Engineering Manual
LOCTITE GC 10 T3 Solder Paste

Suitable for use with: Standard SAC Alloys

Contents

Contents

GC 10: Performance Summary

Flux

- Halogen-free flux: passes IC with pretreatment IPC-TM-650 2.3.34/EN14582
- Halogen-free flux classification: ANSI/J-STD-004 Rev. B for a type ROL0 classification

Paste

- Suitable for printing up to 125mm/s (5”/s)
- Optimized for long hot soak reflow profiles
- Excellent coalescence in air & nitrogen atmosphere
- Excellent humidity resistance
- Excellent solderability on challenging surface finishes, including CuNiZn
- Colourless residues for easy post-reflow inspection
- Long 12 month shelf-life when stored below 25°C

Contents

Introduction

Basic Solder Paste Properties

Flux Description	GC 10
Alloy	SAC305
Henkel Powder Size	Type 3
Powder Size range, μm	45-25
Metal Content, %	88.5
Malcom Viscosity, 10rpm Pa.s	207
TI	0.50
IPC slump @182°C (0.33mm x 2.03mm) first space no bridge	0.15
IPC Solder Balling	preferred

Introduction

GC 10 Features & Benefits

Product Attribute	Process Benefit
Halogen Free	• No added halogen • Measured <900ppm chlorine and bromine and <1,500ppm total by oxygen (O_2) bomb test
Halide Free	• Flux classification ROL0 in accordance to J-STD-004B
Application	• Designed for printing and pin-in-paste • Excellent wetting to a broad range of metallisations, even through long hot soak profiles in an air atmosphere • Compatible with existing halogen free solutions • Suitable for medium to large board assemblies • Designed for long 12 month shelf-life stability without impact to printing or reflow

Introduction

GC 10 Features & Benefits

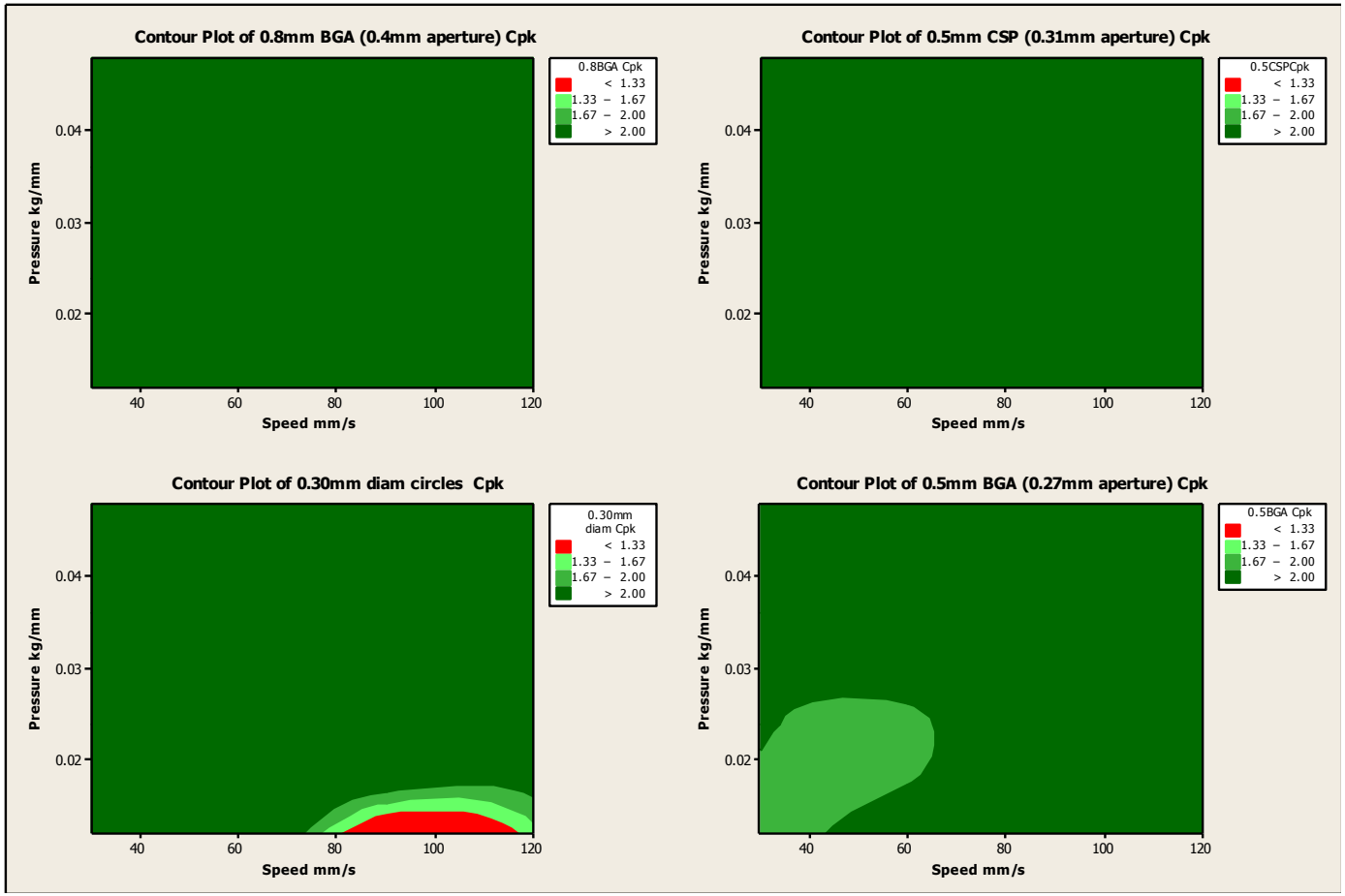
Product Attribute	Process Benefit
Technology Printing Advantages	• Wide process window for printing and minimal slump • Abandon time of up to 2 hours; work life > 16 hours • Excellent print capability and reduction in print related defects • Suited for high throughput production, where yield consistency on print deposits is key • Improved paste transfer efficiency • Allows on line paste utilisation protocols to be re-written
Technology Reflow Advantages	• Optimised for long hot soak reflow processes • Very shiny Pb-free solder joints over wide range of reflow • Excellent coalescence • Excellent humidity resistance • Excellent solderability on challenging surface finishes (ENIG, Copper OSP, CuNiZn and Imm Ag)
Low Voiding	• Low void levels increases solder joint reliability • New chemistries allow pursuit of class 3 void levels in accordance to IPC7095B on industry surface finishes: ENIG, Copper OSP, CuNiZn and Imm Ag • Low voiding in CSP/BGA
Residues	• Clear, transparent and colourless • Pin testable after 4x reflows

