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Low-Loss Couplers

DATA SHEET / 2K-001

Coaxial couplers up to 67 GHz
Waveguide couplers with integrated downconverters to 110 GHz



Maury Microwave

// SEPTEMBER 2023

Low-Loss Couplers

LOW-LOSS, HIGH DIRECTIVITY, HIGH POWER COUPLERS FOR LOAD PULL AND OTHER POWER APPLICATIONS

Features

- > High Power Handling
- > High Directivity
- > Low Insertion Loss
- > Broadband Performance
- > Excellent VSWR

Applications

- > Amplifier Power Monitoring
- > High-Power Base Station Integration
- > Test and Measurement (Load Pull, Antenna Test, General Lab...)



LLC18-7 Low-Loss Coupler



LLC18-N-MF Low-Loss Coupler



LLC34-35-MF Low-Loss Coupler



LLC40-292-MM Low-Loss Coupler



LLC67-185-MM Low-Loss Coupler

Description

The LLC-series of bidirectional airline couplers represents a breakthrough in high-power coupler technology. Combining precision machining with stellar electrical characteristics, LLC-series couplers offer unmatched performance. The differentiating features of the LLC-series bidirectional coupler include high power handling, high directivity, low insertion loss and broadband performance. High power handling enables integration in high-power applications including amplifiers and base stations, and for high-power test and measurement applications including PA testing and load pull. Unlike inferior models which are rated at breakdown, Maury defines power handling capability as the power at which there is no discernible change in the performance of the coupler.

High directivity, the difference between coupling and isolation, enables highly-accurate measurements by isolating the direct and coupled measurement pathways. This is especially important in a calibrated system where changing coupler characteristics due to poor directivity can invalidate the calibration and result in erroneous measurements. Low insertion loss is critical for high-power applications in order to avoid power loss and eliminate drift due to heating. Compared with microstrip couplers that suffer losses and self-heating due to metal resistivity and dielectric permittivity, LLC-series airline couplers have no added dielectric. When used as part of a vector-receiver load pull setup, low insertion loss directly maximizes tuning range when combined with an impedance tuner. The broadband nature of the coupler allows it to be used for wideband applications.

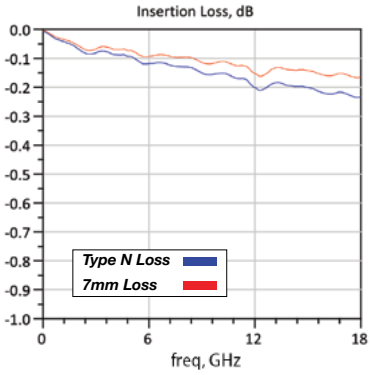
Specifications

Available Models	Connector		Coupling Ports	Frequency Range[1] (GHz)	Max Insertion Loss at Fmax	Directivity Typ.	Coupling Typ.	Power Handling
	Input Port	Output Port						
LLC18-7	7mm	7mm	3.5mm Female	0.6 – 8.0 8.0–18.0	0.15 dB 0.25 dB	15 dB 10 dB	30 dB[2] ±3 dB	500 W CW / 2 KW Peak
LLC18-N-FF	Type N Female	Type N Female			0.25 dB 0.35 dB			
LLC18-N-MF	Type N Male	Type N Female						
LLC18-N-MM	Type N Male	Type N Male						
LLC34-35-FF	3.5mm Female	3.5mm Female	2.92mm Female	2.0 – 26.5 26.5–34.0	0.35 dB	14 dB 10 dB		150 W CW / 500 W Peak
LLC34-35-MF	3.5mm Male	3.5mm Female						
LLC34-35-MM	3.5mm Male	3.5mm Male						
LLC40-292-FF	2.92mm Female	2.92mm Female	2.92mm Female	3.0-10.0 10.0-40.0	0.1 dB 0.2 dB	18 dB 12 dB	45 ±5 dB[3] 35 dB ±5 dB	10 W CW / 100W Peak
LLC40-292-MF	2.92mm Male	2.92mm Female						
LLC40-292-MM	2.92mm Male	2.92mm Male						
LLC67-185-FF	1.85mm Female	1.85mm Female	1.85mm Female	3.0-20.0 20.0-67.0	0.2 dB 0.4 dB	18 dB 12 dB	45 ±5 dB[3] 35 dB ±5 dB	10 W CW / 100W Peak
LLC67-185-MF	1.85mm Male	1.85mm Female						
LLC67-185-MM	1.85mm Male	1.85mm Male						

