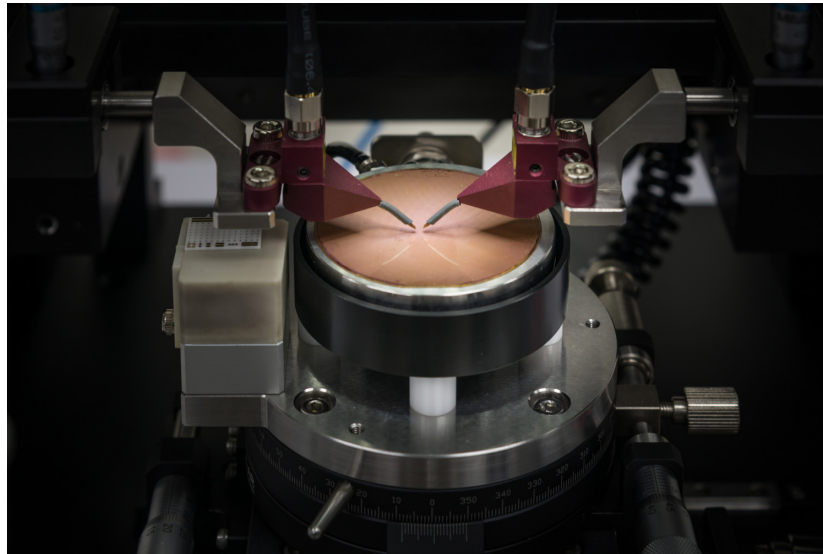


MPI Probe Selection Guide



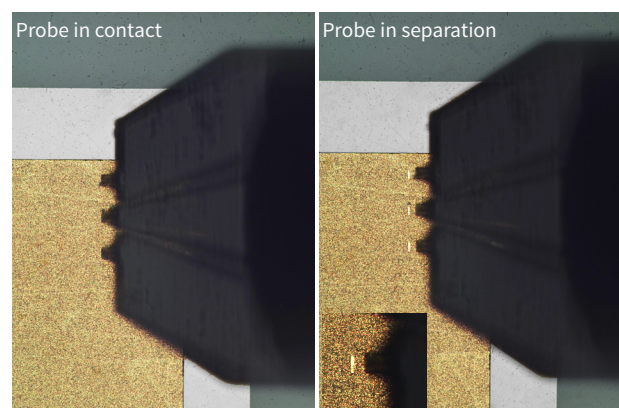
By understanding numerous measurement challenges of today's RF applications, MPI offers RF probing solutions that are optimized for applications and customer needs. Utilizing MPI's own in-house MEMS process and vast experience in worldwide renowned manufacturing excellence, MPI offers quality assured consumable RF probe products with a lead time and a performance that match market requirements.

With the acquisition of Allstron Probing Solution, MPI extended its product portfolio and offers now an ASP probe series - the ideal choice for the on-Wafer S-parameter measurements of RF, mm-wave devices and circuits up to 110 GHz as well as for the characterization of RF power devices up to 10 W of continuous power with long probe life time and a low cost of ownership.

A perfectly matched characteristic impedance of the MEMS fabricated coplanar probe results in excellent probe electrical characteristics. At the same time, the patented protrusion design of the probe tip allows probing of pads even with a small passivation window, and with minimal probe forward skate on any type of metallization.

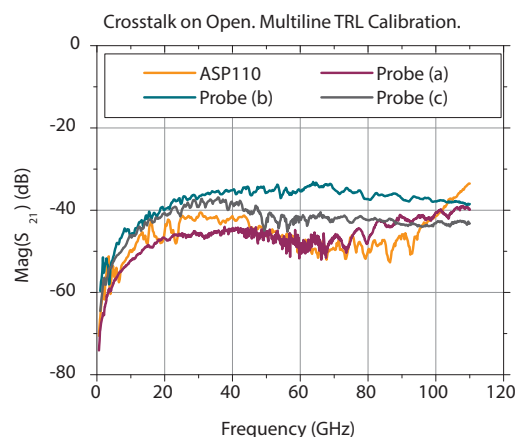
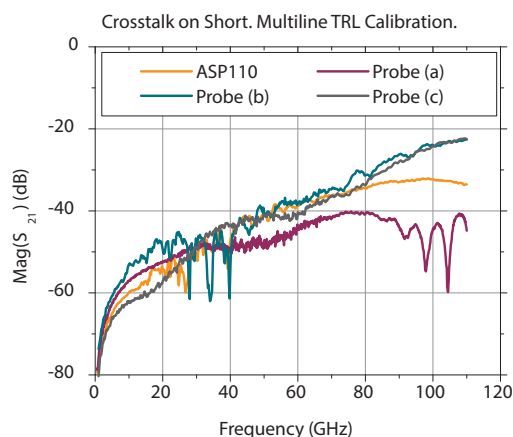


Unique design of the MEMS coplanar contact tip of the ASP probe series.



Minimal forward skate due to the unique design of the tip.

