



Ironwood
ELECTRONICS
www.ironwoodelectronics.com

SM/SMP Product Presentation

Toll Free: (800) 404-0204 U.S. Only

Tel: (952) 229-8200

Fax: (952) 229-8201

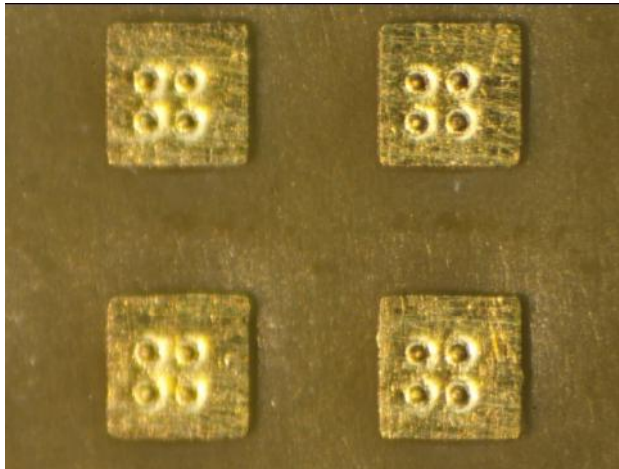
email: info@ironwoodelectronics.com

SMP and SM Contact Components

Gold P-Layer (SMP only)

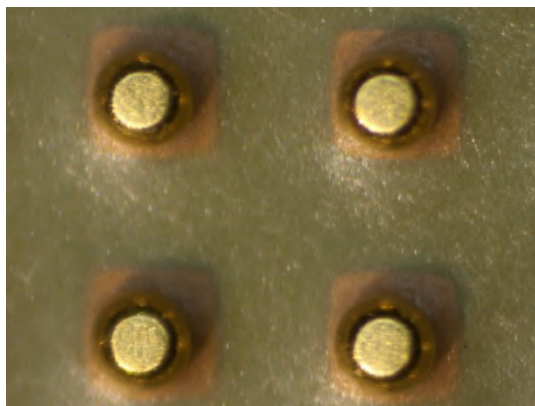
Top Side

Tips Pierce
DUT

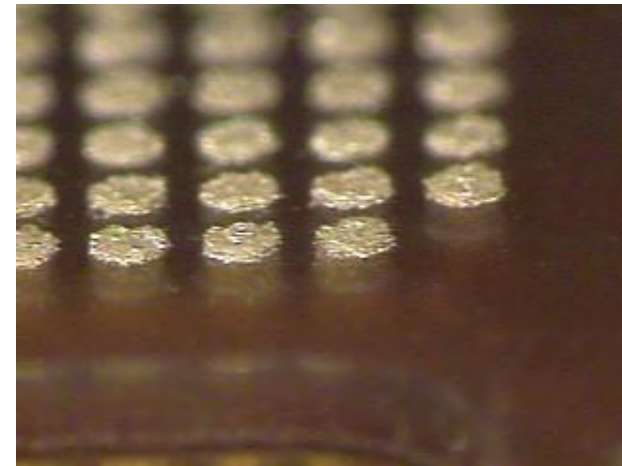


Bottom Side

Tails Compress
SM Columns



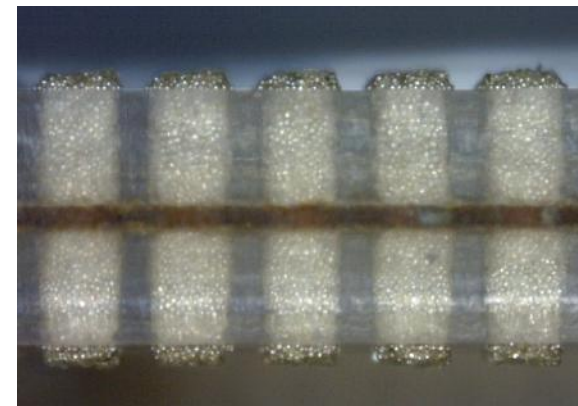
SM Interposer



**Array of
Columns**

Elastomer
Matrix

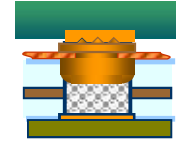
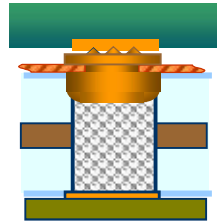
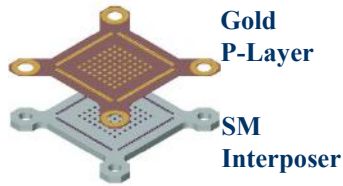
Compliant
Buttons



Cross Section

Silver
Particles

Patented
Core



SMP and SM Contacts		SMP-1.0	SMP-0.6	SM
High Performance Contacts for Hand Test and Automation (Patented / Proprietary Contact Structures)		2 Piece System Gold P-Layer + SM with Core	2 Piece System Gold P-Layer + SM with Core	1 Piece System SM Interposer with Core (No Gold P-Layer)
Packages (BGA, LGA, QFN, CSP, PoP)	All Package Types and Sizes, Full and Partial Array Capabilities			
Minimum Package Pitch (Mixed Pitch Ok)	0.5 mm	0.35 mm	0.3 mm	
Compressed Contact Length	1.0 mm	0.6 mm	0.4 mm	
Bandwidth (S21 @ -1db Loss)	40 Ghz	> 40 Ghz	> 40 Ghz	
Inductance (Self / Mutual)	0.22 / 0.05 nH	0.13 / 0.03 nH	0.10 / 0.03 nH	
Capacitance (Self / Mutual)	0.25 / 0.04 pF	0.18 / 0.03 pF	0.14 / 0.02 pF	
Contact Resistance	< 25 mOhms	< 25 mOhms	< 25 mOhms	
Current (Continuous / Pulse per Lead)	3.4A / 5.8A @ 20°C	4.2A / 6.0A @ 20°C	8.5A / 8.7A @ 20°C	
Closest Component Proximity	Within 0.5 mm	Within 0.5 mm	Within 0.5 mm	
Compliance (Travel / Operating Stroke)	0.38 / 0.23 mm	0.28 / 0.18 mm	0.23 / 0.13 mm	
Contact Force (Initial per Lead)	25-45 Grams	25-45 Grams	20-40 Grams	
Operating Temperature	-55°C to +155°C	-55°C to +155°C	-55°C to +155°C	
Gold P-Layer Expected Life (Actuations)*	> 2,000,000	> 2,000,000	n/a	
SM Interposer Expected Life (Actuations)*	> 500,000	> 500,000	> 1,000-100,000	
Value Summary: High Performance, Reliable, Durable, Compliant and Easily Replaceable = Low Cost of Ownership	Most Robust Longest Life in Prod ATE Optimized	Best Electricals w/ Long Life in Prod ATE Optimized	Best Electricals Low Cost Custom Hand Test/ Eval/ B2B	
Target Applications (IC Test, Industrial, Military, Medical)	Lrg BGA/Hi Freq/Hi Pwr Char/ SLT/ ATE HVM	RF/ Mmw ave/ Hi Speed Char/ SLT/ ATE HVM	Hi Freq-Speed-Pwr Char/ SLT/ Rel-BI/ B2B	

