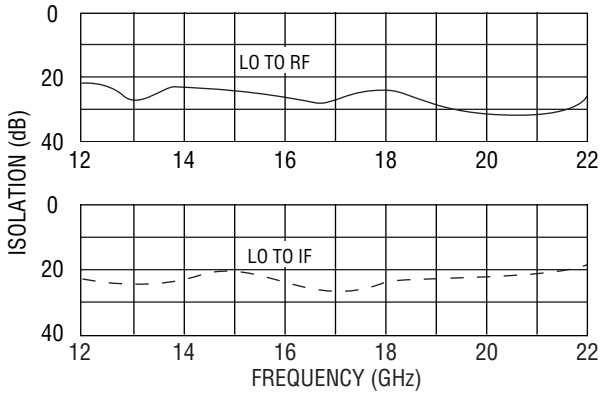
INPUT PARAMETERS	CONDITION	UNITS	MIN.	TYP.	MAX.
RF frequency range		GHz	12		18
RF VSWR (RF = -10 dBm, LO = +10 dBm)	12 to 18 GHz	Ratio		2.5:1	
LO frequency range		GHz	12		18
LO power range L H		dBm dBm	+7 +17	+10 +20	+13 +23
LO VSWR (LO = +10 dBm)	12 to 18 GHz	Ratio		2.5:1	
TRANSFER CHARACTERISTICS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
Conversion loss (IF = 100 MHz, LO = +10 dBm) L (IF = 100 MHz, LO = +20 dBm) H	12 to 18 GHz 12 to 18 GHz	dB dB		6.5 7.5	8.5 9.5
Single-sideband noise figure L H	12 to 18 GHz 12 to 18 GHz	dB dB			9.5 10.5
LO-to-RF isolation	12 to 18 GHz	dB	20	25	
LO-to-IF isolation	12 to 18 GHz	dB		20	
RF-to-IF isolation	12 to 18 GHz	dB		20	
Input two-tone third-order intercept point L H	LO = +10 dBm LO = +20 dBm	dBm dBm		+10 +20	
OUTPUT PARAMETERS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
IF frequency range	2 dB bandwidth	GHz	DC		2
IF VSWR (IF = -10 dBm, LO = +10 dBm)		Ratio		2.5:1	

DB1218LW1 TYPICAL TEST DATA

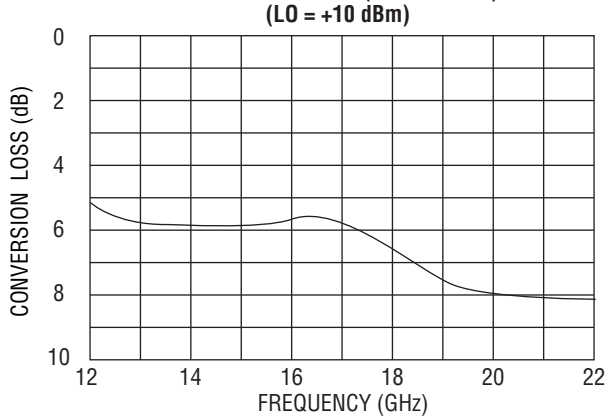
VSWR
(LO = +10 dBm)



ISOLATION



CONVERSION LOSS (IF = 100 MHz)
(LO = +10 dBm)



SINGLE-TONE (m) RF x (n) LO RELATIVE SPUR LEVEL (dBc)
(AVERAGE MIDBAND RF, LO, IF FREQUENCIES,
RF = -10 dBm, LO = +10 dBm)

SPUR (m) RF x (n) LO	RF TEST FREQ. (GHz)	LO TEST FREQ. (GHz)	SPUR LEVEL (dBc)
1 x 1	18	17.9	0
1 x 2	18	8.95	30
1 x 3	18	5.97	10
2 x 1	9	17.9	43
2 x 2	9	8.95	54
2 x 3	9	5.97	43
3 x 1	6	17.9	59
3 x 2	6	8.95	72
3 x 3	6	5.97	57

MAXIMUM RATINGS

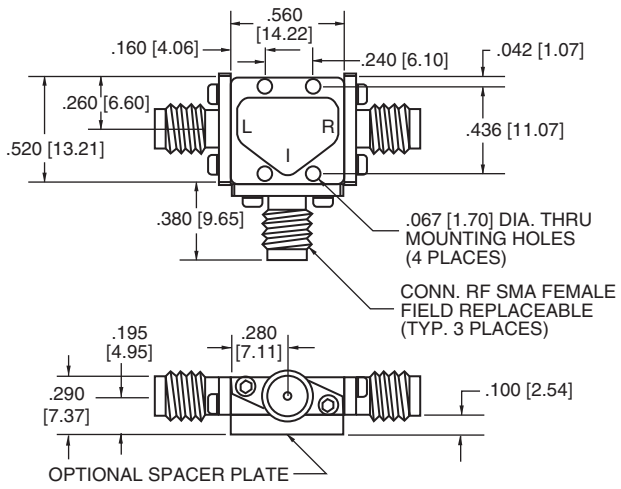
Specification temperature ..... +25°C
Operating temperature ..... -54 to +85°C
Storage temperature ..... -65 to +125°C

AVAILABLE OPTION

Medium dynamic range option
M (LO = +13 to +16 dBm), (IP^3 = +15 dBm typ.)
Conversion loss = 9.5 dB

NOTE: Test data supplied at 25°C; conversion loss and LO-to-RF isolation.

OUTLINE DRAWING



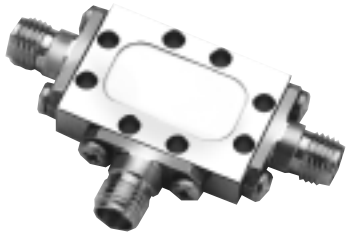
NOTE: All dimensions shown in brackets [ ] are in millimeters.

2 TO 26 GHz DOUBLE-BALANCED MIXER

MODEL: DB0226LA1

FEATURES

- **RF/LO coverage ..... 2 to 26 GHz**
- **IF operation ..... DC to 500 MHz**
- **LO power range ..... +7 to +13 dBm**
- **Conversion loss..... 6.5 dB typical**
- **Packaging..... Hermetically sealed**



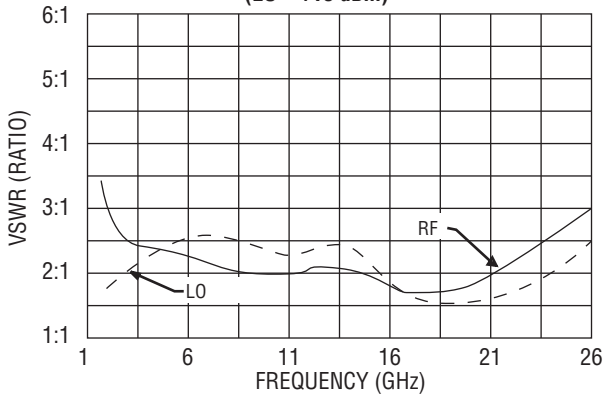
MITEQ's DB0226LA1 mixer is constructed of a balanced diode quad fed by microstrip RF and LO baluns and a DC-coupled IF structure. The construction, coupled with the hermetic packaging, provides for high inherent reliability and performance over an extremely broad frequency range. This device performs as an up- or downconverter covering most EW bands, utility testing and breadboard applications.

ELECTRICAL SPECIFICATIONS

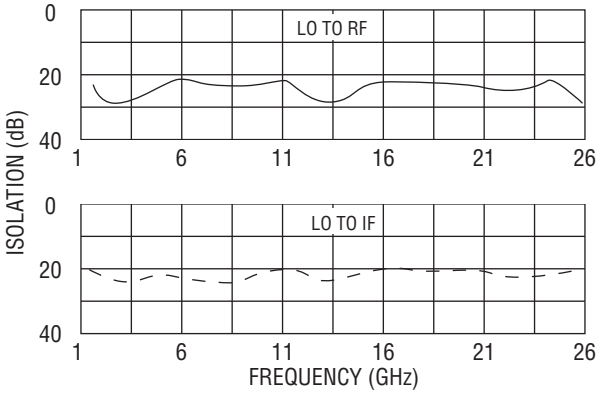
INPUT PARAMETERS	CONDITION	UNITS	MIN.	TYP.	MAX.
RF frequency range		GHz	2		26
RF VSWR (RF = -10 dBm, LO = +10 dBm)	2 to 18 GHz 2 to 26 GHz	Ratio Ratio		1.5:1 2.5:1	
LO frequency range		GHz	2		26
LO power range		dBm	+7	+10	+13
LO VSWR (LO = +10 dBm)	2 to 18 GHz 2 to 20 GHz	Ratio Ratio		1.5:1 2:1	
TRANSFER CHARACTERISTICS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
Conversion loss (IF = 100 MHz, LO = +10 dBm)	2 to 18 GHz 2 to 26 GHz	dB dB		6.5 9	 10
Single-sideband noise figure	2 to 26 GHz	dB			10
LO-to-RF isolation	2 to 26 GHz	dB	20	30	
LO-to-IF isolation	2 to 18 GHz	dB		20	
RF-to-IF isolation	2 to 18 GHz	dB		20	
Input power at 1 dB compression	LO = +10 dBm	dBm		+5	
Input two-tone third-order intercept point	LO = +10 dBm	dBm		+15	
OUTPUT PARAMETERS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
IF frequency range	3 dB bandwidth	GHz	DC		0.5
IF VSWR (IF = -10 dBm, LO = +10 dBm)		Ratio		1.5:1	

DB0226LA1 TYPICAL TEST DATA

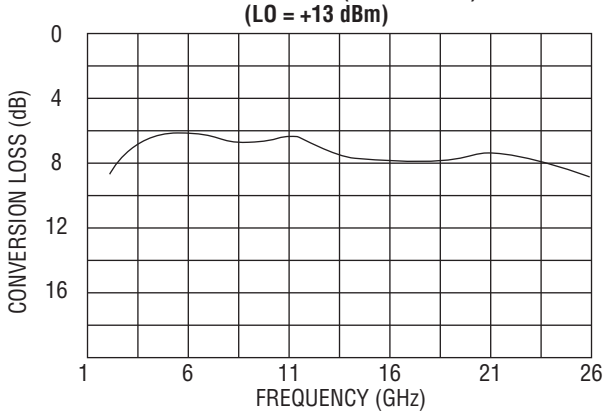
VSWR
(LO = +10 dBm)



ISOLATION



CONVERSION LOSS (IF = 100 MHz)
(LO = +13 dBm)



SINGLE-TONE (m) RF x (n) LO RELATIVE SPURL LEVEL (dBc)
TO REF (RF = -10 dBm, LO = +10 dBm)

RF HARMONIC (m)					
5	> 85	> 85	> 85	> 85	> 85
4	75	75	80	85	80
3	45	60	55	65	55
2	43	49	50	50	60
1	REF	30	11	33	20
	1	2	3	4	5

LO HARMONIC (n)

MAXIMUM RATINGS

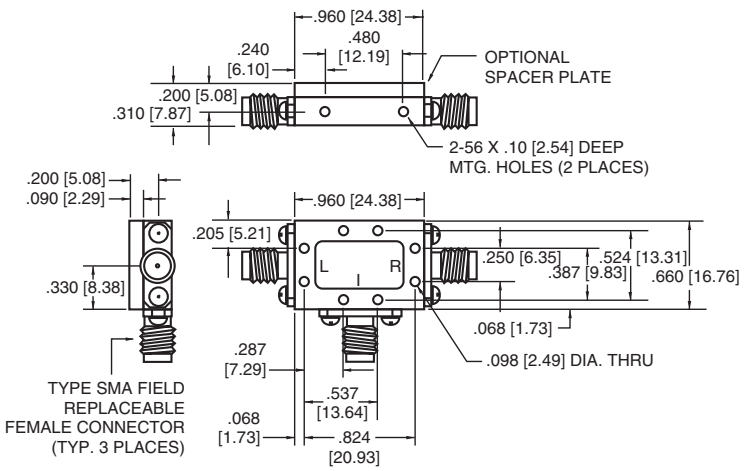
Specification temperature ..... +25°C
Operating temperature ..... -54 to +85°C
Storage temperature ..... -65 to +125°C

AVAILABLE OPTION

Medium/high dynamic range options
M (LO = +13 to +17 dBm), (IP^3 = +18 dBm typ.)
H (LO = +17 to +20 dBm), (IP^3 = +22 dBm typ.)
M, H (Conversion loss = 11 dB)

NOTE: Test data supplied at 25°C; conversion loss and LO-to-RF isolation.

OUTLINE DRAWING



NOTE: All dimensions shown in brackets [ ] are in millimeters.

4 TO 26 GHz DOUBLE-BALANCED MIXER

MODEL: DB0426LW1

FEATURES

- **RF/LO coverage ..... 4 to 26 GHz**
- **IF operation ..... DC to 2 GHz**
- **LO power range ..... +7 to +13 dBm**
- **Input 1 dB comp. ..... +5 dBm typical**
- **Packaging ..... Hermetically sealed**



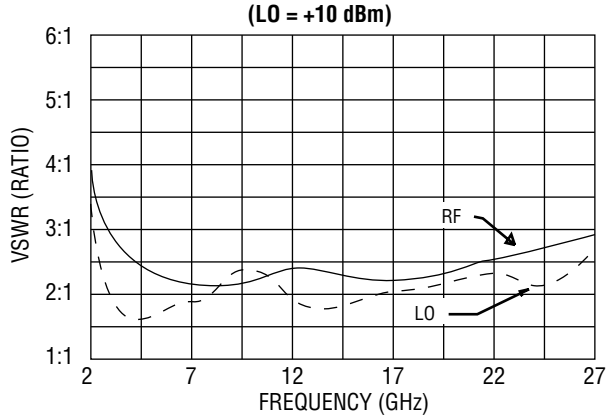
MITEQ's double-balanced DB0426 Series provides multioctave RF and LO coverage with high IF frequency operation. The miniature coaxial package is ideal for dense integration or drop-in interface. This device performs as an up- or downconverter.

ELECTRICAL SPECIFICATIONS

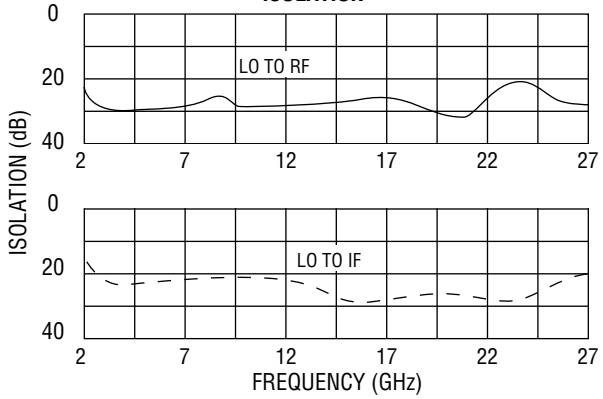
INPUT PARAMETERS	CONDITION	UNITS	MIN.	TYP.	MAX.
RF frequency range		GHz	4		26
RF VSWR (RF = -10 dBm, LO = +10 dBm)	4 to 26 GHz	Ratio		2.75:1	
LO frequency range		GHz	4		26
LO power range		dBm	+7	+10	+13
LO VSWR (LO = +10 dBm)	4 to 26 GHz	Ratio		2.5:1	
TRANSFER CHARACTERISTICS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
Conversion loss (IF = 100 MHz, LO = +10 dBm)	4 to 26 GHz	dB		7.5	9.5
Single-sideband noise figure	4 to 26 GHz	dB			10.5
LO-to-RF isolation	4 to 26 GHz	dB	20	25	
LO-to-IF isolation	4 to 26 GHz	dB		20	
RF-to-IF isolation	4 to 26 GHz	dB		20	
Input power at 1 dB compression	LO = +10 dBm	dBm		+5	
Input two-tone third-order intercept point	LO = +10 dBm	dBm		+15	
OUTPUT PARAMETERS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
IF frequency range	3 dB bandwidth	GHz	DC		2
IF VSWR (IF = -10 dBm, LO = +10 dBm)		Ratio		2.5:1	

DB0426LW1 TYPICAL TEST DATA

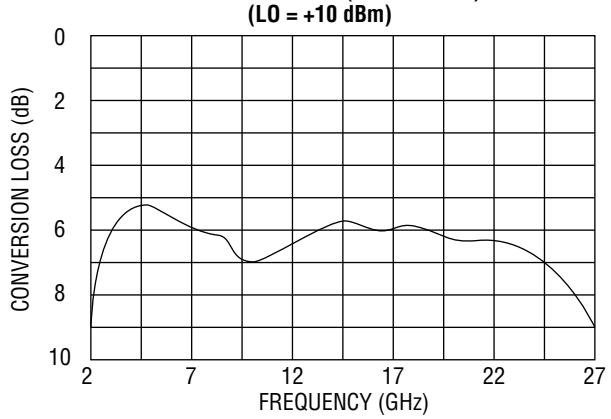
VSWR
(LO = +10 dBm)



ISOLATION



CONVERSION LOSS (IF = 100 MHz)
(LO = +10 dBm)



SINGLE-TONE (m) RF x (n) LO RELATIVE SPUR LEVEL (dBc)
(AVERAGE MIDBAND RF, LO, IF FREQUENCIES,
RF = -10 dBm, LO = +10 dBm)

SPUR (m) RF x (n) LO	RF TEST FREQ. (GHz)	LO TEST FREQ. (GHz)	SPUR LEVEL (dBc)
1 x 1	18	17.9	0
1 x 2	18	8.95	30
1 x 3	18	5.97	10
2 x 1	9	17.9	43
2 x 2	9	8.95	54
2 x 3	9	5.97	43
3 x 1	6	17.9	59
3 x 2	6	8.95	72
3 x 3	6	5.97	57

MAXIMUM RATINGS

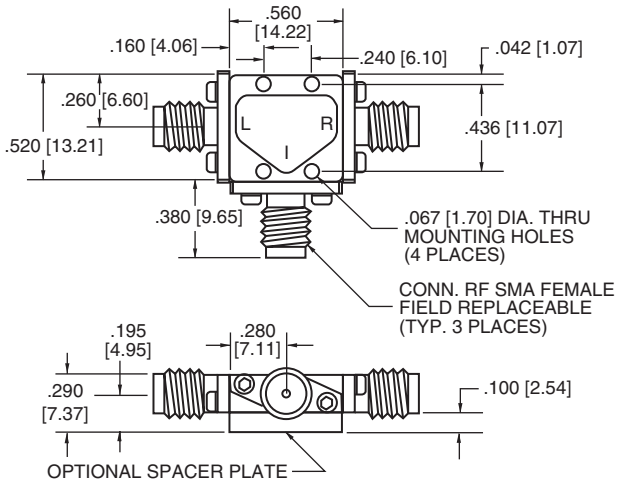
Specification temperature ..... +25°C
Operating temperature ..... -54 to +85°C
Storage temperature ..... -65 to +125°C

AVAILABLE OPTION

Medium/high dynamic range options
M (LO = +13 to +17 dBm), (IP^3 = +18 dBm typ.)
H (LO = +17 to +20 dBm), (IP^3 = +22 dBm typ.)
M, H (Conversion loss = 10.5 dB)

NOTE: Test data supplied at 25°C; conversion loss and LO-to-RF isolation.

OUTLINE DRAWING



NOTE: All dimensions shown in brackets [ ] are in millimeters.

18 TO 26 GHz DOUBLE-BALANCED MIXER

MODEL: DB1826LW1

FEATURES

- **RF/LO coverage ..... 18 to 26 GHz**
- **IF operation ..... DC to 2 GHz**
- **LO power range ..... +7 to +13 dBm**
- **Input 1 dB comp. ..... +5 dBm typical**
- **Packaging ..... Hermetically sealed**



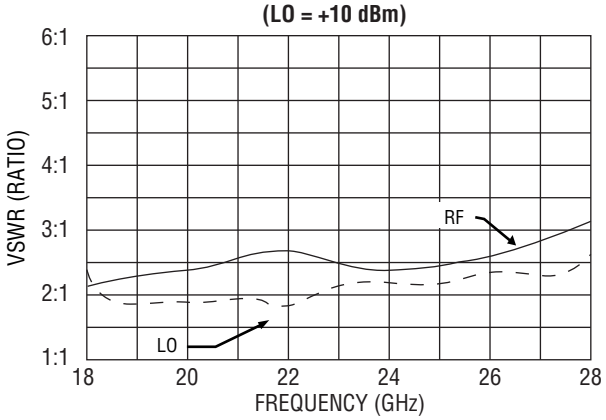
MITEQ's double-balanced DB1826LW1 Series provides octave RF and LO coverage with high IF frequency operation. The miniature coaxial package is ideal for dense integration or drop-in interface. This device performs as an up- or downconverter.

ELECTRICAL SPECIFICATIONS

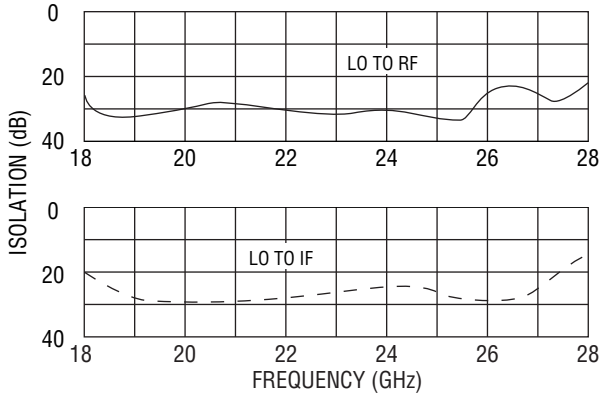
INPUT PARAMETERS	CONDITION	UNITS	MIN.	TYP.	MAX.
RF frequency range		GHz	18		26
RF VSWR (RF = -10 dBm, LO = +10 dBm)	18 to 26 GHz	Ratio		2.75:1	
LO frequency range		GHz	18		26
LO power range		dBm	+7	+10	+13
LO VSWR (LO = +10 dBm)	18 to 26 GHz	Ratio		2.5:1	
TRANSFER CHARACTERISTICS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
Conversion loss (IF = 100 MHz, LO = +10 dBm)	18 to 26 GHz	dB		7.5	9.5
Single-sideband noise figure	18 to 26 GHz	dB			10.5
LO-to-RF isolation	18 to 26 GHz	dB	20	25	
LO-to-IF isolation	18 to 26 GHz	dB		20	
RF-to-IF isolation	18 to 26 GHz	dB		20	
Input power at 1 dB compression	LO = +10 dBm	dBm		+5	
Input two-tone third-order intercept point	LO = +10 dBm	dBm		+15	
OUTPUT PARAMETERS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
IF frequency range	2 dB bandwidth	GHz	DC		2
IF VSWR (IF = -10 dBm, LO = +10 dBm)		Ratio		2.5:1	

DB1826LW1 TYPICAL TEST DATA

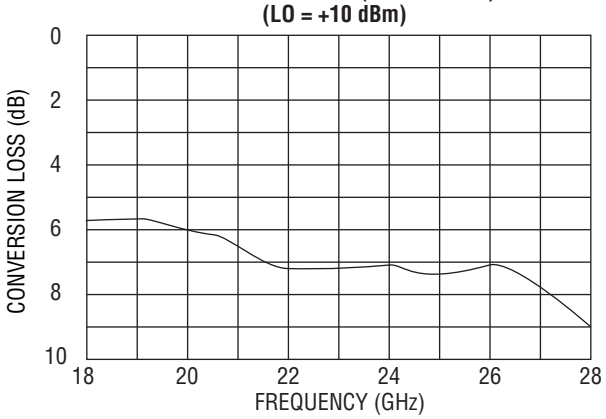
VSWR
(LO = +10 dBm)



ISOLATION



CONVERSION LOSS (IF = 100 MHz)
(LO = +10 dBm)



SINGLE-TONE (m) RF x (n) LO RELATIVE SPUR LEVEL (dBc)
(AVERAGE MIDBAND RF, LO, IF FREQUENCIES,
RF = -10 dBm, LO = +10 dBm)

SPUR (m) RF x (n) LO	RF TEST FREQ. (GHz)	LO TEST FREQ. (GHz)	SPUR LEVEL (dBc)
1 x 1	18	17.9	0
1 x 2	18	8.95	30
1 x 3	18	5.97	10
2 x 1	9	17.9	43
2 x 2	9	8.95	54
2 x 3	9	5.97	43
3 x 1	6	17.9	59
3 x 2	6	8.95	72
3 x 3	6	5.97	57

MAXIMUM RATINGS

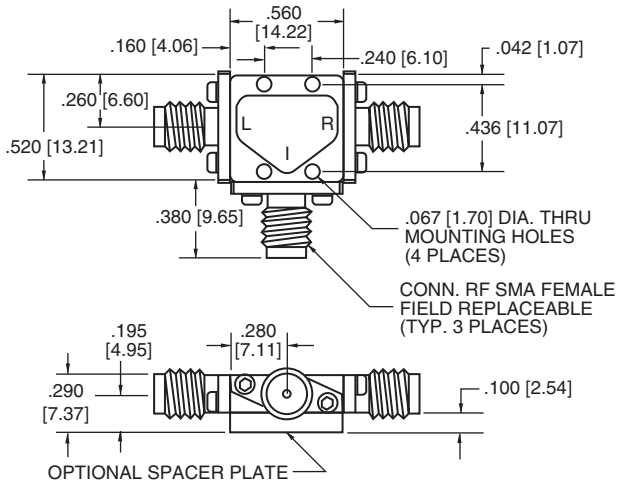
Specification temperature ..... +25°C
Operating temperature ..... -54 to +85°C
Storage temperature ..... -65 to +125°C

AVAILABLE OPTION

Medium/high dynamic range options
M (LO = +13 to +17 dBm), (IP^3 = +18 dBm typ.)
H (LO = +17 to +20 dBm), (IP^3 = +22 dBm typ.)
M, H (Conversion loss = 10.5 dB)

NOTE: Test data supplied at 25°C; conversion loss and LO-to-RF isolation.

OUTLINE DRAWING



NOTE: All dimensions shown in brackets [ ] are in millimeters.

1 TO 30 GHz DOUBLE-BALANCED MIXER

MODEL: DB0130LA2

FEATURES

- **RF/LO coverage ..... 1 to 30 GHz**
- **IF operation ..... DC to 500 MHz**
- **Conversion loss..... 8.5 dB typical**
- **Ultra-broadband frequency coverage**
- **Operational as fundamental and third order harmonic mixer**



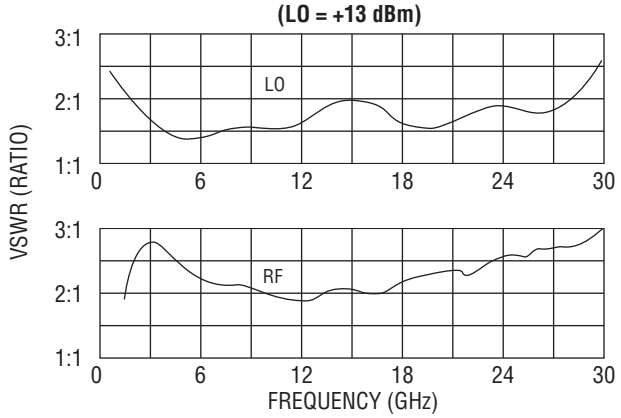
MITEQ's double-balanced DB0130LA2 provides the industry's broadest frequency span in a single device. The extended performance baluns and efficiently matched diodes provide five octaves of instantaneous frequency coverage. This unit is ideal for instrumentation requirements of converting broad frequency ranges to a common IF frequency. This device performs as an up- or downconverter.

ELECTRICAL SPECIFICATIONS

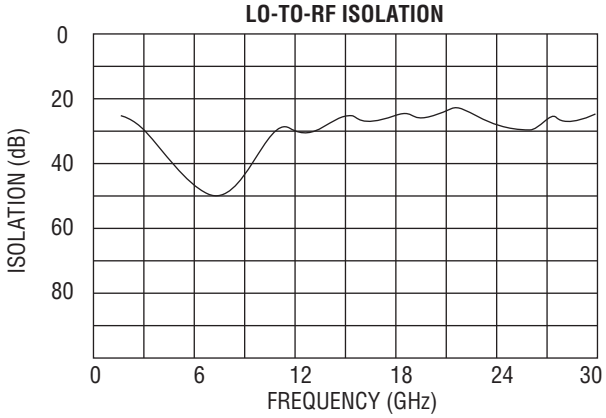
INPUT PARAMETERS	CONDITION	UNITS	MIN.	TYP.	MAX.
RF frequency range		GHz	1		30
RF VSWR (RF = -10 dBm, LO = +13 dBm)	1 to 30 GHz	Ratio		3:1	
LO frequency range		GHz	1		30
LO power range		dBm	+10		+13
LO VSWR (LO = +13 dBm)	1 to 30 GHz	Ratio		3:1	
TRANSFER CHARACTERISTICS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
Conversion loss (IF = 100 MHz, LO = +13 dBm)	1 to 30 GHz	dB		8.5	9.5
Single-sideband noise figure	1 to 30 GHz	dB		9	
LO-to-RF isolation	1 to 30 GHz	dB	18	30	
LO-to-IF isolation	1 to 30 GHz	dB		15	
RF-to-IF isolation	1 to 30 GHz	dB		15	
Input power at 1 dB compression		dBm		+5	
Input two-tone third-order intercept point		dBm		+15	
OUTPUT PARAMETERS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
IF frequency range	3 dB bandwidth	GHz	DC		0.5
IF VSWR (IF = -10 dBm, LO = +13 dBm)		Ratio		2.5:1	

DB0130LA2 TYPICAL TEST DATA

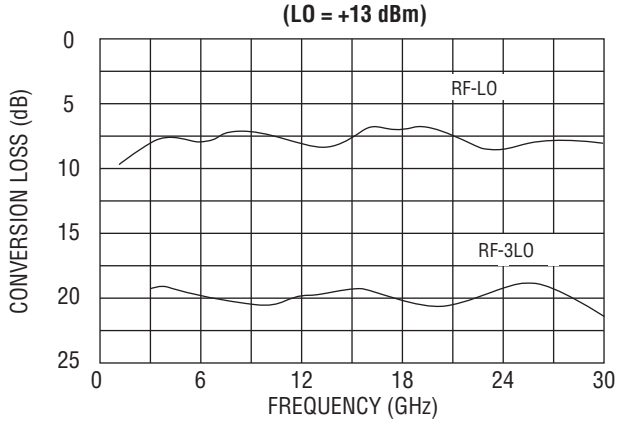
VSWR
(LO = +13 dBm)



LO-TO-RF ISOLATION



FUNDAMENTAL AND THIRD
HARMONIC CONVERSION LOSS
(LO = +13 dBm)



SINGLE-TONE (m) RF x (n) LO RELATIVE SPUR LEVEL (dBc)
TO REF (RF = -10 dBm, LO = +13 dBm)

RF HARMONIC (m)						
5	94	100	100	104	95
4	81	84	82	88	83
3	59	72	57	80	55
2	43	54	43	50	50
1	REF	30	10	37	18
	1	2	3	4	5

LO HARMONIC (n)

MAXIMUM RATINGS

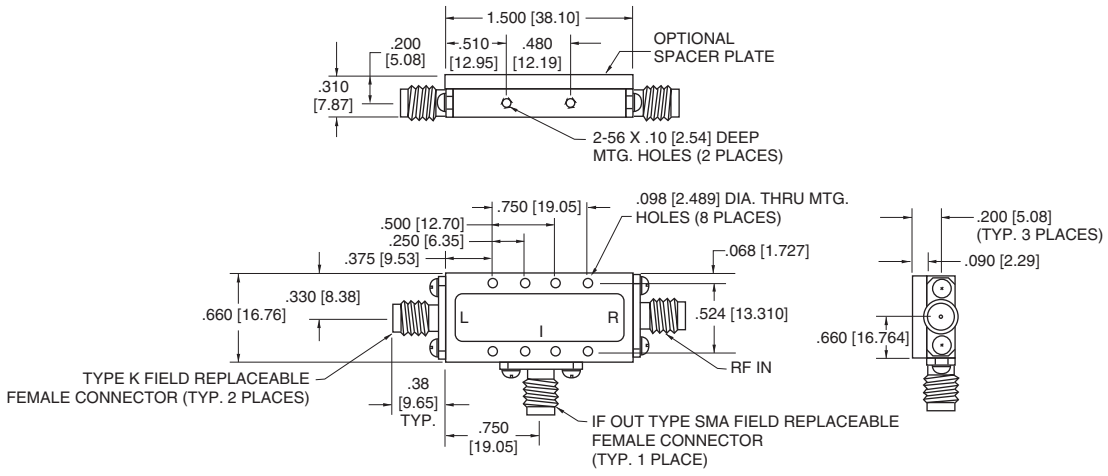
Specification temperature ..... +25°C
Operating temperature ..... -54 to +85°C
Storage temperature ..... -65 to +125°C

AVAILABLE OPTION

Medium/high dynamic range options
M (LO = +13 to +17 dBm), (IP^3 = +18 dBm typ.)
H (LO = +17 to +20 dBm), (IP^3 = +22 dBm typ.)
M, H (Conversion loss = 10.5 dB)

NOTE: Test data supplied at 25°C; conversion loss and LO-to-RF isolation.

OUTLINE DRAWING



NOTE: All dimensions shown in brackets [ ] are in millimeters.

4 TO 40 GHz DOUBLE-BALANCED MIXER

MODELS: DB0440LW1 AND DB0440HW1

FEATURES

- **RF/LO coverage ..... 4 to 40 GHz**
- **IF operation ..... DC to 2 GHz**
- **LO power range ..... +10 to +15 dBm**
- **Input 1 dB comp. ..... +5 dBm typical**
- **Packaging ..... Hermetically sealed**



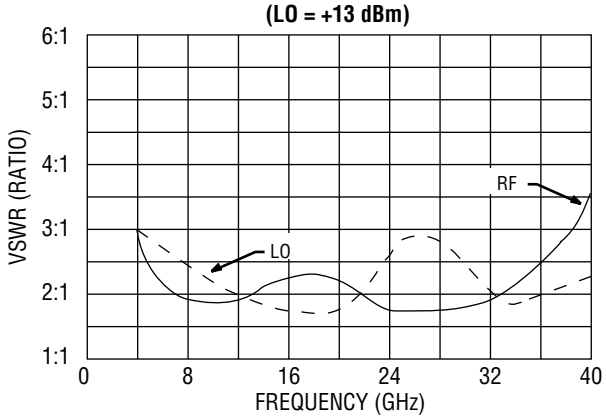
The DB0440 Series provides a broad frequency span in a single device. Furthermore, from 12 to 40 GHz this mixer can be used in the third harmonic mode with a lower frequency 4 to 13 GHz local oscillator. The conversion loss is typically 10 dB higher in this mode. This device performs as an up- or downconverter.

ELECTRICAL SPECIFICATIONS

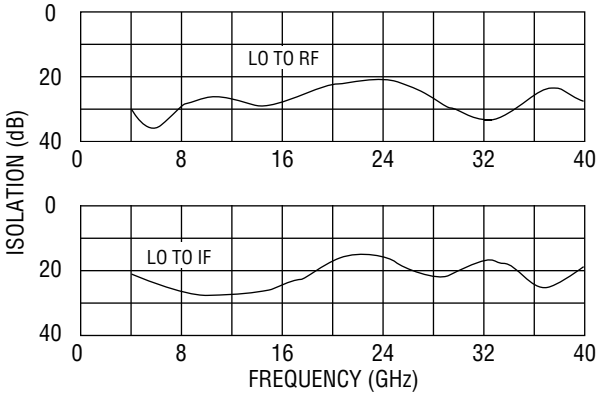
INPUT PARAMETERS	CONDITION	UNITS	MIN.	TYP.	MAX.
RF frequency range		GHz	4		40
RF VSWR (RF = -10 dBm, LO = +13 dBm)	6 to 30 GHz 4 to 40 GHz	Ratio Ratio		2.5:1 3:1	
LO frequency range		GHz	4		40
LO power range L H		dBm dBm	+10 +17	+13 +18.5	+15 +20
LO VSWR (LO = +13 dBm)	6 to 30 GHz 4 to 40 GHz	Ratio Ratio		2.5:1 3:1	
TRANSFER CHARACTERISTICS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
Conversion loss (IF = 100 MHz, LO = +13 dBm)	4 to 40 GHz	dB		9	10
Single-sideband noise figure	5 to 30 GHz	dB 4 to 40 GHz	 dB	8.5	 9.5
LO-to-RF isolation	4 to 40 GHz	dB	20	25	
LO-to-IF isolation	4 to 40 GHz	dB		20	
RF-to-IF isolation	4 to 40 GHz	dB		30	
Input power at 1 dB compression	LO = +13 dBm	dBm		+5	
Input two-tone third-order intercept point	LO = +13 dBm	dBm		+15	
OUTPUT PARAMETERS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
IF frequency range	3 dB bandwidth	GHz	DC		2
IF VSWR (IF = -10 dBm, LO = +13 dBm)		Ratio		2.5:1	

DB0440LW1 TYPICAL TEST DATA

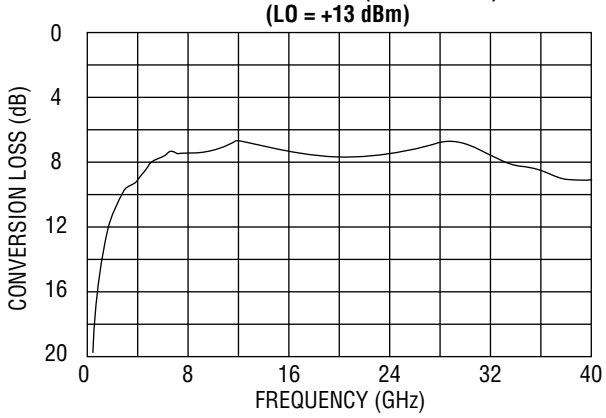
VSWR
(LO = +13 dBm)



ISOLATION



CONVERSION LOSS (IF = 100 MHz)
(LO = +13 dBm)



SINGLE-TONE (m) RF x (n) LO RELATIVE SPUR LEVEL (dBc)
(AVERAGE MIDBAND RF, LO FREQUENCIES,
RF = -10 dBm, LO = +13 dBm)

SPUR (m) RF x (n) LO	RF TEST FREQ. (GHz)	LO TEST FREQ. (GHz)	SPUR LEVEL (dBc)
1 x 1	20	20.1	REF
1 x 2	20	10.05	30
1 x 3	20	6.7	10
2 x 1	10	20.1	42
2 x 2	10	10.05	53
2 x 3	10	6.7	41
3 x 1	6.67	20.1	58
3 x 2	6.67	10.05	70
3 x 3	6.67	6.7	56

MAXIMUM RATINGS

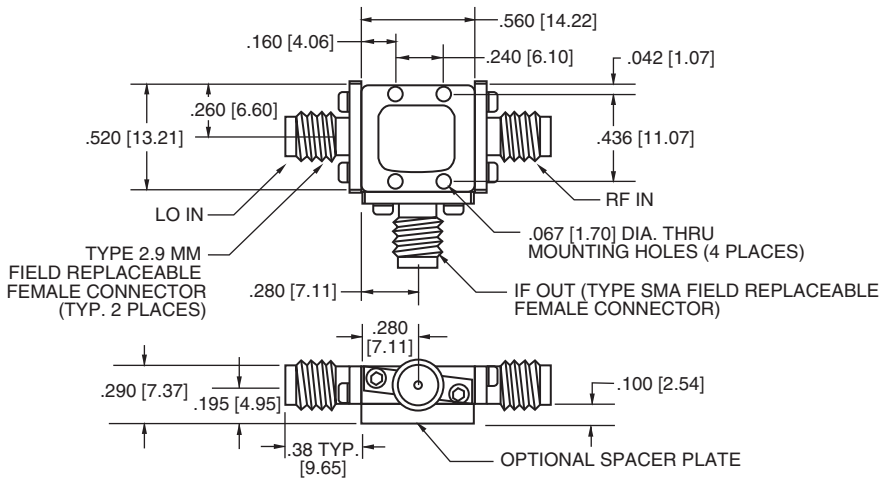
Specification temperature ..... +25°C
Operating temperature ..... -54 to +85°C
Storage temperature ..... -65 to +125°C

AVAILABLE OPTION

High dynamic range option
H (LO = +20 dBm), (IP^3 = +20 dBm typ.)
Conversion loss = 11 dB
For V connectors, use P/N DB0440LW1V.

NOTE: Test data supplied at 25°C; conversion loss and LO-to-RF isolation.

OUTLINE DRAWING



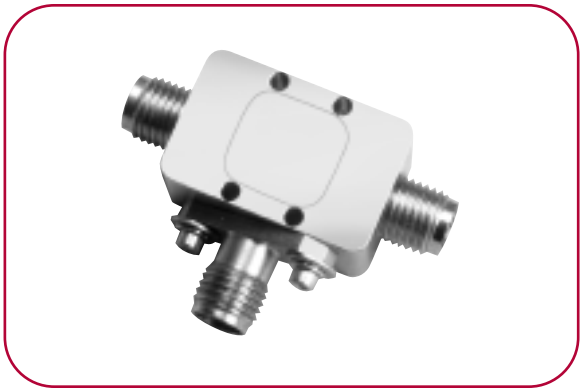
NOTE: All dimensions shown in brackets [ ] are in millimeters.

2 TO 50 GHz DOUBLE-BALANCED MIXER

MODEL: DB0250LW1V

FEATURES

- **RF/LO coverage ..... 2 to 50 GHz**
- **IF operation ..... DC to 2 GHz**
- **LO power range ..... +13 to +17 dBm**
- **Input 1 dB comp. ..... +5 dBm typical**
- **Packaging ..... Hermetically Sealed**



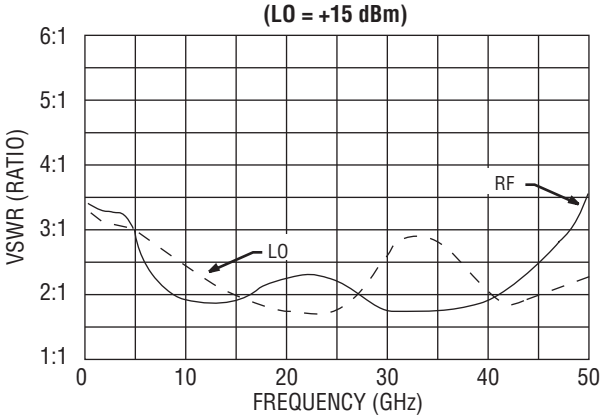
The DB0250LW1V provides a broad frequency span in a single device. Furthermore, from 12 to 50 GHz this mixer can be used in the third harmonic mode with a lower frequency 4 to 16 GHz local oscillator. The conversion loss is typically 10 dB higher in this mode.

ELECTRICAL SPECIFICATIONS

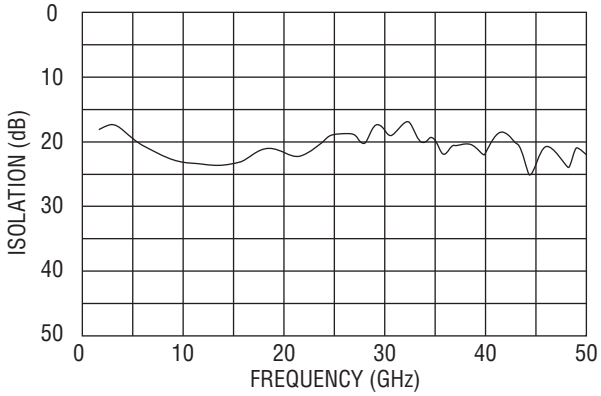
INPUT PARAMETERS	CONDITION	UNITS	MIN.	TYP.	MAX.
RF frequency range		GHz	2		50
RF VSWR (RF = -10 dBm, LO = +15 dBm)	2 to 50 GHz	Ratio		3.5:1	
LO frequency range		GHz	2		50
LO power range		dBm	+13		+17
LO VSWR (LO = +15 dBm)	2 to 50 GHz	Ratio		3.5:1	
TRANSFER CHARACTERISTICS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
Conversion loss (IF = 1 GHz, LO = +15 dBm)	2 to 50 GHz	dB		10	15
Single sideband noise figure	2 to 50 GHz	dB		15	
LO-to-RF isolation		dB	18	20	
LO-to-IF isolation		dB		20	
RF-to-IF isolation		dB		20	
Input power at 1 dB compression	LO = +13 dBm	dBm		+5	
Input two-tone third order intercept point	LO = +13 dBm	dBm		+15	
OUTPUT PARAMETERS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
IF frequency range	3 dB bandwidth	GHz	DC		2
IF VSWR (IF = -10 dBm, LO = +15 dBm)		Ratio		2.5:1	

DB0250LW1V TYPICAL TEST DATA

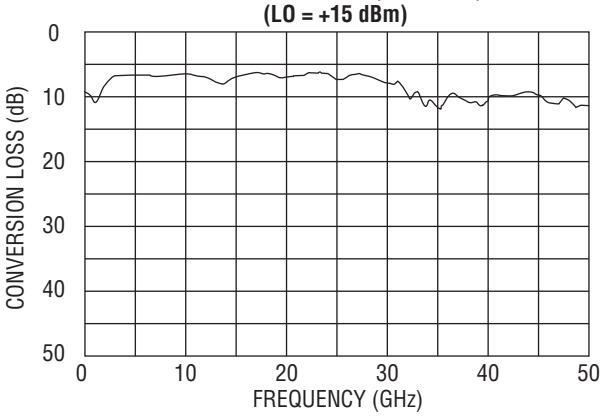
VSWR
(LO = +15 dBm)



LO-TO-RF ISOLATION



CONVERSION LOSS (IF = 1 GHz)
(LO = +15 dBm)



SINGLE-TONE (m) RF x (n) LO RELATIVE SPUR LEVEL (dBc)
(AVERAGE MIDBAND RF, LO, IF FREQUENCIES,
RF = -10 dBm, LO = +15 dBm)

SPUR (m) RF x (n) LO	RF TEST FREQ. (GHz)	LO TEST FREQ. (GHz)	SPUR LEVEL (dBc)
1 x 1	20	20.1	REF
1 x 2	20	10.05	30
1 x 3	20	6.7	10
2 x 1	10	20.1	42
2 x 2	10	10.05	53
2 x 3	10	6.7	41
3 x 1	6.67	20.1	58
3 x 2	6.67	10.05	70
3 x 3	6.67	6.7	56

MAXIMUM RATINGS

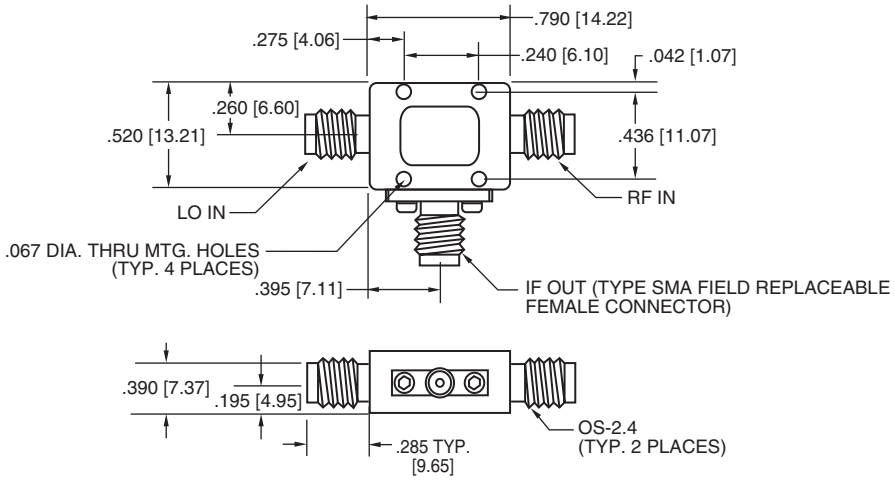
Specification temperature ..... +25°C
Operating temperature ..... -54 to +85°C
Storage temperature ..... -65 to +125°C

AVAILABLE OPTIONS

High dynamic range
H (LO = +17 to +23 dBm), (IP^3 = +22 dBm typ.)
Conversion loss = 16 dB max.

NOTE: Test data supplied at 25°C; conversion loss and LO-to-RF isolation.

OUTLINE DRAWING



NOTE: All dimensions shown in brackets [ ] are in millimeters.

0.5 TO 2 GHz DOUBLE-BALANCED MIXER

MODELS: DM0052LA2 AND DM0052HA2

FEATURES

- **RF/LO coverage..... 0.5 to 2 GHz**
- **IF operation..... DC to 0.5 GHz**
- **LO power range**
  - **L..... +7 to +13 dBm**
  - **H ..... +17 to +23 dBm**
- **Conversion loss ..... 5.5 dB typical**
- **LO-to-RF isolation..... 40 dB typical**



MITEQ's DM0052H and DM0052L mixers are constructed using a new microwave double-tuned RF/LO balun (patent pending) that yields an IF response from DC to the lowest RF frequency. This design also produces unusually high port-to-port isolation and further rejects out-of-band input signals with a "filter like" skirt selectivity. This device performs as an up- or downconverter covering most PCN and communication applications requiring high input signal levels (H version). The DM0052HA2 also makes an excellent high-level biphase test modulator or detector with low DC offset voltage.

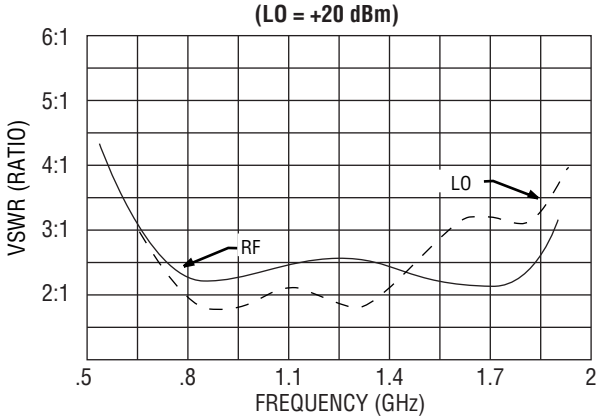
ELECTRICAL SPECIFICATIONS

INPUT PARAMETERS	CONDITION	UNITS	MIN.	TYP.	MAX.
RF frequency range		GHz	0.5		2
RF VSWR L (RF = -10 dBm, LO = +10 dBm) H (RF = -10 dBm, LO = +20 dBm)	0.65 to 1.85 GHz	Ratio Ratio		2.5:1 3:1	
LO frequency range		GHz	0.5		2
LO power range L H		dBm dBm	+7 +17		+13 +23
LO VSWR	0.65 to 1.85 GHz	Ratio		3:1	
TRANSFER CHARACTERISTICS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
Conversion loss (IF = 100 MHz, LO = +10 dBm)	0.5 to 2 GHz	dB		6.5	8.5
Single-sideband noise figure	0.5 to 2 GHz	dB		8.5	
LO-to-RF isolation	0.5 to 2 GHz	dB	25	40	
LO-to-IF isolation	0.5 to 2 GHz	dB		25	
IF-to-RF isolation	DC to 1 GHz	dB		30	
Input power at 1 dB compression L/H	LO = +10/+20 dBm	dBm	0	+3/+13	
Input two-tone third-order intercept point L/H	LO = +10/+20 dBm	dBm	+10/+20	+13/+23	
OUTPUT PARAMETERS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
IF frequency range	3 dB bandwidth	GHz	DC		0.5
IF VSWR (IF = -10 dBm, LO = +10 dBm)		Ratio		2.5:1	

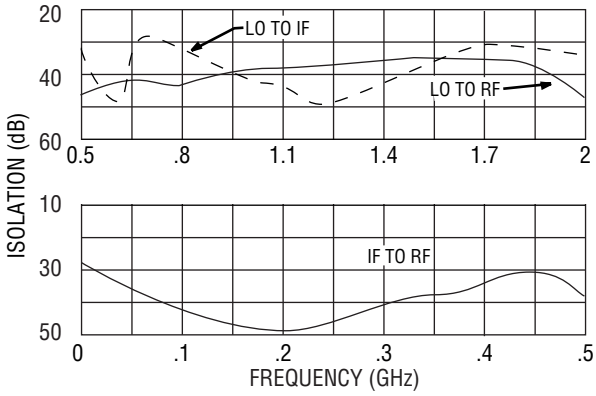
Revised: 03/30/12

DM0052HA2 TYPICAL TEST DATA

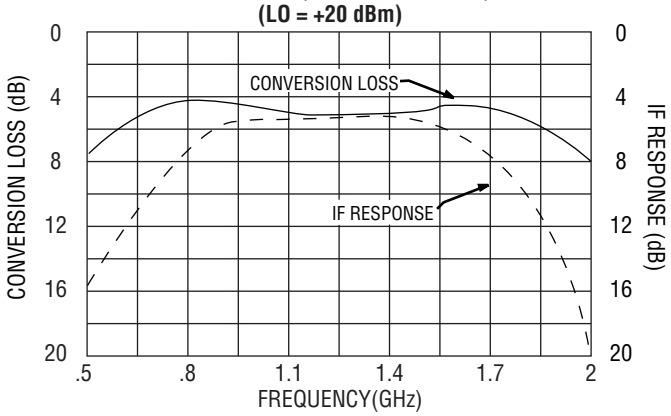
VSWR
(LO = +20 dBm)



ISOLATION



CONVERSION LOSS (IF = 100 MHz)
IF RESPONSE (1.25 GHz FIXED LO)
(LO = +20 dBm)



SINGLE-TONE (m) RF x (n) LO RELATIVE SPUR LEVEL (dBc)
AVERAGE MIDBAND RF, LO, IF FREQUENCIES,
RF = -10 dBm, LO = +10 dBm (L), +20 dBm (H)

SPUR (m) RF x (n) LO	RF TEST FREQ. (GHz)	LO TEST FREQ. (GHz)	SPUR LEVEL (dBc) L	H
1 x 1	1.12	1.37	0	0
1 x 2	1.6	1.92	-46	-40
1 x 3	1.8	.69	-12	-12
2 x 1	.75	1.75	-55	-63
2 x 2	1.19	1.31	-57	-60
2 x 3	1.45	1.05	-46	-60
3 x 1	.56	1.93	-50	-70
3 x 2	.95	1.55	-70	-75
3 x 3	1.20	1.32	-57	-70

MAXIMUM RATINGS

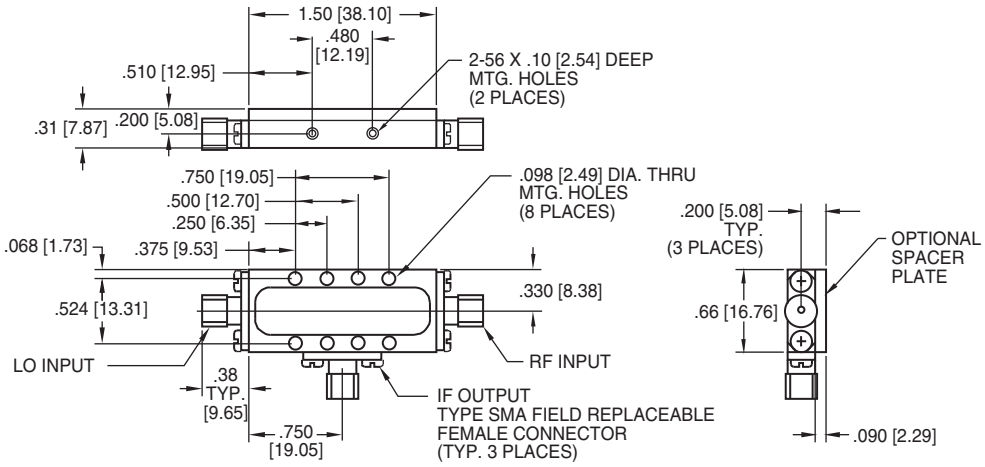
Specification temperature ..... +25°C
Operating temperature ..... -54 to +85°C
Storage temperature ..... -65 to +125°C

AVAILABLE OPTION

Medium/high dynamic range options
M (LO = +13 to +17 dBm), (IP^3 = +18 dBm typ.)
Conversion loss = 9.5 dB max.

NOTE: Test data supplied at 25°C; conversion loss and LO-to-RF isolation.

OUTLINE DRAWING



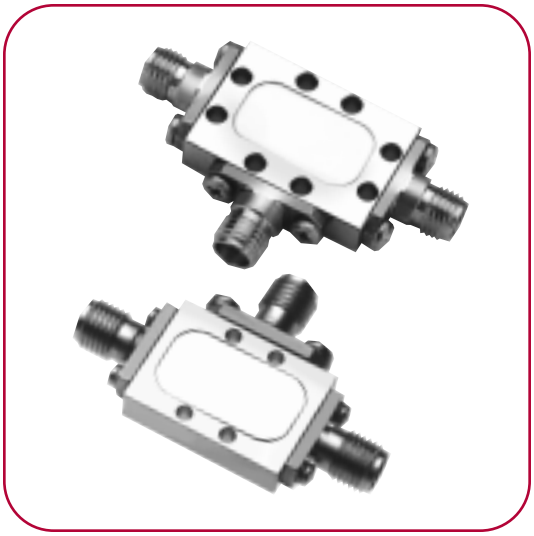
NOTE: All dimensions shown in brackets [ ] are in millimeters.