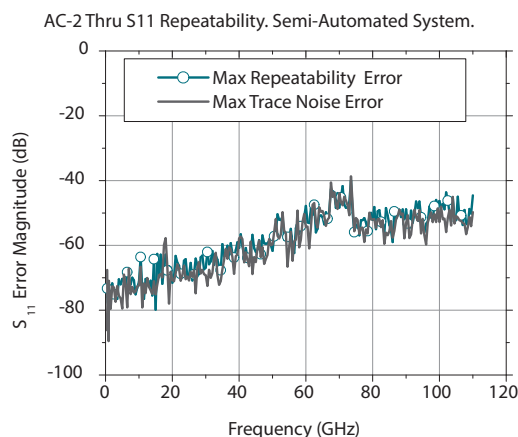
Crosstalk



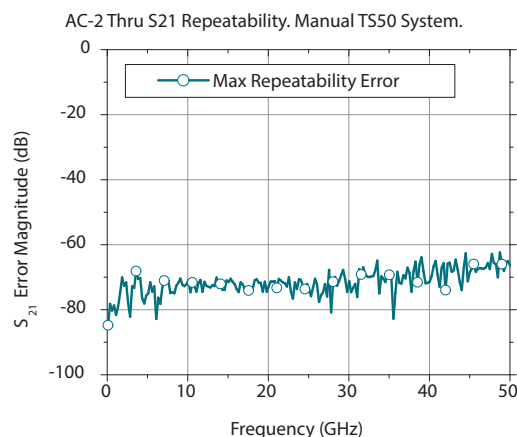
Crosstalk of ASP probes on the short and the bare ceramic open standard of 150 micron spacing compared to conventional 110 GHz probe technologies. Results are corrected by the multiline TRL calibration. All probes are of the GSG configuration and 100 micron pitch.

Contact Repeatability

Another advantage of the ASP probe is its superior contact repeatability, which is comparable with the entire system trace noise when measured on the semi-automated system and on gold contact pads.



The maximal probe contact repeatability error of the calibrate S11-parameter of the AC-2 thru standard by ASP110 probes. Semi-automated system. Ten contact circles.



The maximal probe contact repeatability error of the calibrate S21-parameter of the AC-2 thru standard by ASP50 probes. Manual probe system TS50.

Mechanical Characteristics

Cantilever needle material	Ni alloy
Body material	All alloy
Contact pressure @2 mils overtravel	20 g
Lifetime, touchdowns	> 1,000,000
Ground and signal alignment error	< 15 μ m
Planarity error	< 15 μ m
Contact footprint width	< 30 μ m
Contact resistance on Au	< 3 m Ω

26 GHz Probes for Wireless Applications

Understanding customer needs to reduce the cost of development and product testing for the high competitive wireless application market, MPI offers low-cost yet high-performance RF probes. The specifically developed SMA connector and its outstanding transmission of electro-magnetic waves through the probe design make these probes suitable for applications frequencies up to 26 GHz. The available pitch range is from 50 micron to 1250 micron with GS/SG and GSG probe tip configurations.

ASP 26 GHz probes are the ideal choice for measurement needs when developing components for WiFi, Bluetooth, and 3G/4G commercial wireless applications as well as for student education.

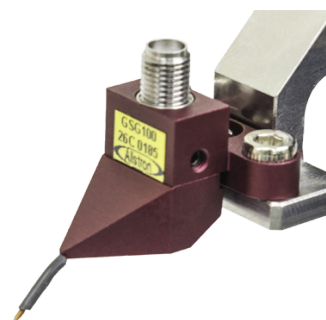
26 GHz Probe Model: ASP-26

Typical Electrical Characteristics

Characteristic Impedance	50 Ω
Frequency range	DC to 26 GHz
Insertions loss (GSG configuration)	< 0.6 dB
Return loss (GSG configuration)	> 18 dB
DC current	≤ 1 A
DC voltage	≤ 100 V
RF power, @10 GHz	≤ 5 W

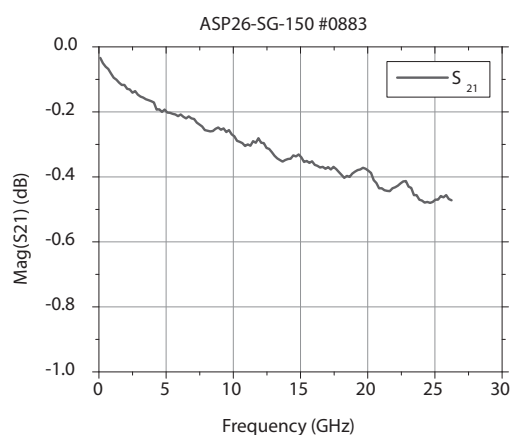
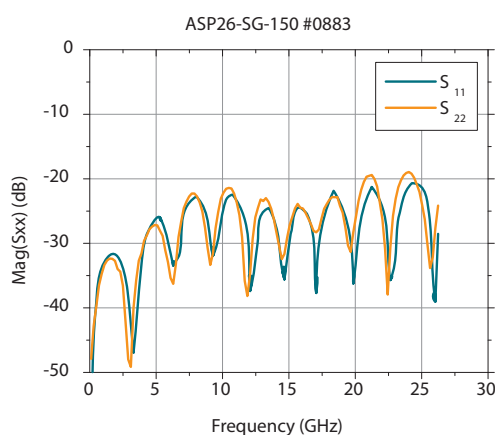
Mechanical Characteristics

Connector	SMA
Pitch range	50 to 1250 μm
Standard pitch step	50 μm
Tip configurations	GSG, GS, SG
Connector angle	C-Style: 90-degree P-Style: 45-degree



ASP-26 probe, C-style of the connector

Typical Electrical Characteristics: 26 GHz SG probe, 150 micron pitch



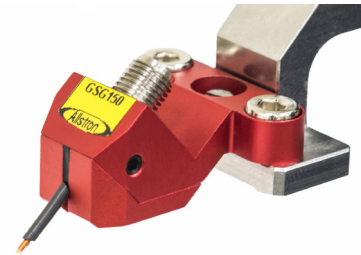
26 GHz Probes for RF Power Applications

MPI offers the high power version of ASP 26 GHz RF probes for radar, space, military, and commercial wireless applications. The ASP-26-HP probe model enables RF testing with up to 10 W of power which is two times more compared to what the standard probe family can achieve. ASP-26-HP offers low testing costs for the development of power RF devices and front-end MMICs for C-band, X-band and Ku-band applications.

