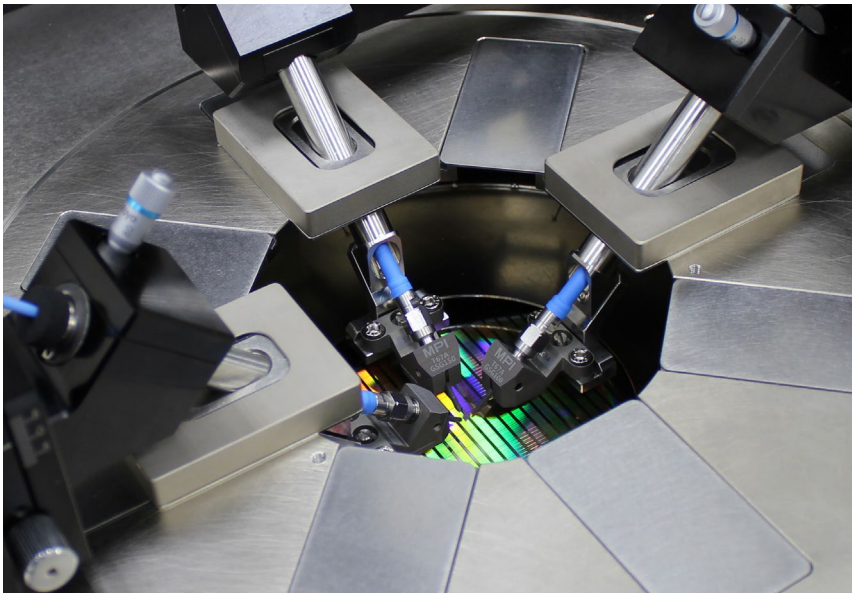
MPI Cable Selection Guide

MPI engineers focus to provide on optimal cable solutions taking into account a number of requirements specific for wafer-level measurement systems: optimal cable length, cable weight, magnitude, phase, and temperature stability, design, precision, and manufacturing quality of RF connectors, and the lifetime.

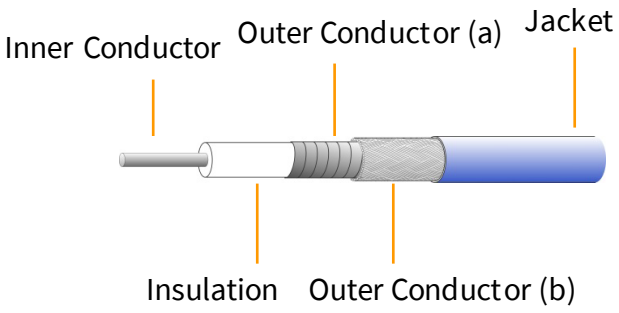
As a result, MPI can offer two series of RF cables — the high-end MMC and the standard MRC — covering the entire frequency range starting from 18 GHz. This allows engineers to choose the optimal system configuration in dependence of the required measurement accuracy and budget restrictions. Both cable series are design for use at any MPI system platform, from simple manual TS50 prober and up to advanced automated systems with ShieldEnvironment™ and support testing from -60 °C to +125 °C.

Feature	Benefit
Standard length of 80 cm and 120 cm	• Best integration of test instruments with both manual and automated system platforms • Minimal insertion loss • Maximal convenience of operation
Special design of the male connector of both MMC- and MRC-series	• EMI-, light-tight and ice-free RF measurements on MPI ShieldEnvironment™ systems • Simple and convenient installation of RF probes on the probe arm • Minimal weight-load of the RF probe arm • Stable and consistent RF contact
Multi-step armouring of the connector-cable interface	• Optimal heatsink, cable weight and diameter combination • Extended cable lifetime • Easy integration with the RF probe arm
Optimized cable diameter	• Minimal weight-load of the RF probe • Maximal stability of the RF contact • Integration with ShieldEnvironment™ • Shortest thermal equilibrium time
Excellent magnitude, phase and temperature stability	• Longest time of a valid system calibration
High-end RF connectors of MMC-series	• Best calibration and measurement results • Longest lifetime of the cable assembly

