



RF Connector Overview Guide

Linx Technologies offers a wide variety of SMA, MCX, MMCX and MHF radio frequency connector and cable assemblies. RF connectors and cables consist of miniature precision-machined mechanical components and clever designs with complex assembly which are necessary to minimize losses and reflections. This requires tight tolerances, quality surface finishing and proper choice of metals and insulators. By combining domestic design and quality with offshore connector manufacturing, Linx offers low loss connectors at very competitive prices for OEM customers.

SMA Connectors

SMA (subminiature version A) connectors are high performance coaxial RF connectors with 50-ohm matching and excellent electrical performance up to 18GHz with insertion loss as low as 0.17dB. They also have high mechanical strength through their thread coupling. This coupling minimizes reflections and attenuation by ensuring uniform contact. SMA connectors are among the most popular connector type for OEMs as they offer high durability, low VSWR and a variety of antenna mating choices. In order to comply with FCC Part 15 requirements for non-standard antenna connectors, SMA connectors are also available in reverse polarity (RP-SMA).

PCB Board Termination SMA and RP-SMA Connectors

Connector Type	Orientation	Mount	Style	Board Thickness	Body Finish	Polarity	Part Numbers
	Straight	Through-hole	Receptacle		Nickel	Standard	CON SMA001
					Gold		CON SMA001-G
					Nickel	Reverse	CON REVSMA001
					Gold		CON REVSMA001-G
	Straight	Surface-mount	Receptacle		Nickel	Standard	CON SMA001-SMD
					Gold		CON SMA001-SMD-G
					Nickel	Reverse	CON REVSMA001-SMD
					Gold		CON REVSMA001-SMD-G
	Straight	Edge	Receptacle	0.031 in	Nickel	Standard	CON SMA003.031
							Reverse
				0.062 in		Standard	CON SMA003.062
							Reverse
	Straight	Edge, Bulkhead	Receptacle	0.031 in	Nickel	Standard	CON SMA006.031
							Reverse
				0.062 in		Standard	CON SMA006.062
		Reverse					CON REVSMA006.062
		Edge, Square Flange		Reverse		CON REVSMA006.062SQ	
	Straight	Edge	Plug	0.031 in	Nickel	Standard	CON SMA013.031
							Reverse
				0.062 in		Standard	CON SMA013.062
							Reverse
	Right Angle	Through-hole	Receptacle		Nickel	Standard	CON SMA002
					Gold		CON SMA002-G
					Nickel	Reverse	CON REVSMA002
					Gold		CON REVSMA002-G
	Right Angle	Surface-mount	Receptacle		Nickel	Standard	CON SMA002-SMD
					Gold		CON SMA002-SMD-G
					Nickel	Reverse	CON REVSMA002-SMD
					Gold		CON REVSMA002-SMD-G
	Right Angle	Edge	Receptacle	0.062 in	Nickel	Standard	CON SMA009.062
						Reverse	CON REVSMA009.062
	Right Angle, Extended	Through-hole, Bulkhead	Receptacle		Nickel	Standard	CON SMA002-L
						Reverse	CON REVSMA002-L
	Straight, Extended	Through-hole	Receptacle		Nickel	Standard	CON SMA008
						Reverse	CON REVSMA008
	Straight, Extended	Edge	Receptacle	0.031 in	Nickel	Standard	CON SMA003.031-L
						Reverse	CON REVSMA003.031-L
				0.062 in		Standard	CON SMA003.062-L
						Reverse	CON REVSMA003.062-L