26 GHz Probe Model: ASP-26-HP

Typical Electrical Characteristics

Characteristic Impedance	50 Ω
Frequency range	DC to 26 GHz
Insertions loss (GSG configuration)	< 0.6 dB
Return loss (GSG configuration)	> 18 dB
DC current	≤ 1 A
DC voltage	≤ 100 V
RF power, @10 GHz	≤ 10 W

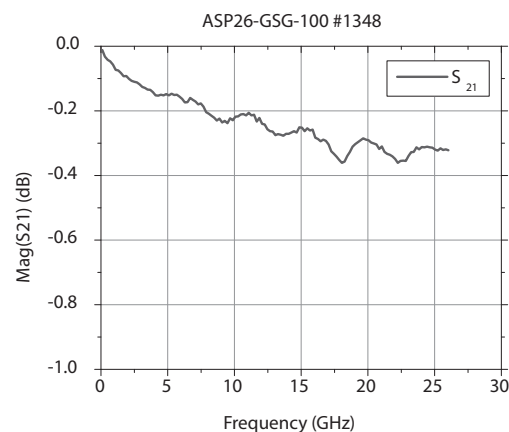
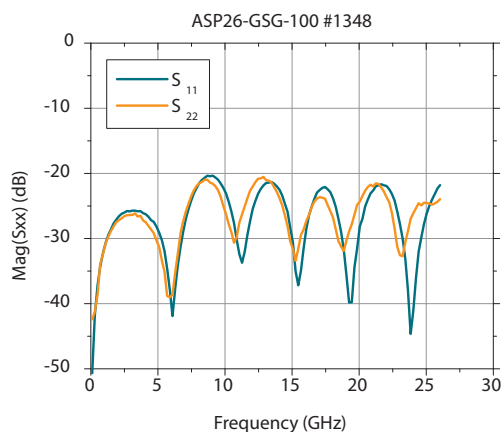


ASP-26-HP probe, P-style of the connector

Mechanical Characteristics

Connector	SMA
Pitch range	100 to 350 μm
Standard pitch step	50 μm
Tip configurations	GSG, GS, SG
Connector angle	P-Style: 45-degree

Typical Electrical Characteristics: 26 GHz GSG probe, 100 micron pitch



Probes for Device and IC Characterization up to 110 GHz

ASP probes realize a unique combination of the micro-coaxial cable based probe technology and MEMS fabricated probe tip. A perfectly matched characteristic impedance of the coplanar probe tips and optimized signal transmission across the entire probe down to the pads of the device under test (DUT) result in excellent probe electrical characteristics. At the same time, the unique design of the probe tip provides minimal probe forward skate on any type of pad metallization material, therefore achieving accurate and repeatable measurement up to 110 GHz. ASP probes are suitable for probing on small pads with long probe lifetime and low cost of ownership.

The APS probe family contains dual probes for engineering and design debug of RF and mm-wave IC's as well as high-end mm-wave range probes for S-parameter characterization up to 110 GHz for modeling of high-performance microwave devices.

40 GHz Probe Model: ASP-40

Typical Electrical Characteristics

Characteristic Impedance	50 Ω
Frequency range	DC to 40 GHz
Insertions loss (GSG configuration)	< 0.7 dB
Return loss (GSG configuration)	> 18 dB
DC current	≤ 1 A
DC voltage	≤ 100 V
RF power, @10 GHz	≤ 5 W

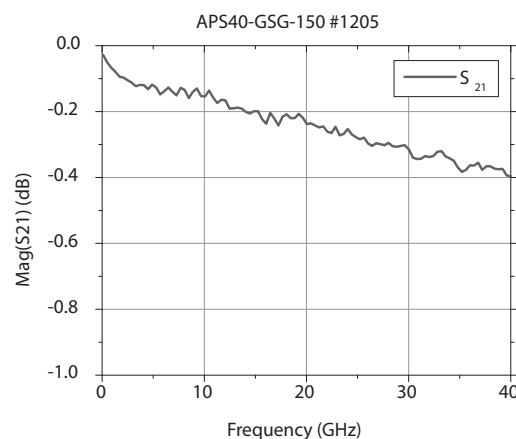
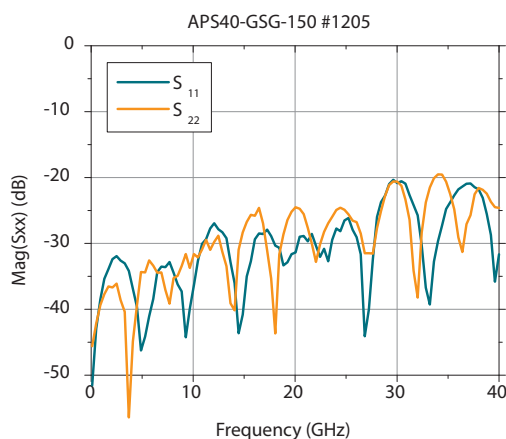


