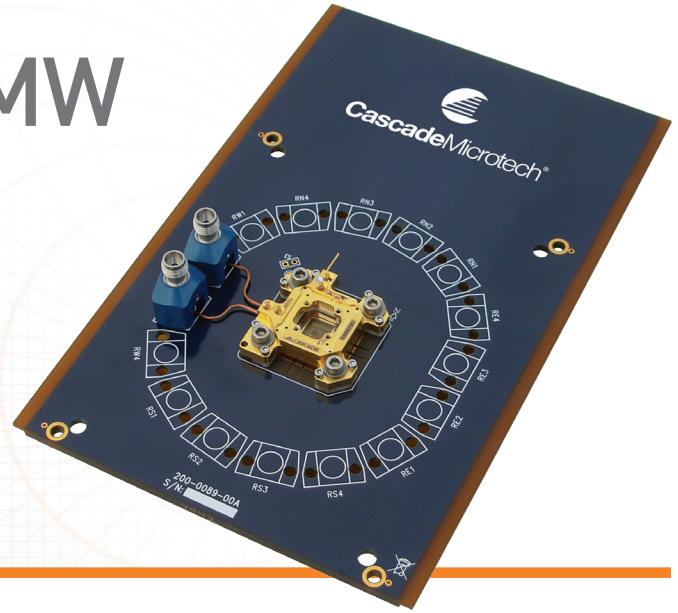


# PyramidMW

High-performance mmW  
Pyramid Probe® card



DATA SHEET

For robust, lower cost and long-life production testing of 57 GHz 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	<p>High-bandwidth mmW RF transmission lines to probe tips guarantee performance and ensure low signal loss.</p> <p>Patented ground and power planes, with bypass capacitors, provide resonance-free stable power supplies directly to the DUTs.</p> <p>Consistent low contact resistance and low-inductance probe tips ensure accurate and repeatable RF and mmW measurements.</p>
Mechanical robustness	<p>MicroScrub® technology provides consistent low contact resistance and inductance on a variety of pad materials and flip-chip bumps.</p> <p>High-density photolithographically-placed contact probe tips are stable over lifetime of product.</p> <p>Low maintenance and permanent probe tip placement improve test cell uptime, reducing the cost of ownership compared to other probing technologies.</p>
Versatile and cost-effective	<p>Lower maintenance overhead with less cleaning and no need for probe tip alignment.</p>
Advanced membrane technology	<p>Cascade Microtech's industry-leading Pyramid Plus™ manufacturing process delivers higher performance and offers unique features that lower your cost of test.</p>

## 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 @ 20 GHz
Input reflection	$\pm 80$ mrho @ 50 $\Omega$

### Optional (not available on 60-80 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

## SIGNAL TRACE LENGTH MATCHING

Custom line match

### SERIES PATH RESISTANCE (SPR)

P100-MW

DC resistance	1 $\Omega$
Microstrip	1.2 $\Omega$
CPW	0.8 $\Omega$

## INSTRUMENT CONNECTOR OPTIONS

FREQUENCY RANGE	CONNECTION TYPE	OPTION
60 - 80 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)

TYPE OF DEVICE	OUTPUT IMPEDANCE	COMPONENTS	CORRELATION TO PACKAGE
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

I/O capacity	108
XY area (mm)	5.334/5.334
Components on core	32
Maximum RF lines	27, 9/side
Maximum MW lines	8, 2/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.

\*\* Engineering assistance needed.

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Data subject to change without notice

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