



SOLUTION GUIDE

RF Connectors, Cables and Passive Components for Test and Measurement

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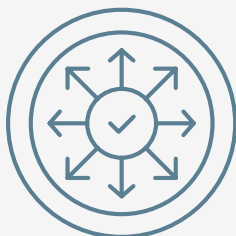
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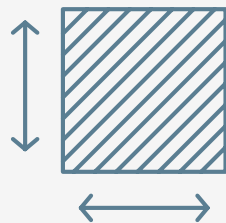
CONNECTIVITY SOLUTIONS FOR RF TESTING INNOVATION

The RF testing landscape is evolving rapidly as 5G/6G and radar technologies push frequencies to 110 GHz and beyond. In these advanced setups, connectors function as vital measurement elements. Engineers face the challenge of balancing measurement accuracy with physical durability. They also navigate signal complexity and setup sensitivity to maintain lab-to-production correlation. Exceptional phase stability and high mating cycle durability stand out as top priorities for these testing environments.

WHAT IS DRIVING RF TESTING INNOVATION?



5G/6G and mmWave Expansion

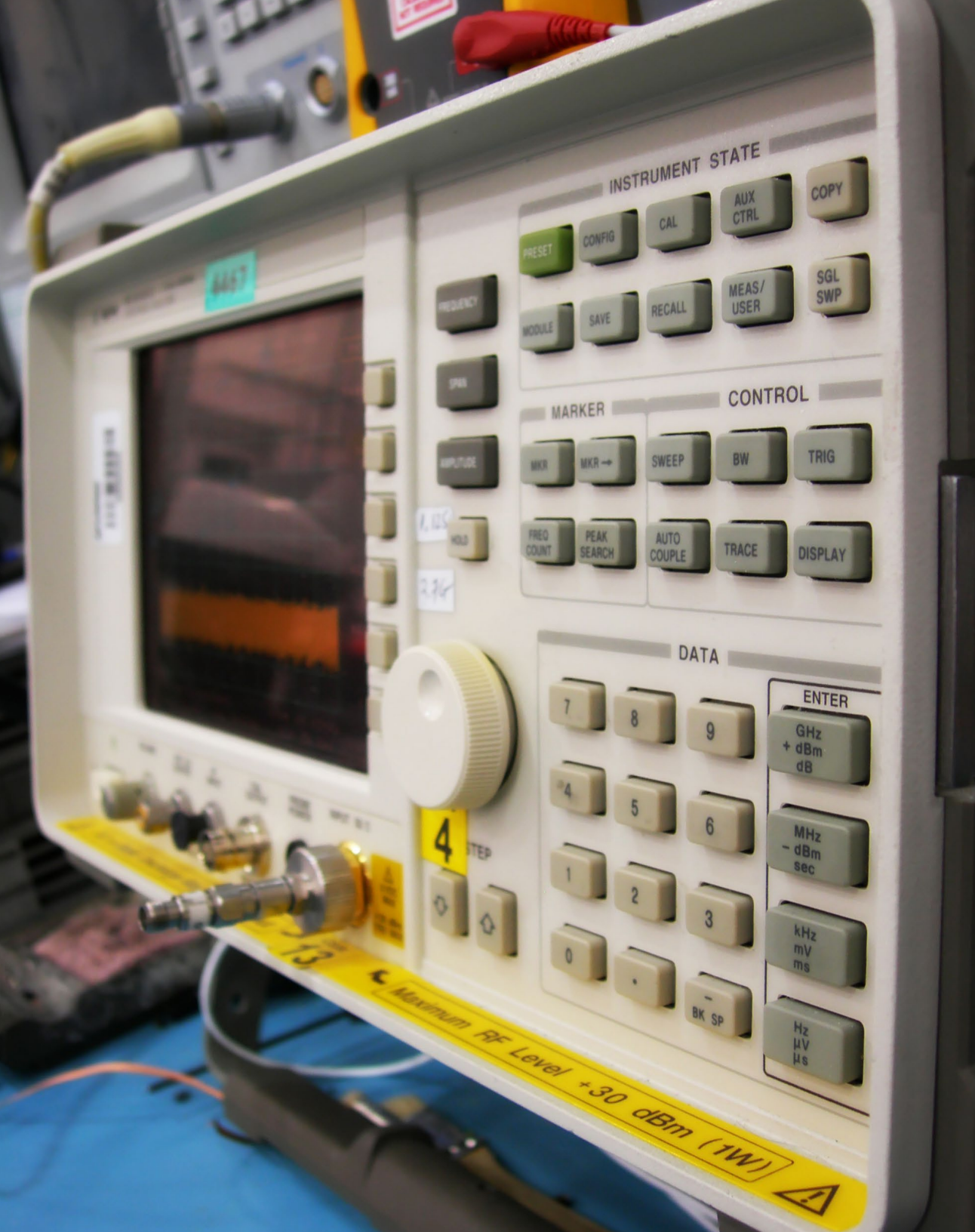


Measurement Accuracy Demands



Physical Durability and Harsh Environments