ASP-40 probe, P-style of the connector

Mechanical Characteristics

Connector	K (2.92)
Pitch range	50 to 1250 μm
Standard pitch step	50 μm
Tip configurations	GSG, GS, SG
Connector angle	C-Style: 90-degree P-Style: 45-degree

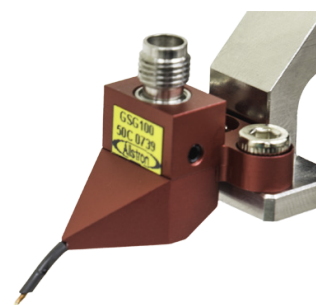
Typical Electrical Characteristics: 40 GHz GSG probe, 150 micron pitch



50 GHz Probe Model: ASP-50

Typical Electrical Characteristics

Characteristic Impedance	50 Ω
Frequency range	DC to 50 GHz
Insertions loss (GSG configuration)	< 0.7 dB
Return loss (GSG configuration)	> 18 dB
DC current	≤ 1 A
DC voltage	≤ 100 V
RF power, @10 GHz	≤ 5 W



ASP-50 probe, C-style of the connector

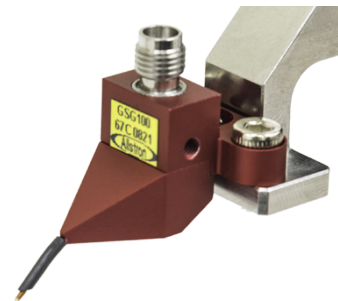
Mechanical Characteristics

Connector	Q (2.4)
Pitch range	50 to 1250 μ m
Standard pitch step	50 μ m
Tip configurations	GSG, GS, SG
Connector angle	C-Style: 90-degree P-Style: 45-degree

67 GHz Probe Model: ASP-67

Typical Electrical Characteristics

Characteristic Impedance	50 Ω
Frequency range	DC to 67 GHz
Insertions loss (GSG configuration)	< 0.7 dB
Return loss (GSG configuration)	> 14 dB
DC current	≤ 1 A
DC voltage	≤ 100 V
RF power, @10 GHz	≤ 5 W



ASP-67 probe, C-style of the connector

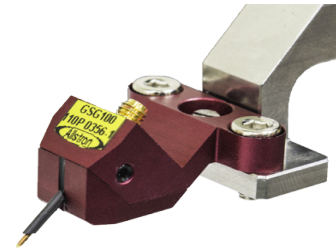
Mechanical Characteristics

Connector	V (1.85)
Pitch range	50 to 1250 μ m
Standard pitch step	50 μ m
Tip configurations	GSG, GS, SG
Connector angle	C-Style: 90-degree P-Style: 45-degree

110 GHz Probe Model: ASP-110

Typical Electrical Characteristics

Characteristic Impedance	50 Ω
Frequency range	DC to 110 GHz
Insertions loss (GSG configuration)	< 1.4 dB
Return loss (GSG configuration)	> 12 dB
DC current	≤ 1 A
DC voltage	≤ 100 V
RF power, @10 GHz	≤ 5 W

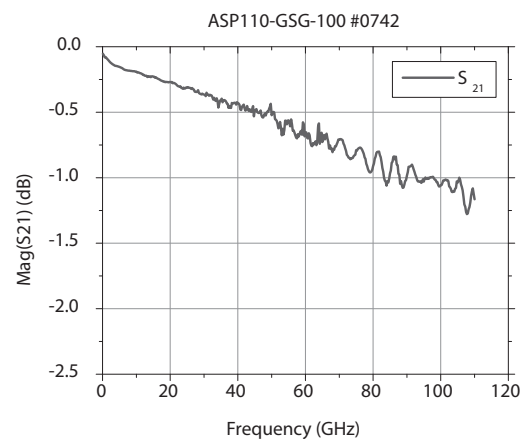
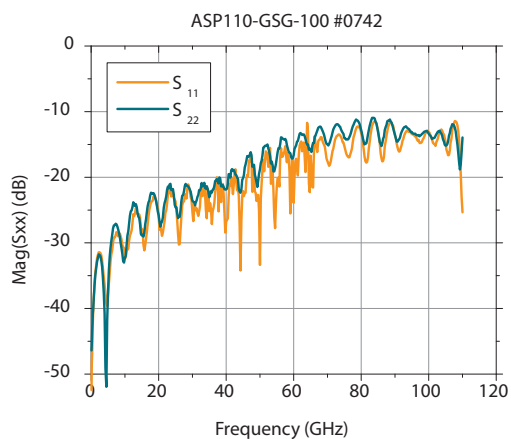


ASP-110 probe, P-style of the connector

Mechanical Characteristics

Connector	1 mm
Pitch range	50, 100, 125, 150 μm
Standard pitch step	50 μm
Tip configurations	GSG
Connector angle	P-Style: 45-degree

Typical Electrical Characteristics: 110 GHz GSG probe, 100 micron pitch



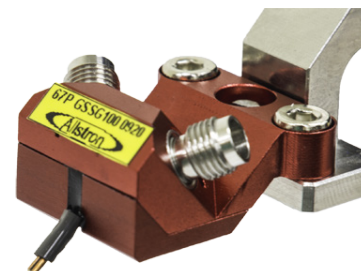
Dual Probes for Characterization of Multiport and Differential RF ICs

The APS probe family includes dual 26 GHz as well as 40, 50 and 67 GHz probes in GSGSG and GSSG configuration for cost-effective characterization of multiport and differential front-ends, integrated circuits and components of commercial wireless, radar and defense applications.