High-End MMC-Series

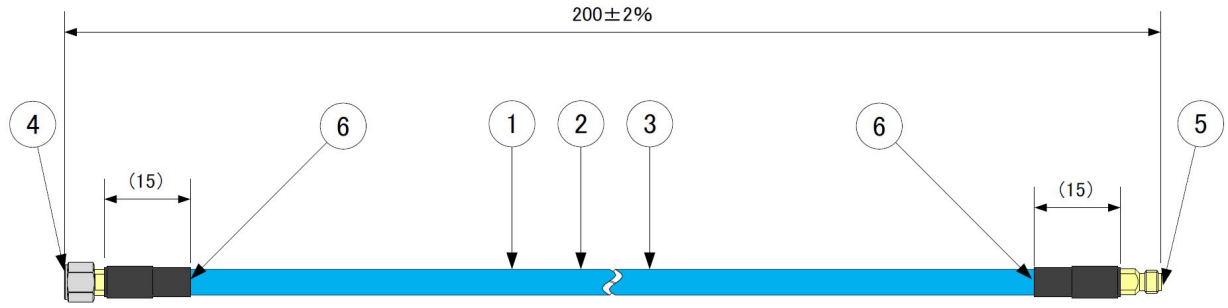


Cable Structure



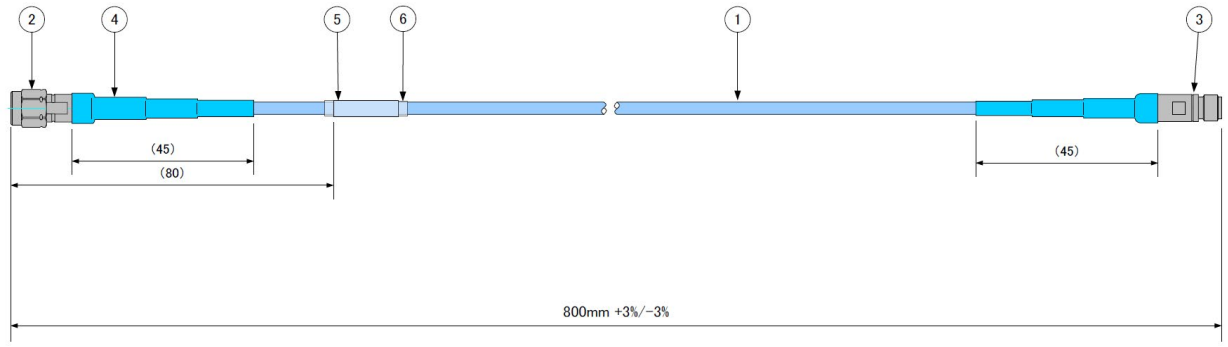
Inner conductor	Solid silver plated copper
Insulator	Porous PTFE
Outer conductor (a)	Silver plated copper tape
Outer conductor (b)	Silver plated copper braid
Jacket	FEP

	Inner conductor		Dielectric	Outer conductor	Jacket	
Part Number	Material	Composition, mm	Material	Material	Material	Diameter, mm
MMC – 110A	SPC	1 / 0.287	Porous PTFE	Silvered Cu Tape and Silvered Cu Braid	FEP (Blue)	1.7
MMC – 67V MMC – 50Q	SPC	1 / 0.51	Porous PTFE	Silvered Cu Tape and Silvered Cu Braid	FEP (Blue)	2.7
MMC – 40K	SPC	1 / 0.70	Porous PTFE	Silvered Cu Tape and Silvered Cu Braid	FEP (Blue)	3.3



MMC – 110A – MF – 200

1	Coaxial cable
2	1st armor (Special Structure)
3	2nd armor (Special Structure)
4	1.0 mm male connector
5	1.0 mm female connector
6	Heat-shrinking and armoring tube

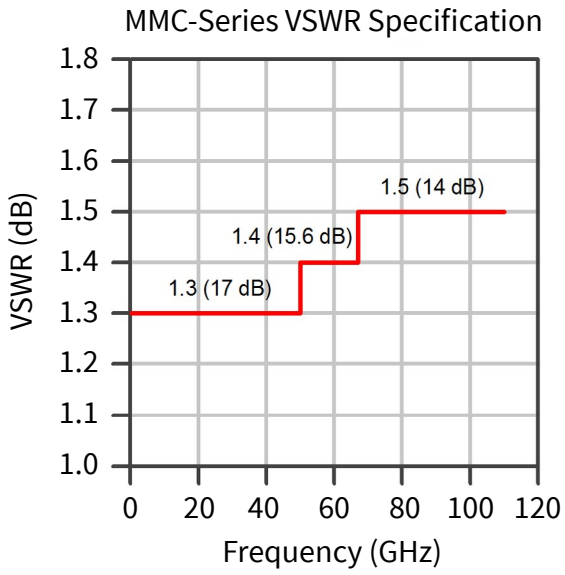


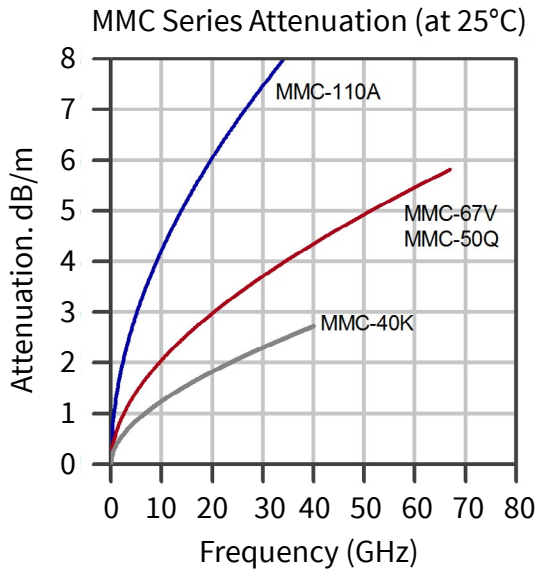
MMC – 67V / 50Q / 40K – MF – 800

1	Coaxial cable
2	1.85 mm / 2.4 mm / 2.92 mm female connector
3	1.85 mm / 2.4 mm / 2.92 mm male connector
4	Heat-shrinking and armoring tube
5	Label

