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Radiall™

Our Most Important Connection is with You.™



RF COAXIAL CONNECTORS

MICROWAVE COMPONENTS

Coaxial, RF & Microwave

Full Line Catalog

Performance, not promises

AEP Part Numbering System

9006-9113-001

A B C D

A Model number

1000-1999 - SMC
2000-2999 - SMB
3000-3999 - SLB
4000-4999 - N
5000-5999 - Adapters
6000-6499 - TNC
6500-6999 - BNC
7000-7199 - SSMC
7200-7299 - SSMB
7300-7499 - SSLB
8000-8999 - Others
9000-9999 - SMA - SSMA

B Plating

1 - Gold
6 - Silver
7 - Nickel
8 - Tin
9 - Passivated

C Material

1 - Brass
2 - Beryllium copper
3 - Stainless steel
4 - Brass & Stainless steel
6 - Ph bronze
7 - Brass over Ni

D Cable group

01 - RG55, RG142, RG223
02 - RG178, RG196
03 - RG174, RG188, RG316
05 - RD196, RD178
06 - RG58, RG141
07 - RG59, RG62
08 - RD188, RD316, RD 174
09 - .141, RG402
10 - .085, RG405
11 - .047
12 - .250, RG401
25 - RD178
30 - RG122



Applied Engineering Products (AEP) was established in 1972 as a company which strongly believes in quality products and on-time delivery. A custom-built facility established in the downtown area of New Haven CT, USA was home to this highly successful company, which ranked as the best of the US independent manufacturers of sub-miniature coaxial connectors used in the RF and Microwave Industry.

Today, AEP is a Radiall product brand commercialized alongside the core Radiall RF product lines. AEP connectors and cable assemblies are designed and qualified by our dedicated staff in New Haven, CT. The most popular AEP product range is the "7000" family, which includes multiple designs in SSMB, SSMC and SSLB connector series. AEP is also recognized for the reliability of its waterproof coaxial connectors, 100% immersion tested before shipping. With over 100 AEP QPL MIL-PRF-39012 active part numbers, Radiall is well positioned to serve the needs of the military and defense radio equipment manufacturers.

In this catalog, AEP connector part numbers are listed together with the Radiall line. The AEP codification for connectors is explained below. Most AEP connector data sheets are available for download at www.radiall.com. Click on "Product Finder", then "RF Coaxial Connectors" and select AEP.

Ingress Protection Rating

First digit (protection against solid objects)



0 - No protection



1 - Protected against solid objects over 50mm (e.g. accidental touch by hands)



2 - Protected against solid objects over 12mm (e.g. Fingers)



3 - Protected against solid objects over 2.5mm (e.g. tools and wires)



4 - Protected against solid objects over 1mm (E.g. tools, wires and small wires)



5 - Protected against dust - limited ingress (No harmful deposit)



6 - Totally protected against dust

Second digit (protection against liquids)



0 - No protection



1 - Protected against vertically falling drops of water



2 - Protected against direct sprays up to 15° from the vertical



3 - Protected against direct sprays up to 60° from the vertical



4 - Protected against sprays from all directions limited ingress permitted



5 - Protected against low pressure jets if water from all directions - limited ingress permitted



6 - Protected against strong jets of water (e.g. for use on shipdecks) - limited ingress permitted



7 - Protected against the effects of temporary immersion 15cm to 1m. Duration of test: 30 min.



8 - Protected against long periods of immersion under pressure

Ingress Protection Rating

The rating number refers to a specific test described by international standard (IEC60529 for example) specifying and classifying the degree of protection from dust and water for the equipment.

The first digit represents the protection level against solid object and the second against liquids.

Example on our N clamp type connector: IP67= totally protected against dust and against temporary immersion between 15cm and 1m.

Note

Do not mix up IP rating with hermeticity level.

Hermeticity sealing is required for microwave modules to provide long term reliability. A measure of hermeticity is the leak rate, which is expressed in atmosphere cc/ second, based on the Helium Fine Leak Test (MIL-std 803 or JEDIC - JESD22-A109-A). A traditional hermeticity value must be 5 × 10-8 atm-cc/s Helium or better.

Plating Properties

Radiall offers a comprehensive range of in-house electroplating for standard or specific uses and conditions. Plating performance is key in several characteristics of the connector such as: Durability, Wear Behavior, Contact Resistance, Electrical Conductivity, Magnetic Properties, Corrosion Behavior, Solderability, and Appearance. Radiall operates its plating facility since 1977 in compliance with the latest environmental standards.

Radiall Plating Know-How

Available coatings are Copper, Nickel, Nickel phosphorous, Tin, Gold, Palladium, white Bronze, Chromium, Silver, Nickel PTFE, and passivation of stainless steel. Base materials on which we apply coating are Copper alloys, Stainless steel, Ferronickel, Zink die cast, Plastic, and Aluminium.



Radiall Proprietary Plating

NPGR (Nickel Phosphorous Gold Radiall)

This plating consists of a thin layer of gold on top of a layer of electrolytic nickel-phosphorous. With the addition of Phosphorous (>10%), the Ni becomes non magnetic and offers a low intermodulation level. The combination of gold and NiP provides an excellent protection against corrosion, and an ultra low friction coefficient allowing up to 10,000 mating cycles. The thin gold layer allows for good wetability. NPGR is recommended for center and outer contacts, PCB/SMT connector bodies, and for telecom/datacom applications. It is not recommended, however, for solder joints in harsh environment, high temperature applications. NPGR is a cost reduction alternative to standard gold plating compliant with AMS QQN 290 and MiL DTL 45204.

N2PGR (New Nickel Phosphorous Gold Radiall)

This plating offers similar properties as NPGR with the following advantages: improved mechanical resistance and reliability of solder joints in high temperature environment and better corrosion resistance. This is achieved due to a new Nickel barrier between NiP and gold. N2PGR is compliant with AMS QQN 290 and MiL DTL 45204.

BBR (Bright Bronze Radiall)

BBR is a copper-tin-zinc base alloy plating, applicable on all copper substrates which looks like bright white silver. It was designed to replace Ni plating and offers better conductivity while being non allergic and non magnetic. Intermodulation generated by BBR is as low as that with silver plating. BBR connectors are solderable using mildly activated flux. Corrosion and tarnishing resistance are among the most important environmental features of this plating, together with excellent wearing resistance and mechanical characteristics. BBR is recommended for outer contacts and conductor bodies in cable and panel connectors' applications.

Standard Plating

Gold

Gold plating is preferred for its great electrical signal transmission properties. It also provides excellent oxidation resistance (even in polluted environment) and mating durability (wear resistant). Gold over copper is mainly used for center and outer contacts with thickness of 0.8 to 2.5µm or more. Gold over Nickel is often used for PCB connector bodies to improve solderability. Gold is compliant with MiL DTL 45204.



Manual plating production line



Automatic plating production line

Nickel

This plating has been widely used on connector bodies and outer conductors for its mechanical and environmental properties. But it is often replaced by alternative platings because of the risk of allergy. Now Nickel is commonly used as an underlayer for gold or other noble metals. The Ni layer acts as a diffusion barrier, to prevent the migration of base material atoms (usually copper) to the top coating. But Nickel is magnetic thus not suitable for applications requiring a low IM level. Where Nickel plating is used for PCB connectors with solder legs, it is recommended to choose selective tin plating or hot dipping on the legs before soldering. Nickel is compliant with AMS QQN 290.

Silver

The main advantage of Silver is its excellent electrical and thermal conductivity, featuring the lowest contact resistance. Silver plated connectors are particularly suitable for applications where low intermodulation is required. It is also recommended for connector parts that need soldering or brazing. Silver plating is often used as a cheaper replacement for gold plating, but Silver tarnishes over time, creating an oxide layer on the surface which affects its electrical properties. Silver is often combined with BBR to avoid tarnishing. Silver is compliant with ASTMB700.

Nickel PTFE

Nickel PTFE plating can be specified for connectors used in harsh environment for military applications, due to it's friction, corrosion and wear resistance. Nickel PTFE is compliant with AMS 2454.

Summary table

	Solderability	Electrical performance	Corrosion resistance	Friction, mating durability	IM, magnetic properties	Hardness	Tarnishing	Cost
NPGR - N2PGR (*)	+	++	++	++	+	+	+	+
BBR	-	+	++	+	++	++	++	++
GBR	+	+	++	+	+	+	+	+
Gold / nickel Ni2Au0.2	+	++	++	+	-	+	+	+
Gold / copper Cu2.5Au1.3	+	++	++	+	+	-	+	--
Silver	+	++	+	-	++	--	--	-
Nickel	-	+	++	+	--	+	++	+
NiPTFE	--	+	+++	+++	--	+++	+++	--

(*) NPGR is not compatible with Zinc die cast (zamak) parts.

