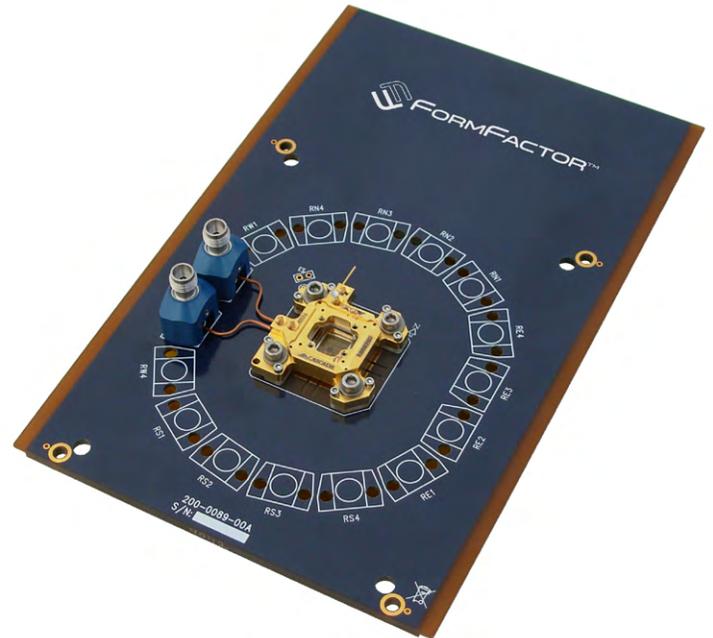


Pyramid-MW

High-performance mmW Pyramid Probe® Card

Overview

For robust, lower cost and long-life production probing up to 81 GHz RFICs, FormFactor'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. FormFactor'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

- FormFactor's industry-leading Pyramid Plus™ manufacturing process delivers higher performance and offers unique features that lower your cost of test

➤ Mechanical Specifications

Minimum pitch	50 μm (depending on application)
Staggered pitch	36 μm /72 μm
Dimensional stability for lifetime	10 μm for single temperature
Probe tip size Al, Cu (nominal)	12 μm
Probe tip size Low K/PoAA (nominal)	18 μm
Probe tip size Au, solder balls (nominal)	25 μm
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 Ω (Au pads), 0.1 to 0.2 Ω (Al pads)
Maximum current / tip	200 mA (Al pads, Cu pads and solder balls), 1 A (Au pads)
Max power 50 Ω microstrip	+33 dBm CW, +36 dBm pulsed
Max power 50 Ω Co-Planar Waveguide (CPW)	+33 dBm CW, +39 dBm pulsed

➤ Power Supply Performance

Power trace impedance	10 Ω
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 Ω nominal
Ground inductance (typical)	0.04 nH
Return loss (S_{11})	>10 dB @ specified bandwidth
Input reflection	± 80 mrho @ 50 Ω
Optional (not available on 60+ GHz RF lines)	
Range of trace impedances	2 Ω to 120 Ω $\pm 20\%$
Differential impedance	50 Ω , 100 Ω and 200 Ω

➤ Signal Trace Performance (60 - 81 GHz)

RF Signal line impedance	50 Ω nominal
Ground Inductance (typical)	0.04 nH
Return loss (S11) with 1.85 mm connector	>10 dB @ 67 GHz
Return loss (S11) with 1 mm connector	>10 dB @ 81 GHz
Input reflection	± 80 mrho @ 50 Ω
Range of trace impedances	50 Ω only
Differential impedance	100 Ω only
Pitch range	50 μm to 500 μm
Available core frames	RFC and MSI

➤ Signal Trace Length Matching

Custom line match

➤ Series Path Resistance (SPR)

	P100-MW
DC resistance	1 Ω
Microstrip	1.2 Ω
CPW	0.8 Ω
Max current per power supply	10 A

➤ Instrument Connector Options

Maximun Operating Frequency Range	Connection Type	Option
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)

Type Of Device	Output Impedance	Components	Correlation to Package
Power amplifiers	2 Ω to 8 Ω	125 ps from DUT	± 0.5 dB
Wireless RF	100 Ω to 120 Ω differential	Balun on PCB	± 1 dB

➤ Components or Membrane

Package type	SMT
Sizes	01005, 0201, 0402, 0603, 0805

➤ Components Defined Within Membrane (Not Available on 60-81 GHz RF Lines)

Inductors	0.3 nH to 1 nH (± 0.3 nH)
Inductors	1 nH to 10 nH ($\pm 30\%$)
Trimmed inductors	0.3 nH to 10 nH (± 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

Membrane	Transmission line		Frame Core Bandwidth*	
	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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