MEETING CHANGING TESTING REQUIREMENTS

Interconnects are the catalyst for RF testing innovation, enabling modern systems to function reliably. Engineers expect solutions that offer exceptional phase stability and withstand high mating cycles. These components also need to adapt to dense multi-port configurations without degrading signal integrity. As testing environments grow more complex, the ability to implement modular interconnect architectures becomes a distinct competitive advantage.

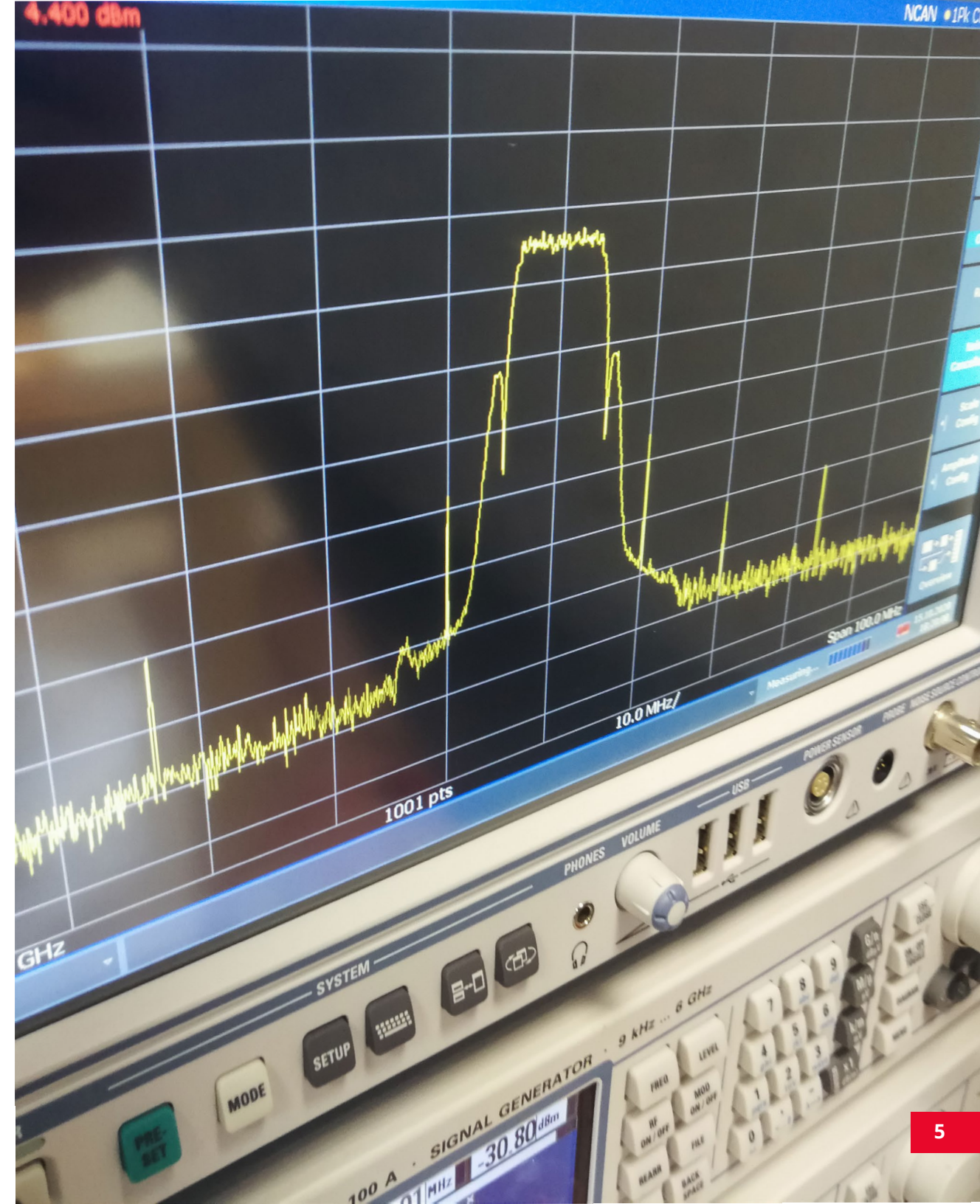
Molex supplies engineers with a comprehensive portfolio of RF connectors for test and measurement that addresses these high-frequency demands. The Molex portfolio of advanced RF connectors and test cables delivers the high-frequency performance required for modern testing environments. From highly accurate precision connectors for lab validation to ruggedized assemblies for automated manufacturing, Molex provides the mechanical flexibility and electrical stability required to advance the next generation of RF testing.