Cable Termination SMA and RP-SMA Connectors

Connector Type	Orientation	Mount	Style	Cable Types	Body Finish	Polarity	Part Numbers
	Straight	Crimp End	Plug	RG-174, RG-188A, RG-316	Nickel	Standard	CON SMA007
						Reverse	CON REVSMA007
	Straight	Crimp End	Plug	RG-58/58A/58C, RG-141A	Nickel	Standard	CON SMA007-R58
						Reverse	CON REVSMA007-R58
	Straight	Crimp End	Plug	RG-178, RG-196	Nickel	Standard	CON SMA007-R178
						Reverse	CON REVSMA007-R178
	Right Angle	Crimp End	Plug	RG-174, RG-188A, RG-316	Nickel	Standard	CON SMA012
						Reverse	CON REVSMA012
	Right Angle	Crimp End	Plug	RG-58/58A/58C, RG-141A	Nickel	Standard	CON SMA012-R58
						Reverse	CON REVSMA012-R58
	Right Angle	Crimp End	Plug	RG-178, RG-196	Nickel	Standard	CON SMA012-R178
						Reverse	CON REVSMA012-R178
	Straight	Crimp End	Receptacle	RG-174, RG-188A, RG-316	Nickel	Standard	CON SMA011
						Reverse	CON REVSMA011
	Straight	Crimp End	Receptacle	RG-58/58A/58C, RG-141A	Nickel	Standard	CON SMA011-R58
						Reverse	CON REVSMA011-R58
	Straight	Crimp End	Receptacle	RG-178, RG-196	Nickel	Standard	CON SMA011-R178
						Reverse	CON REVSMA011-R178
	Straight	Crimp End, Bulkhead	Receptacle	RG-174, RG-188A, RG-316	Nickel	Standard	CON SMA005
						Reverse	CON REVSMA005
	Straight	Crimp End, Bulkhead	Receptacle	RG-58/58A/58C, RG-141A	Nickel	Standard	CON SMA005-R58
						Reverse	CON REVSMA005-R58
	Straight	Crimp End, Bulkhead	Receptacle	RG-178, RG-196	Nickel	Standard	CON SMA005-R178
						Reverse	CON REVSMA005-R178
	Straight	Crimp End, Bulkhead, Rear-Mount	Receptacle	RG-174, RG-188A, RG-316	Nickel	Standard	CON SMA014
						Reverse	CON REVSMA014
	Straight	Crimp End, Bulkhead, Rear-Mount	Receptacle	RG-58/58A/58C, RG-141A	Nickel	Standard	CON SMA014-R58
						Reverse	CON REVSMA014-R58
	Straight	Crimp End, Bulkhead, Rear-Mount	Receptacle	RG-178, RG-196	Nickel	Standard	CON SMA014-R178
						Reverse	CON REVSMA014-R178
	Straight	Crimp End, Bulkhead, Front-Mount	Receptacle	RG-174, RG-188A, RG-316	Nickel	Standard	CON SMA015
						Reverse	CON REVSMA015
	Straight	Crimp End, Bulkhead, Front-Mount	Receptacle	RG-178, RG-196	Nickel	Standard	CON SMA015-R178
						Reverse	CON REVSMA015-R178

SMA Connector General Specifications

Materials

Connector Part	Material	Finish
Bodies	Brass	Nickel or Gold
	Stainless Steel (Special Order)	Passivated or Gold
Center Contact	Male: Brass	Gold
	Female: Beryllium Copper	
Insulator	PTFE	N/A
Crimp Ferrule	Annealed Copper	Nickel or Gold

Electrical

Electrical Data	Detail
Impedance	50-ohm
Frequency Range	Flexible cable: 0-12.4GHz
	Semi-rigid cable: 0-18GHz
Insertion Loss	0.04dB max. √f GHz (straight)
	0.06dB max. √f GHz (right angle)
VSWR: f(GHz)	RG-178/U ST: 1.20+0.025f RA: 1.20+0.03f
	RG-174, 316/U ST: 1.15+0.02f RA: 1.15+0.03f
	RG-58, 141, 142, 223/U ST: 1.10+0.01f RA: 1.15+0.02f

MCX Connectors

MCX (micro coaxial) connectors are subminiature RF connectors that offer strong electrical performance in a smaller size, compared to SMAs and SMBs. The outer diameter of the plug is approximately 2.6 mm or 0.140 inch. Linx MCX connectors are available at 50-ohms and operate up to 6GHz at less than 0.2dB insertion loss. Their small size and snap-on connection is ideal for dense packaging such as those in consumer products, GPS and automotive application.