Electrical Specification

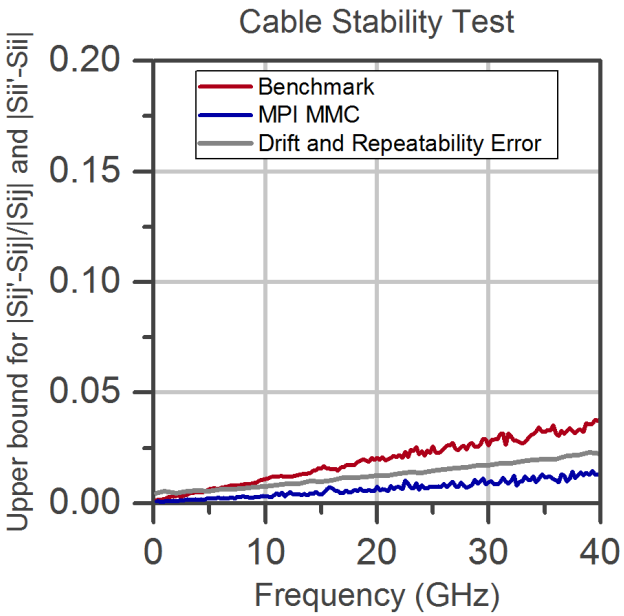
Part Number	MMC-40K-MF-xxxx	MMC-50Q-MF-xxxx	MMC-67V-MF-xxxx	MMC-110A-MF-xxxx
Frequency, GHz	40	50	67	110
Moding frequency, GHz	52	75	75	134
Connector type	2.92	2.40	1.85	1.00
Length, cm	80/120	80/120	80/120	12.5/20/25
Characteristic impedance, Ω	50			
Return loss, dB	≥ 17	≥ 17	≥ 15.6	≥ 14
Insertion loss, dB	≤ 2.58/3.84	≤ 4.16/5.97	≤ 4.66/6.89	≤ 2.41/3.91/4.23
VSWR	≤ 1.3	≤ 1.3	≤ 1.4	≤ 1.5
Nominal capacitance, pF/m	85			
Nominal transmission delay time, ns/m	4.3			
Temperature range, °C	from -65 to +125			
Min bending radius, mm	≥ 20	≥ 15	≥ 15	≥ 10





MMC-Series Stability Test Results on a Probe System

Magnitude and phase stability are key quality criteria of RF cables. Together with the instrument drift, they define lifetime of the system calibration and therefore, the length of the RF calibration cycle, - the period between two system calibrations. Low-quality cables are sensitive to mechanical stress, like accidental hit by system operator that can happen when modifying settings of measured parameters on the instrument front panel. Such accidental stress of MMC cable was simulated on the wafer-level RF measurement system from MPI and its impact on the measurement error of all S-parameters was calculated using NIST calibration comparison method. Reference experiment was contacted on the same system setup for the high-end industry reference RF cables. The results proved that excellent phase and magnitude stability of the MMC-series RF cables from MPI.



Connectors of MMC-Series Cables

Quality of connectors is another distinguishing feature of MMC-series of RF cables. Extremely precise manufactured, with exceptional surface quality and special coating, connectors of MMC-series guarantee outstanding electrical characteristics and long lifetime of the entire cable assembly.