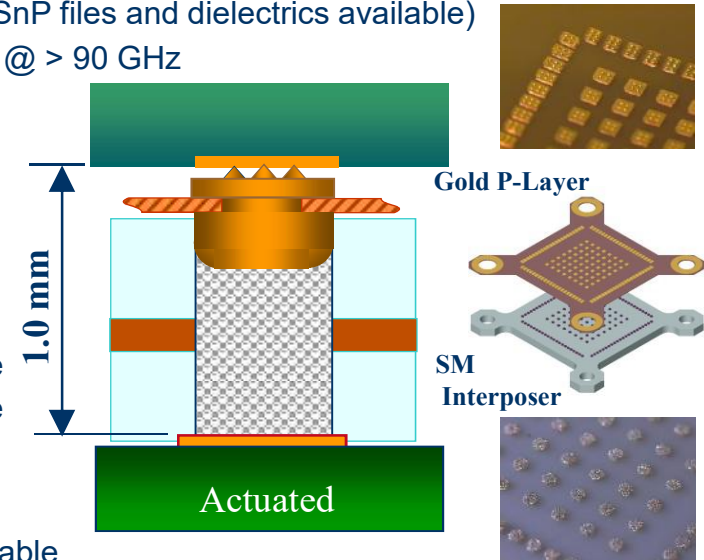
*Contact life may vary and can be influenced by many factors including the package, board, amount of compression, debris, test application, environment, handling and maintenance, etc.

SMP-1.0 Contacts

2 Piece System – Gold P-Layer and SM Interposer with Core Technology

Electrical (0.5 mm pitch, measured data with full reports, SPICE models, SnP files and dielectrics available)

– Insertion loss / bandwidth (corner)	-1.0 db @ 40 GHz, -1.5 db @ > 90 GHz
– Inductance (field)	0.22 nH
– Mutual inductance (field)	0.05 nH
– Capacitance to ground (field)	0.25 pF
– Mutual capacitance (field)	0.04 pF
– Contact resistance (initial)	< 25 mΩ
– Thermal resistance (per contact)	130.5 K/W
– Continuous current rating (per contact)	3.4 amps @ 20°C heat rise
– Pulse rating 1% duty cycle (per contact)	5.8 amps @ 20°C heat rise



Mechanical (qualified and validated, measured data available)

– Contact length (compressed)	1.0 mm
– Minimum pitch	0.5 mm – mixed pitch available
– Packages	BGA, LGA, QFN, DFN, CSP, POP – full and partial arrays available
– Structure	Gold P-Layer and SM Interposer with core technology (patented)
– Gold P-Layer materials	Gold and nickel plating over copper (no vias)
– SM Interposer materials	Silver particles in silicone elastomer with polyimide core (patented)
– Compliance range	0.38 mm maximum travel with 0.23 mm operating stroke
– Contact force (per contact)	25-45 grams – depends on amount of compression
– Operating temperature	-55°C to +155°C
– Estimated life*	Gold P-Layer > 2,000,000 actuations, SM Interposer > 500,000 actuations

* Contact life may vary and can be influenced by many factors including the package, board, amount of compression, debris, test application, environment, handling and maintenance, etc.

SMP-0.6 Contacts

2 Piece System – Gold P-Layer and SM Interposer with Core Technology

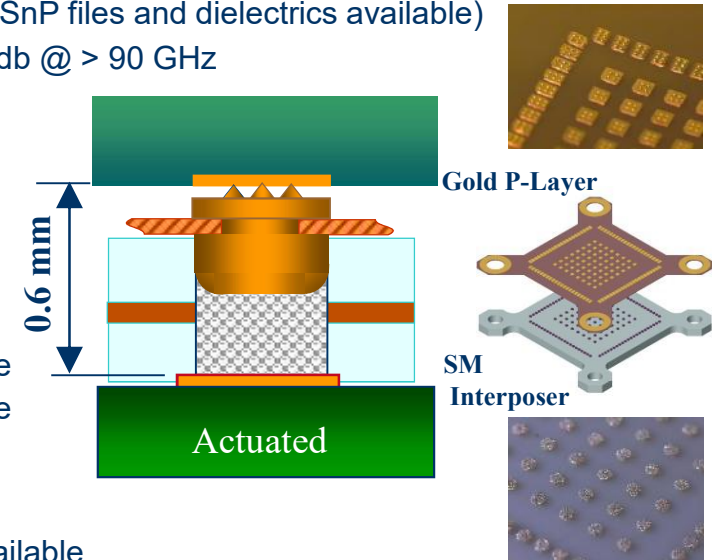
Electrical (0.5 mm pitch, measured data with full reports, SPICE models, SnP files and dielectrics available)

– Insertion loss / bandwidth (corner)	-1.0 db @ > 40 GHz, -1.5 db @ > 90 GHz
– Inductance (field)	0.13 nH
– Mutual inductance (field)	0.03 nH
– Capacitance to ground (field)	0.18 pF
– Mutual capacitance (field)	0.03 pF
– Contact resistance (initial)	< 25 mΩ
– Thermal resistance (per contact)	109.8 K/W
– Continuous current rating (per contact)	4.2 amps @ 20°C heat rise
– Pulse rating 1% duty cycle (per contact)	6.0 amps @ 20°C heat rise

Mechanical (qualified and validated, measured data available)

– Contact length (compressed)	0.6 mm
– Minimum pitch	0.35 mm – mixed pitch available
– Packages	BGA, LGA, QFN, DFN, CSP, POP – full and partial arrays available
– Structure	Gold P-Layer and SM Interposer with core technology (patented)
– Gold P-Layer materials	Gold and nickel plating over copper (no vias)
– SM Interposer materials	Silver particles in silicone elastomer with polyimide core (patented)
– Compliance range	0.28 mm maximum travel with 0.18 mm operating stroke
– Contact force (per contact)	25-45 grams – depends on amount of compression
– Operating temperature	-55°C to +155°C
– Estimated life*	Gold P-Layer > 2,000,000 actuations, SM Interposer > 500,000 actuations

* Contact life may vary and can be influenced by many factors including the package, board, amount of compression, debris, test application, environment, handling and maintenance, etc.