CHALLENGES AND OPPORTUNITIES IN RF TEST AND MEASUREMENT

Today's RF testing landscape is rapidly evolving as the industry embraces higher frequencies and wider bandwidths. The shift toward automated testing and harsh field environments introduces new design challenges. Engineering teams face the dilemma of balancing advanced testing functionality with tighter accuracy targets and greater reliability demands.

HIGH-FREQUENCY SIGNAL DEGRADATION

Frequencies moving into millimeter wave (mmWave) expose the limits of legacy connectors, where interfaces begin to bottleneck overall test capabilities. Small connector imperfections introduce insertion loss and return loss variability, while also causing phase distortion. At higher frequencies and bandwidths, connector variations directly compromise phase stability and overall system margin.



MEASUREMENT INSTABILITY AND TRANSITIONS

Inconsistent mating and transition errors mimic false device-under-test (DUT) behavior and consume significant debug time. Engineers spend valuable resources determining whether performance issues stem from the device itself or from a connector mismatch. Accurate calibration relies on moving the reference plane directly to the connector to isolate interconnect effects.

PHYSICAL WEAR AND ENVIRONMENTAL STRESS

High cycle counts in automated testing degrade connector performance. This turns durability into a test-system reliability issue rather than just a mechanical concern. Harsh field environments expose equipment to thermal cycling, vibration, moisture and mechanical strain. These factors accelerate interconnect degradation and cause costly downtime.



HARDWARE OBSOLESCENCE AND COMPLEX SETUPS

Evolving standards and dense multi-port configurations create lab-to-production correlation issues. Unrecognized connector variations can cause these data discrepancies. Different connector types are often used across design validation labs and manufacturing test fixtures. This split creates measurement offsets and disagreements between lab and factory data. Inflexible setups force costly rework of established test fixtures and interconnect layouts.

The combination of higher frequencies and complex multi-port setups creates a demanding environment for RF design. Success relies heavily on selecting the right RF connectors for test and measurement.



DESIRED CAPABILITIES IN RF CONNECTORS AND CABLES FOR TEST AND MEASUREMENT

As RF testing systems grow more advanced, expectations rise for the connectors that support them. These systems require components that meet high-frequency data needs while reflecting evolving design priorities, from exceptional signal integrity to modular architectures. Connector systems balance performance with practicality, offering secure and repeatable solutions that align with long-term testing goals.

EXCEPTIONAL SIGNAL INTEGRITY

Managing connectors as performance-critical components helps preserve phase stability and reduce high-frequency loss. Precision RF connectors and adapters feature tight mechanical tolerances that stabilize the measurement path. This consistency allows engineers to confidently move the reference plane directly to the connector and isolate interconnect effects.

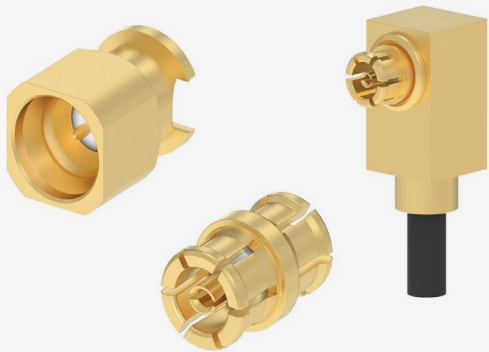


FEATURED PRODUCTS

HIGH-ACCURACY RF CONNECTORS



Precision High-Frequency
RF Connectors and Adapters



SMA and SMP/SMPM/SMPs Connectors

DESIGN FOR REPEATABILITY AND DURABILITY

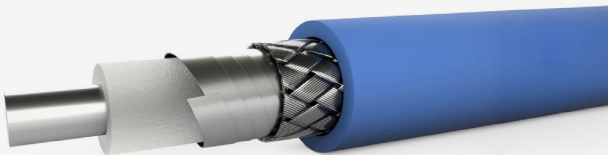
Precision interfaces minimize torque sensitivity and operator variability. Robust mating mechanics preserve consistent electrical performance despite high cycle counts and physical stress.