40 GHz K (2.92 mm), Male MMC connector

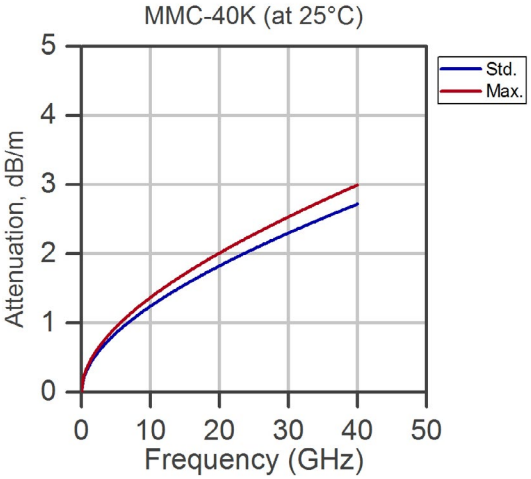
50 GHz Q (2.4 mm), Male MMC connector

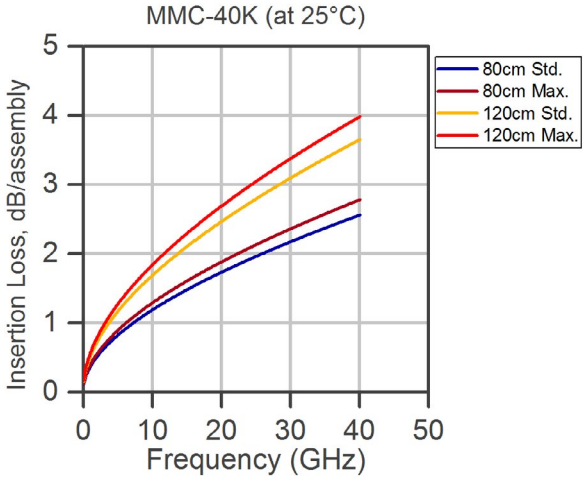
67 GHz V (1.85 mm), Male MMC connector

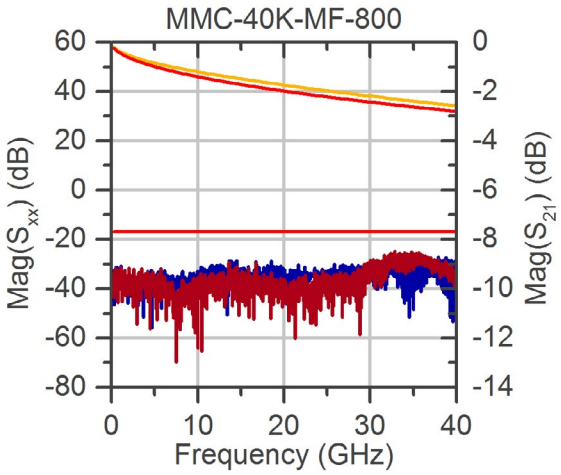
110 GHz A (1.0 mm), Male MMC connector

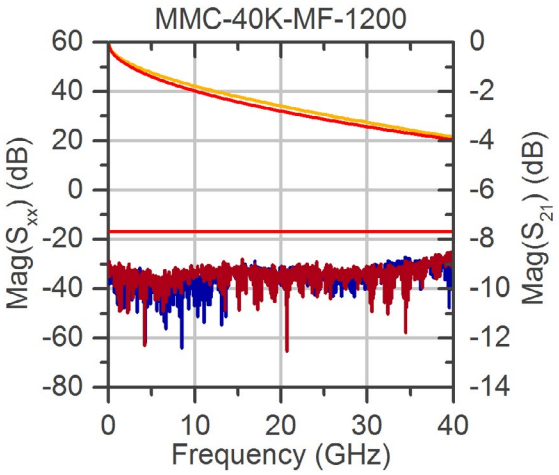
MMC-Series characteristics, 40 GHz

- MMC – 40K– MF – 800
- MMC – 40K– MF – 1200



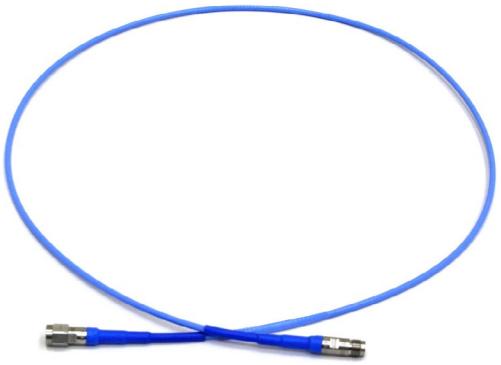


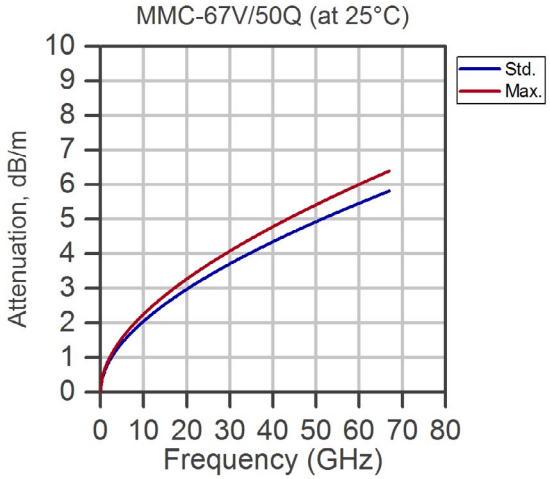