RF Cable Assemblies

A. Cable Type				B. Cable Dimensions mm (Inch)				C. Radiall Cable if Applicable	
Type	Cable Designation	Cable Group dia. / Ω	Max Freq.	Core Type	Core dia.	Dielectric/ Insulator dia.	Outer dia.	Radiall P/N	Additional Comments
Microcoax & mini coax	N/A	0.8 / 50 S	3 GHz	Solid	0.16 (.006)	0.50 (.020)	0.83 (.033)	C291042066	PFA dielectric
	N/A	1 / 50 S	2 GHz	Solid	0.17 (.007)	0.52 (.020)	1.17 (.046)	C291050060	PTFE dielectric
	50 VMTX Type	1 / 50 S	3 GHz	Solid	0.17 (.007)	0.52 (.020)	1.17 (.046)	C291050066	PTFE dielectric
	N/A	1 / 50 S	6 GHz	7 x 0.08	0.24 (.009)	0.68 (.027)	1.13 (.044)	C291051270	PTFE dielectric
	N/A	1 / 50 S	6 GHz	7 x 0.102	0.30 (.012)	0.89 (.035)	1.37 (.054)	C291066070	PTFE dielectric
	75 VMTX Type	1 / 80 S	2 GHz	Solid	0.10 (.004)	0.57 (.020)	0.80 (.031)	C291055076	PTFE dielectric
	124416 Type	2/50 D	3 GHz	Solid	0.29 (.011)	0.84 (.033)	1.60 (.063)	C291146087	PTFE dielectric
	296775 Type	2/75S	3 GHz	Solid	0.17 (.007)	1.00 (.039)	2.00 (.079)	C291147060	PTFE dielectric
ECO (high performance by Radiall	ECO 316	2.6 / 50 S	3 GHz	Solid	0.55 (.022)	1.55 (.061)	2.45 (.096)	C291999904	Better than RG316
	ECO 316 X	2.6 / 50 S	3 GHz	Stranded	0.54 (.021)	1.54 (.061)	2.52 (.099)	C291171083	Better T°c & power range
	ECO 316 D	2.6 / 50 D	3 GHz	Solid	0.55 (.022)	1.55 (.061)	2.80 (.110)	C291999905	Better than RD316
	ECO 316 DX	2.6 / 50 D	6 GHz	Stranded	0.54 (.021)	1.54 (.061)	3.16 (.124)	C291217020	Better T°c & power range
	ECO 142	5 / 50 D	3 GHz	Solid	0.95 (.037)	2.80 (.110)	4.50 (.177)	C291325290	Better than RG142
	ECO 142 X	5 / 50 D	6 GHZ	Solid	0.95 (.037)	2.98 (.117)	5.00 (.197)	C291320180	Better T°C & power range
	POWER142	5 / 50 D	3 GHz	solid	0,94 (,037)	2,95 (,116)	4,50 (,177)	C291325270	High power level
	ECO 230	6 / 50 D	4 GHz	Solid	1.48 (.057)	4.07 (.160)	5.90 (.232)	C291326490	
	ECO 393	10 / 50 D	3 GHz	Solid	2.40 (.094)	7.25 (.285)	9.10 (.358)	C291491060	Better than RG393
	ECO 393 X	10 / 50 D	6 GHz	7 x 0.8	2.35 (.093)	7.20 (.283)	10 (0.394)	C291512020	ECO393 with high power level
Semi-rigid NF-C-93-551	KS 1	.085"	20 GHZ	Solid	0.51 (.020)	1.68 (.066)	2.20 (.087)	C291850001	Copper tubing
	KS 2	.141"	20 GHZ	Solid	0.92 (.036)	2.98 (.117)	3.58 (.141)	C291860001	Copper tubing
	KS 3	.250"	20 GHZ	Solid	1.63 (.064)	5.31 (.209)	6.35 (.250)	C291870001	Copper tubing
Flexible NF-C-93-550 standard	KX 3B	2.6 / 50 S	1 GHz	7 x 0.16	0.48 (.019)	1.52 (.060)	2.79 (.110)	C291150010	PVC jacket
	KX 4	10 / 50 S	3 GHz	7 x 0.75	2.25 (.089)	7.25 (.285)	10.29 (.405)	C291510010	PVC jacket
	KX 6A	6 / 75 S	1 GHz	7 x 0.20	0.60 (.024)	3.70 (.146)	6.10 (.240)	C291351012	PVC jacket
	KX 8	10 / 75 S	1 GHz	7 x 0.40	1.20 (.047)	7.25 (.285)	10.29 (.405)	C291550012	PVC jacket
	KX 13	11 / 50 D	11 GHZ	7 x 0.75	2.25 (.089)	7.24 (.285)	10.80 (.425)	C291600000	PVC jacket
	KX 14	22 / 50 S		Solid	5.0 (.197)	17.30 (.681)	22.10 (.870)	N/A	
	KX 15	5 / 50 S	1 GHz	19 x 0.18	0.90 (.035)	2.95 (.116)	4.95 (.195)	C291305010	PVC jacket
	KX 21A	2 / 50 S	3 GHz	7 x 0.10	0.30 (.012)	0.84 (.033)	1.78 (.070)	C291145017	FEP jacket
	KX 22A	2.6 / 50 S	3 GHz	7 x 0.17	0.53 (.021)	1.52 (.060)	2.49 (.098)	C291170017	FEP jacket
	KX 23	5 / 50 D	3 GHz	7 x 0.34	0.92 (.036)	2.95 (.116)	5.10 (.200)	C291322017	Fiber glass jacket
	KX 24	11 / 50 D	11 GHZ	7 x 0.80	2.40 (.094)	7.25 (.285)	10.90 (.429)	C291605017	Fiber glass jacket
	KX 25	6 / 75 S		7 x 0.23	0.71 (.028)	3.70 (.146)	5.90 (.232)	N/A	
	KX 30	6 / 93 S		Solid	0.64 (.025)	3.70 (.146)	6.15 (.242)	N/A	
	KX 52	6 / 75 S		Solid	0.64 (.025)	3.70 (.146)	6.10 (.240)	N/A	
Standard flexible HD	Mini RG59 Type	4.6 / 75 D	4.5 GHz	Solid	0.60 (0.24)	2.80 (.110)	4.60 (.181)	C291033039	
	RG59 Type	6 / 75 D	4.5 GHz	Solid	0.81 (.032)	3.68 (.145)	5.92 (.233)	C291360093	
	RG6 Type	7 / 75 D	4.5 GHz	Solid	1.02 (.04)	4.56 (.18)	6.95 (.274)	C291384083	
LMR®*	LMR 200	5 / 50 S		Solid	1.12 (.044)	2.95 (.116)	4.95 (.195)	C291316070	PE jacket
	LMR 400	10.3 / 50 S		Solid	2.77 (.109)	7.24 (.285)	10.3 (.405)	C291516070	PE jacket
	LMR 600	15.2 / 50 S		Solid	4.47 (.176)	11.56 (.455)	14.99 (.590)	C291626070	PE jacket
AEP (equivalent to LMR®*)	AEP-100FR	2.6 / 50 S+F	6 GHz	Solid	0.46 (0,018)	1.52 (0.06)	2.79	C291327060	Flame retardant
	AEP-195FR	5 / 50 S+F	6 GHz	Solid	0.94 (0,037)	2.79 (0.11)	4.95	C291327010	Flame retardant
	AEP-200FR	5 / 50 S+F	6 GHz	Solid	1.12 (0,044)	2.95 (0.116)	4.95	C291327020	Flame retardant
	AEP-240FR	6.1 / 50 S+F	6 GHz	Solid	1.42 (0,056)	3.81 (0.15)	6.1	C291327030	Flame retardant
	AEP-400FR	10.3 / 50 S+F	6 GHz	Solid	2.74 (0,108)	7.24 (0.285)	10.29	C291327040	Flame retardant
	AEP-600FR	15 / 50 S+F	6 GHz	Solid	4.47 (0,176)	11.56 (0,455)	14.99	C291327050	Flame retardant
Flexible MIL-C-17 standard	RG 6 A/U	8 / 75 D		Solid	0.72 (.028)	4.70 (.185)	8.43 (.332)	N/A	
	RG 11 A/U	10 / 75 S		7 x 0.4	1.20 (.047)	7.25 (.285)	10.29 (.405)	N/A	
	RG 12 A/U	10 / 75 S		7 x 0.4	1.20 (.047)	7.25 (.285)	12.06 (.474)	N/A	
	RG 58 C/U	5 / 50 S	1 GHz	19 x 0.18	0.90 (.035)	2.95 (.116)	4.95 (.195)	C291305000	PVC jacket
	RG 59 B/U	6 / 75 S	1 GHz	Solid	0.57 (.022)	3.71 (.146)	6.15 (.242)	C291360000	PVC jacket
	RG 62 B/U	6 / 93 S	1 GHz	Solid	0.64 (.025)	3.71 (.146)	6.15 (.242)	C291400000	PVC jacket
	RG 63 B/U	10 / 125 S		Solid	0.65 (.026)	2.95 (.116)	10.29 (.405)	N/A	
	RG 71 B/U	6 / 93 D		Solid	0.64 (.025)	3.71 (.146)	6.22 (.245)	N/A	
	RG 140 /U	6 / 75 S		Solid	0.64 (.025)	3.71 (.146)	5.92 (.233)	N/A	
	RG 141 A/U	5 / 50 S	1 GHz	Solid	0.99 (.039)	2.95 (.116)	4.83 (.190)	C291315007	Glass fiber jacket