FEATURED PRODUCTS

PHASE-STABLE TEST CABLES



Cardinal Test Cables



Temp-Flex Cables



MODULAR AND SCALABLE ARCHITECTURES

Configurable multi-port-ready interconnects adapt to changing test requirements like 5G/6G and mmWave without rebuilding the entire setup. Solutions like Cardinal Multi-Port Test Cables streamline dense configurations and eliminate the transition errors that often mimic false device behavior.

PROACTIVE LIFECYCLE MANAGEMENT

Separating highly accurate lab interfaces from ruggedized production interfaces protects hardware. Standardizing connector choices across design validation, production and field test teams improves consistency. This unified approach eliminates the measurement offsets and data discrepancies that frequently occur between the lab and the manufacturing floor.

FEATURED PRODUCTS

PRECISION CONNECTORS AND COMPONENTS



Cardinal Multi-Port
Test Cables



Coaxial Adapters



Coaxial Attenuators



Coaxial Terminations





RF TESTING INNOVATION ACROSS APPLICATIONS

From validation labs to production lines and field environments, dependable signal integrity is essential for confident measurements. Molex RF connectors and test-cable solutions help maintain accuracy while supporting the bandwidth, durability and environmental resilience needed for evolving applications.

LAB VALIDATION AND CHARACTERIZATION

High-precision connectors and Cardinal Test Cables optimize bandwidth and DUT-adjacent calibration. High-frequency capabilities enable chipset validation and next-generation protocol testing.

HIGH-VOLUME MANUFACTURING AND AUTOMATION

Ruggedized interfaces and highly repeatable assemblies extend cycle life and throughput. These components bridge the gap between lab accuracy and production ruggedness to improve data correlation.

FIELD TESTING AND HARSH ENVIRONMENTS

Armored cables and connectors support outdoor 5G base stations, aerospace equipment, satellite communications (SATCOM) installations and radar systems. High-performance materials withstand extreme temperatures, vibration, moisture and mechanical wear.

MOLEX RF SOLUTIONS FOR HIGH-FREQUENCY CONNECTIVITY

Molex offers an extensive portfolio of connectors and test cables engineered to address the diverse demands of modern RF test and measurement systems. These components prioritize signal integrity and phase stability to meet today’s stringent industry standards. Molex precision RF connectors for test and measurement provide the mechanical flexibility required to prepare for the scalable testing environments of tomorrow.

	Frequency Range	VSWR	Return Loss	Velocity of Propagation	Coaxial Connector	PCP Mount Orientation	Port Configuration	Pitch	Cable Style
Cardinal Multi-Port High-Frequency RF Test Cables									
	DC to 67 GHz	1.6:1	-13 dB	70%	1.85mm	Vertical, right-angle or edge-mount	Single-row 1x4 or 1x8 Dual-row 2x8	2.54mm (0.10")	1.53mm-diameter PTFE coaxial
	DC to 110 GHz	2.0:1	-10 dB	76%	1.0mm	Vertical or right-angle			1.81mm-diameter PTFE coaxial
	DC to 145 GHz		-10 dB	70%	0.8mm				1.30mm-diameter PTFE coaxial