Contents

Operating Parameters

Print Process Window (LOCTITE GC 10 SAC305 T3 885V)

- Excellent printing in the range 30 – 120mm/s, 0.4mm to 0.27mm round apertures

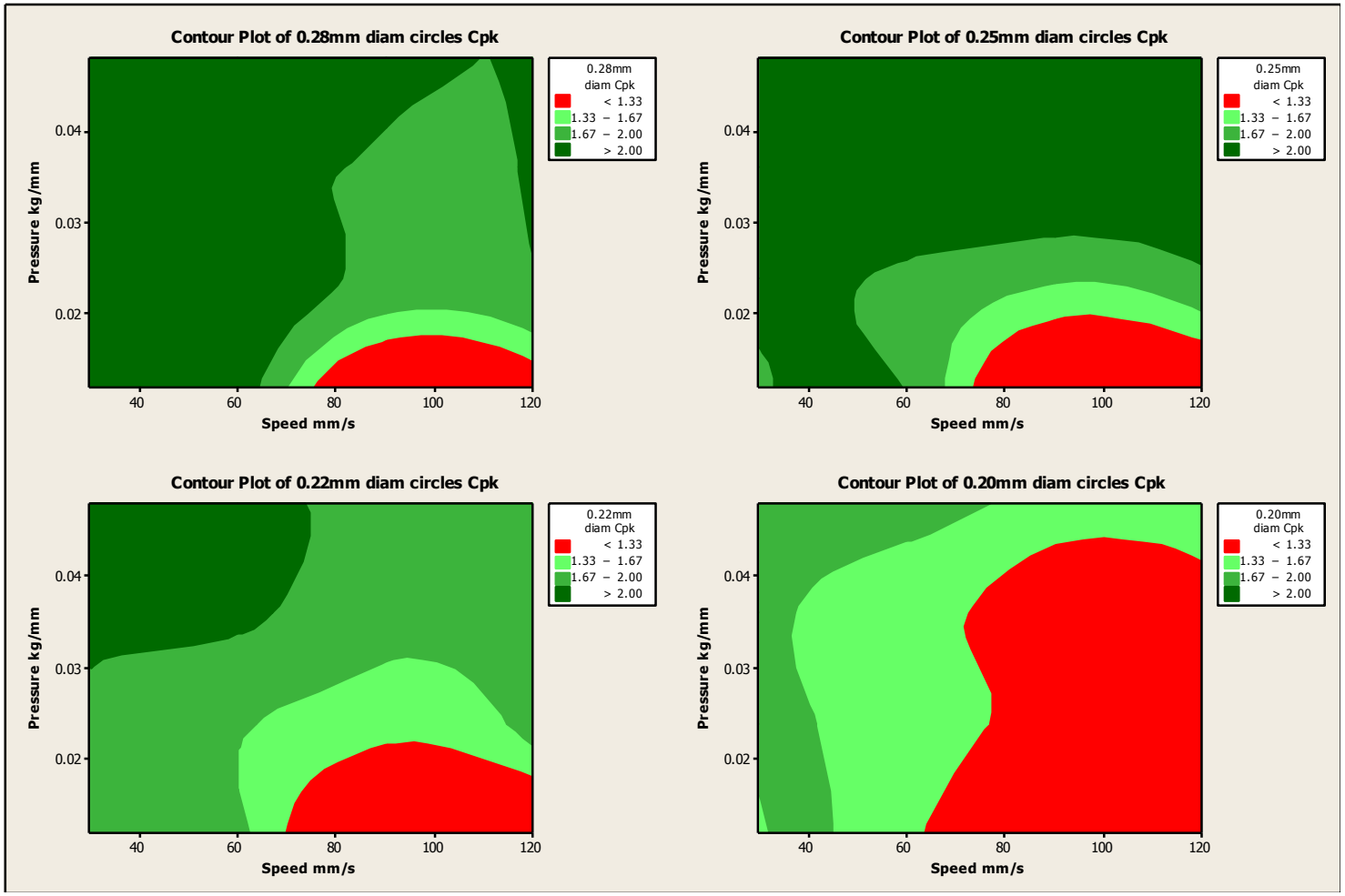


0.8mm, 0.5mm & 0.4mm pitch round apertures, (120µm stencil)

Operating Parameters

Print Process Window (LOCTITE GC 10 SAC305 T3 885V)

- Excellent printing in the range 30 – 120mm/s, 0.28-0.22mm round apertures
- Limited process window with 0.20mm apertures. GC 10 T4 may be required