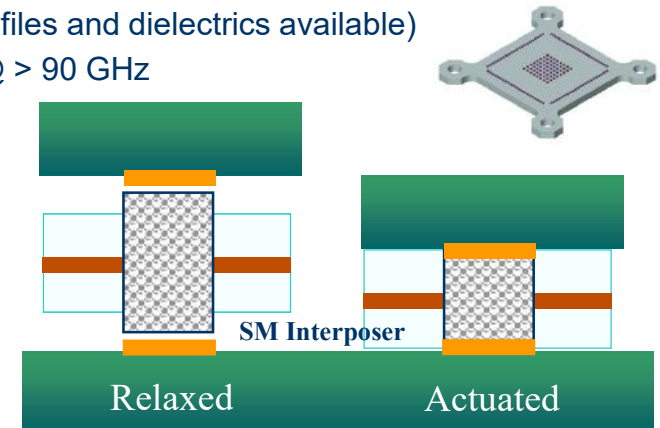


SM Interposer

1 Piece System – SM Interposer with Core Technology

Electrical (0.5 mm pitch, measured data with full reports, SPICE models, SnP files and dielectrics available)

- | | |
|--|--|
| – Insertion loss / bandwidth (corner) | -1.0 db @ > 40 GHz, -1.2 db @ > 90 GHz |
| – Inductance (field) | 0.10 nH |
| – Mutual inductance (field) | 0.03 nH |
| – Capacitance to ground (field) | 0.14 pF |
| – Mutual capacitance (field) | 0.02 pF |
| – Contact resistance (initial) | < 25 mΩ |
| – Thermal resistance (per contact) | 59.8 K/W |
| – Continuous current rating (per contact) | 8.5 amps @ 20°C heat rise |
| – Pulse rating 1% duty cycle (per contact) | 8.7 amps @ 20°C heat rise |



Mechanical (qualified and validated, measured data available)

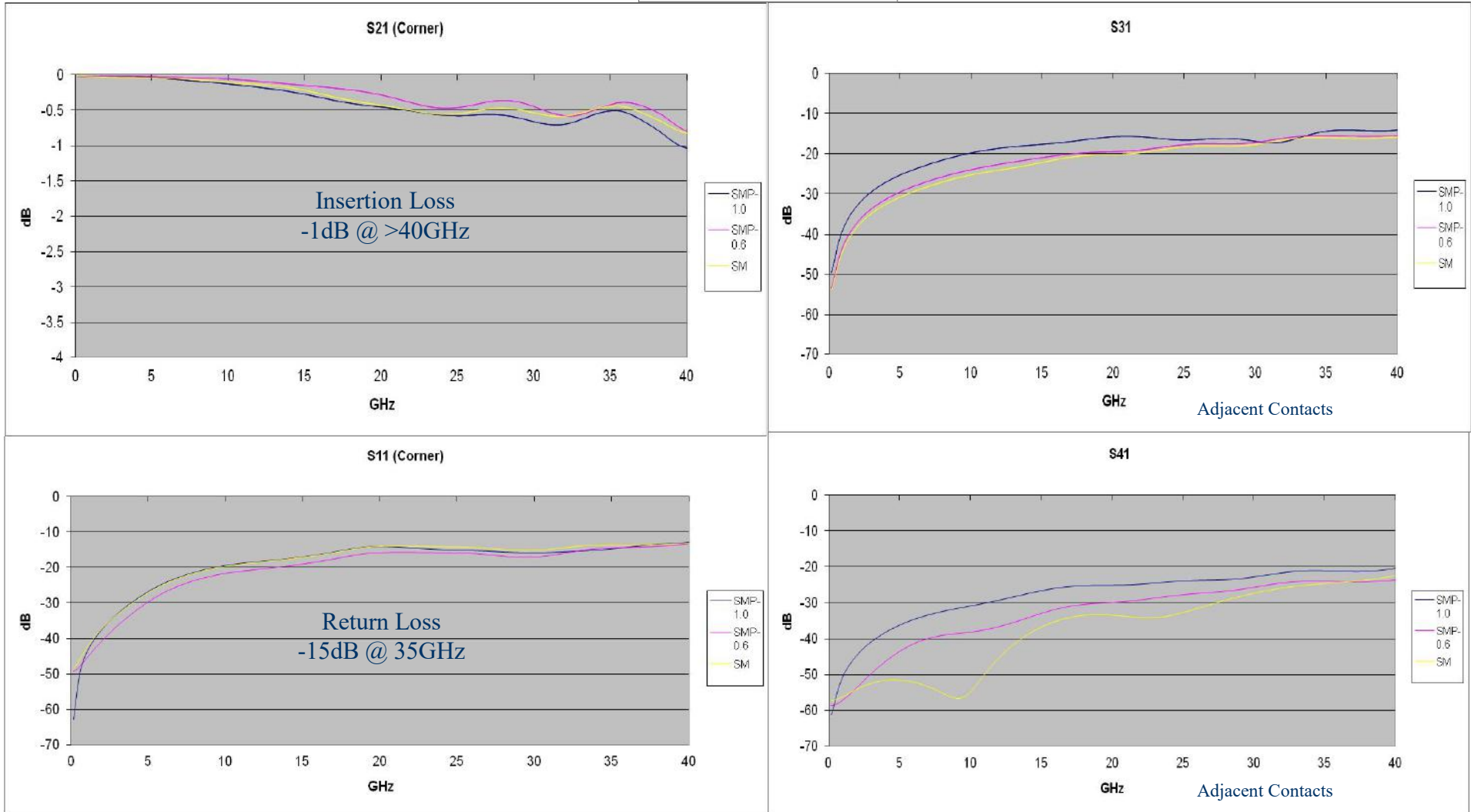
- | | |
|-------------------------------|---|
| – Contact length (compressed) | 0.4-0.6 mm – depends on package |
| – Minimum pitch | 0.3 mm – mixed pitch available |
| – Packages | BGA, LGA, QFN, DFN, CSP, POP – full and partial arrays available |
| – Structure | SM Interposer with core technology (patented) |
| – SM Interposer materials | Silver particles in silicone elastomer with polyimide core (patented) |
| – Compliance range | 0.23 mm maximum travel with 0.13 mm operating stroke |
| – Contact force (per contact) | 20-40 grams – depends on amount of compression |
| – Operating temperature | -55°C to +155°C |
| – Estimated life* | > 1,000-100,000 actuations |



* Contact life may vary and can be influenced by many factors including the package, board, amount of compression, debris, test application, environment, handling and maintenance, etc.