PCB Board Termination MCX and RP-MCX Connectors

Connector Type	Orientation	Mount	Style	Board Thickness	Body Finish	Polarity	Part Numbers
 MCX001	Straight	Through-hole	Receptacle		Gold	Standard	CONMCX001
 MCX001-SMD	Straight	Surface-mount	Receptacle		Gold	Standard	CONMCX001-SMD
						Reverse	CONREVMCX001-SMD
 MCX003	Straight	Edge	Receptacle	0.031 in 0.062 in	Gold	Standard	CONMCX003.031 CONMCX003.062
 MCX002	Right Angle	Through-hole	Receptacle		Gold	Standard	CONMCX002
 MCX002-SMD	Right Angle	Surface-mount	Receptacle		Gold	Standard	CONMCX002-SMD
						Reverse	CONREVMCX002-SMD
 MCX003-L	Straight, Extended	Edge	Receptacle	0.031 in 0.062 in	Gold	Standard	CONMCX003.031-L CONMCX003.062-L

Cable Termination MCX and RP-MCX Connectors

Connector Type	Orientation	Mount	Style	Cable Types	Body Finish	Polarity	Part Numbers
 MCX007	Straight	Crimp End	Plug	RG-174, RG-188A, RG-316	Gold	Standard	CONMCX007
						Reverse	CONREVMCX007
 MCX007-R178	Straight	Crimp End	Plug	RG-178, RG-196	Gold	Standard	CONMCX007-R178
 MCX012	Right Angle	Crimp End	Plug	RG-174, RG-188A, RG-316	Gold	Standard	CONMCX012
 MCX012-R178	Right Angle	Crimp End	Plug	RG-178, RG-196	Gold	Standard	CONMCX012-R178
 MCX011	Straight	Crimp End, Bulkhead	Receptacle	RG-174, RG-188A, RG-316	Gold	Standard	CONMCX011
						Reverse	CONREVMCX011
 MCX011-R178	Straight	Crimp End, Bulkhead	Receptacle	RG-178, RG-196	Gold	Standard	CONMCX011-R178
 MCX005	Straight	Crimp End, Bulkhead	Receptacle	RG-174, RG-188A, RG-316	Gold	Standard	CONMCX005
						Reverse	CONREVMCX005
 MCX005-R178	Straight	Crimp End, Bulkhead	Receptacle	RG-178, RG-196	Gold	Standard	CONMCX005-R178

MMCX Connectors

MMCX (micro-miniature coaxial) connectors are similar to the MCX but smaller and approximately one third lighter. MMCX connectors are matched to 50-ohms and operate up to 6GHz with less than 0.3dB insertion loss. The connectors have a snap locking mechanism which allows 360° rotation. Because of their small size, MMCX connectors are popular in consumer products, PCS devices and GPS applications.

PCB Board Termination MMCX Connectors

Connector Type	Orientation	Mount	Style	Body Finish	Polarity	Part Numbers
 MMCX001	Straight	Through-hole	Receptacle	Gold	Standard	CONMMCX001
 MMCX001-SMD	Straight	Surface-mount	Receptacle	Gold	Standard	CONMMCX001-SMD
 MMCX002	Right Angle	Through-hole	Receptacle	Gold	Standard	CONMMCX002
 MMCX002-SMD	Right Angle	Surface-mount	Receptacle	Gold	Standard	CONMMCX002-SMD

Cable Termination MMCX Connectors

Connector Type	Orientation	Mount	Style	Cable Types	Body Finish	Polarity	Part Numbers
 MMCX007	Straight	Crimp End	Plug	RG-174, RG-188A, RG-316	Gold	Standard	CONMMCX007
 MMCX007-R178	Straight	Crimp End	Plug	RG-178, RG-196	Gold	Standard	CONMMCX007-R178
 MMCX012	Right Angle	Crimp End	Plug	RG-174, RG-188A, RG-316	Gold	Standard	CONMMCX012
 MMCX012-R178	Right Angle	Crimp End	Plug	RG-178, RG-196	Gold	Standard	CONMMCX012-R178
 MMCX011	Straight	Crimp End	Receptacle	RG-174, RG-188A, RG-316	Nickel	Standard	CONMMCX011
 MMCX011-R178	Straight	Crimp End	Receptacle	RG-178, RG-196	Nickel	Standard	CONMMCX011-R178