1 TO 4 GHz DOUBLE-BALANCED MIXER

MODELS: DM0104LA1 AND DM0104LA3

FEATURES

- **RF/LO coverage..... 1 to 4 GHz**
- **IF operation..... DC to 1 GHz**
- **LO power range..... +7 to +13 dBm**
- **Conversion loss ..... 5.5 dB typical**
- **LO-to-RF isolation..... 40 dB typical**



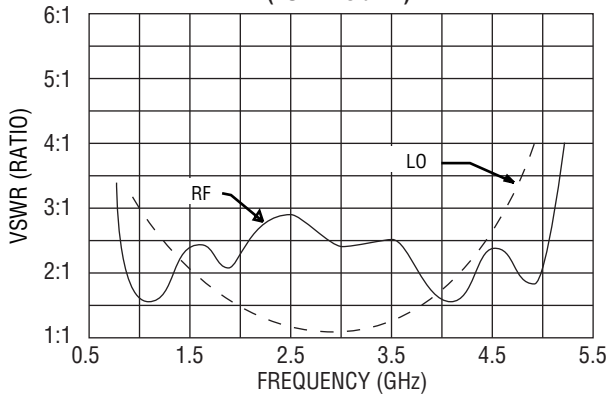
MITEQ's DM0104L Series of mixers are constructed using double-tuned microstrip RF and LO baluns with a DC-coupled IF structure. The construction, coupled with the hermetic packaging, provides for high inherent reliability and isolation over an extremely broad frequency range. This device performs as an up- or downconverter covering most PCN bands and communication applications. This mixer is also available with medium or high forward voltage diodes (M, H) yielding proportional changes in LO power and spurious performance.

ELECTRICAL SPECIFICATIONS

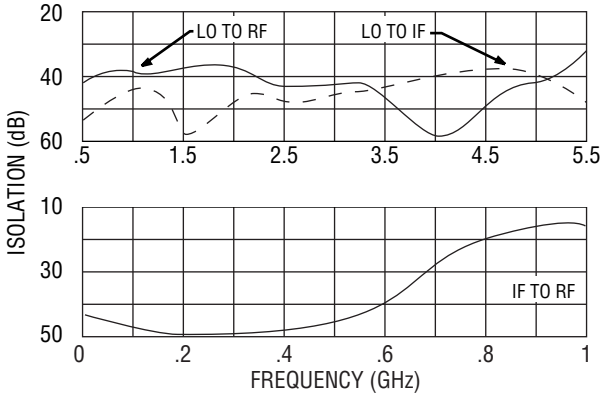
INPUT PARAMETERS	CONDITION	UNITS	MIN.	TYP.	MAX.
RF frequency range		GHz	1		4
RF VSWR (RF = -10 dBm, LO = +10 dBm)	1 to 4 GHz	Ratio		2.5:1	
LO frequency range		GHz	1		4
LO power range		dBm	+7		+13
LO VSWR (LO = +10 dBm)	1 to 4 GHz	Ratio		3:1	
TRANSFER CHARACTERISTICS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
Conversion loss (IF = 100 MHz, LO = +10 dBm)	1 to 4 GHz	dB		5.5	7
Single-sideband noise figure	1 to 4 GHz	dB		7.5	
LO-to-RF isolation	1 to 4 GHz	dB	30	40	
LO-to-IF isolation	1 to 4 GHz	dB	30	40	
IF-to-RF isolation	DC to 1 GHz	dB		30	
Input power at 1 dB compression	LO = +10 dBm	dBm	0	+3	
Input two-tone third-order intercept point	LO = +10 dBm	dBm	+10	+13	
OUTPUT PARAMETERS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
IF frequency range	2 dB bandwidth	GHz	DC		1
IF VSWR (IF = -10 dBm, LO = +10 dBm)		Ratio		2.5:1	

DM0104LA1/A3 TYPICAL TEST DATA

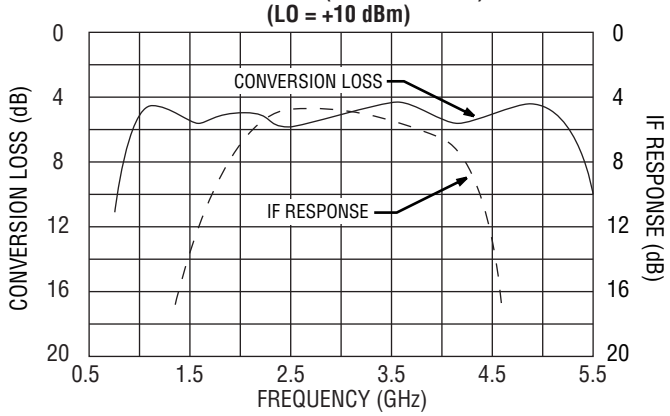
VSWR
(LO = +10 dBm)



ISOLATION



CONVERSION LOSS (IF = 100 MHz)
IF RESPONSE (3 GHz FIXED LO)
(LO = +10 dBm)



SINGLE-TONE (m) RF x (n) LO RELATIVE SPUR LEVEL (dBc)
(AVERAGE MIDBAND RF, LO, IF FREQUENCIES,
RF = -10 dBm, LO = +10 dBm)

SPUR (m) RF x (n) LO	RF TEST FREQ. (GHz)	LO TEST FREQ. (GHz)	SPUR LEVEL (dBc)
1 x 1	2.25	2.75	0
1 x 2	3.16	1.83	22
1 x 3	3.62	1.37	9
2 x 1	1.5	3.5	65
2 x 2	2.38	2.62	68
2 x 3	2.9	2.1	65
3 x 1	1.12	3.86	60
3 x 2	1.9	3.1	> 70
3 x 3	2.41	2.58	> 70

MAXIMUM RATINGS

Specification temperature ..... +25°C
Operating temperature ..... -54 to +85°C
Storage temperature ..... -65 to +125°C

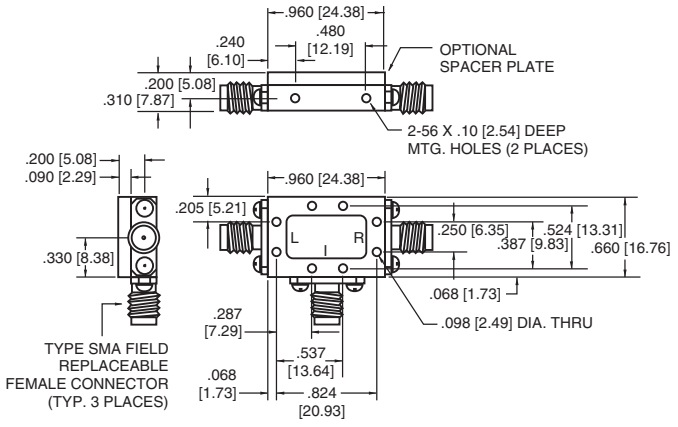
AVAILABLE OPTION

Medium/high dynamic range options
M (LO = +16 dBm), (IP^3 = +16 dBm typ.)
H (LO = +20 dBm), (IP^3 = +20 dBm typ.)
M, H (Conversion loss = 8 dB max.)

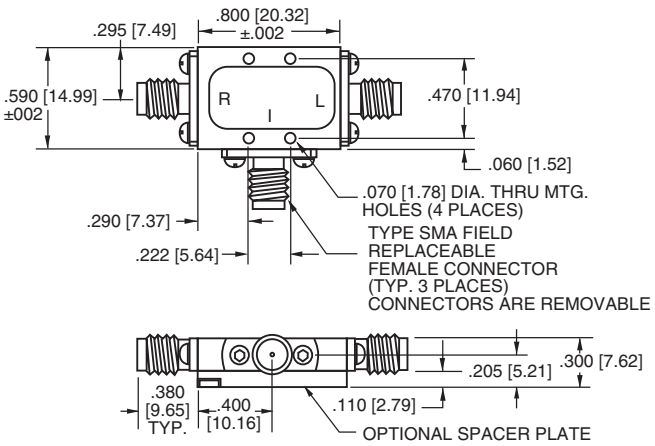
NOTE: Test data supplied at 25°C; conversion loss and LO-to-RF isolation.

OUTLINE DRAWINGS

A1 HOUSING



A3 HOUSING



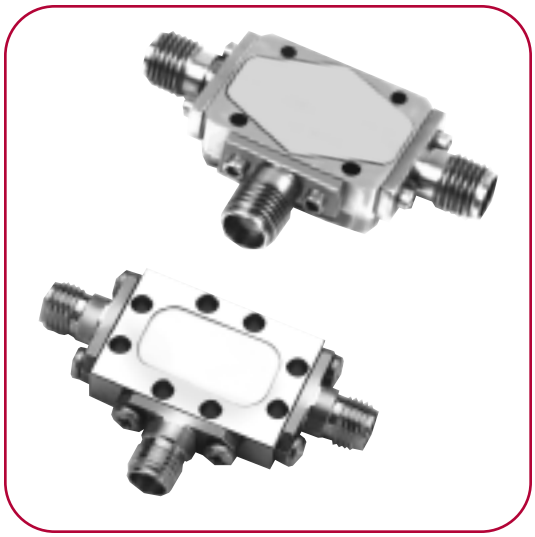
NOTE: All dimensions shown in brackets [ ] are in millimeters.

2 TO 4 GHz DOUBLE-BALANCED MIXER

MODELS: DM0204LW2 AND DM0204LA1

FEATURES

- **RF/LO coverage ..... 2 to 4 GHz**
- **IF operation ..... DC to 1 GHz**
- **LO power range ..... +7 to +13 dBm**
- **Conversion loss..... 4.5 dB typical**
- **LO-to-RF isolation ..... 40 dB typical**
- **Input 1 dB comp. ..... +3 dBm typical**
- **Input IP^3 ..... +13 dBm typical**



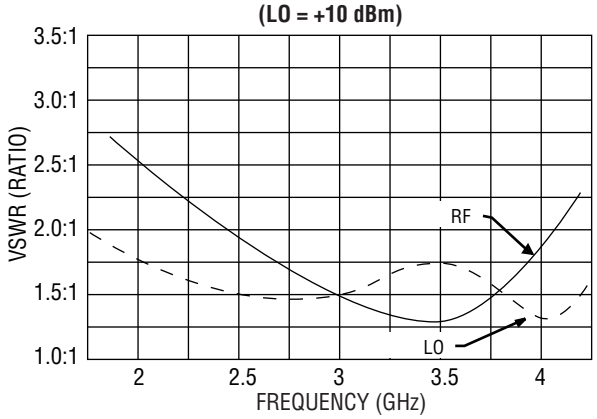
MITEQ's DM0204LW2 and A1 Series of mixers are constructed using new highly efficient, double-tuned microstrip RF and LO baluns (patent pending) with a DC-coupled IF structure. The construction, coupled with the hermetic packaging, provides for high inherent reliability and isolation over an octave frequency range. This device performs as an up- or downconverter covering many PCN and communication applications. This mixer is also available with medium or high forward voltage diodes (M, H) yielding proportional changes in LO power and spurious performance.

ELECTRICAL SPECIFICATIONS

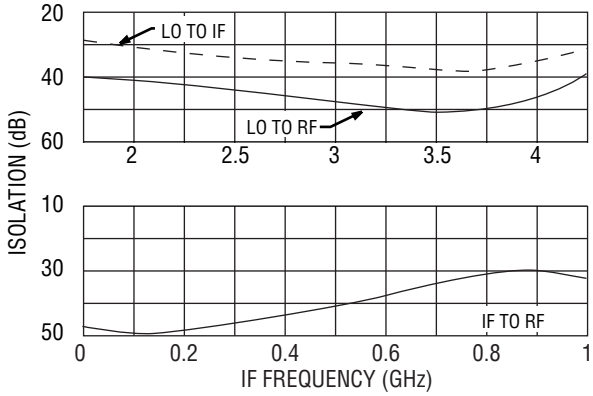
INPUT PARAMETERS	CONDITION	UNITS	MIN.	TYP.	MAX.
RF frequency range		GHz	2		4
RF VSWR (RF = -10 dBm, LO = +10 dBm)		Ratio		1.75:1	
LO frequency range		GHz	2		4
LO power range		dBm	+7		+13
LO VSWR (LO = +10 dBm)		Ratio		1.5:1	
TRANSFER CHARACTERISTICS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
Conversion loss (IF = 100 MHz, LO = +10 dBm)		dB		4.5	7
Single-sideband noise figure		dB		5	
LO-to-RF isolation		dB	35	40	
LO-to-IF isolation		dB	25	35	
IF-to-RF isolation	DC to 1 GHz	dB		40	
Input power at 1 dB compression	LO = +10 dBm	dBm		+3	
Input two-tone third-order intercept point	LO = +10 dBm	dBm	+10	+13	
OUTPUT PARAMETERS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
IF frequency range	3 dB bandwidth	GHz	DC		1
IF VSWR (IF = -10 dBm, LO = +10 dBm)		Ratio		2.5:1	

DM0204LA1 TYPICAL TEST DATA

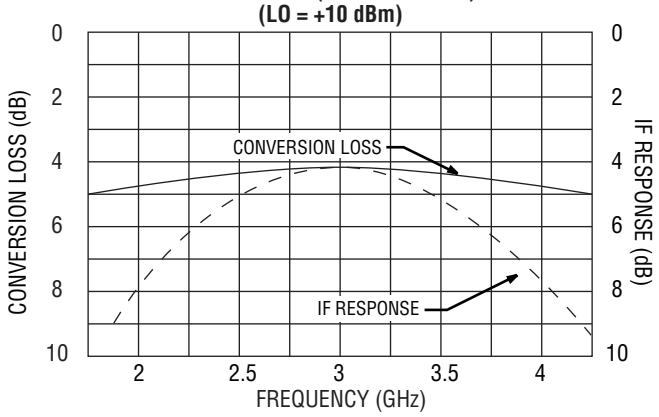
VSWR
(LO = +10 dBm)



ISOLATION



CONVERSION LOSS (IF = 100 MHz)
IF RESPONSE (3 GHz FIXED LO)
(LO = +10 dBm)



SINGLE-TONE (m) RF x (n) LO RELATIVE SPUR LEVEL (dBc)
(AVERAGE MIDBAND RF, LO, IF FREQUENCIES,
RF = -10 dBm, LO = +10 dBm)

SPUR (m) RF x (n) LO	RF TEST FREQ. (GHz)	LO TEST FREQ. (GHz)	SPUR LEVEL (dBc)
1 x 1	2.7	3.2	0
1 x 2	3.5	2.0	25
1 x 3	4.6	1.7	11
2 x 1	1.8	4.1	55
2 x 2	2.9	3.1	59
2 x 3	2.9	2.1	60
3 x 1	1.4	4.5	65
3 x 2	2.1	3.4	75
3 x 3	2.95	3.12	75

MAXIMUM RATINGS

Specification temperature ..... +25°C
Operating temperature ..... -54 to +85°C
Storage temperature ..... -65 to +125°C

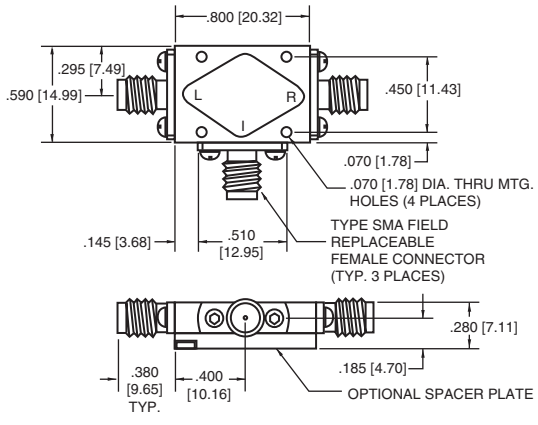
AVAILABLE OPTION

Medium/high dynamic range options
M (LO = +13 dBm), (IP^3 = +15 dBm typ.)
H (LO = +20 dBm), (IP^3 = +22 dBm typ.)
M, H (Conversion loss = 8 dB max.)

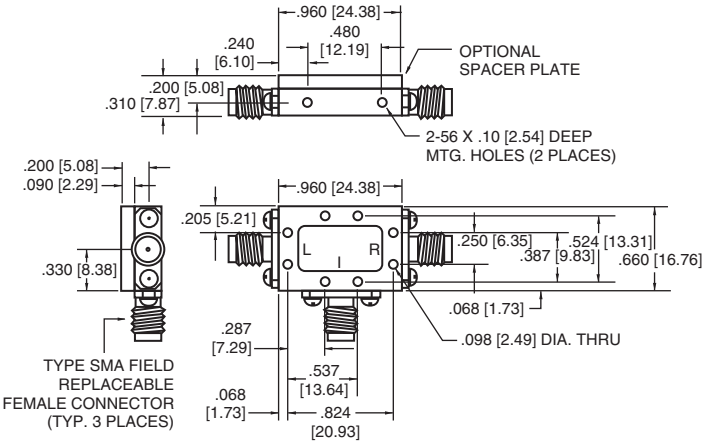
NOTE: Test data supplied at 25°C; conversion loss and LO-to-RF isolation.

OUTLINE DRAWINGS

W2 HOUSING



A1 HOUSING



NOTE: All dimensions shown in brackets [ ] are in millimeters.

2 TO 6 GHz LOAD SOURCE VSWR INDEPENDENT DOWNCONVERTING MIXER

MODEL: TIM0206HI2

FEATURES

- **IP³ independent of VSWR**
- **RF/LO coverage..... 2 to 6 GHz**
- **IF operation..... DC to 2 GHz**
- **Input IP³..... +26 dBm typical**
- **LO/RF VSWR..... 1.5:1 typical**



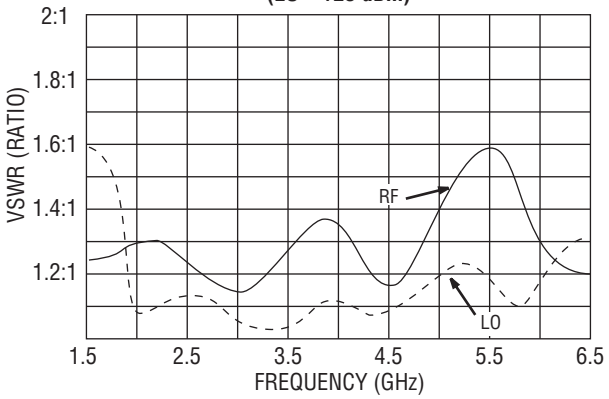
MITEQ's TIM0206HI2 high power level Schottky mixer is ideally suited as a second-stage IF mixer for broadband EW and communication test equipment. The low RF and LO input VSWR is independent of LO power and, therefore, compatible with terminating any narrowband system filters without phase and amplitude ripples.

ELECTRICAL SPECIFICATIONS

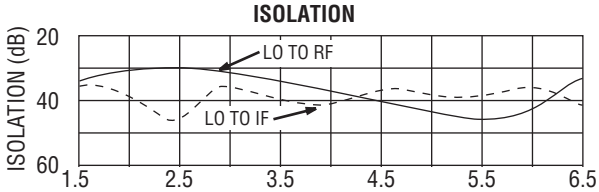
INPUT PARAMETERS	CONDITION	UNITS	MIN.	TYP.	MAX.
RF frequency range		GHz	2		6
RF VSWR (RF = -10 dBm)	LO = +23 dBm	Ratio		1.5:1	
LO frequency range		GHz	2		6
LO power range		dBm	+17	+23	+26
LO VSWR (RF = -10 dBm)	LO = +23 dBm	Ratio		1.5:1	
TRANSFER CHARACTERISTICS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
Conversion loss (IF = 500 MHz) (IF = 1500 MHz)	LO = +23 dBm	dB dB		7 8	8 10
Single-sideband noise figure	IF = 500 MHz	dB		8.5	
LO-to-RF isolation		dB	25	35	
LO-to-IF isolation		dB	30	45	
RF-to-IF isolation		dB		30	
Input power at 1 dB compression	LO = +23 dBm	dBm		+16	
Input two-tone second-order intercept point	LO = +23 dBm	dBm		+65	
Input two-tone third-order intercept point	LO = +23 dBm	dBm		+26	
OUTPUT PARAMETERS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
IF frequency range	3 dB bandwidth	GHz	DC		2
IF VSWR	LO = +23 dBm	Ratio		2:1	

TIM0206HI2 TYPICAL TEST DATA

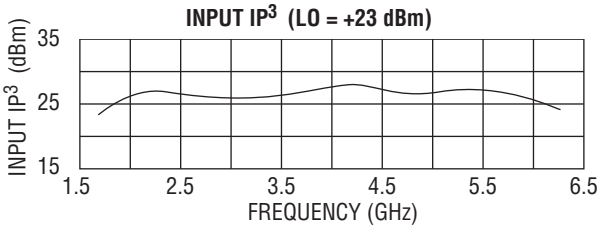
VSWR
(LO = +23 dBm)



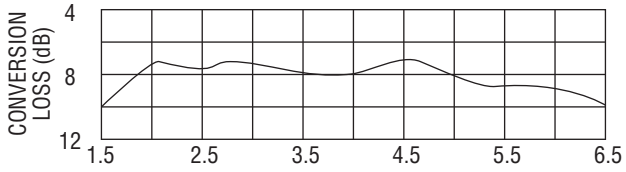
ISOLATION



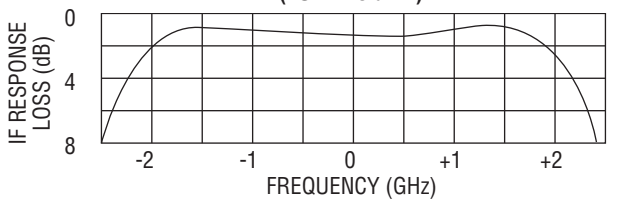
INPUT IP^3 (LO = +23 dBm)



CONVERSION LOSS (IF = 500 MHz)



RELATIVE IF RESPONSE FREQUENCY (4 GHz FIXED LO)
(LO = +23 dBm)



SINGLE-TONE (m) RF x (n) LO RELATIVE SPUR LEVEL (dBc)
(AVERAGE MIDBAND RF, LO, IF FREQUENCIES,
RF = 0 dBm, LO = +23 dBm)

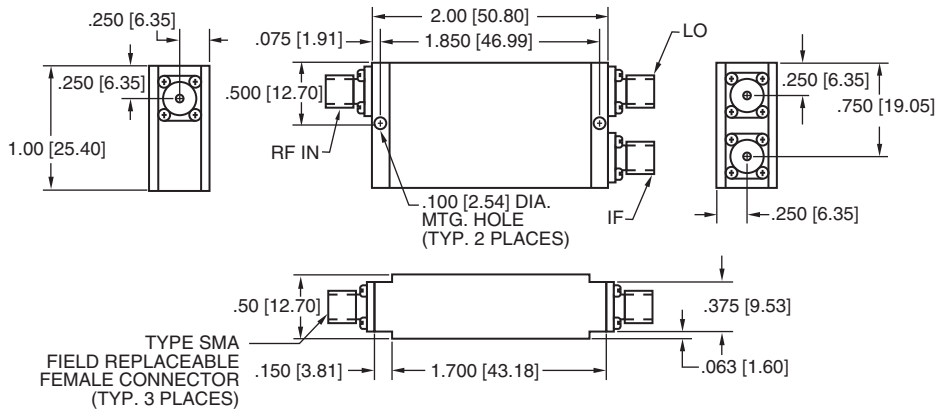
SPUR (m) RF x (n) LO	RF TEST FREQ. (GHz)	LO TEST FREQ. (GHz)	SPUR LEVEL (dBc)
1 x 1	2.7	3.2	0
1 x 2	3.5	2	46
1 x 3	4.6	1.7	25
2 x 1	2.5	4.5	60
2 x 2	3.9	5.1	60
2 x 3	3.5	2.5	60
3 x 1	2	5.5	70
3 x 2	2.5	3.5	75
3 x 3	3.9	4.1	70

MAXIMUM RATINGS

Specification temperature ..... +25°C
Operating temperature ..... -54 to +85°C
Storage temperature ..... -65 to +125°C

NOTE: Test data supplied at 25°C; conversion loss, LO-to-RF and LO-to-IF isolation.

OUTLINE DRAWING



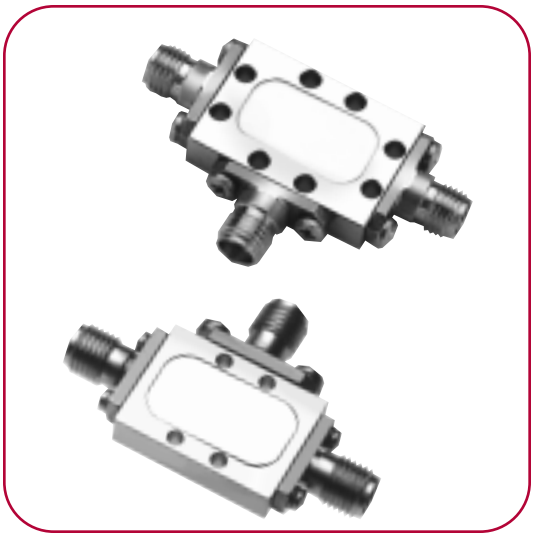
NOTE: All dimensions shown in brackets [ ] are in millimeters.

2 TO 7 GHz DOUBLE-BALANCED MIXER

MODELS: DMX0207L AND DMY0207L

FEATURES

- **RF/LO coverage ..... 2 to 7 GHz**
- **IF operation ..... DC to 2 GHz**
- **LO power range ..... +7 to +13 dBm**
- **Conversion loss..... 6 dB typical**
- **LO-to-RF isolation ..... 40 dB typical**



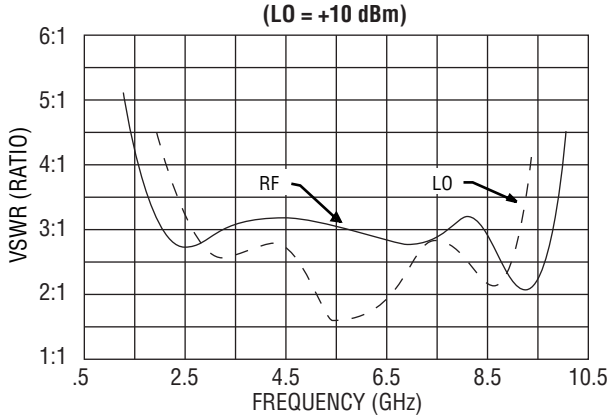
MITEQ's DMX and DMY Series of mixers are constructed using double-tuned microstrip RF and LO baluns with a DC-coupled IF structure. The construction, coupled with the hermetic packaging, provides for high inherent reliability and isolation over an extremely broad frequency range. This device performs as an up- or downconverter covering most EW bands and communication applications. This mixer is also available with medium or high forward voltage diodes (M, H) yielding proportional changes in LO power and spurious performance.

ELECTRICAL SPECIFICATIONS

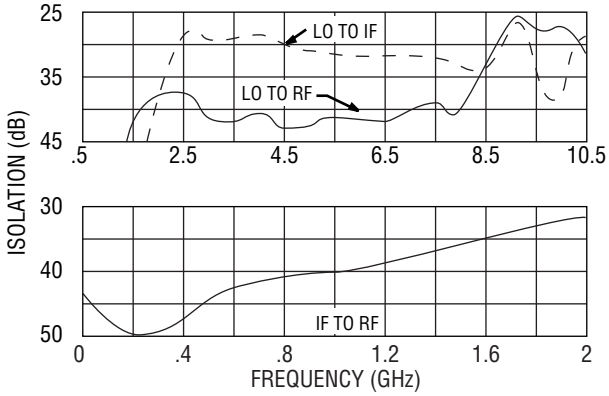
INPUT PARAMETERS	CONDITION	UNITS	MIN.	TYP.	MAX.
RF frequency range		GHz	2		7
RF VSWR (RF = -10 dBm, LO = +10 dBm)	2 to 7 GHz	Ratio		2.5:1	
LO frequency range		GHz	2		7
LO power range		dBm	+7		+13
LO VSWR (LO = +10 dBm)	2 to 7 GHz	Ratio		2.5:1	
TRANSFER CHARACTERISTICS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
Conversion loss (IF = 100 MHz, LO = +10 dBm)	2 to 7 GHz	dB		6	8
Single-sideband noise figure	2 to 7 GHz	dB			8.5
LO-to-RF isolation	2 to 7 GHz	dB	30	40	
LO-to-IF isolation	2 to 7 GHz	dB	20	30	
IF-to-RF isolation	DC to 2 GHz	dB		40	
Input power at 1 dB compression	LO = +10 dBm	dBm	0	+3	
Input two-tone third-order intercept point	LO = +13 dBm	dBm	+10	+13	
OUTPUT PARAMETERS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
IF frequency range	3 dB bandwidth	GHz	DC		2
IF VSWR (IF = -10 dBm, LO = +10 dBm)		Ratio		2:1	

DMX0207L TYPICAL TEST DATA

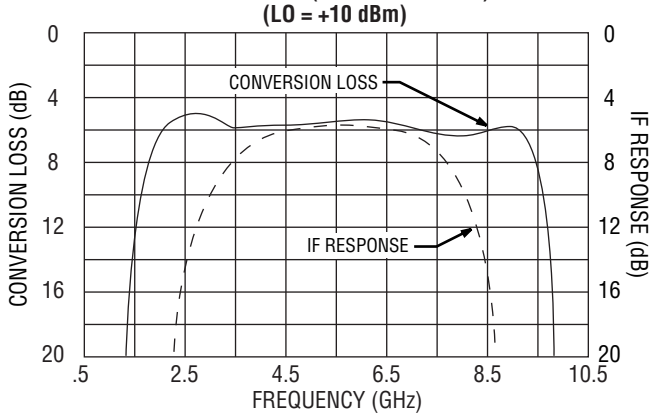
VSWR
(LO = +10 dBm)



ISOLATION



CONVERSION LOSS (IF = 100 MHz)
IF RESPONSE (5.5 GHz FIXED LO)
(LO = +10 dBm)



SINGLE-TONE (m) RF x (n) LO RELATIVE SPUR LEVEL (dBc)
(AVERAGE MIDBAND RF, LO, IF FREQUENCIES,
RF = -10 dBm, LO = +10 dBm)

SPUR (m) RF x (n) LO	RF TEST FREQ. (GHz)	LO TEST FREQ. (GHz)	SPUR LEVEL (dBc)
1 x 1	4.5	5.5	0
1 x 2	6.32	3.66	-38
1 x 3	7.24	2.74	-15
2 x 1	3	7	-53
2 x 2	4.76	5.24	-65
2 x 3	5.8	4.2	-50
3 x 1	2.24	7.72	-47
3 x 2	3.8	6.2	-65
3 x 3	4.82	5.16	-53

MAXIMUM RATINGS

Specification temperature ..... +25°C
Operating temperature ..... -54 to +85°C
Storage temperature ..... -65 to +125°C

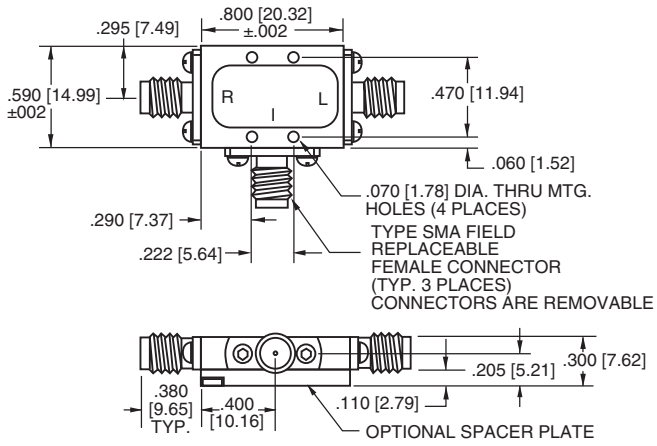
AVAILABLE OPTION

Medium/high dynamic range options
M (LO = +13 to +17 dBm), (IP^3 = +18 dBm typ.)
H (LO = +17 to +20 dBm), (IP^3 = +22 dBm typ.)
Conversion loss = 9 dB max.

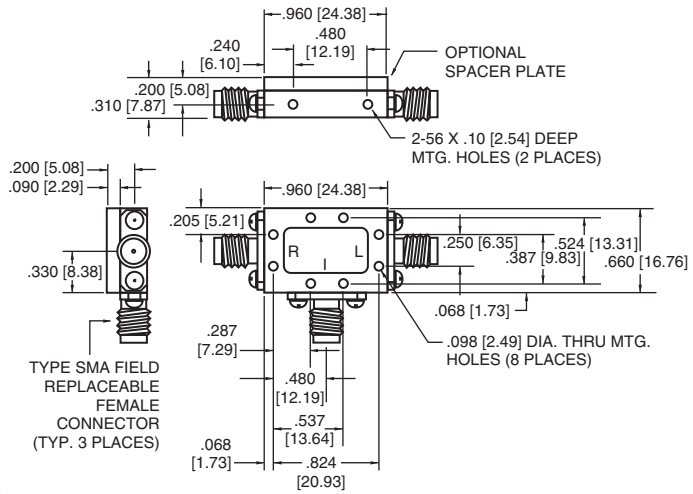
NOTE: Test data supplied at 25°C; conversion loss and LO-to-RF isolation.

OUTLINE DRAWINGS

DMY HOUSING



DMX HOUSING



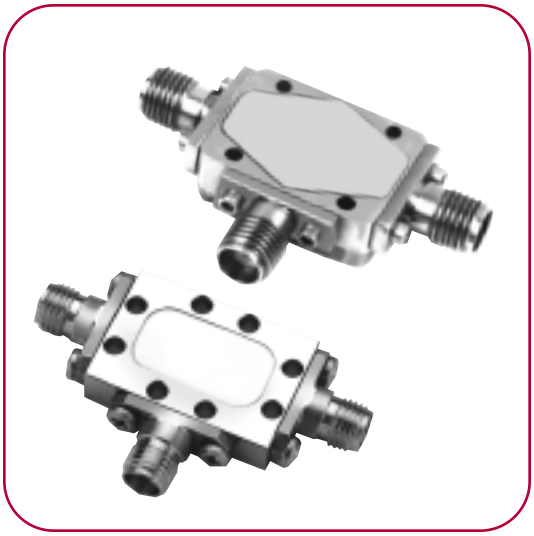
NOTE: All dimensions shown in brackets [ ] are in millimeters.

2 TO 8 GHz DOUBLE-BALANCED MIXER

MODELS: DM0208LW2 AND DM0208LA1

FEATURES

- **RF/LO coverage..... 2 to 8 GHz**
- **IF operation..... DC to 2 GHz**
- **LO power range..... +7 to +13 dBm**
- **Conversion loss ..... 7 dB typical**
- **LO-to-RF isolation..... 40 dB typical**



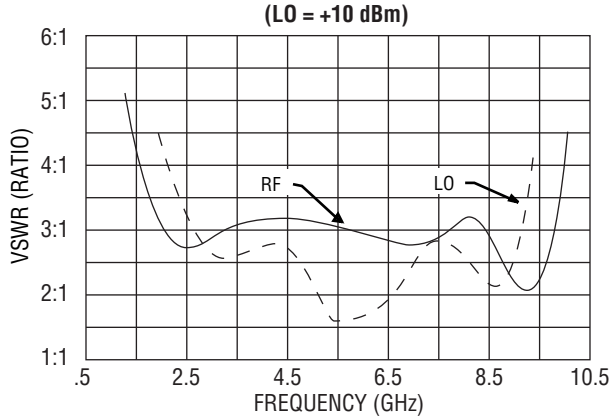
MITEQ's DM Series of mixers is constructed using double-tuned microstrip RF and LO baluns with a DC-coupled IF structure. The construction, coupled with the hermetic packaging, provides for high inherent reliability and isolation over an extremely broad frequency range. This device performs as an up- or downconverter covering most EW bands and communication applications. This mixer is also available with medium or high forward voltage diodes (M, H) yielding proportional changes in LO power and spurious performance.

ELECTRICAL SPECIFICATIONS

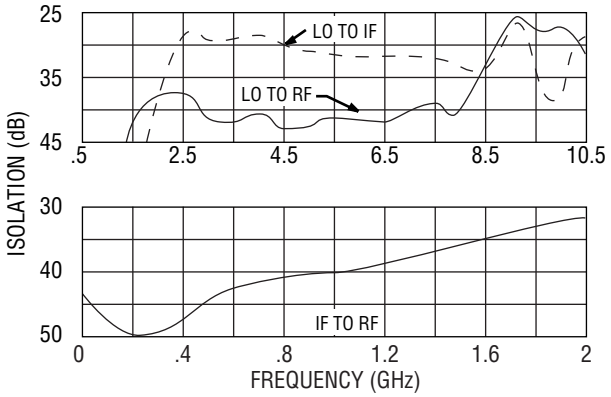
INPUT PARAMETERS	CONDITION	UNITS	MIN.	TYP.	MAX.
RF frequency range		GHz	2		8
RF VSWR (RF = -10 dBm, LO = +10 dBm)	2 to 8 GHz	Ratio		3:1	
LO frequency range		GHz	2		8
LO power range		dBm	+7		+13
LO VSWR (LO = +10 dBm)	2 to 8 GHz	Ratio		3:1	
TRANSFER CHARACTERISTICS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
Conversion loss (IF = 100 MHz, LO = +10 dBm)	2 to 8 GHz	dB		7	8
Single-sideband noise figure	2 to 8 GHz	dB			8.5
LO-to-RF isolation	2 to 8 GHz	dB	30	40	
LO-to-IF isolation	2 to 8 GHz	dB	20	30	
IF-to-RF isolation	DC to 2 GHz	dB		40	
Input power at 1 dB compression	LO = +10 dBm	dBm	0	+3	
Input two-tone third-order intercept point	LO = +13 dBm	dBm	+10	+13	
OUTPUT PARAMETERS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
IF frequency range	3 dB bandwidth	GHz	DC		2
IF VSWR (IF = -10 dBm, LO = +10 dBm)		Ratio		2:1	

DM0208LW2/A1 TYPICAL TEST DATA

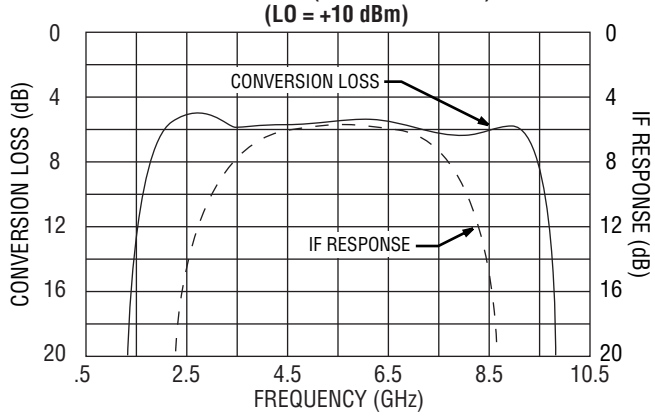
VSWR
(LO = +10 dBm)



ISOLATION



CONVERSION LOSS (IF = 100 MHz)
IF RESPONSE (5.5 GHz FIXED LO)
(LO = +10 dBm)



SINGLE-TONE (m) RF x (n) LO RELATIVE SPUR LEVEL (dBc)
(AVERAGE MIDBAND RF, LO, IF FREQUENCIES,
RF = -10 dBm, LO = +10 dBm)

SPUR (m) RF x (n) LO	RF TEST FREQ. (GHz)	LO TEST FREQ. (GHz)	SPUR LEVEL (dBc)
1 x 1	4.5	5.5	0
1 x 2	6.32	3.66	-38
1 x 3	7.24	2.74	-15
2 x 1	3	7	-53
2 x 2	4.76	5.24	-65
2 x 3	5.8	4.2	-50
3 x 1	2.24	7.72	-47
3 x 2	3.8	6.2	-65
3 x 3	4.82	5.16	-53

MAXIMUM RATINGS

Specification temperature ..... +25°C
Operating temperature ..... -54 to +85°C
Storage temperature ..... -65 to +125°C

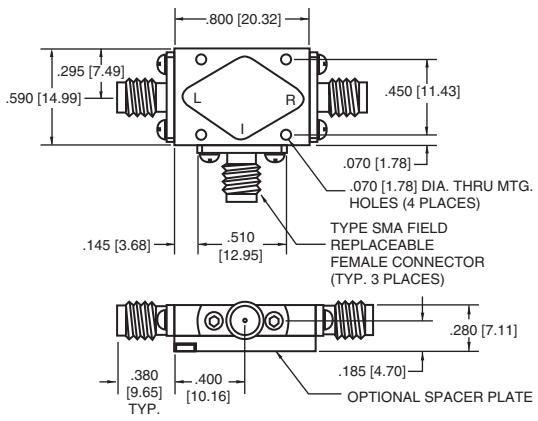
AVAILABLE OPTION

Medium/high dynamic range options
M (LO = +13 to +17 dBm), (IP^3 = +18 dBm typ.)
H (LO = +17 to +20 dBm), (IP^3 = +22 dBm typ.)
Conversion loss = 9 dB max.

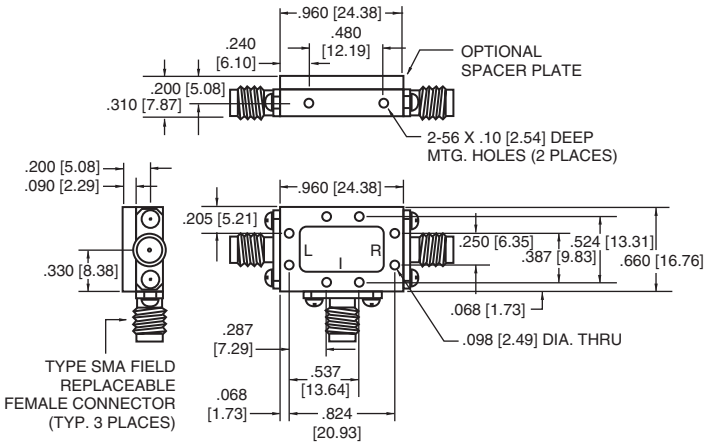
NOTE: Test data supplied at 25°C; conversion loss and LO-to-RF isolation.

OUTLINE DRAWINGS

W2 HOUSING



A1 HOUSING



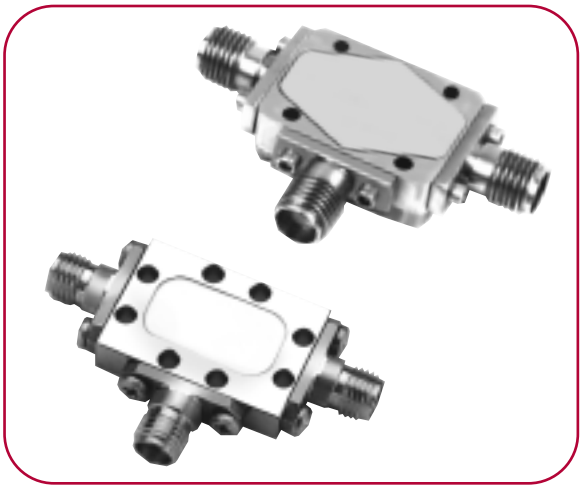
NOTE: All dimensions shown in brackets [ ] are in millimeters.

4 TO 8 GHz DOUBLE-BALANCED MIXER

MODELS: DM0408LW2, DM0408HW2, DM0408LA1 AND DM0408HA1

FEATURES

- **RF/LO coverage ..... 4 to 8 GHz**
- **IF operation ..... DC to 2 GHz**
- **LO power range**
  - **L ..... +7 to +13 dBm**
  - **H ..... +15 to +20 dBm**
- **Conversion loss (midband RF) ..... 5 dB typical**
- **LO-to-RF isolation ..... 40 dB typical**



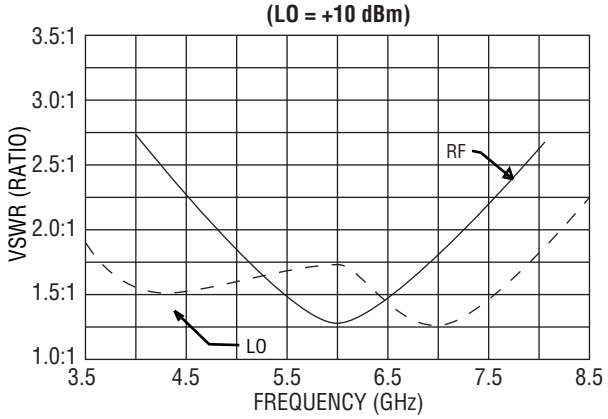
MITEQ's DM0408 Series of mixers are constructed using new highly efficient double-tuned microstrip RF and LO baluns with a DC-coupled IF structure. The construction, coupled with the hermetic packaging, provides for high inherent reliability and isolation over an octave frequency range. This device performs as an up- or downconverter covering satellite and communication applications. This mixer is also available with medium voltage diodes (M) yielding proportional changes in LO power and spurious performance.

ELECTRICAL SPECIFICATIONS

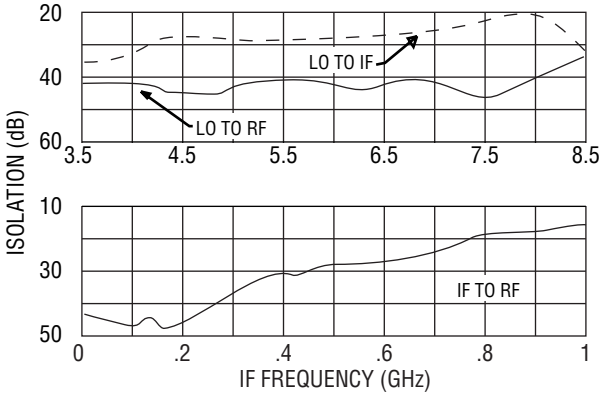
INPUT PARAMETERS	CONDITION	UNITS	MIN.	TYP.	MAX.
RF frequency range		GHz	4		8
RF VSWR (RF = -10 dBm, LO = +10 dBm) -L/-H (RF = -10 dBm, LO = +17 dBm)		Ratio Ratio		2:1 2.2:1	
LO frequency range		GHz	4		8
LO power range L H		dBm dBm	+7 +17	+10	+13 +23
LO VSWR		Ratio		1.75:1	
TRANSFER CHARACTERISTICS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
Conversion loss (IF = 100 MHz) L H	LO = +10 dBm LO = +17 dBm	dB dB		5 6	6 7
Single-sideband noise figure L/H		dB		5.5/6.5	
LO-to-RF isolation		dB	30	40	
LO-to-IF isolation		dB	20	30	
IF-to-RF isolation	DC to 2 GHz	dB		30	
Input power at 1 dB compression L/H	LO = +10/+17 dBm	dBm		+3/+12	
Input two-tone third-order intercept point L/H	LO = +10/+17 dBm	dBm	+10/+20	+13/+22	
OUTPUT PARAMETERS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
IF frequency range	3 dB bandwidth	GHz	DC		2
IF VSWR (IF = -10 dBm, LO = +10 dBm)		Ratio		2.5:1	

DM0408LA1 TYPICAL TEST DATA

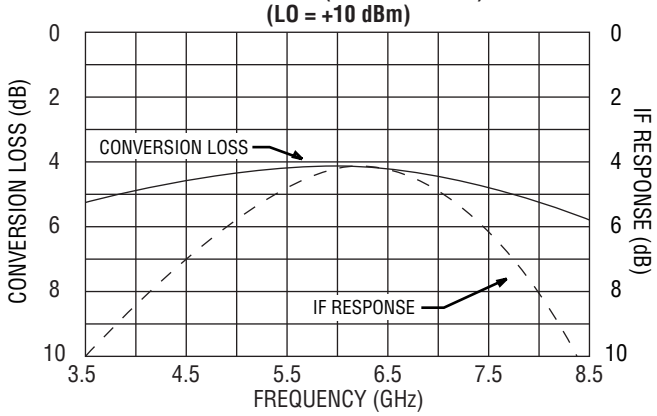
VSWR
(LO = +10 dBm)



ISOLATION



CONVERSION LOSS (IF = 100 MHz)
IF RESPONSE (6 GHz FIXED LO)
(LO = +10 dBm)



SINGLE-TONE (m) RF x (n) LO RELATIVE SPUR LEVEL (dBc)
(AVERAGE MIDBAND RF, LO, IF FREQUENCIES,
RF = -10 dBm, LO = +10 dBm (L), +20 dBm (H))

SPUR (m) RF x (n) LO	RF TEST FREQ. (GHz)	LO TEST FREQ. (GHz)	SPUR LEVEL (dBc) L	H
1 x 1	5.5	6.5	0	0
1 x 2	7.2	4.1	28	32
1 x 3	8.3	3.2	12	10
2 x 1	4	7	53	60
2 x 2	5.75	6.25	55	58
2 x 3	7	5	50	55
3 x 1	3.17	8.5	47	-75
3 x 2	4	6.5	64	-75
3 x 3	6	6.33	53	-75

MAXIMUM RATINGS

Specification temperature ..... +25°C
Operating temperature ..... -54 to +85°C
Storage temperature ..... -65 to +125°C

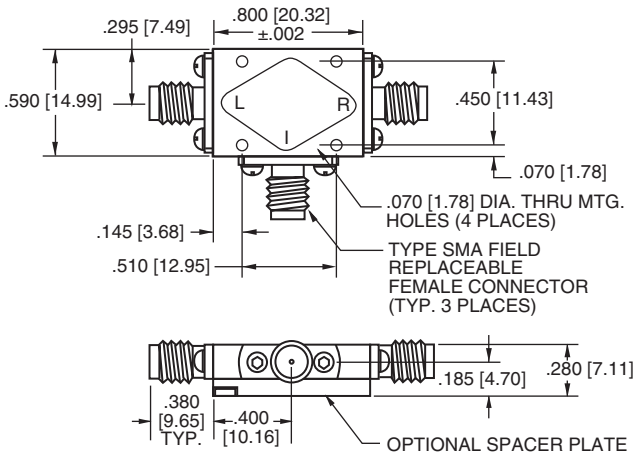
AVAILABLE OPTION

Medium range option
M (LO = +13 to +16 dBm), (IP^3 = +18 dBm typ.)
Conversion loss = 7 dB max.

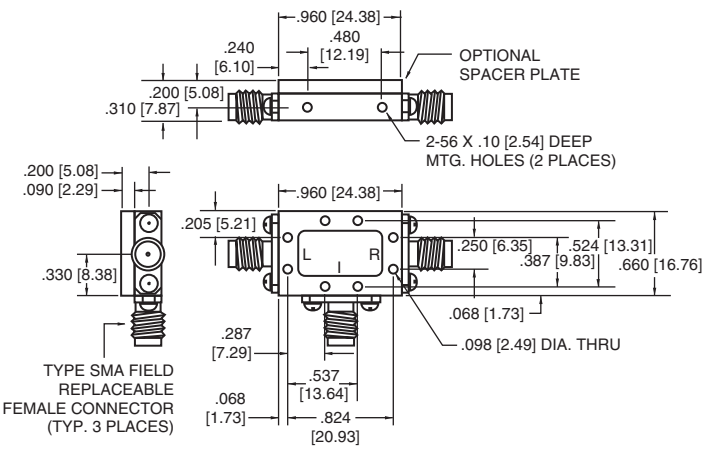
NOTE: Test data supplied at 25°C; conversion loss and LO-to-RF isolation.

OUTLINE DRAWINGS

W2 HOUSING



A1 HOUSING



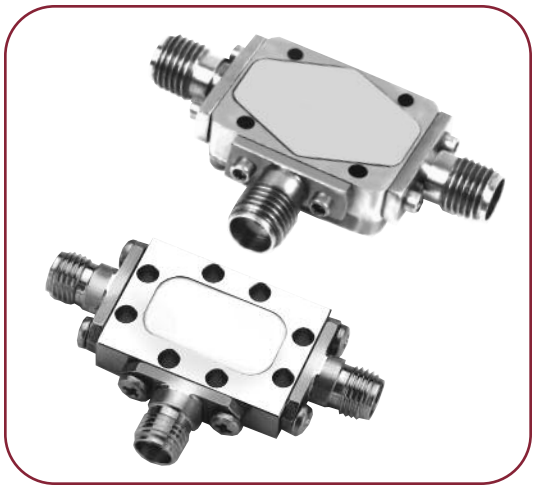
NOTE: All dimensions shown in brackets [ ] are in millimeters.

4 TO 16 GHz DOUBLE-BALANCED MIXER

MODELS: DM0416LW2, DM0416LA1, DM0412LW2 AND DM0412LA1

FEATURES

- **RF/LO coverage..... 4 to 16 GHz**
- **IF operation..... DC to 4 GHz**
- **LO power range..... +7 to +13 dBm**
- **Conversion loss ..... 6 dB typical**
- **LO-to-RF isolation..... 40 dB typical**



MITEQ's DM0416 Series of mixers are constructed using double-tuned microstrip RF and LO baluns with a DC-coupled IF structure. The construction, coupled with the hermetic packaging, provides for high inherent reliability and isolation over an extremely broad frequency range. This device performs as an up- or downconverter covering most EW bands and communication applications. This mixer is also available with medium or high forward voltage diodes (M, H) yielding proportional changes in LO power and spurious performance.