RF Cable Assemblies

A. Cable Type				B. Cable Dimensions mm (Inch)				C. Radiall Cable if Applicable	
Type	Cable Designation	Cable Group dia. / W	Max Freq.	Core Type	Core dia.	Dielectric/ Insulator dia.	Outer dia.	Radiall P/N	Additional Comments
Flexible MIL-C-17 standard continued	RG 142 B/U	5 / 50 D	12.4 GHz	Solid	0.94 (.037)	2.95 (.116)	4.95 (.195)	C291320007	
	RG 144 /U	10 / 75 S		7 x 0.45	1.35 (.053)	7.25 (.285)	10.40 (.409)	N/A	
	RG 165 /U	10 / 50 S		7 x 0.8	2.40 (.094)	7.25 (.285)	10.40 (.409)	N/A	
	RG 174 A/U	2.6 / 50 S	1 GHz	7 x 0.16	0.48 (.019)	1.52 (.060)	2.79 (.110)	C291150000	PVC jacket
	RG 178 B/U	2 / 50 S	3 GHz	7 x 0.1	0.30 (.012)	0.84 (.033)	1.78 (.070)	C291145007	FEP jacket
	RG 178 B/U	2 / 50 S	3 GHz	7 x 0.1	0.30 (.012)	0.84 (.033)	1.83 (.072)	C291145060	PVC jacket
	RG 178 non m.	2 / 50 S	3 GHz	7 x 0.1	0.29 (.011)	0.84 (.033)	1.80 (.071)	C291140087	Nonmagnetic / FEP jacket
	RG 179 B/U	2.6 / 75 S	3 GHz	7 x 0.1	0.30 (.012)	1.60 (.063)	2.54 (.010)	C291210007	FEP jacket
	RG 187 A/U	2.6 / 75 S	3 GHz	7 x 0.1	0.30 (.012)	1.60 (.063)	2.79 (.110)	C291211006	PTFE jacket
	RG 188 A/U	2.6 / 50 S	3 GHz	7 x 0.17	0.51 (.020)	1.52 (.060)	2.79 (.110)	C291160006	PTFE jacket
	RG 196 A/U	2 / 50 S	3 GHz	7 x 0.1	0.30 (.012)	0.86 (.034)	2.03 (.080)	C291110006	PTFE jacket
	RG 212 /U	8 / 50 D		Solid	1.41 (.056)	4.70 (.185)	8.43 (.331)	N/A	
	RG 213 /U	10 / 50 S	1 GHz	7 x 0.75	2.26 (.089)	7.24 (.285)	10.30 (.406)	C291510000	PVC jacket
	RG 214 /U	11 / 50 D	11 GHz	7 x 0.75	2.25 (.089)	7.24 (.285)	10.80 (.425)	C291600000	PVC jacket
	RG 215	10 / 50 S		7 x 0.75	2.25 (.089)	7.25 (.285)	10.29 (.405)	N/A	
	RG 216 /U	11 / 75 D	3 GHz	7 x 0.4	1.21 (.048)	7.24 (.285)	10.80 (.425)	C291610000	PVC jacket
	RG 217 /U	14 / 50 D	3 GHz	Solid	2.69 (.106)	9.40 (.370)	13.84 (.545)	C291620000	PVC jacket
	RG 218 /U	22 / 50 S	1 GHz	Solid	4.95 (.195)	17.27 (.680)	22.10 (.870)	C291630000	PVC jacket
	RG 223 /U	5 / 50 D	12.4 GHz	Solid	0.89 (.035)	2.95 (.116)	5.38 (.212)	C291330000	PVC jacket
	RG 225 /U	11 / 50 D	1 GHz	7 x 0.8	2.38 (.094)	7.24 (.285)	10.90 (.429)	C291605007	Glass fiber jacket
	RG 303 /U	5 / 50 S		Solid	0.94 (.037)	2.95 (.116)	4.32 (.170)	N/A	
	RG 316 /U	2.6 / 50 S	3 GHz	7 x 0.17	0.53 (.021)	1.52 (.060)	2.49 (.098)	C291170007	FEP jacket
	RD 316	2.6 / 50 D	3 GHz	7 x 0.17	0.53 (.021)	1.52 (.060)	2.80 (.110)	C291185067	FEP jacket
	RG 393	10 / 50 D	11 GHz	7 x 0.81	2.39 (.094)	7.24 (.285)	9.91 (.390)	C291511007	FEP jacket
	RG 400	5 / 50 / D	12.4 GHz	19 x 0.19	0.98 (.039)	2.95 (.116)	4.95 (.195)	C291324007	FEP jacket
Flexible BT approved	RD 179	2.6 / 75 D	3 GHz	7 x 0.10	0.30 (.012)	1.6 (.063)	3.07 (.121)	C291230080	LSZH jacket
	BT 3002	3.6 / 75 D	200 MHz	Solid	0.31 (.012)	1.95 (.077)	3.55 (.140)	C291246046	FEP jacket
	BT 2002	5 / 75 D	200 MHz	7 x 0.20	0.60 (.024)	2.5 (.098)	5.1 (.200)	C291333080	FEP jacket
Semi-rigid MIL-C-17 standard	RG 401 /U	.250"	20 GHz	Solid	1.63 (.064)	5.31 (.209)	6.35 (.250)	C291870001	Copper tubing
	RG 401 alu	.250"	20 GHz	Solid	1.63 (.064)	5.31 (.209)	6.35 (.250)	C291874187	Tinned alu tubing
	RG 402 /U	.141"	20 GHz	Solid	0.92 (.036)	2.98 (.117)	3.58 (.141)	C291860001	Copper tubing
	RG 402 tin	.141"	20 GHz	Solid	0.92 (.036)	2.98 (.117)	3.58 (.141)	C291862005	Tinned copper tubing
	RG 402 silver	.141"	20 GHz	Solid	0.92 (.036)	2.98 (.117)	3.58 (.141)	C291861066	Silvered copper tubing
	RG 402 alu	.141"	20 GHz	Solid	0.92 (.036)	2.98 (.117)	3.58 (.141)	C291864187	Tinned alu tubing
	RG402 non m.	.141"	20 GHz	Solid	0.92 (.036)	2.98 (.117)	3.58 (.141)	C291861061	Non magnetic / copper tubing
	RG 405 /U	.085"	20 GHz	Solid	0.51 (.020)	1.68 (.066)	2.20 (.087)	C291850001	Copper tubing
	RG 405 tin	.085"	20 GHz	Solid	0.51 (.020)	1.68 (.066)	2.20 (.087)	C291850005	Tinned copper tubing
	RG 405 alu	.085"	20 GHz	Solid	0.51 (.020)	1.68 (.066)	2.20 (.087)	C291844187	Tinned alu tubing
	RG 405 non m.	.085"	20 GHz	Solid	0.51 (.020)	1.68 (.066)	2.20 (.087)	C291851001	Non magnetic / copper tubing
	.047"	.047"	20 GHz	Solid	0.29 (.011)	0.94 (.037)	1.19 (.047)	C291855001	Copper tubing
	.047" tin	.047"	20 GHz	Solid	0.29 (.011)	0.94 (.037)	1.19 (.047)	C291855065	Tinned copper tubing
Hand-formable	Hand-formable	.085"	20 GHz	Solid	0.51 (.020)	1.63 (.064)	2.21 (.087)	C291844065	Tin soaked braid
	Hand-formable	.141"	20 GHz	Solid	0.92 (.036)	2.95 (.116)	3.50 (.138)	C291864065	Tin soaked braid
	Hand-formable	.141"	20 GHz	Solid	0.92 (.036)	2.98 (.117)	4.05 (.159)	C291866378	FEP jacket
	Hand-formable	.141"	20 GHz	Solid	0.92 (.036)	2.98 (.117)	4.50 (.177)	C291866270	LSZH jacket
Corrugated (w/ helical or ringed/ annual copper tube)	Flexible	1/4"		Solid	2.38 (.094)	6.40 (.252)	8.70 (.343)	N/A	Ringed/annular tube
	Flexible	1/2"	8.8 GHz	Solid	4.80 (.189)	11.6 (.457)	16.35 (.644)	C291972085	Ringed/annular tube
	Flexible	7/8"		Solid	9.13 (.359)	22.5 (.866)	27.7 (1.091)	N/A	Ringed/annular tube
	Flexible	1 1/4"		Solid	12.7 (.500)	32.5 (1.28)	39.5 (1.55)	N/A	Ringed/annular tube
	Flexible	1 5/8"		Solid	17.3 (.681)	43.5 (1.71)	50.5 (1.99)	N/A	Ringed/annular tube
	Super flexible	1/4"	20 GHz	Solid	1.90 (.075)	4.70 (.185)	7.40 (.291)	C291993080	Helical tube
	Super flexible	1/4"	12 GHz	Solid	1.90 (.075)	4,40 (,173)	7,70 (,303)	C291993170	Helical tube HCF type
	Super flexible	3/8"	13.4 GHz	Solid	2.60 (.102)	6.30 (.248)	10.8 (.425)	C291996070	Helical tube
	Super flexible	3/8"	11 GHz	Solid	2.60 (.102)	6.30 (.248)	10,1 (,398)	C291996170	Helical tube HCF type
	Super flexible	1/2"	10.2 GHz	Solid	3.60 (.142)	8.70 (.343)	13.2 (.520)	C291994080	Helical tube
	Super flexible	1/2"	11.7 GHz	Solid	3.60 (.142)	8,3 (,327)	13,5 (,531)	C291994170	Helical tube HCF type
	Super flexible	7/8"	5 GHz	Tube	9.04 (.356)	23.62 (.930)	27.48 (1.082)	C291996580	Helical tube

This table is intended as a guideline only. For detailed specifications please refer to the relevant standard or to the cable manufacturer's specifications. All dimensions are nominal unless otherwise noted. *LMR is a registered trademark of Times Microwave Systems.

Coaxial Connectors

| A. Series | | B. Style | | | | | | | | | | | | | | | | | | | C. Electrical Options | | | | | | | | | | | | | | | | | | |

Coaxial Connectors

| A. Series | | B. Style | | | | | | | | | | | | | | | | C. Electrical Options | | | | | | | | | | | | | | | |

Conversion Charts

Inch/mm conversion chart

Fractional (in.)	Decimal (in.)	mm
	0.0039	0.1000
	0.0079	0.2000
	0.0118	0.3000
1/64	0.0156	0.3969
	0.0157	0.4000
	0.0197	0.5000
	0.0236	0.6000
	0.0276	0.7000
1/32	0.0313	0.7938
	0.0315	0.8000
	0.0354	0.9000
	0.0394	1.0000
1/16	0.0625	1.5875
	0.0787	2.0000
	0.1181	3.0000
1/8	0.1250	3.1750
	0.1969	5.0000

To convert to millimeters: Inches x 25.4
To convert to inches: mm x 0.0394

Radio Band Designations

Frequency	Designation
30 - 300 Hz	ELF
30 - 3000 Hz	ULF
3 - 30 kHz	VLF
30 - 300 kHz	LF
300 - 3000 kHz	MF
3 - 30 MHz	HF
30 - 300 MHz	VHF
300 - 3000 MHz	UHF
3 - 30 GHz	SHF
30 - 300 GHz	EHF

IEEE Radar Band Designations

Frequency	Designation
1 -2 GHz	L Band
2 -4 GHz	S Band
4 - 8 GHz	C Band
8 - 12 GHz	X Band
12 - 18 GHz	Ku Band
18 - 27 GHz	K Band
27 - 40 GHz	Ka Band
40 - 75 GHz	V Band
75 - 110 GHz	W Band
110 - 300 GHz	mm Band
300 - 3000 GHz	u mm Band