MCX and MMCX Connector General Specifications

Materials

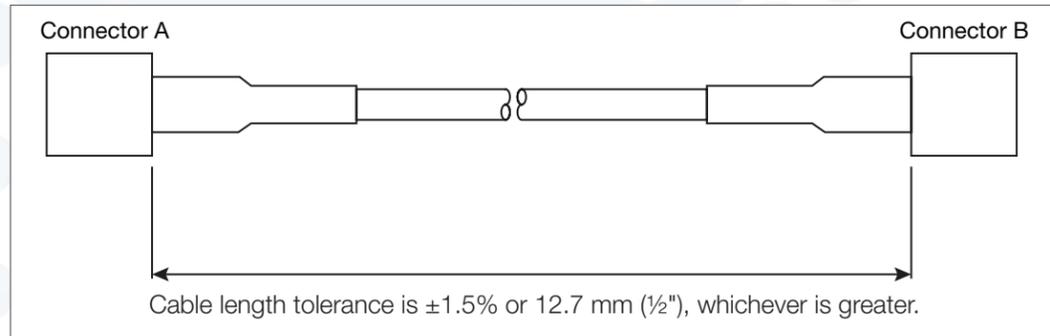
Connector Part	Material	Finish
Bodies	Brass	Nickel or Gold
Center Contact	Male: Brass	Gold
	Female: Beryllium Copper	
Insulator	PTFE	N/A
Crimp Ferrule	Annealed Copper	Nickel or Gold

Electrical

Electrical Data	Detail
Impedance	50-ohm
Frequency Range	0-6GHz
Insertion Loss (MCX)	0.1dB max. (straight)
	0.2dB max. (right angle)
Insertion Loss (MMCX)	0.2dB max. at 1GHz (straight)
	0.3dB max. at 1GHz (right angle)
MCX	
VSWR f(GHz)	RG-178/U ST: 1.17+0.04f RA: 1.07+0.06f
	RG-316/U ST: 1.13+0.04f RA: 1.07+0.04f
MMCX	
VSWR f(GHz)	ST: 1.3 max. RA: 1.5 max.

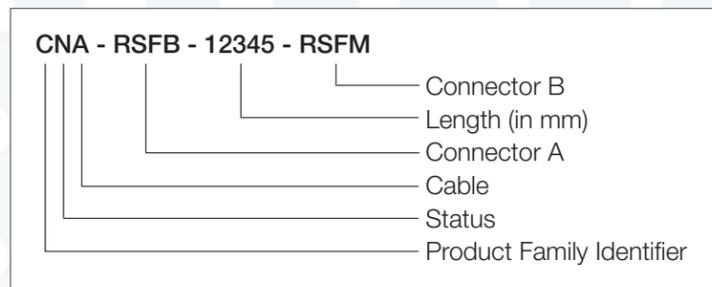
Cable Assembly Capabilities

Cable Length Tolerance



Cable Assembly Part Numbering System

Our part numbers are structured as follows:



Cable Codes and Specifications												
Cable Type Code	Description	Impedance	Attenuation (dB/100M)									
			100MHz	200MHz	400MHz	700MHz	900MHz	1GHz	1.8GHz	2.45GHz	5.2GHz	5.8GHz
A	RG-174	50Ω	27.6	41	62.3	88.6	101/8					
B	RG-178	50Ω	52.49		108.27			170.61				
C	RG-58	50Ω	14.8	22.3	32.8	45.9	52.8					
D	RG-58LL	50Ω		4.66	6.32	8.45	9.67	10.2				
E	RG-316	50Ω	36.09		68.9			124.68				
I	1.13mm	50Ω							2.2	2.6	3.9	4.3

Cable Status Codes	
Status Code	Description
C	Custom
S	Stock*
N	Non-stock

Connector Specifications			
Series	Impedance	Frequency Range	Insertion Loss
SMA & RP-SMA	50Ω	0-12.4GHz	0.04dB max
MCX & RP-MCX	50Ω	0-6GHz	
MMCX	50Ω	0-6GHz	