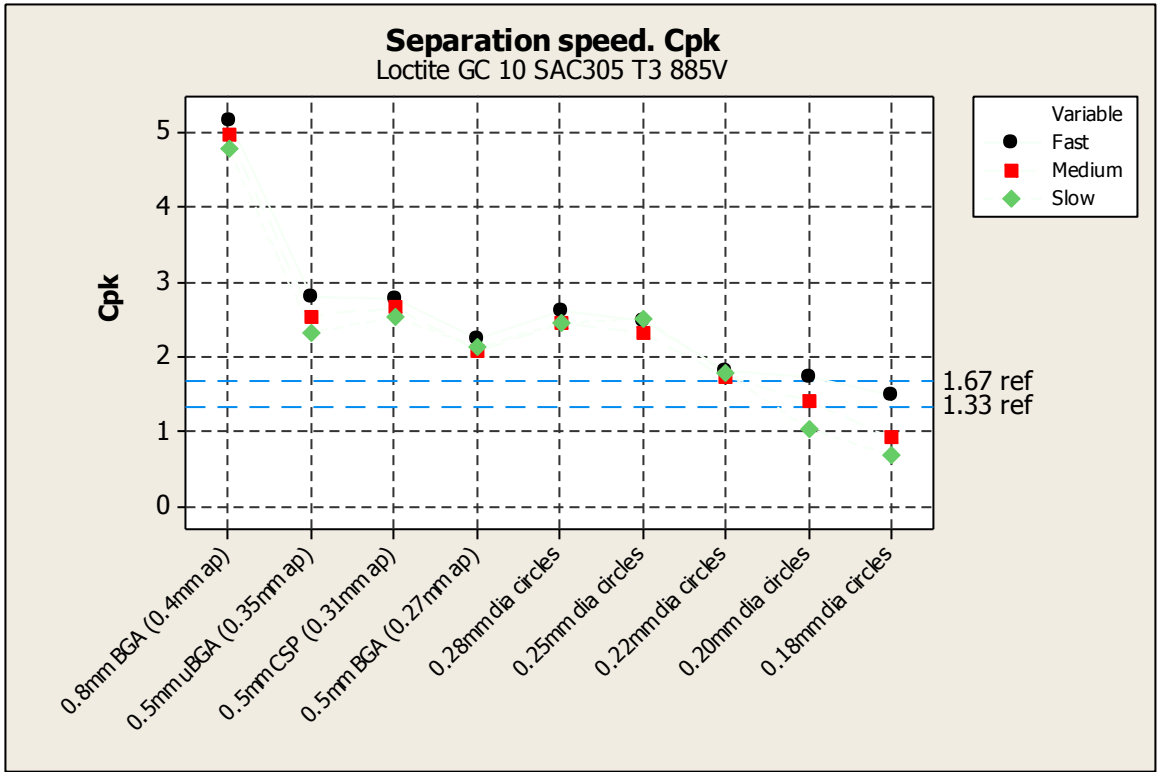


0.28mm – 0.20mm round apertures, (120µm stencil)

Operating Parameters – Separation Speed

Print Process Window (LOCTITE GC 10 SAC305 T3 885V)

- Excellent printing in the range down to 0.22mm round apertures.
- Fast separation speed is preferable.

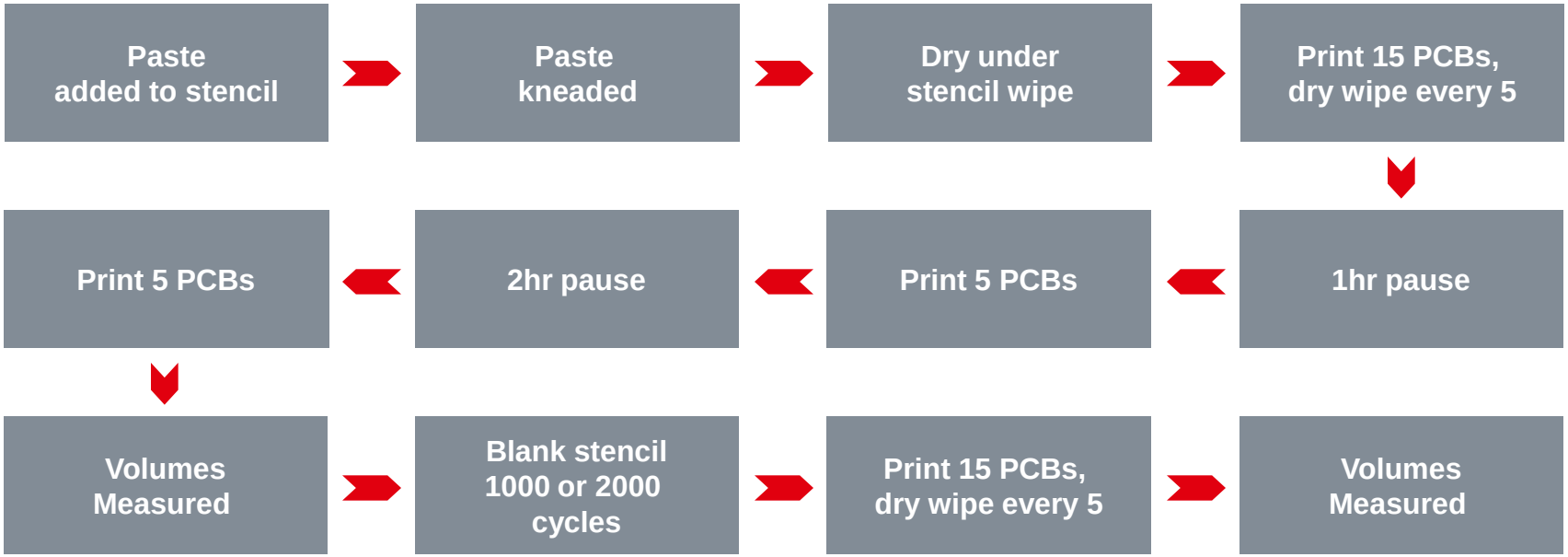


0.8mm BGA – 0.18mm round apertures, 120µm stencil thickness, 60mm/s,10kg

Operating Parameters

Continuous Print and Abandon Stability Assessment

Henkel Board 0.8mm BGA to 0.18mm diameter circles Process flow for Henkel print test as shown below



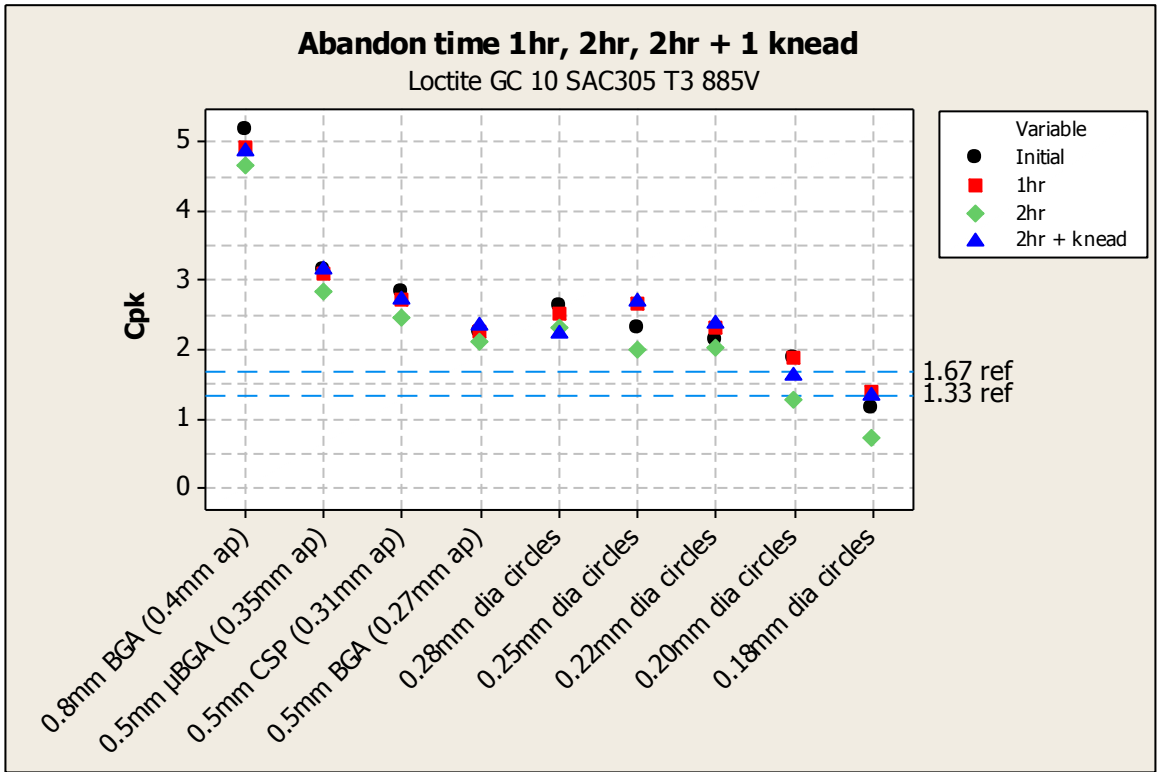
- Printing
- DEK Europa
- Stainless steel, laser cut
- 120µm thickness
- Vacuum tooling