ELECTRICAL SPECIFICATIONS

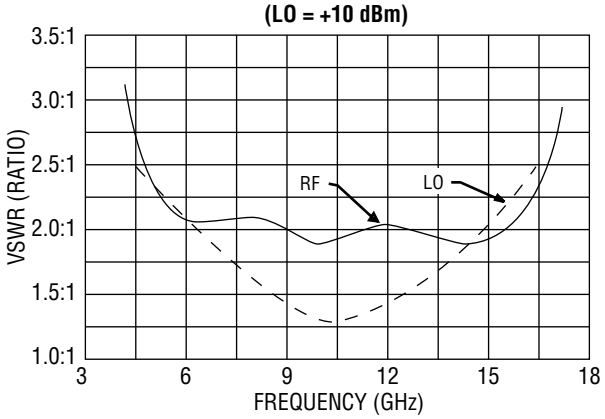
INPUT PARAMETERS	CONDITION	UNITS	MIN.	TYP.	MAX.
RF frequency range		GHz	4		16
RF VSWR (RF = -10 dBm, LO = +10 dBm)	4 to 12 GHz 4 to 16 GHz	Ratio Ratio		2.5:1 3:1	
LO frequency range		GHz	4		16
LO power range		dBm	+7		+13
LO VSWR (RF = 0 dBm, LO = +10 dBm)	4 to 12 GHz 4 to 16 GHz	Ratio Ratio		2.5:1 3.5:1	
TRANSFER CHARACTERISTICS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
Conversion loss (IF = 100 MHz, LO = +10 dBm)	4 to 12 GHz 4 to 16 GHz	dB dB		6 7	7 8
Single-sideband noise figure	4 to 16 GHz	dB			9
LO-to-RF isolation	4 to 16 GHz	dB	30	40	
LO-to-IF isolation	4 to 16 GHz	dB	20	30	
IF-to-RF isolation	DC to 4 GHz	dB	30	40	
Input power at 1 dB compression	LO = +13 dBm	dBm	0	+5	
Input two-tone third-order intercept point	LO = +13 dBm	dBm	10	+15	
OUTPUT PARAMETERS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
IF frequency range	3 dB bandwidth	GHz	DC		4
IF VSWR (IF = -10 dBm, LO = +10 dBm)		Ratio		2:1	

MITEQ 100 Davids Drive, Hauppauge, NY 11788 • TEL: (631) 439-9220 • FAX: (631) 436-7430 • www.miteq.com

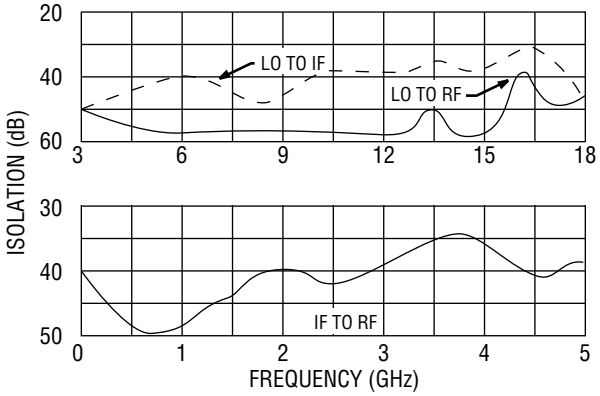
Revised: 10/22/14

DM0416LW2/A1 TYPICAL TEST DATA

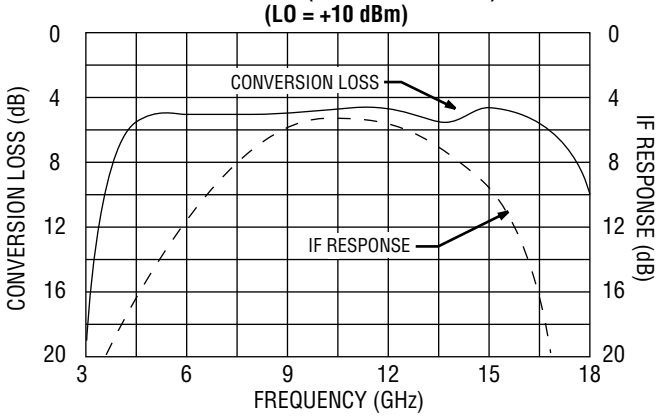
VSWR
(LO = +10 dBm)



ISOLATION



CONVERSION LOSS (IF = 100 MHz)
IF RESPONSE (10.5 GHz FIXED LO)
(LO = +10 dBm)



SINGLE-TONE (m) RF x (n) LO RELATIVE SPUR LEVEL (dBc)
(AVERAGE MIDBAND RF, LO, IF FREQUENCIES,
RF = -10 dBm, LO = +10 dBm)

SPUR (m) RF x (n) LO	RF TEST FREQ. (GHz)	LO TEST FREQ. (GHz)	SPUR LEVEL (dBc)
1 x 1	9	11	0
1 x 2	12.6	7.3	35
1 x 3	14.5	5.5	12
2 x 1	6	14	42
2 x 2	9.5	10.5	60
2 x 3	8.4	11.6	50
3 x 1	4.5	15.5	50
3 x 2	7.6	12.4	70
3 x 3	9.6	10.3	65

MAXIMUM RATINGS

Specification temperature ..... +25°C
Operating temperature ..... -54 to +85°C
Storage temperature ..... -65 to +125°C

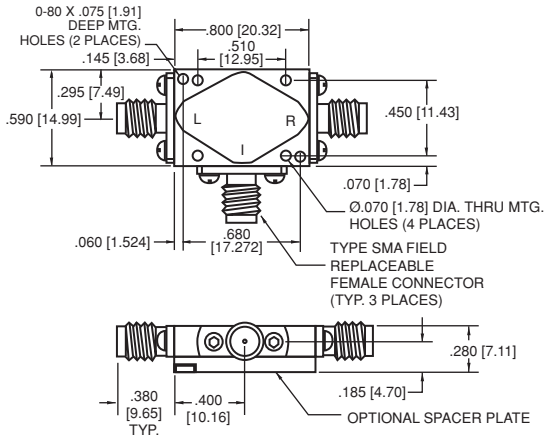
AVAILABLE OPTIONS

Medium/high dynamic range options
M (LO = +13 to +16 dBm), (IP3 = +18 dBm typ.)
H (LO = +17 to +20 dBm), (IP3 = +22 dBm typ.)
DM0412L, M, H (Conversion loss = 8 dB max.)
DM0416L, M, H (Conversion loss = 9 dB max.)
L-R isolation all M, H models: +27 dBm

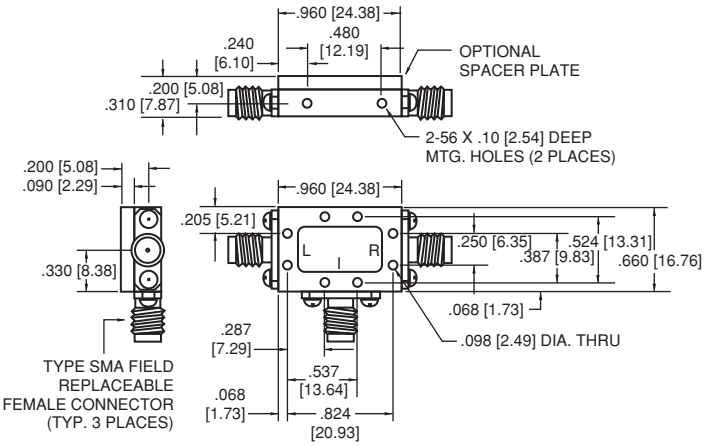
NOTE: Test data supplied at 25°C; conversion loss and LO-to-RF isolation.

OUTLINE DRAWINGS

W2 HOUSING



A1 HOUSING



NOTE: All dimensions shown in brackets [ ] are in millimeters.

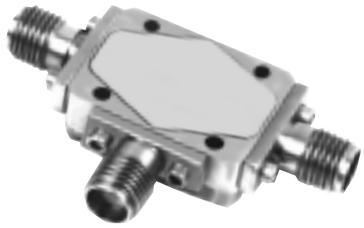
Revised: 10/22/14

8 TO 12 GHz DOUBLE-BALANCED MIXER

MODEL: DM0812LW2

FEATURES

- **RF/LO coverage..... 8 to 12 GHz**
- **IF operation..... DC to 4 GHz**
- **LO power range..... +7 to +13 dBm**
- **Conversion loss (midband RF)..... 4.5 dB typical**
- **LO-to-RF isolation..... 35 dB typical**



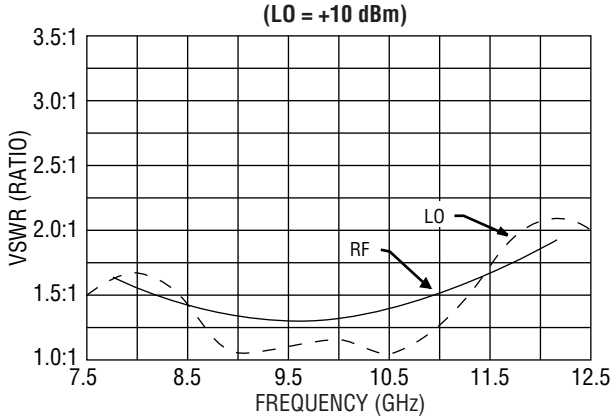
MITEQ's DM0812LW2 mixer is constructed using new, highly efficient, double-tuned microstrip RF and LO baluns with a DC-coupled IF structure. The construction, coupled with the hermetic packaging, provides for high inherent reliability and isolation over an octave frequency range. This device performs as an up- or downconverter covering most X-band and communication applications. This mixer is also available with medium or high forward voltage diodes (M, H) yielding proportional changes in LO power and spurious performance.

ELECTRICAL SPECIFICATIONS

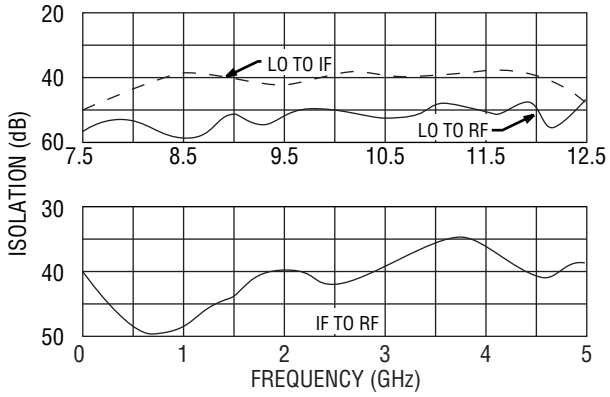
INPUT PARAMETERS	CONDITION	UNITS	MIN.	TYP.	MAX.
RF frequency range		GHz	8		12
RF VSWR (RF = -10 dBm, LO = +10 dBm)		Ratio		1.5:1	
LO frequency range		GHz	8		12
LO power range		dBm	+7		+13
LO VSWR (LO = +10 dBm)		Ratio		1.5:1	
TRANSFER CHARACTERISTICS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
Conversion loss (IF = 100 MHz, LO = +10 dBm)		dB		4.5	6
Single-sideband noise figure		dB		5	
LO-to-RF isolation		dB	30	35	
LO-to-IF isolation		dB		30	
IF-to-RF isolation		dB	30	35	
Input power at 1 dB compression		dBm	0	+3	
Input two-tone third-order intercept point		dBm	+10	+13	
OUTPUT PARAMETERS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
IF frequency range	3 dB bandwidth	GHz	DC		4
IF VSWR (IF = -10 dBm, LO = +10 dBm)		Ratio		2:1	

DM0812LW2 TYPICAL TEST DATA

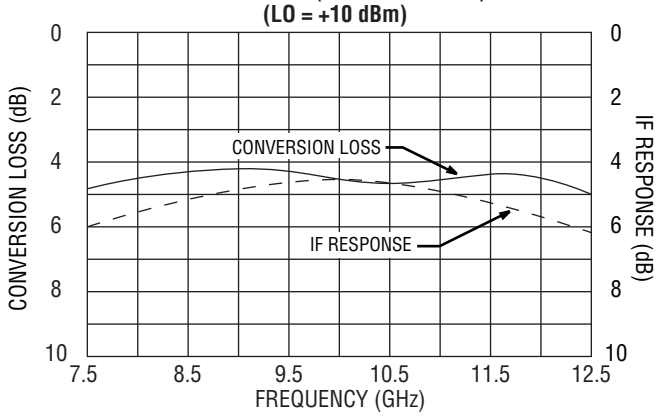
VSWR
(LO = +10 dBm)



ISOLATION



CONVERSION LOSS (IF = 100 MHz)
IF RESPONSE (10 GHz FIXED LO)
(LO = +10 dBm)



SINGLE-TONE (m) RF x (n) LO RELATIVE SPUR LEVEL (dBc)
(AVERAGE MIDBAND RF, LO, IF FREQUENCIES,
RF = -10 dBm, LO = +10 dBm)

SPUR (m) RF x (n) LO	RF TEST FREQ. (GHz)	LO TEST FREQ. (GHz)	SPUR LEVEL (dBc)
1 x 1	9	11	0
1 x 2	12.6	7.3	27
1 x 3	14	5.5	15
2 x 1	6	14	50
2 x 2	9.5	10.5	65
2 x 3	8.4	11.6	60
3 x 1	4.5	15.5	53
3 x 2	7.6	12.4	> 65
3 x 3	9.6	10.3	60

MAXIMUM RATINGS

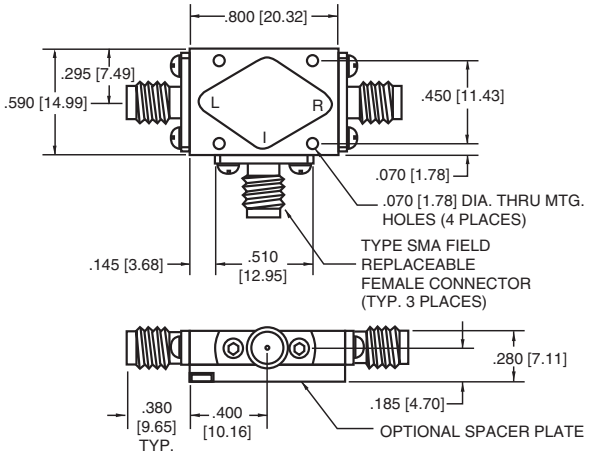
Specification temperature ..... +25°C
Operating temperature ..... -54 to +85°C
Storage temperature ..... -65 to +125°C

AVAILABLE OPTIONS

Medium/high dynamic range options
M (LO = +13 to +17 dBm), (IP^3 = +18 dBm typ.)
H (LO = +17 to +20 dBm), (IP^3 = +22 dBm typ.)
Conversion loss = 7 dB max.

NOTE: Test data supplied at 25°C; conversion loss and LO-to-RF isolation.

OUTLINE DRAWING



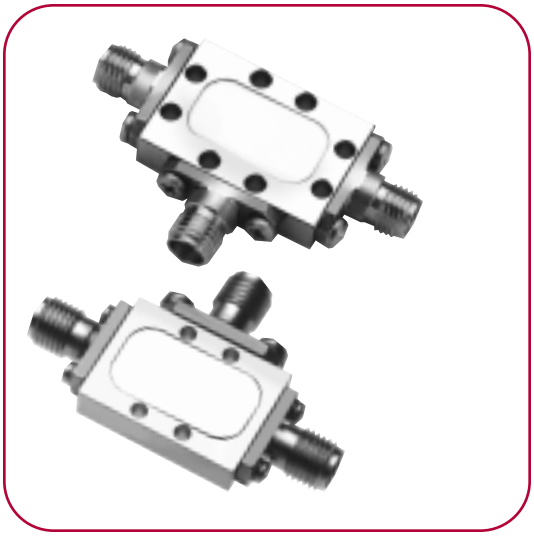
NOTE: All dimensions shown in brackets [ ] are in millimeters.

4 TO 18 GHz DOUBLE-BALANCED MIXER

MODELS: DMX0418L, DMY0418L, DMX0716L AND DMY0716L

FEATURES

- **RF/LO coverage ..... 4 to 18 GHz**
- **IF operation ..... DC to 4 GHz**
- **LO power range ..... +7 to +13 dBm**
- **Conversion loss..... 5 dB typical**
- **LO-to-RF isolation ..... 35 dB typical**
- **Packaging..... Hermetically sealed**



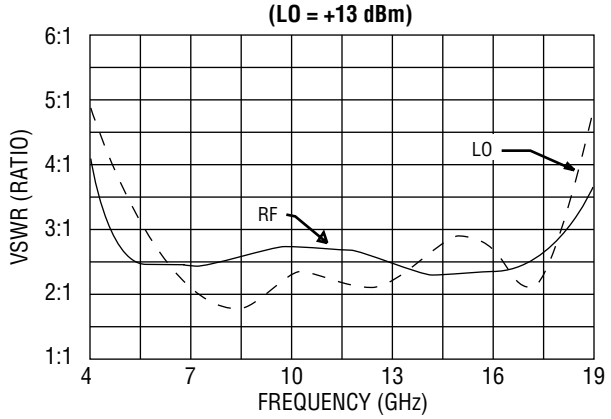
MITEQ's DMX and DMY Series of mixers are constructed using double-tuned microstrip RF and LO baluns with a DC-coupled IF structure. The construction, coupled with the hermetic packaging, provides for high inherent reliability and isolation over an extremely broad frequency range. This device performs as an up- or downconverter covering most EW bands and communication applications. This mixer is also available with medium or high forward voltage diodes (M, H) yielding proportional changes in LO power and spurious performance.

ELECTRICAL SPECIFICATIONS

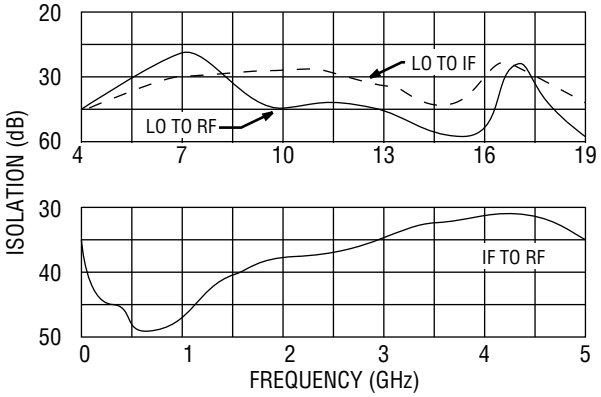
INPUT PARAMETERS	CONDITION	UNITS	MIN.	TYP.	MAX.
RF frequency range		GHz	4		18
RF VSWR (RF = -10 dBm, LO = +10 dBm)	7 to 16 GHz 4 to 18 GHz	Ratio Ratio		2:1 3:1	
LO frequency range		GHz	4		18
LO power range		dBm	+7		+13
LO VSWR (LO = +10 dBm)	7 to 16 GHz 4 to 18 GHz	Ratio Ratio		2:1 2.5:1	
TRANSFER CHARACTERISTICS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
Conversion loss (IF = 100 MHz, LO = +10 dBm)	7 to 16 GHz 4 to 18 GHz	dB dB		5 6	8 9
Single-sideband noise figure	4 to 18 GHz	dB			9.5
LO-to-RF isolation	4 to 18 GHz	dB	20	35	
LO-to-IF isolation	4 to 18 GHz	dB	20	35	
IF-to-RF isolation	DC to 4 GHz	dB	20	35	
Input power at 1 dB compression	LO = +10 dBm	dBm	0	+3	
Input two-tone third-order intercept point	LO = +13 dBm	dBm	+10	+13	
OUTPUT PARAMETERS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
IF frequency range	2 dB bandwidth	GHz	DC		4
IF VSWR (IF = -10 dBm, LO = +10 dBm)		Ratio		2:1	

DMX0418L/DMY0418L TYPICAL TEST DATA

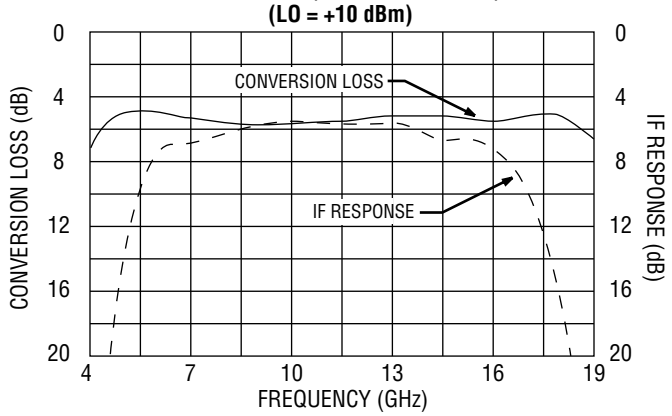
VSWR
(LO = +13 dBm)



ISOLATION



CONVERSION LOSS (IF = 100 MHz)
IF RESPONSE (11.5 GHz FIXED LO)
(LO = +10 dBm)



SINGLE-TONE (m) RF x (n) LO RELATIVE SPUR LEVEL (dBc)
(AVERAGE MIDBAND RF, LO, IF FREQUENCIES,
RF = -10 dBm, LO = +10 dBm)

SPUR (m) RF x (n) LO	RF TEST FREQ. (GHz)	LO TEST FREQ. (GHz)	SPUR LEVEL (dBc)
1 x 1	10	12	0
1 x 2	14	8	32
1 x 3	16	6	12
2 x 1	6	14	38
2 x 2	10.5	11.5	55
2 x 3	12.8	9.2	38
3 x 1	5	17	42
3 x 2	8.4	13.6	60
3 x 3	10.7	11.3	58

MAXIMUM RATINGS

Specification temperature ..... +25°C
Operating temperature ..... -54 to +85°C
Storage temperature ..... -65 to +125°C

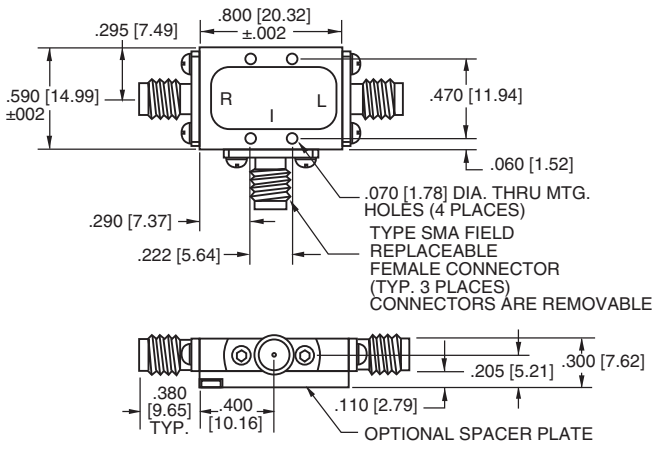
AVAILABLE OPTIONS

Medium/high dynamic range options
M (LO = +13 to +17 dBm), (IP^3 = +18 dBm typ.)
H (LO = +17 to +20 dBm), (IP^3 = +22 dBm typ.)
DMX0418, M, H (Conversion loss = 10 dB max.)
DMX0716, M, H (Conversion loss = 9 dB max.)

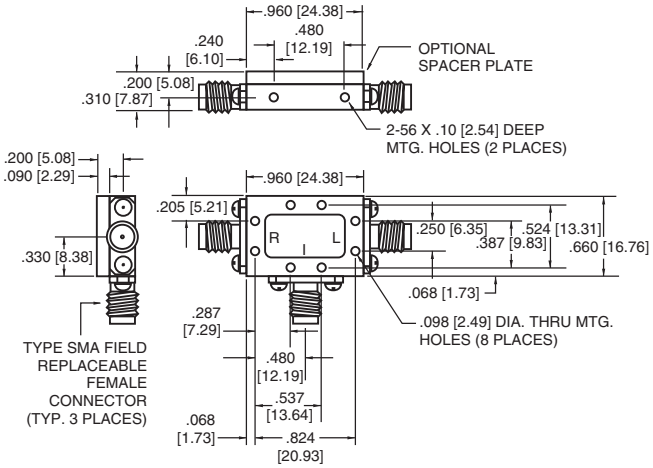
NOTE: Test data supplied at 25°C; conversion loss and LO-to-RF isolation.

OUTLINE DRAWINGS

DMY HOUSING



DMX HOUSING



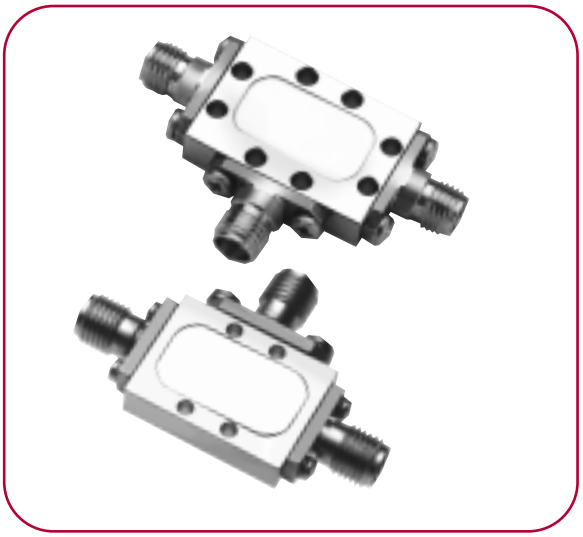
NOTE: All dimensions shown in brackets [ ] are in millimeters.

5 TO 18 GHz DOUBLE-BALANCED MIXER

MODELS: DMX0518L, DMY0518L, DMX0618L AND DMY0618L

FEATURES

- **RF/LO coverage ..... 5 to 18 GHz**
- **IF operation ..... DC to 7 GHz**
- **LO power range ..... +7 to +13 dBm**
- **Conversion loss..... 5 dB typical**
- **LO-to-RF isolation ..... 35 dB typical**
- **Packaging..... Hermetically sealed**



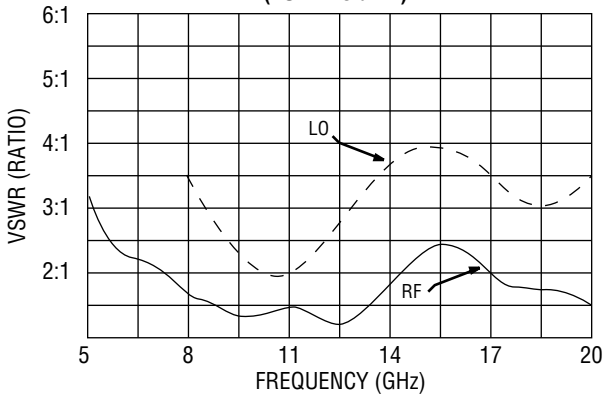
MITEQ's DMX and DMY Series of mixers are constructed using double-tuned microstrip RF and LO baluns with a DC-coupled IF structure. The construction, coupled with the hermetic packaging, provides for high inherent reliability and isolation over an extremely broad frequency range. This device performs as an up- or downconverter covering most EW bands and communication applications. This mixer is also available with medium or high forward voltage diodes (M, H) yielding proportional changes in LO power and spurious performance.

ELECTRICAL SPECIFICATIONS

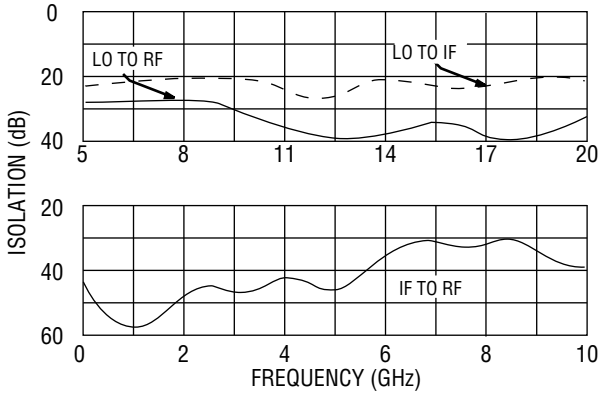
INPUT PARAMETERS	CONDITION	UNITS	MIN.	TYP.	MAX.
RF frequency range		GHz	5		18
RF VSWR (RF = -10 dBm, LO = +10 dBm)	5 to 18 GHz 6 to 18 GHz	Ratio Ratio		2:1 1.75:1	
LO frequency range		GHz	5		18
LO power range		dBm	+7	+10	+13
LO VSWR (LO = +10 dBm)	5 to 18 GHz 6 to 18 GHz	Ratio Ratio		3.5:1 3:1	
TRANSFER CHARACTERISTICS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
Conversion loss (IF = 100 MHz, LO = +10 dBm)	5 to 18 GHz 6 to 18 GHz	dB dB		6 5	8 7
Single-sideband noise figure	6 to 18 GHz	dB		7	8
LO-to-RF isolation	6 to 18 GHz	dB	20	35	
LO-to-IF isolation	6 to 18 GHz	dB	20	35	
IF-to-RF isolation	DC to 8 GHz	dB	20	35	
Input power at 1 dB compression	LO = +10 dBm	dBm	0	+3	
Input two-tone third-order intercept point	LO = +13 dBm	dBm	+10	+13	
OUTPUT PARAMETERS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
IF frequency range	3 dB bandwidth	GHz	DC		7
IF VSWR (IF = -10 dBm, LO = +10 dBm)		Ratio		2:1	

DMX0518L/DMY0518L TYPICAL TEST DATA

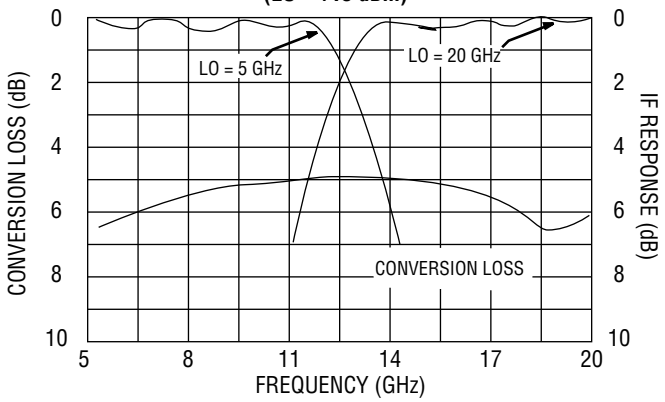
VSWR
(LO = +13 dBm)



ISOLATION



CONVERSION LOSS (IF = 100 MHz)
IF RESPONSE (WITH 5 AND 20 GHz FIXED LO)
(LO = +13 dBm)



SINGLE-TONE (m) RF x (n) LO RELATIVE SPUR LEVEL (dBc)
(AVERAGE MIDBAND RF, LO, IF FREQUENCIES,
RF = -10 dBm, LO = +10 dBm)

SPUR (m) RF x (n) LO	RF TEST FREQ. (GHz)	LO TEST FREQ. (GHz)	SPUR LEVEL (dBc)
1 x 1	11	15	0
1 x 2	14.4	9.2	-36
1 x 3	16.4	6.8	-14
2 x 1	9	14	-45
2 x 2	12	14	-56
2 x 3	15.5	9	-46
3 x 1	7.33	18	-50
3 x 2	8	10	-55
3 x 3	10.66	12	-53

MAXIMUM RATINGS

Specification temperature ..... +25°C
Operating temperature ..... -54 to +85°C
Storage temperature ..... -65 to +125°C

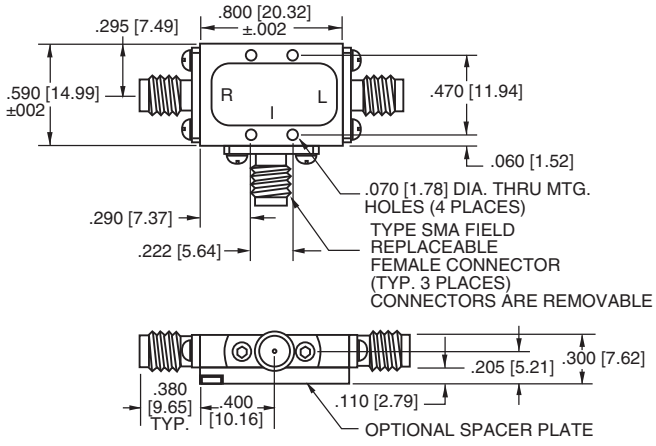
AVAILABLE OPTIONS

Medium/high dynamic range options
M (LO = +13 to +17 dBm), (IP^3 = +18 dBm typ.)
H (LO = +17 to +20 dBm), (IP^3 = +22 dBm typ.)
DMX0518, M, H (Conversion loss = 9 dB max.)
DMX0618, M, H (Conversion loss = 8 dB max.)

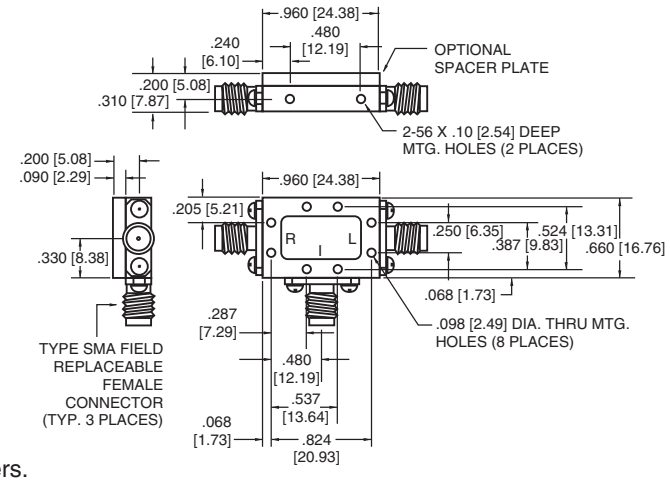
NOTE: Test data supplied at 25°C; conversion loss and LO-to-RF isolation.

OUTLINE DRAWINGS

DMY HOUSING



DMX HOUSING



NOTE: All dimensions shown in brackets [ ] are in millimeters.

5 TO 20 GHz DOUBLE-BALANCED MIXER

MODELS: DM0520LW1

FEATURES

- **RF/LO coverage ..... 5 to 20 GHz**
- **IF operation ..... DC to 7 GHz**
- **LO power range ..... +7 to +13 dBm**
- **Conversion loss..... 6 dB typical**
- **LO-to-RF isolation ..... 30 dB typical**



MITEQ's DM0520 Series of mixers is constructed using double-tuned microstrip RF and LO baluns with a DC-coupled IF structure. The construction, coupled with the hermetic packaging, provides for high inherent reliability and isolation over an extremely broad frequency range. This device performs as an up- or downconverter covering most EW bands and communication applications. This mixer is also available with high forward voltage diodes (H) yielding proportional changes in LO power and spurious performance.

ELECTRICAL SPECIFICATIONS

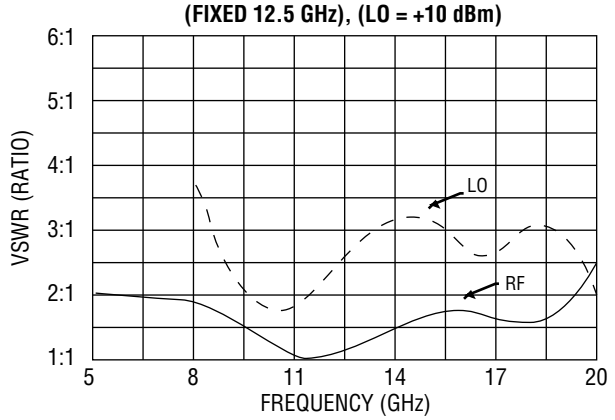
INPUT PARAMETERS	CONDITION	UNITS	MIN.	TYP.	MAX.
RF frequency range		GHz	5		20
RF VSWR (RF = -10 dBm, LO = +10 dBm)	5 to 20 GHz	Ratio		2:1	
LO frequency range		GHz	5		20
LO power range		dBm	+7	+10	+13
LO VSWR (LO = +10 dBm)	5 to 20 GHz	Ratio		3.5:1	
TRANSFER CHARACTERISTICS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
Conversion loss (IF = 100 MHz, LO = +10 dBm)	5 to 20 GHz	dB		6	9
Single-sideband noise figure		dB			9
LO-to-RF isolation		dB	25	30	
LO-to-IF isolation		dB	15	25	
IF-to-RF isolation	DC to 7 GHz	dB	20	40	
Input power at 1 dB compression	LO = +10 dBm	dBm		0	
Input two-tone third-order intercept point	LO = +10 dBm	dBm		+10	
OUTPUT PARAMETERS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
IF frequency range	3 dB bandwidth	GHz	DC		7
IF VSWR (IF = -10 dBm, LO = +10 dBm)		Ratio		2:1	

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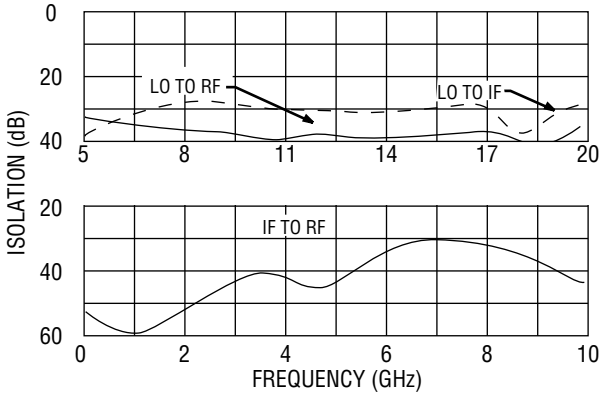
Revised: 08/18/14

DM0520LW1 TYPICAL TEST DATA

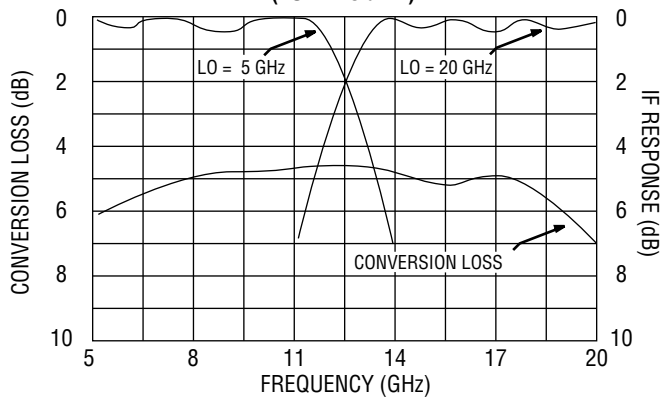
VSWR
(FIXED 12.5 GHz), (LO = +10 dBm)



ISOLATION



CONVERSION LOSS (IF = 100 MHz)
IF RESPONSE (WITH 5 AND 20 GHz FIXED LO)
(LO = +10 dBm)



SINGLE-TONE (m) RF x (n) LO RELATIVE SPUR LEVEL (dBc)
(AVERAGE MIDBAND RF, LO, IF FREQUENCIES,
RF = -10 dBm, LO = +10 dBm)

SPUR (m) RF x (n) LO	RF TEST FREQ. (GHz)	LO TEST FREQ. (GHz)	SPUR LEVEL (dBc)
1 x 1	11	15	0
1 x 2	14.4	9.2	-38
1 x 3	16.4	6.8	-13
2 x 1	9	14	-50
2 x 2	12	14	-55
2 x 3	15.5	9	-46
3 x 1	7.33	18	-56
3 x 2	8	10	-55
3 x 3	10.66	12	-50

MAXIMUM RATINGS

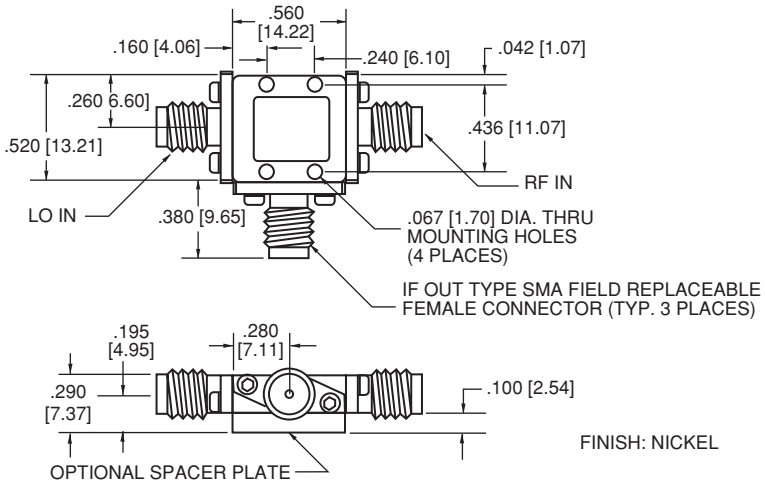
Specification temperature..... +25°C
Operating temperature ..... -54 to +85°C
Storage temperature ..... -65 to +125°C

AVAILABLE OPTIONS

Medium/high dynamic range options
M (LO = +13 to +17 dBm), (IP^3 = +18 dBm)
H (LO = +17 to +20 dBm), (IP^3 = +22 dBm)
DM0520, M, H (Conversion loss = 10 dB max.)

NOTE: Test data supplied at 25°C; conversion loss and LO-to-RF isolation.

OUTLINE DRAWING



NOTE: All dimensions shown in brackets [ ] are in millimeters.

Revised: 08/18/14

8 TO 18 GHz DOUBLE-BALANCED MIXER

MODELS: DM0818LW1

FEATURES

- **RF/LO coverage ..... 8 to 18 GHz**
- **IF operation ..... DC to 7 GHz**
- **LO power range ..... +7 to +13 dBm**
- **Conversion loss..... 6 dB typical**
- **LO-to-RF isolation ..... 30 dB typical**



MITEQ's DM0818 Series of mixers is constructed using double-tuned microstrip RF and LO baluns with a DC-coupled IF structure. The construction, coupled with the hermetic packaging, provides for high inherent reliability and isolation over an extremely broad frequency range. This device performs as an up- or downconverter covering most EW bands and communication applications. This mixer is also available with high forward voltage diodes (H) yielding proportional changes in LO power and spurious performance.

ELECTRICAL SPECIFICATIONS

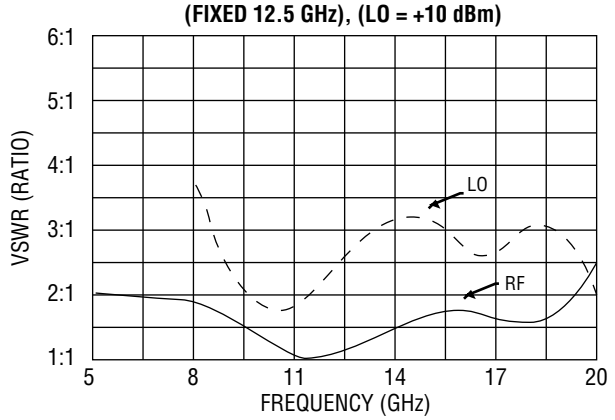
INPUT PARAMETERS	CONDITION	UNITS	MIN.	TYP.	MAX.
RF frequency range		GHz	8		18
RF VSWR (RF = -10 dBm, LO = +10 dBm)	8 to 18 GHz	Ratio		1.5:1	
LO frequency range		GHz	8		18
LO power range		dBm	+7	+10	+13
LO VSWR (LO = +10 dBm)	8 to 18 GHz	Ratio		3:1	
TRANSFER CHARACTERISTICS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
Conversion loss (IF = 100 MHz, LO = +10 dBm)	8 to 18 GHz	dB		6	8
Single-sideband noise figure	8 to 18 GHz	dB			9
LO-to-RF isolation	8 to 18 GHz	dB	25	30	
LO-to-IF isolation	8 to 18 GHz	dB	15	25	
IF-to-RF isolation	DC to 7 GHz	dB	20	40	
Input power at 1 dB compression	LO = +10 dBm	dBm		0	
Input two-tone third-order intercept point	LO = +10 dBm	dBm		+10	
OUTPUT PARAMETERS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
IF frequency range	3 dB bandwidth	GHz	DC		7
IF VSWR (IF = -10 dBm, LO = +10 dBm)		Ratio		2:1	

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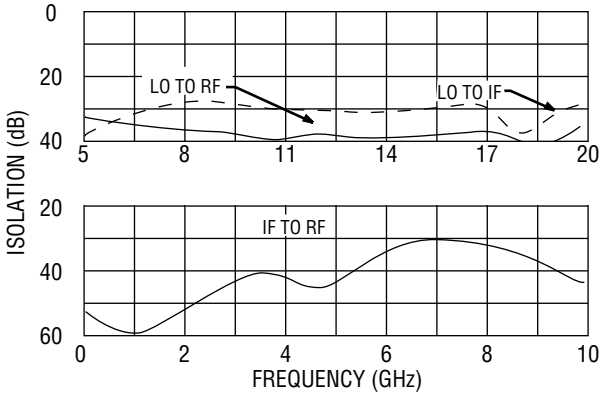
Revised: 08/19/14

DM0818LW1 TYPICAL TEST DATA

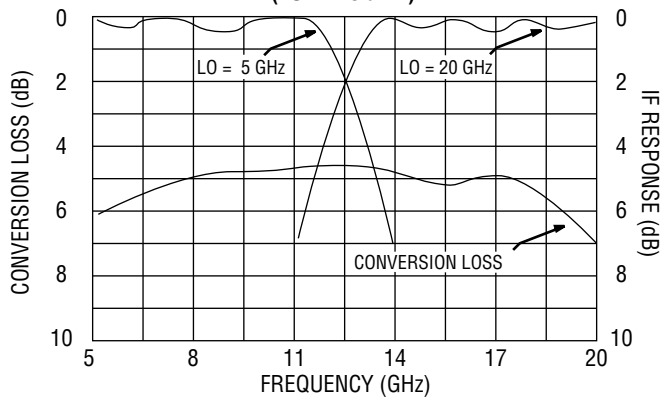
VSWR
(FIXED 12.5 GHz), (LO = +10 dBm)



ISOLATION



CONVERSION LOSS (IF = 100 MHz)
IF RESPONSE (WITH 5 AND 20 GHz FIXED LO)
(LO = +10 dBm)



SINGLE-TONE (m) RF x (n) LO RELATIVE SPUR LEVEL (dBc)
(AVERAGE MIDBAND RF, LO, IF FREQUENCIES,
RF = -10 dBm, LO = +10 dBm)

SPUR (m) RF x (n) LO	RF TEST FREQ. (GHz)	LO TEST FREQ. (GHz)	SPUR LEVEL (dBc)
1 x 1	11	15	0
1 x 2	14.4	9.2	-38
1 x 3	16.4	6.8	-13
2 x 1	9	14	-50
2 x 2	12	14	-55
2 x 3	15.5	9	-46
3 x 1	7.33	18	-56
3 x 2	8	10	-55
3 x 3	10.66	12	-50

MAXIMUM RATINGS

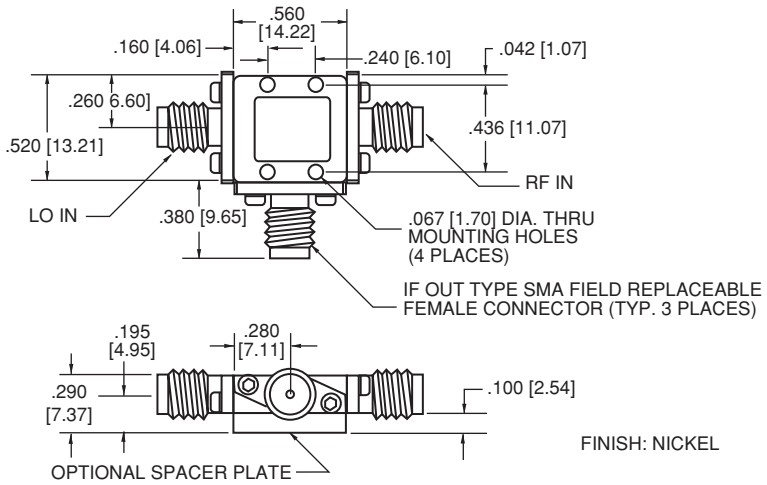
Specification temperature..... +25°C
Operating temperature ..... -54 to +85°C
Storage temperature ..... -65 to +125°C

AVAILABLE OPTIONS

Medium/high dynamic range options
M (LO = +13 to +17 dBm), (IP^3 = +18 dBm)
H (LO = +17 to +20 dBm), (IP^3 = +22 dBm)
DM0818, M, H (Conversion loss = 8 dB max.)

NOTE: Test data supplied at 25°C; conversion loss and LO-to-RF isolation.

OUTLINE DRAWINGS



NOTE: All dimensions shown in brackets [ ] are in millimeters.

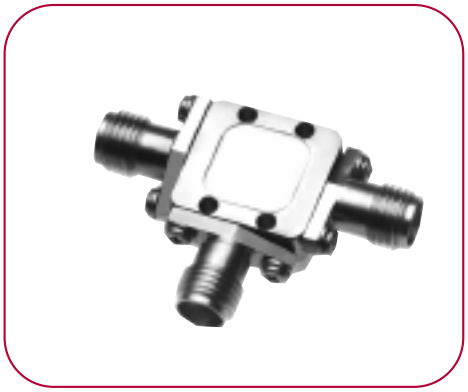
Revised: 08/19/14

2 TO 5 GHz DOUBLE-BALANCED MIXER

MODEL: M0205W1

FEATURES

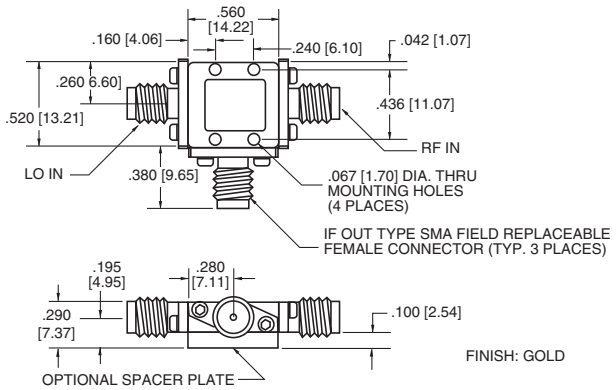
- **RF/LO coverage ..... 2 to 5 GHz**
- **IF operation ..... DC to 3 GHz**
- **LO power range ..... +13 to +17 dBm**
- **Packaging ..... Hermetically sealed**



ELECTRICAL SPECIFICATIONS

INPUT PARAMETERS	CONDITION	UNITS	MIN.	TYP.	MAX.
RF frequency range		GHz	2		5
RF VSWR	LO = +15 dBm	Ratio		3.5:1	
LO frequency range		GHz	2		5
LO power range		dBm	+13		+17
LO VSWR	LO = +15 dBm	Ratio		3.5:1	
TRANSFER CHARACTERISTICS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
Conversion loss (IF = 100 MHz)	LO = +15 dBm	dB		8	10.5
Single-sideband noise figure at 25°C	LO = +15 dBm	dB		8.5	
LO-to-RF isolation	LO = +15 dBm	dB	30	40	
LO-to-IF isolation		dB		30	
RF-to-IF isolation		dB		10	
Input power at 1 dB compression	LO = +15 dBm	dBm		+5	
Input two-tone third-order intercept point	LO = +15 dBm	dBm		+15	
OUTPUT PARAMETERS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
IF frequency range	3 dB bandwidth	GHz	DC		3
IF VSWR		Ratio		3.5:1	

OUTLINE DRAWING



NOTE: All dimensions shown in brackets [ ] are in millimeters.

MAXIMUM RATINGS

Specification temperature..... +25°C
Operating temperature ..... -54 to +85°C
Storage temperature ..... -65 to +125°C

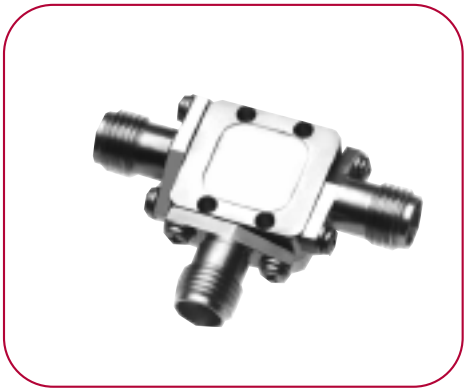
NOTE: Test data supplied at 25°C;
conversion loss and LO-to-RF isolation.

4 TO 8 GHz DOUBLE-BALANCED MIXER

MODEL: M0408W1

FEATURES

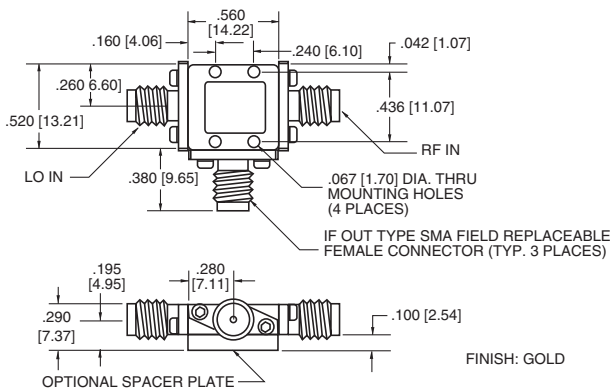
- **RF/LO coverage ..... 4 to 8 GHz**
- **IF operation ..... DC to 3 GHz**
- **LO power range ..... +13 to +17 dBm**
- **Packaging ..... Hermetically sealed**



ELECTRICAL SPECIFICATIONS

INPUT PARAMETERS	CONDITION	UNITS	MIN.	TYP.	MAX.
RF frequency range		GHz	4		8
RF VSWR	LO = +15 dBm	Ratio		3:1	
LO frequency range		GHz	4		8
LO power range		dBm	+13		+17
LO VSWR	LO = +15 dBm	Ratio		3.25:1	
TRANSFER CHARACTERISTICS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
Conversion loss (IF = 100 MHz)	LO = +15 dBm	dB		8	9.5
Single-sideband noise figure at 25°C	LO = +15 dBm	dB		8.5	
LO-to-RF isolation	LO = +15 dBm	dB	28	35	
LO-to-IF isolation		dB		35	
RF-to-IF isolation		dB		12	
Input power at 1 dB compression	LO = +15 dBm	dBm		+5	
Input two-tone third-order intercept point	LO = +15 dBm	dBm		+15	
OUTPUT PARAMETERS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
IF frequency range	3 dB bandwidth	GHz	DC		3
IF VSWR		Ratio		2.75:1	

OUTLINE DRAWING



NOTE: All dimensions shown in brackets [ ] are in millimeters.

MAXIMUM RATINGS

Specification temperature ..... +25°C
Operating temperature ..... -54 to +85°C
Storage temperature ..... -65 to +125°C

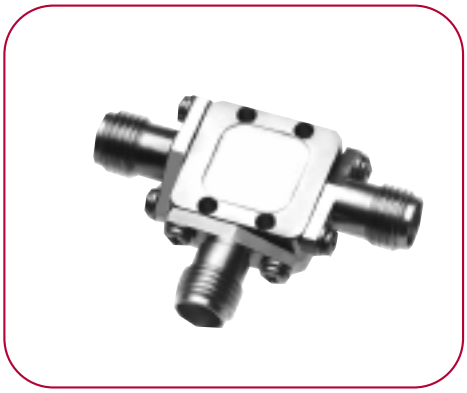
NOTE: Test data supplied at 25°C;
conversion loss and LO-to-RF isolation.

6 TO 18 GHz DOUBLE-BALANCED MIXER

MODEL: M0618W1

FEATURES

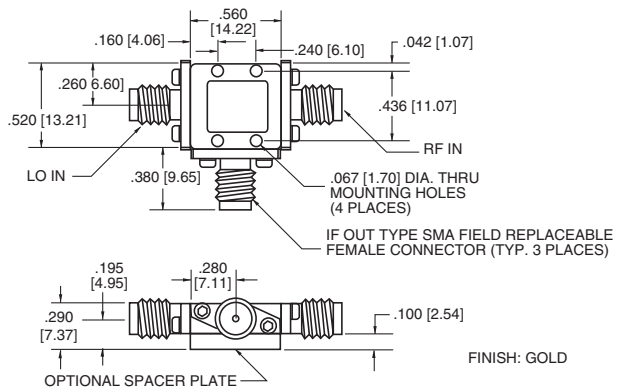
- **RF/LO coverage ..... 6 to 18 GHz**
- **IF operation ..... DC to 6 GHz**
- **LO power range ..... +17 to +23 dBm**
- **Packaging ..... Hermetically sealed**



ELECTRICAL SPECIFICATIONS

INPUT PARAMETERS	CONDITION	UNITS	MIN.	TYP.	MAX.
RF frequency range		GHz	6		18
RF VSWR	LO = +20 dBm	Ratio		3:1	
LO frequency range		GHz	6		18
LO power range		dBm	+17		+23
LO VSWR	LO = +20 dBm	Ratio		2.75:1	
TRANSFER CHARACTERISTICS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
Conversion loss (IF = 1 GHz)	LO = +20 dBm	dB		10	13
Single-sideband noise figure at 25°C	LO = +20 dBm	dB		10.5	
LO-to-RF isolation	LO = +20 dBm	dB	20	25	
LO-to-IF isolation		dB		15	
RF-to-IF isolation		dB		12	
Input power at 1 dB compression	LO = +20 dBm	dBm		+12	
Input two-tone third-order intercept point	LO = +20 dBm	dBm		+22	
OUTPUT PARAMETERS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
IF frequency range	3 dB bandwidth	GHz	DC		6
IF VSWR		Ratio		2.75:1	

OUTLINE DRAWING



NOTE: All dimensions shown in brackets [ ] are in millimeters.

MAXIMUM RATINGS

Specification temperature..... +25°C
Operating temperature ..... -54 to +85°C
Storage temperature ..... -65 to +125°C

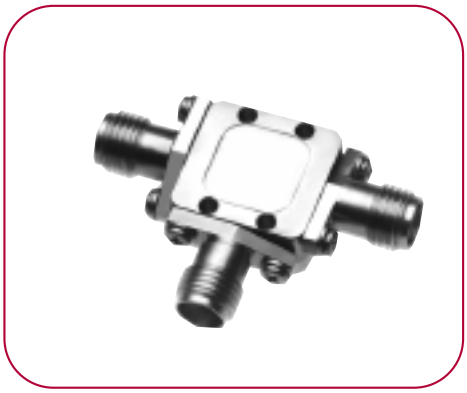
NOTE: Test data supplied at 25°C;
conversion loss and LO-to-RF isolation.

5 TO 20 GHz DOUBLE-BALANCED MIXER

MODEL: M0520W1

FEATURES

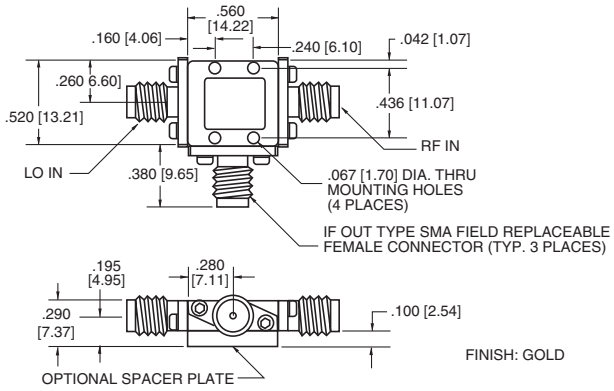
- **RF/LO coverage ..... 5 to 20 GHz**
- **IF operation ..... DC to 3 GHz**
- **LO power range ..... +17 to +23 dBm**
- **Packaging ..... Hermetically sealed**



ELECTRICAL SPECIFICATIONS

INPUT PARAMETERS	CONDITION	UNITS	MIN.	TYP.	MAX.
RF frequency range		GHz	5		20
RF VSWR	LO = +20 dBm	Ratio		2.75:1	
LO frequency range		GHz	5		20
LO power range		dBm	+17		+23
LO VSWR	LO = +20 dBm	Ratio		2.75:1	
TRANSFER CHARACTERISTICS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
Conversion loss (IF = 1 GHz)	LO = +20 dBm	dB		10	13
Single-sideband noise figure at 25°C	LO = +20 dBm	dB		10.5	
LO-to-RF isolation	LO = +20 dBm	dB	25	30	
LO-to-IF isolation		dB		15	
RF-to-IF isolation		dB		15	
Input power at 1 dB compression	LO = +20 dBm	dBm		+10	
Input two-tone third-order intercept point	LO = +20 dBm	dBm		+20	
OUTPUT PARAMETERS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
IF frequency range	3 dB bandwidth	GHz	DC		3
IF VSWR		Ratio		2.5:1	

OUTLINE DRAWING



NOTE: All dimensions shown in brackets [ ] are in millimeters.

MAXIMUM RATINGS

Specification temperature..... +25°C
Operating temperature ..... -54 to +85°C
Storage temperature ..... -65 to +125°C

NOTE: Test data supplied at 25°C;
conversion loss and LO-to-RF isolation.

