

PRODUCTS & TECHNOLOGIES



**SYNERGIE
CAD PROBE**

Global Test Solutions

Conception and production of probe cards for testing microchips



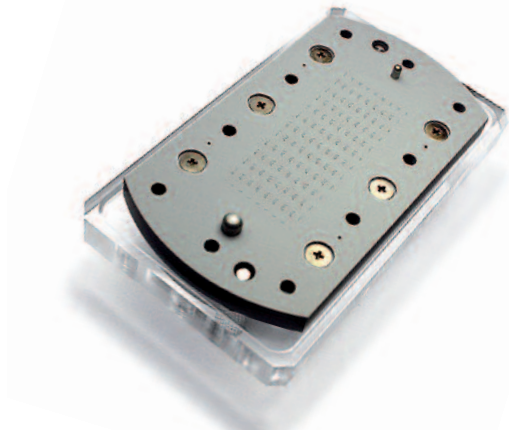
Synergie Cad Probe developed different solutions of test, it has become a leader in the design and production of cantilever probe cards for High-speed, high density wafer probing.

Our vertical probe cards use buckling beam technology (T78) and also Micro spring needles (Verti B and Verti P) to accommodate smaller test pad sizes and area array solder bumps found in increasingly sophisticated ships, and the product can be configured for array, peripheral, and parallel probing.

From Cantilever to vertical technologies, Synergie Cad Probe can assist you and provide the best possible test solutions for your applications.

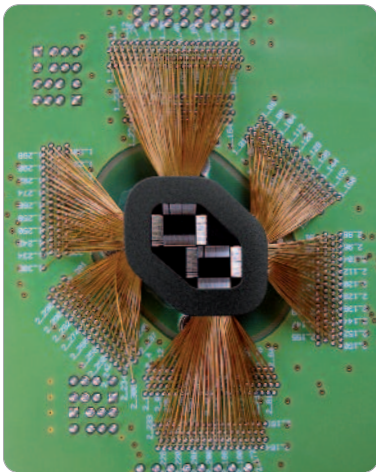
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All Technologies



Parameters Technologies	Cantilever	Verti-B	Verti-C	Verti-P	Verti-T78
Minimal Pitch Linear	30 µm	100 µm	130 µm	100 µm	60 µm
Pad type	Flat/WLCSP	WLCSP	Flat/WLCSP	Flat	Flat/Copper Pillar
Pad Material	Aluminium Gold/Other	Aluminium Gold/Other	Aluminium Gold/Other	Aluminium Gold/Other	Aluminium Gold/Other
Max current	0.2 to 0.25 A	0.3 to 0.5 A	0.35 to 0.6 A	0.3 to 0.5 A	0.15 to 0.3 A
Max Frequency specifications	3 GHz	8 GHz (Direct attach)	70 MHz (Wired Space Transformer)	8 GHz (Direct attach)	70 MHz (Wired Space Transformer)
Multi-DUT	Yes	Yes	Yes	Yes	Yes
Temperature	- 55°C to 150°C	- 55°C to 150°C	- 40/+155°C	- 55/+165°C	- 40/+155°C
Probe TIP shape	Flat/Semi radius/Radius	Radius/Crown /Flat	Flat/Semi radius	Conical	Flat/Semi radius
Probe diameter	80 to 254 µm	80 to 300 µm	76, 101 and 127 µm	80 to 150 µm	38 and 50 µm
Probe TIP diameter	13 µm to 20 µm (+/- 2)	15 to 150 µm (+/- 2)	12 to 127 µm (+/- 5)	12 µm (+/- 2.5)	13 µm to 50 µm (+/- 2)

*Contact us for custom specifics applications.



Synergie Cad Probe Cantilever are engineering, designed and manufactured using the latest equipments for accurate probe placement, alignment and planarity.

Synergie Cad Probe highly skilled manufacturing team bring years of probe card building experience of the product.