- 250mm, 60° squeegee
- 60mm/s squeegee speed
- Fast separation speed
- Conditions typical, 22C, 40% RH
- Koh Young KY-8020T volume measurement

Operating Parameters – Abandon Stability 22°C/40%RH

Print Process Window (LOCTITE GC 10 SAC305 T3 885V)

- **Print Capabilities**
- Excellent printing in the range down to 0.22mm round apertures
- Single knead cycle required after 2hr abandon at 0.20mm round apertures



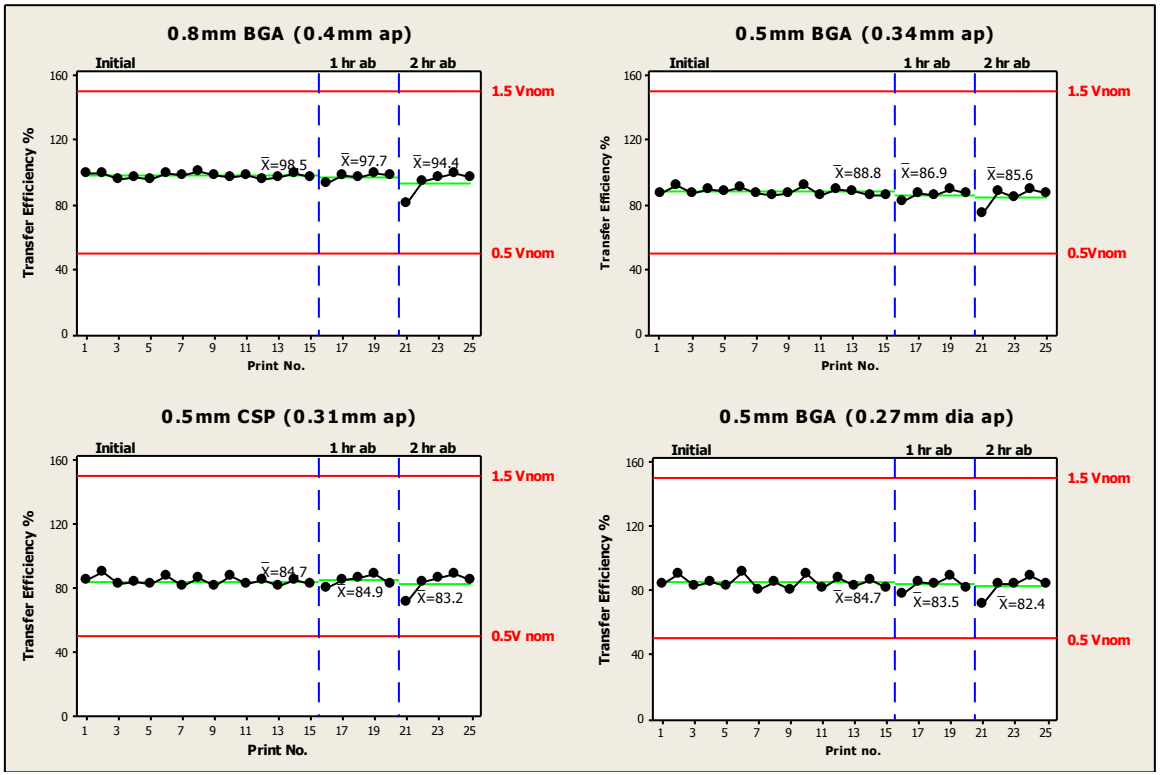
0.8mm BGA – 0.15mm round apertures

120µm stencil thickness, 60mm/s, fast separation, 250mm squeegee, 10kg

Operating Parameters – Abandon Stability 22°C/40%RH

Print Process Window (LOCTITE GC 10 SAC305 T3 885V)

- **Transfer Efficiencies**
- Excellent printing in the range 0.40mm down to 0.27mm round apertures