18 TO 26 GHz DOUBLE-BALANCED MIXER

MODEL: M1826W1

FEATURES

- **RF/LO coverage ..... 18 to 26 GHz**
- **IF operation ..... DC to 8 GHz**
- **Input IP^3 ..... +14 dBm**
- **LO power range ..... +10 to +15 dBm**
- **Packaging ..... Hermetically sealed**

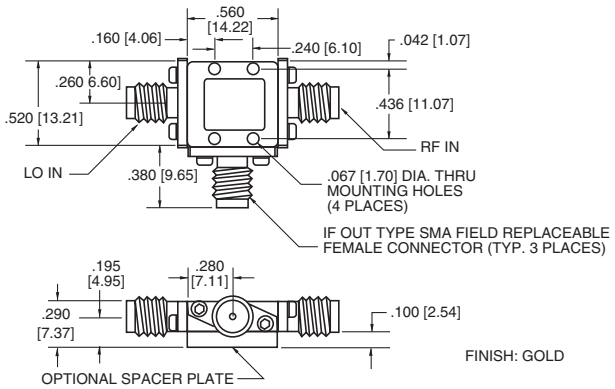


ELECTRICAL SPECIFICATIONS

INPUT PARAMETERS	CONDITION	UNITS	MIN.	TYP.	MAX.
RF frequency range		GHz	18		26
RF VSWR	RF = -10 dBm	Ratio		2.75:1	
LO frequency range		GHz	18		26
LO power range		dBm	+10		+15
LO VSWR		Ratio		2.75:1	
TRANSFER CHARACTERISTICS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
Conversion loss (IF = 1 GHz)	LO = +13 dBm	dB		9	12
Single-sideband noise figure at 25°C		dB		9.5	
LO-to-RF isolation		dB	25	35	
LO-to-IF isolation		dB	20	30	
RF-to-IF isolation		dB		20	
Input power 1 dB compression point	LO = +13 dBm	dBm		+7	
Input two-tone third-order intercept point	LO = +13 dBm	dBm		+14	
OUTPUT PARAMETERS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
IF frequency range at 3 dB bandwidth	LO = +13 dBm	GHz	DC		8
IF VSWR	IF = -10 dBm	Ratio		3:1	

NOTE: Test data supplied at 25°C;
conversion loss and LO-to-RF isolation.

OUTLINE DRAWING



NOTE: All dimensions shown in brackets [ ] are in millimeters.

MAXIMUM RATINGS

Specification temperature..... +25°C
Operating temperature ..... -54 to +85°C
Storage temperature ..... -65 to +125°C

**TYPICAL SINGLE-TONE (m) RF x (n)
LO RELATIVE SPUR LEVEL (dBc)
TO REF (RF = -10 dBm, LO = +13 dBm)**

RF HARMONIC (m)					
4		>110	>110	>110
3		92	68	85
2	69	76	75	
1	REF	58		
		2	3	4

LO HARMONIC (n)

26 TO 40 GHz DOUBLE-BALANCED MIXER

MODEL: M2640W1

FEATURES

- **RF/LO coverage ..... 26 to 40 GHz**
- **IF operation ..... DC to 12 GHz**
- **Input IP^3 ..... +18 dBm**
- **LO power range ..... +10 to +15 dBm**
- **Packaging ..... Hermetically sealed**

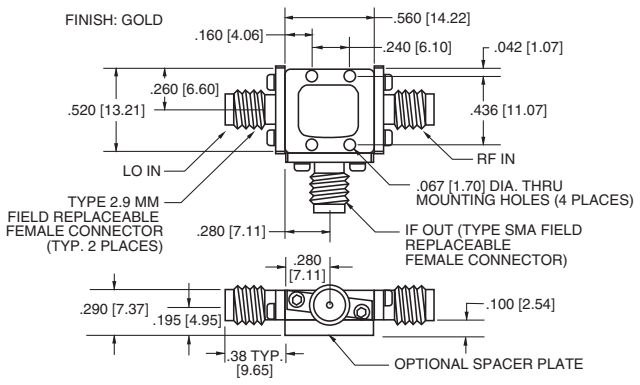


ELECTRICAL SPECIFICATIONS

INPUT PARAMETERS	CONDITION	UNITS	MIN.	TYP.	MAX.
RF frequency range		GHz	26		40
RF VSWR (LO = +13 dBm, RF = -10 dBm)		Ratio		2.75:1	
LO frequency range		GHz	26		40
LO power range		dBm	+10	+13	+15
LO VSWR (LO = +13 dBm)		Ratio		2.75:1	
TRANSFER CHARACTERISTICS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
Conversion loss (IF = 1 GHz)	LO = +13 dBm	dB		10	12
Single-sideband noise figure at 25°C		dB		10.5	
LO-to-RF isolation		dB	28	35	
LO-to-IF isolation		dB		30	
RF-to-IF isolation		dB		25	
Input power at 1 dB compression point	LO = +13 dBm	dBm		+10	
Input two-tone third-order intercept point	LO = +13 dBm	dBm		+18	
OUTPUT PARAMETERS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
IF frequency range at -3 dB bandwidth	LO = +13 dBm	GHz	DC		12
IF VSWR	LO = +13 dBm	Ratio		3:1	

NOTE: Test data supplied at 25°C;
conversion loss and LO-to-RF isolation.

OUTLINE DRAWING



NOTE: All dimensions shown in brackets [ ] are in millimeters.

MAXIMUM RATINGS

Specification temperature ..... +25°C
Operating temperature ..... -54 to +85°C
Storage temperature ..... -65 to +125°C

TYPICAL SINGLE-TONE (m) RF x (n) LO RELATIVE SPUR LEVEL (dBc) TO REF (RF = -10 dBm, LO = +13 dBm)

RF HARMONIC (m)					
4			72	74	
3		71	69	70	
2	68	56	66		
1	REF	40			
	1	2	3	4	

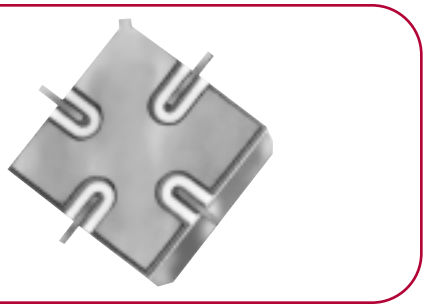
LO HARMONIC (n)

2 TO 5 GHz DOUBLE-BALANCED MIXER

MODELS: M0205W3 AND M0205W8

FEATURES

- RF/LO coverage ..... 2 to 5 GHz
- IF operation ..... DC to 3 GHz
- LO power range ..... +13 to +17 dBm
- Packaging ..... Hermetically sealed
- Surface mount



ELECTRICAL SPECIFICATIONS

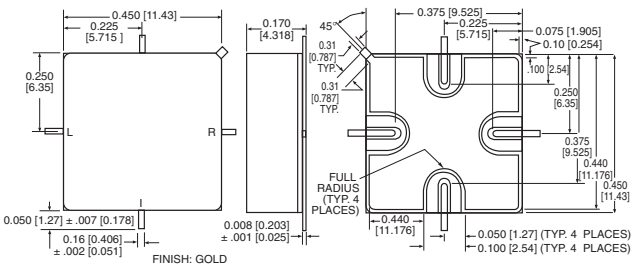
INPUT PARAMETERS	CONDITION	UNITS	MIN.	TYP.	MAX.
RF frequency range		GHz	2		5
RF VSWR	LO = +15 dBm	Ratio		3.75:1	
LO frequency range		GHz	2		5
LO power range		dBm	+13		+17
LO VSWR	LO = +15 dBm	Ratio		3.75:1	
TRANSFER CHARACTERISTICS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
Conversion loss (IF = 100 MHz)	LO = +15 dBm	dB		8	11
Single-sideband noise figure at 25°C	LO = +15 dBm	dB		8.5	
LO-to-RF isolation	LO = +15 dBm	dB	30	40	
LO-to-IF isolation		dB		30	
RF-to-IF isolation		dB		10	
Input power 1 dB compression point	LO = +15 dBm	dBm		+5	
Input two-tone third-order intercept point	LO = +15 dBm	dBm		+15	
OUTPUT PARAMETERS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
IF frequency range	3 dB bandwidth	GHz	DC		3
IF VSWR		Ratio		3.75:1	

NOTE: Test data supplied at 25°C;
conversion loss and LO-to-RF isolation.

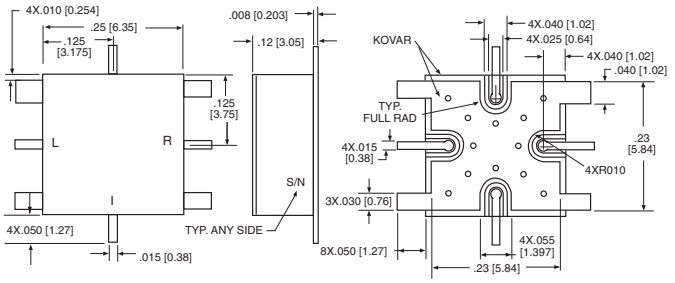
MAXIMUM RATINGS
Specification temperature..... +25°C
Operating temperature ..... -54 to +85°C
Storage temperature ..... -65 to +125°C

OUTLINE DRAWINGS

W3 HOUSING



W8 HOUSING



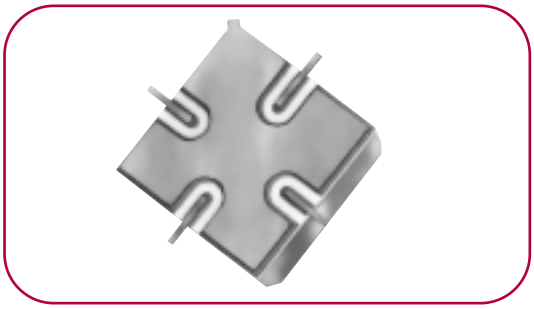
NOTE: All dimensions shown in brackets [ ] are in millimeters.

4 TO 8 GHz DOUBLE-BALANCED MIXER

MODELS: M0408W3 AND M0408W8

FEATURES

- **RF/LO coverage ..... 4 to 8 GHz**
- **IF operation ..... DC to 3 GHz**
- **LO power range ..... +13 to +17 dBm**
- **Packaging ..... Hermetically sealed**
- **Surface mount**



ELECTRICAL SPECIFICATIONS

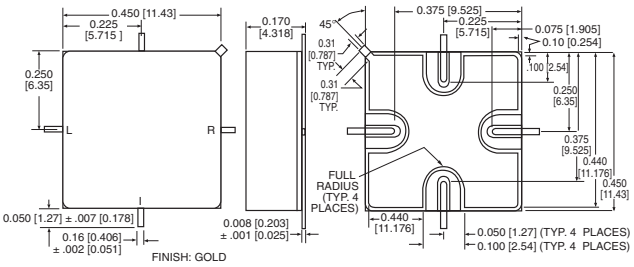
INPUT PARAMETERS	CONDITION	UNITS	MIN.	TYP.	MAX.
RF frequency range		GHz	4		8
RF VSWR	LO = +15 dBm	Ratio		3.25:1	
LO frequency range		GHz	4		8
LO power range		dBm	+13		+17
LO VSWR	LO = +15 dBm	Ratio		3.5:1	
TRANSFER CHARACTERISTICS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
Conversion loss (IF = 100 MHz)	LO = +15 dBm	dB		8	10
Single-sideband noise figure at 25°C	LO = +15 dBm	dB		8.5	
LO-to-RF isolation	LO = +15 dBm	dB	28	35	
LO-to-IF isolation		dB		35	
RF-to-IF isolation		dB		12	
Input power 1 dB compression point	LO = +15 dBm	dBm		+5	
Input two-tone third-order intercept point	LO = +15 dBm	dBm		+15	
OUTPUT PARAMETERS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
IF frequency range	3 dB bandwidth	GHz	DC		3
IF VSWR		Ratio		3:1	

NOTE: Test data supplied at 25°C;
conversion loss and LO-to-RF isolation.

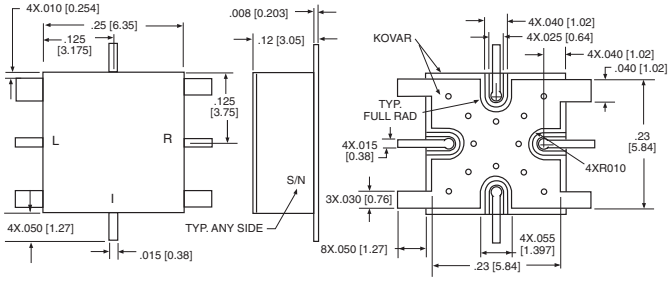
MAXIMUM RATINGS
Specification temperature..... +25°C
Operating temperature ..... -54 to +85°C
Storage temperature ..... -65 to +125°C

OUTLINE DRAWINGS

W3 HOUSING



W8 HOUSING



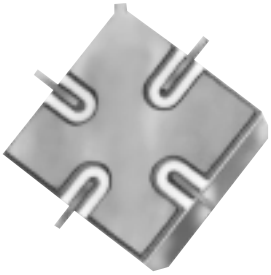
NOTE: All dimensions shown in brackets [ ] are in millimeters.

6 TO 18 GHz DOUBLE-BALANCED MIXER

MODELS: M0618W3 AND M0618W8

FEATURES

- **RF/LO coverage ..... 6 to 18 GHz**
- **IF operation ..... DC to 6 GHz**
- **LO power range ..... +17 to +23 dBm**
- **Packaging ..... Hermetically sealed**
- **Surface mount**



ELECTRICAL SPECIFICATIONS

INPUT PARAMETERS	CONDITION	UNITS	MIN.	TYP.	MAX.
RF frequency range		GHz	6		18
RF VSWR	LO = +20 dBm	Ratio		3.25:1	
LO frequency range		GHz	6		18
LO power range		dBm	+17		+23
LO VSWR	LO = +20 dBm	Ratio		3:1	
TRANSFER CHARACTERISTICS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
Conversion loss (IF = 1 GHz)	LO = +20 dBm	dB		10	13.5
Single-sideband noise figure at 25°C	LO = +20 dBm	dB		10.5	
LO-to-RF isolation	LO = +20 dBm	dB	20	25	
LO-to-IF isolation		dB		15	
RF-to-IF isolation		dB		12	
Input power 1 dB compression point	LO = +20 dBm	dBm		+12	
Input two-tone third-order intercept point	LO = +20 dBm	dBm		+22	
OUTPUT PARAMETERS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
IF frequency range	3 dB bandwidth	GHz	DC		6
IF VSWR		Ratio		3:1	

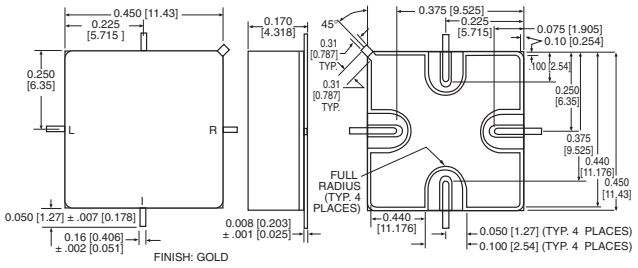
NOTE: Test data supplied at 25°C;
conversion loss and LO-to-RF isolation.

MAXIMUM RATINGS

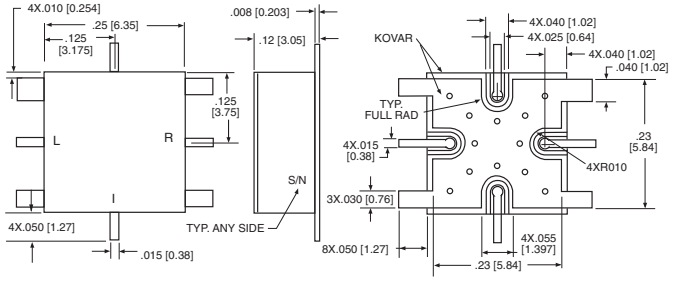
Specification temperature..... +25°C
Operating temperature ..... -54 to +85°C
Storage temperature ..... -65 to +125°C

OUTLINE DRAWINGS

W3 HOUSING



W8 HOUSING



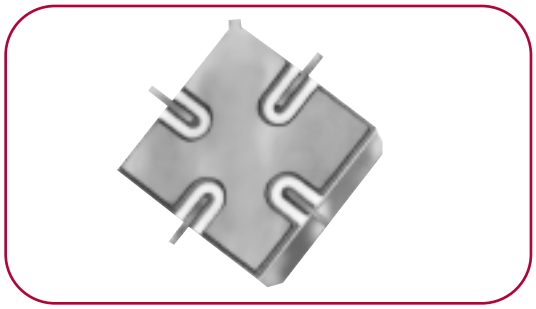
NOTE: All dimensions shown in brackets [ ] are in millimeters.

5 TO 20 GHz DOUBLE-BALANCED MIXER

MODELS: M0520W3 AND M0520W8

FEATURES

- **RF/LO coverage ..... 5 to 20 GHz**
- **IF operation ..... DC to 3 GHz**
- **LO power range ..... +17 to +23 dBm**
- **Packaging..... Hermetically sealed**
- **Surface mount**



ELECTRICAL SPECIFICATIONS

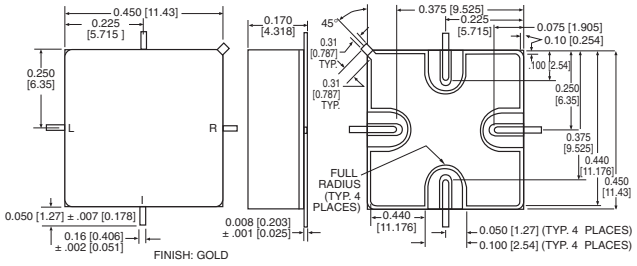
INPUT PARAMETERS	CONDITION	UNITS	MIN.	TYP.	MAX.
RF frequency range		GHz	5		20
RF VSWR	LO = +20 dBm	Ratio		3:1	
LO frequency range		GHz	5		20
LO power range		dBm	+17		+23
LO VSWR	LO = +20 dBm	Ratio		3:1	
TRANSFER CHARACTERISTICS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
Conversion loss (IF = 1 GHz)	LO = +20 dBm	dB		10	13.5
Single-sideband noise figure at 25°C	LO = +20 dBm	dB		10.5	
LO-to-RF isolation	LO = +20 dBm	dB	25	30	
LO-to-IF isolation		dB		15	
RF-to-IF isolation		dB		15	
Input power 1 dB compression point	LO = +20 dBm	dBm		+10	
Input two-tone third-order intercept point	LO = +20 dBm	dBm		+20	
OUTPUT PARAMETERS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
IF frequency range	3 dB bandwidth	GHz	DC		3
IF VSWR		Ratio		2.75:1	

NOTE: Test data supplied at 25°C;
conversion loss and LO-to-RF isolation.

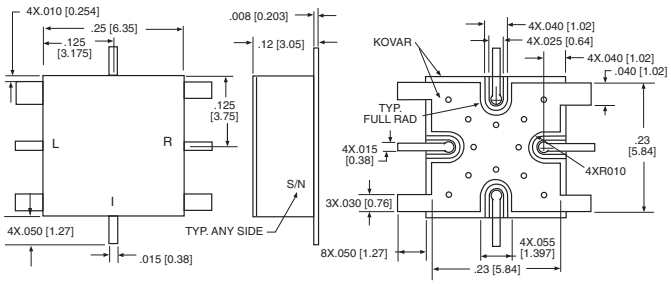
MAXIMUM RATINGS
Specification temperature..... +25°C
Operating temperature ..... -54 to +85°C
Storage temperature ..... -65 to +125°C

OUTLINE DRAWINGS

W3 HOUSING



W8 HOUSING



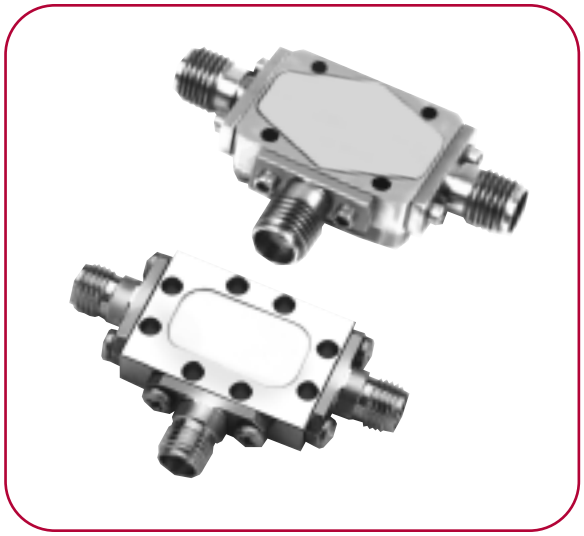
NOTE: All dimensions shown in brackets [ ] are in millimeters.

2 TO 8 GHz TRIPLE-BALANCED MIXER

MODELS: TB0208LW2 AND TB0208LA1

FEATURES

- **RF/LO coverage..... 2 to 8 GHz**
- **IF operation..... 0.5 to 8 GHz**
- **LO power range..... +10 to +15 dBm**
- **Input 1 dB comp. ..... +5 dBm typical**
- **Packaging ..... Hermetically sealed**



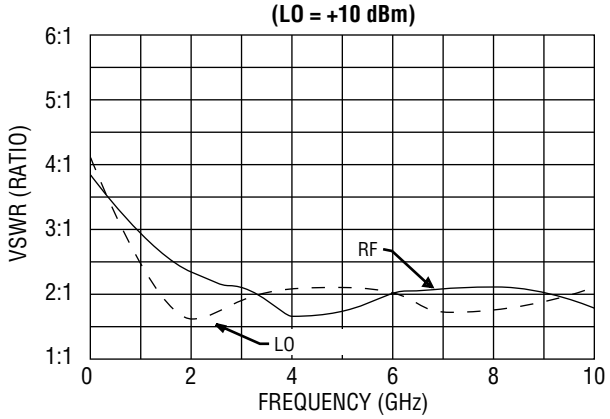
MITEQ's triple-balanced TB0208L mixer series utilizes a dual-quad circuit to provide performance in overlapping RF and IF frequency ranges. In addition to extremely broadband operation, custom-processed diodes allow for minimal variation in conversion loss, extremely high third-order intercept and 1 dB compression points versus input LO power range. Options for various drive level diodes provide numerous combinations of intercept point and LO level. This device performs as an up- or downconverter.

ELECTRICAL SPECIFICATIONS

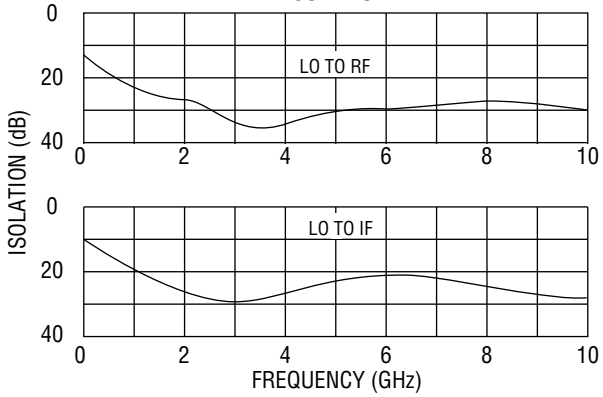
INPUT PARAMETERS	CONDITION	UNITS	MIN.	TYP.	MAX.
RF frequency range		GHz	2		8
RF VSWR (RF = -10 dBm, LO = +10 dBm)	2 to 8 GHz	Ratio		2.5:1	
LO frequency range		GHz	2		8
LO power range		dBm	+10	+13	+15
LO VSWR (LO = +10 dBm)	2 to 8 GHz	Ratio		2.5:1	
TRANSFER CHARACTERISTICS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
Conversion loss (IF = 1000 MHz, LO = +10 dBm)	2 to 8 GHz	dB		7	9
Single-sideband noise figure	2 to 8 GHz	dB			10
LO-to-RF isolation	2 to 8 GHz	dB	20	25	
LO-to-IF isolation	2 to 8 GHz	dB		20	
RF-to-IF isolation	2 to 8 GHz	dB		20	
Input power at 1 dB compression	LO = +13 dBm	dBm		+5	
Input two-tone third-order intercept point	LO = +13 dBm	dBm		+15	
OUTPUT PARAMETERS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
IF frequency range	3 dB bandwidth	GHz	0.5		8
IF VSWR (IF = -10 dBm, LO = +10 dBm)		Ratio		2:1	

TB0208LW2/A1 TYPICAL TEST DATA

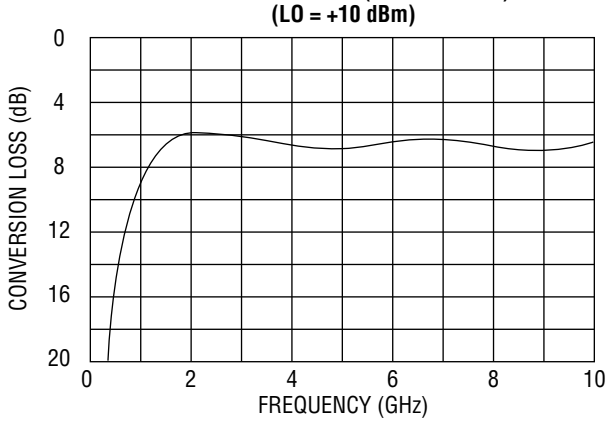
VSWR
(LO = +10 dBm)



ISOLATION



CONVERSION LOSS (IF = 1000 MHz)
(LO = +10 dBm)



SINGLE-TONE (m) RF x (n) LO RELATIVE SPUR LEVEL (dBc)
(AVERAGE MIDBAND RF, LO, IF FREQUENCIES,
RF = -10 dBm, LO = +13 dBm)

SPUR (m) RF x (n) LO	RF TEST FREQ. (GHz)	LO TEST FREQ. (GHz)	SPUR LEVEL (dBc)
1 x 1	7	6	REF
1 x 2	7	3	26
1 x 3	7	2	12
2 x 1	3.5	6	46
2 x 2	3.5	3	52
2 x 3	3.5	2	46
3 x 1	2.33	6	58
3 x 2	2.33	3	63
3 x 3	2.33	2	59

MAXIMUM RATINGS

Specification temperature..... +25°C
Operating temperature ..... -54 to +85°C
Storage temperature ..... -65 to +125°C

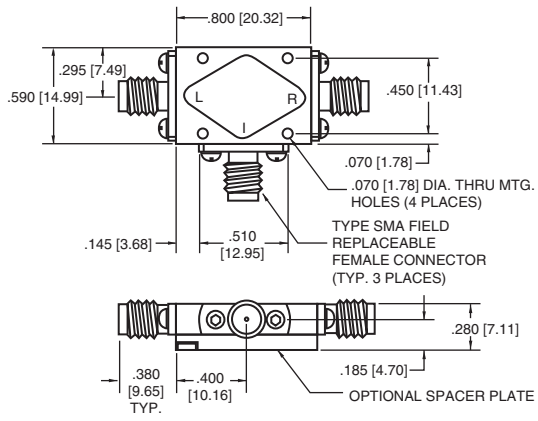
AVAILABLE OPTION

Medium/high dynamic range options
M (LO = +15 to +20 dBm), (IP^3 = +18 dBm typ.)
H (LO = +20 to +23 dBm), (IP^3 = +25 dBm typ.)
M, H (Conversion loss = 10 dB max.)

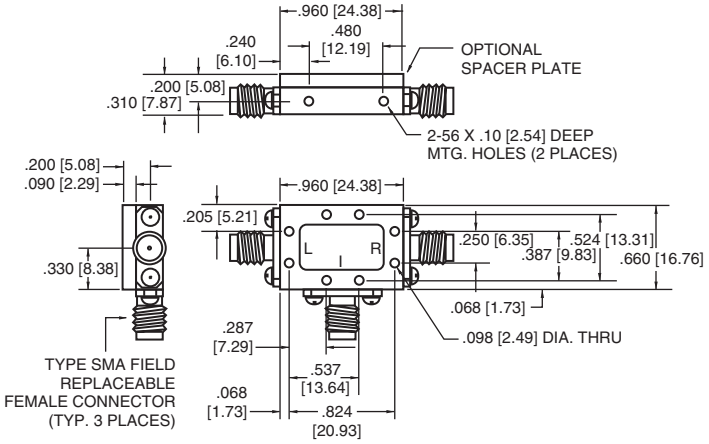
NOTE: Test data supplied at 25°C; conversion loss and LO-to-RF isolation.

OUTLINE DRAWINGS

W2 HOUSING



A1 HOUSING



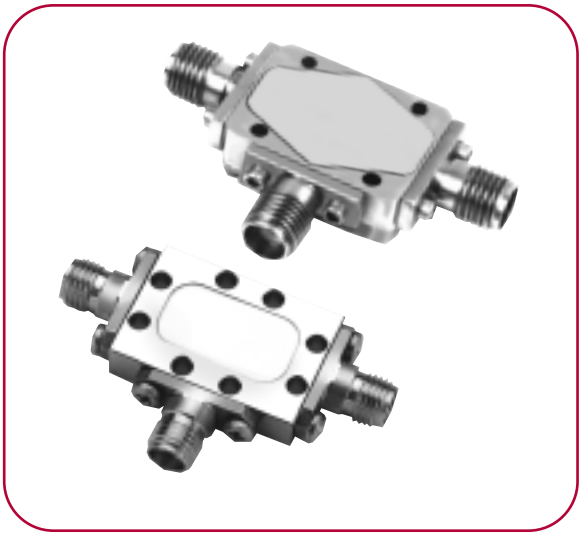
NOTE: All dimensions shown in brackets [ ] are in millimeters.

2 TO 18 GHz TRIPLE-BALANCED MIXER

MODELS: TB0218LW2 AND TB0218LA1

FEATURES

- **RF/LO coverage ..... 2 to 18 GHz**
- **IF operation ..... 0.5 to 8 GHz**
- **High LO-to-RF isolation**
- **Low RF/LO VSWR**
- **High 1 dB compression point**
- **Removable SMA connectors**



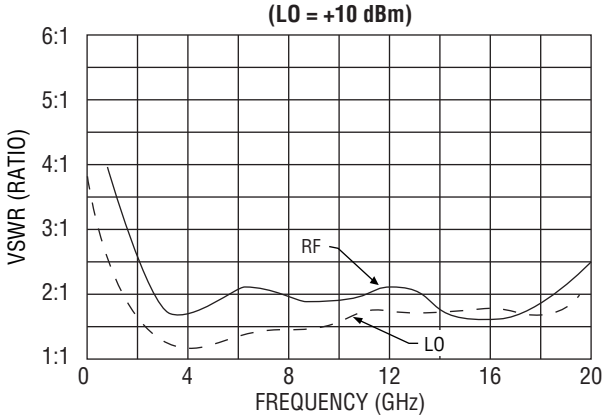
MITEQ's triple-balanced TB0218L mixer series utilizes a dual-quad circuit to provide performance in overlapping RF and IF frequency ranges. In addition to extremely broadband operation, custom-processed diodes allow for minimal variation in conversion loss, extremely high third-order intercept and 1 dB compression points versus input LO power range. Options for various drive level diodes provide numerous combinations of intercept point and LO level. This device performs as an up- or downconverter.

ELECTRICAL SPECIFICATIONS

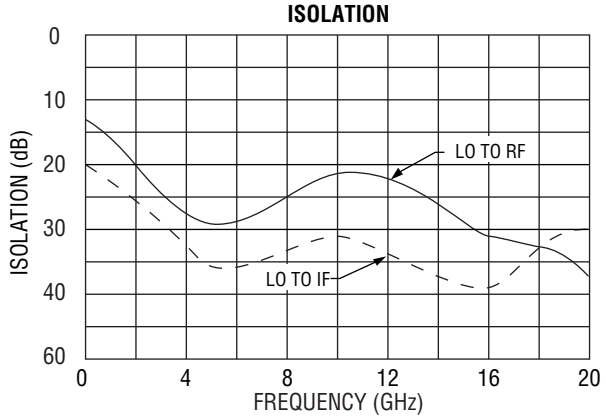
INPUT PARAMETERS	CONDITION	UNITS	MIN.	TYP.	MAX.
RF frequency range		GHz	2		18
RF VSWR (RF = -10 dBm, LO = +10 dBm)	2 to 18 GHz	Ratio		2.5:1	
LO frequency range		GHz	2		18
LO power range		dBm	+10	+13	+15
LO VSWR (LO = +10 dBm)	2 to 18 GHz	Ratio		2.5:1	
TRANSFER CHARACTERISTICS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
Conversion loss (IF = 1000 MHz, LO = +10 dBm)	2 to 18 GHz	dB		7.5	9.5
Single-sideband noise figure	2 to 18 GHz	dB			10
LO-to-RF isolation	2 to 18 GHz	dB	20	25	
LO-to-IF isolation	2 to 18 GHz	dB		20	
RF-to-IF isolation	2 to 18 GHz	dB		20	
Input power at 1 dB compression	LO = +10 dBm	dBm	+3		
Input two-tone third-order intercept point	LO = +10 dBm	dBm	+13	+15	
OUTPUT PARAMETERS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
IF frequency range	3 dB bandwidth	GHz	0.5		8
IF VSWR (IF = -10 dBm, LO = +10 dBm)		Ratio		2:1	

TB0218LW2/A1 TYPICAL TEST DATA

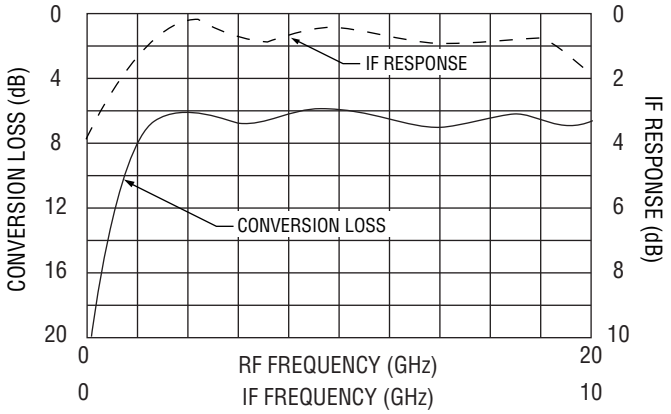
VSWR
(LO = +10 dBm)



ISOLATION



CONVERSION LOSS (IF = 1000 MHz)
RELATIVE IF RESPONSE



SINGLE-TONE (m) RF x (n) LO RELATIVE SPUR LEVEL (dBc)
TO REF (RF = -10 dBm, LO = +13 dBm)

RF HARMONIC (m)

5	> 85	> 85	> 85	> 85	> 85
4	80	> 85	80	> 85	> 85
3	58	63	59	70	63
2	46	52	46	56	47
1	REF	26	12	33	22
	1	2	3	4	5

LO HARMONIC (n)

MAXIMUM RATINGS

Specification temperature..... +25°C
Operating temperature ..... -54 to +85°C
Storage temperature ..... -65 to +125°C

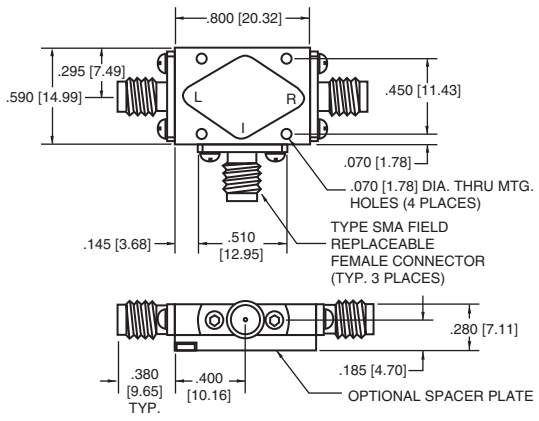
AVAILABLE OPTION

Medium/high dynamic range options
M (LO = +15 to +20 dBm), (IP^3 = +18 dBm typ.)
H (LO = +20 to +23 dBm), (IP^3 = +25 dBm typ.)
M, H (Conversion loss = 10.5 dB max.)

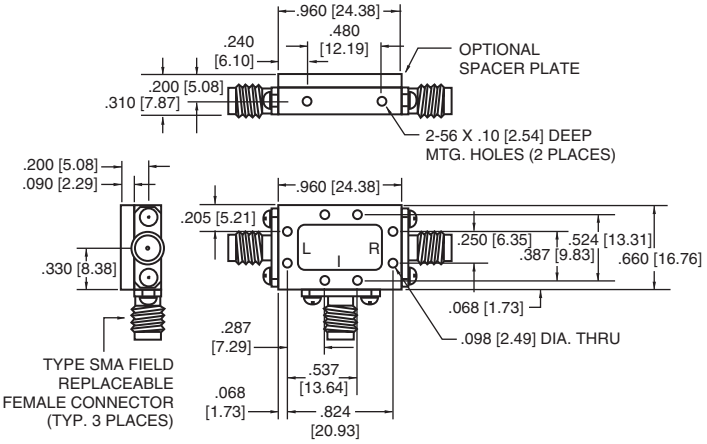
NOTE: Test data supplied at 25°C; conversion loss and LO-to-RF isolation.

OUTLINE DRAWINGS

W2 HOUSING



A1 HOUSING



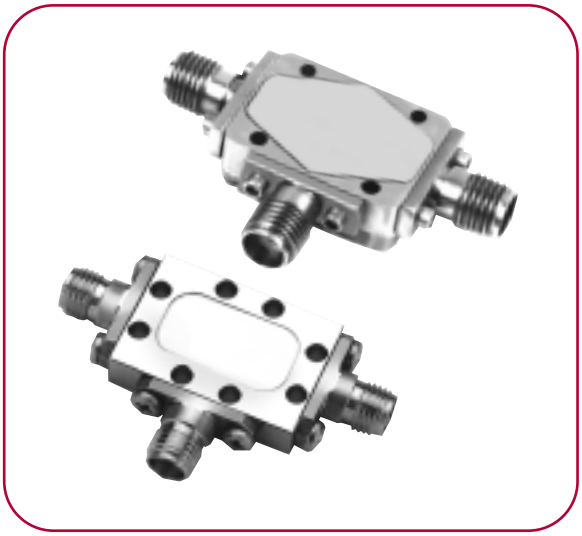
NOTE: All dimensions shown in brackets [ ] are in millimeters.

2 TO 18 GHz TRIPLE-BALANCED MIXER

MODELS: TBR0218LW2 AND TBR0218LA1

FEATURES

- **RF/LO coverage ..... 2 to 18 GHz**
- **IF operation ..... 0.05 to 3 GHz**
- **LO power range ..... +10 to +15 dBm**
- **Input 1 dB comp. ..... +5 dBm typical**
- **Packaging ..... Hermetically sealed**



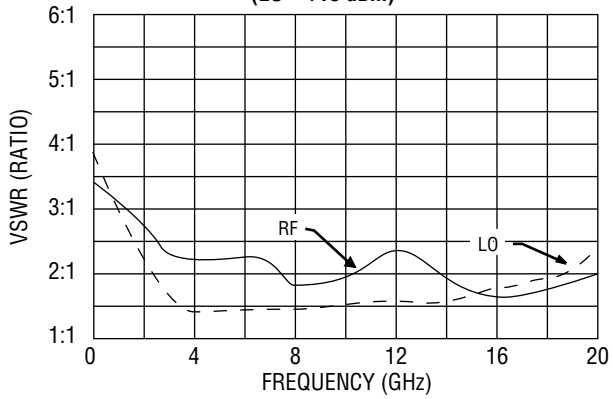
MITEQ's triple-balanced TBR0218L mixer series utilizes a dual-quad circuit to provide performance in overlapping RF and IF frequency ranges. In addition to extremely broadband operation, custom-processed diodes allow for minimal variation in conversion loss, extremely high third-order intercept and 1 dB compression points versus input LO power range. Options for various drive level diodes provide numerous combinations of intercept point and LO level. This device performs as an up- or downconverter.

ELECTRICAL SPECIFICATIONS

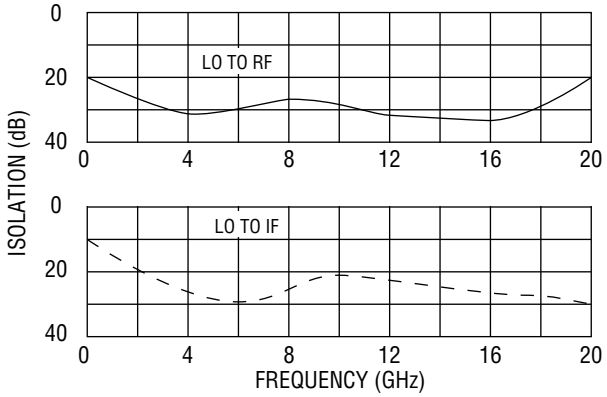
INPUT PARAMETERS	CONDITION	UNITS	MIN.	TYP.	MAX.
RF frequency range		GHz	2		18
RF VSWR (RF = -10 dBm, LO = +10 dBm)	2 to 18 GHz	Ratio		2.5:1	
LO frequency range		GHz	2		18
LO power range		dBm	+10	+13	+15
LO VSWR (LO = +13 dBm)	2 to 18 GHz	Ratio		2.5:1	
TRANSFER CHARACTERISTICS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
Conversion loss (IF = 1000 MHz, LO = +10 dBm)	2 to 18 GHz	dB		6.5	8.5
Single-sideband noise figure	2 to 18 GHz	dB			9.5
LO-to-RF isolation	2 to 18 GHz	dB	20	25	
LO-to-IF isolation	2 to 18 GHz	dB		20	
RF-to-IF isolation	2 to 18 GHz	dB		20	
Input power at 1 dB compression	LO = +13 dBm	dBm		+5	
Input two-tone third-order intercept point	LO = +13 dBm	dBm		+15	
OUTPUT PARAMETERS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
IF frequency range	3 dB bandwidth	GHz	0.05		3
IF VSWR (IF = -10 dBm, LO = +10 dBm)		Ratio		2.5:1	

TBR0218LW2/A1 TYPICAL TEST DATA

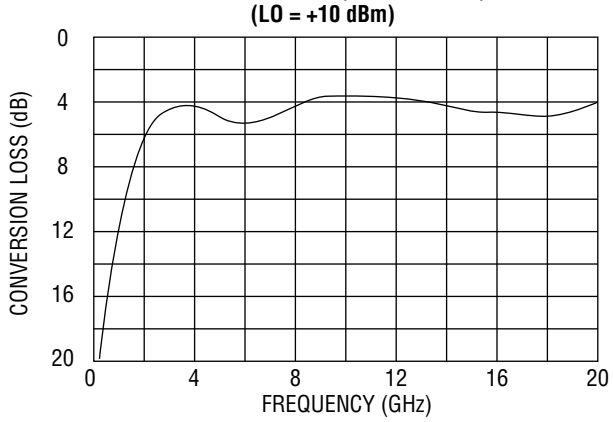
VSWR
(LO = +10 dBm)



ISOLATION



CONVERSION LOSS (IF = 1000 MHz)
(LO = +10 dBm)



SINGLE TONE (m) RF x (n) LO RELATIVE SPUR LEVEL (dBc)
(AVERAGE MIDBAND RF, LO, IF FREQUENCIES,
RF = -10 dBm, LO = +13 dBm)

SPUR (m) RF x (n) LO	RF TEST FREQ. (GHz)	LO TEST FREQ. (GHz)	SPUR LEVEL (dBc)
1 x 1	9	9.1	REF
1 x 2	9	4.55	26
1 x 3	9	3.03	12
2 x 1	4.5	9.1	46
2 x 2	4.5	4.55	52
2 x 3	4.5	3.03	46
3 x 1	3	9.1	59
3 x 2	3	4.55	63
3 x 3	3	3.03	59

MAXIMUM RATINGS

Specification temperature..... +25°C
Operating temperature ..... -54 to +85°C
Storage temperature ..... -65 to +125°C

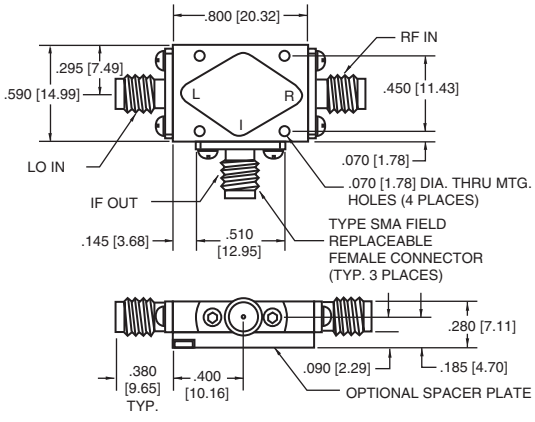
AVAILABLE OPTION

Medium/high dynamic range options
M (LO = +15 to +20 dBm), (IP^3 = +18 dBm typ.)
H (LO = +20 to +23 dBm), (IP^3 = +25 dBm typ.)
M, H (Conversion loss = 9.5 dB max.)

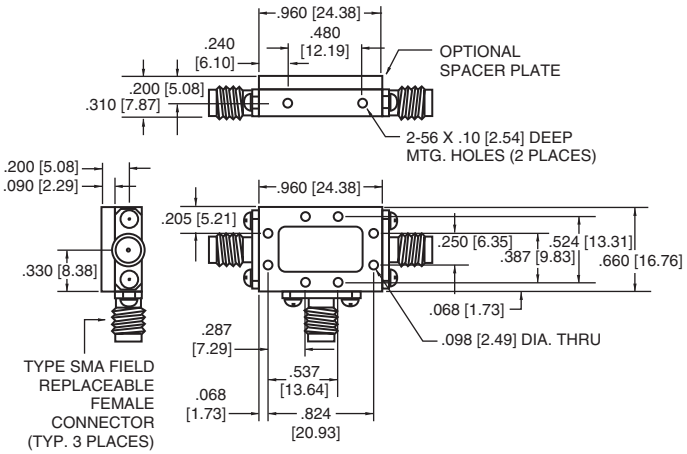
NOTE: Test data supplied at 25°C; conversion loss and LO-to-RF isolation.

OUTLINE DRAWINGS

W2 HOUSING



A1 HOUSING



NOTE: All dimensions shown in brackets [ ] are in millimeters.

4 TO 18 GHz TRIPLE-BALANCED MIXER

MODEL: TB0418LW1

FEATURES

- **RF/LO coverage..... 4 to 18 GHz**
- **IF operation..... 0.5 to 8 GHz**
- **LO power range..... +10 to +15 dBm**
- **Input 1 dB comp. ..... +5 dBm typical**
- **Packaging ..... Hermetically sealed**



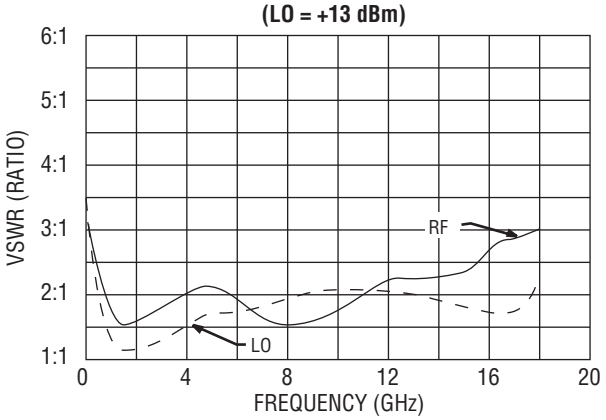
MITEQ's triple-balanced TB0418LW1 mixer series utilizes a dual-quad circuit to provide performance in overlapping RF and IF frequency ranges. In addition to extremely broadband operation, custom-processed diodes allow for minimal variation in conversion loss, extremely high third-order intercept and 1 dB compression points versus input LO power range. Options for various drive level diodes provide numerous combinations of intercept point and LO level. This device performs as an up- or downconverter.

ELECTRICAL SPECIFICATIONS

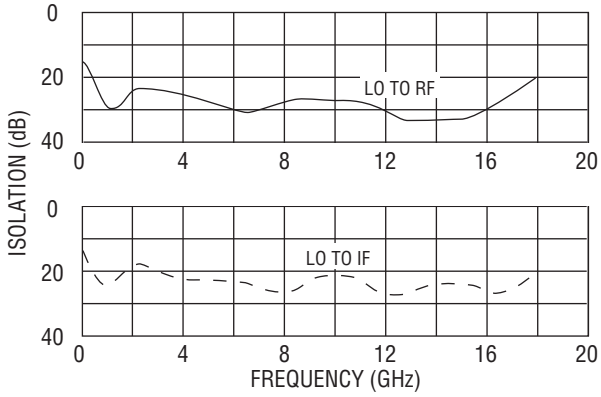
INPUT PARAMETERS	CONDITION	UNITS	MIN.	TYP.	MAX.
RF frequency range		GHz	4		18
RF VSWR (RF = -10 dBm, LO = +13 dBm)		Ratio		3:1	
LO frequency range		GHz	4		18
LO power range		dBm	+10	+13	+15
LO VSWR (LO = +13 dBm)		Ratio		2.5:1	
TRANSFER CHARACTERISTICS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
Conversion loss (IF = 1000 MHz, LO = +13 dBm)		dB		8.5	9.5
Single-sideband noise figure		dB			13
LO-to-RF isolation		dB	20	25	
LO-to-IF isolation		dB		20	
RF-to-IF isolation		dB		20	
Input power at 1 dB compression	LO = +13 dBm	dBm		+5	
Input two-tone third-order intercept point	LO = +13 dBm	dBm		+15	
OUTPUT PARAMETERS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
IF frequency range	3 dB bandwidth	GHz	0.5		8
IF VSWR (IF = -10 dBm, LO = +13 dBm)		Ratio		2.5:1	

TB0418LW1 TYPICAL TEST DATA

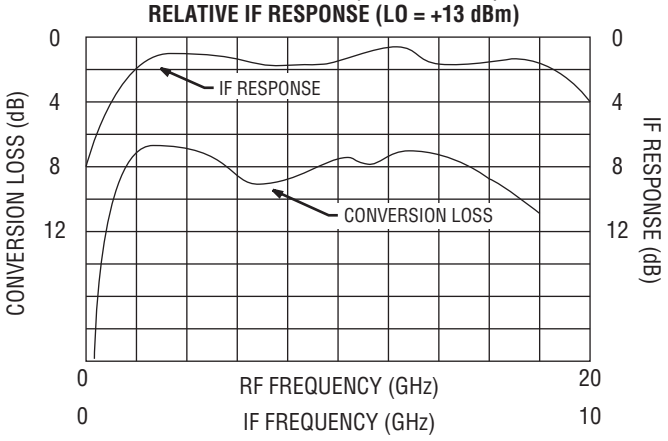
VSWR
(LO = +13 dBm)



ISOLATION



CONVERSION LOSS (IF = 1000 MHz)
RELATIVE IF RESPONSE (LO = +13 dBm)



SINGLE-TONE (m) RF x (n) LO RELATIVE SPUR LEVEL (dBc)
(AVERAGE MIDBAND RF, LO, IF FREQUENCIES,
RF = -10 dBm, LO = +13 dBm)

SPUR (m) RF x (n) LO	RF TEST FREQ. (GHz)	LO TEST FREQ. (GHz)	SPUR LEVEL (dBc)
1 x 1	12	11	REF
1 x 2	12	5.5	25
1 x 3	12	3.67	13
2 x 1	6	11	47
2 x 2	6	5.5	50
2 x 3	6	3.67	46
3 x 1	4	11	56
3 x 2	4	5.5	60
3 x 3	4	3.67	58

MAXIMUM RATINGS

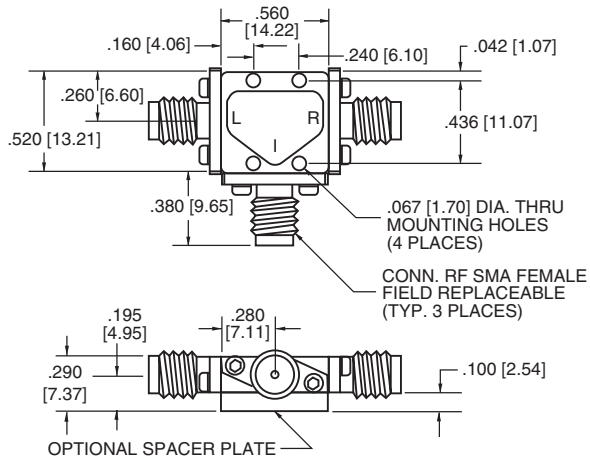
Specification temperature..... +25°C
Operating temperature ..... -54 to +85°C
Storage temperature ..... -65 to +125°C

AVAILABLE OPTION

Medium/high dynamic range options
M (LO = +15 to +20 dBm), (IP^3 = +18 dBm typ.)
H (LO = +20 to +23 dBm), (IP^3 = +25 dBm typ.)
M, H (Conversion loss = 10.5 dB max.)

NOTE: Test data supplied at 25°C; conversion loss and LO-to-RF isolation.

OUTLINE DRAWING



NOTE: All dimensions shown in brackets [ ] are in millimeters.

6 TO 18 TRIPLE-BALANCED MIXER

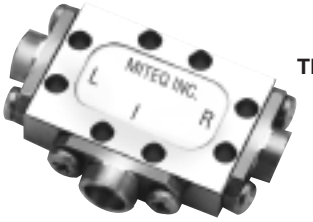
MODELS: TBR0618HA1 AND TBR0618HA1G

FEATURES

- **RF/LO Coverage ..... 6 to 18 GHz**
- **LO Power Range..... +17 to +21 dBm**
- **Input 1 dB comp. ..... +13 dBm typical**
- **Conversion loss..... 6 dB typical**
- **Packaging..... Hermetically sealed (GPO option)**



TBR0618HA1



TBR0618HA1G

MITEQ's triple-balanced TB/TBR mixer series utilizes a dual-quad circuit to provide performance in overlapping RF and IF frequency ranges. In addition to extremely broadband operation, custom-processed diodes allow for minimal variation in conversion loss, extremely high third-order intercept and 1 dB compression points versus input LO power range. Options for various drive level diodes provide numerous combinations of intercept point and LO level.