- Standard Cantilever
- Multi-Die Cantilever
- Imager Cantilever
- Memory Cantilever
- Window Less Cantilever
- Direct docking Cantilever

Parameters Technologies	SCP 8	SCP 9	SCP 9-IMG	SCP10	SCP10FM	SCP11
Needle material	W/WRe/BeCu	WRe	WRe	WRe	WRe	WRe
Wire diameter	101 to 254 μm	101 to 254 μm	101 to 150 μm	80 to 150 μm	101 to 150 μm	80 μm
Tip Length (first layer)	254 μm ($\pm 20 \mu\text{m}$)	280 μm ($\pm 20 \mu\text{m}$)	280 μm ($\pm 20 \mu\text{m}$)	280 μm ($\pm 20 \mu\text{m}$)	280 μm ($\pm 20 \mu\text{m}$)	260 μm ($\pm 20 \mu\text{m}$)
Tip shape	Semi radius	Semi radius	Semi radius	Semi radius	Semi radius	Semi radius
Tip Diameter	20 μm (+2.5/-5)	20 μm (+2.5/-5)	15 μm (+/-2)	13 μm (+/-2)	20 μm (+/-2)	15 μm (+/-2)
Tip Area	314 μm^2	314 μm^2	177 μm^2	133 μm^2	314 μm^2	177 μm^2
Max over travel	90 μm	90 μm	90 μm	90 μm	90 μm	90 μm
Fan Out	93°	93°	93°	93°	93°	93°
Tiers Number	4 maximum	4 maximum	4 maximum	6 maximum	8 maximum	6 maximum
Ring materiel	Ceramic	Ceramic	Ceramic	Ceramic	Ceramic	Ceramic
Needle Pressure	6.05 mg/mils* μm^2	5.73 mg/mils* μm^2	7.36 mg/mils* μm^2	9.79 mg/mils* μm^2	4.14 mg/mils* μm^2	5.09 mg/mils* μm^2
Contact force	1.9g/mils (+/-10%)	1.8g/mils (+/-10%)	1.3g (+/-10%)	1.3g (+/-10%)	1.3g (+/-10%)	0.9g (+/-10%)
Max current	Up to 0.3 A	Up to 0.3 A	Up to 0.25 A	Up to 0.2 A	Up to 0.27 A	Up to 0.2 A
Temperature range	-55°C to 150°C	-55°C to 150°C	-55°C to 150°C	-55/+150°C	-55/+150°C	-55/+150°C
Min pitch linear	30 μm	30 μm	30 μm	30 μm	30 μm	30 μm
Min pitch 2 rows	45 μm	45 μm	45 μm	40 μm	40 μm	40 μm
X/Y alignment specification	+/-5 μm	+/-5 μm	+/-5 μm	+/-5 μm	+/-5 μm	+/-5 μm
Planarity specification	+/-5 μm	+/-5 μm	+/-5 μm	+/-5 μm	+/-5 μm	+/-5 μm
TIP length (EOL)	50% of BOL	50% of BOL	50% of BOL	50% of BOL	50% of BOL	50% of BOL

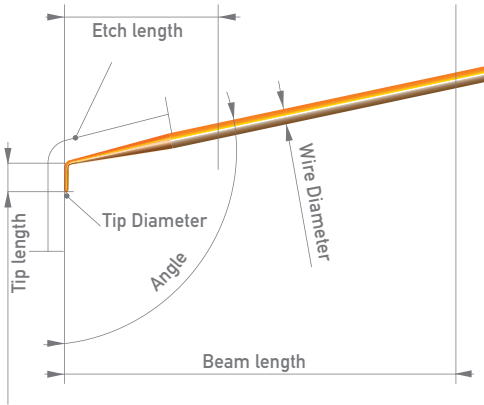
*Contact us for custom specifics applications.