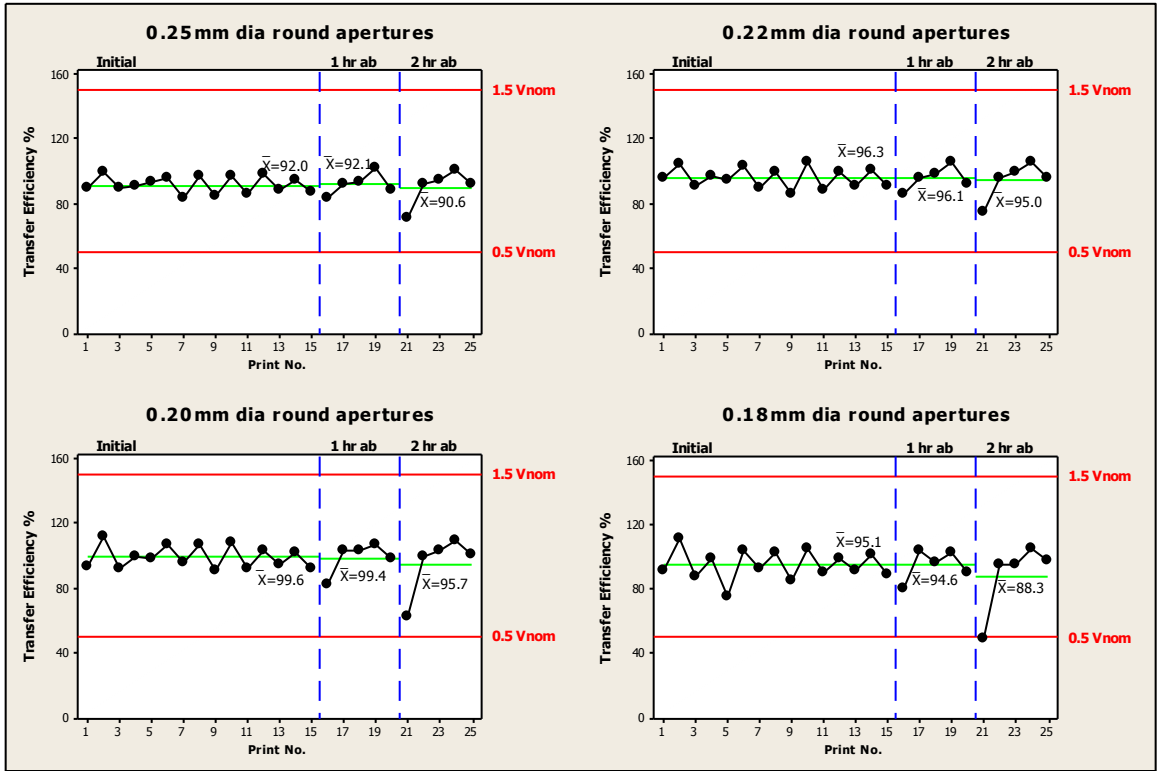
0.8mm BGA – 0.5mm BGA round apertures

120µm stencil thickness, 60mm/s, fast separation, 250mm squeegee, 10kg

Operating Parameters – Abandon Stability 22°C/40%RH

Print Process Window (LOCTITE GC 10 SAC305 T3 885V)

- **Transfer Efficiencies**
- Excellent printing in the range down to 0.22mm round apertures
- Single knead cycle for best results after 2hr abandon at 0.20mm round apertures and below



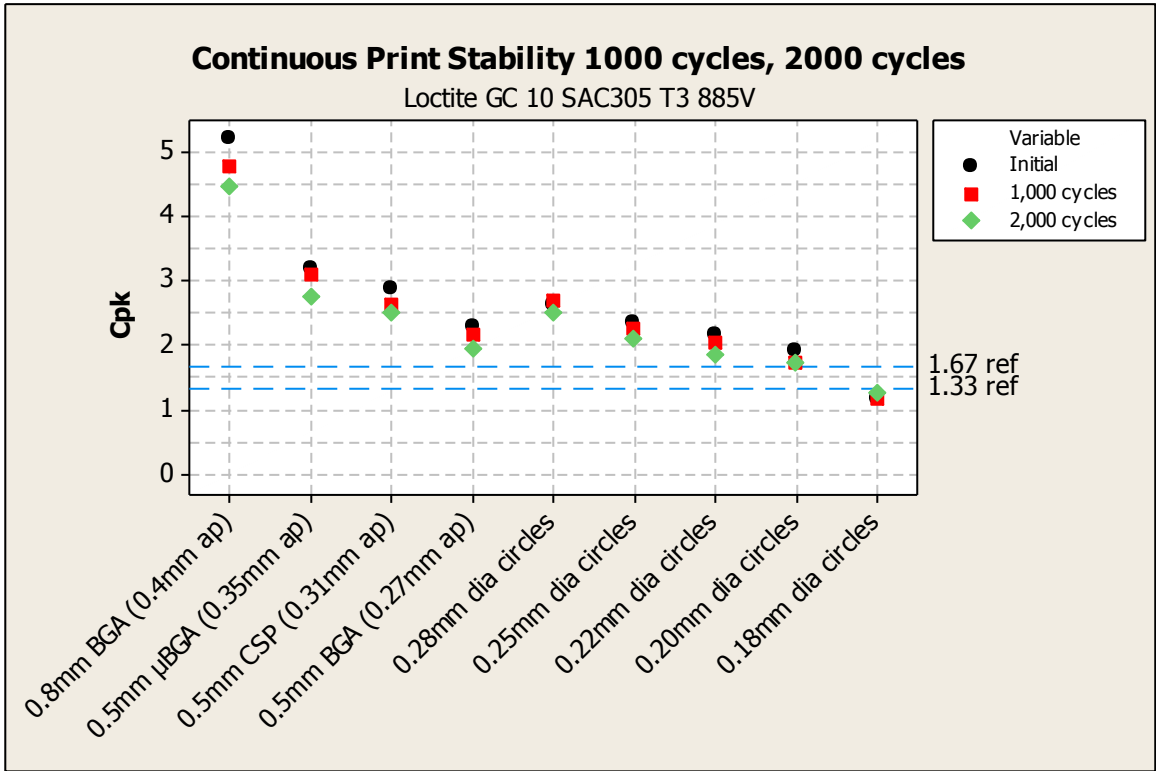
0.28mm – 0.20mm round apertures

120µm stencil thickness, 60mm/s, fast separation, 250mm squeegee, 10kg

Operating Parameters – Continuous Print Stability

Print Process Window (LOCTITE GC 10 SAC305 T3 885V)

- **Print Capabilities**
- No impact on print performance after 8 hours (1000 cycles) and 16 hours (2000 cycles) printing