	Frequency Range	Typical VSWR	Dielectric Withstanding Voltage	Voltage Rating	Coaxial Connector	Connector Styles	Cable Styles	Cable Lengths	Cable Outer Diameter
Cardinal Flex Cable Assemblies									
	DC to 18 GHz	1.3:1	1,000V DC	500V RMS	SMA, N	SMA plug, N plug or jack	Flexible phase-stable MX204	12, 24, 36" Custom lengths: minimum 6", no maximum length	1.81 to 3.60mm
	DC to 26.5 GHz	1.3:1	1,000V DC	500V RMS	3.5mm	Plug or jack	Flexible phase-stable MX204		
	DC to 40 GHz	1.3:1	350V DC	500V RMS	2.92mm	Plug or jack	Flexible phase-stable MX204		
	DC to 50 GHz	1.3:1	350V DC	500V RMS	2.4mm	Plug or jack	Flexible phase-stable MX204		
	DC to 67 GHz	1.3:1	350V DC	500V RMS	1.85mm	Plug or jack	Flexible phase-stable MX205		
	18 to 110 GHz	<1.4:1 up to 110 GHz (dependent upon connector selection)	600V DC	500V RMS	1.0mm	Plug or jack	Flexible phase-stable MX601		
Cardinal Test Cable Assemblies									
	DC to 18 GHz	1.3:1	1,000V DC	500V RMS	SMA, N	SMA plug, N plug or jack	Armored MXR100	12, 24, 36" Custom lengths: minimum 6", no maximum length	6.40mm
	DC to 26.5 GHz	1.3:1	1000V DC	500V RMS	3.5mm	Plug or jack			
	DC to 40 GHz	1.3:1	350V DC	500V RMS	2.92mm	Plug or jack			
	DC to 50 GHz	1.3:1	350V DC	500V RMS	2.4mm	Plug or jack	Armored MXR200		
	DC to 67 GHz	1.3:1	350V DC	500V RMS	1.85mm	Plug or jack	Armored MXR300		
	18 to 110 GHz	<1.4:1 up to 110 GHz (connector dependent)	600V DC	500V RMS	1.0mm	Plug or jack	Armored MXR110		

	Frequency Range	Typical VSWR	Dielectric Withstanding Voltage	Voltage Rating	Coaxial Connector	Connector Styles	Cable Styles	Cable Lengths	Cable Bending Radius
Cardinal Wave Cable Assemblies									
	DC to 40 GHz	≤1.3:1	750V DC	335V RMS	2.92mm	Plug or jack	Flexible phase-stable .047/.086 cable	6, 12, 24, 36"	.047" Cables: Bending radius static (min.): .23" (6.00mm) Bending radius dynamic (min.): .59" (15.00mm) .086" Cables: Bending radius static (min.): .55" (14.00mm) Bending radius dynamic (min.): 1.10" (28.00mm)
	DC to 50 GHz	≤1.35:1	500V DC	250V RMS	2.4mm				
	DC to 67 GHz	≤1.35:1			1.85mm				

	Frequency Range	VSWR (max.)	Return Loss	Data Characterization Rates	Connector	PCB Mount Orientation	PCB Architecture	Attachment	Impedance
High-Frequency RF Connectors and Adapters									
	DC to 115 GHz	1.4:1	≥-15.56 dB	Up to 448Gbps	1.0mm	End launch, vertical launch jacks	Microstrip or stripline	Mechanical (screw) with compression mount or soldered contact	50 Ohms
	DC to 70 GHz	1.35:1	≥-15 dB	Up to 224Gbps	1.85mm				
	DC to 50 GHz	1.2:1	≥-20 dB	Up to 112Gbps	2.4mm				
	DC to 40 GHz	1.15:1	≥-20 dB	Up to 112Gbps	2.92mm				

	Frequency Range	VSWR	Input Power	Attenuation Accuracy	Coaxial Connector	Configuration	Connector Length
RF Fixed Coaxial Attenuators							
	DC to 50 GHz	1.75:1	0.5W at +25°C 0.1W at +125°C Derated linearity to 0.1W at +85°C	3, 6 and 10 dB: ±1.5 dB 20 and 30 dB: ±2.0 dB	2.4mm	Male/female, mates with 1.85mm and 2.4mm	1.12" ±.05" (28.40 ±1.30mm)
	DC to 50 GHz	1.75:1	2W at +25°C Derated linearity to 0.75W at +55°C	3, 6 and 10 dB: ±1.5 dB 20 and 30 dB: ±2.0 dB	1.85mm	Male/female, mates with 1.85mm and 2.4mm	1.12" ±.05" (28.40 ±1.30mm)
	DC to 40 GHz	1.40:1	0.5W at +25°C Derated linearity to 0.1W at +125°C	3 and 6 dB: ±0.8 dB 10, 20 and 30 dB: ±1.0 dB	2.92mm	Male/female, mates with SMA and 3.5mm	.88" ±.05" (22.40 ±1.30mm)
	DC to 18 GHz	1.35:1 (max.)	2W at +25°C Derated linearity to 0.5W at +125°C Peak power: 250W (max.)	1 to 6 dB: ±0.3 dB 7 to 20 dB: ±0.5 dB 30 dB: ±0.75 dB	N-type	Male/female, mates with MIL-STD-348	1.76" ±.03" (44.70 ±0.80mm)
	DC to 18 GHz	1.35:1 (max.)	2W at +25°C with derated linearity to 0.5W at +125°C 5W at +25°C with derated linearity to 1W at +125°C Peak power: 250W (max.)	0 to 6 dB: ±0.3 dB 7 to 20 dB: ±0.5 dB 21 to 30 dB: ±0.75 dB 31 to 40 dB: ±1.5 dB	SMA	Male/female, mates with SMA and 3.5mm	0 to 12 dB: .86" ±.03" (21.80 ±0.80mm) 13 to 30 dB: .99" ±.03" (25.80 ±0.80mm) 31 to 40 dB: 1.20" ±.05" (30.50 ±1.30mm)"