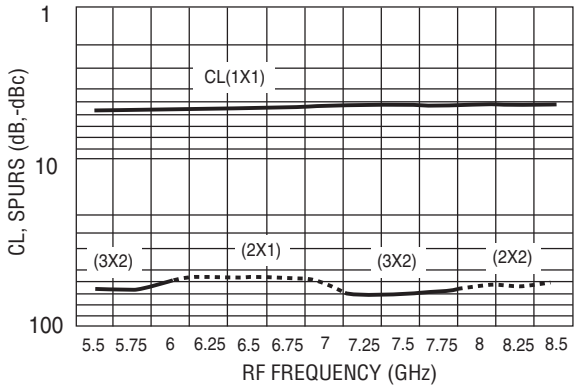
ELECTRICAL SPECIFICATIONS

INPUT PARAMETERS	CONDITION	UNITS	MIN.	TYP.	MAX.
RF frequency range		GHz	6		18
RF VSWR (RF = -10 dBm, LO = +17 dBm)	6 to 18 GHz	Ratio		2.5:1	
LO frequency range		GHz	6		18
LO power range		dBm	+17	+18	+21
LO VSWR (LO = +17 dBm)	6 to 18 GHz	Ratio		2.5:1	
TRANSFER CHARACTERISTICS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
Conversion loss (IF = 3 GHz, LO = +17 dBm)	6 to 18 GHz	dB		6	8
Single-sideband noise figure	6 to 18 GHz	dB			8.5
LO-to-RF isolation	6 to 18 GHz	dB	25	30	
LO-to-IF isolation	6 to 18 GHz	dB	25	28	
RF-to-IF isolation	6 to 18 GHz	dB		20	
Input power at 1 dB compression	LO = +17 dBm	dBm		+13	
Input two-tone third-order intercept point	LO = +17 dBm	dBm		+23	
OUTPUT PARAMETERS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
IF frequency range	3 dB bandwidth	GHz	0.05		5
IF VSWR (IF = -10 dBm, LO = +17 dBm)		Ratio		2.5:1	

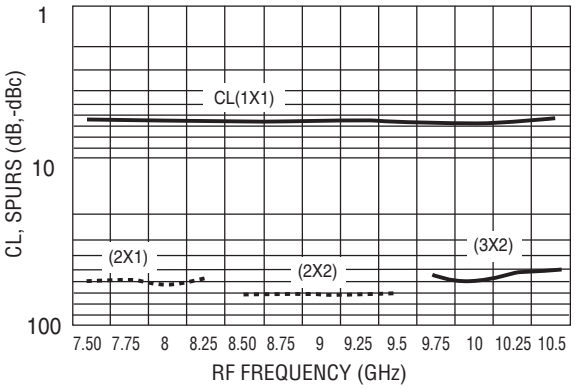
TBR0618HA1 TYPICAL TEST DATA (BLOCK DOWNCONVERTER MODE)

RF IN 6 BANDS (IF = 1.5 TO 4.5 GHz, LO FREQ. = 10, 12, 14 GHz, RF = -5 dBm, LO = +17 dBm)

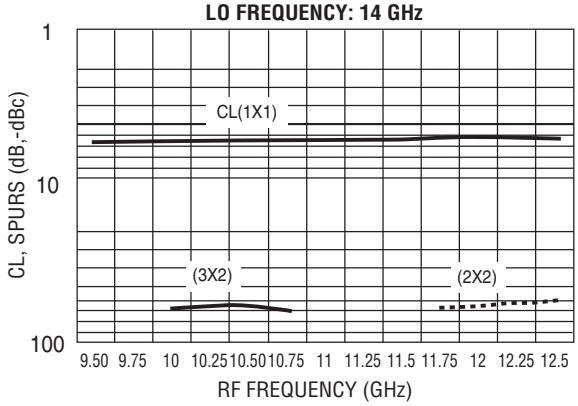
LO FREQUENCY: 10 GHz



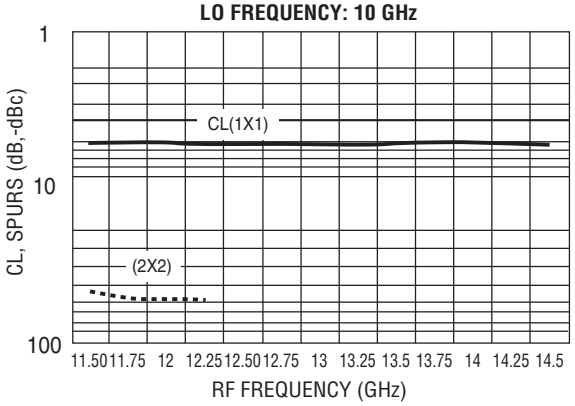
LO FREQUENCY: 12 GHz



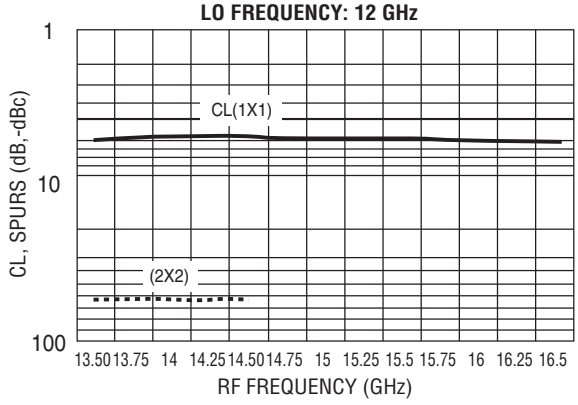
LO FREQUENCY: 14 GHz



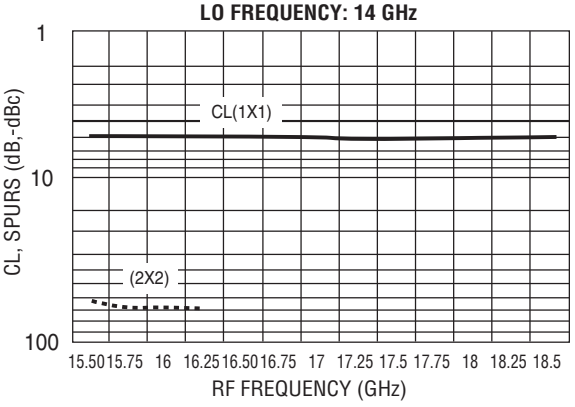
LO FREQUENCY: 10 GHz



LO FREQUENCY: 12 GHz



LO FREQUENCY: 14 GHz

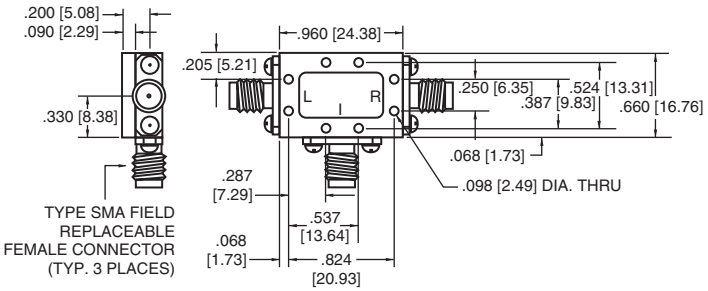


NOTE: Test data supplied at 25°C;
conversion loss and LO-to-RF isolation.

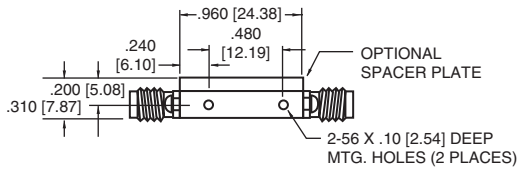
MAXIMUM RATINGS

Specification temperature..... +25°C
Operating temperature ..... -54 to +85°C
Storage temperature ..... -65 to +125°C

OUTLINE DRAWINGS



A1 HOUSING



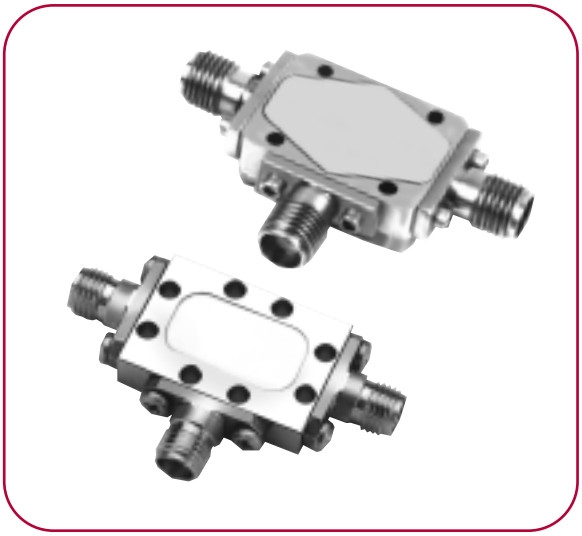
NOTE: All dimensions shown in brackets [ ] are in millimeters.

2 TO 26 GHz TRIPLE-BALANCED MIXER

MODELS: TB0226LW2 AND TB0226LA1

FEATURES

- **RF/LO coverage ..... 2 to 26 GHz**
- **IF operation ..... 0.5 to 8 GHz**
- **LO power range ..... +10 to +15 dBm**
- **Input 1 dB comp. ..... +5 dBm typical**
- **Packaging ..... Hermetically sealed**



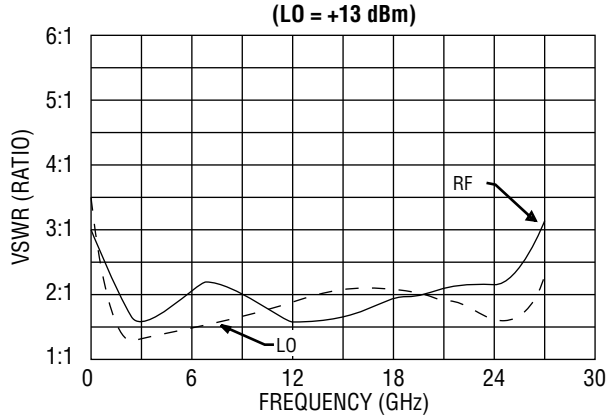
MITEQ's triple-balanced TB0226L mixer series utilizes a dual-quad circuit to provide performance in overlapping RF and IF frequency ranges. In addition to extremely broadband operation, custom-processed diodes allow for minimal variation in conversion loss, extremely high third-order intercept and 1 dB compression points versus input LO power range. Options for various drive level diodes provide numerous combinations of intercept point and LO level. This device performs as an up- or downconverter.

ELECTRICAL SPECIFICATIONS

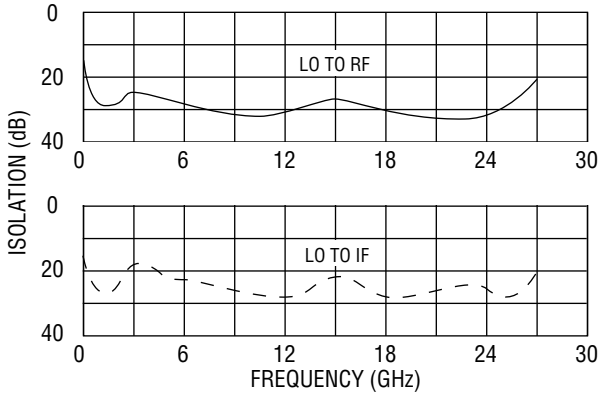
INPUT PARAMETERS	CONDITION	UNITS	MIN.	TYP.	MAX.
RF frequency range		GHz	2		26
RF VSWR (RF = -10 dBm, LO = +13 dBm)	4 to 24 GHz 2 to 26 GHz	Ratio Ratio		2.5:1 3:1	
LO frequency range		GHz	2		26
LO power range		dBm	+10	+13	+15
LO VSWR (LO = +13 dBm)	2 to 26 GHz	Ratio		2.5:1	
TRANSFER CHARACTERISTICS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
Conversion loss (IF = 1000 MHz, LO = +13 dBm)	2 to 18 GHz 18 to 26 GHz	dB dB		8.5 10	9.5 12
Single-sideband noise figure	2 to 26 GHz	dB			13
LO-to-RF isolation	2 to 26 GHz	dB	20	25	
LO-to-IF isolation	2 to 26 GHz	dB		20	
RF-to-IF isolation	2 to 26 GHz	dB		20	
Input power at 1 dB compression	LO = +13 dBm	dBm	+3	+5	
Input two-tone third-order intercept point	LO = +13 dBm	dBm	+13	+15	
OUTPUT PARAMETERS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
IF frequency range	3 dB bandwidth	GHz	0.5		8
IF VSWR (IF = -10 dBm, LO = +13 dBm)		Ratio		2.5:1	

TB0226LW2/A1 TYPICAL TEST DATA

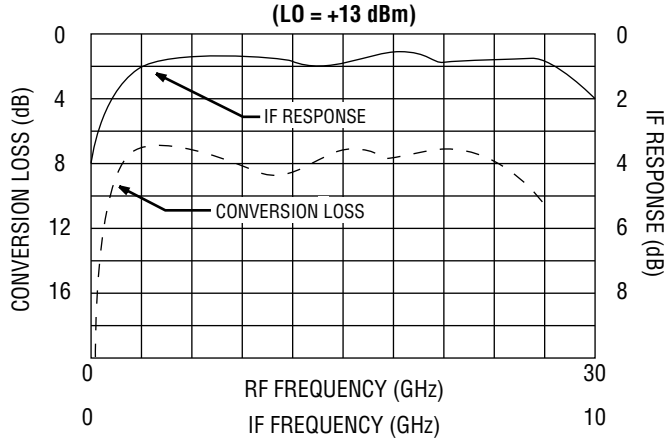
VSWR
(LO = +13 dBm)



ISOLATION



CONVERSION LOSS (IF = 1000 MHz)
RELATIVE IF RESPONSE
(LO = +13 dBm)



SINGLE-TONE (m) RF x (n) LO RELATIVE SPUR LEVEL (dBc)
(AVERAGE MIDBAND RF, LO, IF FREQUENCIES,
RF = -10 dBm, LO = +13 dBm)

SPUR (m) RF x (n) LO	RF TEST FREQ. (GHz)	LO TEST FREQ. (GHz)	SPUR LEVEL (dBc)
1 x 1	12	11	REF
1 x 2	12	5.5	25
1 x 3	12	3.67	13
2 x 1	6	11	47
2 x 2	6	5.5	50
2 x 3	6	3.67	46
3 x 1	4	11	56
3 x 2	4	5.5	60
3 x 3	4	3.67	58

MAXIMUM RATINGS

Specification temperature..... +25°C
Operating temperature ..... -54 to +85°C
Storage temperature ..... -65 to +125°C

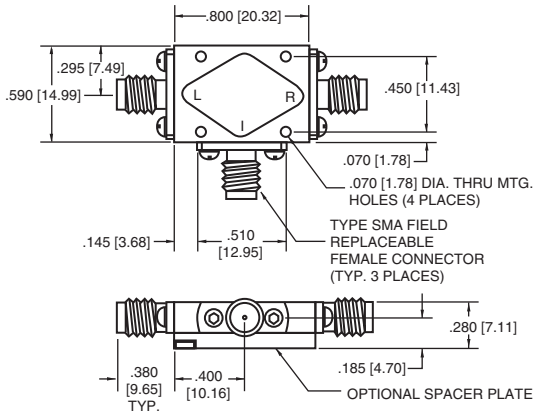
AVAILABLE OPTION

Medium/high dynamic range options
M (LO = +15 to +20 dBm), (IP^3 = +18 dBm typ.)
H (LO = +20 to +23 dBm), (IP^3 = +25 dBm typ.)
M, H (Conversion loss = 13 dB max.)

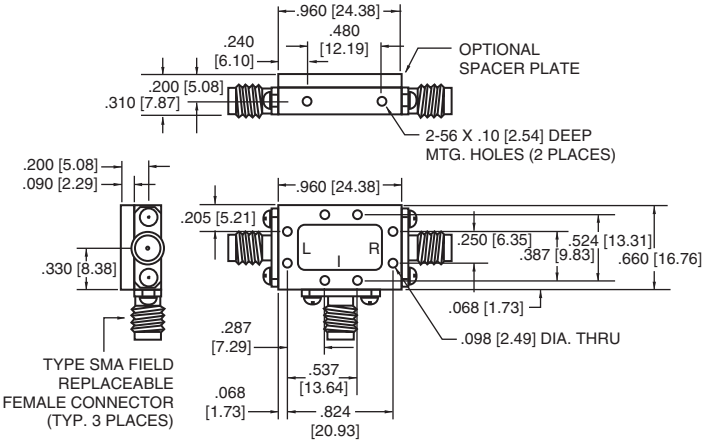
NOTE: Test data supplied at 25°C; conversion loss and LO-to-RF isolation.

OUTLINE DRAWINGS

W2 HOUSING



A1 HOUSING



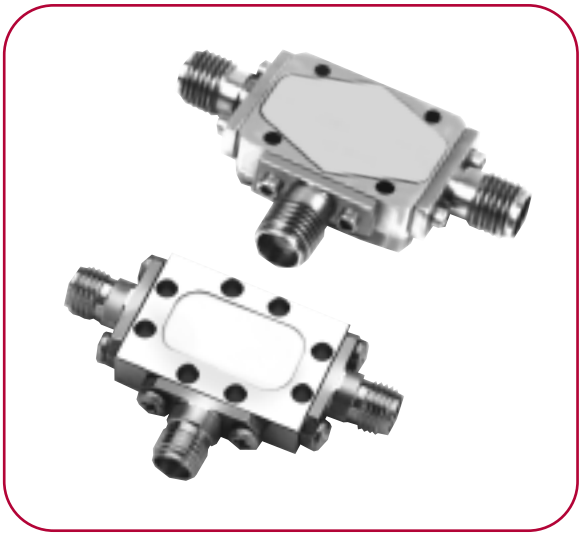
NOTE: All dimensions shown in brackets [ ] are in millimeters.

2 TO 26 GHz TRIPLE-BALANCED MIXER

MODELS: TBR0226LW2 AND TBR0226LA1

FEATURES

- **RF/LO coverage ..... 2 to 26 GHz**
- **IF operation ..... 0.05 to 3 GHz**
- **LO power range ..... +10 to +15 dBm**
- **Input 1 dB comp. ..... +5 dBm typical**
- **Packaging ..... Hermetically sealed**



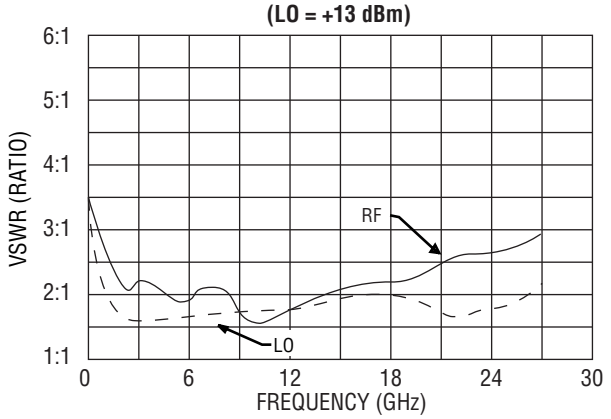
MITEQ's triple-balanced TBR0226L mixer series utilizes a dual-quad circuit to provide performance in overlapping RF and IF frequency ranges. In addition to extremely broadband operation, custom-processed diodes allow for minimal variation in conversion loss, extremely high third-order intercept and 1 dB compression points versus input LO power range. Options for various drive level diodes provide numerous combinations of intercept point and LO level. This device performs as an up- or downconverter.

ELECTRICAL SPECIFICATIONS

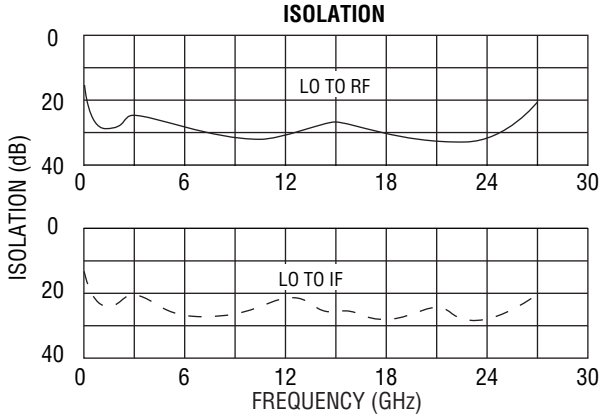
INPUT PARAMETERS	CONDITION	UNITS	MIN.	TYP.	MAX.
RF frequency range		GHz	2		26
RF VSWR (RF = -10 dBm, LO = +13 dBm)	4 to 24 GHz 2 to 26 GHz	Ratio Ratio		2.5:1 3:1	
LO frequency range		GHz	2		26
LO power range		dBm	+10	+13	+15
LO VSWR (RF = -10 dBm, LO = +13 dBm)	2 to 26 GHz	Ratio		2.5:1	
TRANSFER CHARACTERISTICS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
Conversion loss (IF = 1000 MHz, LO = +13 dBm)	2 to 18 GHz 18 to 26 GHz	dB dB		8.5 10	9.5 12
Single-sideband noise figure	2 to 26 GHz	dB			13
LO-to-RF isolation	2 to 26 GHz	dB	20	25	
LO-to-IF isolation	2 to 26 GHz	dB		20	
RF-to-IF isolation	2 to 26 GHz	dB		20	
Input power at 1 dB compression	LO = +13 dBm	dBm		+5	
Input two-tone third-order intercept point	LO = +13 dBm	dBm		+15	
OUTPUT PARAMETERS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
IF frequency range	3 dB bandwidth	GHz	0.05		3
IF VSWR (IF = -10 dBm, LO = +13 dBm)		Ratio		2:1	

TBR0226LW2/A1 TYPICAL TEST DATA

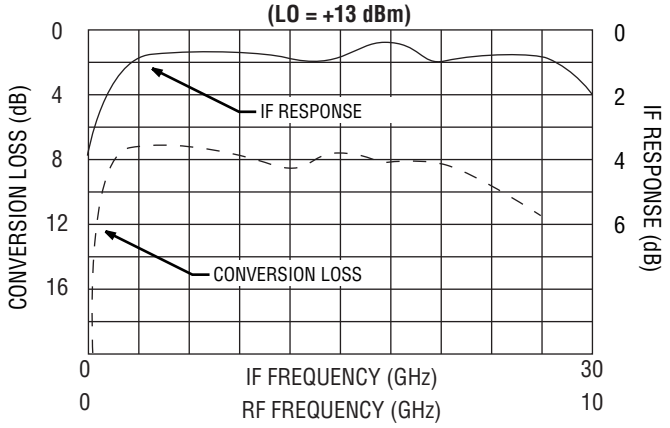
VSWR
(LO = +13 dBm)



ISOLATION



CONVERSION LOSS (IF = 1000 MHz)
RELATIVE IF RESPONSE
(LO = +13 dBm)



SINGLE-TONE (m) RF x (n) LO RELATIVE SPUR LEVEL (dBc)
(AVERAGE MIDBAND RF, LO, IF FREQUENCIES,
RF = -10 dBm, LO = +13 dBm)

SPUR (m) RF x (n) LO	RF TEST FREQ. (GHz)	LO TEST FREQ. (GHz)	SPUR LEVEL (dBc)
1 x 1	12	11	REF
1 x 2	12	5.5	25
1 x 3	12	3.67	13
2 x 1	6	11	47
2 x 2	6	5.5	50
2 x 3	6	3.67	46
3 x 1	4	11	56
3 x 2	4	5.5	60
3 x 3	4	3.67	58

MAXIMUM RATINGS

Specification temperature..... +25°C
Operating temperature ..... -54 to +85°C
Storage temperature ..... -65 to +125°C

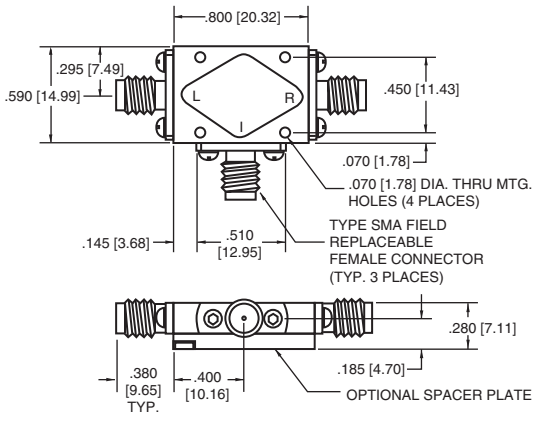
AVAILABLE OPTION

Medium/high dynamic range options
M (LO = +15 to +20 dBm), (IP^3 = +18 dBm typ.)
H (LO = +20 to +23 dBm), (IP^3 = +25 dBm typ.)
M, H (Conversion loss = 13 dB max.)

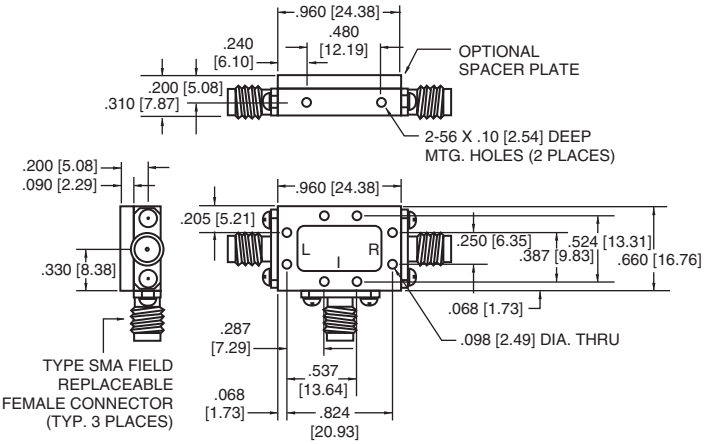
NOTE: Test data supplied at 25°C; conversion loss and LO-to-RF isolation.

OUTLINE DRAWINGS

W2 HOUSING



A1 HOUSING



NOTE: All dimensions shown in brackets [ ] are in millimeters.

4 TO 26 GHz TRIPLE-BALANCED MIXER

MODEL: TB0426LW1

FEATURES

- **RF/LO coverage..... 4 to 26 GHz**
- **IF operation..... 0.5 to 8 GHz**
- **LO power range..... +10 to +15 dBm**
- **Input 1 dB comp. ..... +5 dBm typical**
- **Packaging ..... Hermetically sealed**



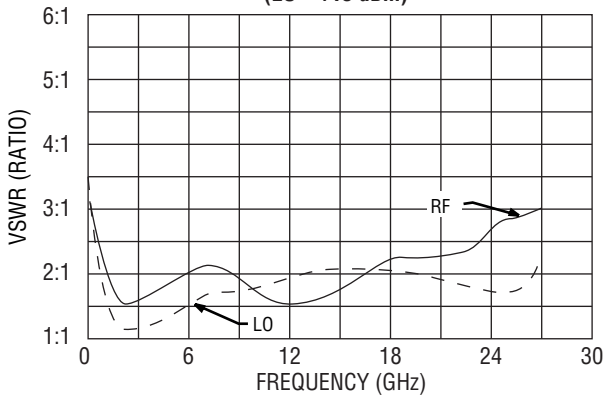
MITEQ's triple-balanced TB0426LW1 mixer series utilizes a dual-quad circuit to provide performance in overlapping RF and IF frequency ranges. In addition to extremely broadband operation, custom-processed diodes allow for minimal variation in conversion loss, extremely high third-order intercept and 1 dB compression points versus input LO power range. Options for various drive level diodes provide numerous combinations of intercept point and LO level. This device performs as an up- or downconverter.

ELECTRICAL SPECIFICATIONS

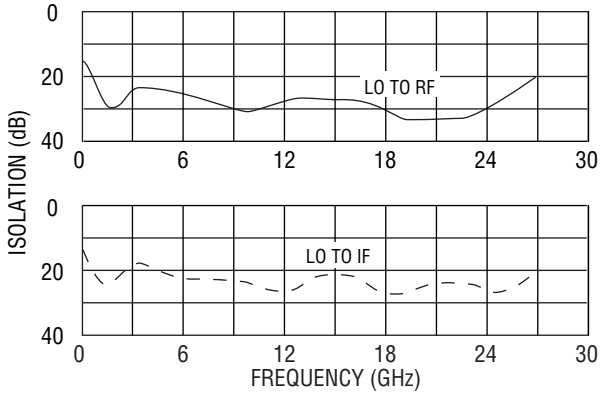
INPUT PARAMETERS	CONDITION	UNITS	MIN.	TYP.	MAX.
RF frequency range		GHz	4		26
RF VSWR (RF = -10 dBm, LO = +13 dBm)	4 to 24 GHz 4 to 26 GHz	Ratio Ratio		2.5:1 3:1	
LO frequency range		GHz	4		26
LO power range		dBm	+10	+13	+15
LO VSWR (LO = +13 dBm)	4 to 26 GHz	Ratio		2.5:1	
TRANSFER CHARACTERISTICS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
Conversion loss (IF = 1000 MHz, LO = +13 dBm)	4 to 18 GHz 18 to 26 GHz	dB dB		8.5 10	9.5 12
Single-sideband noise figure	4 to 26 GHz	dB			13
LO-to-RF isolation	4 to 26 GHz	dB	20	25	
LO-to-IF isolation	4 to 26 GHz	dB		20	
RF-to-IF isolation	4 to 26 GHz	dB		20	
Input power at 1 dB compression	LO = +13 dBm	dBm		+5	
Input two-tone third-order intercept point	LO = +13 dBm	dBm		+15	
OUTPUT PARAMETERS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
IF frequency range	3 dB bandwidth	GHz	0.5		8
IF VSWR (IF = -10 dBm, LO = +13 dBm)		Ratio		2.5:1	

TB0426LW1 TYPICAL TEST DATA

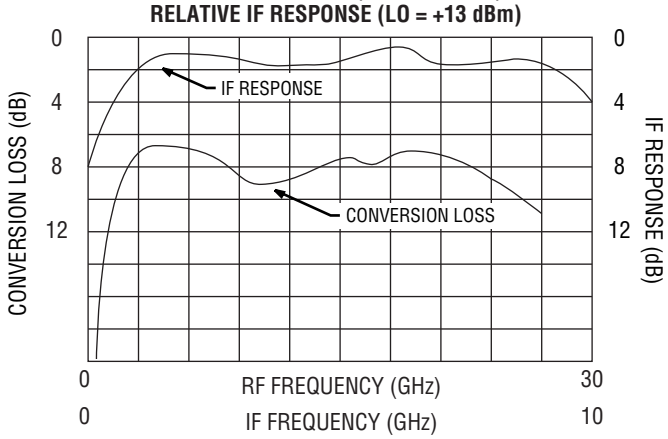
VSWR
(LO = +13 dBm)



ISOLATION



CONVERSION LOSS (IF = 1000 MHz)
RELATIVE IF RESPONSE (LO = +13 dBm)



SINGLE-TONE (m) RF x (n) LO RELATIVE SPUR LEVEL (dBc)
(AVERAGE MIDBAND RF, LO, IF FREQUENCIES,
RF = -10 dBm, LO = +13 dBm)

SPUR (m) RF x (n) LO	RF TEST FREQ. (GHz)	LO TEST FREQ. (GHz)	SPUR LEVEL (dBc)
1 x 1	12	11	REF
1 x 2	12	5.5	25
1 x 3	12	3.67	13
2 x 1	6	11	47
2 x 2	6	5.5	50
2 x 3	6	3.67	46
3 x 1	4	11	56
3 x 2	4	5.5	60
3 x 3	4	3.67	58

MAXIMUM RATINGS

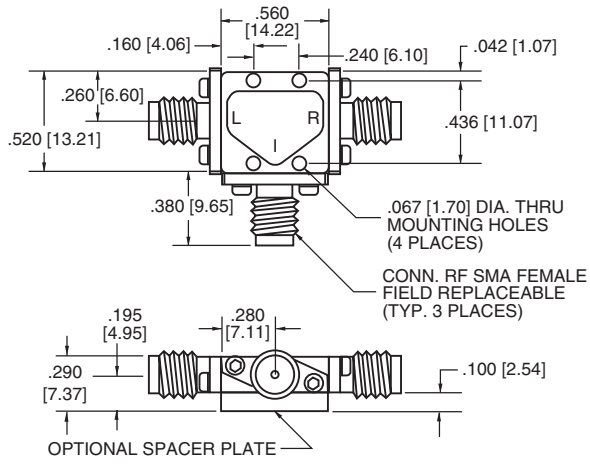
Specification temperature..... +25°C
Operating temperature ..... -54 to +85°C
Storage temperature ..... -65 to +125°C

AVAILABLE OPTION

Medium/high dynamic range options
M (LO = +15 to +20 dBm), (IP^3 = +18 dBm typ.)
H (LO = +20 to +23 dBm), (IP^3 = +25 dBm typ.)
M, H (Conversion loss = 13 dB max.)

NOTE: Test data supplied at 25°C; conversion loss and LO-to-RF isolation.

OUTLINE DRAWING



NOTE: All dimensions shown in brackets [ ] are in millimeters.

4 TO 40 GHz TRIPLE-BALANCED MIXER

MODEL: TB0440LW1

FEATURES

- **RF coverage..... 4 to 40 GHz**
- **LO coverage ..... 4 to 42 GHz (usable to 50 GHz)**
- **IF operation..... 0.5 to 20 GHz**
- **LO power range..... +10 to +15 dBm**
- **RF-to-IF isolation..... 30 dB typical**
- **Removable K connectors**



MITEQ's Model TB0440LW1 offers the industry's first millimeter-wave triple-balanced mixer. The unique balun design and custom semiconductor packaging allows coverage of 4 to 40 GHz through the RF and LO port with simultaneous IF operation from 0.5 to 20 GHz. Applications include a single LO block conversion of the low Ka-bands into an existing common frequency receiver front end. This device performs as an up- and downconverter.

ELECTRICAL SPECIFICATIONS

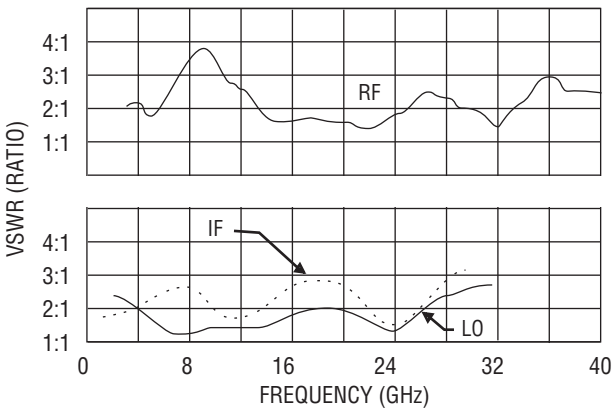
INPUT PARAMETERS	CONDITION	UNITS	MIN.	TYP.	MAX.
RF frequency range		GHz	4		40
RF VSWR (RF = -10 dBm, LO = +13 dBm)		Ratio		2.5:1	
LO frequency range		GHz	4		42
LO power range		dBm	+10	+13	+15
LO VSWR	LO = +13 dBm	Ratio		2:1	
TRANSFER CHARACTERISTICS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
Conversion loss (IF = 1000 MHz, LO = +13 dBm) L/H		dB		10/11	12/13
Single-sideband noise figure at 25°C		dB		10.5	
LO-to-RF isolation		dB	18	20	
LO-to-IF isolation		dB	20	25	
RF-to-IF isolation		dB	20	30	
Input power at 1 dB compression L/H		dBm		+5/+10	
Input two-tone third-order intercept point L/H		dBm		+15/+20	
OUTPUT PARAMETERS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
IF frequency range	3 dB bandwidth	GHz	0.5		20
IF VSWR (IF = -10 dBm, LO = +13 dBm)		Ratio		2.5:1	

100 Davids Drive, Hauppauge, NY 11788 • TEL: (631) 439-9220 • FAX: (631) 436-7430 • **www.miteq.com**

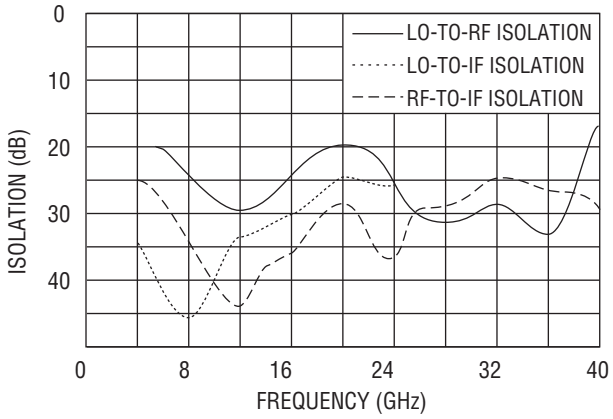
Revised: 04/24/12

TB0440LW1 TYPICAL TEST DATA

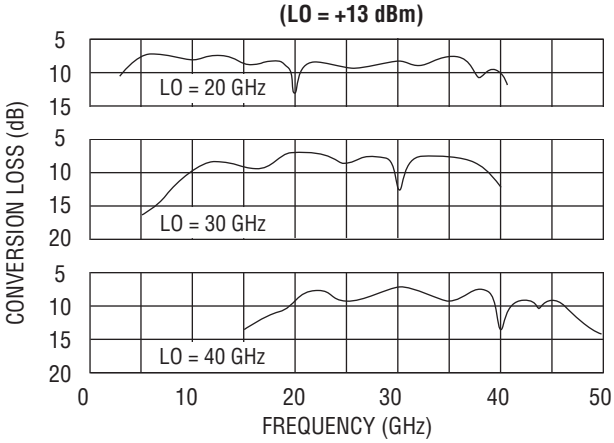
VSWR
(LO = +10 dBm)



ISOLATION



CONVERSION LOSS
(LO = +13 dBm)



SINGLE-TONE (m) RF x (n) LO RELATIVE SPUR LEVEL (dBc)
TO REF (RF = -10 dBm, LO = +10 dBm)

RF HARMONIC (m)					
5	> 85	> 85	> 85	> 85	> 85
4	80	> 85	80	> 85	> 85
3	58	63	59	70	63
2	46	52	46	56	47
1	REF	27	12	33	22
	1	2	3	4	5

LO HARMONIC (n)

MAXIMUM RATINGS

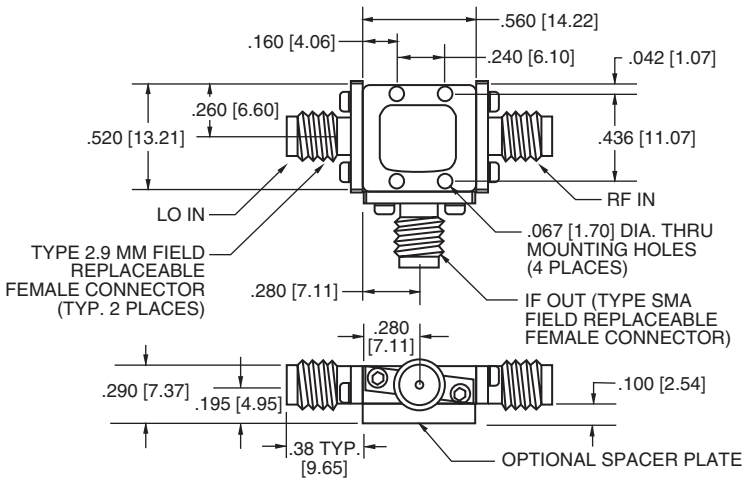
Specification temperature..... +25°C
Operating temperature ..... -54 to +85°C
Storage temperature ..... -65 to +125°C

AVAILABLE OPTION

High dynamic range option
H (LO = +17 to +23 dBm)

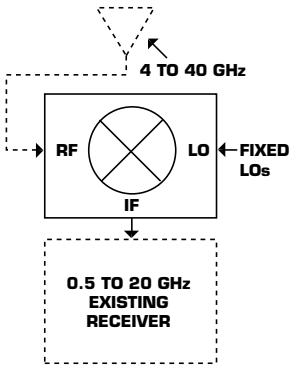
NOTE: Test data supplied at 25°C; conversion loss and LO-to-RF isolation.

OUTLINE DRAWING



NOTE: All dimensions shown in brackets [ ] are in millimeters.

BLOCK DIAGRAM

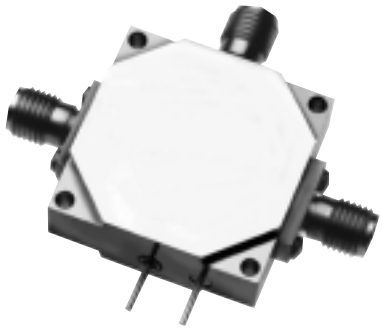


2 TO 18 GHz BIASABLE BRIDGE QUAD MIXER

MODEL: SBB0218LR5

FEATURES

- **RF/LO coverage..... 2 to 18 GHz (usable 2 to 20 GHz)**
- **LO power range..... -10 to +10 dBm**
- **Packaging ..... Hermetically sealed**
- **Low RF/LO VSWR (nearly independent of LO power)**



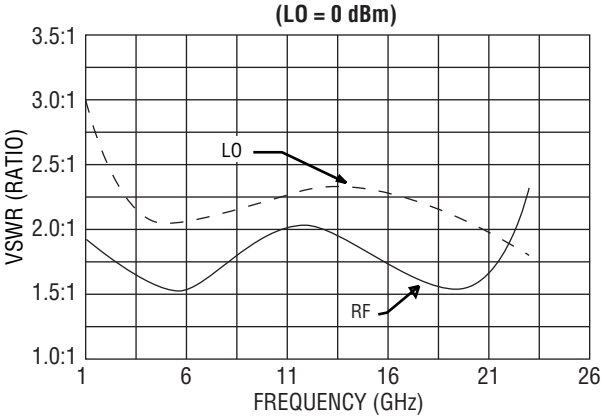
This mixer employs a bridge quad of Schottky diodes to isolate the LO and RF signals. The RF and IF are separated by a double-tuned diplexer. The self-optimizing DC bias circuit makes this mixer ideally suited to wide bandwidth operation with low and highly variable LO power.

ELECTRICAL SPECIFICATIONS

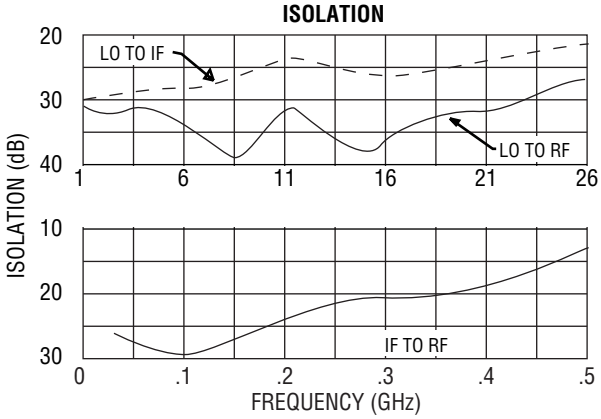
INPUT PARAMETERS	CONDITION	UNITS	MIN.	TYP.	MAX.
RF frequency range		GHz	2		18
RF VSWR (RF = -10 dBm, LO = 0 dBm)		Ratio		2:1	
LO frequency range		GHz	2		18
LO power range		dBm	-10		+10
LO VSWR (LO = 0 dBm)		Ratio		2.5:1	
DC bias +15 V		mA		8	
TRANSFER CHARACTERISTICS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
Conversion loss (IF = 100 MHz, LO = 0 dBm)		dB		9	11
Single-sideband noise figure		dB		10	
LO-to-RF isolation		dB	20	25	
LO-to-IF isolation		dB		25	
IF-to-RF isolation	DC to 0.5 GHz	dB		15	
Input power at 1 dB compression	LO = 0 dBm	dBm		-5	
Input two-tone third-order intercept point	LO = 0 dBm	dBm	-3	0	
OUTPUT PARAMETERS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
IF frequency range	2 dB bandwidth	MHz	10		500
IF VSWR (IF = -10 dBm, LO = 0 dBm)		Ratio		2:1	

SBB0218LR5 TYPICAL TEST DATA

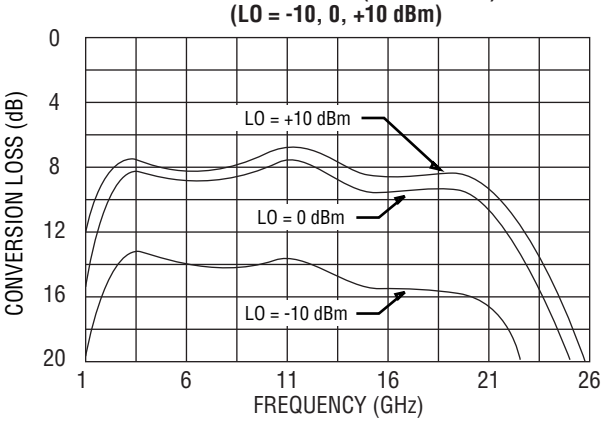
VSWR
(LO = 0 dBm)



ISOLATION



CONVERSION LOSS (IF = 100 MHz)
(LO = -10, 0, +10 dBm)



SINGLE-TONE (m) RF x (n) LO RELATIVE SPUR LEVEL (dBc)
(AVERAGE MIDBAND RF, LO, IF FREQUENCIES,
RF = -10 dBm, LO = 0 dBm)

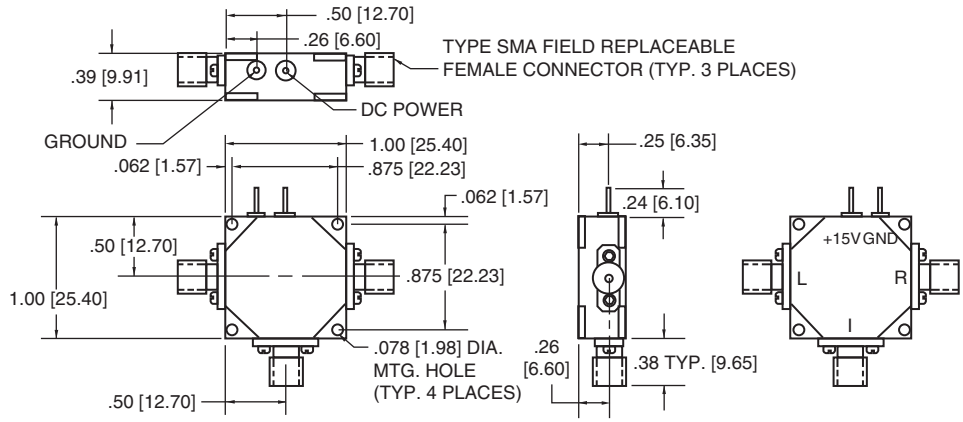
SPUR (m) RF x (n) LO	RF TEST FREQ. (GHz)	LO TEST FREQ. (GHz)	SPUR LEVEL (dBc)
1 x 1	10.1	10	0
1 x 2	13.36	6.63	21
1 x 3	15.02	4.97	23
2 x 1	6.63	13.36	55
2 x 2	10.25	9.75	56
2 x 3	12.02	7.98	55
3 x 1	5.02	14.9	52
3 x 2	8.02	11.98	54
3 x 3	10.01	9.98	59

MAXIMUM RATINGS

Specification temperature..... +25°C
Operating temperature ..... -54 to +85°C
Storage temperature ..... -65 to +125°C

NOTE: Test data supplied at 25°C; conversion loss and LO-to-RF isolation.

OUTLINE DRAWING



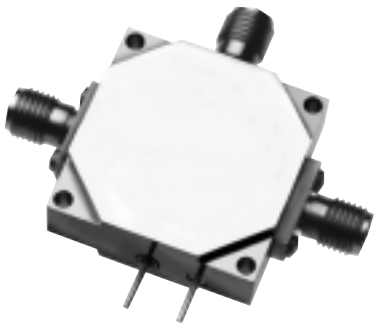
NOTE: All dimensions shown in brackets [ ] are in millimeters.

2 TO 26 GHz BIASABLE BRIDGE QUAD MIXER

MODEL: SBB0226LR5

FEATURES

- **RF/LO coverage..... 2 to 26 GHz**
- **LO power range..... -10 to +10 dBm**
- **Packaging..... Hermetically sealed**
- **Low RF/LO VSWR (nearly independent of LO power)**



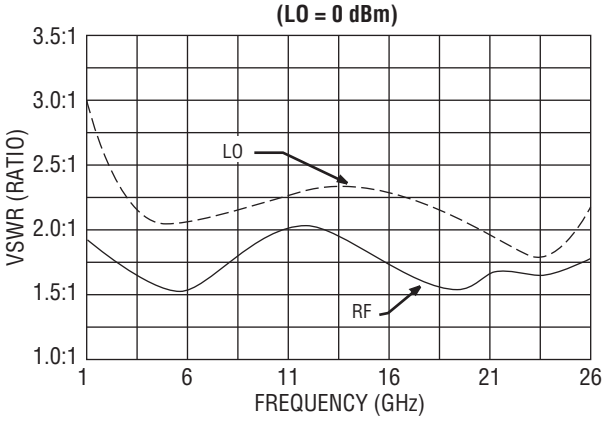
This mixer employs a bridge quad of Schottky diodes to isolate the LO and RF signals. The RF and IF are separated by a double-tuned diplexer. The self-optimizing DC bias circuit makes this mixer ideally suited to wide bandwidth operation with low and highly variable LO power.

ELECTRICAL SPECIFICATIONS

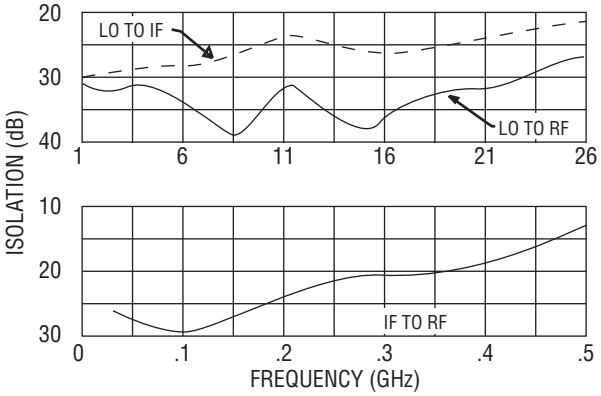
INPUT PARAMETERS	CONDITION	UNITS	MIN.	TYP.	MAX.
RF frequency range		GHz	2		26
RF VSWR (RF = -10 dBm, LO = 0 dBm)		Ratio		2.5:1	
LO frequency range		GHz	2		26
LO power range		dBm	-10		+10
LO VSWR (LO = 0 dBm)	50 ohm reference	Ratio		2.5:1	
DC bias +15 V		mA		9	
TRANSFER CHARACTERISTICS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
Conversion loss (IF = 100 MHz, LO = 0 dBm)		dB		10	14.5
Single-sideband noise figure		dB		15	
LO-to-RF isolation		dB	20	25	
LO-to-IF isolation		dB		23	
IF-to-RF isolation	DC to 0.5 GHz	dB		15	
Input power at 1 dB compression	LO = 0 dBm	dBm		-5	
Input two-tone third-order intercept point	LO = 0 dBm	dBm	-3	0	
OUTPUT PARAMETERS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
IF frequency range	2 dB bandwidth	MHz	10		500
IF VSWR (IF = -10 dBm, LO = 0 dBm)		Ratio		2:1	

SBB0226LR5 TYPICAL TEST DATA

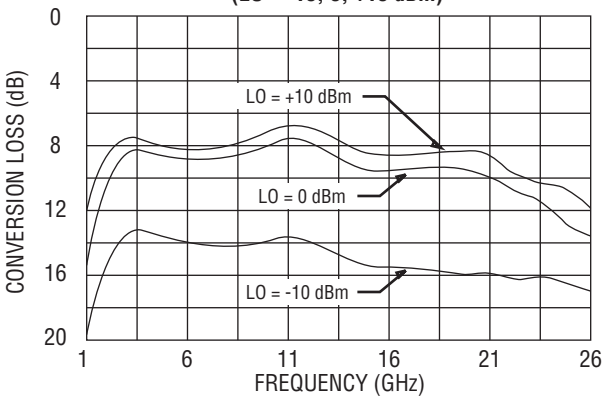
VSWR
(LO = 0 dBm)



ISOLATION



CONVERSION LOSS (IF = 100 MHz)
(LO = -10, 0, +10 dBm)



SINGLE-TONE (m) RF x (n) LO RELATIVE SPUR LEVEL (dBc)
(AVERAGE MIDBAND RF, LO, IF FREQUENCIES,
RF = -10 dBm, LO = 0 dBm)

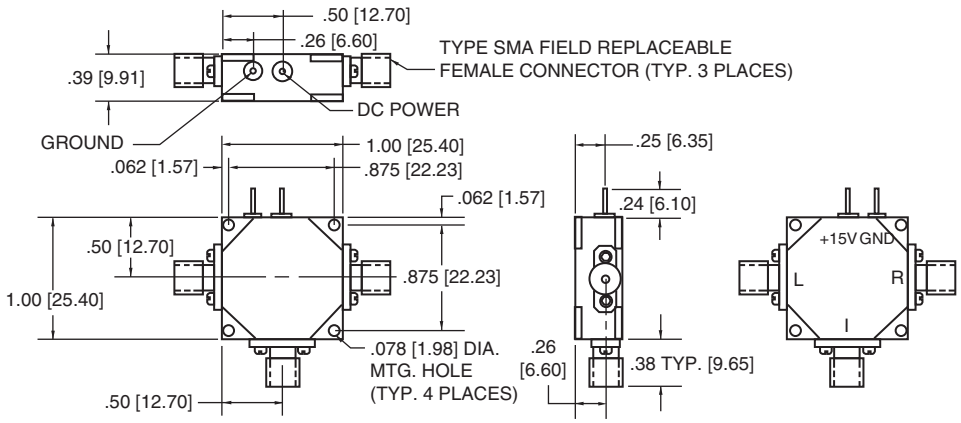
SPUR (m) RF x (n) LO	RF TEST FREQ. (GHz)	LO TEST FREQ. (GHz)	SPUR LEVEL (dBc)
1 x 1	10.1	10	0
1 x 2	13.36	6.63	21
1 x 3	15.02	4.97	23
2 x 1	6.63	13.36	55
2 x 2	10.25	9.75	56
2 x 3	12.02	7.98	55
3 x 1	5.02	14.9	52
3 x 2	8.02	11.98	54
3 x 3	10.01	9.98	59

MAXIMUM RATINGS

Specification temperature..... +25°C
Operating temperature ..... -54 to +85°C
Storage temperature ..... -65 to +125°C

NOTE: Test data supplied at 25°C; conversion loss and LO-to-RF isolation.

OUTLINE DRAWING



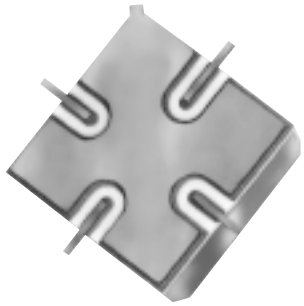
NOTE: All dimensions shown in brackets [ ] are in millimeters.

1.8 GHz, 1 WATT, MESFET POWER MIXER

MODEL: DBF1800W3

FEATURES

- **RF/LO coverage ..... 1.7 to 1.9 GHz**
- **Input IP³ ..... +40 dBm @ +30 dBm LO**
  +36 dBm @ +26 dBm LO
  +30 dBm @ +20 dBm LO
- **IF response ..... 50 to 200 MHz**
- **Packaging ..... Surface mount or microstrip**



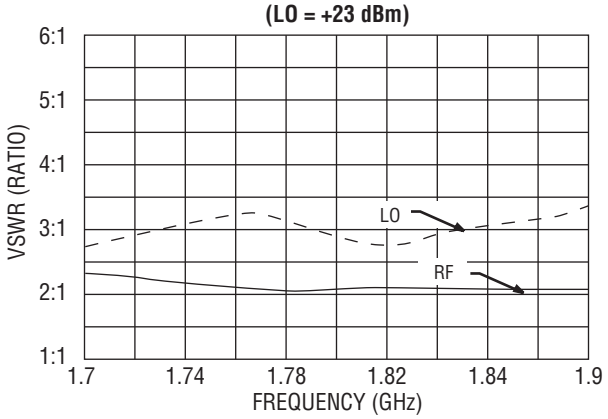
As the density of signals in a receiver increase, the input IP³ rather than noise figure of the front end begins to limit the dynamic range. This is particularly true for the newer fixed-tuned LO wideband RF "block" downconverters that utilize digital IF circuits to separate and demodulate each user of the channel. The digital filters can often process closely spaced signals that are 60 or 80 dB different in power, thus requiring similar rejection of spurious mixer outputs. This double-balanced mixer uses power MESFETs to achieve an input 1 dB compression point of +30 dBm (+10 volt peak RF) using an equal power LO. The corresponding input IP³ is +40 dBm (10 watts), thus permitting an 80 dB dynamic range with 0 dBm RF inputs. The corresponding noise figure and IF corner frequency are 8.7 dB and 50 kHz, respectively.

ELECTRICAL SPECIFICATIONS

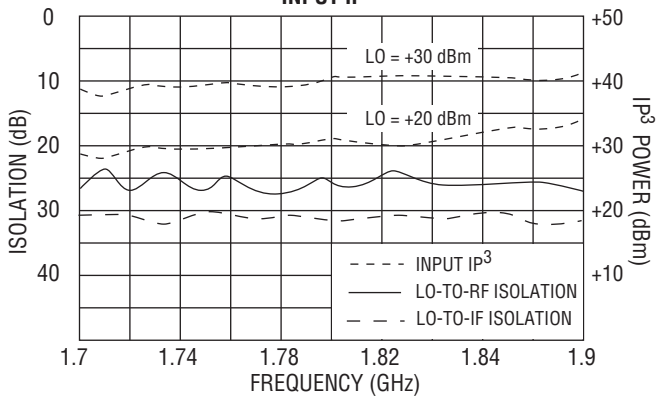
INPUT PARAMETERS	CONDITION	UNITS	MIN.	TYP.	MAX.
RF frequency range		GHz	1.7		1.9
RF VSWR (RF = -10 dBm, LO = +23 dBm)		Ratio		1.5:1	
LO frequency range		GHz	1.7		1.9
LO power range		dBm	+23		+26
LO VSWR (LO = +23 dBm)		Ratio		2.5:1	
TRANSFER CHARACTERISTICS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
Conversion loss	IF = 1 GHz	dB		8.5	9.5
Single-sideband noise figure at 25°C		dB		9	10
LO-to-RF isolation		dB	20	28	
LO-to-IF isolation		dB	25	30	
RF-to-IF isolation	RF < LO	dB		20	
Input power at 1 dB compression	LO = +25/+30 dBm	dBm		+20/+30	
Input two-tone third-order intercept point	LO = +26 dBm	dBm		+36	
Input two-tone second-order intercept point	LO = +26 dBm	dBm		+50	
OUTPUT PARAMETERS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
IF frequency range		MHz	20		200
IF VSWR (IF = -10 dBm, LO = +23 dBm)		Ratio		2:1	

DBF1800W3 TYPICAL TEST DATA

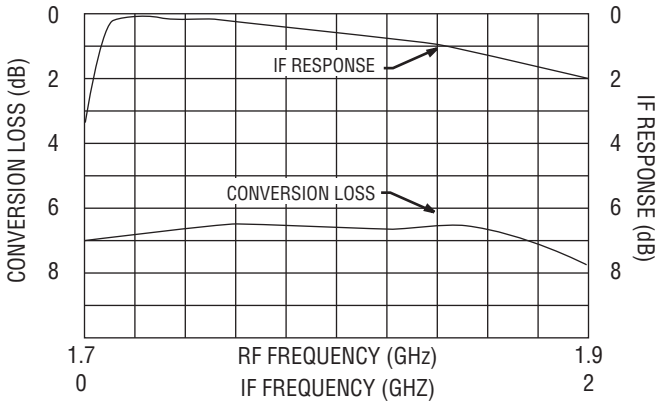
VSWR
(LO = +23 dBm)



ISOLATION
INPUT IP3



CONVERSION LOSS
RELATIVE IF RESPONSE
(LO = +23 dBm)



SINGLE-TONE (m) RF x (n) LO RESPONSE SPUR LEVEL (dBc)
TO REF (RF = -10 dBm, LO = +26 dBm)

RF HARMONIC (m)						
5	> 100	-	-	-	-
4	> 100	> 100	> 100	-	-
3	82	95	> 100	> 100	> 100
2	68	70	80	80	85
1	REF	OUT-OF-BAND			
	1	2	3	4	5

LO HARMONIC (n)

MAXIMUM RATINGS

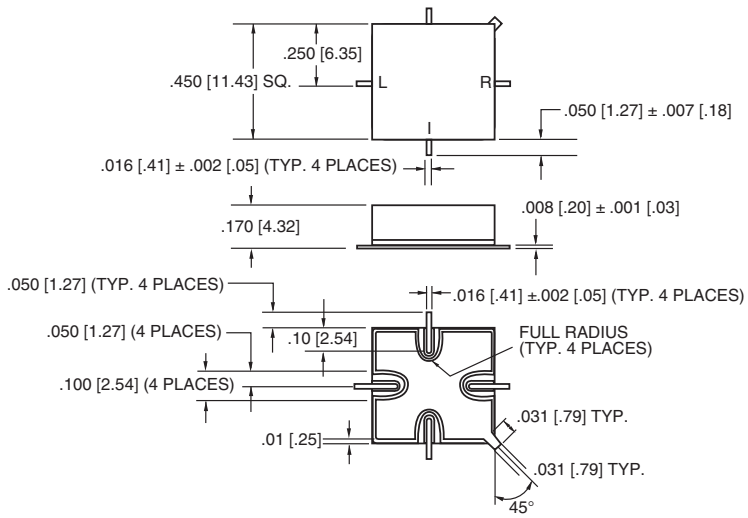
Specification temperature..... +25°C
Operating temperature ..... -54 to +85°C
Storage temperature ..... -65 to +125°C

GENERAL NOTE

1. Unit must be heatsinked when operating above +26 dBm LO power.

NOTE: Test data supplied at 25°C; conversion loss, LO-to-RF isolation and IP3.