Probe pressure: $W = \frac{3 \pi \beta D^4 E \delta}{64 L^3}$

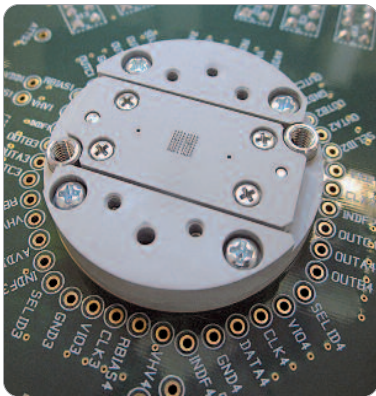
- W: Probe pressure (g)
- L: Beam length (mm)
- D: Probe diameter
- δ: Overdrive amount (mm)
- β: Attenuation constant depending on tapers and shapes
- E: Young's modulus (N/mm2)

Parameters	online cleaning - 40 to 150°C	
Step	1	2
Material	TG-GREEN-EM polymer sheet	3M-3µm Pink Lapping sheet
Cleaning Method	Z only	Z only
N° of cycles	3 to 5	3 to 5
Overdrive	40 µm	40 µm
Frequency	60 to 200	60 to 200
Shift between touchdowns	100 µm	100 µm



Needle	Tungsten Rhenium	Tungsten	Beryllium Copper
Code	WRe	W	BeCu
Density g/cm3	19.3	19.3	8.4
Knoop Hardness	818 - 891	705 - 832	300 - 350
Tensile strength Ksi	2.90 - 3.36	2.65 - 2.9	1.38 - 1.64
Electrical resistivity (µohm/cm)	9.65	5.86	7.93
Elastic modulus (GPa)	395.7 ± 6.4	394.5 ± 6.1	131.5 ± 5.5
Vickers Hardness	745 - 877	665 - 738	288 - 325
Melting Point (°C)	3108	3410	870-980
Tensile Yield Strength (Gpa)	2.90 - 3.36	2.65 - 2.90	1.38 - 1.64
Ultimate Tensile Strength (Gpa)	5.00 - 5.75	4.25 - 4.85	2.70 - 3.00
PROPERTIES %			
Pd %	0	0	0
Ag %	0	0	0
Cu %	0	0	98
Au %	0	0	0
Pt %	0	0	0
Zn %	0	0	0
Be %	0	0	2
W %	97	99.99	0
Re %	3	0	0





Technology based on circular Micro Spring using direct attach PCB.

Fully customizable and Hand-Lid socket adaptable.

Verti-B is the solution for all your testing needs: Multi-site, RF, Kelvin and High/Low Temperature.

Easy to install and maintain, Verti-B is the best solution for advanced WLCSP probing.



Parameters/Technologies	Verti-B RF	Verti-B
Needle material	Pd/BeCu Alloy	Pd/BeCu Alloy
Tip Diameter	15 to 150 μm (+/-2)	15 to 150 μm (+/-2)
Needle free length	2000 to 5300 μm	5700 to 8400 μm
Needle Pressure	8.5 to 0.35 mg /mils*μm²	8.5 to 0.35 mg /mils*μm²
Contact force	4.5 to 18 g @ 3 mils OD	4.5 to 18 g @ 3 mils OD
Max current	0.3 to 0.5 A	0.3 to 0.5 A
Temperature range	-55°C to 150°C	-55°C to 150°C
Min pitch linear	150 μm	100 μm
Min pitch full array	200 μm	150 μm
X/Y alignment specification	+/- 15 to +/- 50 μm	+/- 15 to +/- 50 μm
Planarity specification	+/- 15 to +/- 60 μm	+/- 15 to +/- 60 μm
Nominal Overdrive	150 to 200 μm	150 to 200 μm
Maximum Overdrive	250 μm	250 μm
Max frequency (MHz)/ Corresponding min linear pitch		
- Wired Space Transformer	N/A	70 MHz
- Interposer	5 GHz	3 GHz
- Direct attach	12 GHz	8 GHz
Parallelism level		
- Versus die size	//256- Die size >4mm	//256- Die size >4mm
- Versus pad size	N/A	N/A
TIP length (BOL)	300 μm (+/-10)	300 μm (+/-10)

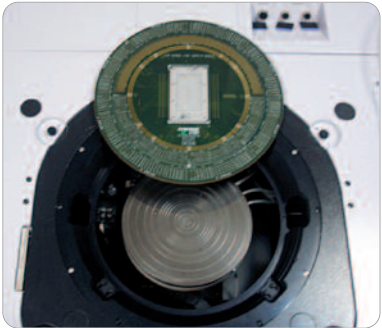
*Contact us for custom specifics applications.