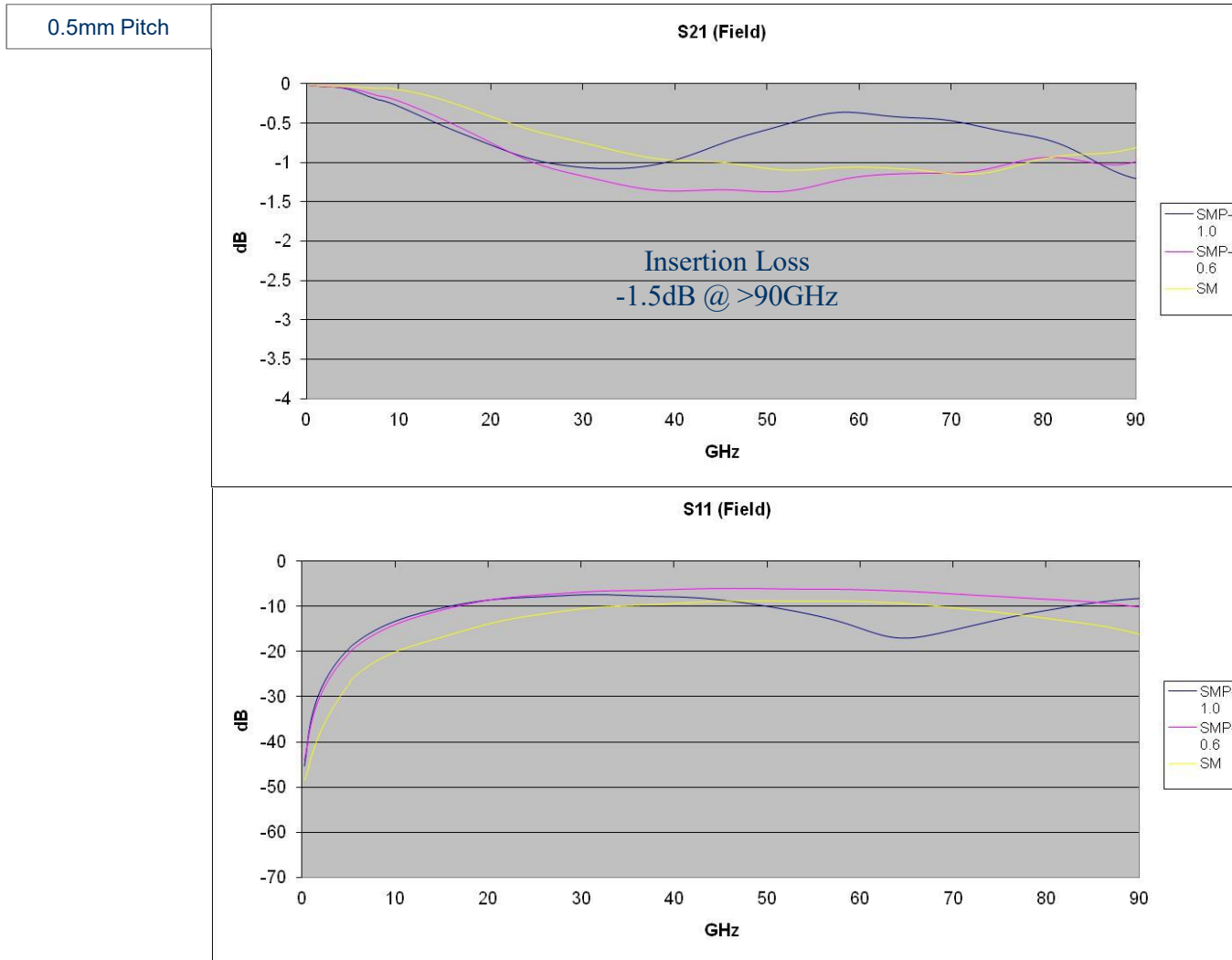
SMP and SM Contacts – 40 GHz

0.5mm Pitch



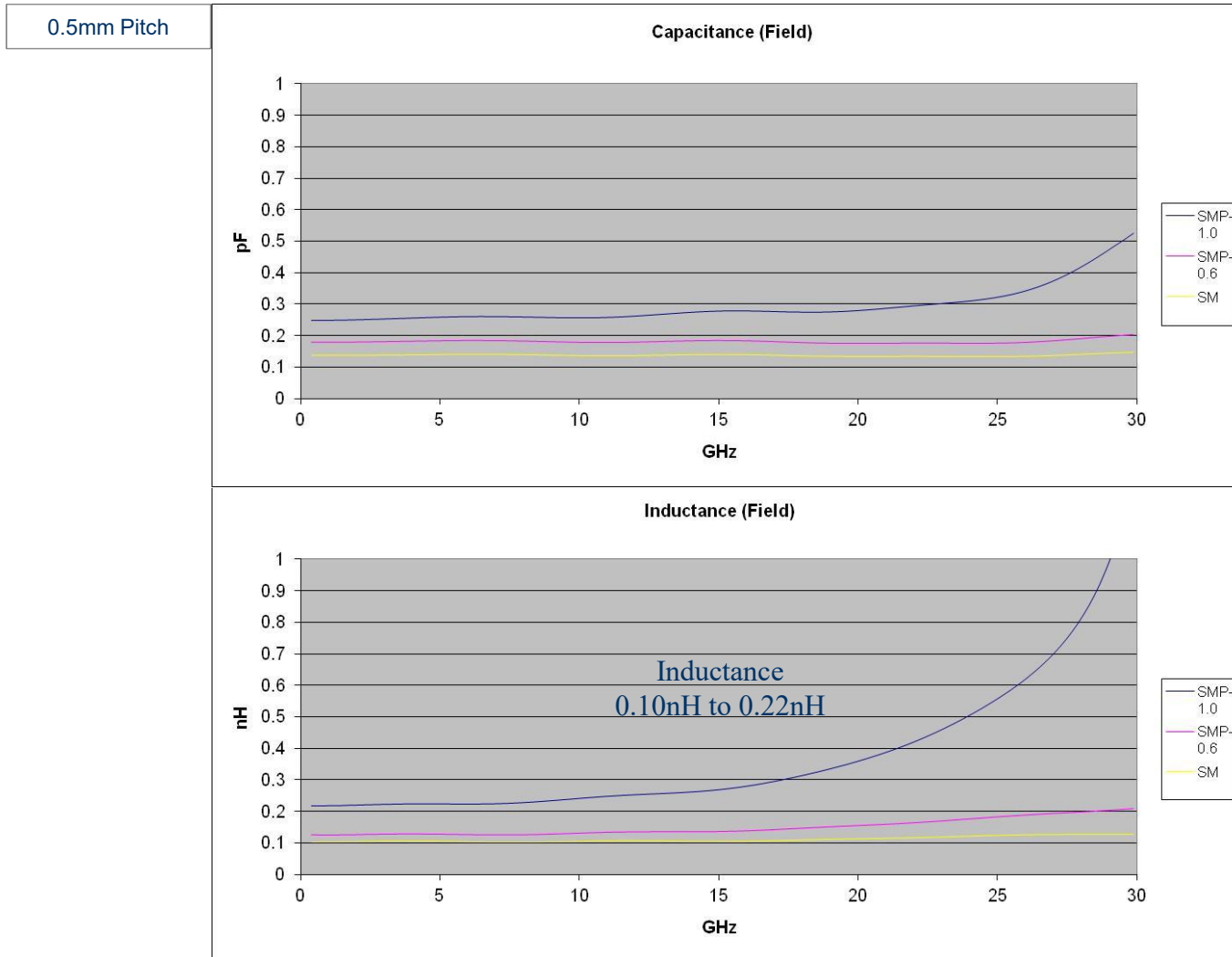
Note: Detailed Reports & S-Parameter Files Available Upon Request