OUTLINE DRAWING



NOTE: All dimensions shown in brackets [ ] are in millimeters.

2 TO 8 GHz BIASABLE MESFET MIXER

MODEL: SBF0208LW2

FEATURES

- **RF/LO coverage..... 2 to 8 GHz**
- **IF operation..... DC to 1 GHz**
- **LO power range..... +10 to +20 dBm**
- **Input 1 dB comp. ..... +20 dBm**
- **Input IP^3..... +27 dBm typical (@ +20 dBm LO)**



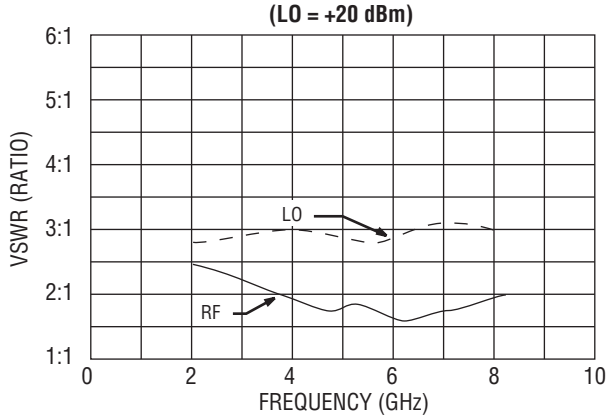
This FET mixer is designed to upgrade the dynamic range of existing systems that use a conventional ring type Schottky diode mixer, without changing the LO source. The input 1 dB compression and third-order intercept powers are typically 6 dB higher than a ring diode mixer of equal LO power. However, the LO-to-RF isolation of this particular FET mixer is approximately 10 dB less than an equivalent ring mixer.

ELECTRICAL SPECIFICATIONS

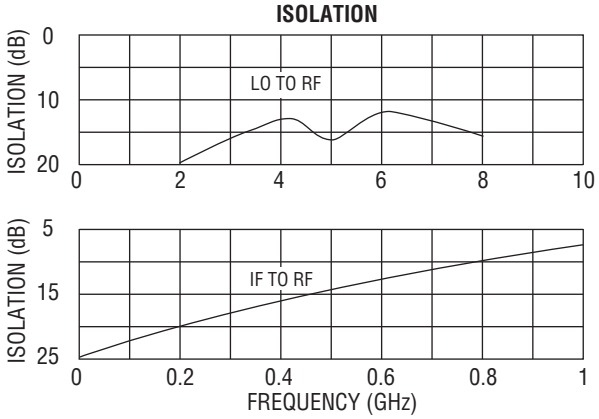
INPUT PARAMETERS	CONDITION	UNITS	MIN.	TYP.	MAX.
RF frequency range		GHz	2		8
RF VSWR (RF = 0 dBm, LO = +20 dBm)		Ratio		2.5:1	
LO frequency range		GHz	2		8
LO power range		dBm	+10		+20
LO VSWR	LO = +20 dBm	Ratio		3:1	
DC bias -15 V		mA		10	
TRANSFER CHARACTERISTICS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
Conversion loss (IF = 100 MHz)	LO = +20 dBm LO = +10 dBm	dB dB		7 10	9
Single-sideband noise figure	LO = +20 dBm	dB		10	
LO-to-RF isolation (Note 1)		dB	10	15	
LO-to-IF isolation		dB	18	25	
IF-to-RF isolation		dB		12	
Input power at 1 dB compression	LO = +20 dBm	dBm		+20	
Input two-tone third-order intercept point	LO = +20 dBm	dBm	+25	+27	
OUTPUT PARAMETERS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
IF frequency range	3 dB bandwidth	GHz	DC		1
IF VSWR (IF = 0 dBm, LO = +20 dBm)		Ratio		2.5:1	

SBF0208LW2 TYPICAL TEST DATA

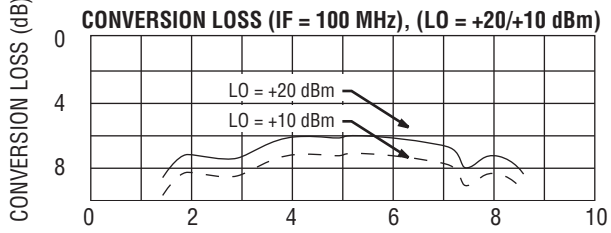
VSWR
(LO = +20 dBm)



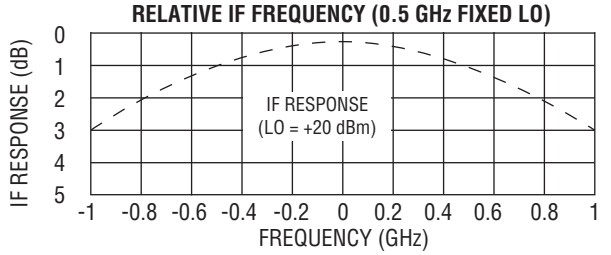
ISOLATION



CONVERSION LOSS (IF = 100 MHz), (LO = +20/+10 dBm)



RELATIVE IF FREQUENCY (0.5 GHz FIXED LO)



SINGLE-TONE (m) RF x (n) LO RELATIVE SPUR LEVEL (dBc)
(AVERAGE MIDBAND RF, LO, IF FREQUENCIES,
RF = -10 dBm, LO = +20 dBm)

SPUR (m) RF x (n) LO	RF TEST FREQ. (GHz)	LO TEST FREQ. (GHz)	SPUR LEVEL (dBc)
1 x 1	5	5.1	0
1 x 2	7.1	3.5	-15
1 x 3	6.1	2	-10
2 x 1	3.5	7.1	-50
2 x 2	5	5.05	-52
2 x 3	3	2.03	-51
3 x 1	2	6.1	-72
3 x 2	4	6.05	-65
3 x 3	5	5.033	-67

MAXIMUM RATINGS

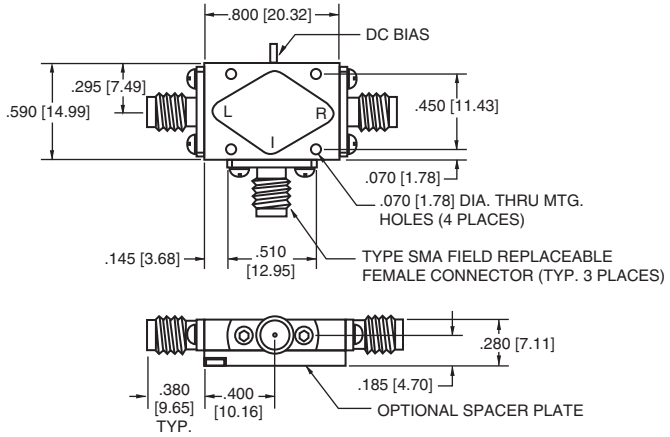
Specification temperature..... +25°C
Operating temperature ..... -54 to +85°C
Storage temperature ..... -65 to +125°C

GENERAL NOTE

1. Single- and double-balanced circuits available with greater IP^3 and LO-to-RF isolation, in octave bandwidths.

NOTE: Test data supplied at 25°C; conversion loss, LO-to-RF isolation and IP^3.

OUTLINE DRAWING



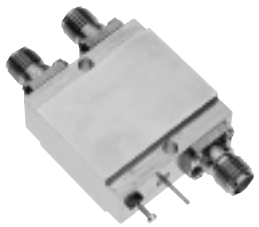
NOTE: All dimensions shown in brackets [ ] are in millimeters.

8 TO 10 GHz ULTRA-HIGH LEVEL FET MIXER

MODELS: SBF0810HI3A AND SBF0810HI3B

FEATURES

- **RF/LO coverage ..... 8 to 10 GHz**
- **IF operation ..... 20 to 2000 MHz**
- **LO power range ..... +20 to +23 dBm**
- **Input IP^3 ..... +33 dBm typical**
- **Packaging ..... Hermetically sealed**



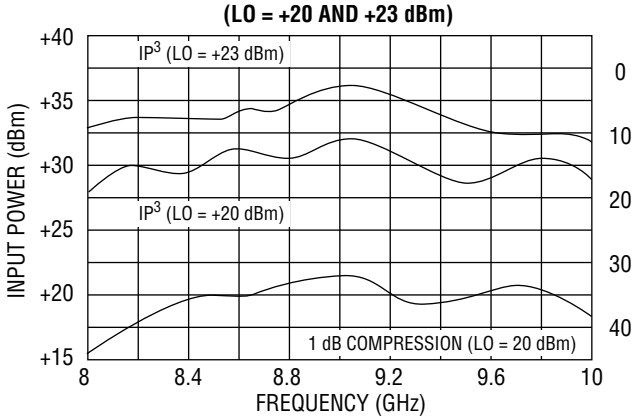
MITEQ's Model SBF0810HI3 utilizes high-level MESFETs in a single-balanced mixer configuration to provide truly state-of-the-art dynamic range performance. Through MITEQ's unique balun design, the SBF0810H Series is able to surpass the performance of any Schottky device by supporting 10 dB of separation between the LO power and third-order intercept point. Applications for this type of device span any dense signal environment system or any extremely high dynamic receiver, such as a phase coherent receiver utilizing high-gain low-noise amplifiers.

ELECTRICAL SPECIFICATIONS

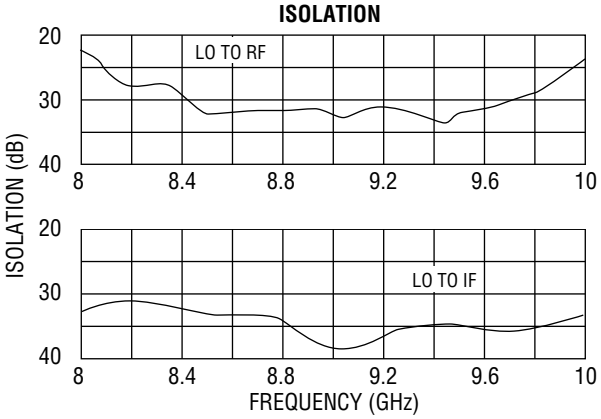
INPUT PARAMETERS	CONDITION	UNITS	MIN.	TYP.	MAX.
RF frequency range		GHz	8		10
RF VSWR (IF = -10 dBm, LO = +23 dBm)		Ratio		2.5:1	
LO frequency range	SBF0810HI3A	GHz	8		10
LO < RF, only	SBF0810HI3B	GHz	6		10
LO power range		dBm	+20		+23
LO VSWR (RF = -10 dBm, LO = +23 dBm)		Ratio		3.5:1	
DC bias -12 VDC		mA		25	
TRANSFER CHARACTERISTICS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
Conversion loss	IF = 1 GHz	dB		8	9
LO-to-RF isolation		dB	20	30	
LO-to-IF isolation		dB		20	
RF-to-IF isolation		dB		30	
Input power at 1 dB compression	LO = +23 dBm LO = +20 dBm	dBm dBm		+23 +20	
Input two-tone third-order intercept point	LO = +23 dBm LO = +20 dBm	dBm dBm	30	+33 +30	
Input two-tone second-order intercept point	LO = +23 dBm	dBm		+45	
OUTPUT PARAMETERS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
IF frequency range (3 dB bandwidth)	SBF0810HI3A SBF0810HI3B	MHz MHz	200 1400		1200 2000
IF VSWR (IF = -10 dBm, LO = +23 dBm)		Ratio		2:1	

SBF0810HI3A/B TYPICAL TEST DATA

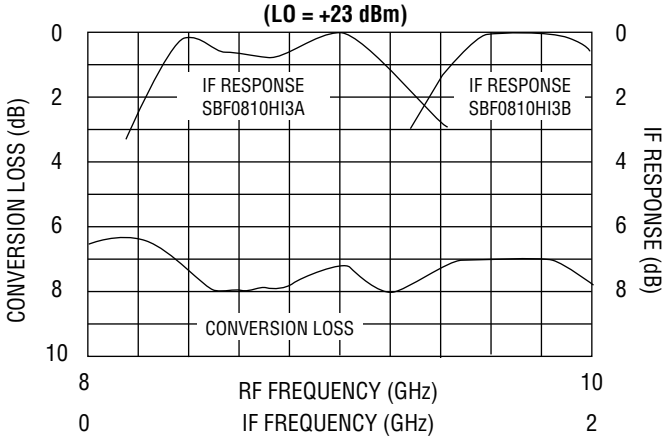
INPUT IP^3 AND P 1 dB COMPRESSION
(LO = +20 AND +23 dBm)



ISOLATION



CONVERSION LOSS IF RESPONSE
(LO = +23 dBm)



SINGLE-TONE (m) RF x (n) LO RELATIVE SPUR LEVEL (dBc)
(RF = 0 dBm, LO = +23 dBm)

(m) RF	x	(n) LO	SPUR LEVEL (dBc)
2	x	2	-50
3	x	3	-65
3	x	4	-70
4	x	5	-90
5	x	6	-100
6	x	7	-130
6	x	8	-135
7	x	8	-155
7	x	9	-150
8	x	9	-170

MAXIMUM RATINGS

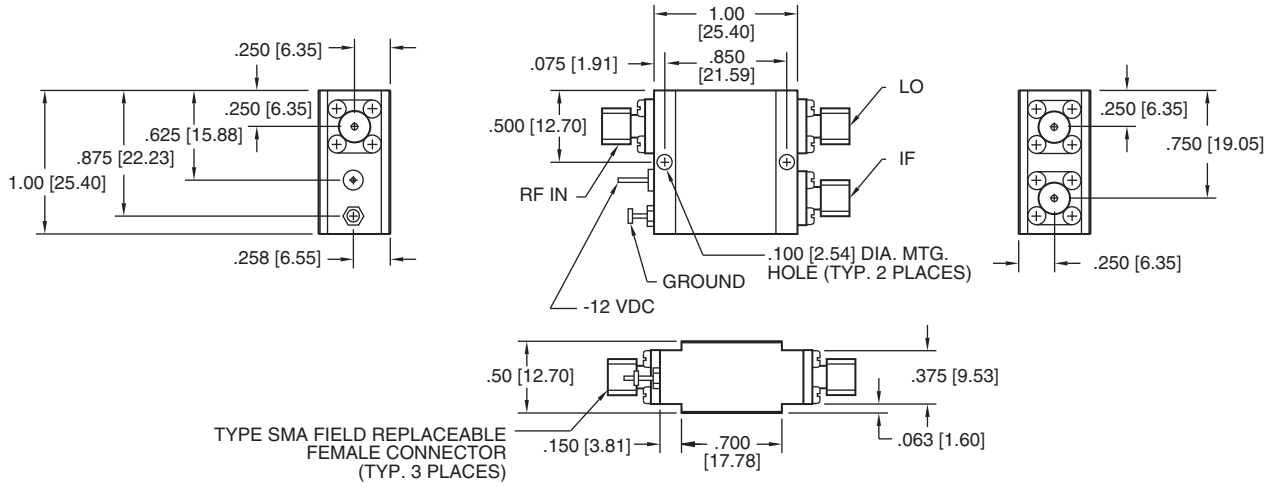
Specification temperature..... +25°C
Operating temperature ..... -54 to +85°C
Storage temperature ..... -65 to +125°C

AVAILABLE OPTIONS

Alternate LO drive levels.
Alternate RF and IF frequencies.
Open substrate carrier versions.

NOTE: Test data supplied at 25°C; conversion loss, LO-to-RF isolation and IP^3.

OUTLINE DRAWING



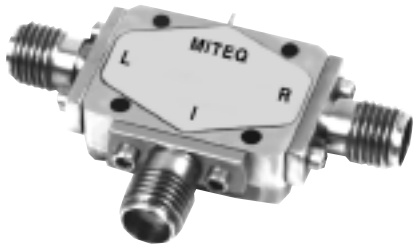
NOTE: All dimensions shown in brackets [ ] are in millimeters.

6 TO 18 GHz BIASABLE MESFET MIXER

MODEL: SBF0618LW2

FEATURES

- **RF/LO coverage ..... 6 to 18 GHz**
- **IF operation ..... DC to 3 GHz**
- **LO power range ..... +10 to +16 dBm**
- **Input 1 dB comp. ..... +10 dBm minimum**
- **Packaging ..... Hermetically sealed**



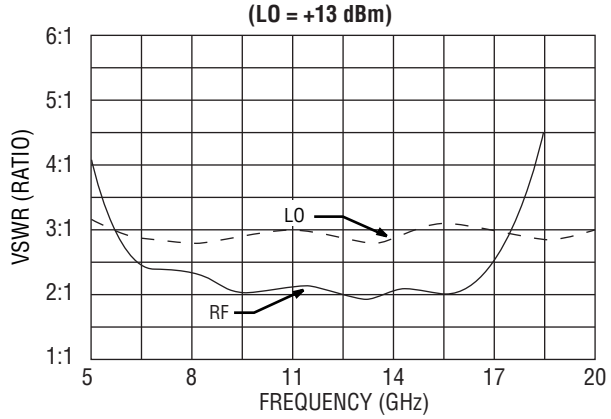
This FET mixer is designed to upgrade the dynamic range of existing systems that use a conventional ring type Schottky diode mixer, without changing the LO source. The input 1 dB compression and third-order intercept powers are typically 6 dB higher than a ring diode mixer of equal LO power. However, the LO-to-RF isolation of this particular FET mixer is approximately 10 dB less than the equivalent ring mixer (for example: MITEQ Model DB0418ME1).

ELECTRICAL SPECIFICATIONS

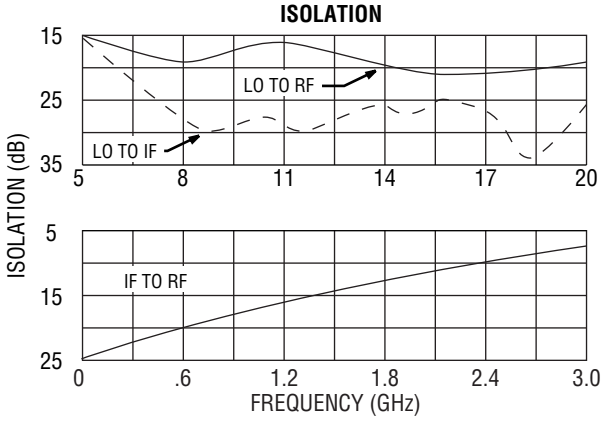
INPUT PARAMETERS	CONDITION	UNITS	MIN.	TYP.	MAX.
RF frequency range		GHz	6		18
RF VSWR (RF = 0 dBm, LO = +13 dBm)	8 to 12 GHz 6 to 18 GHz	Ratio Ratio		2.5:1 3:1	
LO frequency range		GHz	6		18
LO power range		dBm	+10	+13	+16
LO VSWR (LO = +13 dBm)	8 to 12 GHz	Ratio		2:1	
DC bias -15 V	6 to 18 GHz	Ratio		3:1	
TRANSFER CHARACTERISTICS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
Conversion loss (IF = 100 MHz, LO = +13 dBm)	8 to 12 GHz 6 to 18 GHz	dB dB		6 7.5	 9
Single-sideband noise figure	6 to 18 GHz	dB			9.5
LO-to-RF isolation	6 to 18 GHz	dB	10	15	
LO-to-IF isolation	6 to 18 GHz	dB	18	25	
IF-to-RF isolation	DC to 3 GHz	dB		12	
Input power at 1 dB compression	LO = +16 dBm	dBm	+10		
Input two-tone third-order intercept point	LO = +16 dBm	dBm	+20	+23	
OUTPUT PARAMETERS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
IF frequency range	3 dB bandwidth	GHz	DC		3
IF VSWR (IF = 0 dBm, LO = +13 dBm)		Ratio		2.5:1	

SBF0618LW2 TYPICAL TEST DATA

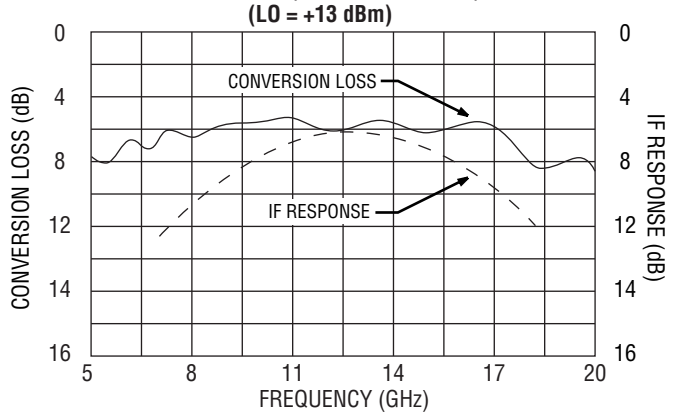
VSWR
(LO = +13 dBm)



ISOLATION



CONVERSION LOSS (IF = 100 MHz)
IF RESPONSE (12.5 GHz FIXED LO)
(LO = +13 dBm)



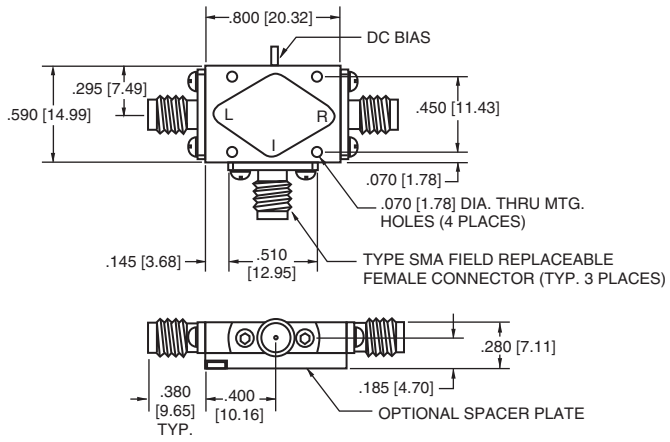
SINGLE-TONE (m) RF x (n) LO RELATIVE SPUR LEVEL (dBc)
(AVERAGE MIDBAND RF, LO, IF FREQUENCIES,
RF = -10 dBm, LO = +16 dBm)

SPUR (m) RF x (n) LO	RF TEST FREQ. (GHz)	LO TEST FREQ. (GHz)	SPUR LEVEL (dBc)
1 x 1	11.2	12.7	0
1 x 2	15.5	8.5	22
1 x 3	18.3	5.6	15
2 x 1	7.5	16.5	63
2 x 2	11.6	12.4	35
2 x 3	14.7	9.3	55
3 x 1	6.3	17.6	73
3 x 2	9.7	14.1	63
3 x 3	11.7	12.2	63

MAXIMUM RATINGS
Specification temperature..... +25°C
Operating temperature ..... -54 to +85°C
Storage temperature ..... -65 to +125°C

NOTE: Test data supplied at 25°C; conversion loss, LO-to-RF isolation and IP3.

OUTLINE DRAWING



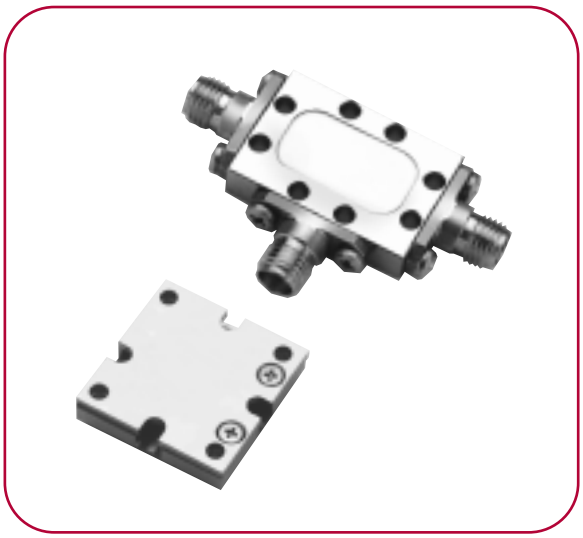
NOTE: All dimensions shown in brackets [ ] are in millimeters.

8 TO 18 GHz EVEN HARMONIC (1/2 LO) BALANCED MIXER

MODELS: SBE0818LA1, SBE1015LM2 AND SBE0818LM2

FEATURES

- **RF coverage ..... 8 to 18 GHz**
- **LO coverage ..... 4 to 9 GHz**
- **IF operation ..... DC to 1 GHz**
- **2LO-to-RF isolation ..... 60 dB typical**
- **High carrier rejection when used as an upconverter**



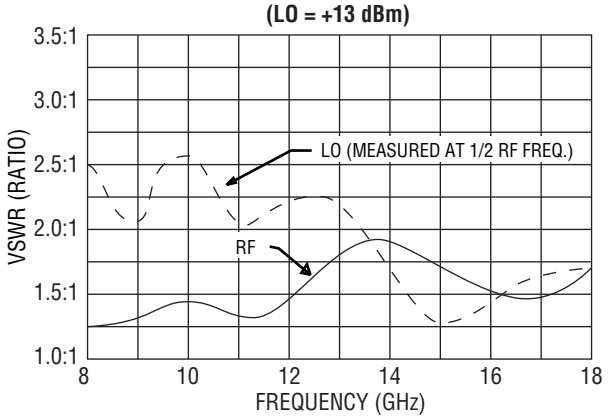
The SBE Series of mixers employs antiparallel ring diodes to achieve efficient RF-to-IF or IF-to-RF conversion using an LO at 1/2 the normal frequency. These units are particularly useful in miniature transceivers as upconverters, where high carrier rejection is desired without costly tunable filters or isolators.

ELECTRICAL SPECIFICATIONS

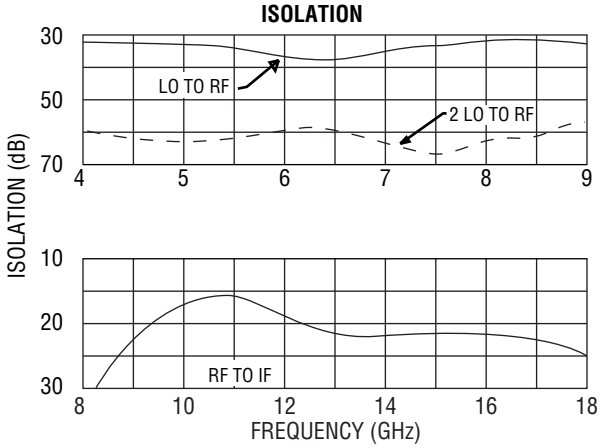
INPUT PARAMETERS	CONDITION	UNITS	MIN.	TYP.	MAX.
RF frequency range		GHz	8		18
RF VSWR (RF = -10 dBm, LO = +10 dBm)	10 to 15 GHz 8 to 18 GHz	Ratio Ratio		1.5:1 1.75:1	
LO frequency range		GHz	4		9
LO power range		dBm	+13		+15
LO VSWR (LO = +10 dBm)	5 to 7.5 GHz 4 to 9 GHz	Ratio Ratio		2:1 1.75:1	
TRANSFER CHARACTERISTICS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
Conversion loss (IF = 100 MHz, LO = +13 dBm)	10 to 15 GHz 8 to 18 GHz	dB dB		9 10	10 11
Single-sideband noise figure	8 to 18 GHz	dB		9.5	
LO-to-RF isolation	4 to 9 GHz	dB		35	
2LO-to-RF isolation	4 to 9 GHz	dB	40	60	
RF-to-IF isolation	8 to 18 GHz	dB		30	
Input power at 1 dB compression	LO = +10 dBm	dBm		-3	
Input two-tone third-order intercept point	LO = +10 dBm	dBm	5	7	
OUTPUT PARAMETERS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
IF frequency range	1 dB bandwidth	MHz	DC		1000
IF VSWR (IF = -10 dBm, LO = +13 dBm)		Ratio		2:1	

SBE0818LA1 TYPICAL TEST DATA

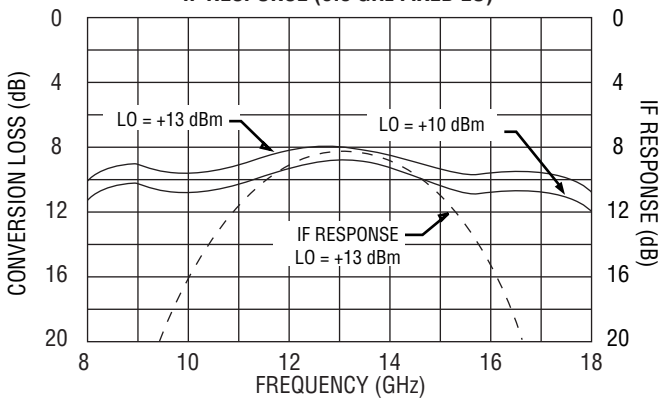
VSWR
(LO = +13 dBm)



ISOLATION



CONVERSION LOSS (IF = 100 MHz)
IF RESPONSE (6.5 GHz FIXED LO)



SINGLE-TONE (m) RF x (n) LO RELATIVE SPUR LEVEL (dBc)
(AVERAGE MIDBAND RF, LO, IF FREQUENCIES,
RF = -10 dBm, LO = +13 dBm)

SPUR (m) RF x (n) LO	RF TEST FREQ. (GHz)	LO TEST FREQ. (GHz)	SPUR LEVEL (dBc)
1 x 1	10.75	11.25	-33
1 x 2	14.5	7.5	REF
1 x 3	16.36	5.62	-30
2 x 1	7.16	14.8	-45
2 x 2	10.87	11.12	-50
2 x 3	13.10	8.9	-45
3 x 1	5.37	16.6	-40
3 x 2	8.7	13.3	-40
3 x 3	10.91	11.08	-50

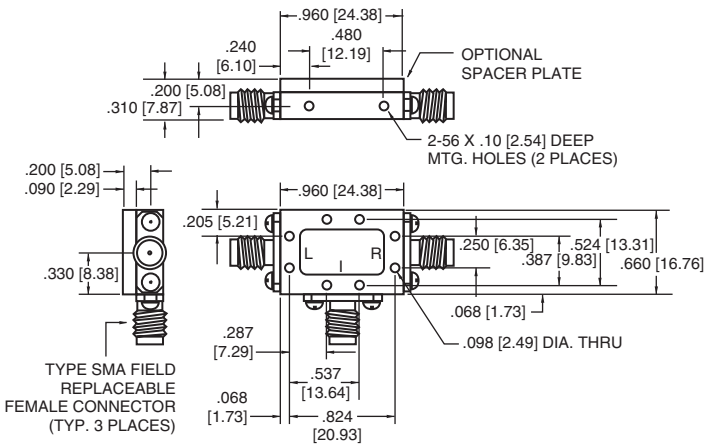
MAXIMUM RATINGS

Specification temperature..... +25°C
Operating temperature ..... -54 to +85°C
Storage temperature ..... -65 to +125°C

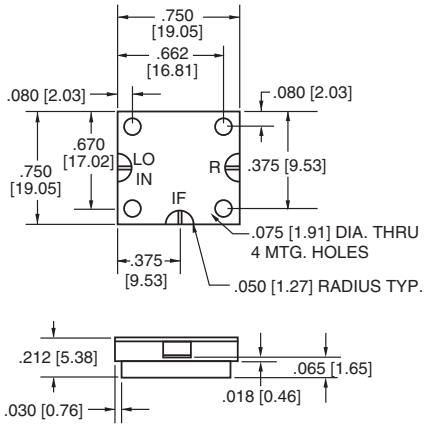
NOTE: Test data supplied at 25°C; conversion loss and 2LO-to-RF isolation.

OUTLINE DRAWINGS

A1 HOUSING



M2 HOUSING



NOTE: All dimensions shown in brackets [ ] are in millimeters.

4 TO 40 GHz EVEN HARMONIC (1/2 LO) BALANCED MIXER

MODEL: SBE0440LW1

FEATURES

- **RF coverage..... 4 to 40 GHz**
- **LO coverage ..... 2 to 20 GHz**
- **IF operation..... DC to 1.5 GHz**
- **LO power range..... +10 to +15 dBm**
- **High carrier rejection of 30 dB typical when used as an upconverter**



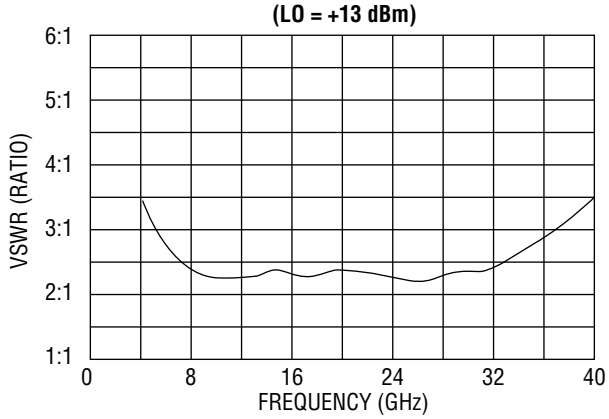
The SBE Series of mixers employs antiparallel ring diodes to achieve efficient RF-to-IF or IF-to-RF conversion using an LO at 1/2 the normal frequency. These units are particularly useful in miniature transceivers as upconverters, where high carrier rejection is desired without costly tunable filters or isolators.

ELECTRICAL SPECIFICATIONS

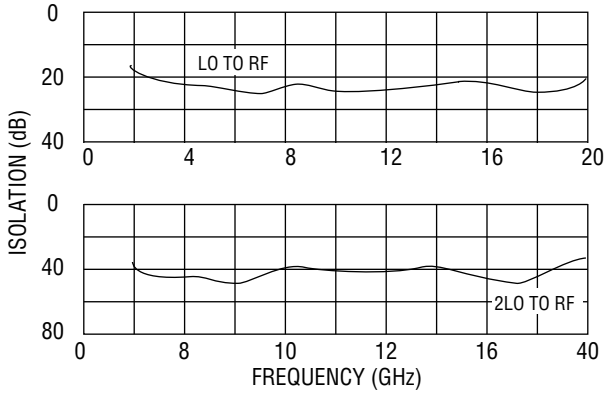
INPUT PARAMETERS	CONDITION	UNITS	MIN.	TYP.	MAX.
RF frequency range		GHz	4		40
RF VSWR (RF = -10 dBm, LO = +13 dBm)	6 to 30 GHz 4 to 40 GHz	Ratio Ratio		2.5:1 3.5:1	
LO frequency range		GHz	2		20
LO power range		dBm	+10	+13	+15
LO VSWR (LO = +13 dBm)	2 to 20 GHz	Ratio		2.75:1	
TRANSFER CHARACTERISTICS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
Conversion loss (IF = 100 MHz, LO = +13 dBm)	6 to 30 GHz 4 to 40 GHz	dB dB		9 10	11 12
LO-to-RF isolation	2 to 20 GHz	dB		20	
2LO-to-RF isolation	4 to 40 GHz	dB	30	40	
LO-to-IF isolation	2 to 20 GHz	dB		20	
RF-to-IF isolation	2 to 20 GHz	dB		15	
Input power at 1 dB compression	LO = +13 dBm	dBm		0	
Input two-tone third-order intercept point	LO = +13 dBm	dBm		+10	
OUTPUT PARAMETERS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
IF frequency range	3 dB bandwidth	GHz	DC		1.5
IF VSWR (IF = -10 dBm, LO = +13 dBm)		Ratio		2.75:1	

SBE0440LW1 TYPICAL TEST DATA

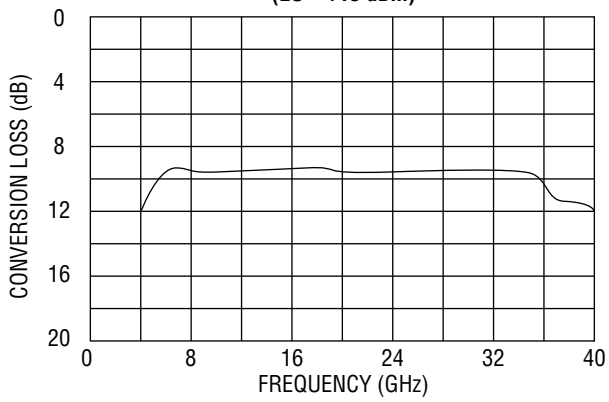
VSWR
(LO = +13 dBm)



ISOLATION



CONVERSION LOSS (IF = 100 MHz)
(LO = +13 dBm)



SINGLE-TONE (m) RF x (n) LO RELATIVE SPUR LEVEL (dBc)
(AVERAGE MIDBAND RF, LO, IF FREQUENCIES,
RF = -10 dBm, LO = +13 dBm)

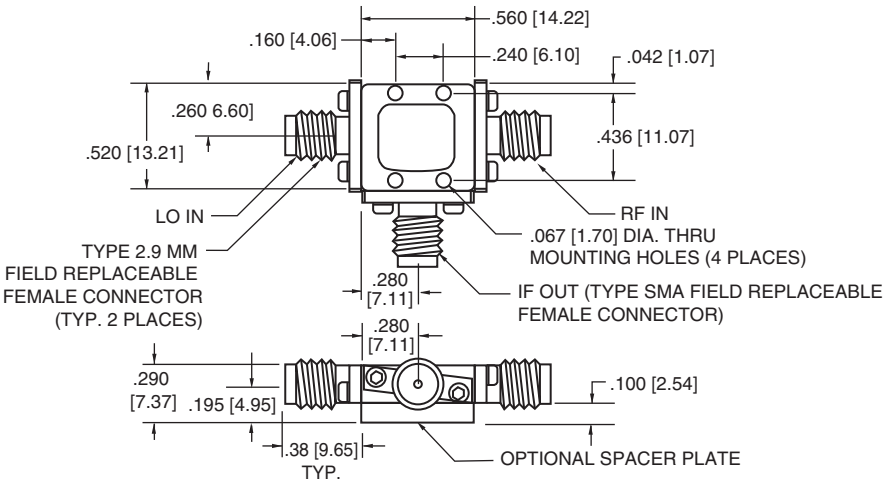
SPUR (m) RF x (n) LO	RF TEST FREQ. (GHz)	LO TEST FREQ. (GHz)	SPUR LEVEL (dBc)
1 x 1	10.75	11.25	-33
1 x 2	14.5	7.5	REF
1 x 3	16.36	5.62	-30
2 x 1	7.16	14.8	-45
2 x 2	10.87	11.12	-50
2 x 3	13.1	8.9	-45
3 x 1	5.37	16.6	-40
3 x 2	8.7	13.3	-40
3 x 3	10.91	11.08	-50

MAXIMUM RATINGS

Specification temperature..... +25°C
Operating temperature ..... -54 to +85°C
Storage temperature ..... -65 to +125°C

NOTE: Test data supplied at 25°C; conversion loss and 2LO-to-RF isolation.

OUTLINE DRAWING



NOTE: All dimensions shown in brackets [ ] are in millimeters.

20 TO 40 GHz EVEN HARMONIC MIXER

MODEL: ME2640W1

FEATURES

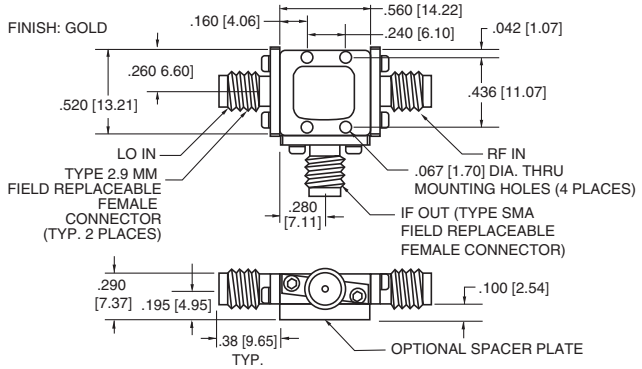
- **RF coverage ..... 26 to 40 GHz**
- **LO coverage ..... 13 to 20 GHz**
- **IF operation ..... 2 to 4 GHz**
- **LO power range ..... +10 to +14 dBm**
- **Packaging ..... Hermetically sealed**



ELECTRICAL SPECIFICATIONS

INPUT PARAMETERS	CONDITION	UNITS	MIN.	TYP.	MAX.
RF frequency range		GHz	26		40
RF VSWR	LO = +12 dBm	Ratio		3.75:1	
LO frequency range		GHz	13		20
LO power range		dBm	+10		+14
LO VSWR	LO = +12 dBm	Ratio		3:1	
TRANSFER CHARACTERISTICS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
Conversion loss (IF = 3 GHz)	LO = +12 dBm	dB		12	15
2LO-to-RF isolation	LO = +12 dBm	dB	35	40	
LO-to-RF isolation	LO = +12 dBm	dB	25	30	
RF-to-IF isolation		dB		30	
LO-to-IF isolation		dB		40	
Input power at 1 dB compression point	LO = +12 dBm	dBm		+5	
Input two-tone third-order intercept point	LO = +12 dBm	dBm		+15	
OUTPUT PARAMETERS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
IF frequency range		GHz	2		4
IF VSWR	LO = +12 dBm	Ratio		3:1	

OUTLINE DRAWING



NOTE: All dimensions shown in brackets [ ] are in millimeters.

MAXIMUM RATINGS

Specification temperature..... +25°C
Operating temperature ..... -54 to +85°C
Storage temperature ..... -65 to +125°C

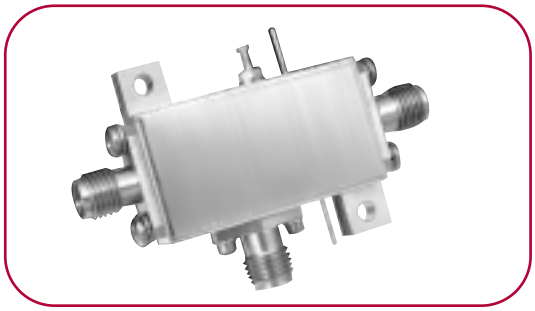
NOTE: Test data supplied at 25°C;
conversion loss and 2LO-to-RF isolation.

X2 MULTIPLIER MIXER

MODEL: SYSMM2X2335

FEATURES

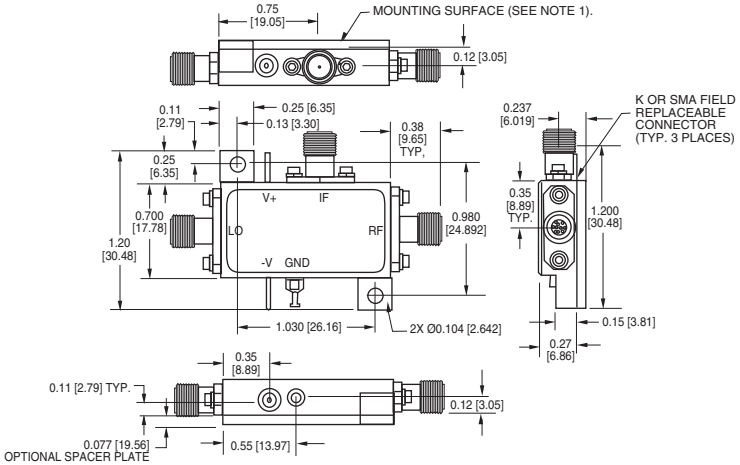
- Mixer with active LO doubler
- RF-to-IF conversion loss ..... 11 dB
- LO-to-RF fundamental leakage ..... -50 dBm
- Use as an up- or downconverter
- Packaging..... Hermetically sealed



ELECTRICAL SPECIFICATIONS

INPUT PARAMETERS	CONDITION	UNITS	MIN.	TYP.	MAX.
RF frequency range		GHz	23.67		35.33
RF VSWR	50 ohm reference	Ratio		2.5:1	
LO frequency range		GHz	11.38		17.66
LO power		dBm	+13		+15
V+ bias voltage	@ 300 mA max.	VDC	9		16
V- bias voltage	@ 15 mA max.	VDC	-9		-16
TRANSFER CHARACTERISTICS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
RF-to-IF conversion loss		dB		11	12
LO-to-RF leakage at 2LO		dBm		-20	-15
LO-to-RF fundamental leakage		dBm		-50	-35
Output power at 1 dB compression point		dBm	-5	-1	
OUTPUT PARAMETERS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
IF frequency range		MHz	DC		230
IF VSWR	50 ohm reference	Ratio		2.5:1	

OUTLINE DRAWING



Note 1: Unit's mounting surface shall be attached to a heatsink capable of dissipating the devices power consumption without exceeding the operating temperature limits.

NOTE: All dimensions shown in brackets [ ] are in millimeters.

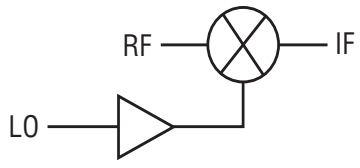
MAXIMUM RATINGS

Specification temperature..... +25°C
Operating temperature ..... -40 to +65°C
Storage temperature..... -65 to +95°C

Additional options for:
RF, IF, LO amplifiers..... Contact MITEQ

NOTE: Test data supplied at 25°C; conversion loss and isolation.

BLOCK DIAGRAM

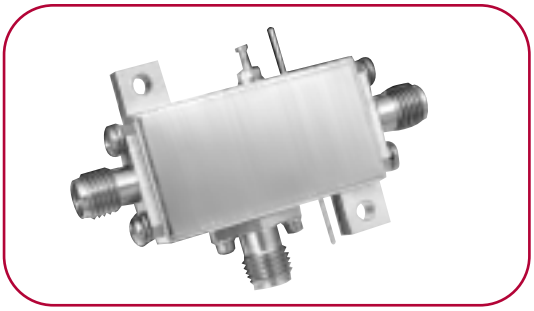


X3 MULTIPLIER MIXER

MODEL: SYSMM3X2934

FEATURES

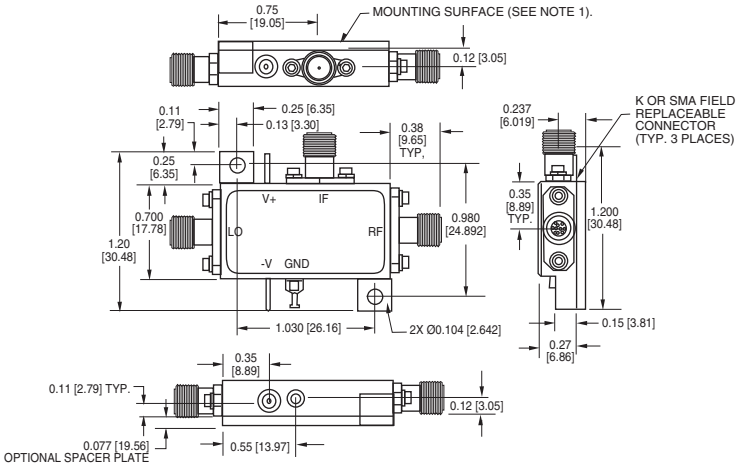
- **Mixer with active LO tripler**
- **RF-to-IF conversion loss ..... 9 dB**
- **LO-to-RF fundamental leakage ..... -70 dBm**
- **Use as an up- or downconverter**
- **Packaging ..... Hermetically sealed**



ELECTRICAL SPECIFICATIONS

INPUT PARAMETERS	CONDITION	UNITS	MIN.	TYP.	MAX.
RF frequency range		GHz	29		34
RF VSWR	50 ohm reference	Ratio		2.5:1	
LO frequency range		GHz	9.7		10.3
LO power		dBm	+13		+15
V+ bias voltage	@ 275 mA typ.	VDC	12		
V- bias voltage	@ 25 mA typ.	VDC	-12		
TRANSFER CHARACTERISTICS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
RF-to-IF conversion loss		dB		9	12
LO-to-RF leakage at 3LO		dBm		-25	-15
LO fundamental leakage at RF		dBm		-70	-55
2X fundamental LO at RF		dBm		-60	-40
Output power at 1 dB compression point		dBm	-5	-1	
OUTPUT PARAMETERS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
IF frequency range		GHz	DC		3
IF VSWR	50 ohm reference	Ratio		2.5:1	

OUTLINE DRAWING



Note 1: Unit's mounting surface shall be attached to a heatsink capable of dissipating the devices power consumption without exceeding the operating temperature limits.

NOTE: All dimensions shown in brackets [ ] are in millimeters.

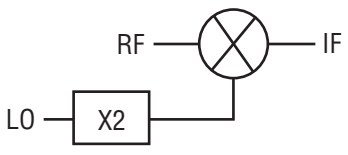
MAXIMUM RATINGS

Specification temperature..... +25°C
Operating temperature ..... -40 to +65°C
Storage temperature..... -65 to +95°C

Additional options for:
RF, IF, LO amplifiers..... Contact MITEQ

NOTE: Test data supplied at 25°C; conversion loss and isolation.

BLOCK DIAGRAM



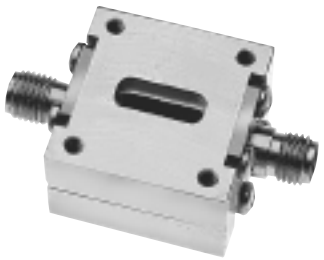
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22 TO 26 GHz SINGLE-BALANCED MIXER

MODEL: SBW2226LG1

FEATURES

- **WR 42 waveguide RF input**
- **Low conversion loss..... 5.5 dB typical**
- **Usable with 1/3 LO frequency**
- **Field replaceable diodes**
- **Coaxial LO/IF ..... DC to 2 GHz**



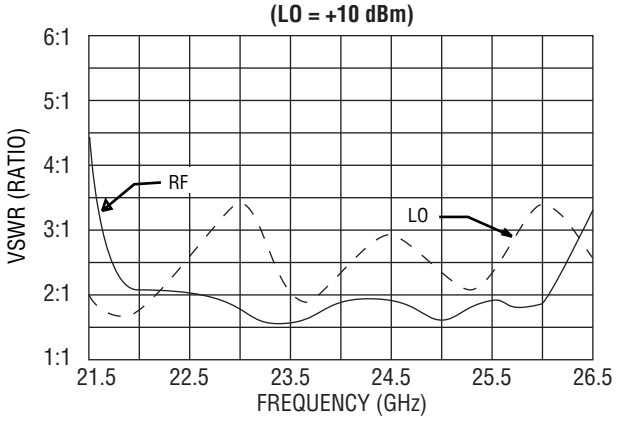
MITEQ's Model SBW2226LG1 is designed for use as an up- or downconverter in popular communication and radar bands. The innovative architecture provides low conversion loss and VSWR at modest LO power. This mixer is also available with high-level diodes yielding greater IP^3 at proportionally more LO power.

ELECTRICAL SPECIFICATIONS

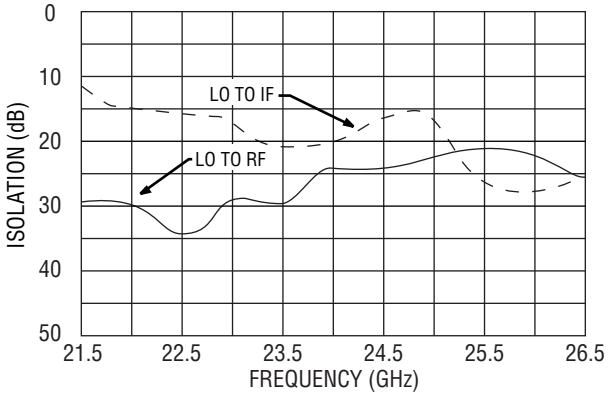
INPUT PARAMETERS	CONDITION	UNITS	MIN.	TYP.	MAX.
RF frequency range		GHz	22		26
RF VSWR (RF = -10 dBm, LO = +10 dBm)		Ratio		1.5:1	
LO frequency range	Fundamental LO = 1/3 freq.	GHz GHz	22 7.5		26 8.5
LO power range		dBm	+7		+10
LO VSWR (LO = +10 dBm)	22 to 26 GHz	Ratio		2.5:1	
TRANSFER CHARACTERISTICS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
Conversion loss (IF = 100 MHz, LO = +10 dBm)	Fundamental LO = 1/3 freq.	dB dB		5.5 15.5	7.5
Single-sideband noise figure	Fundamental LO	dB		6	
LO-to-RF isolation		dB	20	30	
LO-to-IF isolation		dB		15	
RF-to-IF isolation		dB		30	
2RF – 2LO isolation (RF = -10 dBm)		dBc		45	
Input power at 1 dB compression	LO = +10 dBm	dBm		0	
Input two-tone third-order intercept point	LO = +10 dBm	dBm	+7	+10	
OUTPUT PARAMETERS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
IF frequency range	-3 dB bandwidth	MHz	DC		2000
IF VSWR (IF = -10 dBm, LO = +10 dBm)		Ratio		1.5:1	

SBW2226LG1 TYPICAL TEST DATA

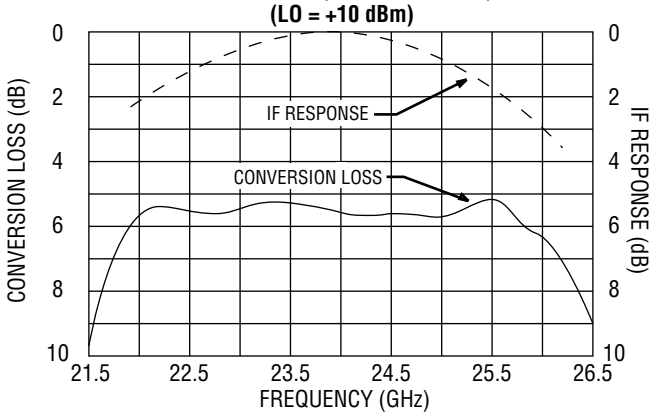
VSWR
(LO = +10 dBm)



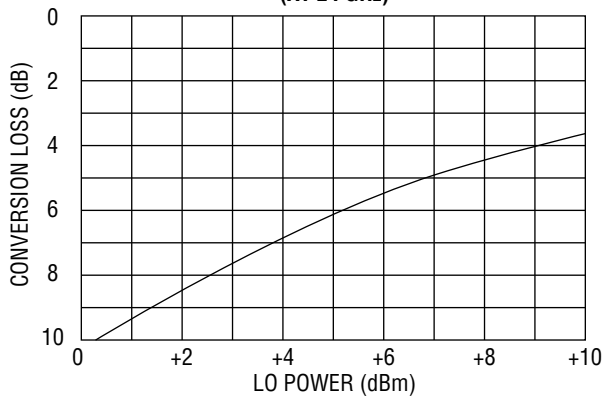
ISOLATION



CONVERSION LOSS (IF = 500 MHz)
IF RESPONSE (24 GHz FIXED LO)
(LO = +10 dBm)



CONVERSION LOSS
(AT 24 GHz)

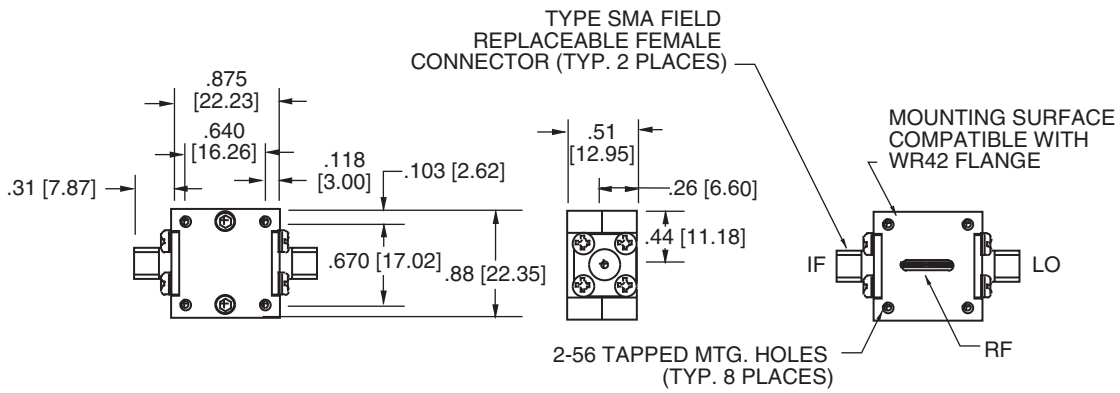


MAXIMUM RATINGS

Specification temperature..... +25°C
Operating temperature ..... -54 to +85°C
Storage temperature ..... -65 to +125°C

NOTE: Test data supplied at 25°C; conversion loss and LO-to-RF isolation.