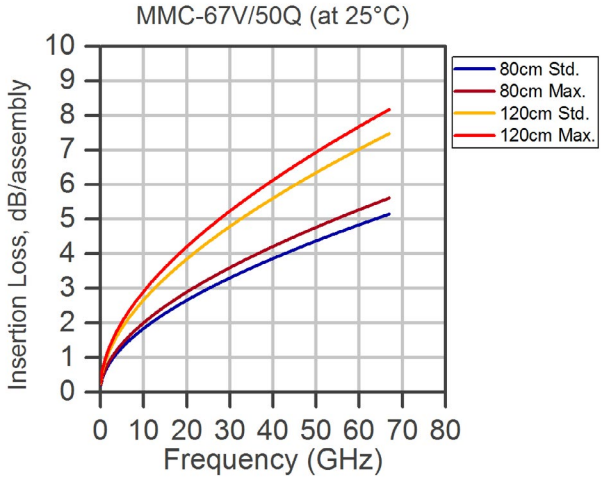


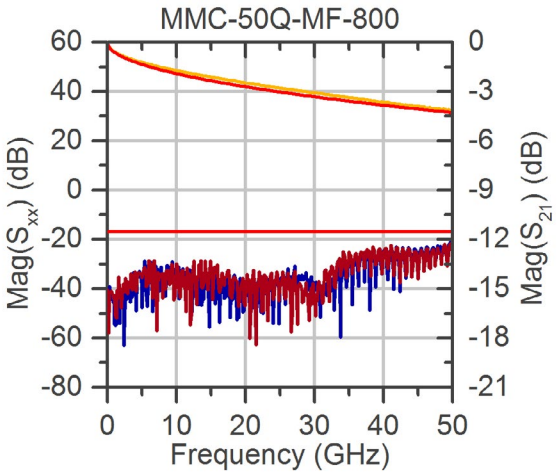
MMC-Series characteristics, 50 GHz

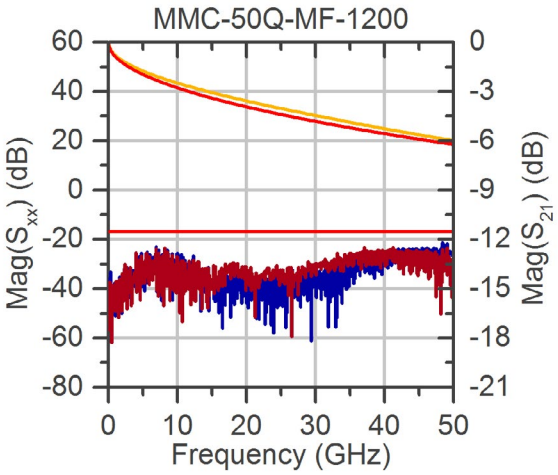
- MMC – 50Q– MF – 800
- MMC – 50Q– MF – 1200





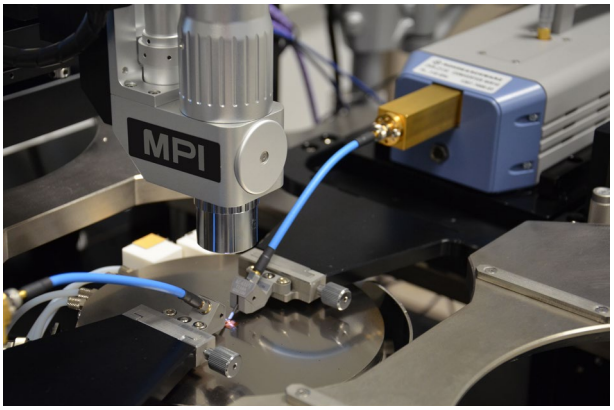


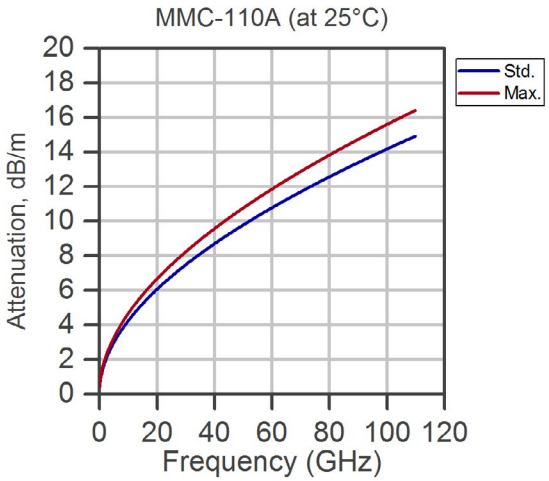


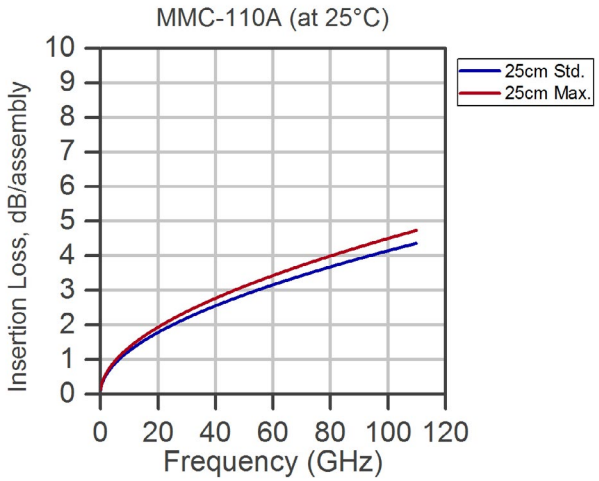


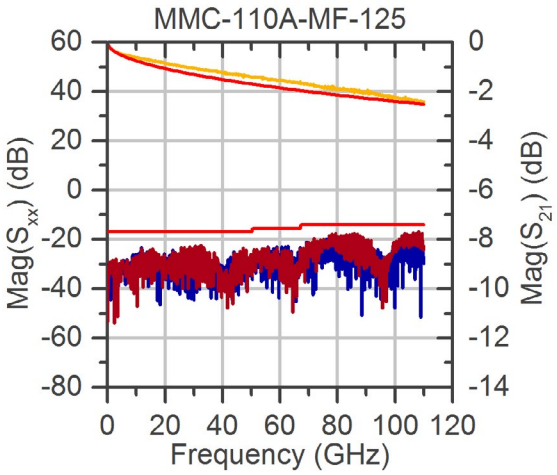
MMC-Series characteristics, 110 GHz

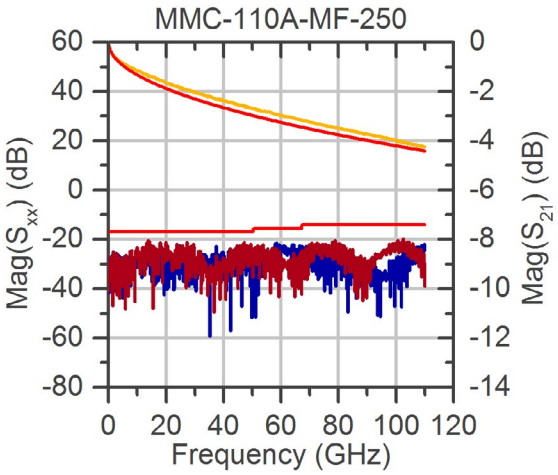
- MMC – 110A– MF – 125
- MMC – 110A– MF – 250