67 GHz Probe Model: Dual ASP-67

Typical Electrical Characteristics

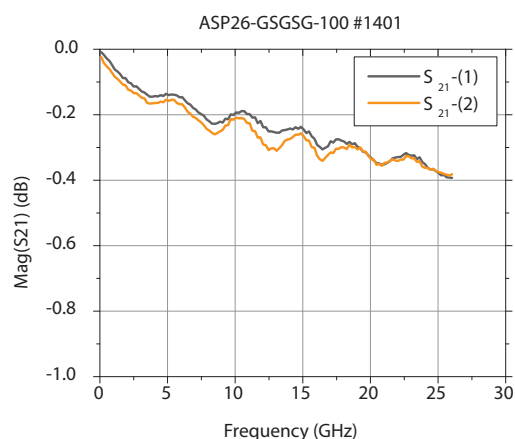
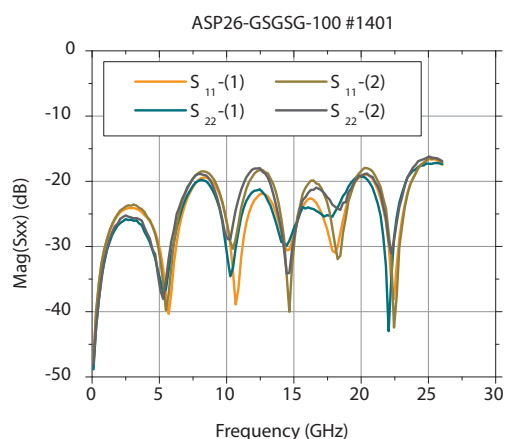
Characteristic Impedance	50 Ω
Frequency range	DC to 67 GHz
Insertions loss (GSG configuration)	< 0.7 dB
Return loss (GSG configuration)	> 14 dB
Port crosstalk	< -28 dB
DC current	≤ 1 A
DC voltage	≤ 100 V
RF power @10 GHz	≤ 5 W



Mechanical Characteristics

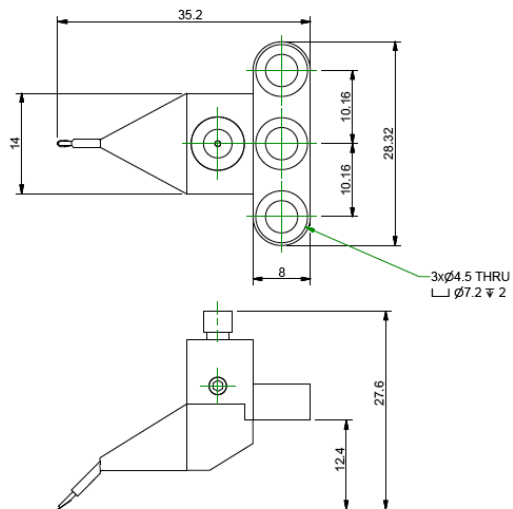
Connector	V (1.85 mm)
Pitch range	100 to 500 μ m
Standard pitch step	50 μ m
Tip configurations	GSSG, GSGSG
Connector angle	P-Style: 45-degree

