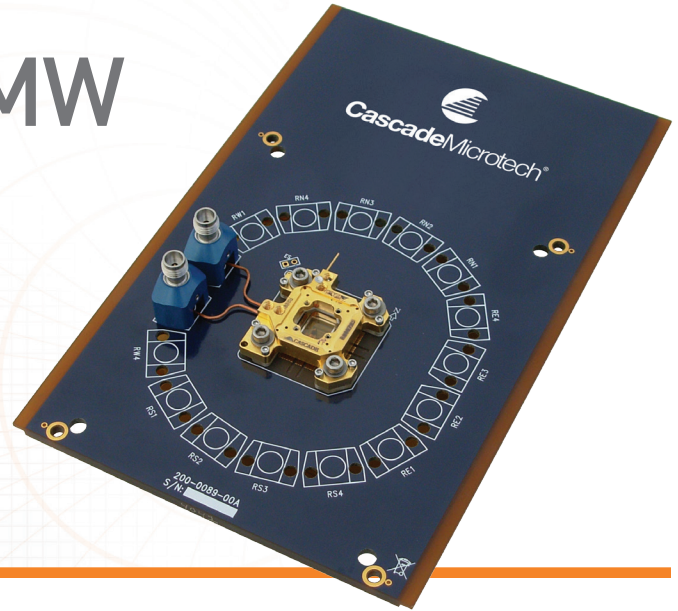


# PyramidMW

High-performance mmW  
Pyramid Probe® card



DATA SHEET

For robust, lower cost and long-life production probing up to 81 GHz RFICs, Cascade Microtech's Pyramid-MW Probe is the world's only mm-wave (mmW) RF production probe card that ensures reliable and repeatable measurement results critical for high-yield testing. Cascade Microtech's Pyramid-MW Probe card delivers an ultra-durable, photo-lithographically defined fine-pitch tip structure that probes smaller pads and provides consistent low-contact resistance and lowers your cost of production test through fast set-ups, minimal maintenance and documented cleaning regimes. Microstrip transmission lines maintain impedance control all the way to the DUT pad. Patented ground and power planes with bypass capacitors provide resonance-free power supplies directly to the IC. In addition, the Pyramid-MW delivers minimal pad damage and extremely long life, dramatically reducing the cost of ownership versus other mmW RF probe offerings.

## FEATURES / BENEFITS

Superior signal performance	High-bandwidth mmW RF transmission lines to probe tips guarantee performance and ensure low signal loss. Patented ground and power planes, with bypass capacitors, provide resonance-free stable power supplies directly to the DUTs. Consistent low contact resistance and low-inductance probe tips ensure accurate and repeatable RF and mmW measurements.
Mechanical robustness	MicroScrub® technology provides consistent low contact resistance and inductance on a variety of pad materials and flip-chip bumps. High-density photolithographically-placed contact probe tips are stable over lifetime of product. Low maintenance and permanent probe tip placement improve test cell uptime, reducing the cost of ownership compared to other probing technologies.
Versatile and cost-effective	Lower maintenance overhead with less cleaning and no need for probe tip alignment.
Advanced membrane technology	Cascade Microtech's industry-leading Pyramid Plus™ manufacturing process delivers higher performance and offers unique features that lower your cost of test.

## MECHANICAL

Minimum pitch	50 $\mu\text{m}$ (depending on application)
Staggered pitch	36 $\mu\text{m}$ /72 $\mu\text{m}$
Dimensional stability for lifetime	10 $\mu\text{m}$ for single temperature
Probe tip size Al, Cu (nominal)	12 $\mu\text{m}$
Probe tip size Low K/PoAA (nominal)	18 $\mu\text{m}$
Probe tip size Au, solder balls (nominal)	25 $\mu\text{m}$
Probe tip material	Non-oxidizing nickel alloy
Temperature range	-50 °C to 125 °C
Pad and bump materials	Al, Cu, Au, all types of solder balls
Spring rate	1.67 g/mil
Edge sense	Optional

## ELECTRICAL

Leakage	1 nA/V
Contact resistance	0.005 to 0.010 $\Omega$ (Au pads), 0.1 to 0.2 $\Omega$ (Al pads)
Maximum current / tip	200 mA (Al pads, Cu pads and solder balls), 1 A (Au pads)
Max power 50 $\Omega$ microstrip	+33 dBm CW, +36 dBm pulsed
Max power 50 $\Omega$ Co-Planar Waveguide (CPW)	+33 dBm CW, +39 dBm pulsed