SMP and SM Contacts – 90 GHz



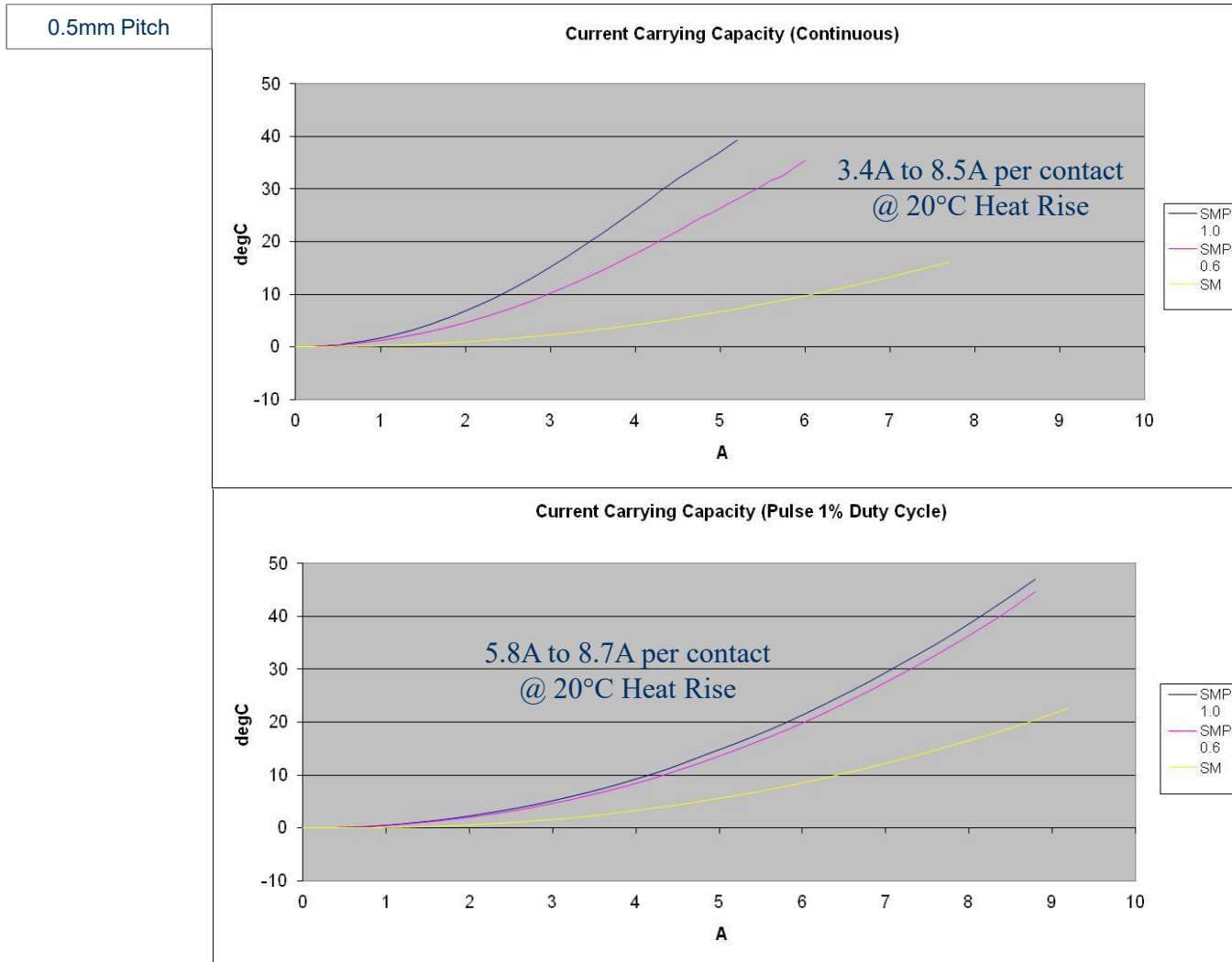
Note: Detailed Reports & S-Parameter Files Available Upon Request