Typical Electrical Characteristics: Dual 67 GHz GSGSG probe, 100 micron pitch

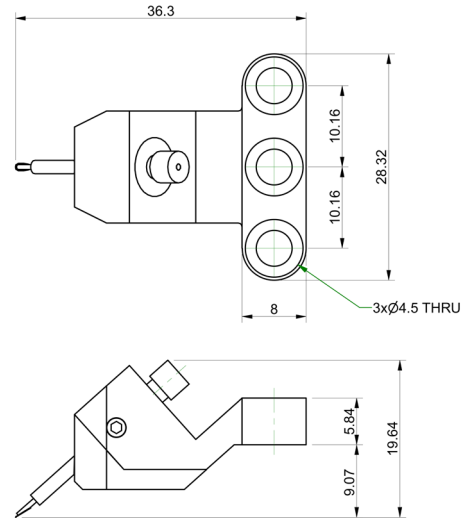


Body Dimensions Probes

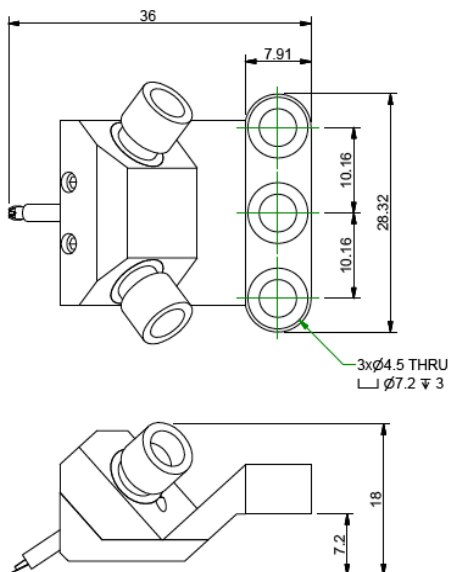
Single-Ended C-Style



Single-Ended P-Style

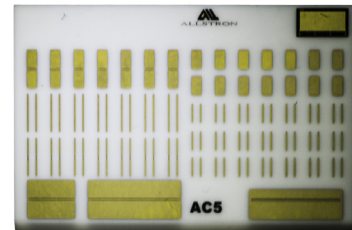
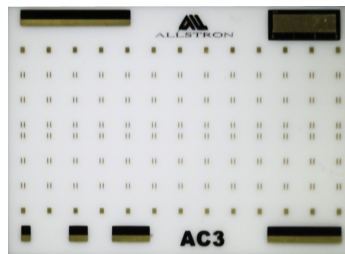
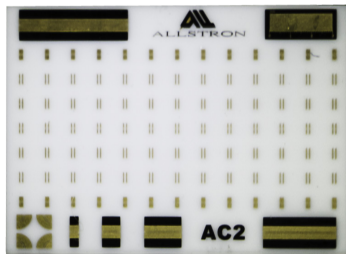


P-Style Dual Probes



Calibration Substrates

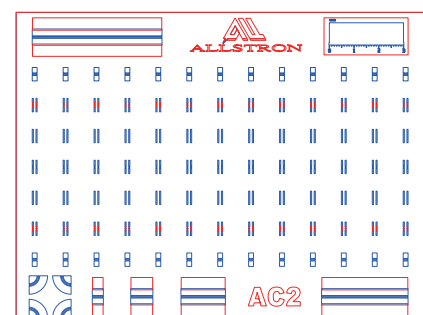
AC-series of calibration standard substrates offers up to 26 standard sets for wafer-level SOLT, LRM probe-tip calibration for GS/SG and GSG probes. Five coplanar lines provide the broadband reference multiline TRL calibration as well as accurate verification of conventional methods. Right-angled reciprocal elements are added to support the SOLR calibration of the system with the right-angled configuration of RF probes. A calibration substrate for wide-pitch probes is also available.



Material	Alumina
Elements design	Coplanar
Supported calibration methods	SOLT, LRM, SOLR, TRL and multiline TRL
Thickness	635 μm
Size	16.5 x 12.5 mm
Effective propagation velocity @20 GHz	0.45
Nominal line characteristic impedance @20 GHz	50 Ω
Nominal resistance of the load	50
Typical load trimming accuracy error	< 1 %
Open standard	Au pads on substrate
Calibration verification elements	yes
Ruler scale	0 to 3 mm
Ruler step size	100 μm

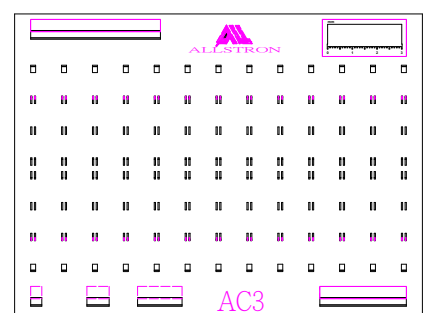
Calibration substrate AC-2

Probe Configuration	GSG
Supported probe pitch	75 to 250 μm
Number of SOLT standard groups	26
Number of verification and calibration lines	5



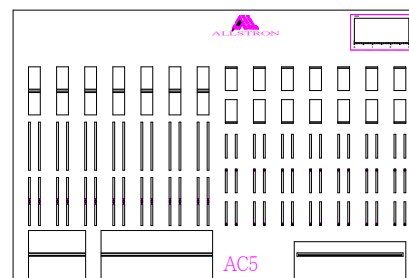
Calibration substrate AC-3

Probe Configuration	GS/SG
Supported probe pitch	50 μm to 250 μm
Number of SOLT standard groups	26
Number of verification and calibration lines	5