OUTLINE DRAWING



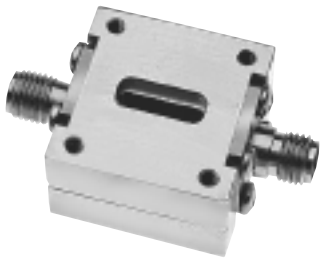
NOTE: All dimensions shown in brackets [ ] are in millimeters.

33 TO 37 GHz SINGLE-BALANCED MIXER

MODEL: SBW3337LG2

FEATURES

- **WR28 waveguide RF input**
- **Coaxial LO/IF..... DC to 4 GHz**
- **Usable with 1/3 LO frequency**
- **Field replaceable diodes**



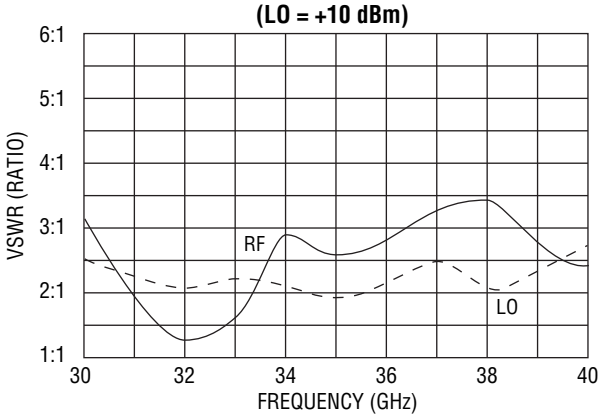
This mixer is designed for waveguide-mounted 35 GHz communication and radar applications. Low-level silicon diodes require small LO power without bias. This mixer is also available with gallium arsenide diodes yielding higher IP^3 at proportionally more LO power.

ELECTRICAL SPECIFICATIONS

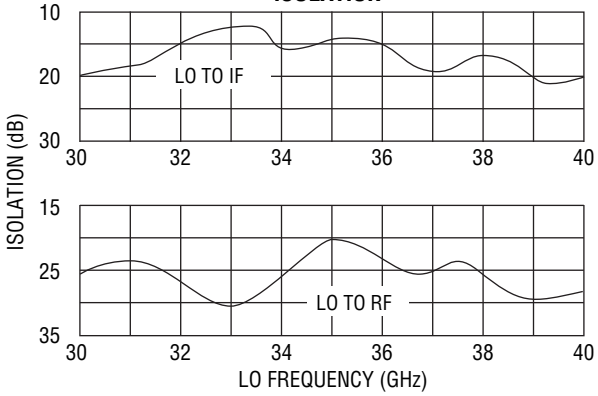
INPUT PARAMETERS	CONDITION	UNITS	MIN.	TYP.	MAX.
RF frequency range		GHz	33		37
RF VSWR (RF = -10 dBm, LO = +10 dBm)		Ratio		2.5:1	
LO frequency range	Fundamental LO = 1/3 freq.	GHz GHz	33 10		37 12.5
LO power range		dBm	+5		+13
LO VSWR (LO = +10 dBm)	33 to 37 GHz	Ratio		2:1	
TRANSFER CHARACTERISTICS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
Conversion loss (IF = 100 MHz, LO = +10 dBm)	Fundamental LO = 1/3 freq.	dB dB		7.5 17	8.5
Single-sideband noise figure	Fundamental LO	dB		8	
LO-to-RF isolation		dB	18	25	
LO-to-IF isolation		dB		15	
RF-to-IF isolation		dB		25	
2RF - 2LO isolation (RF = -10 dBm, LO = +10 dBm)		dBc		44	
Input power at 1 dB compression	LO = +10 dBm	dBm		0	
Input two-tone third-order intercept point	LO = +10 dBm	dBm	+7	+10	
OUTPUT PARAMETERS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
IF frequency range	3 dB bandwidth	GHz	DC		4
IF VSWR (IF = -10 dBm, LO = +10 dBm)		Ratio		1.5:1	

SBW3337LG2 TYPICAL TEST DATA

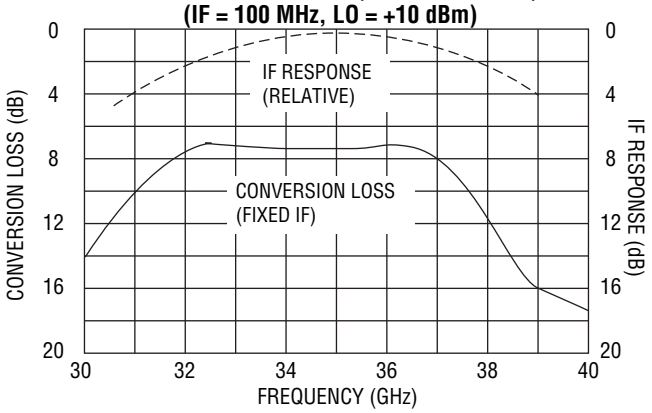
VSWR
(LO = +10 dBm)



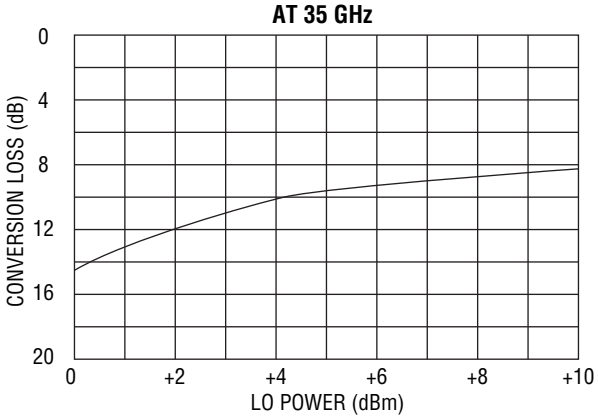
ISOLATION



CONVERSION LOSS AND
RELATIVE IF RESPONSE (35 GHz FIXED LO)
(IF = 100 MHz, LO = +10 dBm)



CONVERSION LOSS
AT 35 GHz

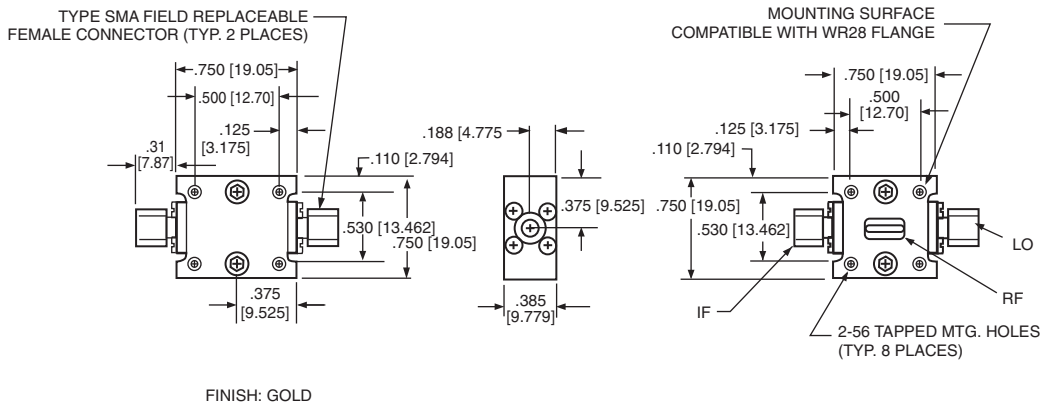


MAXIMUM RATINGS

Specification temperature..... +25°C
Operating temperature ..... -54 to +85°C
Storage temperature ..... -65 to +125°C

NOTE: Test data supplied at 25°C; conversion loss and LO-to-RF isolation.

OUTLINE DRAWING



FINISH: GOLD

NOTE: All dimensions shown in brackets [ ] are in millimeters.

LO AMPLIFIED 26 TO 40 GHz DOUBLE-BALANCED MIXER

MODEL: MA2640W1

FEATURES

- **RF/LO coverage..... 26 to 40 GHz**
- **IF operation..... DC to 12 GHz**
- **LO power..... 0 to +5 dBm**
- **Packaging..... Hermetically sealed**

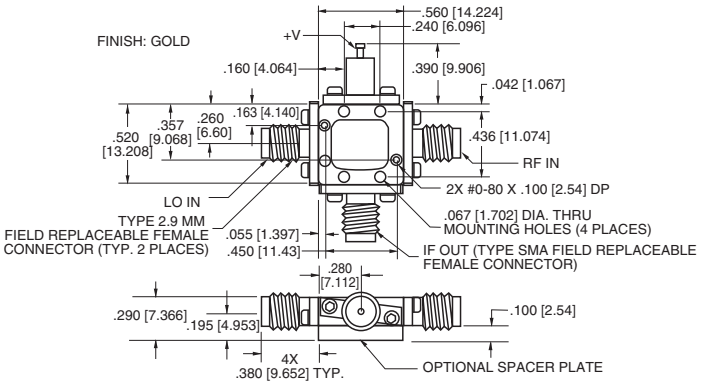


ELECTRICAL SPECIFICATIONS

INPUT PARAMETERS	CONDITION	UNITS	MIN.	TYP.	MAX.
RF frequency range		GHz	26		40
RF VSWR (RF = -10 dBm)	LO = 0 dBm	Ratio		2.75:1	
LO frequency range		GHz	26		40
LO power range		dBm	0		+5
LO VSWR	LO = 0 dBm	Ratio		2.5:1	
Bias	+15 volts	mA		200	
TRANSFER CHARACTERISTICS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
Conversion loss (IF = 1 GHz)	LO = 0 dBm	dB		10	12
Single-sideband noise figure at 25°C	dB			10.5	
LO-to-RF isolation		dB	15	20	
LO-to-IF isolation		dB		15	
RF-to-IF isolation		dB		25	
Input power at 1 dB compression point	LO = 0 dBm	dBm		0	
Input two-tone third-order intercept point	LO = 0 dBm	dBm		+18	
OUTPUT PARAMETERS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
IF frequency range at -3 dB bandwidth	LO = 0 dBm	GHz	DC		12
IF VSWR	LO = 0 dBm	Ratio		3:1	

NOTE: Test data supplied at 25°C;
conversion loss and LO-to-RF isolation.

OUTLINE DRAWING



NOTE: All dimensions shown in brackets [ ] are in millimeters.

MAXIMUM RATINGS

Specification temperature..... +25°C
Operating temperature ..... -54 to +85°C
Storage temperature ..... -65 to +125°C

TYPICAL SINGLE-TONE (m) RF x (n) LO RELATIVE SPUR LEVEL (dBc) TO REF (RF = -10 dBm, LO = 0 dBm)

RF HARMONIC (m)					
4			72	74	
3		71	69	70	
2	68	56	66		
1	REF	40			
	1	2	3	4	

LO HARMONIC (n)

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2 TO 18 GHz MESFET SAMPLING MIXER

MODEL: SRD0218LW4

FEATURES

- **RF Coverage ..... 2 to 18 GHz**
- **LO Coverage ..... 0.8 to 1.3 dBm**
- **Low intermodulation vs. Schottky diode versions**
- **Built-in LO and IF amplifiers**
- **Temperature and LO power insensitive**



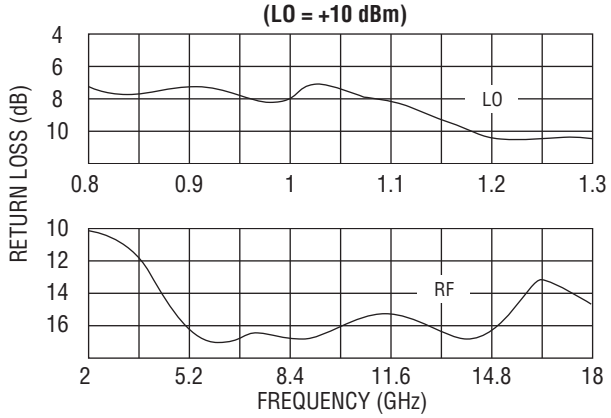
Sampling mixers are often employed to lock a coarse-tuned microwave source to a phase-stable UHF source without the need for costly intermediate microwave reference LO sources. The wide IF bandwidth of the SRD0218W4 permits rapid RF frequency changes. A second fixed-frequency phase detector can be used to extract DC-locking voltages. In a similar manner, MITEQ's SRD Series is also useful as an inexpensive downconverting receiver by utilizing any of the 2 to 18th harmonics of a 1 GHz LO input at +10 dBm.

ELECTRICAL SPECIFICATIONS

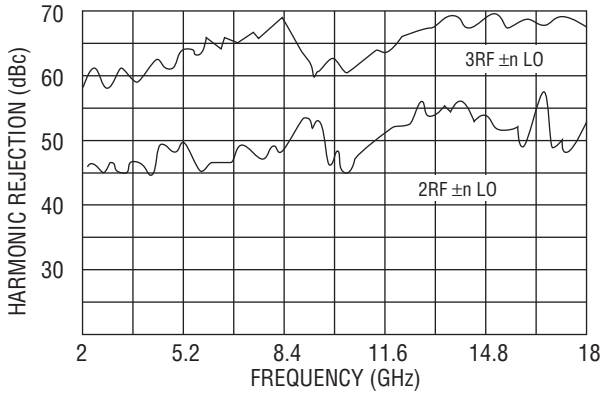
INPUT PARAMETERS	CONDITION	UNITS	MIN.	TYP.	MAX.
RF frequency range		GHz	2		18
RF VSWR (RF = -10 dBm, LO = +10 dBm)		Ratio		2:1	3:1
LO frequency range		GHz	0.8		1.3
LO power range		dBm	+10	+13	+17
LO VSWR (RF = -10 dBm, LO = +10 dBm)		Ratio		2:1	3:1
DC power supply	+15 VDC	mA			100
TRANSFER CHARACTERISTICS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
Conversion gain (including temp. & LO power)		dB	-10		+3
Single-tone intermodulation products	2RF ±n LO 3RF ±n LO	dBc dBc	-20 -30	-30 -50	-40 -60
All spurious outputs relative to -10 dBm input		dBc		-55	
LO-to-RF isolation		dB	20	25	
IF output power at 1 dB compression	LO = +10 dBm	dBm		+10	
OUTPUT PARAMETERS	**CONDITION**	**UNITS**	**MIN.**	**TYP.**	**MAX.**
IF frequency range		GHz	0.1		0.4
IF VSWR (IF = -10 dBm, LO = +10 dBm)		Ratio		2.5:1	

SRD0218LW4 TYPICAL TEST DATA

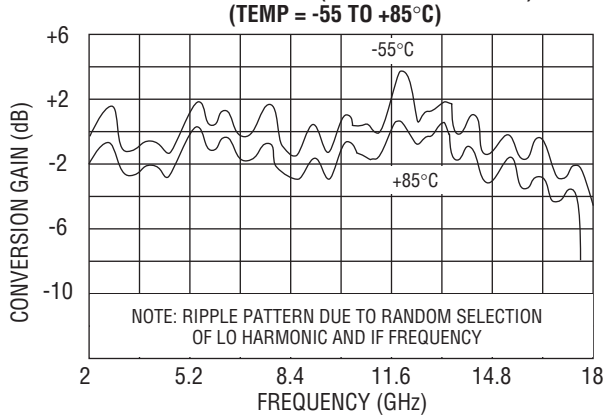
RETURN LOSS
(LO = +10 dBm)



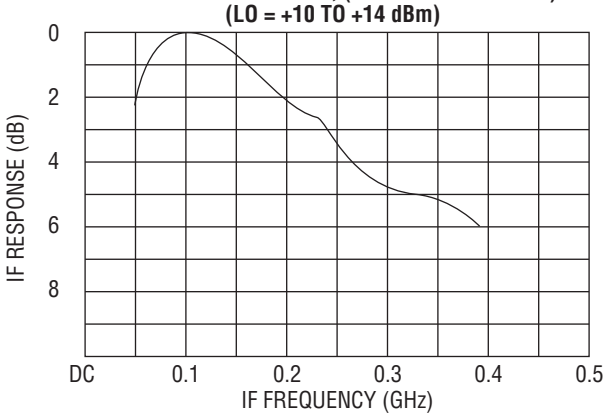
2nd AND 3rd HARMONIC REJECTION
AT -10 dBm RF INPUT @ 25°C



CONVERSION GAIN (LO = +10 TO +14 dBm)
(TEMP = -55 TO +85°C)



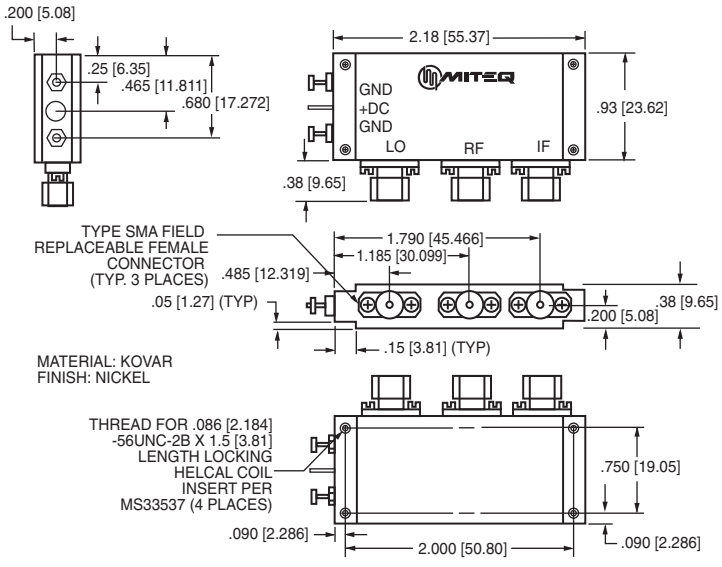
RELATIVE IF RESPONSE, (TEMP = -55 TO +85°C)
(LO = +10 TO +14 dBm)



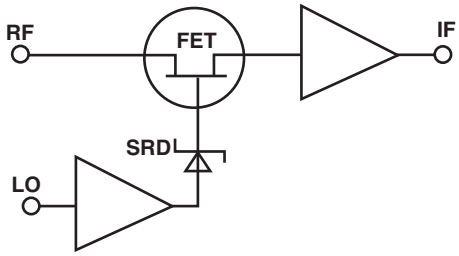
MAXIMUM RATINGS

Specification temperature..... +25°C
Operating temperature ..... -54 to +85°C
Storage temperature ..... -65 to +125°C

OUTLINE DRAWING



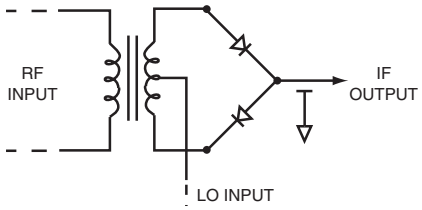
BLOCK DIAGRAM



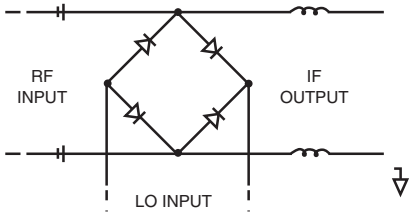
NOTE: All dimensions shown in brackets [ ] are in millimeters.

DOUBLE-SIDEBAND MIXER CIRCUITS

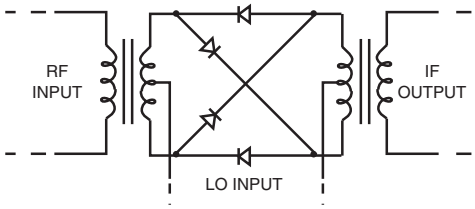
SBW SERIES
Waveguide RF,
SMA LO/IF



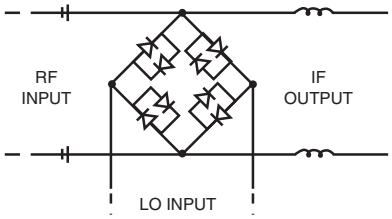
SBB SERIES
DC Biasable,
Low LO Power



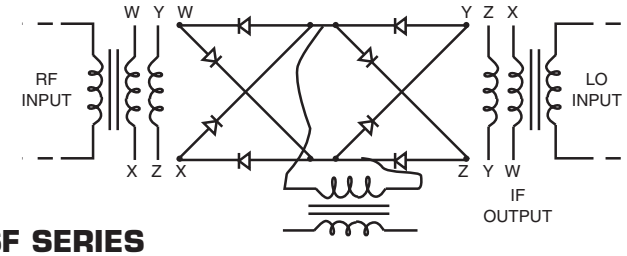
DB, DM SERIES
General Purpose



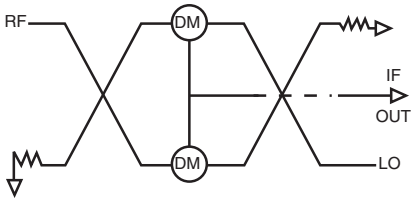
SBE SERIES
Even Harmonic
(1/2 LO)



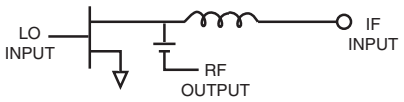
TB, TBR SERIES
Best Spurs,
Overlap RF/IF



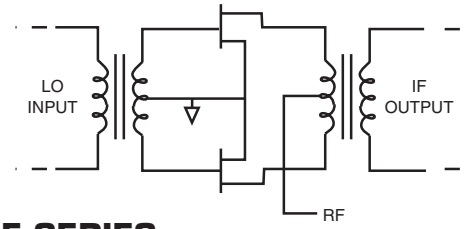
TIM SERIES
Low VSWR,
Load Insensitive



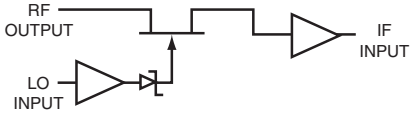
SF SERIES
General Purpose
High IP³/LO Ratio



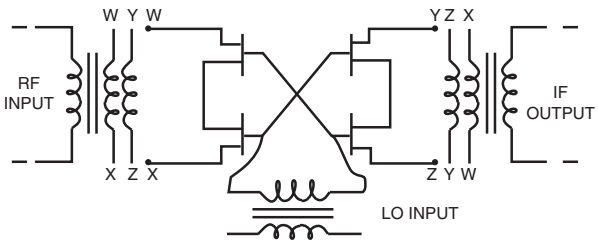
SBF SERIES
+30 dBm, IP³



SRD SERIES
Sampling,
0.5 TO 1.5 GHz LO

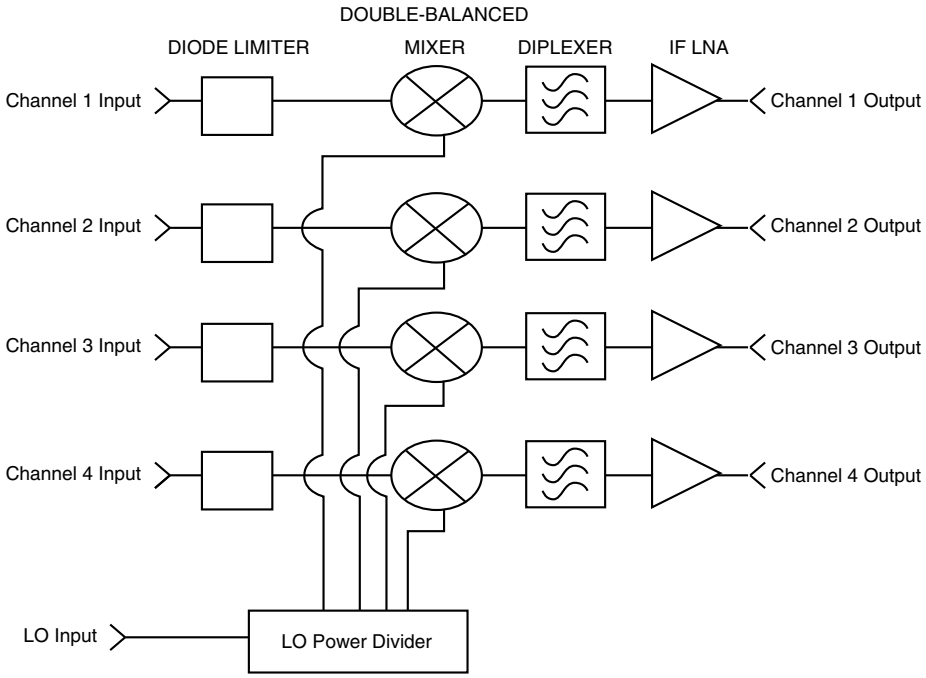


DBF SERIES
+36 dBm, IP³



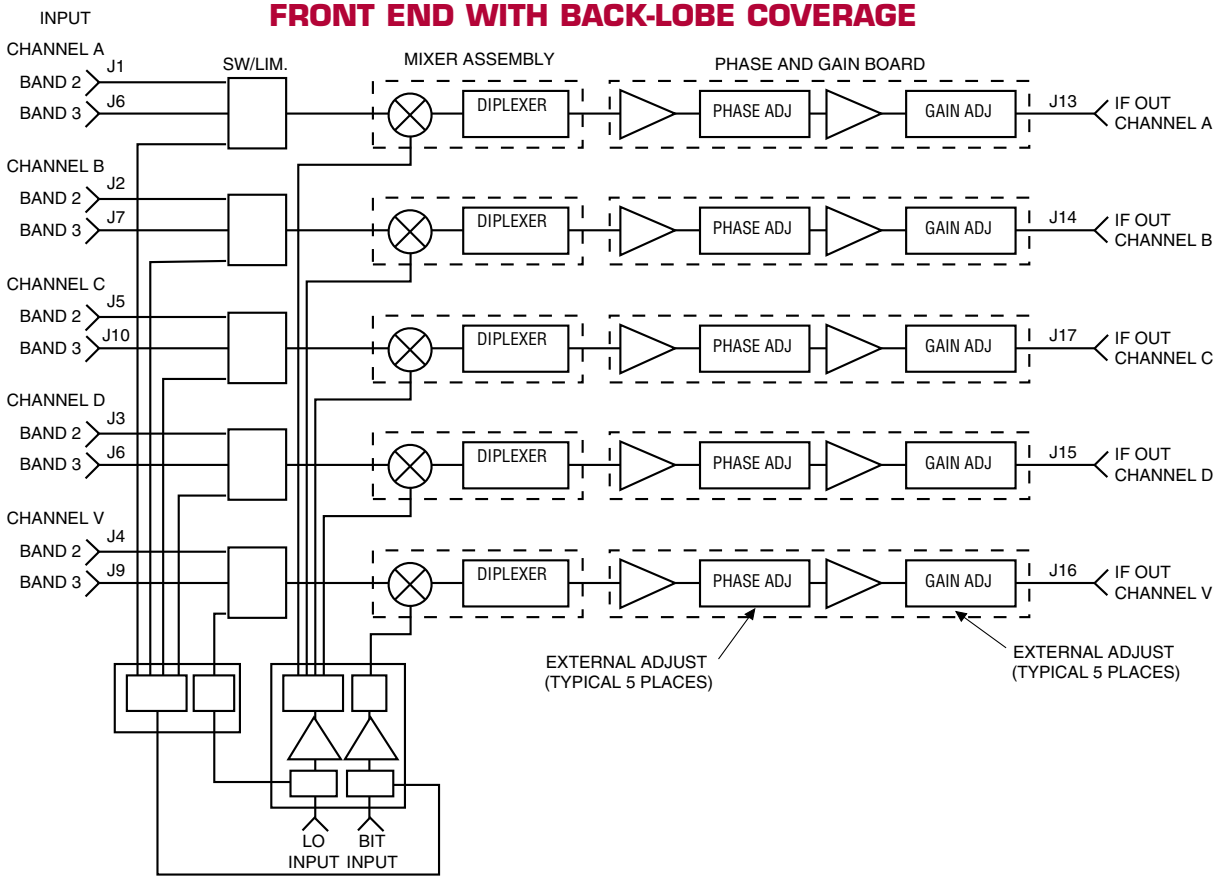
DA4 SERIES

BASIC FOUR-CHANNEL DIRECTION-FINDING FRONT END



DSS SERIES

EXTENDED FEATURE FIVE-CHANNEL DIRECTION-FINDING FRONT END WITH BACK-LOBE COVERAGE



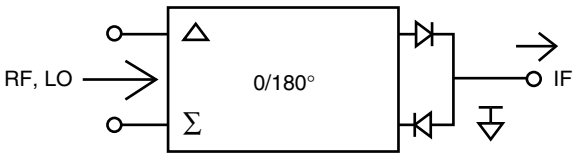
Questions and Answers about...

SINGLE-, DOUBLE- AND TRIPLE-BALANCED SCHOTTKY DIODE MIXERS

Q1: What are the differences between single- and double-balanced mixers?

A1: Before explaining this difference we should mention that a one-diode or unbalanced mixer is often used in economical receiver front ends, where tunable or fixed bandpass filters can easily separate the LO, RF and IF energy coupled to and from the diode. Early wideband receivers utilized two diodes in a single-balanced mixer circuit with a 90° hybrid to couple RF and LO power to a pair of diodes. This technique allowed overlapping LO and RF bandwidths without filters, but the isolation was dependent on how well the diodes were impedance matched. Broadband 180° hybrid balanced mixers eliminated this problem. The figure below shows the equivalent circuit and the single-tone intermodulation table of the MITEQ Model SBB0618LA1 biasable single-balanced mixer with 0 dBm LO applied to the in-phase port of the 180° hybrid and -10 dBm RF at the delta port. In this mode of operation only the RF energy is balanced or applied out of phase to each diode, with a subsequent reduction or cancellation of even harmonic mixing products (i.e., LO ± 2RF, LO ± 4RF).

Alternately, in any single-balanced mixer one could choose to apply the LO to the 180° port and observe suppression of the even harmonic LO products instead (2LO ± RF, 4LO ± RF etc.). The circuit and resulting products are shown below:



SINGLE-BALANCED RF/LO PORT

Δ = RF (-10 dBm)
Σ = LO (0 dBm)

RF HARMONIC				
3	45	46	41
2	38	42	41
1	0	17	15
	1	2	3

LO HARMONIC

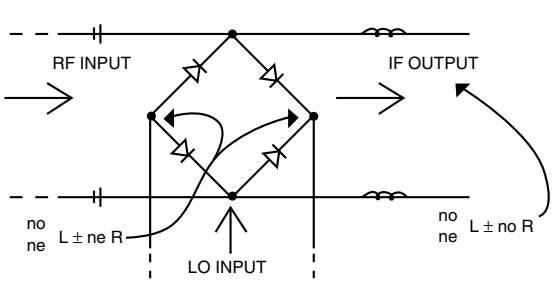
Δ = LO (0 dBm)
Σ = RF (-10 dBm)

RF HARMONIC				
3	49	53	40
2	28	44	28
1	0	30	15
	1	2	3

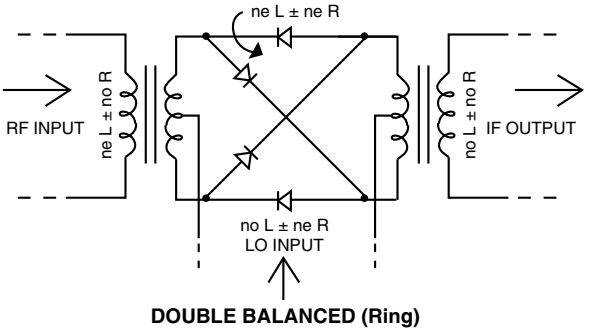
LO HARMONIC

Both single-balanced mixer configurations, however, suppress any RF or noise energy that may be present with the LO (common mode or noise rejection). In addition, single-balanced mixer circuits are particularly easy to bias and monitor the diode currents.

Alternately, one could also make an easily biasable single-balanced mixer with multioctave bandwidth coverage using a diode bridge (shown below). This appears very similar to the ring double-balanced mixer (also shown), but the key difference is that all even order products are canceled in the output of the double-balanced, whereas only even products of the RF are canceled in the single-balanced circuit. The MITEQ Model SBB0218LR5 uses this circuitry for RF coverage from 2 to 18 GHz and 2 to 26 GHz, however the IF output cannot overlap the RF coverage.



SINGLE BALANCED (Bridge)

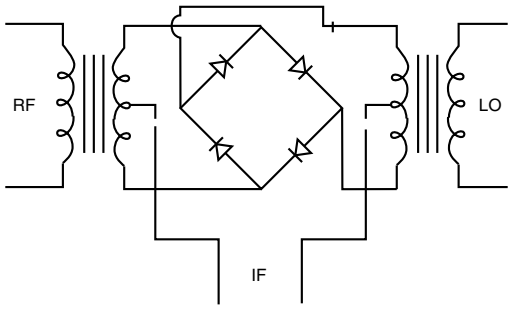


DOUBLE BALANCED (Ring)

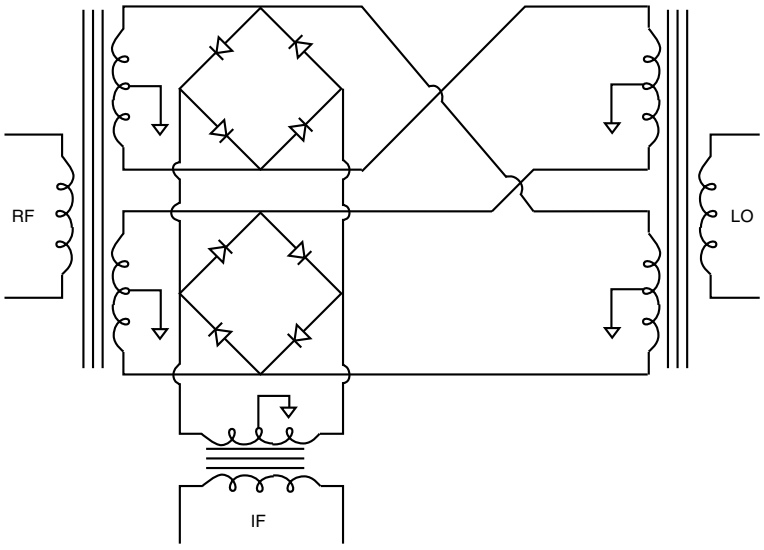
The double-balanced mixer circuit provides mutual isolation of LO, RF and IF energy, without filters, because of the combined properties of the ring diode circuit and wideband baluns. This results in suppression of all even-order harmonic mixing products of both the LO and RF (i.e., 2LO ± RF, LO ± 2RF, 2LO ± 2RF, etc.). The double-balanced mixer, however, requires 3 dB more LO power than the two-diode single-balanced circuit assuming, of course, that the same barrier voltage diode is used in each case.

Q2: What are the major differences between triple- (or double-double) and double-balanced mixers?

A2: The triple-balanced mixer employs two diode quads (eight junctions in total) fed by two power splitters at the RF and LO microwave baluns. The architecture allows both quads to be coupled together with mutual LO-to-RF isolation. The most significant advantage of this circuit is that the output IF signal is available at two separate balanced and isolated terminals with large bandwidth (typical 0.5 to 10 GHz). The IF signal and return path are isolated from both the RF and LO ports, thus allowing for overlapping frequencies at all three ports. A slight disadvantage of this circuit is that it will not yield a DC IF. In contrast, the standard microwave double-balanced mixer often uses diplexing techniques to separate the IF signal from the LO band. As a result, a microwave double-balanced mixer cannot support widely overlapping RF and IF frequencies while maintaining a DC response at the IF port. The theoretical single-tone spur product port cancellation relations are the same for each mixer circuit, however, in practice the triple-balanced mixer and only certain designs of double-balanced mixers with high port isolation yield the best spur suppression (MITEQ DM Series).



DOUBLE-BALANCED MIXER



TRIPLE-BALANCED MIXER

Q3: For what applications are triple-balanced mixers best suited?

A3: They are especially valuable for translating large bandwidth segments from one frequency range to another with low intermodulation distortion. The high IF-to-LO and IF-to-RF isolation of this class of mixers makes the conversion loss flatness much less dependent on IF frequency mismatches that almost always exist at the RF and LO ports. Recently MITEQ perfected a triple-balanced 4 to 40 GHz RF/LO mixer with a 0.5 to 20 GHz IF (Model TB0440LW1). Many customers are using this mixer with several fixed LOs to downconvert the 26 to 40 GHz portion of the millimeter band into existing receivers in the 0.5 to 18 GHz range. This mixer is also useful for upconverting the 0.5 to 18 GHz band into a fixed Ku-band second converter, thus eliminating the image response without tunable preselectors.

Q4: For what applications are microwave double-balanced mixers best suited?

A4: Double-balanced mixers are most utilized in lower cost applications where there is no requirement for overlapping RF and IF frequencies and moderate LO power is available. In addition, the DC-coupled output of the double-balanced design makes it a prime candidate as a building block for phase detectors, I/Q modulators and demodulators that operate over narrow or extremely wide bandwidths. Lower frequency torroid balun type mixers below 2 GHz often have excellent LO-to-RF balance or isolation (40 to 50 dB) and, therefore, function well as low offset phase demodulators or high carrier rejection I/Q modulators. Conventional microwave double-balanced mixers with tapered line baluns seldom exceed 20 dB LO-to-RF isolation. The MITEQ DM Series of double-balanced mixers uses a unique balun (patent pending) that yields 30 dB minimum LO-to-RF isolation over multioctave bandwidths and 40 dB typical over communication bands (Models DM0208LW2, DM0416LW2). In addition, the 4 to 16 GHz version has a DC to 4 GHz IF range with 30 dB minimum isolation to the RF and LO ports.

Q5: How much LO power is required for double- and triple-balanced mixers?

A5: Nonbiasable double-balanced mixers with so-called "zero bias" silicon Schottky diode quads will operate with +3 to +6 dBm LO power. Schottky diodes made with other junction metals and base semiconductor material, such as gallium arsenide (GaAs), can operate up to +23 dBm of LO power. The required LO power is usually determined by the desired input 1 dB compression point of the mixer and is typically specified at 5 dB above this level. Triple-balanced mixers typically require 3 dB more LO power than single-quad mixers since there are twice as many diode junctions.

Q6: What is meant by single- and two-tone intermodulation products?

A6: Using amplifier terminology, a single-tone input at a frequency (f_1) can produce outputs at the harmonic frequencies ($2f_1$, $3f_1$, $4f_1$...mf_1). Each harmonic has an input-to-output power slope equal to the order of the product (m). For example, if we double the input power (3 dB increase), we expect to see the 2nd harmonic frequency increase in power by 6 dB, the 3rd by 9 dB, etc.

In the case when two nonharmonically related tones are simultaneously fed into an amplifier, the output spectrum becomes more complex. The two tones can mix with each other due to the nonlinear transfer in the amplifier, and produce new additional signals (two-tone intermodulation products) of the order m ± n. Certain products are of particular interest because no amount of input filtering can eliminate them, such as the two-tone third order (i.e., $2f_1 \pm f_2$ and $f_1 \pm 2f_2$). In this case, we recognize this as third order because m + n = 3.

The former discussion is applicable to mixers with the additional complexity that the power supply for a mixer is not DC, but a time-varying voltage classified as the LO signal. The LO does not switch the mixer in a sinusoidal fashion, but rather as a square wave and, therefore, an additional set of harmonics are present at the output of the device. Single-tone spurs are not only harmonically related to the frequency of the RF input signal (f_{RF}), but are also related to the harmonics of the LO input signal (f_{LO}). The output spurious signals are typically classified by their order (i.e., $mf_{RF} \times nf_{LO}$) and represented in a spur table or m x n matrix chart.

The two-tone third-order outputs of a mixer are defined the same way as for an amplifier, but are usually referred to the input. The LO shifts the third-order product into the IF range by the relation:

$$(m_1 f_{RF1}, \pm m_2 f_{RF2}) \pm n \text{ LO}$$

The rules for determining the RF input to IF output power slope of each RF intermodulation product remain the same for all LO harmonics.

Q7: What determines the level of undesired single- and multitone intermodulation products in a mixer?

A7: This is a rather complex question that requires knowledge of the mixer circuit used, power ratio between the LO and applied RF, the order of the product, the degree of mixer circuit balance and the terminating impedances at each port, including out-of-band responses.

In general, mixer intermodulation products at multiples of the RF frequency are produced when the RF power level is sufficient to affect the conducting state of the diode or semiconductor used for the mixer switching action. Intermodulation products at multiples or harmonics of the LO frequency are caused by the nonsinusoidal resistance variation of the diodes due to the exponential forward voltage/current characteristic. Typically, RF harmonics can be reduced by increasing the LO power and mixer circuit complexity (i.e., single, double or triple balanced). Basically, when the incoming RF is subdivided between many diodes and the individual output IFs are recombined, each diode will generate disproportionally less intermodulation. However, each time we double the amount of diodes, both the LO power and the RF dependent intercept powers will double (+3 dB).

More recently, MESFETs (metal epitaxial semiconductor field effect transistors) have been utilized for passive mixing by applying the LO signal to the gate source junction and RF/IF to the drain source junction. The principal advantage of these mixers is much lower levels of the single-and two-tone third-order products for a given amount of LO power. For example, a typical Schottky diode mixer has a 3 dB greater input IP^3 power level than the LO power, but the MESFET version is 10 dB higher. The MITEQ Model SBF0812HI3 (8 to 12 GHz) has an input IP^3 level of +33 dBm when using +23 dBm LO.

Intermodulation levels in most mixers are influenced by external and internal terminating impedances at the RF, IF and LO ports. Internally terminated and load insensitive mixers are also available, including a new MITEQ design that redirects reflected IF, RF and sum energy to separate ports (patent pending).

In general, a good practice is to:

1. Use a mixer requiring a high or medium drive level.
2. Use a mixer with the high interport isolation (i.e., good balance).
3. Have broadband resistive terminations at all ports (beyond the desired pass bands). If this is not possible, use a broadband termination at the IF or RF port.
4. Compare each mixer design by measuring data in the system reflection environment actually encountered.

BALANCED SCHOTTKY DIODE MIXERS (CONT.)

Q8: What are the differences between the DB and DM Series of double-balanced mixers?

A8: The DB Series of mixers utilize the more conventional tapered ground microstrip balun (invented in 1972 at RHG by present MITEQ personnel). This balun is ideally suited for extremely broadband microwave applications (2 to 18 and 1 to 30 GHz), requiring modest LO-to-RF isolation (20 dB typical). The major limitations of this design relate to the high and unsymmetric balun leg impedances, making it difficult to achieve high IF frequency coverage with DC capability.

More recently at MITEQ, we have perfected a new more symmetric balun which yields typical LO-to-RF isolation of 35 dB over 4 to 1 bandwidth ratios. This design is synthesized from double- and triple-tuned microwave filter theory and, therefore, has much higher out-of-band rejection than conventional double-balanced mixers. In addition, the IF capability is greatly extended. For example, the Model DM0520LW1 has an IF coverage of DC to 8 GHz with simultaneous RF and LO coverage of 5 to 20 GHz.

Q9: What advantage does the new DM and FDM mixer baluns offer for narrow RF bandwidth applications?

A9: In general, the new balun design exhibits best performance at band center and, therefore, the narrower band units yield progressively better LO-to-RF isolation (45 dB typical for 10 percent bandwidth units). In addition, the spurious mixing products of these microwave units are similar to that expected from VHS/UHF double-balanced mixers having similar isolation. The 10 percent RF bandwidth units typically have the same RF skirt selectivity as a two-pole filter, thus reducing the system input preselection requirements (see Model FDM0325HA1).

Another advantage of the FDM design is that the LO and IF coverage are relatively broadband and one can choose an IF frequency that causes the RF image response to fall on the skirt of the balun, thus yieding image rejection without the usual more expensive matched mixers and hybrid circuit topology.

Finally, special versions of the FDM design can be optimized for simultaneous image rejection and image recovery in selected communication bands requiring relatively high IF frequencies. The typical conversion loss in this mode is 3.5 dB.

Q10: What is the principle advantage of even harmonic mixing?

A10: Aside from requiring an LO at half the normal frequency, one can achieve ultra-high (-55 to -60 dB) rejection of the LO leakage out the RF port relative to the input power. This means an input isolator can often be eliminated, but more important, for linear upconverter or modulation requirements, the carrier rejection can be maintained at high levels. Some customers employ pairs of I/Q even harmonic up- and downconverter mixers for lower cost data links. The principle disadvantages of the even harmonic mixer are slightly higher (2 dB) conversion loss, more LO power sensitivity and, of course, doubling of the LO phase noise.

Questions and Answers about...

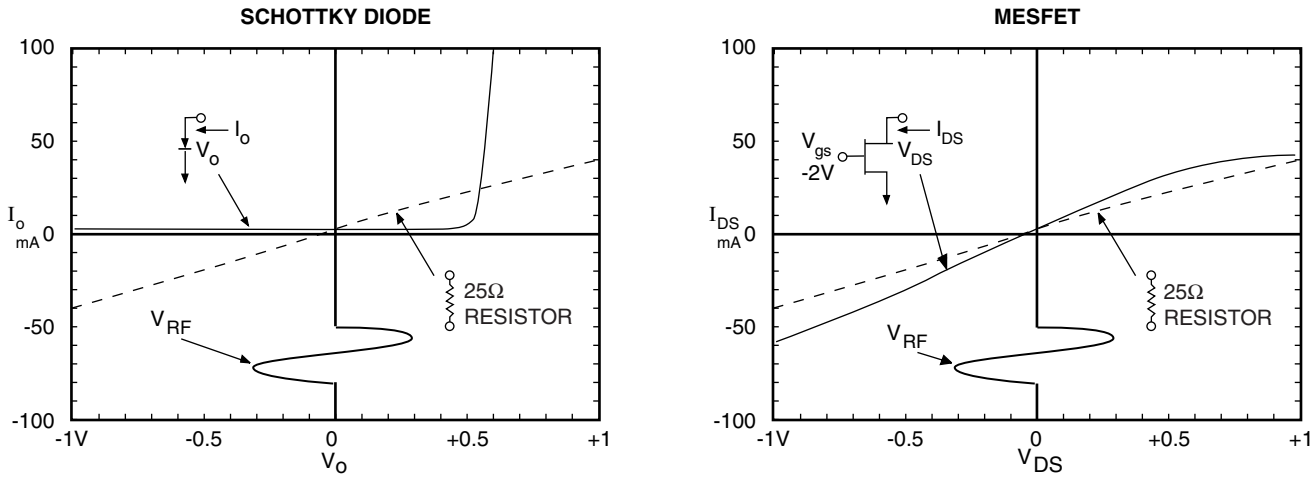
MESFET MIXERS

Q1: What does MESFET mean?

A1: Metal Epitaxial Semiconductor Field Effect Transistor (i.e., the gate electrode is a metal to semiconductor junction similar to a Schottky diode).

Q2: Why use a MESFET for mixing instead of a Schottky diode?

A2: The principal advantage of a FET mixer is a reduction in the third-order distortion, thus yielding improved single-tone (i.e., LO ± 3RF) and two-tone (2RF, - RF_2 - LO) intermodulation products relative to a Schottky diode mixer that operates at the same LO power. The figure below illustrates the source of mixing distortion (E/I characteristic) of a Schottky diode and a typical MESFET.



The dotted sine wave represents an applied RF signal across each semiconductor junction at the instant that the LO voltage is zero (in the case of the MESFET curve a fixed negative bias on the gate results in the E/I VD curve shown). The most significant difference in the two curves is how they each compare to an ideal fixed 50 ohm resistor, shown by the dotted straight line. The resistor, of course, would yield no distortion in the resulting current sine wave. We notice that the deviation from a straight line for the Schottky diode is considerably greater, thus yielding a poor IP^3 at this bias point. The measured IP^3 of both mixers is the average of the instantaneous IP^3 distortion at each LO operating voltage. The input IP^3 of a MESFET mixer is typically 10 dB or greater than the LO power. A general rule for Schottky diode mixers is 3 dB greater than the LO power (the intercept powers of mixers are usually specified relative to the maximum signal power at the input). The third-order intercept point of amplifiers is, therefore, relative to the output port.

In addition, the linear mixing region of a Schottky diode is approximately 5 dB below the applied LO power since both the RF signal and LO signal exist at the same terminal. However, a FET mixer, configured in the passive mode, has the LO applied to the gate and controls the drain to source channel resistance with low power. RF and IF signals that are present at the drain cannot easily modulate the channel resistance and, therefore, produce an RF 1 dB compression point approximately equal to the LO power. At the lower switching rates (UHF and VHF frequencies) the power difference is more dramatic (e.g., a FET switch controls +25 dBm RF with microwatts of gate power).

Another difference between the MESFET and the Schottky diode is that the latter is a two-terminal device and, therefore, requires filters or multiple diodes and balanced circuits to separate the LO, RF and IF circuits (this is essential when signal LO and RF bandwidth overlap). The MESFET is a three-terminal device and allows decoupling between the LO (gate to source) and RF/IF circuitry (drain to source). Single- and double-balanced FET mixer circuits also exist.

Q3: What are the disadvantages of a MESFET mixer relative to the Schottky device?

A3: There are two, cost and LO VSWR, particularly for broad bandwidth applications. At the present time, the fabrication process for making 4 silicon diodes in a quad configuration is considerably less costly than that of 4 GaAs MESFETs, therefore, if the P1 dB or IP^3 requirements are moderate (up to +10 and +20 dBm respectively), a Schottky diode device is adequate. For P1 dB and IP^3 of greater than +17 and +27 dBm, the MESFET cost may be justified in view of the extra cost of an LO amplifier needed for the Schottky device. The Schottky device will typically require LO powers of +24 dBm to achieve IP^3 of +27 dBm, whereas the MESFET mixer requires only +17 dBm LO power.

Another difficulty of designing octave and multioctave bandwidth MESFET mixers is impedance matching the FET gate circuit to a 50 ohm source impedance. Unlike the Schottky mixer, the FET gate circuit is not driven into full conduction during LO operation, but rather swings from pinch-off to zero bias and thus always has a high reflection coefficient. For narrow bandwidth applications, one can impedance match to the low series resistance of the gate and achieve large voltage swings with little LO power (a desirable condition). More recently at MITEQ, we have achieved octave bandwidth operation with 15 dB or more gate return loss by employing balanced circuitry. This technique has been employed to make a series of octave high level (P1 dB = +23 dBm input) MESFET mixers from 6 to 18 GHz that are suitable for a second-stage image rejection mixer following a high-gain low-noise RF preamplifier.

Q4: What are the differences between active and passive FET mixing?

A4: Active FET mixers are typically DC biased like an amplifier and employ a dual gate or two series FETs. The LO and RF signals are applied to separate gates and the IF signal (or sum frequency) is coupled from the drain. This circuit yields low IP^3 and moderate gain with high shot noise at low IF frequencies.

Passive FET mixers have conversion loss and noise similar to Schottky diode mixers. The RF signal is applied across the drain source channel of the MESFET without any DC drain voltage. The LO signal is fed to the gate, effectively modulating the channel resistance. This produces a mixing action with the sum and difference appearing across the drain source. External or self gate biasing is used to prevent forward gate conduction from the LO signal, however, since no average current is drawn, the main noise source in this mixing is thermal.

MESFET MIXERS (CONT.)

Q5: Are there preferred frequency ranges for MESFET mixers?

A5: No, since the advantage of their high IP^3 with moderate LO power has been proven at UHF through millimeter bands.

Q6: Where should MESFET mixers be used?

A6: In any application requiring high dynamic range. For example, in receiver front end downconverters where one or more high level RF signals result in intermodulation distortion spurs (such as in EW, radar or communication front ends). MESFET mixers are also well suited to second-stage mixing following a low-noise, high-gain RF preamplifier. In the latter usage a filter or imageless mixer must be used to reject the added noise. A typical communication example is in any wireless cable TV link where up to 60 tones will be frequency multiplexed onto a single carrier. In this case, the Schottky diode mixer is no match for the spur handling capability of the MESFET mixer.

Q7: What about the relative cost of Schottky diode versus MESFET mixers?

A7: Broadband double- and triple- (double-double) balanced Schottky mixers are a mature technology and are available from many suppliers. Therefore, diode mixers are more likely to be the winner in any moderate quantity cost contest where LO power is easily available. In addition, the unbiased Schottky diode does not require a separate DC power supply. However, when the issue is maximum RF power handling with low LO power, the comparison is not always obvious. Particularly, when a separate LO amplifier may be required to supply the extra 6 dB needed to make the Schottky diode mixer perform at the same signal powers as the FET mixer. Typical cost ratios put the MESFET mixer 2 to 4 times higher in unit price to that of the Schottky mixer. This can often compensate the cost of an LO amplifier or the enhancement in overall system performance.

Q8: Is the MESFET mixer more susceptible to burnout from a high power RF pulse or CW signal when compared to a conventional Schottky ring?

A8: Quite the contrary, since the RF is applied across the channel (drain source) of the FET, the FET power dissipation is more like the limits for the DC supply power in a FET amplifier. The CW RF power limit of a typical 10 GHz balanced MESFET mixer is approximately 1 watt (the CW power limit of a typical Schottky ring mixer is about 300 mW). Thus, in some system applications, an RF limiter is not required.

Q9: What about the noise level of FET versus Schottky diode mixers?

A9: When using FETs in the passive mode (no average drain current), the 1/f and thermal noise is very similar to GaAs Schottky diode mixers, i.e., corner frequency (defined as the point where the 1/f noise equals the thermal noise) is about 100 kHz.

Q10: Are MESFET mixers more temperature sensitive than Schottky diode mixers?

A10: No, particularly if one employs zener voltage regulating diodes in the MESFET gate bias circuit. Each type mixer will then commonly have a conversion loss variation of +0.25 dB for a temperature variation of +50°C when using a constant LO power.

Q11: Are there passive modes of operation for the MESFET mixer other than LO on gates and RF/IF on the drain source?

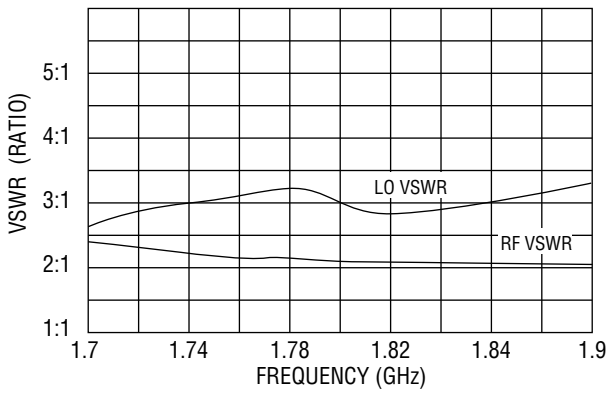
A11: It is possible to get very low conversion loss (-3 to 0 dB) by applying LO between the drain and source and RF to the gate with IF output at the drain. In this mode of operation, the LO periodically powers the FET into the active amplifier region and one obtains normal amplifier gain less the Fourier LO switching coefficient (approximately -6 dB). The input IP3, burnout and noise figure for this mode of operation are all considerably lower than drain source mixing. The lower limit of noise figure for this mode of operation is 3 dB because of the image response.

Q12: What are the performance characteristics of a typical MITEQ narrow bandwidth MESFET mixer?