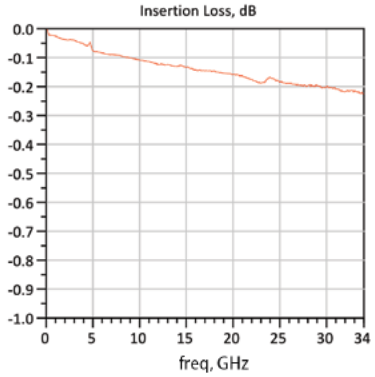
[1] Usable from 0.1 GHz with increased coupling. *[2] ±6dB 0.6 – 0.8 GHz for LLC18 and 2.0 – 3.0 GHz for LLC34.* *[3] ±10 dB 3.0 – 6.0 GHz.*

Mainline Insertion Loss

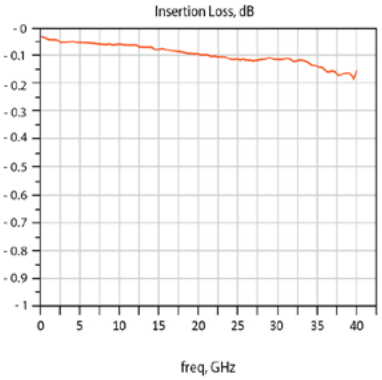
LLC18



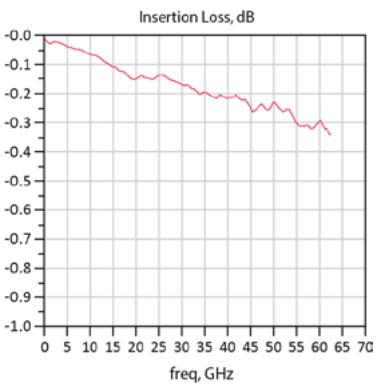
LLC34



LLC40

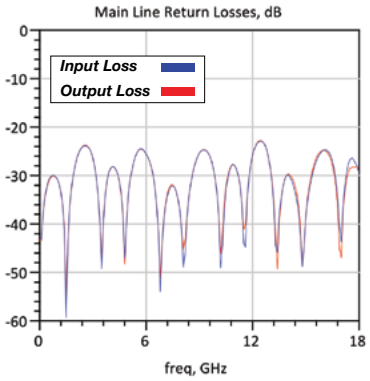


LLC67

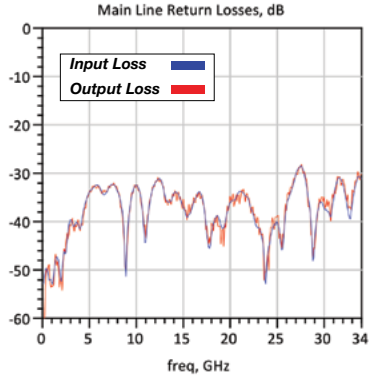


Mainline Return Loss

LLC18



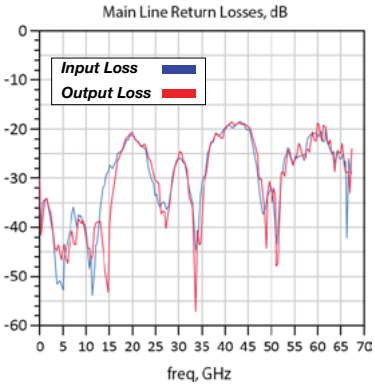
LLC34



LLC40

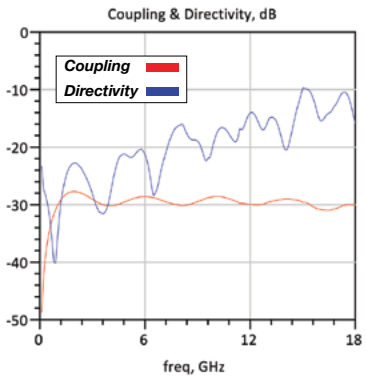


LLC67

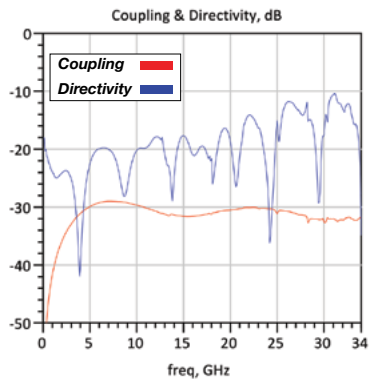


Coupling and Directivity

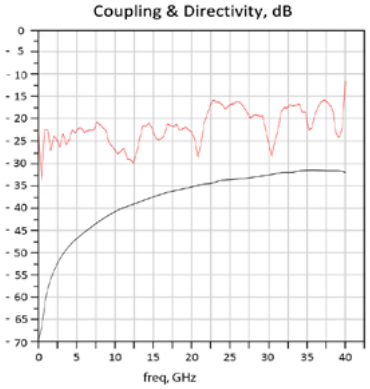
LLC18



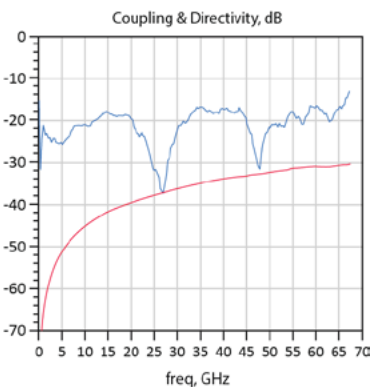
LLC34



LLC40



LLC67

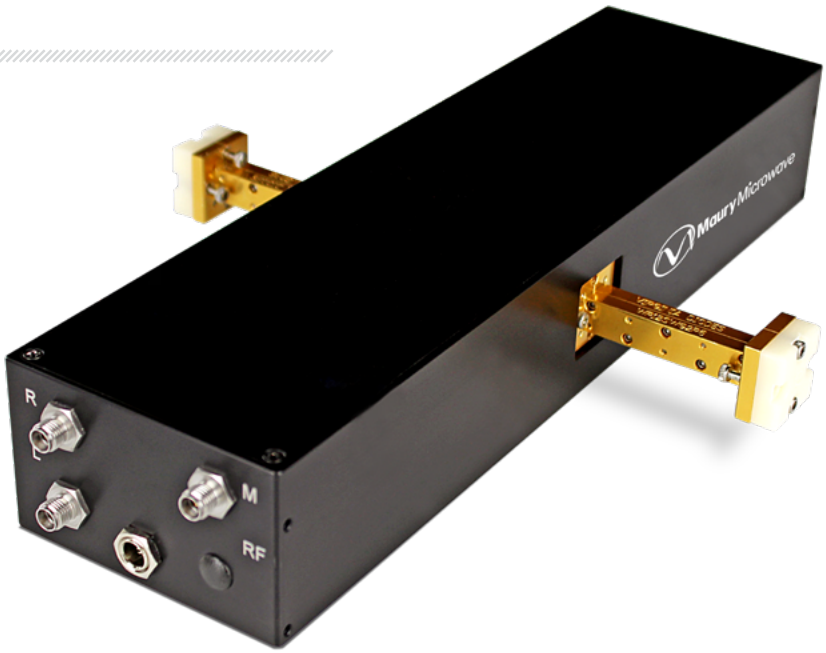


Low-Loss Couplers with Integrated Downconverters

LOW-LOSS, HIGH DIRECTIVITY, HIGH POWER COUPLERS FOR LOAD PULL AND OTHER POWER APPLICATIONS

Features

- High Power Handling
- High Directivity
- Low Insertion Loss
- Full Waveguide Band
- Excellent VSWR
- Integrated Downconverter



Description

The LLC-series of bidirectional waveguide couplers with integrated downconverters are ideal for waveguide banded mmW load pull applications. The coupler's low insertion-loss and high-directivity ensures a minimal impact on the tuning range at the DUT reference plane, while enabling the benefits of vector-receiver load pull measurements. The integrated downcoverters allow a direct connection to a sub-26.5 GHz VNA's receiver ports without worrying about mechanical incompatibilities of standard waveguide frequency extender modules.