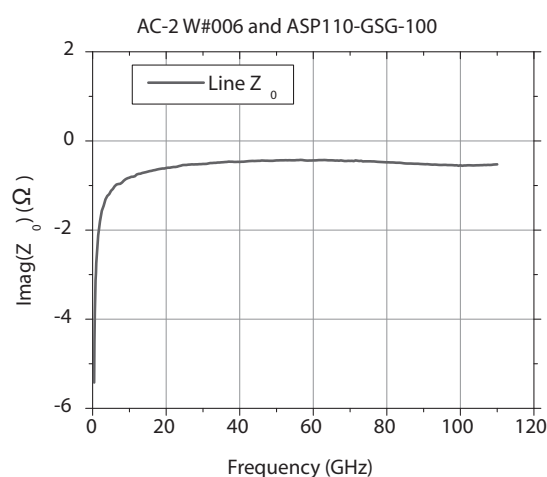
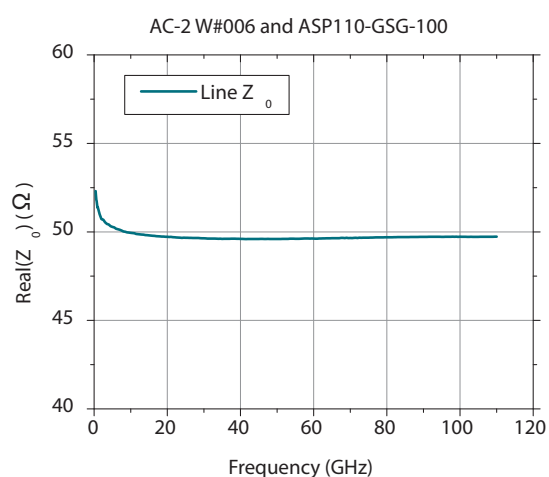
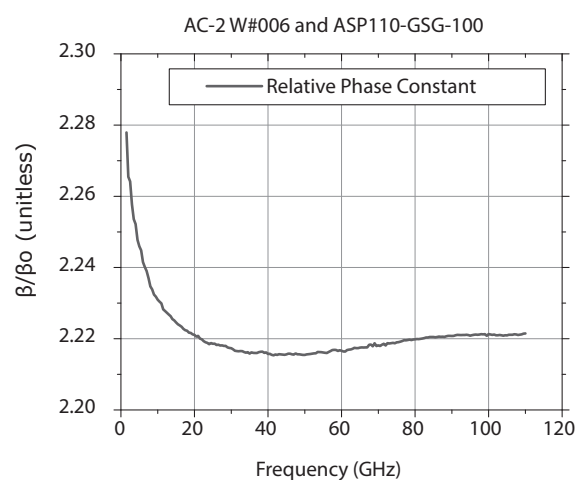
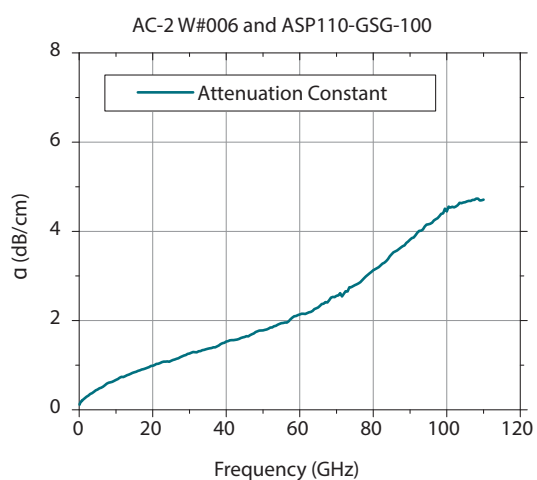


Calibration substrate AC-5

Probe Configuration	GSG, GS/SG
Supported probe pitch	150 μ m to 1250 μ m
Number of SOLT standard groups	GSG : 7 SG : 7 SG : 7
Open standard	On bare ceramic
Number of verification and calibration lines	GSG : 2 GS : 1



Typical Electrical Characteristics



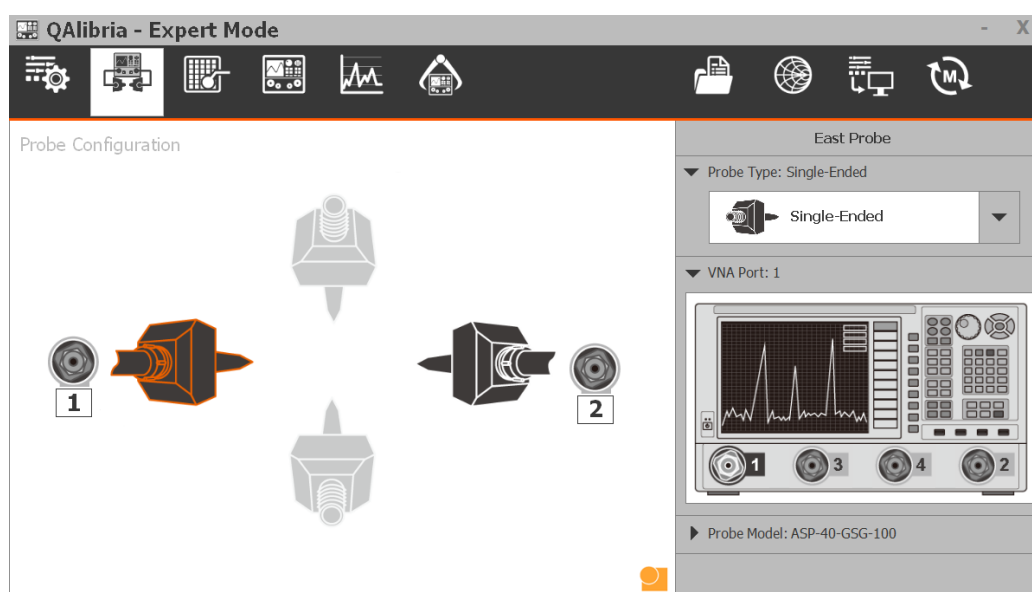
Typical characteristics of the coplanar line standard of AC-2 calibration substrate measured using ASP110-GSG-100 probes, and methods recommended by the National Institute of Standard and Technologies [1, 2].

MPI QAlibria™ RF calibration software

MPI QAlibria™ RF calibration software has been designed to simplify complex and tedious RF system calibration tasks. By implementing a progressive disclosure methodology and realizing intuitive touch operation, QAlibria™ provides crisp and clear guidance to the RF calibration process, minimizing configuration mistakes and helping to obtain accurate calibration results in fastest time. In addition, its concept of multiple GUI's offers full access to all configuration settings and tweaks for advanced users.