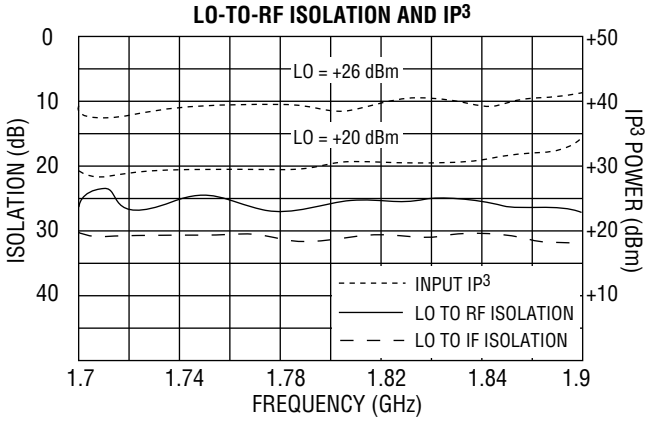
A12: The curves below show averaged measured data on four L-band units:

TYPICAL TEST DATA
MODEL DBF1800W3

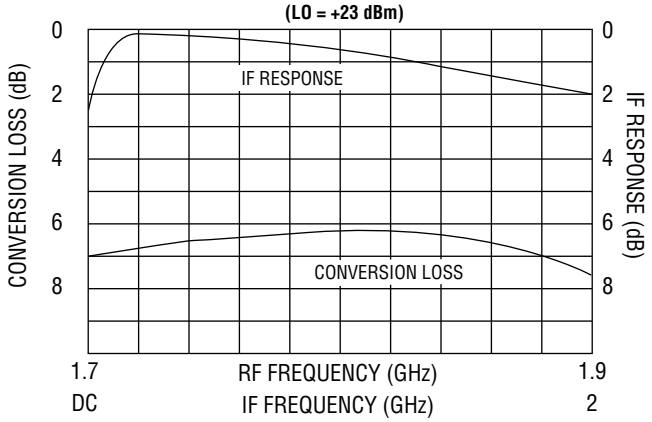
RF AND LO VSWR
(LO = +23 dBm)



LO-TO-RF ISOLATION AND IP3



CONVERSION LOSS
RELATIVE IF RESPONSE
(LO = +23 dBm)



SINGLE-TONE (m) RF x (n) LO SPUR LEVEL
RELATIVE (dBc) TO REF (RF = -10 dBm, LO = +26 dBm)

RF HARMONIC						
5	> 100	-	-	-	-
4	> 100	> 100	> 100	-	-
3	82	95	> 100	> 100	> 100
2	68	70	80	80	85
1	REF	50	47	70	58
	1	2	3	4	5

LO HARMONIC

FUNDAMENTAL, HARMONIC AND SAMPLING MESFET MIXERS CIRCUITS

Schottky diode mixers have generally been used as the front-end downconverter for commercial and military receivers. As the density of signals in a given channel increases, the input IP³ rather than noise figure of the front end begins to limit the receiver's dynamic range.[1] The principles of operation and advantages of fundamental, harmonic and sampling mixers using MESFETs instead of Schottky diodes, as well as performance data obtainable with new MESFET equivalent circuits, are reported.

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The input RF compression power of any Schottky mixer is approximately 5 dB below the available LO power because both signals are simultaneously applied to the diodes. Under normal circumstances, it is not desirable for the RF to control the conduction state of the diode, which results in RF harmonics. Therefore, higher compression RF powers are achievable only with proportional increases in LO power. Greater LO power usually means higher receiver cost and volume, and lower battery life. Many designers have extended the original work in which MESFETs are used instead of Schottky diodes for greater mixer RF power handling with less switching or LO power.[2]

MESFETs can basically be used in either of two modes for multiplication of the LO and RF signals. In the active mode, the LO and RF signals are applied to the gate (or dual gate) and the IF signal is recovered from the drain. The drain also has a positive DC voltage, thus providing some gain to the frequency conversion process. In the passive mode, the LO is applied to the gate of the MESFET, while the RF and IF are both connected between the drain and source. No DC voltage is used on the drain, although a small negative voltage is used at the gate.

In the passive mode, the LO at the gate essentially switches the drain/source channel between high and low resistance states. Unlike the active mode, no gain is achieved but the resulting conversion loss is similar to a Schottky mixer including low phase noise. This paper emphasizes the passive MESFET mode because of its superior third-order distortion.

Distortion is generated in any Schottky diode mixer primarily from the exponential shape of the junction voltage and current, as shown in Figure 1. The small-signal RF resistance of a Schottky mixer is approximately equal to the average value of the time varying slope of the E/I curve, which at the knee, is quite nonlinear. By contrast, the passive MESFET drain/source resistance is almost linear at two different LO bias voltages. The symmetry of the MESFET curves about the origin (V_{DS} = 0) also accounts for the low odd order RF distortion products, such as 3RF ± LO and $2RF_1 \pm RF_2$. In this passive mode, the MESFET channel acts as an LO voltage time-dependent linear resistor. In contrast, the active MESFET mixer has an RF input gate source resistance and intermodulation similar to the Schottky diode mixer.

THE E/I CHARACTERISTICS OF (a) A SCHOTTKY DIODE AND (b) A MESFET

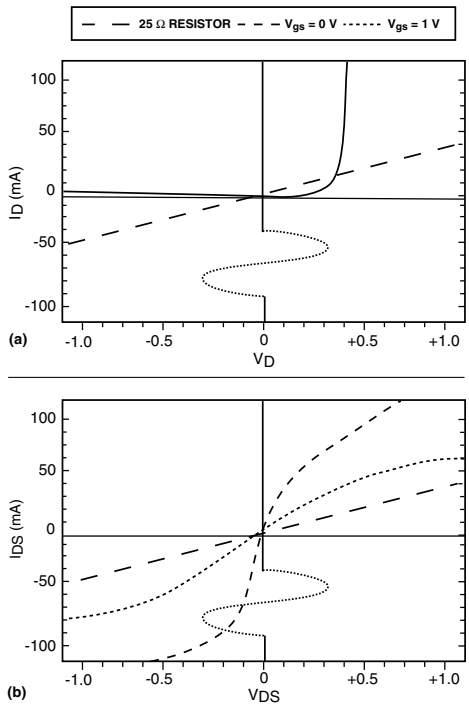


FIGURE 1

FUNDAMENTAL LO MIXER CIRCUITS

The basic mixer design problem arises in situations that require LO, RF and IF circuits to be coupled efficiently to a common semiconductor element, while requiring each port be decoupled or isolated from one another. Various multiple diode single-, double- and triple-balanced circuits have evolved that rely on different coupling modes for port separation. Figure 2 shows the double-balanced Schottky diode mixer circuit and a MESFET version of the same circuit. The Schottky circuit advantages are its low cost and its performance. It has an IP^3/P_{LO} equal to 0 to 5 dB, maximum IP^3 of +25 dBm above 2 GHz and a P_{1dB}/P_{LO} equal to -5 dB. The MESFET mixer is easy to bias and has an IP^3/P_{LO} equal to 5 to 15 dB, an IP^3 maximum of greater than +35 dBm and a P_{1dB}/P_{LO} of 0 dB. The MESFET circuit is usually chosen for receiver design because of its increased RF dynamic range with the same LO power as normally employed for the Schottky mixer. The cost of the passive MESFET mixer is usually higher, but must be weighed against

FUNDAMENTAL DOUBLE-BALANCED MIXING CIRCUITS; (a) A SCHOTTKY AND (b) A MESFET

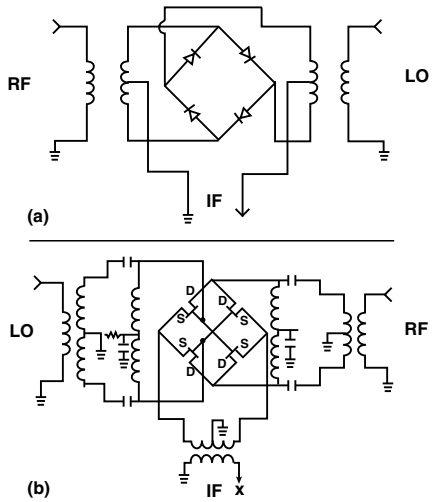


FIGURE 2

the extra cost of a higher power LO source needed to get the same dynamic range using Schottky diodes. When operation at low LO power is desired, the double-balanced MESFET mixer, shown in Figure 3, has the additional advantage that the separate LO gate circuit is more easily DC biased than a continuous ring-quad of diodes. The 1/f and uniform thermal phase noise of the Schottky diode and passive MESFET circuits are similar.

Table 1 lists the typical measured data of a 1.8 GHz MESFET mixer at +30 and +20 dBm LO powers. In each case, the input IP^3 is approximately 10 dB greater than the LO power. The ratio of IP^3 to LO power is dependent upon the channel doping profile of the MESFET and the LO port reflection coefficient. The input RF 1 dB compression power is approximately equal to the LO power for this mixer, and it will accept an RF input power of +30 dBm when the LO is also at this power. Perhaps the term power mixer is more descriptive of this device. Thus, each MESFET in this double-balanced quad has a 1 dB RF compression of +24 dBm. Another interesting advantage of the passive MESFET mixer relative to a Schottky diode mixer is the burn-out RF power limit. A general rule used by Schottky diode manufacturers is 75 mW maximum CW power for each diode junction or +300 mW (+25 dBm) for a quad. The average high frequency MESFET will accept an RF power or DC power across the drain and source of 250 mW (50 mA at 4 V) and 1 W for the quad. The described L-band mixer can survive 25 W CW. In actual practice, the thermal resistance of the microwave copper circuitry and that of the Schottky or MESFET ceramic packages must be considered.

THE 1.8 GHz MESFET MIXER'S TYPICAL PERFORMANCE

RF/LO FREQUENCY (GHz)	1.7 to 1.9
Input IP^3 (dBm)	
@ 30 dBm LO	+40
@ 26 dBm LO	+36
IF RESPONSE (MHz)	**50 to 2000**
Isolation (dB)	
LO/RF	25
LO/IF	30
SWR	
RF	2
LO	3
IF	2

TABLE 1

A 1.8 GHz DOUBLE-BALANCED MESFET MIXER

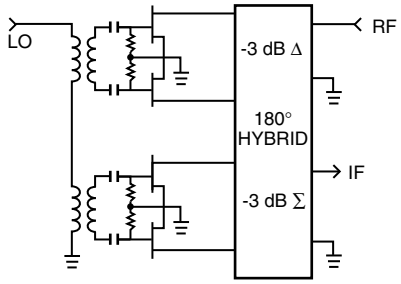


FIGURE 3

Figure 4 shows the X-band MESFET mixer circuit using quadrature coupled single-balanced mixers. This four-FET circuit has three unique system advantages. The input IP^3 is not affected by IF circuit mismatches (it is termination insensitive). The LO-to-RF isolation is typically 30 dB, and the input LO and RF VSWRs are low and nearly independent of LO power, that is, the circuit behaves as if ferrite isolators were used at these ports. A 12 to 18 GHz scaled version of this mixer circuit was produced with a 2 to 4 GHz IF output. Table 2 lists the X-band MESFET mixer's performance. The listed performance was measured with an LO power of +25 dBm. However, when DC bias is used at the gates, operation at +13 dBm LO is possible with 2 dB higher conversion loss.

A TERMINATION-INDEPENDENT MESFET MIXER

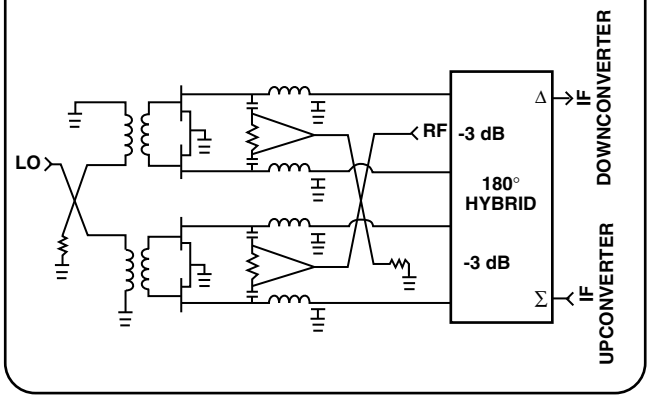


FIGURE 4

AN EVEN-HARMONIC BALANCED, SCHOTTKY DIODE MIXER

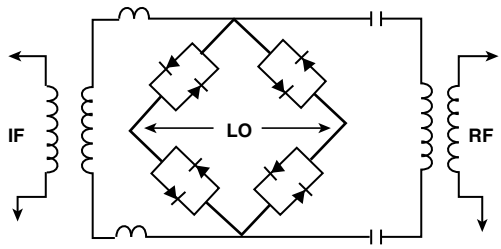


FIGURE 5

PERFORMANCE OF THE X-BAND MESFET MIXER

RF (GHz)	8	8.5	9	9.5	10	10.5	11	11.5	12
LO (GHz)	6	6.5	7	7.5	8	8.5	9	9.5	10
Input IP^3 (dBm)	37	37	37	37	36	37	34	37	36
Conversion loss (dB)	8	8	7.9	7.7	7.5	7.9	8.2	8.5	9
Input P1 dB (dBm)	26	27	26	25	25	25	25	25	24
LO/RF isolation (dB)	30	34	36	32	32	40	34	34	32
Return loss (dB)									
RF	25	25	23	21	20	17	16	15	15
LO	15	16	20	22	20	19	18	20	23

LO = 26 dBm Bias = -15 V

TABLE 2

THE SCHOTTKY DIODE MIXER'S TYPICAL PERFORMANCE

RF frequency (GHz)	8 to 18
RF power (dBm)	-3
LO frequency (GHz)	4 to 9
LO power (dBm)	+7
IF output (GHz)	DC to 1
Upconverter carrier rejection (dB)	45
Conversion loss (dB)	10

TABLE 3

HARMONIC LO MIXING CIRCUITS

It is becoming increasingly popular, particularly at mm-wave frequencies, to use Schottky diode mixers that operate at one-half or one-third the normal LO frequency, that is, second- and third-harmonic mixing.[3,4] At these frequencies, there is a considerable savings in the cost of the LO and a reduction in LO reradiation because of the higher inherent 2LO-to-RF isolation of these mixers. Figure 5 shows a typical 8 to 18 GHz even-harmonic balanced, Schottky diode mixer using an LO frequency at one-half the RF. Its performance as a downconverter is listed in Table 3. The unusually high 2LO-to-RF isolation (60 dB) of this circuit also makes it useful as an upconverter for digital quadrature amplitude modulation radios because linear upconverters or modulators require high suppression of the LO or carrier in order to maintain accurate RF quadrature phase I/Q states.

The even-harmonic mixer is generally more popular than third-harmonic mixing because the even harmonic has approximately the same conversion loss as fundamental mixing, whereas third-harmonic mixing is typically 10 dB poorer than fundamental mixing. However, an even-harmonic Schottky mixer generally has 6 to 10 dB poorer input RF compression compared to fundamental Schottky mixing because the LO power for optimum conversion loss is more critical and often lower. Once again, the MESFET has a useful role in upgrading the dynamic range of a mixer. Figure 6 shows a MESFET even-harmonic mixer. Table 4 lists its performance.

A MESFET EVEN-HARMONIC MIXER

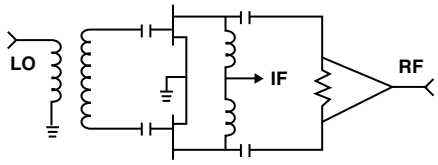


FIGURE 6

THE MESFET EVEN-HARMONIC MIXER'S TYPICAL PERFORMANCE

RF frequency (GHz)	5 to 6
RF P1 dB (dBm)	+10
LO frequency (GHz)	2.5 to 3
LO power (with bias) (dBm)	+13
IF frequency (GHz)	DC to 1
Conversion loss (dB)	10
Isolation (2LO/RF) (dB)	30

TABLE 4

The circuit yields approximately 10 dB conversion loss at +13 dBm LO power and exhibits 1 dB RF compression at +10 dBm. The half frequency LO is applied through a 180 degree balun to the gates of the two identical MESFETs. The drain-to-source lead pairs are connected in parallel. Therefore, each FET has the same RF and IF signal. During one LO cycle each FET conducts during its corresponding positive half cycle, which produces two low impedance states across the RF terminals during each LO cycle, effectively doubling the input LO switching rate. The incident RF and reflected IF energy is separated by a diplexer. This circuit is only balanced with respect to the LO/RF and will not reject RF or IF harmonic spur products. The thermal output noise of an even-harmonic mixer is identical to a pad, but any LO phase noise is doubled in the mixing process.

The conversion loss penalty is severe for harmonic mixing above n = 2. For example, a third-harmonic mixer made from a ring-type Schottky mixer is typically $(1/n)^2$ or 10 dB poorer than fundamental mixing. Other odd-harmonic products of square wave ring switched mixers follow the same relation unless reactive terminations of unused output frequencies are provided. Sometimes a step-recovery diode (SRD) is used to generate a comb of output frequencies as an LO source. A conventional Schottky diode mixer will have progressively higher conversion loss in direct proportion to the spectral power output of the SRD pulse harmonic. If only one harmonic of the comb is filtered and amplified, low conversion loss is possible, but is considered the same as fundamental mixing. Fortunately, high conversion efficiency can be achieved from a mixer using LO harmonic ratios of 10 to 100.

SAMPLING MIXER CIRCUITS

Using sampling mixer circuits the amplitude of any repetitive RF signal can be detected by periodically sampling or connecting a small capacitor with a diode or MESFET switch and charging it with the unknown voltage. Figure 7 shows the sampling mixer concept. If the switching action (typically in picoseconds) occurs at an exact or submultiple (one, one-half, one-third, ... one/n) of the unknown measured frequency, then the capacitor charging voltage or sampled RF waveform is identical during each switching instant. Since the switching diode is off (high resistance) between samples (typically in nanoseconds), the average capacitor voltage would not discharge, but rather after many RF cycles would eventually reach the amplitude of the RF signal. In some cases, such as in a phase-locked sampling loop, the capacitor will have zero average voltage because the samples are timed or in-phase with the exact zero crossings of the RF signal.[5] At this point, a small change in sampling frequency phase will yield the positive or negative peak values of the unknown sinusoidal RF signal. Typically, in the phase-locked application, the sampling capacitor voltage is amplified with a high input impedance operational amp and the phase of the much higher frequency-locked source is forced to agree with the multiplied phase of a typically 1 GHz reference or sampling frequency. In other sampling mixer applications, the multiples of the sampling frequency are chosen to be slightly different in frequency by the desired IF of the receiver. In general, the sampling mixer can accommodate slight frequency changes or unknown RF signal bandwidths, provided that the reference LO has a frequency that is at least twice that of the RF information bandwidth, that is, the Nyquist criteria. Under-sampling is a commonly used term to describe bandpass RF signal sampling. The receiving system penalty paid for the savings of a microwave LO source is multiple responses spaced by the fundamental LO frequency, and therefore, the RF bandwidth is restricted to be less than half the LO frequency to prevent response folding. A bandpass filter preceding the sampling mixer would eliminate other narrowband harmonic responses.

The sampling mixer is capable of lower and flatter conversion loss than the discussed harmonic mixer, provided that the following circuit conditions are met. The sampling gate time should be less than a one-half cycle at the highest RF frequency. The sampling rate is required to be considerably higher than the IF frequency. The sampling capacitor and IF load resistance time constant should be much greater than the period of the RF being sampled.

THE SAMPLING MIXER CIRCUIT CONCEPT

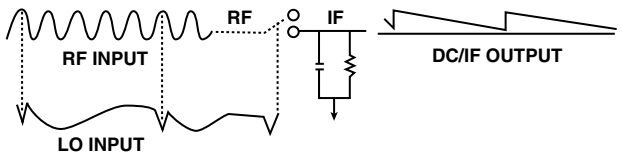


FIGURE 7

The RF input compression power of the sampling mixer generally is higher than the harmonic mixer, particularly if a MESFET is used as the switch. The RF input compression point of a harmonic mixer is related to the harmonic current of the Schottky diode, and falls off as 20 log 1/n.

Figure 8 shows the sampling mixer circuits of the Schottky diode and the MESFET, while Figure 9 shows their relative performance. Both units had approximately 100 to 400 MHz IF frequency ranges and could accommodate wide bandwidth receiver signals or fast phase-locked loops. The MESFET switch input RF compression power was approximately +13 dBm, whereas the Schottky version was 0 dBm, using the same SRD power. Newer I/Q and image rejection MESFET sampling mixers are currently being developed as preparation for a lower cost, low noise front end. A low noise input amplifier and 1 GHz LO will allow 500 MHz operating bandwidths up to 26 GHz.

THE SAMPLING MIXER CIRCUITS USING (a) SCHOTTKY DIODES AND (b) A MESFET

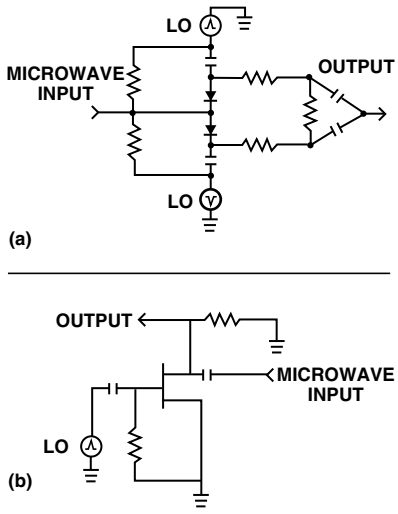


FIGURE 8

PERFORMANCE OF (a) SCHOTTKY DIODES AND (b) MESFET MIXERS

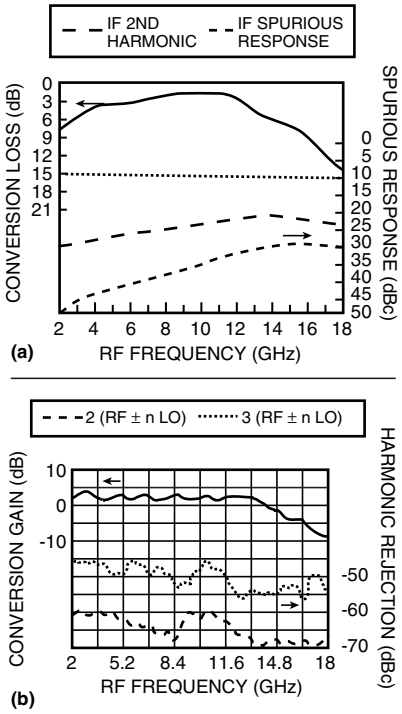


FIGURE 9

CONCLUSION

This paper has demonstrated that almost any existing Schottky diode mixing circuit can benefit in RF power handling capacity by substituting MESFETs. Additional advantages are increased circuit isolation without baluns and/or bias options by virtue of the three-terminal structure of the MESFET. These advantages are particularly helpful in more complicated mixing circuits, such as image rejection types following a high gain input low noise amplifier (LNA). In many existing front-end upgrades, the increased sensitivity of the LNA carries a trade-off in dynamic range by compression of the following imageless mixer due to the increased RF gain. This problem could be avoided with more LO power, but increased LO power would increase the cost of the system upgrade. As a result, front-end designs using broad bandwidth or image rejection mixers with MESFETs are growing in popularity.

Figure 10 shows the dynamic range and input noise figure trade-offs of typical 4 to 8 GHz LNAs with a MESFET second-stage mixer. The corresponding LO power needed to prevent mixer overload at the input RF power is also shown. Other harmonic and sampling MESFET image rejection mixers are currently being developed.

THE LNA - MESFET MIXER'S (a) INPUT DYNAMIC RANGE AS A FUNCTION OF (b) THE LNA'S PERFORMANCE

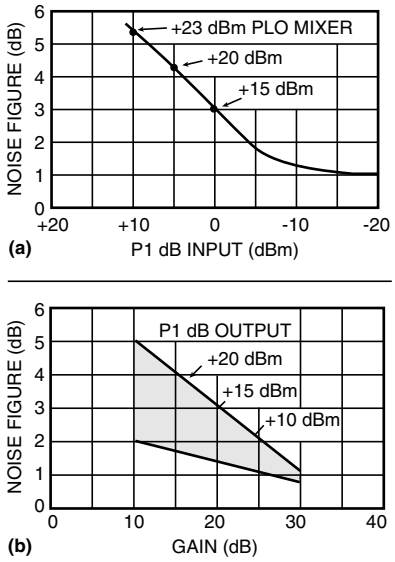


FIGURE 10

REFERENCES

1. B. Bannon, "Using Wideband Dynamic Range Converters for Wideband Radios," May 1995, RF Design, pp. 50-55.

2. S. Maas, "A GaAs MESFET Balanced Mixer with Low Intermodulation," 1987 IEEE MTT-S Symposium Digest, p. 895.

3. M. Cohn, J. Degenford, and B. Newman, "Harmonic Mixing with an Antiparallel Diode Pair," 1974 IEEE MTT-S Digest, pp. 171-172.

4. J. Merenda, D. Neuf, and P. Piro, "4 to 40 GHz Even Harmonic Schottky Mixer," 1988 IEEE MTT-S Digest.

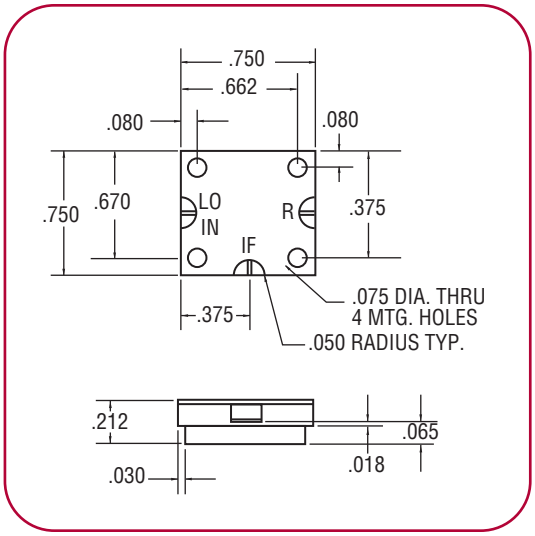
5. S.R. Gibson, "Gallium Arsenide Lowers Cost and Improves Performance of Microwave Counters," Hewlett-Packard Journal, Vol. 37, February 1986, pp. 4-10.

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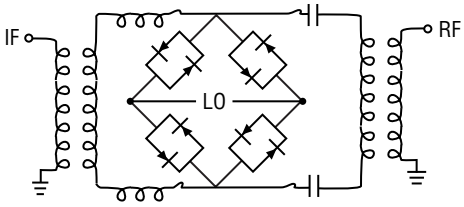
8 TO 18 GHz EVEN-HARMONIC (1/2 LO) BALANCED MIXER

MODEL SBE0818LM2

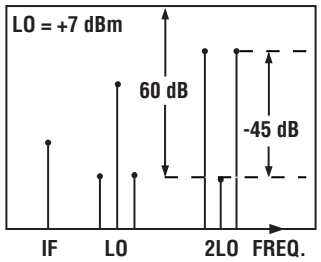
- Isolation ..... 60 dB (2LO to RF)
- RF ..... 8 to 18 GHz
- LO ..... 4 to 9 GHz
- IF ..... DC to 1 GHz
- High carrier rejection (when used as an upconverter)



SCHEMATIC



TYPICAL OUTPUT SPECTRUM AS LINEAR UPCONVERTER (MODULATOR)

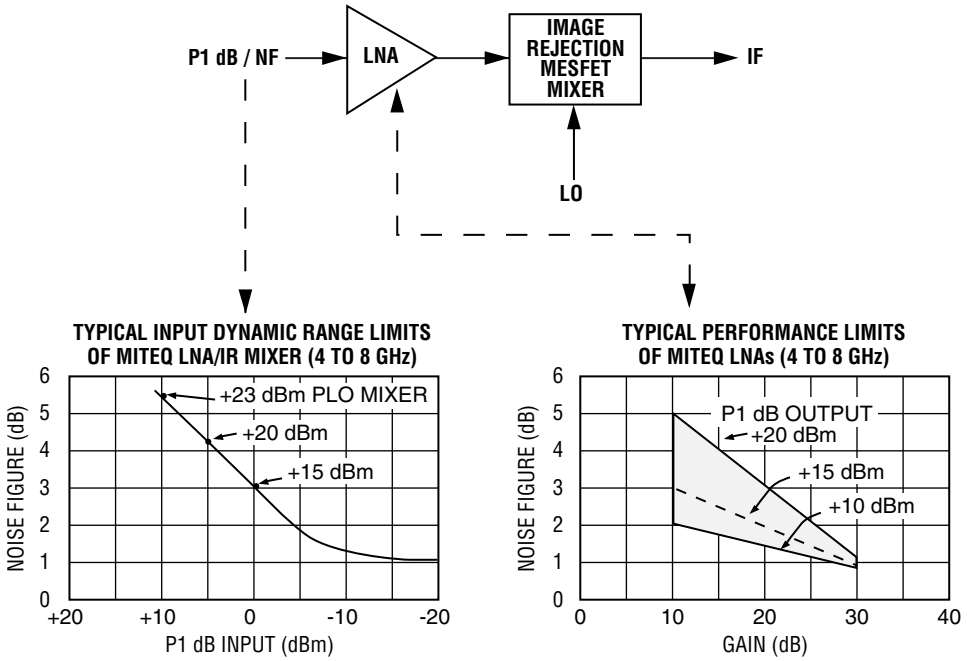


TYPICAL DOWNCONVERTER SPURS

SINGLE TONE (m) RF ± (n) LO RELATIVE SPUR LEVEL (dBc)
(AVERAGE MIDBAND RF, LO, IF FREQUENCIES,
RF = -10 dBm, LO = +7 dBm)

SPUR (m) RF X (n) LO	RF TEST FREQ. (GHz)	LO TEST FREQ. (GHz)	SPUR LEVEL (dBc)
1 x 1	10.75	11.25	-33
1 x 2	14.5	7.5	0 REF
1 x 3	16.36	5.62	-30
2 x 1	7.16	14.8	-45
2 x 2	10.87	11.12	-50
2 x 3	13.10	8.9	-45
3 x 1	5.37	16.6	-40
3 x 2	8.7	13.3	-40
3 x 3	10.91	11.08	-50

INPUT DYNAMIC RANGE OF LNA-MESFET MIXER AS A FUNCTION OF LNA PERFORMANCE

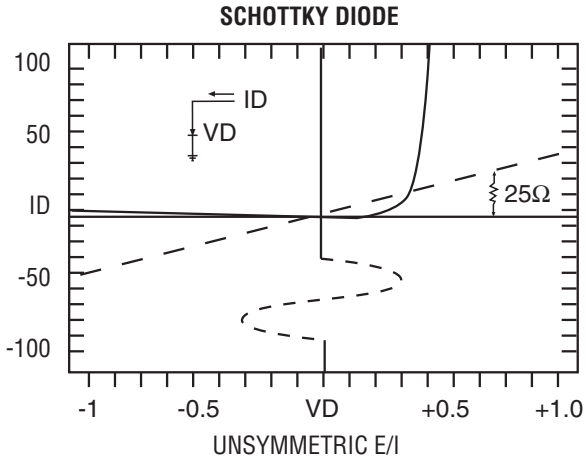


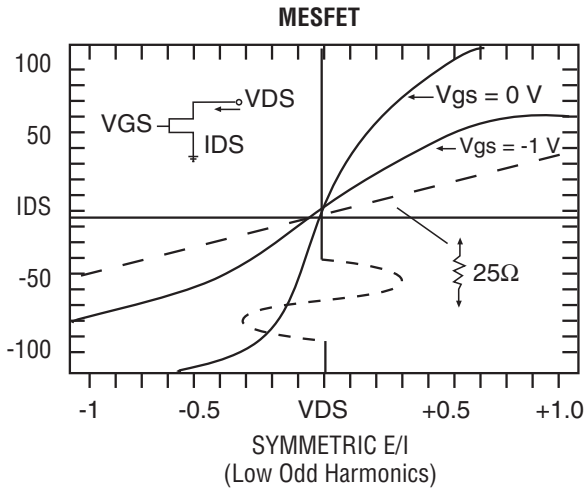
For best spurious levels:

- Choose mixer with highest LO/RF/IF port guaranteed isolation including triple-balanced designs
- Use maximum available LO power and diodes
- Terminate both RF and IF ports (or at least one of them) with wideband termination
- Utilize termination insensitive circuit
- Consider MESFET mixers

SOURCE OF MIXING DISTORTION (E/I CHARACTERISTIC) OF A SCHOTTKY DIODE AND MESFET

- Straight line (25 ohm resistor) yields no distortion
- Maximum Schottky nonlinearity (and spurs) at “knee”
- MESFET symmetry yields low “odd” order spur products

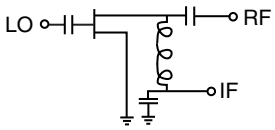




COMMON PASSIVE MESFET MIXER CIRCUITS

SINGLE FET “SF”

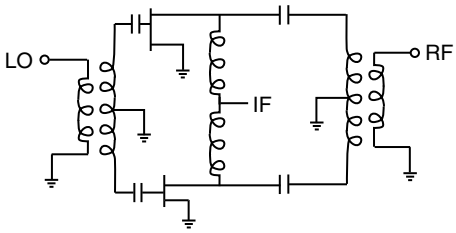
- WIDE BANDWIDTH
- LOW LO/RF ISOLATION



LO = +13
IP³ = +23

DUAL FET “SBF”

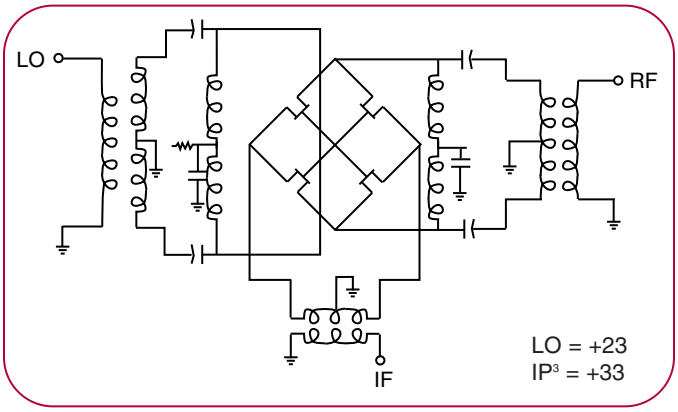
- RF OR IF HARMONIC SUPPRESSION
- REQUIRES BALUNS



LO = +20
IP³ = +30

QUAD FET “DBF”

- RF AND IF HARMONIC SUPPRESSION
- ALL PORTS ISOLATED

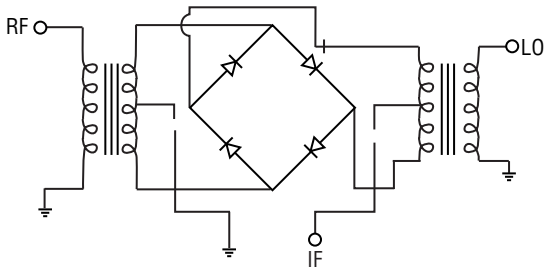


LO = +23
IP³ = +33

TECHNICAL APPLICATION

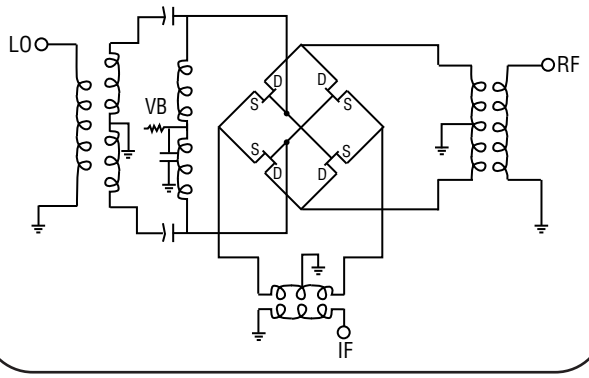
FUNDAMENTAL LO DOUBLE-BALANCED MIXER CIRCUITS

SCHOTTKY



- IP³/PLO = 0 to 5 dB
- Lowest cost
- Max IP³= +25 dBm (>2 GHz)
- P1 dB/PLO = -5 dB

MESFET



- IP³/PLO = 5 to 15 dB
- Easy to bias
- Max IP³ > +35 dBm
- P1 dB/PLO = 0 dB

COMPARISON OF SCHOTTKY AND MESFET MIXER SPURS

SCHOTTKY



DB0418HE1

DB0418HW6



MESFET



SBF0618LW2

SINGLE TONE (m) RF ± (n) LO RELATIVE SPUR LEVEL (dBc)
AVERAGE MIDBAND RF, LO, IF FREQUENCIES,
RF = -10 dBm, LO = +10 dBm (L), +20 dBm (H)

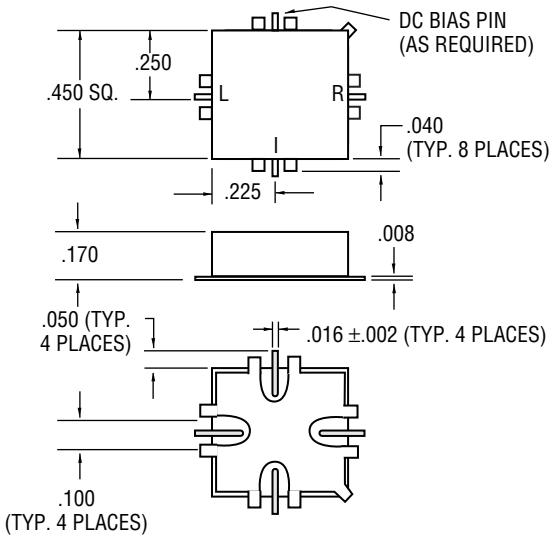
SPUR (m) RF X (n) LO	RF TEST FREQ. (GHz)	LO TEST FREQ. (GHz)	SPUR LEVEL (dBc) L	H
1 x 1	10.5	11.5	0	0
1 x 2	14	7.5	-26	-25
1 x 3	15	5.3	-15	-12
2 x 1	6.5	1.4	-45	-53
2 x 2	10.5	11	-53	-60
2 x 3	13	9	-48	-48
3 x 1	5.3	17	-50	-57
3 x 2	8.3	13	-50	-68
3 x 3	10	10.3	-50	-55

SINGLE TONE (m) RF ± (n) LO RELATIVE SPUR LEVEL (dBc)
(AVERAGE MIDBAND RF, LO, IF FREQUENCIES,
RF = -10 dBm, LO = +16 dBm)

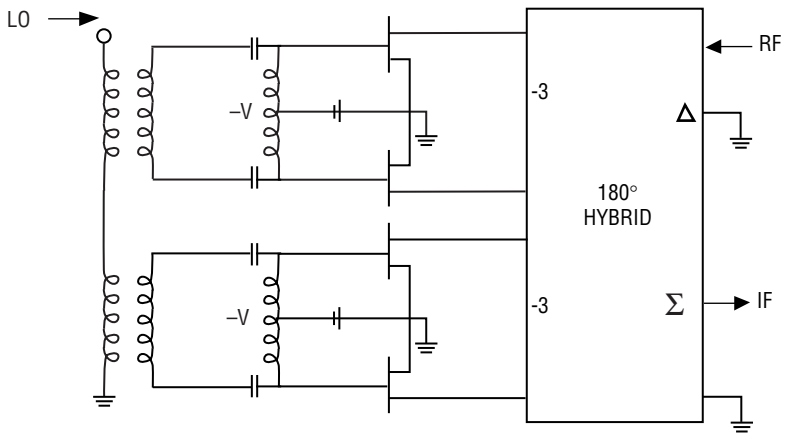
SPUR (m) RF X (n) LO	RF TEST FREQ. (GHz)	LO TEST FREQ. (GHz)	SPUR LEVEL (dBc)
1 x 1	11.2	12.7	0
1 x 2	15.5	8.5	22
1 x 3	18.3	5.6	15
2 x 1	7.5	16.5	63
2 x 2	11.6	12.4	35
2 x 3	14.7	9.3	55
3 x 1	6.3	17.6	73
3 x 2	9.7	14.1	63
3 x 3	11.7	12.2	63

1.8 GHz DOUBLE-BALANCED MESFET MIXER

- **RF/LO ..... 1.7 to 1.9 GHz**
- **Input IP³..... +40 dBm @ +30 dBm LO**
  +36 dBm @ +26 dBm LO
- **IF response..... 50 to 2000 MHz**
- **Isolation ..... 25 dB (LO/RF)**
  30 dB (LO/IF)
- **VSWR RF..... 2:1**
  LO 3:1
  IF 2:1



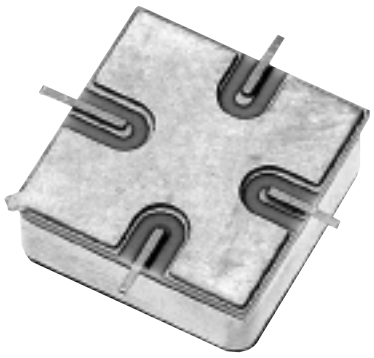
SCHEMATIC



1.8 GHz DOUBLE BALANCED MESFET MIXER

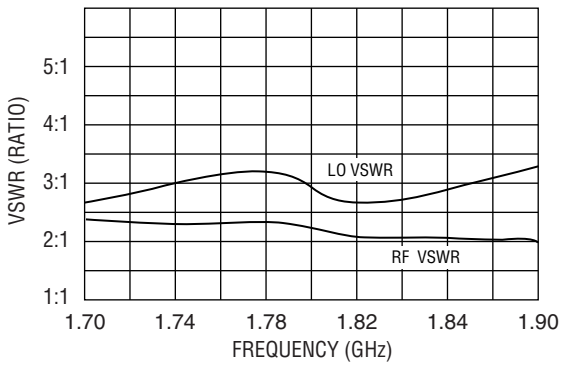
MODEL: DBF1800W3

- Two-tone IP^3 ..... +36 dBm
- RF Input 1 dB comp. ..... +26 dBm
- LO power ..... +20 to +26 dBm
- Packaging ..... Surface mount

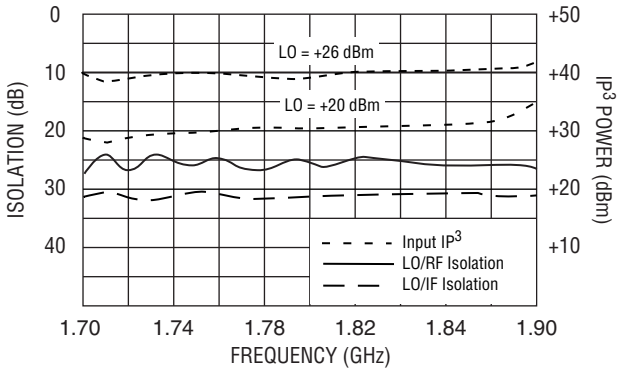


TYPICAL TEST DATA

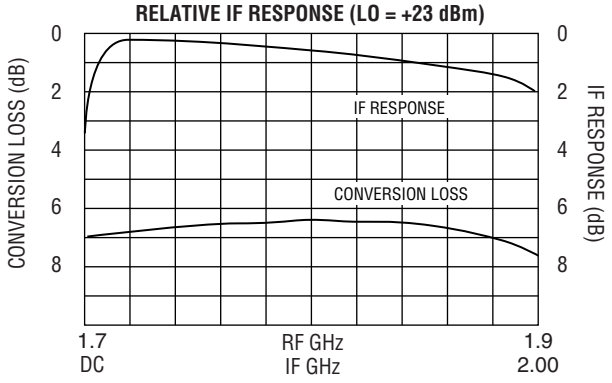
RF AND LO VSWR
(LO = +23 dBm)



LO-TO-RF ISOLATION AND IP^3



CONVERSION LOSS
RELATIVE IF RESPONSE (LO = +23 dBm)



SINGLE TONE (m) RF ± (n) LO SPUR LEVEL
RELATIVE (dBc) TO REF (RF = -10 dBm, LO = +26 dBm)

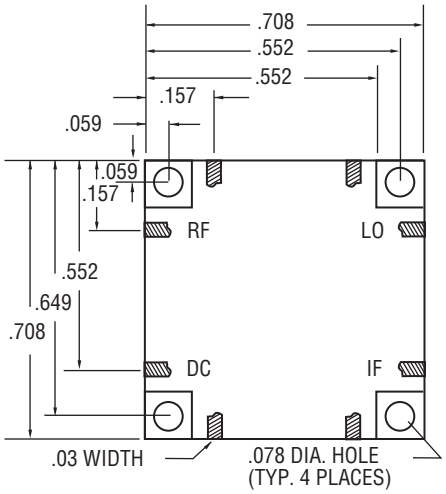
RF HARMONIC						
5	>100	-	-	-	-	
4	>100	>100	>100	-	-	
3	82	95	>100	>100	>100	
2	68	70	80	80	85	
1	REF	50	47	70	58	
	1	2	3	4	5	LO HARMONIC

TECHNICAL APPLICATION

X-BAND TERMINATION INDEPENDENT MESFET MIXER

MODEL: DBF1800W3

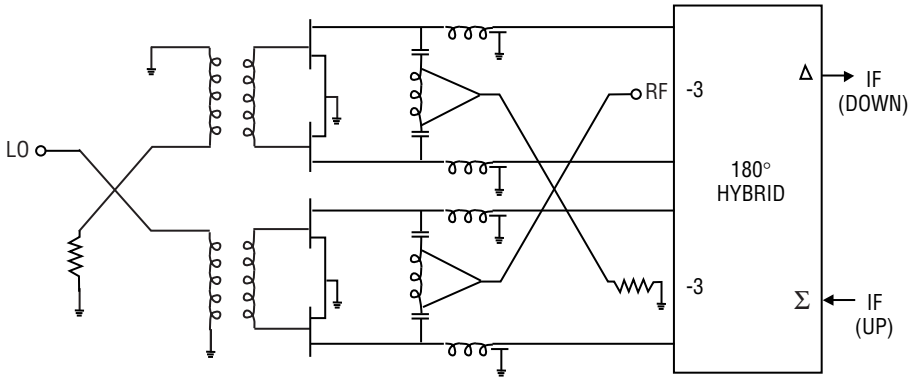
- RF/LO coverage ..... 8 to 12 GHz
- IF operation ..... 1.5 to 2 GHz
- LO-to-RF isolation ..... 30 dB minimum
- Input IP³ ..... +35 dBm
- RF/LO VSWR 1.5:1



RF (GHz)	LO (GHz)	INPUT IP³ (dBm)	CONVERSION LOSS (dB)	INPUT P1 dB (dBm)	LO/RF ISOLATION (dB)	RF RETURN LOSS (dB)	LO RETURN LOSS (dB)
8	6	37	8	26	30	25	15
8.5	6.5	37	8	27	34	25	16
9	7	37	7.9	26	36	23	20
9.5	7.5	37	7.7	25	32	21	22
10	8	36	7.5	25	32	20	20
10.5	8.5	37	7.9	25	40	17	19
11	9	34	8.2	25	34	16	18
11.5	9.5	37	8.5	25	34	15	20
12	10	36	9	24	32	15	23

Note: Measured data with LO = +26 dBm, bias = -15 volts

SCHEMATIC



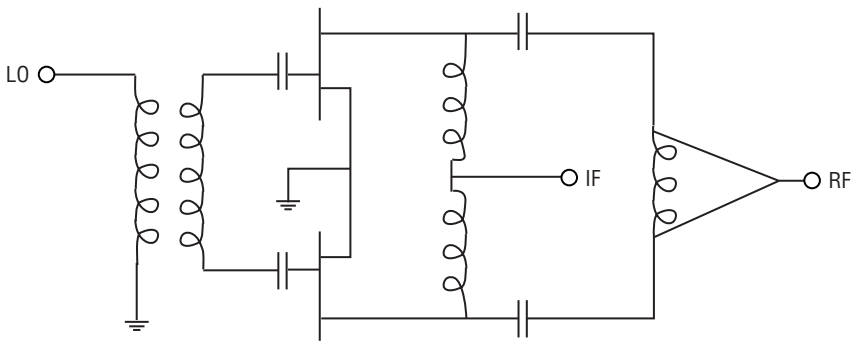
TECHNICAL APPLICATION

NEW MESFET EVEN LO HARMONIC MIXER CIRCUIT

- **RF..... 5 to 6 GHz**
- **LO ..... 2.5 to 3 GHz**
- **Conversion loss ..... 10 dB**
- **RF 1 dB comp. ..... +10 dBm**
- **LO power..... +13 dBm (with bias)**
- **2LO-to-RF isolation..... 30 dB**
- **IF frequency..... DC to 1 GHz**

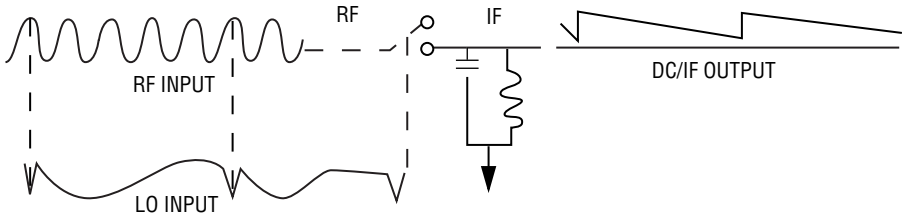


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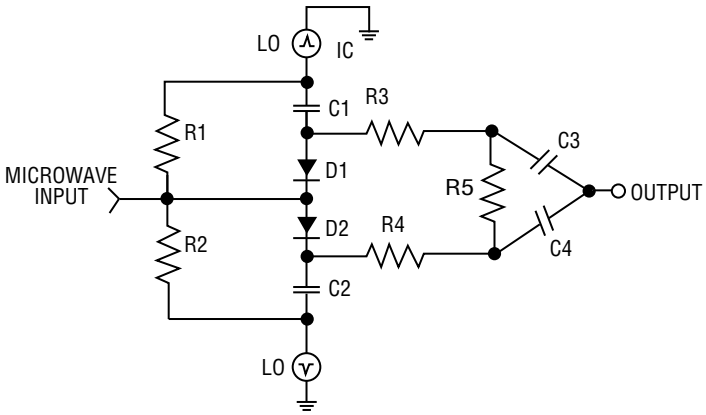


TECHNICAL APPLICATION

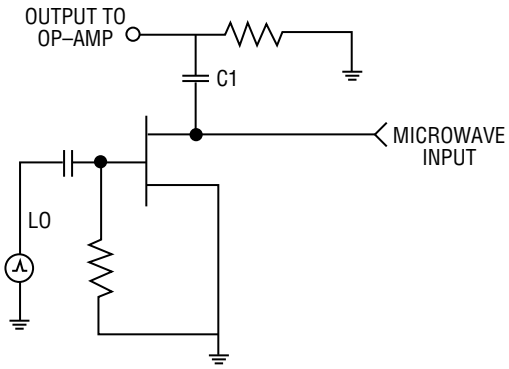
SAMPLING MIXER CIRCUIT



SCHOTTKY

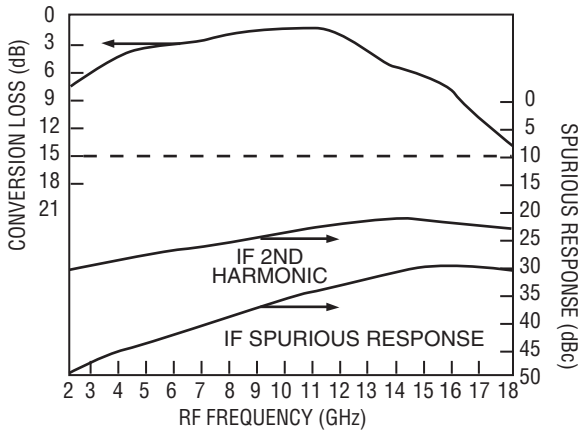


MESFET

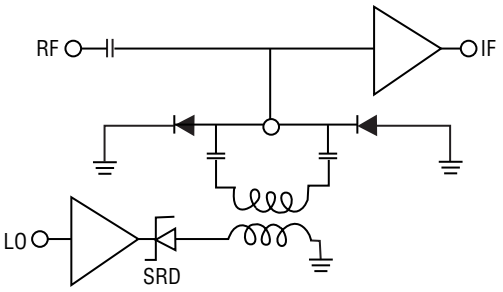


COMPARISON OF SCHOTTKY AND MESFET 2 TO 18 GHz SAMPLING MIXER SPURIOUS RESPONSES

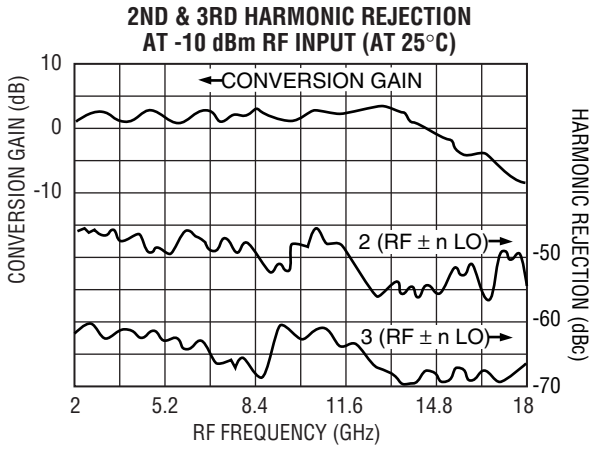
SCHOTTKY DIODE



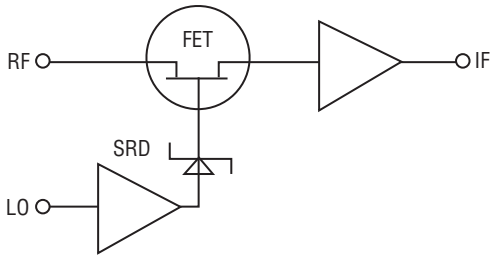
TYPICAL SCHEMATIC



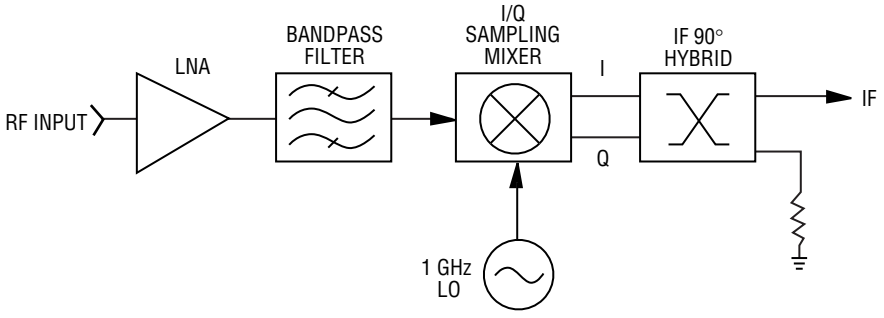
MESFET



SRD0218LW4



LOWER COST RECEIVER USING SAMPLING MIXER TECHNOLOGY



MIXER ORDERING INFORMATION

MODEL NUMBER	LO POWER DESIGNATION(*)	STANDARD OUTLINE DESIGNATION(**)	OPTIONAL OUTLINE DESIGNATION(**)
DA0204LR5	-	-	-
DA0408LR5	-	-	-
DA0812LR5	-	-	-
DA1218LR5	-	-	-
DA0218LR5	-	-	-
DB0118(*)A2	L, M, H	-	-
DB0218(*)(**)	L, M, H	W2	A1
DB0418(*)(**)	L, H	W6	E1
DB0418(*)W1	L, M, H	-	-
DB1218(*)W1	L, M, H	-	-
DB0226(*)A1	L, M, H	-	-
DB0426(*)W1	L, M, H	-	-
DB1826(*)W1	L, M, H	-	-
DB0130(*)A2	L, M, H	-	-
DB0440(*)W1	L, H	-	-
DB0250(*)W1V	L, H	-	-
DM0052(*)A2	L, M, H	-	-
DM0104(*)(**)	L, M, H	A1	A3
DM0204(*)(**)	L, M, H	W2	A1
TIM0206HI2	-	-	-
DM(**)0207(*)	L, M, H	X	Y
DM0208(*)(**)	L, M, H	W2	A1
DM0408(*)(**)	L, M, H	W2	A1
DM0416(*)(**)	L, M, H	W2	A1
DM0412(*)(**)	L, M, H	W2	A1
DM0812(*)W2	L, M, H	-	-
DM(**)0418(*)	L, M, H	X	Y
DM(**)0716(*)	L, M, H	X	Y
DM(**)0518(*)	L, M, H	X	Y
DM(**)0618(*)	L, M, H	X	Y
DM0520(*)W1	L, M, H	-	-
DM0818(*)W1	L, M, H	-	-
M0205W1	-	-	-
M0408W1	-	-	-
M0618W1	-	-	-
M0520W1	-	-	-
M1826W1	-	-	-
M2640W1	-	-	-
M0205(**)	-	W3	W8
M0408(**)	-	W3	W8
M0618(**)	-	W3	W8
M0520(**)	-	W3	W8
TB0208(*)(**)	L, M, H	W2	A1
TB0218(*)(**)	L, M, H	W2	A1
TBR0218(*)(**)	L, M, H	W2	A1
TB0418(*)W1	L, M, H	-	-
TBR0618HA1	-	-	-
TBR0618HA1G	-	-	-
TB0226(*)(**)	L, M, H	W2	A1
TBR0226(*)(**)	L, M, H	W2	A1
TB0426(*)W1	L, M, H	-	-
TB0440(*)W1	L, H	-	-
SBB0218LR5	-	-	-
SBB0226LR5	-	-	-
DBF1800W3	-	-	-
SBF0208LW2	-	-	-
SBF0810HI3A	-	-	-
SBF0810HI3B	-	-	-
SBF0618LW2	-	-	-
SBE1015LM2	-	-	-
SBE0818L(**)	-	A1	M2
SBE0440LW1	-	-	-
ME2640W1	-	-	-
SYSMM2X2335	-	-	-
SYSMM3X2934	-	-	-
SBW2226LG1	-	-	-
SBW3337LG2	-	-	-
MA2640W1	-	-	-
SRD0218LW4	-	-	-

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