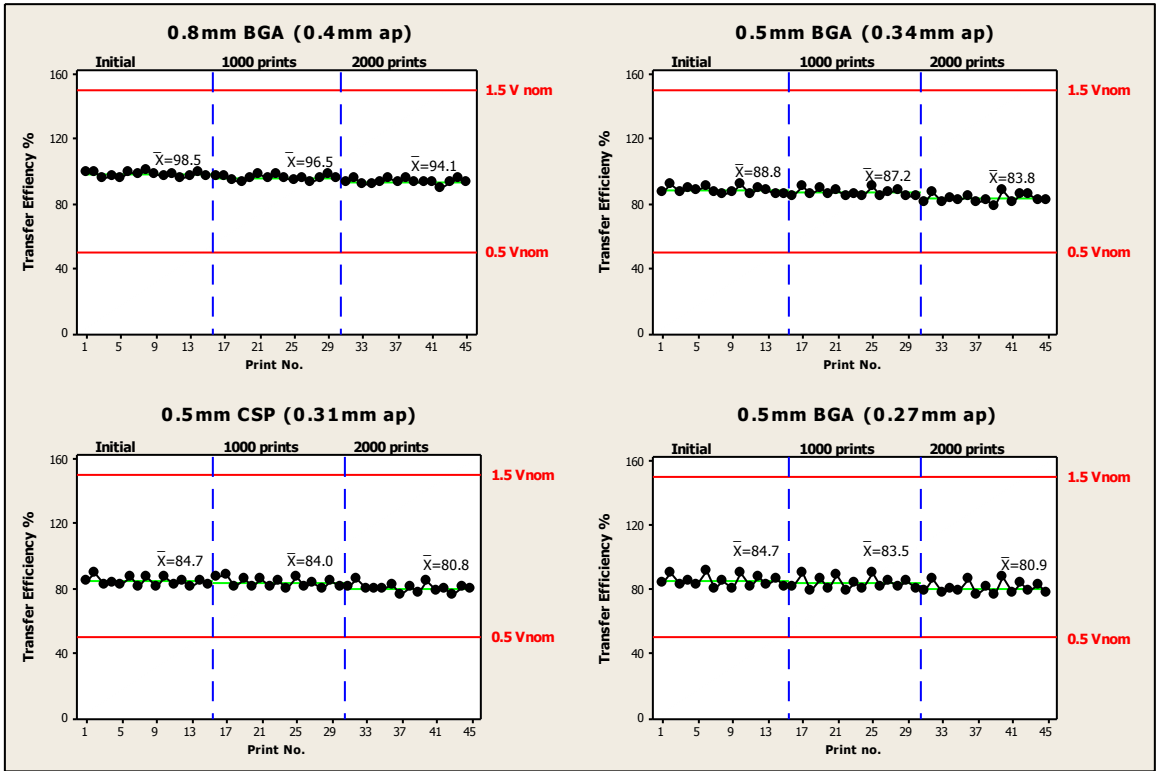


0.8mm BGA – 0.18mm round apertures, 120µm stencil thickness, 60mm/s, Fast separation, 250mm squeegee, 10kg

Operating Parameters – Continuous Print Stability

Print Process Window (LOCTITE GC 10 SAC305 T3 885V)

- **Transfer Efficiencies**
- No impact on print performance after 8 hours (1000 cycles) and 16 hours (2000 cycles) printing



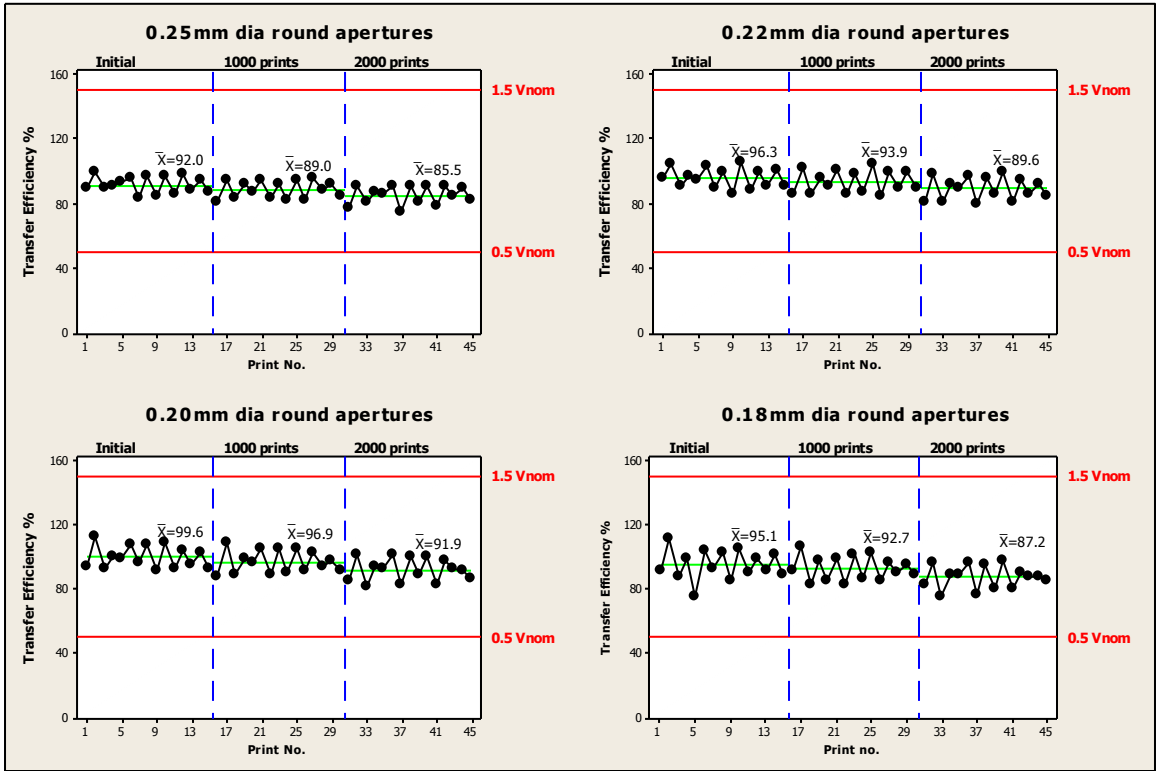
0.8mm BGA – 0.5mm BGA round apertures, 120µm stencil thickness, 60mm/s, Fast separation, 250mm squeegee, 10kg

Operating Parameters – Continuous Print Stability

Print Process Window (LOCTITE GC 10 SAC305 T3 885V)