SMP and SM Contacts – C & L



Note: Detailed Reports & SPICE Models Available Upon Request

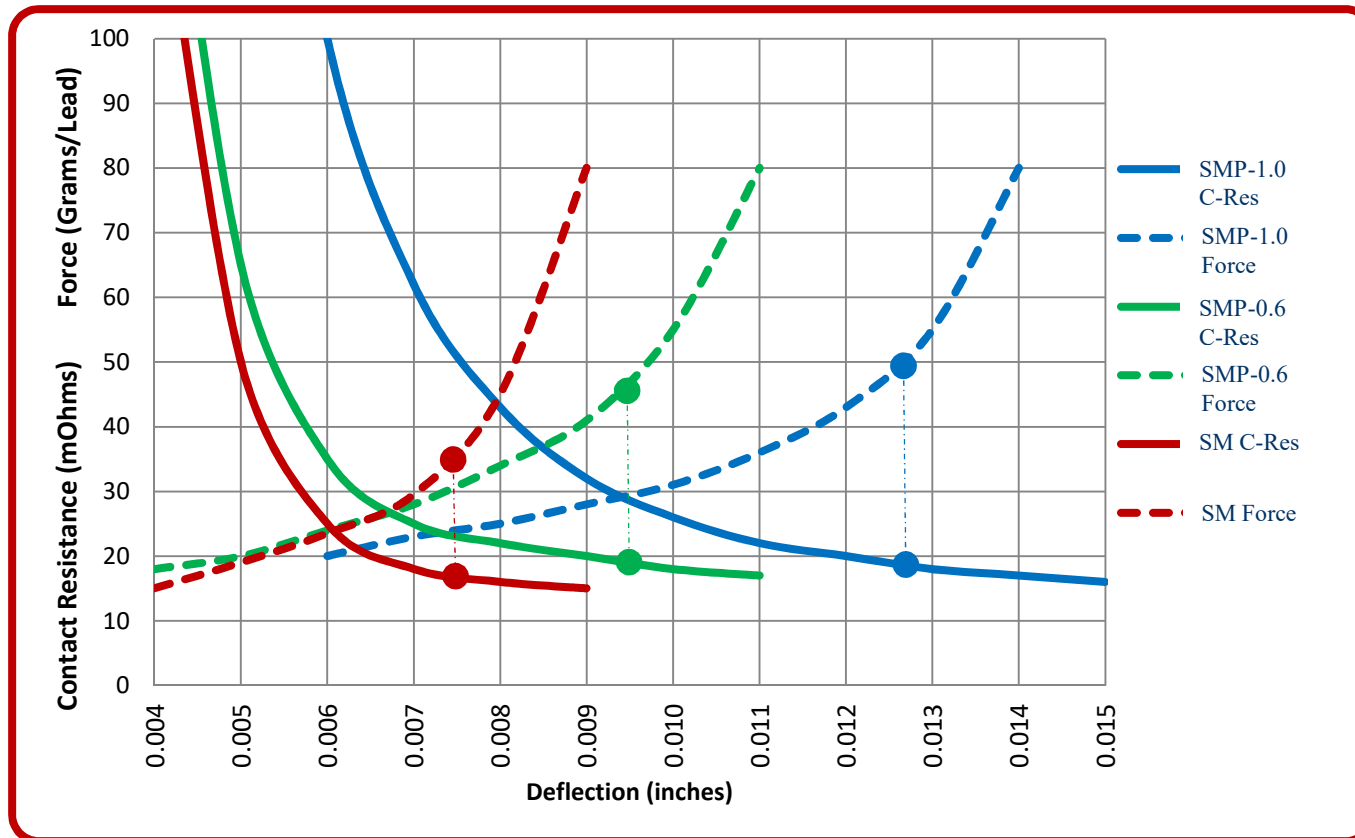
SMP and SM Contacts – DC



Note: Detailed Reports Available Upon Request

SMP and SM Contacts

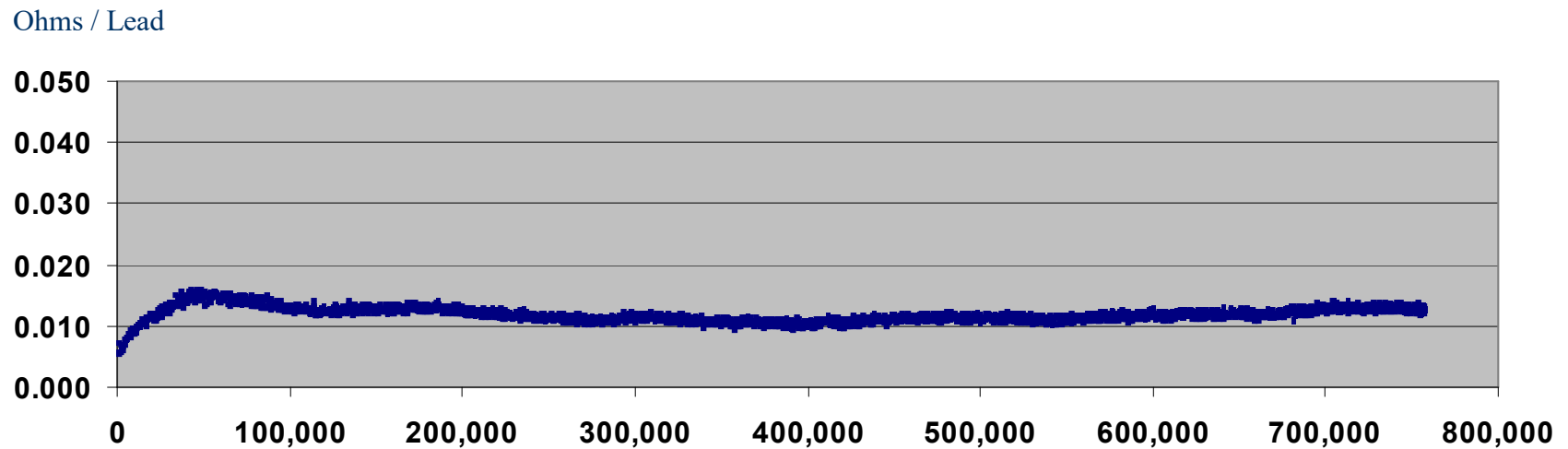
Force – Deflection – Resistance



SMP Cycling Data

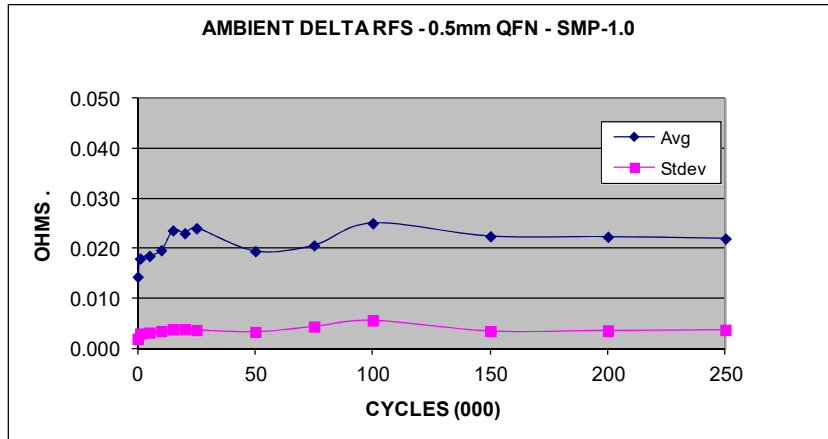
0.5mm Pitch QFN
Internal Cyclor Data
@ Room Temp (Ambient)

SMP-1.0 Two Piece System
- Excellent Electrical Performance
- ATE HVM Solution



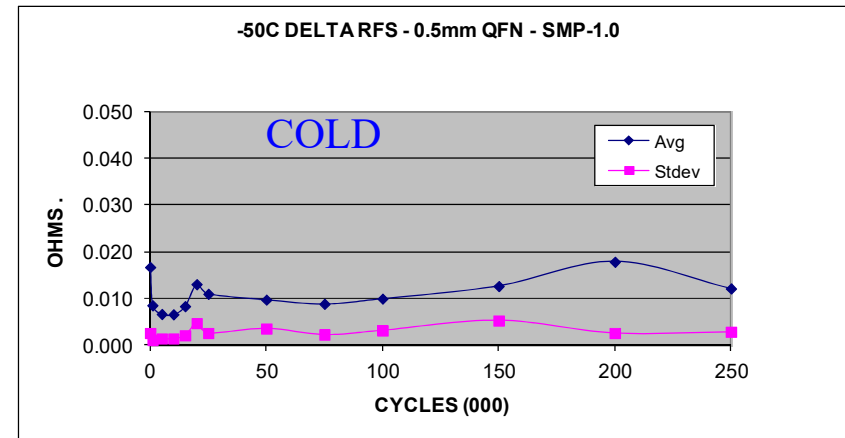
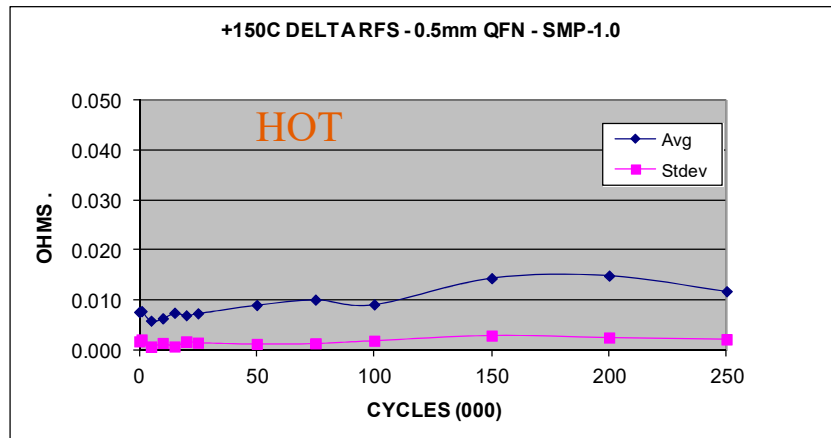
**Gold P-Layer and SM Interposer with Core
Enable Long Life and Smooth Electrical Response**

SMP Cycling Data

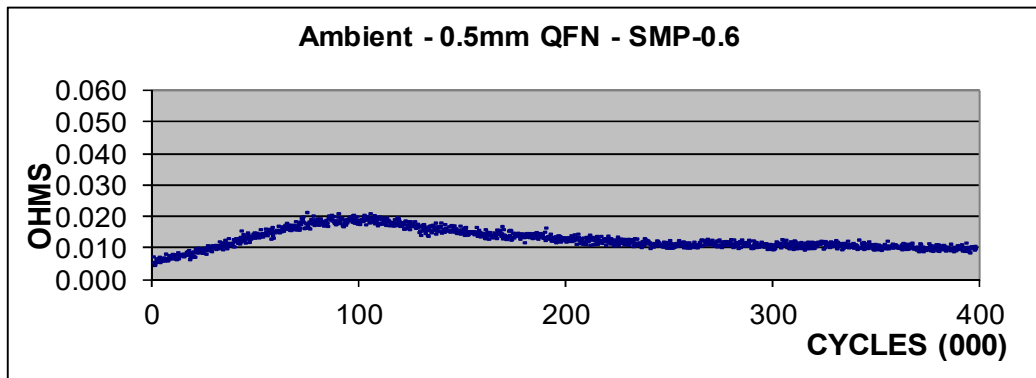


0.5mm Pitch QFN
Delta RFS Handler
Tri-Temp Cycling
(Ambient, +150°C, -50°C)