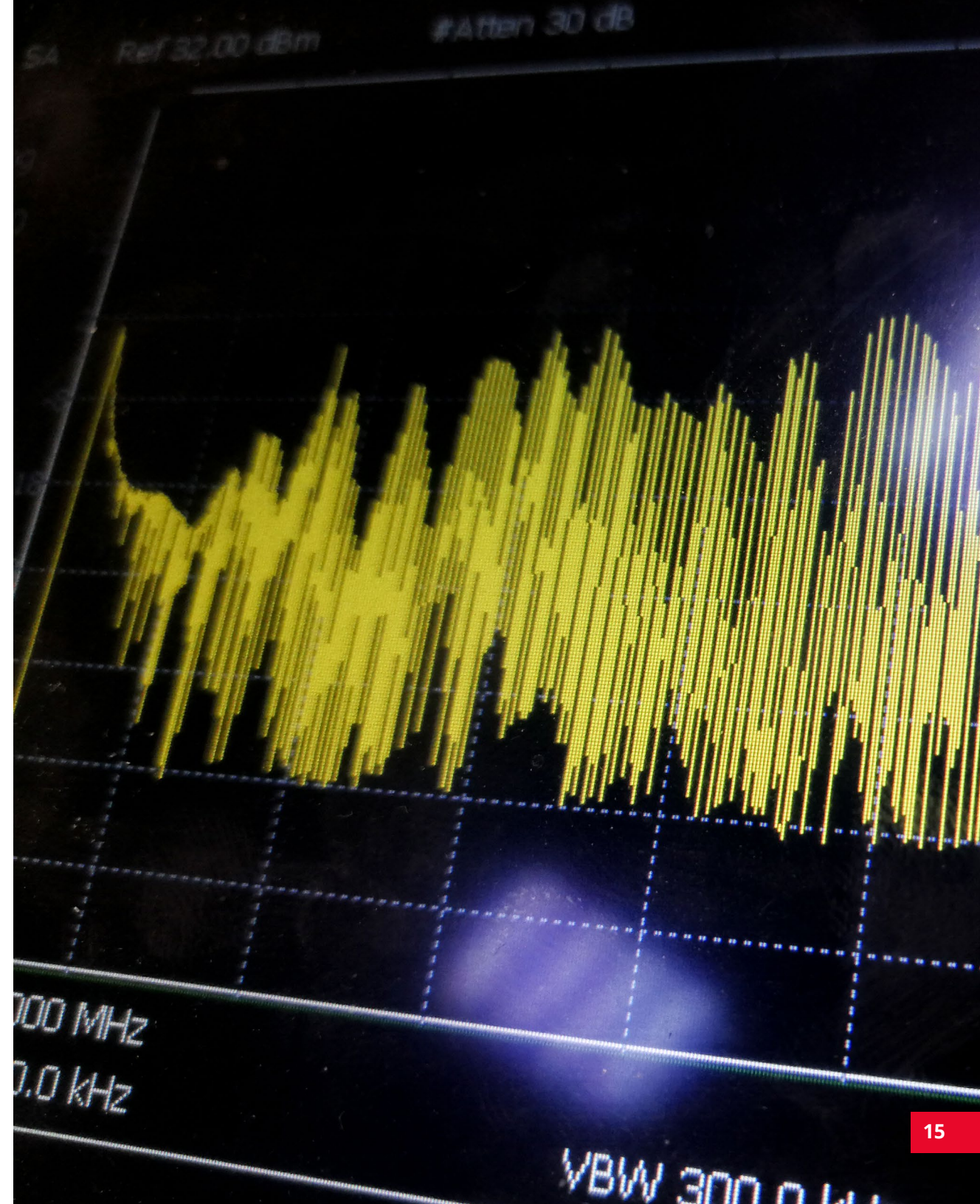
Frequency Range		VSWR	Input Power	Coaxial Connector	Configuration	Connector Length	Bead Chain	Physical
RF Fixed Coaxial Terminations								
	DC to 50 GHz	DC to 40 GHz: 1.40:1 DC to 50 GHz: 1.60:1	0.5W at +25°C Derated linearity to 0.1W at +125°C	2.4mm	Mates with 2.4mm and 1.85mm	Male: .76" ±.05" (19.3 ±1.30mm) Female: .79" ±.05" (20.1 ±1.30mm)	Length: 3.5" (89.00mm) Diameter: .13" (3.30mm)	Housing: gold-plated beryllium copper Conductor: gold-plated beryllium copper Barrel and coupling nut: passivated stainless steel
	DC to 65 GHz	DC to 10GHz: 1.20:1 10 to 30 GHz: 1.40:1 30 to 65 GHz: 1.55:1	1W at +25°C Derated linearity to 0.1W at +125°C	1.85mm	Mates with 2.4mm and 1.85mm	Male: .70" ± .05" (179.89 ±1.30mm) Female: .80" ± .05" (20.27 ±1.30mm)	-	Housing: passivated stainless steel Conductor: gold-plated beryllium copper Barrel and coupling nut: passivated stainless steel
	DC to 40 GHz	1.20:1	1W at +25°C Derated linearity to 0W at +125°C	2.92mm (SMK)	Mates with SMA, K and 3.50mm	Male: .58" ±.05" (14.7 ±1.30mm) Female: .62" ±.05" (15.7 ±1.30mm)	Length: 3.5" (89.00mm) Diameter: .13" (3.30mm) Diameter: .28" (7.10mm)	Housing: passivated stainless steel Conductor: gold-plated beryllium copper Bead chain: passivated stainless steel
	DC to 18 GHz	DC to 4 GHz: 1.10:1 4 to 8 GHz: 1.15:1 8 to 12.4 GHz: 1.20:1 12.4 to 18 GHz: 1.25:1	2W at +25°C Derated linearity to 1W at +125°C	N-type	Mates with MIL-STD-348	Male: 1.17" ±.05" (29.7 ±1.30mm) Female: 1.26" ±.05" (32.0 ±1.30mm)	Length: 3.5" (89.00mm) Diameter: .13" (3.30mm) Diameter: .56" (14.20mm)	