- **Transfer Efficiencies**

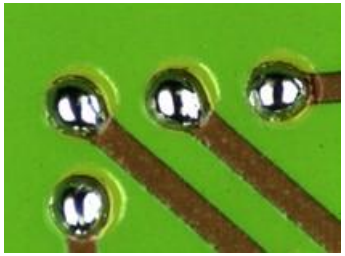
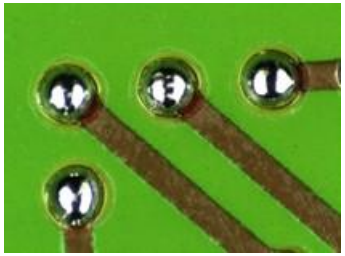
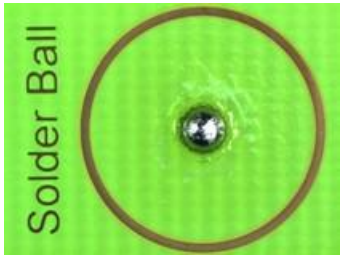
- No impact on print performance after 8 hours (1000 cycles) and 16 hours (2000 cycles) printing

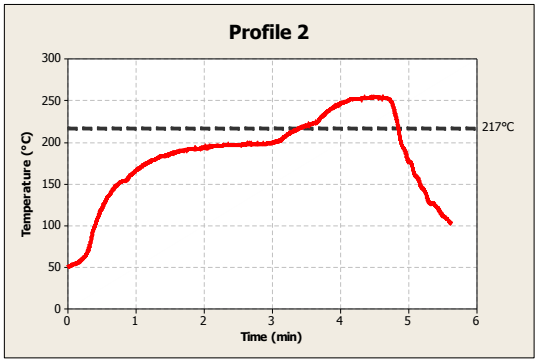


0.28mm– 0.20mm round apertures, 120µm stencil thickness, 60mm/s, Fast separation, 250mm squeegee, 10kg

Operating Parameters (Reflow)

Paste Properties After Continuous Printing

	Initial	1,000 cycles (8 hours) 22°C, 40%RH	2,000 cycles (16 hours) 22°C, 40%RH
0.5mm CSP			
6.5mm Overprint			

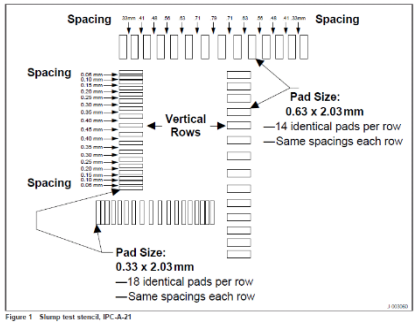


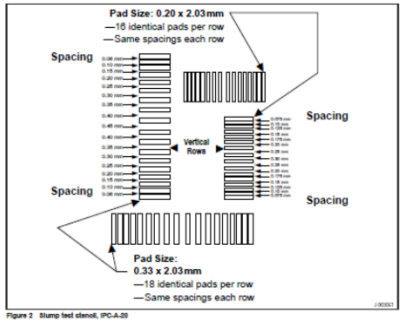
- No change to reflow performance after 16hours printing (2000 print cycles)

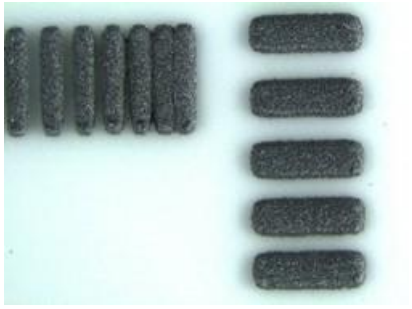
Operating Parameters

Slump

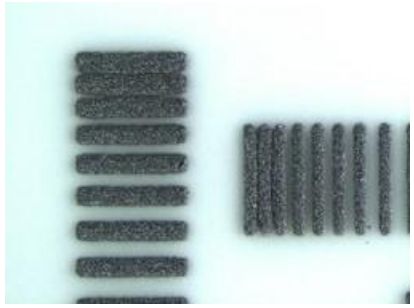
- Slump evaluation was performed in accordance with J-STD-005A, IPC-TM-650 2.4.35
- First spacing with no bridge recorded after 10 minutes at 182°C (35°C below melting point 217°C)







A21
200µm



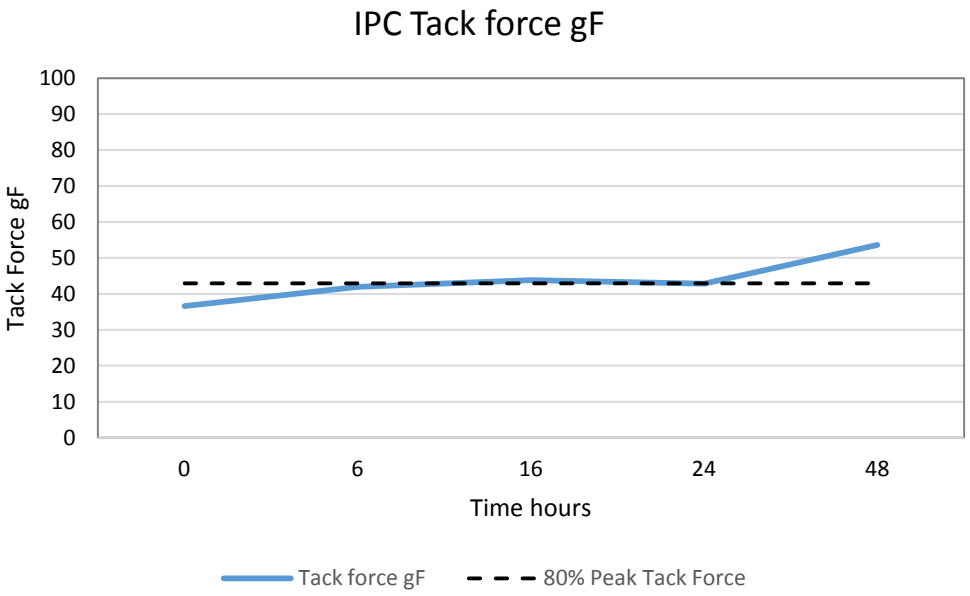
A20
100µm

Stencil Design/ thickness	A 21 200µm		A 20 100µm	
Aperture	0.63 x 2.03mm	0.33 x 2.03mm	0.33 x 2.03mm	0.20 x 2.03mm
Pass mark	0.63mm	0.30mm	0.30mm	0.25mm
GC 10 25°C	0.33mm	0.10mm	0.08mm	0.075mm
GC 10 182°C	0.33mm	0.15mm	0.15mm	0.125mm

Operating Parameters

Tack Force

- Tackiness evaluation was performed in accordance with J-STD-005A, IPC-TM-650 2.4.44
- GC10 tack-life >48hours