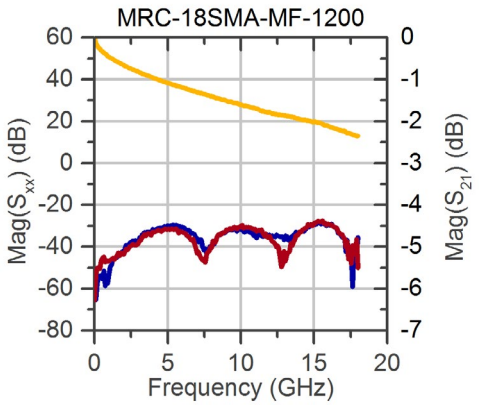
High-Quality MRC-Series

Electrical Specification

Part Number	MRC-18SMA-MF-xxxx	MRC-26SMA-MF-xxxx	MRC-40K-MF-xxxx	MRC-50Q-MF-xxxx	MRC-67V-MF-xxxx
Frequency, GHz	18	26	40	50	67
Connector type	SMA	SMA+	2.92	2.4	1.85
Length, cm	80/120	80/120	80/120	80/120	80/120
Characteristic impedance, Ω			50		
Return loss, dB	≥ 20	≥ 20	≥ 20	≥ 20	≥ 18
Insertion loss, dB	≤ 1.8/2.6	≤ 2.15/3.0	≤ 2.5/3.5	≤ 3.5/4.85	≤ 6.3/8.4
VSWR	≤ 1.3	≤ 1.3	≤ 1.3	≤ 1.3	≤ 1.4
Temperature range, °C			from -55 to +125		
Min bending radius, mm	≥ 20	≥ 20	≥ 20	≥ 20	≥ 15
Diameter, mm	4.14 mm	5 mm	4.1 mm	3.3 mm	2.7 mm