Parameters	Online cleaning Crown TIP - 40 to 150°C	Online cleaning Semi radius TIP - 40 to 150°C	Online cleaning Flat TIP - 40 to 150°C
Material	SI10000-SWE polymer sheet	TG-GREEN-EM polymer sheet	3M-3μm Pink Lapping sheet
Cleaning Method	Z only	Z only	Octagonal movement X = 50 μm 
N° of cycles	7	5	4 to 7 @ room temp / 11 to 16 @ high temp
Overdrive	100 μm	100 to 150 μm	30 to 40 μm
Frequency	70 to 200	70 to 200	150 to 450
Shift between touchdowns	X or Y size of probes array (μm)	100 μm	6000 μm

*Cleaning settings can be customize.

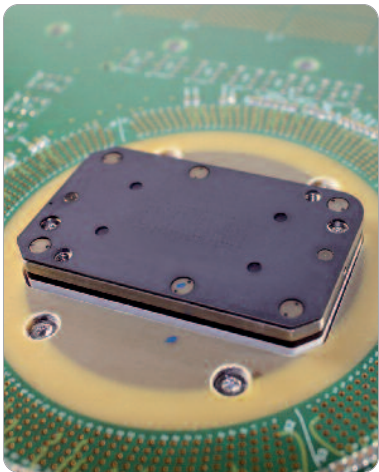
VERTI-B Probe Head Material	
Parameters/Material	Engineering Plastic
Color	Yellow/Grey
Density	1.41 g/cm³
Water absorption	0.4%
Tensile Strength	124 MPa
Tensile Modulus	4.13 GPa
Hardness Rockwell	E80
Max. operating temperature	260°C
Coefficient of thermal Expansion (1x10 ⁻⁶ /°C)	30
Coefficient of thermal conductivity	0.86W/m.k
Thermal shock resistance (Delta)	600 °C

*Contact us for custom specifics applications.



Supplier Data





Synergie Cad Probe has developed and improved Vertical Probe Cards for many years and improvements have been made to increase the limits in terms of PAD / Copper Pillar BUMPS testing.

This technology is based on Buckling Beam approach using circular needles.

Needles diameter: 38 or 50µm
Pointed TIP or Flat TIP.

T78 has the capability of utilizing a large variety of interconnects:
Direct Attach, Wired Space transformer, MLC, MLO or PCB interposer.

MLO: Multi-Layer Organic
MLC: Multi-Layer Ceramic

Parameters/Technologies	Verti-T78B	Verti-T78
Needle material	Paliney C/7	Paliney C/7
Tip Diameter	38 µm (+/-2)	13µm (+/-2)
Needle Pressure	0.98 mg/mils x µm²	8.37 mg/mils x µm²
Contact force	3.5 g @ 80 µm OD	3.5 g @ 80 µm OD
Max current	0.35 A	0.25 A
Maximum voltage level	1200 V	1200 V
Temperature range	-40/+155°C	-40/+155°C
Min pitch linear	60 µm	60 µm
Min pitch full array	75 µm	75 µm
X/Y alignment specification	+/- 10 µm	+/- 8 µm
Planarity specification	+/- 10 µm	+/- 10 µm
Nominal Overdrive	60 µm	60 µm
Maximum Overdrive	80 µm	100 µm
Max frequency (MHz)/ Corresponding min linear pitch		
- Wired Space Transformer	70MHz	70MHz
- Interposer	500MHz	500MHz
- Direct attach	3GHz	3GHz
Parallelism level		
- Versus die size	//256 - Die size >4mm	//256 - Die size >4mm
- Versus pad size	//256 - pad size: 40x45 µm	//256 - pad size: 40x45 µm
Tip length (BOL)	290 µm (+/-10)	290 µm (+/-10)
Tip length (EOL)	180 µm	180 µm