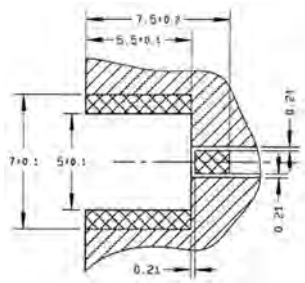
Table of return loss vs. VSWR

VSWR	Return loss (dB)	Trans. loss (dB)	Volt. refl coeff.	Trans. power (%)	Refl. power (%)
1.00	99.9	0.000	0.00	100.0	0.0
1.01	46.1	0.000	0.00	100.0	0.0
1.02	40.1	0.000	0.01	100.0	0.0
1.03	36.6	0.001	0.01	100.0	0.0
1.04	34.2	0.002	0.02	100.0	0.0
1.05	32.3	0.003	0.02	99.9	0.1
1.06	30.4	0.004	0.03	99.9	0.1
1.07	29.4	0.005	0.03	99.9	0.1
1.08	28.3	0.006	0.04	99.9	0.1
1.09	27.3	0.008	0.04	99.8	0.2
1.10	26.4	0.010	0.05	99.8	0.2
1.11	25.7	0.012	0.05	99.7	0.3
1.12	24.9	0.014	0.06	99.7	0.3
1.13	24.3	0.016	0.06	99.6	0.4
1.14	23.7	0.019	0.07	99.6	0.4
1.15	23.1	0.021	0.07	99.5	0.5
1.16	22.6	0.024	0.07	99.5	0.5
1.17	22.1	0.027	0.08	99.4	0.6
1.18	21.7	0.030	0.08	99.3	0.7
1.19	21.2	0.033	0.09	99.2	0.8
1.20	20.8	0.036	0.09	99.2	0.8
1.21	20.4	0.039	0.10	99.1	0.9
1.22	20.1	0.043	0.10	99.0	1.0
1.23	19.7	0.046	0.10	98.9	1.1
1.24	19.4	0.050	0.11	98.9	1.1
1.25	19.1	0.054	0.11	98.8	1.2
1.26	18.8	0.058	0.12	98.7	1.3
1.27	18.5	0.062	0.12	98.6	1.4
1.28	18.2	0.066	0.12	98.5	1.5
1.29	17.9	0.070	0.13	98.4	1.6
1.30	17.7	0.075	0.13	98.3	1.7
1.32	17.2	0.083	0.14	98.10	1.9
1.34	16.8	0.093	0.15	97.90	2.1
1.36	16.3	0.102	0.15	97.70	2.3
1.38	15.9	0.112	0.16	97.50	2.5
1.40	15.6	0.122	0.17	97.20	2.8
1.42	15.2	0.133	0.17	97.00	3.0
1.44	14.9	0.144	0.18	96.70	3.3
1.46	14.6	0.155	0.19	96.50	3.5
1.48	14.3	0.166	0.19	96.30	3.7
1.50	14.0	0.177	0.20	96.00	4.0
1.52	13.7	0.189	0.21	95.70	4.3
1.54	13.4	0.201	0.21	95.50	4.5
1.56	13.2	0.213	0.22	95.20	4.8
1.58	13.0	0.225	0.22	94.90	5.1
1.60	12.7	0.238	0.23	94.70	5.3
1.62	12.5	0.250	0.24	94.40	5.6
1.64	12.3	0.263	0.24	94.10	5.9
1.66	12.1	0.276	0.25	93.80	6.2
1.68	11.9	0.289	0.25	93.60	6.4
1.70	11.7	0.302	0.26	93.30	6.7
1.72	11.5	0.315	0.26	93.00	7.0
1.74	11.4	0.329	0.27	92.10	7.3
1.76	11.2	0.342	0.28	92.40	7.6
1.78	11.0	0.356	0.28	92.10	7.9
1.80	10.9	0.370	0.29	91.80	8.2
1.82	10.7	0.384	0.29	91.50	8.5
1.84	10.6	0.398	0.30	91.30	8.7
1.86	10.4	0.412	0.30	91.00	9.0
1.88	10.3	0.426	0.31	90.70	9.3
1.90	10.2	0.440	0.31	90.40	9.6
1.92	10.0	0.454	0.32	90.10	9.9

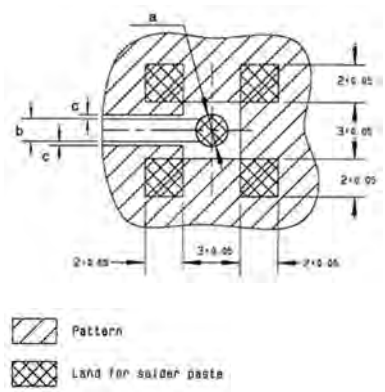
Assembly instructions

M01

Part number
R113 423 000



Part number		a	b	c
R113 424 000 R113 424 010 R113 424 020	R113A 424 020 R113 664 000	Ø 1.7 $^{+0.1}_{0}$	1.2	0.21
R113A 664 120		Ø 1.05	1.2	0.21
R213 424 800		Ø 1.57 $^{+0.1}_{0}$	1	0.63

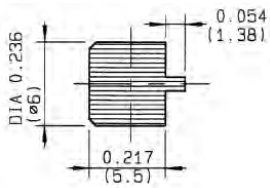


COPLANAR LINE

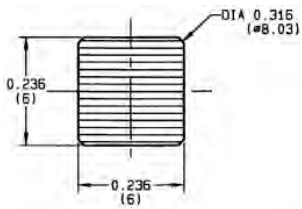
Pattern and signal are on the same side.
Thickness of PCB: .063 (1.6 mm).
The material of PCB is the epoxy resin of glass fabrics bacs (Er = 4.8).
The solder resist should be printed.

VIDEO SHADOW

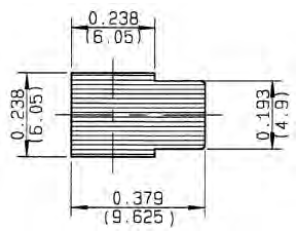
Part number
R113 423 000



Part number	
R113 424 000 R113 424 010	R113 424 020 R113A 424 020 R213 424 800

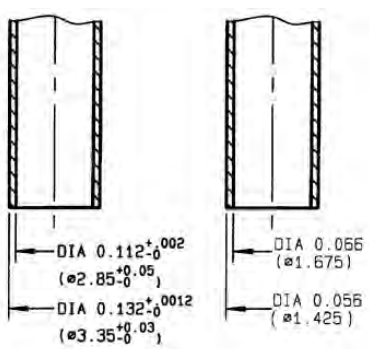


Part number	
R113 664 000	R213 664 800
R113A 664 120	



Aspiration nozzle dimensions

MCX 50Ω **MCX 75Ω**



SECTION 15



High Voltage Connectors (BNC HT-MHV / SHV / THT 20 / HN) Non-Magnetic Connectors

R316 / R317 / R331 / R176

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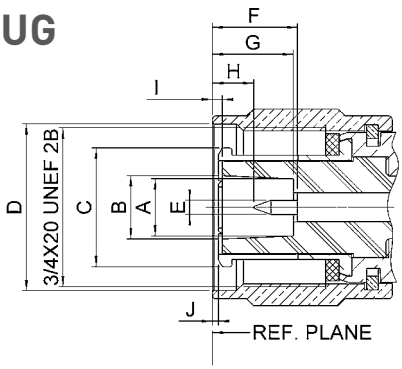
NON-MAGNETIC CABLE ASSEMBLIES
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Introduction

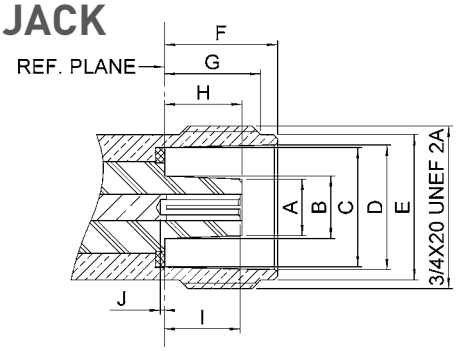
The HN series is designed for industries needing accuracy in RF and HV applications up to 5000 Volts. Radiall continuously strives to improve the range of HN coaxial connectors for nuclear and harsh environments. Our customized connectors allow high radiation resistance, and by using a hexagonal nut for mating, they provide a secure connection. Please contact Radiall regarding this dedicated nuclear range.

Interface

PLUG



JACK



Letter	mm		inch	
	min.	max.	min.	max.
A DIA	6.7	6.8	.264	.268
B DIA	7.4	7.5	.291	.295
C DIA	13.85	13.95	.545	.549
D DIA	19.39	19.59	.763	.771
E DIA	1.62	1.66	.064	.065
F	9.3	10.1	.366	.398
G	9.2	9.7	.362	.382
H	3.9	5.3	.154	.209
I	0.15	0.55	.006	.022
J	-0.5	0.3	.020	.012

Letter	mm		inch	
	min.	max.	min.	max.
A DIA	6.55	6.65	.258	.262
B DIA	7.25	7.35	.285	.289
C DIA	13.91	14.01	.548	.552
D DIA	14.54	14.64	.572	.576
E DIA	16.91	17.01	.666	.670
F	13.2	13.25	.520	.522
G	11.1	11.35	.437	.447
H	8.75	9.25	.344	.364
I	8.55	9.15	.337	.360
J	-1.05	0.15	-.041	.006

Characteristics

ELECTRICAL CHARACTERISTICS

Frequency range	DC to 3 GHz
Impedance	50 Ω
Test voltage at sea level	5000 Vrms (except connector for 5/50-6/75 cable group & adapter M-F: 3000 Vrms)
Insulation resistance	5000 MΩ

MECHANICAL CHARACTERISTICS

Mechanical endurance	500 matings
Vibration	20 g
Shock	1/2 sinusoïdal (severity 100 A)

ENVIRONMENTAL

Temperature range	-55°C + 155°C
Salt spray	48 Hrs
Panel sealing	Splashproof

MATERIALS

Contacts and interfaces	Heat treated beryllium copper
Other pieces	Brass / Stainless steel
Insulator	PTFE / Ceramic / PEEK
Gasket	Silicone rubber

PACKAGING

Packaging	Unit

Plugs, jack and receptacle

STRAIGHT PLUGS CLAMP TYPE





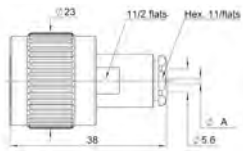


Fig. 1

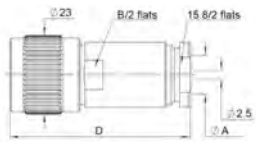


Fig. 2

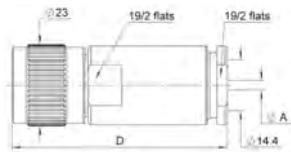


Fig. 3

Cable group	Cable group dia.	Part number	Fig.	Dimensions mm		
				A	B	D
RG58 / RG141 / RG142 / RG223 / RG400	5/50/S+D	R176 006 000	1	5.6		
RG59 / RG62	6/75/S+93	R176 012 000		6.5		
RG213 / RG393 / RG214	10+11/50/S+D	R176 018 000	2	11.2	17	49
		R176 019 000			15.8	56.5
		R176 021 000			17	53
RG 217	14/50	R176 027 000	3	2.5		63

STRAIGHT JACK CLAMP TYPE





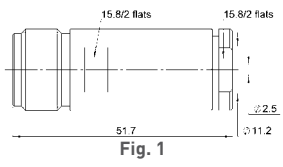


Fig. 1



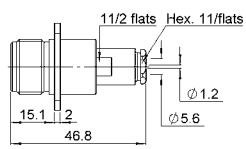
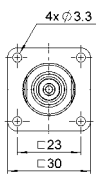