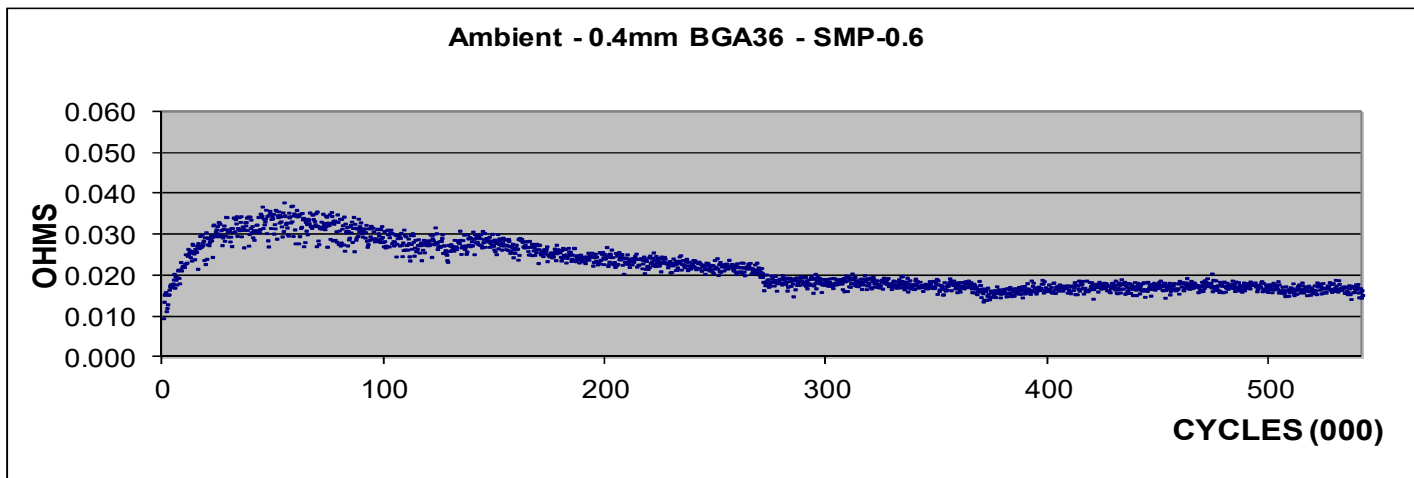
SMP-1.0 Two Piece System
- Excellent Electrical Results
- ATE HVM Solution



SMP Cycling Data



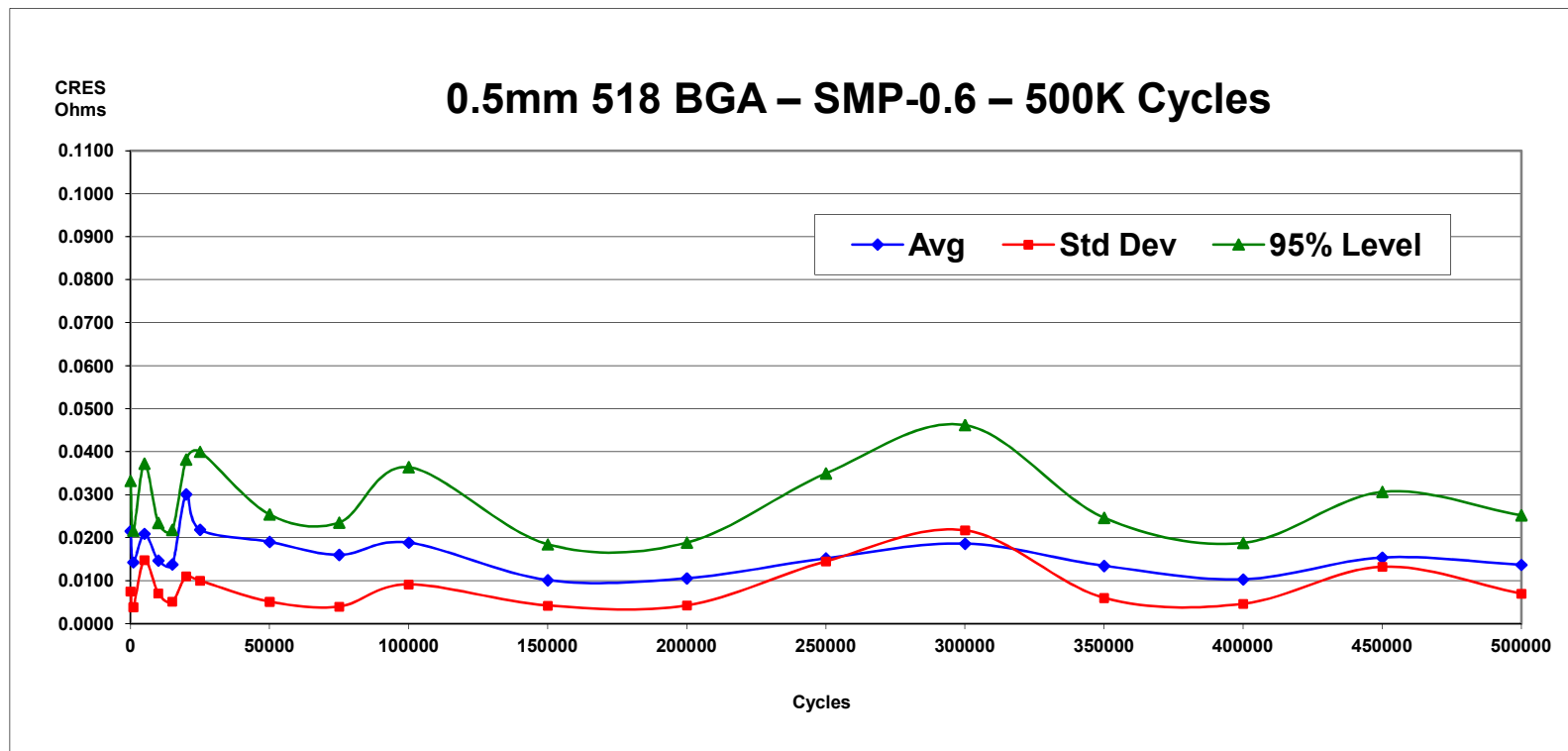
SMP-0.6 Two Piece System
Low Profile Structure:
- Best Electrical Performance
- ATE HVM Solution



SMP Cycling Data

0.5mm 518 BGA
A-Frame Vertical Plunge Cycler
@ Room Temp (Ambient)