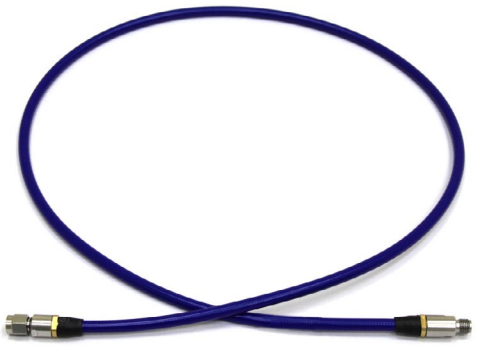
MRC-Series characteristics, 18 GHz

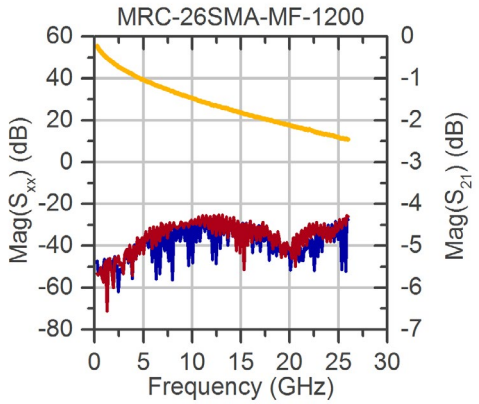
- MRC – 18SMA – MF – 1200



MRC-Series characteristics, 26 GHz

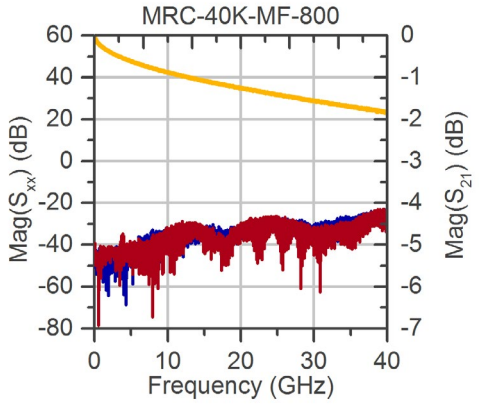
- MRC – 26SMA – MF – 1200





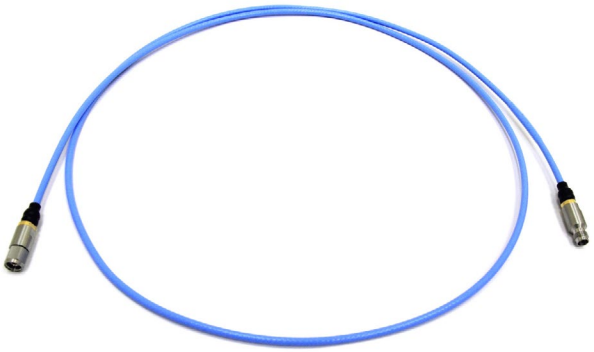
MRC-Series characteristics, 40 GHz

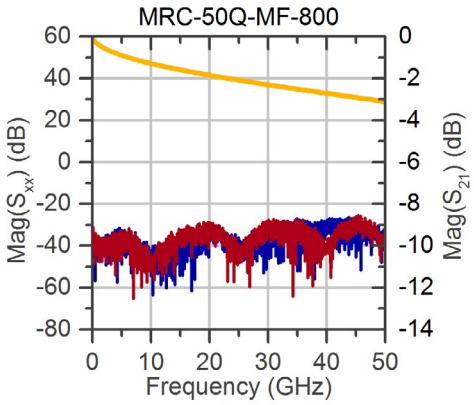
- MRC – 40K – MF – 800



MRC-Series characteristics, 50 GHz

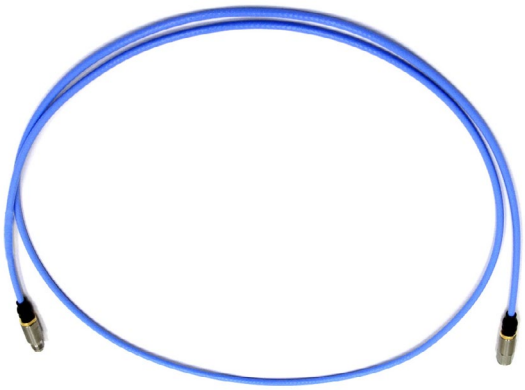
- MRC – 50Q – MF – xxxx

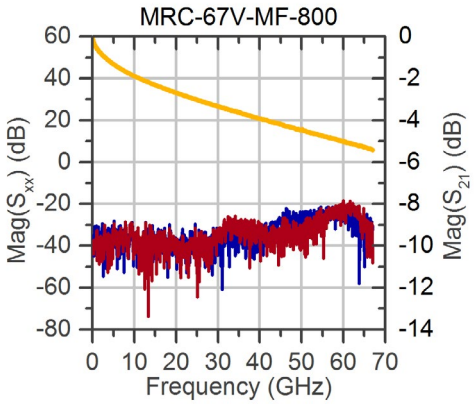




MRC-Series characteristics, 67 GHz

- MRC – 67V – MF – 800





Product PN key

XXX – XXX – MF – XXXX

Cable Length

- 800 : 80 cm
- 1200 : 120 cm

Connector Gender

- Male and Female

Frequency, Connector Type

- 18SMA : 18 GHz, SMA
- 26SMA : 26 GHz, SMA+
- 40K : 40 GHz, 2.92mm
- 50Q : 50 GHz, 2.4mm
- 67V : 67 GHz, 1.85mm
- 110A : 110 GHz, 1.00mm

Cable Series

- MRC : High-quality cable
- MMC : High-end cable

Ordering reference MMC-series

Item	Description
MMC-40K-MF-800	40 GHz precision flex cable 2.92 mm (K) connector, male – female, 80 cm
MMC-40K-MF-1200	40 GHz precision flex cable 2.92 mm (K) connector, male – female, 120 cm
MMC-50Q-MF-800	50 GHz precision flex cable 2.4 mm (Q) connector, male – female, 80 cm
MMC-50Q-MF-1200	50 GHz precision flex cable 2.4 mm (Q) connector, male – female, 120 cm
MMC-67V-MF-800	67 GHz precision flex cable 1.85 mm (V) connector, male – female, 80 cm
MMC-67V-MF-1200	67 GHz precision flex cable 1.85 mm (V) connector, male – female, 120 cm
MMC-110A-MF-125	110 GHz precision flex cable, 1 mm (A) connector, male – female, 12.5 cm
MMC-110A-MF-200	110 GHz precision flex cable 1 mm (A) connector, male – female, 20 cm
MMC-110A-MF-250	110 GHz precision flex cable 1 mm (A) connector, male – female, 25 cm