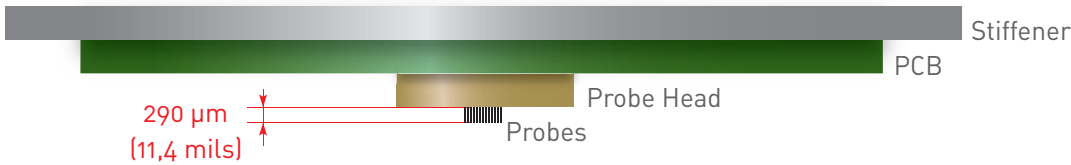
*Contact us for custom specifics applications.

Parameters	Online cleaning Semi radius TIP - 40 to 150°C	Offline cleaning Semi radius TIP	Online cleaning Flat TIP - 40 to 150°C	Offline cleaning Flat TIP
Material	TG-GREEN-EM polymer sheet	TG-GREEN-EM polymer sheet	3M-3µm Pink Lapping sheet	3M-3µm Pink Lapping sheet
Cleaning Method	Z only	Z only	Octagonal movement X = 50 µm 	Octagonal movement X = 50 µm 
N° of cycles	10 to 15	100	4 to 7 @ room temp/ 11to 16 @ high temp	30
Overdrive	60 to 70 µm	80 µm	30 to 40 µm	40 µm
Frequency	70 to 200	1	150 to 450	1
Shift between touchdowns	50 µm	50 µm	6000 µm	5000 µm

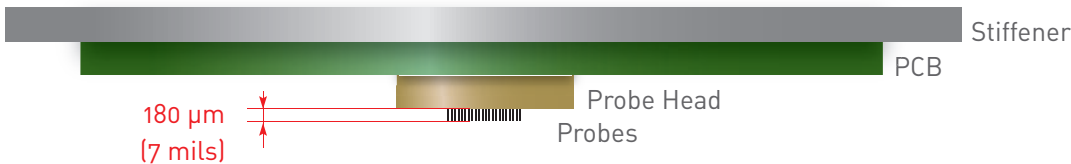
*Cleaning settings can be customize.

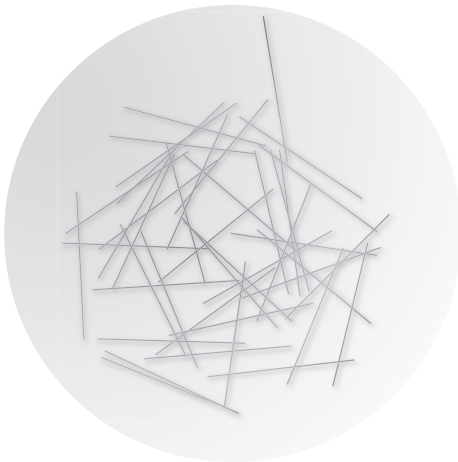
BOL (Beginning of Life)
EOL (End of Life)

BOL = 290 µm (+/- 10)