Fig. 2



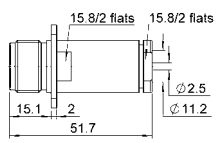
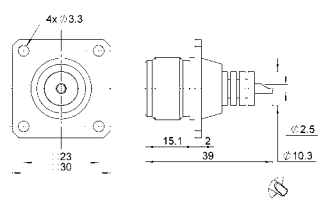


Fig. 3

Cable group	Cable group dia.	Part number	Fig.	Panel drilling	Note
RG213 / RG393 / RG214	10+11/50	R176 218 000	1		
RG58 / RG141 / RG142 / RG223 / RG400	5/50/S+D	R176 256 000	2	P02	Square flange
RG213 / RG393 / RG214	10+11/50	R176 268 000	3		

FLANGE RECEPTACLE





Part number	Panel drilling	Note
R176 404 000	P02	Square flange - Solder pot

Adapters and caps

IN SERIES ADAPTERS



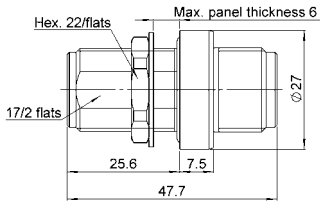


Fig. 1

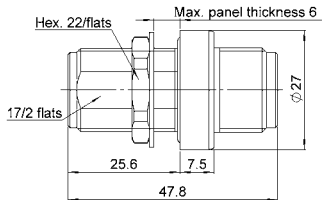


Fig. 2

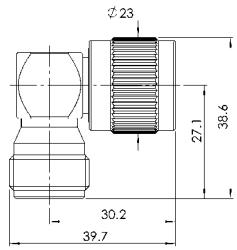


Fig. 3

Part number	Fig.	Panel drilling	Note
R176 754 000	1	P01	Bulkhead female-female - Splashproof panel seal
R176 754 150	2		Bulkhead female-female - Splashproof panel seal - Ceramic insulator
R176 770 000	3		Right angle - male-female

CAPS



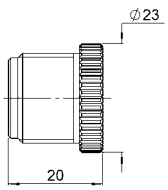


Fig. 1

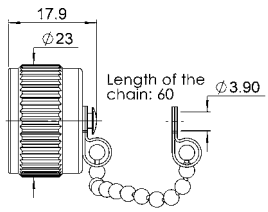
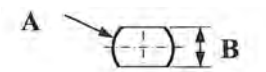


Fig. 2

Part number	Fig.	Note
R176 830 010	1	Protective cap
R176 811 000	2	Protective cap with chain

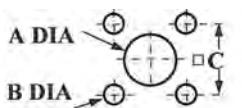
Panel drilling

PO1



	mm	
	Maxi	mini
A	19.3	19.2
B	17.3	17.2

PO2



	mm	
	Maxi	mini
A	19.5	19.4
B	3.5	3.4
C	23.1	23

Introduction

This catalogue features 4 series of high voltage coaxial connectors - all able to withstand continuous voltage up to 20 000 V.

By redesigning the BNC HT interface in order to benefit from its high performance to serve MHV, Radiall created BNC HT/MHV. Radiall BNC HT/MHV is fully compatible with BNC HT with MHV interface according to MIL-STD-348.

TEST VOLTAGES

The test voltages quoted in this catalogue are indicative only. They correspond to those made under normal atmospheric conditions during a test period of 1 minute as specified in the French standard NF EN 60068 - 1.

OPERATING VOLTAGES

The operating voltage is chosen under the responsibility of users, depending on the conditions in which the connectors will be used (environment, safety factor...). The indicated cables are recommended for the mechanical and dimensional suitability with our connectors. As to the electrical characteristics of the cables and in particularly the maximum voltage capacity, it is necessary to conform with the recommendation of the cable manufacturer.

Characteristics BNC HT/MHV

BNC HT/MHV connectors are not intermateable with the BNC and SHV series.

ELECTRICAL CHARACTERISTICS

Frequency range		DC - 2 GHz
Impedance		50Ω
VSWR (plug and jack)		1.20 + 0.2 F (GHz)
Test voltage	• Unmated (Male)	6 000 V D.C.
	• Connectors (Female)	6 000 V D.C.
	• Mated pair	10 000 V D.C.
Current rating		10 A

MECHANICAL AND ENVIRONMENTAL CHARACTERISTICS

Mating cycles	500
Vibration	20 g - 2 000 Hz
Shock	50 g
Salt spray	48 H
Temperature range	- 55°C + 155°C - 40°C + 70°C (with polyethylene insulator)

MATERIALS AND PLATING

Components	Materials	Platings
Body	Brass	Nickel
Center contact	Brass / Beryllium copper	Silver
Other metal parts	Brass or Beryllium copper	Nickel
Insulator	PTFE / Polyethylene	
Gasket	Silicone rubber	

All dimensions are given in mm.

STRAIGHT PLUGS FOR FLEXIBLE CABLES



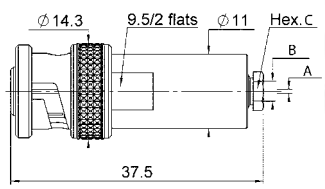


Fig. 1

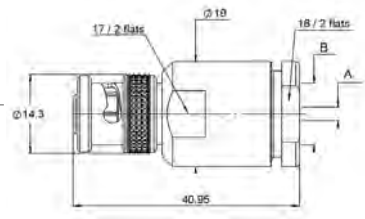


Fig. 2

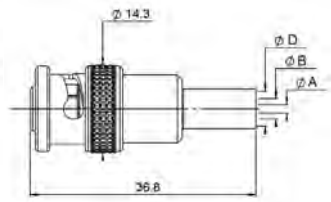


Fig. 3

Cable group	Cable group dia.	Part number	Fig.	Dimensions				Note
				A dia.	B dia.	Hex. C	D dia.	
RG174 / RG316 / RD316 / RG179 / RD179	2.6/50+75/S + D	R316 004 000	1	0.6	3	5/flats	-	Clamp type
RG58 / RG141 / RG142 / RG223 / RG400	5/50/S + D	R316 007 000		1.2	5.6	9.5/flats	-	
RG59/RG62	6/75/S	R316 011 000		1.2	6.5	9.5/flats	-	
RG58/RG141	5/50/S	R316 072 000	3	1.2	3.2	-	5.6	Crimp type
RG214 / RG393 / RG213	10/50/S+D	R316 020 010	2	2.5	11.2	-	-	Clamp type
RG59 / RG62	6/75/S	R316 072 010	3	1.2	4	-	6.6	

STRAIGHT JACKS CLAMP TYPE FOR FLEXIBLE CABLES



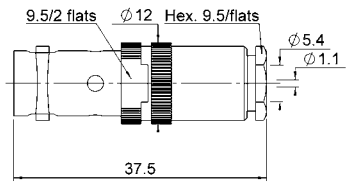


Fig. 1

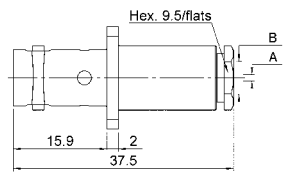


Fig. 2

Cable group	Cable group dia.	Part number	Fig.	Dimensions			Panel Drilling
				A	B	C	
RG58 / RG141 / RG142 / RG223 / RG400	5/50/S + D	R316 207 000	1	1.1	5.4	37.5	
RG59 / RG62	6/75S	R316 211 000			6.5	38.5	
RG58 / RG141 / RG142 / RG223 / RG400	5/50/S+D	R316 257 000	2		5.4	37.5	P01
RG59 / RG62	6/75/S	R316 261 000			6.5		

Receptacles, adapters and gasket

RECEPTACLES





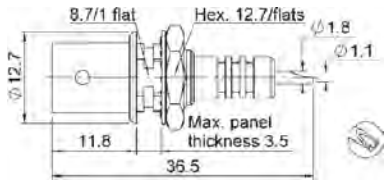


Fig. 1

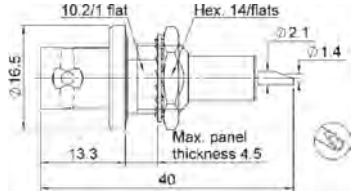


Fig. 2

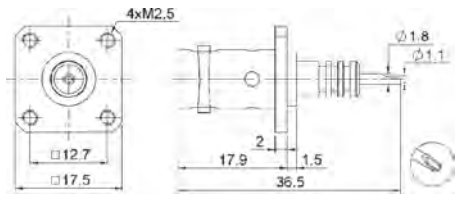


Fig. 3

Part number	Fig.	Panel Drilling	Note
R316 553 000	1	P02	Bulkhead
R316 603 000	2	P03	Bulkhead panel seal
R316 405 000	3	P01	Square flange mounting

IN SERIES ADAPTERS



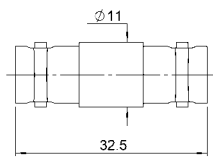


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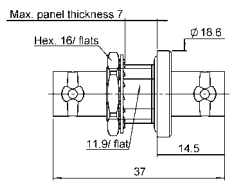
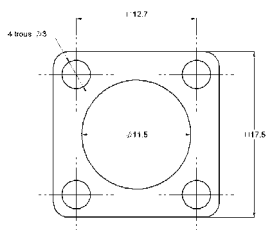


Fig. 2

Part number	Fig.	Panel Drilling	Note
R316 704 000	1		Straight female - female
R316 754 000	2	P04	Straight bulkhead female - female with panel seal

GASKET





Part number
R280 503 000

Introduction

These safe high voltage connectors meet all requirements of the NIM Standard (Nuclear Instrumentation Module) Specification ND 545 Amendment A. Both the pin and socket contacts are securely recessed inside the insulation to guard against potential electrical shock when live unmated connectors are handled.

They are particularly recommended for impulse circuits of linear accelerators as well as in military, nuclear and medical electronics.

These connectors are not intermateable with the BNC and BNC HT/MHV series.