QAlibria™ offers industry standard and advanced calibration methods. Furthermore, QAlibria™ is integrated with the NIST StatistiCal™ calibration packages, ensuring easy access to the NIST multi-line TRL metrology-level calibration and uncertainty analysis.

MPI QAlibria™ supports a multi-language GUI, eliminating any evitable operation risks and inconvenience.



Specifications

Supported VNA	Agilent PNA-X, Model N5227 FW A.09.80.20 Anritsu VectorStar model MS4640B, FW 1.2.3 Rohde & Schwarz model ZVA, FW 3.12
VNA interface	GPIO or TCP/IP over NI VISA ver. 5.0 or later
Calibration methods	SOL, SOLT, transfer TMR(LRM), SOLR, TRL
Integration with NIST StatistiCal™ Plus	Online and offline StatistiCal™ and multiline TRL
GUI modes	Operator, Expert
Computer	
Operation System	Win7
Processor	Pentium(R) Dual-Core CPU E5300 @ 2.6 GHz or better
Memory	4 GB or more
HDD space	500 GB or more
Display - Recommended resolution and size	1366 X 768, 13" (laptop); 1920 X 1080, 21" (desktop)
Multi touch touchscreen	Recommended
GUI Languages	English, Chinese, Japanese, Russian

RF and Microwave Cables

MPI offers an excellent selection of flexible cables and accessories for RF and mm-wave measurement applications for complete RF probe system integration.

Cables

High-quality cable assemblies with SMA and 3.5 mm connectors provide the best value for money, completing the entry-level RF systems for measurement applications up to 26 GHz. Phase stable high-end flexible cable assemblies with high-precision 2.92, 2.4, 1.85 and 1 mm connectors guarantee high stability, accuracy and repeatability of the calibration and measurement for DC applications up to 110 GHz.



MPI offers these cable assemblies in two standard lengths of 120 and 80 cm, matching the probe system's footprint and the location of the VNA.

Cables Ordering Information

MRC-18SMA-MF-800	18 GHz SMA flex cable SMA (male) - SMA (female), 80 cm
MRC-18SMA-MF-1200	18 GHz SMA flex cable SMA (male) - SMA (female), 120 cm
MMC-40K-MF-800	40 GHz precision flex cable 2.92 mm (K) connector, male-female, 80 cm long
MMC-40K-MF-1200	40 GHz precision flex cable 2.92 mm (K) connector, male-female, 120 cm long
MMC-50Q-MF-800	50 GHz precision flex cable 2.4 mm (Q) connector, male-female, 80 cm long
MMC-50Q-MF-1200	50 GHz precision flex cable 2.4 mm (Q) connector, male-female, 120 cm long
MMC-50V-MF-800	65 GHz precision flex cable 1.85 mm (V) connector, male-female, 80 cm long
MMC-50V-MF-1200	65 GHz precision flex cable 1.85 mm (V) connector, male-female, 120 cm long
MMC-110A-MF-250	110 GHz precision flex cable 1 mm (A) connector, male-female, 25 cm long

Adapters

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

MRC-NM-350F	RF 11 GHz adapter N(male) - 3.5 (male), straight
MRC-NM-350M	RF 11 GHz adapter N(male) - 3.5 (female), straight
MPC-350M-350F	Precision 26 GHz adapter 3.5 mm (male) - 3.5 mm (female), straight
MPC-350-F350F	Precision 26 GHz adapter 3.5 mm (female) - 3.5 mm (female), straight
MPC-350M-350M	Precision 26 GHz adapter 3.5 mm (male) - 3.5 mm (male), straight
MPC-292M-240F	Precision 40 GHz adapter 2.92 mm (male) - 2.4 mm (female), straight
MPC-292F-240M	Precision 40 GHz adapter 2.92 mm (female) - 2.4 mm (male), straight
MPC-292M-292F	Precision 40 GHz adapter 2.92 mm (male) - 2.92 mm (female), straight
MPC-292F-292F	Precision 40 GHz adapter 2.92 mm (female) - 2.92 mm (female), straight
MPC-292M-292M	Precision 40 GHz adapter 2.92 mm (male) - 2.92 mm (male), straight
MPC-240M-240F	Precision 50 GHz adapter 2.4 mm (male) - 2.4 mm (female), straight
MPC-240F-240F	Precision 50 GHz adapter 2.4 mm (female) - 2.4 mm (female), straight
MPC-240M-240M	Precision 50 GHz adapter 2.4 mm (male) - 2.4 mm (male), straight
MPC-185M-185F	Precision 65 GHz adapter 1.85 mm (male) - 1.85 mm (female), straight
MPC-185F-185F	Precision 65 GHz adapter 1.85 mm (female) - 1.85 mm (female), straight
MPC-185M-185M	Precision 65 GHz adapter 1.85 mm (male) - 1.85 mm (male), straight
MPC-185M-100F	Precision 65 GHz adapter 1.85 mm (male) - 1.00 mm (male), straight

References

- [1] R. B. Marks and D. F. Williams, "Characteristic impedance determination using propagation constant measurement," IEEE Microwave and Guided Wave Letters, vol. 1, pp. 141-143, June 1991.
- [2] D. F. Williams and R. B. Marks, "Transmission line capacitance measurement," Microwave and Guided Wave Letters, IEEE, vol. 1, pp. 243-245, 1991.

The MPI World Map



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Americas region: ast-americas@mpi-corporation.com

For local support please visit our homepage: www.mpi-corporation.com

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