Connector Choices for Cable Assemblies

Connector Choices for Cable Assemblies							
Type	Style	Orientation	Finish	Polarity	Connector Code		
SMA	Plug	Straight	Nickel	Standard	SMAM		
				Reverse	RPSM		
			Gold	Standard	SGAM		
		Reverse		RGSM			
		Right Angle	Nickel	Standard	SAMR		
				Reverse	RSMR		
	Gold		Standard	SGMR			
		Reverse	RGMR				
	Receptacle	Straight	Nickel	Standard	SMAF		
				Reverse	RPSF		
			Gold	Standard	SGAF		
		Reverse		RGSF			
Receptacle, Rear-Mount, Bulkhead		Straight	Nickel	Standard	SAFB		
				Reverse	RSFB		
	Gold		Standard	SGFB			
Reverse		RGFB					
Receptacle, Rear-Mount, Sealed, Bulkhead	Straight	Nickel	Standard	SAFI			
			Reverse	RSFI			
		Gold	Standard	SGFI			
Reverse	RGFI						
Receptacle, Front-Mount, Sealed, Bulkhead	Straight	Nickel	Standard	SAFE			
			Reverse	RSFE			
		Gold	Standard	SGFE			
Reverse	RGFE						
MCX	Plug	Straight	Gold	Standard	MCXM		
				Reverse	RPXM		
	Right Angle	Gold	Standard	MXMR			
			Reverse	FXMR			
	Receptacle	Straight	Gold	Standard	MCXF		
				Reverse	RPXF		
Receptacle, Rear-Mount, Bulkhead	Straight	Gold	Standard	MXFB			
			Reverse	FXFB			
MMCX	Plug	Straight	Gold	Standard	MMXM		
		Right Angle	Gold	Standard	MMMR		
	Receptacle	Straight	Gold	Standard	MMXF		
				Standard	MMFB		
MHF / U.FL	Plug	Right Angle	Gold	Standard	UFFR		
Straight Cut	N/A	N/A	N/A	N/A	STCT		
Strip & Tin	N/A	N/A	N/A	N/A	STTN		

Note: Illustrations are not representative of the final product



Cable Customization Capabilities

Properly stripping a coaxial cable and attaching it to the connector requires special fixtures and experience. Unlike digital cables, a small deviation from the ideal attachment may yield key parameters that are out of specification. Prudent customers often buy pre-built cables from Linx to benefit from Linx's quality systems, fixtures and RF expertise. In-house cable finishing allows Linx to quickly deliver a variety of cable lengths and connector combinations.

Linx Technologies Headquarters

Linx corporate headquarters are located in a beautiful custom-built facility in Merlin, Oregon, which is in the Rogue Valley near Grants Pass and the Rogue River.



Linx Technologies is continually striving to improve the quality and function of its products. For this reason, we reserve the right to make changes to our products without notice. The information contained in this Data Guide is believed to be accurate as of the time of publication. Specifications are based on representative lot samples. Values may vary from lot-to-lot and are not guaranteed. "Typical" parameters can and do vary over lots and application. Linx Technologies makes no guarantee, warranty, or representation regarding the suitability of any product for use in any specific application. It is Customer's responsibility to verify the suitability of the part for the intended application. At Customer's request, Linx Technologies may provide advice and assistance in designing systems and remote control devices that employ Linx Technologies RF products, but responsibility for the ultimate design and use of any such systems and devices remains entirely with Customer and/or user of the RF products.

Some customers may want Linx radio frequency ("RF") products to control machinery or devices remotely, including machinery or devices that can cause death, bodily injuries, and/or property damage if improperly or inadvertently triggered, particularly in industrial settings or other applications implicating life-safety concerns ("Life and Property Safety Situations").

NO OEM LINX REMOTE CONTROL OR FUNCTION MODULE SHOULD EVER BE USED IN LIFE AND PROPERTY SAFETY SITUATIONS. No OEM Linx Remote Control or Function Module should be modified for Life and Property Safety Situations. Such modification cannot provide sufficient safety and will void the product's regulatory certification and warranty.

Customers may use our (non-Function) Modules, Antenna and Connectors as part of other systems in Life Safety Situations, but only with necessary and industry appropriate redundancies and in compliance with applicable safety standards, including without limitation, ANSI and NFPA standards. It is solely the responsibility of any Linx customer who uses one or more of these products to incorporate appropriate redundancies and safety standards for the Life and Property Safety Situation application.

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