Characteristics

ELECTRICAL CHARACTERISTICS

Frequency range		DC - 2 GHz
Impedance		50Ω
VSWR (plug and jack)		< 1.20 + 0.3 F (GHz)
Contact resistance	• Center contact	< 2.1 mΩ
	• Outer contact	< 1.5 mΩ
Test voltage	• Unmated connectors	10 000 V D.C.
	• Mated pair	12 000 V D.C.
Current rating		10 A

MECHANICAL AND ENVIRONMENTAL CHARACTERISTICS

Temperature range	- 65°C + 165°C
Mating cycles	500
Vibration	10 g - 500 Hz to MIL-STD-202, method 204, condition A
Shock	To MIL-STD-202, method 213 B, condition A
Salt spray	To MIL-STD-202, method 101, condition B-48 H
Contact to cable retention force	> 27 N
Coupling nut retention force	> 450 N
Cable retention	> 180 N

MATERIALS AND PLATING

Components	Materials	Plating
Body	Brass	Nickel
Center contact	Brass / Beryllium copper	Gold
Other metal part	Brass / Beryllium copper	Nickel
Insulator	PTFE	
Gasket	Silicone rubber	

Plugs

STRAIGHT PLUGS FOR FLEXIBLE CABLES





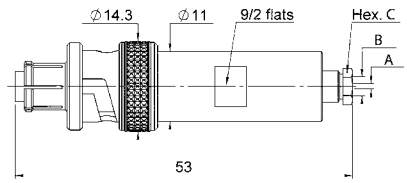


Fig. 1

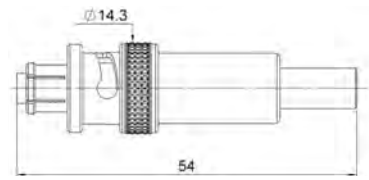


Fig. 2

Cable group	Cable group dia.	Part number	Fig.	Dimensions			Captive center contact	Note
				A dia.	B dia.	Hex. C		
RG58 / RG141 / RG142 RG223 / RG400	5/50/S + D	R317 005 000	1	1.05	5.6	9.5/flats	yes	Clamp type
RG58 / RG141	5/50/S	R317 072 000	2					Crimp type
RG59 / RG62	6/75/S	R317 074 000						

All dimensions are given in mm.

Jacks

STRAIGHT JACKS FOR FLEXIBLE CABLES





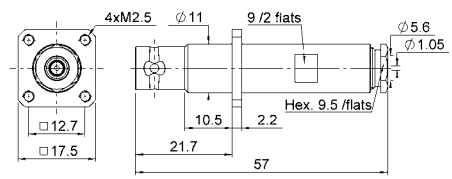


Fig. 1

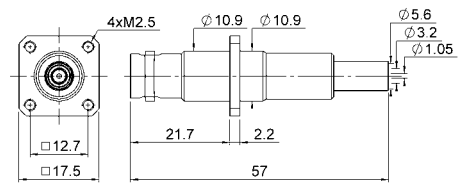


Fig. 2

Cable group	Cable group dia.	Part number	Fig.	Panel Drilling	Captive center contact	Note
RG58 / RG141 / RG142 RG223 / RG400	5/50/S + D	R317 255 000	1	P01	yes	Square flange clamp type
RG58 / RG141	5/50/S	R317 270 000	2			Square flange crimp type

Receptacles and in series adapter

RECEPTACLES





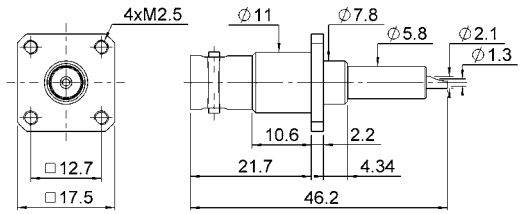


Fig. 1

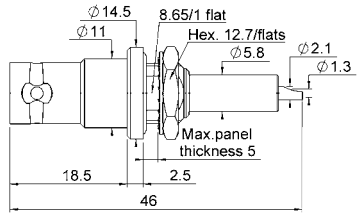
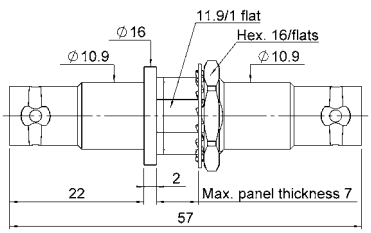


Fig. 2

Part number	Fig.	Panel Drilling	Note
R317 405 000	1	P05	Square flange
R317 580 000	2	P06	Bulkhead

IN SERIES ADAPTER





Part number	Panel Drilling	Note
R317 720 000	P04	Bulkhead jack - jack

Introduction

This large size screw-on interface has a 4 mm internal diameter female center contact which allows testing with standard banana plugs. THT 20 features the highest test voltage with a rating of 20 000 VDC for a mated pair.

Characteristics

Female center contact has a 4 mm internal diameter which allows testing with standard banana plugs.

- Screw coupling

ELECTRICAL CHARACTERISTICS

Frequency range		DC - 1 GHz
Impedance		50Ω
Test Voltage	• Unmated connectors	10 000 V D.C.
	• Mated pair	20 000 V D.C.
Current rating		20 A

MECHANICAL AND ENVIRONMENTAL CHARACTERISTICS

Temperature range	- 40°C + 70°C (polyethylene or styramic insulators) -55°C + 125°C (PTFE insulator)
Mating cycles	500
Salt spray	48 H

MATERIALS AND PLATING

Components	Materials	Plating
Body	Brass	Nickel
Center contact	Brass / Beryllium copper	Gold / Silver
Other metal part	Brass	Nickel
Insulator	PTFE / Polyethylene	
Gasket	Silicone rubber	

Plugs

STRAIGHT PLUGS, CLAMP TYPE FOR FLEXIBLE CABLES





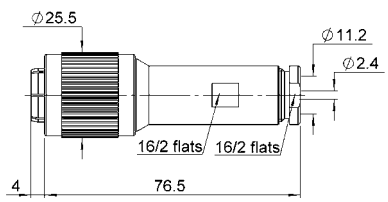


Fig. 1

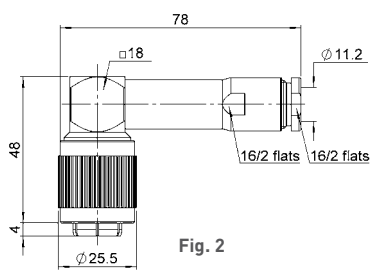


Fig. 2

Cable group	Cable group dia.	Part number	Fig.	Note
RG213 / RG393 / RG214 RG11 / RG12 / RG144 / RG216	10/50+75/S + D + 11/50+75/D	R331 018 000	1	Straight / PE insulator
		R331 168 000	2	Right angle

Receptacles

RECEPTACLES



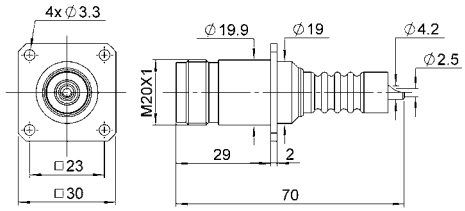


Fig. 1

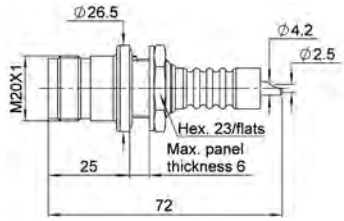
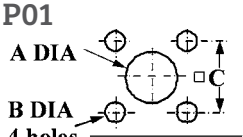


Fig. 2

Part number	Fig.	Panel drilling	Note
R331 405 000	1	P07	Square flange - PTFE insulator
R331 603 000	2	P08	Bulkhead, panel seal PTPE insulator

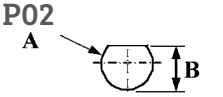
Panel drilling

P01



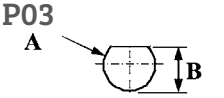
	mm	
	Maxi	mini
A	11.3	11.2
B	2.7	2.6
C	12.75	12.65

P02



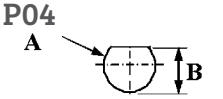
	mm	
	Maxi	mini
A	9.7	9.6
B	8.9	8.8

P03



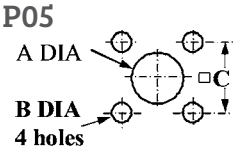
	mm	
	Maxi	mini
A	11.3	11.2
B	10.4	10.3

P04



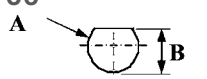
	mm	
	Maxi	mini
A	12.9	12.8
B	12.15	12.05

P05



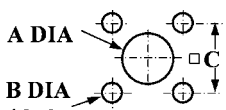
	mm	
	Maxi	mini
A (F. Mount)	11.3	11.2
A (R. Mount)	8.1	8
B	2.7	2.6
C	12.75	12.65

P06



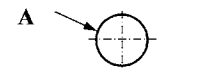
	mm	
	Maxi	mini
A	9.6	9.5
B	8.9	8.8

P07



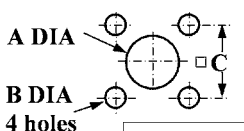
	mm	
	Maxi	mini
A (R. Mount)	9.3	9.2
A (F. Mount)	11.3	11.2
B	2.7	2.6
C	12.75	12.65

P08



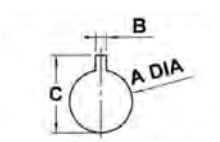
	mm	
	Maxi	mini
A	11.2	11.1

P09



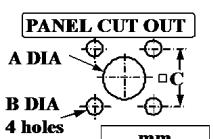
	mm	
	Maxi	mini
A (R. Mount)	19.3	19.2
A (F. Mount)	20.3	20.2
B	3.3	3.2
C	23.05	22.95

P10



	mm	
	Maxi	mini
A	18.3	18.1
B	2.2	2.1
C	19.1	19.0

P11



	mm	
	Maxi	mini
A (R. Mount)	11.3	11.2
A (F. Mount)	9.3	9.2
B	3.1	3.0
C	12.75	12.65

All dimensions are given in mm.

Introduction

Radiall . . . The Best Choice for Non-Magnetic Connectivity Solutions

We Know Your Market

We offer a range of non-magnetic RF connectors and cable assemblies for medical and space applications.

Why Radiall Is Your Best Choice



- Collaboration: We work closely with your engineers to understand your business, your technical needs, and your budget.
- High Performance, Competitively Priced Products: Our connectivity solutions give you the best combination of performance and value.
- Wide Product Range: We manage our product lines through the entire lifecycle, in order to offer you a wide selection of standard products at an affordable price.
- Global Presence: We're everywhere you need us, with worldwide sales, engineering support, R&D in North America, Europe, and Asia, and manufacturing facilities strategically located in the United States, Mexico, France, India, and China to provide on-demand cable assemblies.
- Responsive Support and Service: From the design stage, and planning to post-installation support, we're with you at every step, whether you need sales support or engineering expertise.
- Warranty: We stand behind our products.