	DC to 26.5 GHz	DC to 4 GHz: 1.05:1 4 to 8 GHz: 1.10:1 8 to 12.4 GHz: 1.15:1 12.4 to 18 GHz: 1.20:1 18 to 26.5 GHz: 1.35:1	1W at +25°C Derated linearity to 0W at +125°C	SMA	Mates with MIL-STD-348	Male: .42" ±.05" (10.7 ±1.30mm) Female: .54" ±.05" (13.7 ±1.30mm)	-	Housing: passivated stainless steel Conductor: gold-plated beryllium copper or brass Bead chain: passivated stainless steel

ADVANCING THE NEXT GENERATION OF SMARTER, MORE ACCURATE RF TESTING

Moving into the mmWave spectrum forces engineering teams to rethink interconnect strategies. Maintaining signal integrity, scaling multi-port setups and bridging the data gap between lab validation and high-volume manufacturing remain top priorities. The Molex portfolio addresses these demands through high-accuracy RF connectors and phase-stable Cardinal cables. These components work alongside modular interconnects to reduce measurement uncertainty and prevent costly test downtime.

Engineering teams trust Molex at 110 GHz and beyond because of vertically integrated manufacturing and precision cable engineering. Innovations like Temp-Flex technology combine physical flexibility with exceptional phase stability to eliminate measurement uncertainty. Treating these interconnects as performance-critical RF components empowers engineers to accelerate development cycles. This proactive approach turns overlooked measurement variables into a distinct competitive advantage.

Explore the full portfolio of [RF Test and Measurement solutions](#).





creating connections for life

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