EOL = 180 µm (+/- 10) Recommended by Synergie Cad Probe



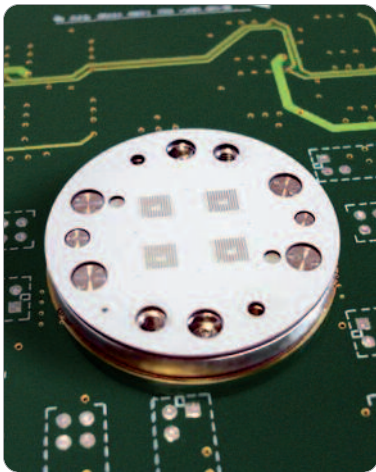


VERTI T78		
Parameter	Paliney C	Paliney 7
Needle material		
Ultimate tensile Strength ksi	220-280	160-200
Modulus of elasticity Psi	17.5 x 10 ⁶	17 x 10 ⁶
Coefficient of linear Expansion /°C (20-100°C)	16.1 x 10 ⁻⁶	13.5 x 10 ⁻⁶
Elongation (% in 2")	3	1-10
Knoop Hardness	425-515	350-410
Electrical conductivity (% IACS,Nominal)	14	5.5
Electrical resistivity (μohm/cm)	12.3	31.6
Properties %		
Pd	33	35
Ag	35	30
Cu	30	14
Au	0	10
Pt	0	10
Zn	0.3	1



VERTI-T78 Probe Head Material	
Parameters/Material	Hard Ceramic
Color	Gray
Density	3.25 g/cm3
Water absorption	0%
Bending Strength	785MPa
Young's Modulus	285GPa
Vickers Hardness	1631HV
Volume Resistivity	1016 Ω.cm
Max. operating temperature	1200°C
Coefficient of thermal Expansion (1x10 ⁻⁶ /°C)	
- RT: 500°C	3.5
- RT: 800°C	4.2
Coefficient of thermal conductivity	13W/m.k
Thermal shock resistance (Delta)	650 °C





Technology based on "Cobra Technology".

Needles diameter 100μ - 76μm.

Test parallelism; grid array.

Verti C has the capability of utilizing a large variety of Inter Connects.

Direct attach; wired space transformer, MLC, MLO or PCB Interposer.

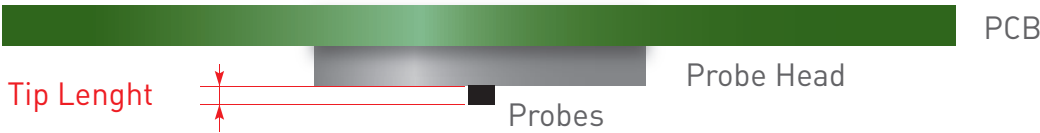
MLO: Multi-Layer Organic
MLC: Multi-Layer Ceramic

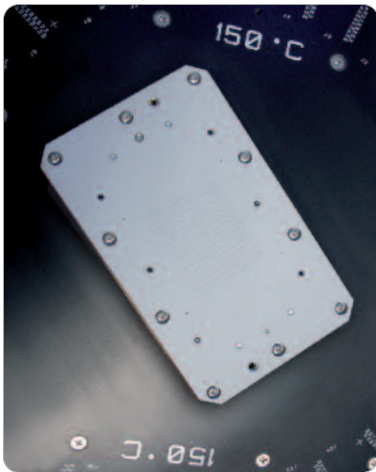
Parameters/Technologies	Verti-C Flat	Verti-C Semi Radius
Needle material	Paliney C/7	Paliney C/7
Tip Diameter	76 to 127 μm (+/-5)	12 μm (+/-2.5)
Needle Pressure	0.55 to 0.2 mg /mils*μm²	22.12 mg/ (mils*μm²)
Contact force	7.5 g (+/-1) @ 3 mils OD	7.5 g (+/-1) @ 3 mils OD
Max current/needle diameter	0.45 to 0.6 A	0.3 to 0.5 A
Maximum voltage level	1200 V	1200 V
Temperature range	-40/+155°C	-40/+155°C
Min pitch linear	130 μm	130 μm
Min pitch full array	150 μm	150 μm
X/Y alignment specification	+/- 20 μm	+/- 15 μm
Planarity specification	+/- 40 μm	+/- 40 μm
Nominal Overdrive	70 to 120 μm	70 to 120 μm
Maximum Overdrive	130 μm	130 μm
Max frequency (MHz)/ Corresponding min linear pitch		
- Wired Space Transformer	70MHz	70MHz
- Interposer	500MHz	500MHz
- Direct attach	3GHz	3GHz
Parallelism level		
- Versus die size	//256- Die size > 4mm	//256- Die size > 4mm
- Versus pad size	//256 - pad size: 40x45 μm	//256 - pad size: 40x45 μm
Tip length (BOL)	450 μm (+/-25)	450 μm (+/-25)
Tip length (EOL)	240 μm	240 μm

*Contact us for custom specifics applications.