Certifications and Environment

Radiall is ISO 9001:2008 certified and dedicated to continuous improvement programs that have resulted in AS9100, TS16949, and ISO 14001 certifications. In addition, Radiall is committed to investing in its people, future technologies, and the environment. Radiall is RoHS (Restriction of Hazardous Substances) and REACH (Registration, Evaluation, Authorization and Restriction of Chemical Substances) compliant.

The Best Manufacturing and Process Technologies

Our dedication to innovation and continuous improvement in leading-edge products means we excel in the techniques to create them:

- High precision machining: metal stamping, milling, turning, and cutting
- Molding, polishing
- Laser, ultrasonic, and vapor soldering
- Plating and plastic metallization
- Automatic assembly
- Characterization
- Test and measurement
- Cable and PTFE wrapping
- Thin and thick-film processes

Introduction

NON-MAGNETIC CONNECTOR FAMILIES

Radiall offers a growing range of non-magnetic connectors for medical, space, and other applications that includes MMCX, MCX, SMP, and SMB interfaces. To guarantee an exceptional non-magnetism level and repeatability, each non-magnetic connector is manufactured through a strictly controlled production process according to our quality assurance procedures.

For space applications, such as satellites used for scientific exploration, we offer an extensive range of SMA products, fully ESA qualified, meeting the residual magnetism required by the ESCC 3402 generic specification and the ESCC 3402/001, 002, and 003 detail specifications. Connectors are made of beryllium copper with gold plating and copper underplating.

NEW NON-MAGNETIC MCX SERIES

Radiall has expanded our range of non-magnetic connectors with the non-magnetic MCX series. These connectors meet the need for smaller interconnections in space-limited MRI equipment, such as those for head, shoulder, or foot. With more reliable connections through superior performance, the reinforced connection system eliminates the risk of perturbation in image quality.

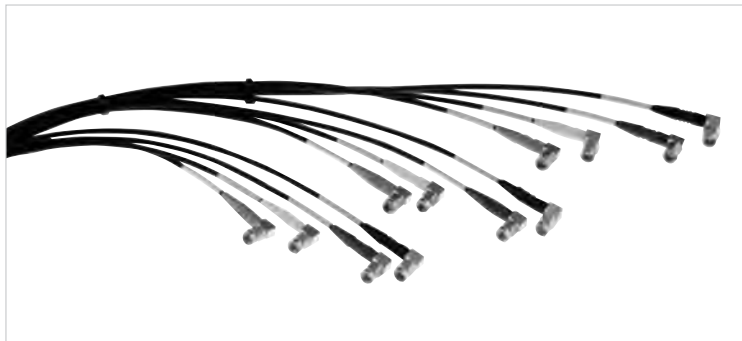
The non-magnetic MCX family also includes a new full-detent cable version, which has been tested in high-vibration conditions, that eliminates intermittent connections. It complies with MIL-STD-202, Method 204, Condition D for vibration testing.

Non-magnetic MCX connectors are available in a wide range of configurations for:

- Board-to-board connections
- Cable-to-board connections
- Cable-to-cable connections

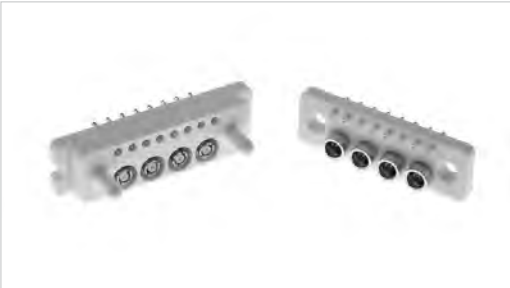
NON-MAGNETIC CABLE ASSEMBLIES





Radiall offers non-magnetic cable assemblies that provide a totally non-magnetic solution to reduce the risk of perturbation while working inside the B_0 magnetic field. Non-magnetic cables are available in RG/316, RG/178 flexible or .085" and .141" semi-rigid styles.

Introduction







CUSTOM PRODUCTS

We are continually developing new non-magnetic products, including high-density, multiposition configurations.

Multi-port connectors: We offer a wide variety of solutions for high-density coaxial contacts based on the standard SMP, Coaxipack 2, SMB and SMA ranges with additional multiple DC contacts. Our expertise and extensive knowledge in RF coaxial connector and cable assembly technology allows us to offer superior technical project support including those projects that need new coaxial connections developed. Multi-port connectors offer the advantage of having only one connector instead of several separate connectors to mate and unmate.

Non-magnetic RF CONNECTORS FOR MEDICAL

Non-magnetic coaxial connectors are used primarily inside MRI and other medical imaging equipment. Magnetic resonance imaging produces high-resolution cross-sectional images of the inside of the human body by exploiting radio frequency (RF) pulses. MRI technology has seen tremendous improvements in recent years with continued advances in technology, a small part of which is due to coaxial non-magnetic connectors.



MRI medical equipment consists of a large magnet or electromagnet to create an intense and homogenous magnetic field (0.3 to 7 T) that surrounds the patient, "gradient coils" to position the area under analysis, and two high-frequency coils. One coil transmits RF pulses of 20 to 300 MHz to excite the atomic nucleus in the area under analysis. The other coil receives a signal that constitutes the image after excitation. The output is sent to a computer for processing and display.

The quality of the picture depends mainly on the homogeneity of the magnetic field and on the signal-to-noise ratio. To avoid any interference in the field homogeneity, coaxial connectors and cables located in the magnetic field to connect the coils should be transparent relative to the field, which means their relative permittivity μ_r should be equal to 1.

High-quality non-magnetic connectors have extremely low magnetic susceptibility so that they are not magnetized by the fields created in the equipment.

Introduction

RADIALL NON-MAGNETIC CONNECTORS

Radiall connectors are specified for coils because they are manufactured with materials especially adapted to non-magnetism (with relative permittivity μr close to 1). Each rod of raw material is selected based on a direct measurement with a vibrant magnetometer, with the highest quality of surface plating such as BBR (Bright Bronze Radiall), or NPGR (gold plated over a non-magnetic nickel phosphorous).

Our non-magnetic connectors have a susceptibility of around 10^{-5}, as opposed to 10^{-2} for standard connectors made of brass/nickel materials. As a result, our non-magnetic connectors are transparent to the magnetic field, which means no field distortion, a higher SNR, and higher quality images.

Performance of Radiall non-magnetic RF connectors

Table of distortion comparison:

	Distortion at 10 mm $\Delta H/H_{ext}$ with B_0=1.5 Tesla	Magnetic susceptibility x
Radiall non-magnetic connector	≤ 5.10^{-7}	≈ 10^{-5}
Standard non-magnetic connector	≈ 10^{-5}	≈ 10^{-3}
Brass/nickel connector	≈ 10^{-4}	≈ 10^{-2}

The relative distortion of a magnetic field of 1.5 T, generated by Radiall non-magnetic connectors is only 5.10^{-7} maximum, at a distance of 10 mm from the surface of the connector. Furthermore, they meet the electrical and mechanical characteristics required for any reliable coaxial connector. In addition, these connectors are extremely durable for medical applications.

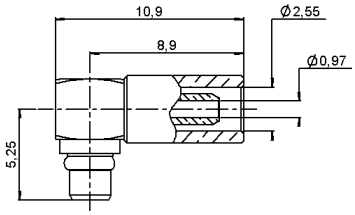
Manufacturing

Manufacturing a Radiall non-magnetic connector involves a special "clean room" environment where all precautions are taken to avoid any contact with ferromagnetic materials during the machining and cleaning process. Radiall follows strict manufacturing guidelines through a quality assurance plan where documented rules are enforced throughout the production line. This quality assurance procedure guarantees the highest level of non-magnetism and repeatability for all Radiall non-magnetic connectors.

MMCX plug and PCB receptacle

RIGHT-ANGLE PLUG CRIMP TYPE FOR FLEXIBLE CABLE

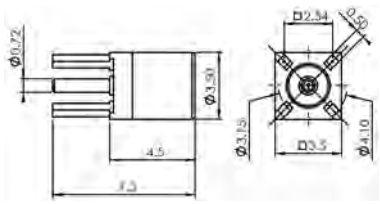




Cable group	Cable group dia.	Part number	Captive center contact	Body material	Finish
RG178 Non-magnetic cable	2/50/S	R110 170 147	yes	Non-magnetic bronze	BBR

STRAIGHT PCB RECEPTACLE



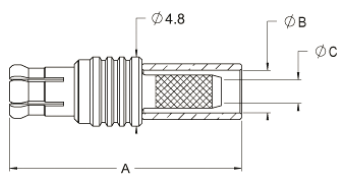


Part number	Captive center contact	Panel drilling	Body material
R110 426 107	yes	P01	Non-magnetic Bronze

MCX plug

STRAIGHT PLUG CRIMP TYPE FOR FLEXIBLE CABLE

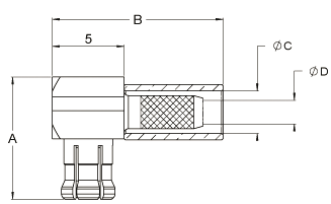




Cable group	Cable group dia.	Part number	Dimensions (mm)			Note	Finish
			A	B	C		
RG178	2/50/S	R113 081 097	16.1	2.55	1.1	—	BBR
RG316	2.6/50/S	R113 082 097	16.1	2.95	1.65	—	
RG316	2.6/50/S	R299 122 097	16.1	2.95	1.65	Full detent	

RIGHT-ANGLE PLUG CRIMP TYPE FOR FLEXIBLE CABLE





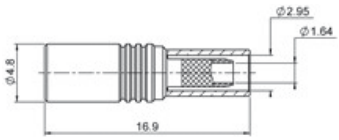
Cable group	Cable group dia.	Part number	Dimensions (mm)				Note	Finish
			A	B	C	D		
RG178	2/50/S	R113 181 097	8.6	11.9	2.55	1.1	—	BBR
RG316	2.6/50/S	R113 182 097	8.6	11.9	2.95	1.65	—	
RG316	2.6/50/S	R299 122 087	8.6	11.9	2.95	1.65	Full detent	