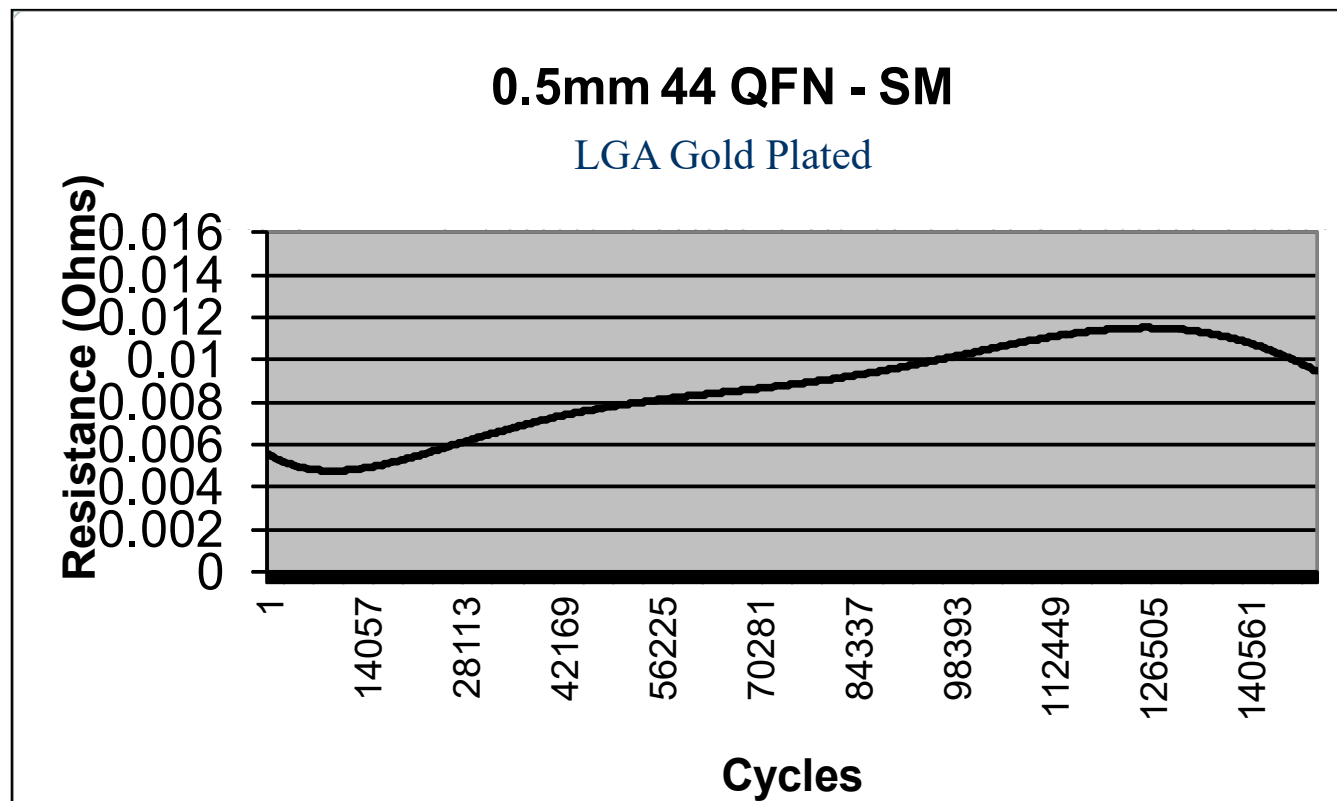
SMP-0.6 Two Piece System
Low Profile Structure:
- Best Electrical Performance
- ATE HVM Solution



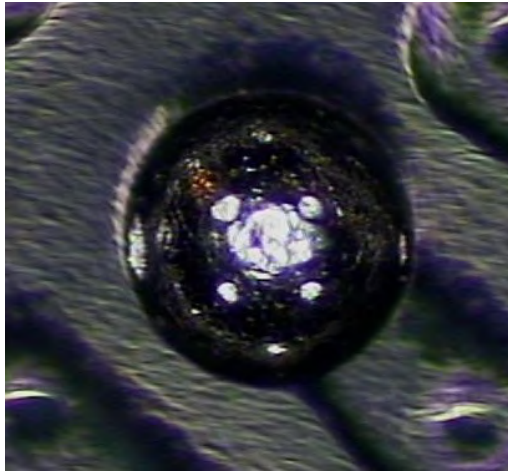
SM Cycling Data

0.5mm Pitch QFN
Internal Cyclor Data
@ Room Temp (Ambient)

SM One Piece System
SM Interposer Only
Low Cost Solution

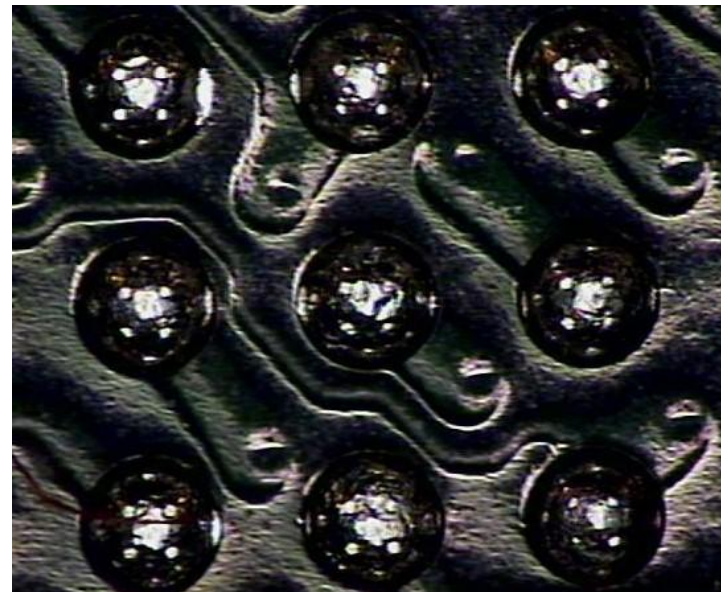
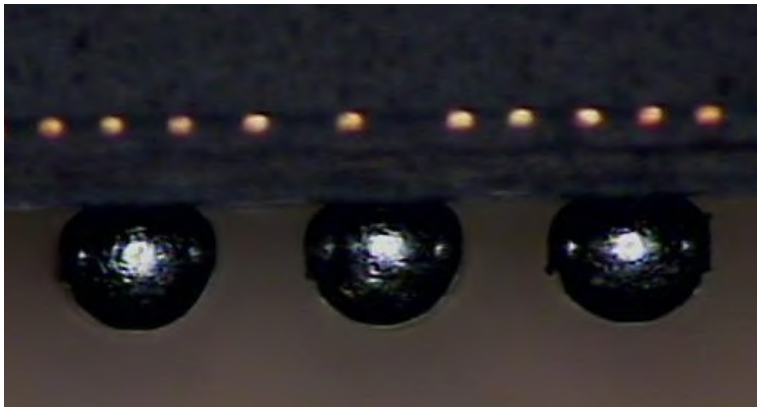


SMP Contacts – BGA Witness Marks



SMP Two Piece Systems
Contact Tips Pierce Only
(No Digging or Scrubbing)

Uniform Sharp Contact Tips Minimize
Ball Damage with No Solder Transfer
and Less Cleaning



Images taken after 5 actuations with the same BGA package

SM Interposer – BGA Witness Marks



SM One Piece System
SM Conductive Particles Pierce Only
(No Digging or Scrubbing)

SM Interposer Conforms & Small Size
Particles Maximize Surface Area Contact
and Prevent Ball Damage