Specifications

Available Models	Connector		Coupling Ports	Frequency Range[1] (GHz)	Typ. Insertion Loss at Fmax	Directivity Typ.	Coupling Typ.	Power Handling
	Input Port	Output Port						
LLC75WR15	WR15	WR15	3.5mm[4]	50-75	0.8dB	30dB	36[5]	5W
LLC90WR12	WR12	WR12	3.5mm[4]	60-90	0.8dB	30dB	43[5]	5W
LLC110WR10	WR10	WR10	3.5mm[4]	75-110	0.8dB	30dB	42[5]	2W

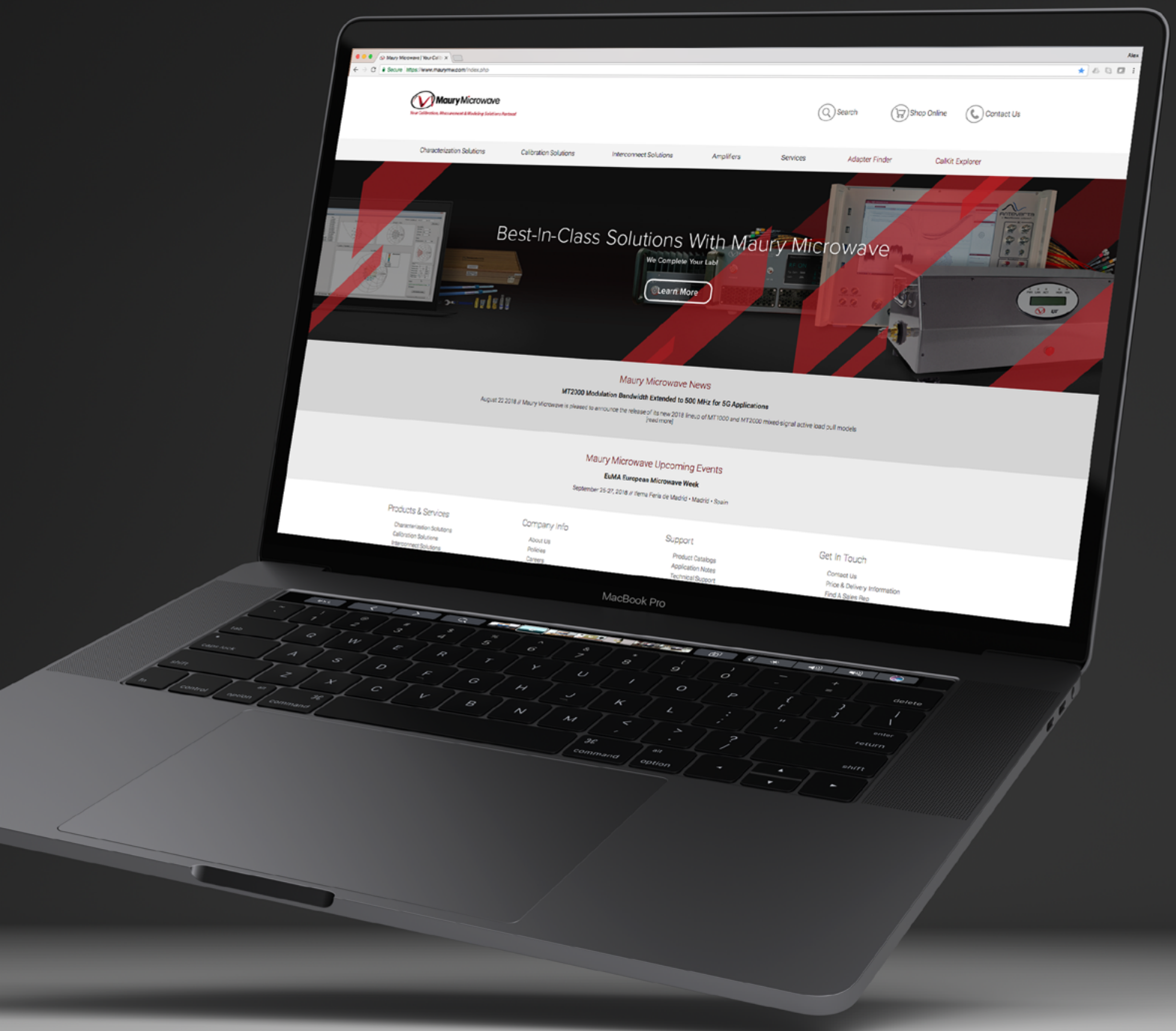
[4] X6 down conversion included, it requires external LO (max 2dBm).

[5] A micrometer is included to reduce the coupling factor of 30dB.

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CONTACT US:
W / maurymw.com
E / maury@maurymw.com
P / +1-909-987-4715
F / +1-909-987-1112
2900 Inland Empire Blvd
Ontario, CA 91764

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