PRODUCT SPECIFICATION: please refer to the standard range

MCX jack and PCB receptacles

STRAIGHT JACK CRIMP TYPE FOR FLEXIBLE CABLE





Cable group	Cable group dia.	Part number	Finish
RG316	2.6/50/S	R113 240 097	BBR

STRAIGHT PCB RECEPTACLE



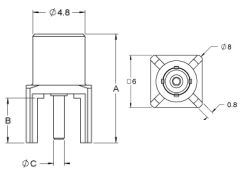


Fig. 1

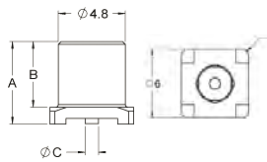


Fig. 2

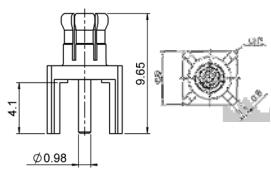
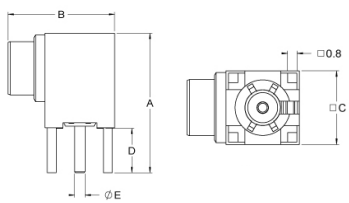


Fig. 3

Part number	Fig.	Dimensions (mm)			Panel drilling	Termination	Finish	Type
		A	B	C				
R113 426 097	1	10	4.1	0.98	P01	Solder legs	Gold over copper	female
R113 424 097	2	5.9	4.7	0.96	--	SMT		female
R113 425 097	3	9.65	4.1	0.98	P01	Solder legs		male

RIGHT-ANGLE PCB RECEPTACLE



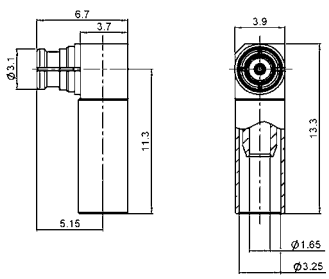


Part number	Panel drilling	Termination style	Finish	Type
R113 665 097	P01	Solder legs	Gold over copper	female

SMP plug

RIGHT-ANGLE PLUG CRIMP TYPE FOR FLEXIBLE CABLE





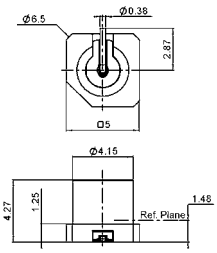
Cable group	Cable group dia.	Part number	Captive center contact	Body material	Finish
RG179 non-magnetic cable	2.6/50/S	R222 900 357	yes	Non-magnetic bronze	BBR

PRODUCT SPECIFICATION: please refer to the standard range

SMP receptacle

STRAIGHT SMT RECEPTACLE



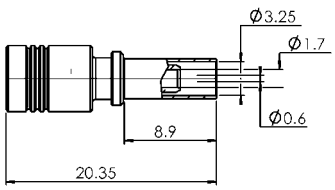


Part number	Retention	Captive center contact	Body material	Finish
R222 941 324	Limited detent	yes	Non-magnetic bronze	Gold over copper

SMB Plugs and jack

STRAIGHT PLUG FULL CRIMP TYPE FOR FLEXIBLE CABLE

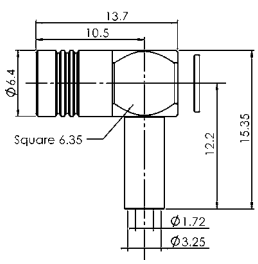




Cable group	Cable group dia.	Part number	Captive center contact	Body material	Finish
RG179, RG316 non-magnetic cable	2.6/50+75/S	R114 082 107	yes	Non-magnetic bronze	BBR

RIGHT-ANGLE PLUG CRIMP TYPE FOR FLEXIBLE CABLE

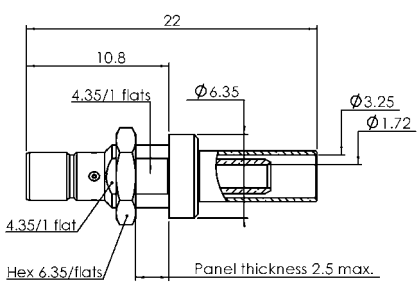




Cable group	Cable group dia.	Part number	Captive center contact	Body material	Finish
RG179, RG316 non-magnetic cable	2.6/50+75/S	R114 186 197	yes	Non-magnetic bronze	BBR

STRAIGHT BULKHEAD JACK CRIMP TYPE FOR FLEXIBLE CABLE





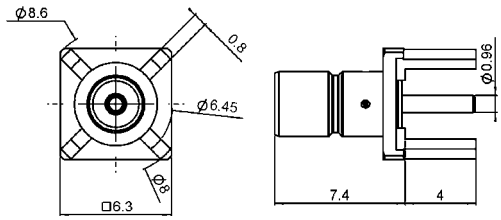
Cable group	Cable group dia.	Part number	Captive center contact	Panel drilling	Body material	Finish
RG316 non-magnetic cable	2.6/50+75/S	R114 313 197	yes	P02	Non-magnetic bronze	BBR

PRODUCT SPECIFICATION: please refer to the standard range

SMB receptacle

STRAIGHT MALE RECEPTACLE FOR PCB

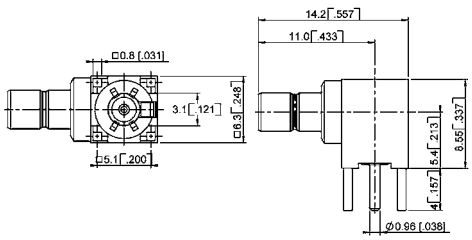




Part number	Body material	Finish
R114 426 147	Non-magnetic bronze	Gold over copper

RIGHT-ANGLE RECEPTACLE FOR PCB, SOLDER LEGS



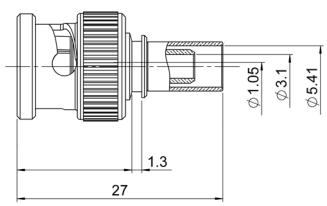


Part number	Captive center contact	Body material	Finish
R114 665 107	yes	Non-magnetic bronze	Gold over copper

BNC plugs and jack

STRAIGHT PLUG FULL CRIMP TYPE

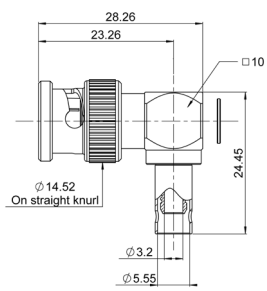




Cable group	Cable group dia.	Part number	Captive center contact	Body material	Finish
RG58 / RG141	5/50S	R141 082 097	yes	Non-magnetic bronze	BBR / Gold

RIGHT-ANGLE PLUG CRIMP TYPE FOR FLEXIBLE CABLE

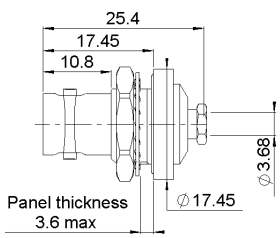




Cable group	Cable group dia.	Part number	Captive center contact	Body material	Finish
RG58 / RG141	5/50S	R141 182 177	yes	Non-magnetic bronze	BBR / Gold

STRAIGHT BULKHEAD JACK SOLDER TYPE FOR SEMI RIGID CABLE

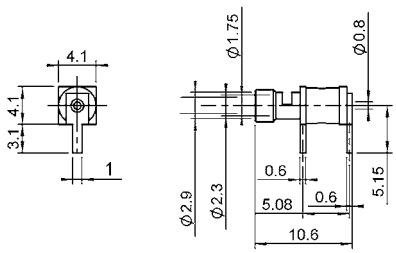




Cable group	Cable group dia.	Part number	Captive center contact	Body material	Finish	Note
RG402	.141"	R141 338 007	no	Non-magnetic bronze	BBR / Gold	Panel sealed

RIGHT-ANGLE TERMINAL SOLDER TYPE FOR FLEXIBLE CABLES

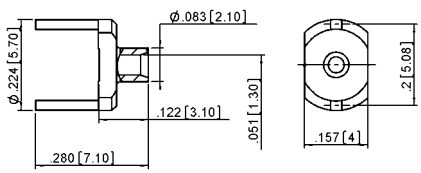




Cable group	Cable group dia.	Part number	Panel drilling	Body material	Finish
RG-174, RG-316, RD-316, RG-179, RD-179	2.6/50+75	R280 220 027	P03	Non-magnetic bronze	Gold over copper

STRAIGHT TERMINAL SOLDER TYPE FOR SEMI-RIGID CABLES





Cable group	Cable group dia.	Part number	Panel drilling	Body material	Finish
RG-174, RG-316, RD-316, RG-179, RD-179	.047	R280 287 107	P04	Non-magnetic bronze	Gold over copper

PRODUCT SPECIFICATION: please refer to the standard range

Non-magnetic cable assemblies

Radiall also offers a standard range of non-magnetic cable assemblies fit to work within the B_0 magnetic field. The cables are not sold separately.

In order to meet our customers specific project requirements, Radiall provides worldwide technical support.







Cable type	Cable group dia.	Part number
RG-178 non-magnetic	2/50/S	C291 140 087
RG-316 non-magnetic	2.6/50/S	C291 170 079
RG-400 non-magnetic	5/50/S	C291 324 079
.085" semi-rigid	.085	C291 851 001
.141" semi-rigid	.141	C291 861 061

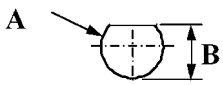
Panel drilling

P01



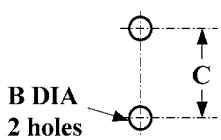
	mm	
	Maxi	mini
A	1.29	1.25
B	0.85	0.75
C	2.56	2.52

P02



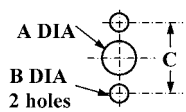
	mm	
	Maxi	mini
A	5	4.9
B	4.58	4.46

P03



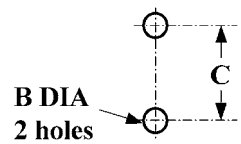
	mm	
	Maxi	mini
B	1.5	1.4
C	5.13	5.03

P04



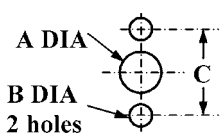
	mm		inch	
	Maxi	mini	Maxi	mini
A	1.1	1.05	.043	.041
B	1.1	1.05	.043	.041
C	5.16	5.00	.203	.197

P05



	mm	
	Maxi	mini
B	1.5	1.4
C	5.13	5.03

P06



	mm		inch	
	Maxi	mini	Maxi	mini
A	1.1	1.05	.043	.041
B	1.1	1.05	.043	.041
C	5.16	5.00	.203	.197

PRODUCT SPECIFICATION: please refer to the standard range

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