## POWER SUPPLY PERFORMANCE

Power trace impedance	10 $\Omega$
Power supply non-resonant	up to 10 GHz
Inductance to first capacitor	0.2 nH
Max current power trace	1 A
Max current per power supply	10 A

## SIGNAL TRACE PERFORMANCE (20 GHZ)

### Standard

Signal line impedance	50 $\Omega$ nominal
Ground inductance (typical)	0.04 nH
Return loss ( $S_{11}$ )	>10 dB @ specified bandwidth
Input reflection	$\pm 80$ mrho @ 50 $\Omega$

### Optional (not available on 60+ GHz RF lines)

Range of trace impedances	2 $\Omega$ to 120 $\Omega$ $\pm 20\%$
Differential impedance	50 $\Omega$ , 100 $\Omega$ and 200 $\Omega$

## SIGNAL TRACE PERFORMANCE (60 - 81 GHz)

RF Signal line impedance	50 $\Omega$ nominal
Ground Inductance (typical)	0.04 nH
Return loss ( $S_{11}$ ) with 1.85 mm connector	>10 dB @ 67 GHz
Return loss ( $S_{11}$ ) with 1 mm connector	>10 dB @ 81 GHz
Input reflection	$\pm 80$ mrho @ 50 $\Omega$
Range of trace impedances	50 $\Omega$ only
Differential impedance	100 $\Omega$ only
Pitch range	50 $\mu$ m to 500 $\mu$ m
Available core frames	RFC and MSI

## SIGNAL TRACE LENGTH MATCHING

Custom line match

## SERIES PATH RESISTANCE (SPR)

	<b>P100-MW</b>
DC resistance	1 $\Omega$
Microstrip	1.2 $\Omega$
CPW	0.8 $\Omega$

## INSTRUMENT CONNECTOR OPTIONS

<b>MAXIMUM OPERATING FREQUENCY RANGE</b>	<b>CONNECTION TYPE</b>	<b>OPTION</b>
60 - 81 GHz	Roos Instruments' Cassini Waveguide	Waveguide interface kit
60 - 67 GHz	Coaxial cable (standard)	1.85 mm connector
60 - 67 GHz	Coaxial cable (optional)	1 mm connector
68 - 81 GHz	Coaxial cable	1 mm connector

## MATCHING NETWORKS EXAMPLES (NOT AVAILABLE ON 60-81 GHz RF LINES)

<b>TYPE OF DEVICE</b>	<b>OUTPUT IMPEDANCE</b>	<b>COMPONENTS</b>	<b>CORRELATION TO PACKAGE</b>
Power amplifiers	2 $\Omega$ to 8 $\Omega$	125 ps from DUT	$\pm 0.5$ dB
Wireless RF	100 $\Omega$ to 120 $\Omega$ differential	Balun on PCB	$\pm 1$ dB

## COMPONENTS ATTACHED TO MEMBRANE

Package type	SMT
Sizes	0201, 0402 (preferred), 0603, 0805

## COMPONENTS DEFINED WITHIN MEMBRANE (NOT AVAILABLE ON 60-81 GHz RF LINES)

Inductors	0.3 nH to 1 nH ( $\pm 0.3$ nH)
Inductors	1 nH to 10 nH ( $\pm 30\%$ )
Trimmed inductors	0.3 nH to 10 nH ( $\pm 0.1$ nH)
Capacitors	20 fF to 2 pF ( $\pm 20\%$ )

## PYRAMID CORE OPTIONS

	RFC	MSI
I/O capacity	108	408
XY area (mm)	5.334/5.334	5.334/5.334
Components on core	32	40
Maximum RF lines	27, 9/side	56, 14/side
Maximum MW lines	8, 2/side	56, 14/side

## RF-CLASS BANDWIDTH AND RISETIME PERFORMANCE

TRANSMISSION LINE			FRAME CORE BANDWIDTH*	
Membrane	PCB	Connector	P100	P100-MW
Microstrip	Microstrip	Pogo pad	2 GHz	2 GHz
Microstrip	Microstrip	PCB coaxial	7 GHz	7 GHz
Microstrip	Coax	K or V	20 GHz	20 GHz
CPW	Coax	K or V	20 GHz	20 GHz
CPW	Coax-SE	1.85 mm		67 GHz
CPW	Coax-SE	1 mm		81 GHz

\* 67 GHz and 81 GHz bandwidth is only attainable with signals in a GSG/GSSG configuration.

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Data subject to change without notice

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