Parameters	Offline cleaning Flat TIP (TIP Activation)	Online cleaning Flat TIP - 40 to 150°C	Online cleaning Semi radius TIP - 40 to 150°C
Material	3M-3μm Pink Lapping sheet	3M-3μm Pink Lapping sheet	TG-GREEN-EM polymer sheet
Cleaning Method	Octagonal movement X = 50 μm 	Octagonal movement X = 50 μm 	Z only
N° of cycles	30	5	10 to 15
Overdrive	70 μm	70 μm	30 to 40 μm
Frequency	1	400	150 to 450
Shift between touchdowns	N/A	6000 μm	5000 μm

*Cleaning settings can be customize.





This technology has been developed with the support of key customers and is designed to offer high performance.

Verti-P use a Micro Spring Pin design with conical TIP as contact element. This feature delivers the necessary mechanical compliance for probing and minimizes PAD damage.

High test parallelism, Verti-P has the ability to test more than 256 die simultaneously. Where probe performance is influencing costs more than ever. Verti-P is lowering test time and costs for chipmakers worldwide.

Parameters/Technologies	Verti-P	
Minimal Pitch	100 µm	
Needle material	Au/Pd/Ni Alloy	
Tip Diameter	12 µm (+/-2.5)	
Tip style	Conical	
Needle length	5200 µm	
Needle Pressure	11.5 mg/(mils*µm²)	
Contact force	1.3g/mils	
Max current	0.35 A	
Maximum voltage level	1200 V	
Temperature range	-55/+165°C	
Min pitch linear	100 µm	
Min pitch full array	150 µm	
X/Y alignment specification	+/- 11.5 µm	+/-15 µm
Planarity specification	+/- 15 µm	
Nominal Overdrive	60 to 100 µm	
Maximum Overdrive	125 µm	
Max frequency (MHz)/ Corresponding min linear pitch - Wired Space Transformer - Interposer - Direct attach	N/A 500MHz 3GHz	
Parallelism level - Versus die size - Versus pad size	//512 - Die size > 3.5mm //512512 – pad size: 35x45 µm	
TIP length (BOL)	200 µm (+/-10)	300 µm (+/-10)
TIP length (EOL)	150 µm (+/-10)	200 µm (+/-10)
Contact resistance (pin only)	100 to 540 mΩ	

*Contact us for custom specifics applications.

Parameters	Online cleaning Conical TIP - 40 to 150°C
Material	TG-GREEN-EM polymer sheet
Cleaning Method	Z only
N° of cycles	10
Overdrive	85 to 100 µm
Frequency	400 to 200
Shift between touchdowns	100 µm

*Cleaning settings can be customize.



VERTI-P Probe Head Material		
Parameters/Material	Ceramic	Ceramic
Color	Gray	Gray
Density	2.56 g/cm³	3.5 g/cm³
Water absorption	0%	0%
Bending Strength	440MPa	320MPa
Young's Modulus	157GPa	130GPa
Vickers Hardness	230HV	230HV
Volume Resistivity	1015 Ω.cm	1015 Ω.cm
Max. operating temperature	1000°C	1000°C
Coefficient of thermal Expansion (1x10 ⁻⁶ /°C)	1.4	4.7
Coefficient of thermal conductivity	50W/m.k	23W/m.k
Thermal shock resistance (Delta)	600 °C	400°C
Characteristics	High strength Low thermal expansion Machinability	High strength Thermal expansion Machinability