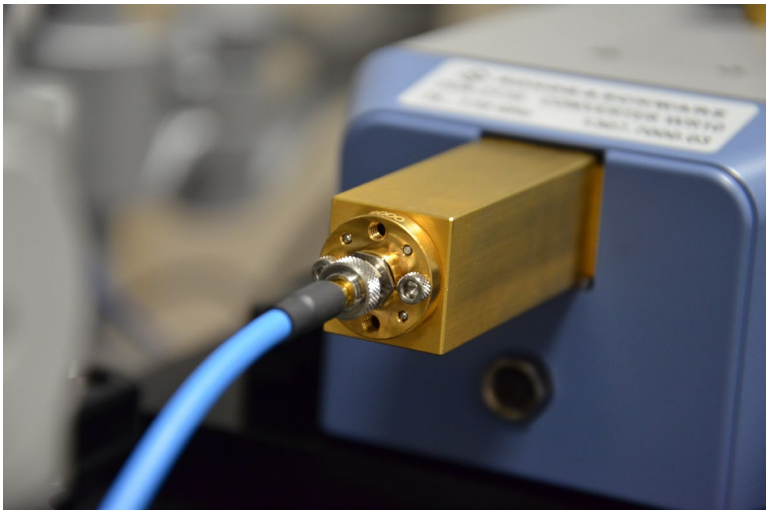
Ordering reference MRC-series

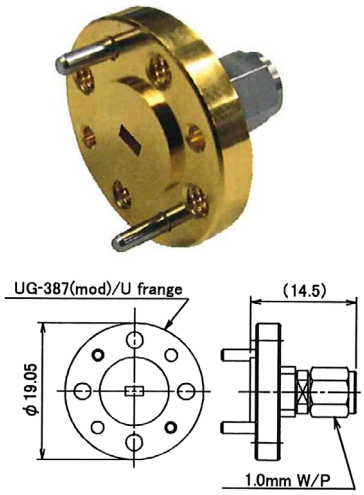
Item	Description
MRC-18SMA-MF-800	18 GHz precision flex cable, SMA connector, male – female, 80 cm
MRC-18SMA-MF-1200	18 GHz precision flex cable, SMA connector, male – female, 120 cm
MRC-26SMA-MF-800	26 GHz precision flex cable, SMA connector, male – female, 80 cm
MRC-26SMA-MF-1200	26 GHz precision flex cable, SMA connector, male – female, 120 cm
MRC-40K-MF-800	40 GHz precision flex cable, 2,92 mm (K) connector, male – female, 80 cm
MRC-40K-MF-1200	40 GHz precision flex cable, 2,92 mm (K) connector, male – female, 120 cm
MRC-50Q-MF-800	50 GHz precision flex cable, 2,4 mm (Q) connector, male – female, 80 cm
MRC-50Q-MF-1200	50 GHz precision flex cable, 2,4 mm (Q) connector, male – female, 120 cm
MRC-67V-MF-800	67 GHz precision flex cable, 1.85 mm (V) connector, male – female, 80 cm
MRC-67V-MF-1200	67 GHz precision flex cable, 1.85 mm (V) connector, male – female, 120 cm

Adapters

High-In addition, high-quality RF and high-end mm-wave range adapters are offered to address challenges of regular system reconfiguration with different type of test instrumentation.

Waveguide to Coaxial Adapters





Electrical Specification

Part Number	MWA-WR15-1MM	MWA-WR12-1MM	MWA-WR10-1MM
Frequency, GHz	50 – 75	60 – 90	75 – 110
VSWR (Max)	1.4	1.4	1.4
Insertion loss, dB	0.35	0.4	0.55
Connector	1 mm (male)	1 mm (male)	1 mm (male)
Waveguide	WR-15	WR-12	WR-10

RF Adapters

- Product PN Key

XXX – XXXX – XXXX

Adapter Dimension, Gender

Adapter Series

- M/F : Male/Female
- N : 11 GHz adapter, N
- 350 : 26 GHz adapter, 3.5 mm
- 292 : 40 GHz adapter, 2.92 mm
- 240 : 50 GHz adapter, 2.4 mm
- 185 : 67 GHz adapter, 1.85 mm
- 100 : 110 GHz adapter, 1.0 mm

- MRA : RF Adapter
- MPA : Precision high-end (Microwave) Adapter

Item	Description
MRA-NM-350F	11 GHZ RF adapter, N(M)-3.5(F)
MRA-NM-350M	11 GHZ RF adapter, N(M)-3.5(M)
MPA-350M-350F	26 GHZ precision RF adapter, 3.5(M)-3.5(F)
MPA-350F-350F	26 GHZ precision RF adapter, 3.5(F)-3.5(F)
MPA-350M-350M	26 GHZ precision RF adapter, 3.5(M)-3.5(M)
MPA-292M-240F	40 GHZ precision RF adapter, K(M)-Q(F)
MPA-292F-240M	40 GHZ precision RF adapter, K(F)-Q(M)
MPA-292M-292F	40 GHZ precision RF adapter, K(M)-K(F)
MPA-292F-292F	40 GHZ precision RF adapter, K(F)-K(F)
MPA-292M-292M	40 GHZ precision RF adapter, K(M)-K(M)
MPA-240M-240F	50 GHZ precision RF adapter, Q(M)-Q(F)
MPA-240F-240F	50 GHZ precision RF adapter, Q(F)-Q(F)
MPA-240M-240M	50 GHZ precision RF adapter, Q(M)-Q(M)
MPA-185M-185F	67 GHZ precision RF adapter, V(M)-V(F)
MPA-185F-185F	67 GHZ precision RF adapter, V(F)-V(F)
MPA-185M-185M	67 GHZ precision RF adapter, V(M)-V(M)
MPA-185M-100F	67 GHZ precision RF adapter, V(M)-A(F)

RF Adapters

- Electrical Specification

Item	VSWR	Item	VSWR	Item	VSWR
MRA-NM-350F	≤ 1.15	MPA-292F-240M	≤ 1.12	MPA-240M-240M	≤ 1.20
MRA-NM-350M	≤ 1.15	MPA-292M-292F	≤ 1.20	MPA-185M-185F	≤ 1.15
MPA-350M-350F	≤ 1.10	MPA-292F-292F	≤ 1.15	MPA-185F-185F	≤ 1.15
MPA-350F-350F	≤ 1.10	MPA-292M-292M	≤ 1.15	MPA-185M-185M	≤ 1.15
MPA-350M-350M	≤ 1.10	MPA-240M-240F	≤ 1.20	MPA-185M-100F	≤ 1.30
MPA-292M-240F	≤ 1.12	MPA-240F-240F	≤ 1.20		

See MPI Corporation's Terms and Conditions of Sale for more details.

MPI Global Presence

Direct contact:
Asia region: ast-asia@mpi-corporation.com
EMEA region: ast-europe@mpi-corporation.com
America region: ast-americas@mpi-corporation.com

MPI global presence: for your local support, please find the right contact here:
www.mpi-corporation.com/ast/support/local-support-worldwide