Malcom TK1 Tackiness Tester

Preload	300g
Preload time	5 secs
Retraction Speed	2.5mm/sec
Deposit diameter	5.1mm
Deposit height	0.25mm

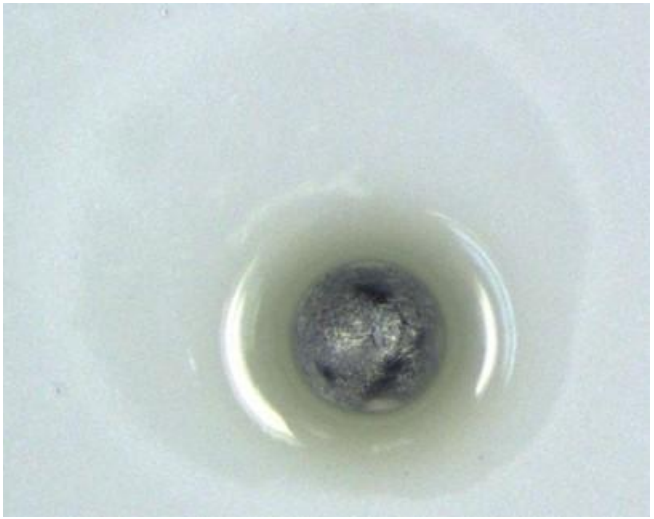
Operating Parameters
Solder Balling

- Solder balling performance as been assessed in accordance with an extended version of IPC-TM-650 2.4.4.3
- Clear and colourless residues observed post-reflow

Initial

Preferred Pass

24hrs 25°C 50% RH

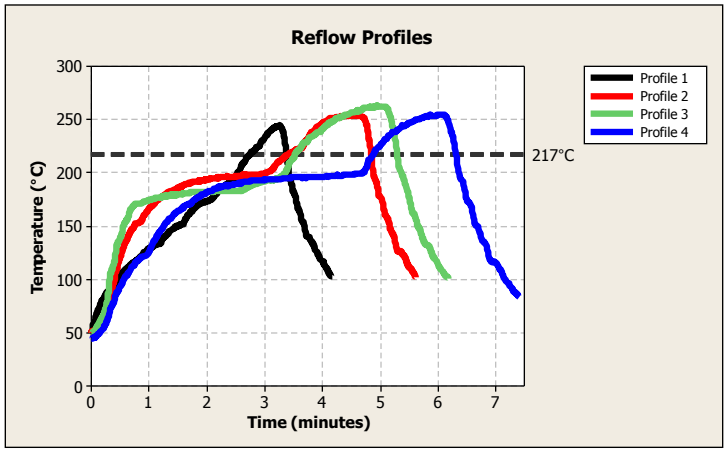


Preferred Pass

Operating Parameters

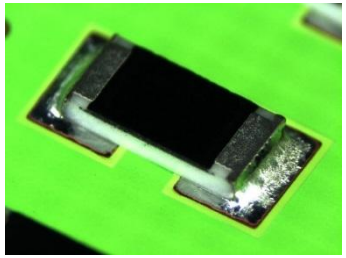
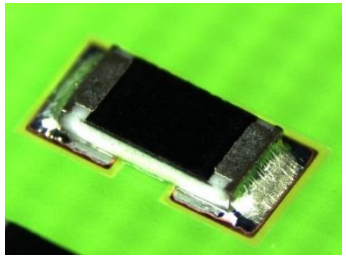
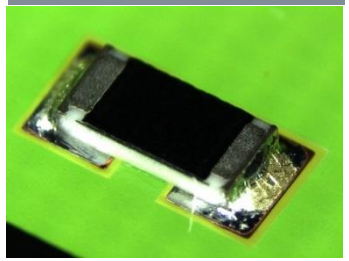
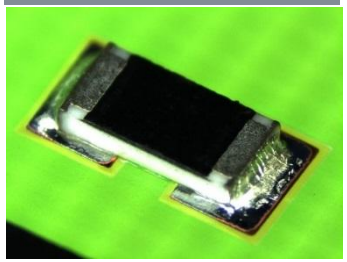
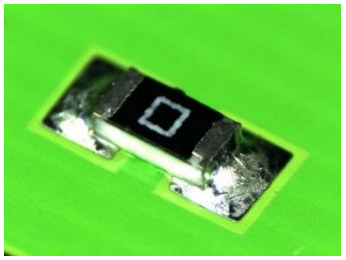
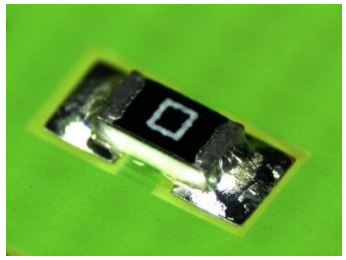
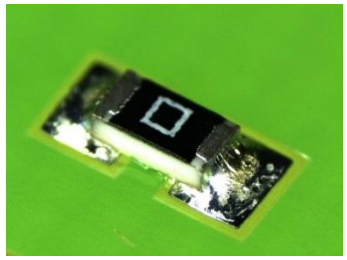
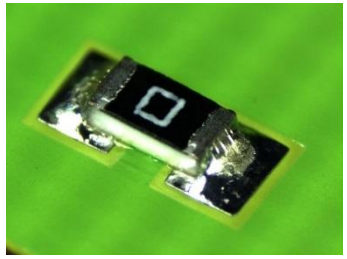
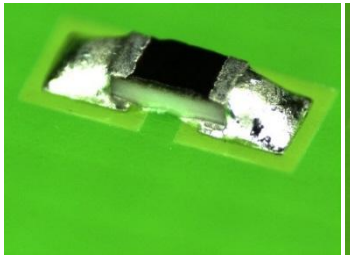
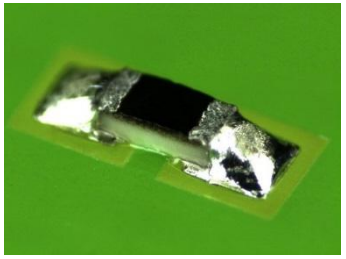
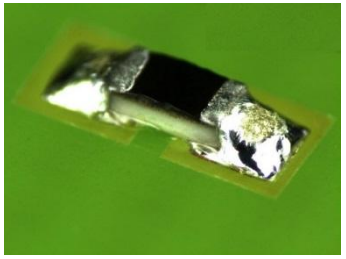
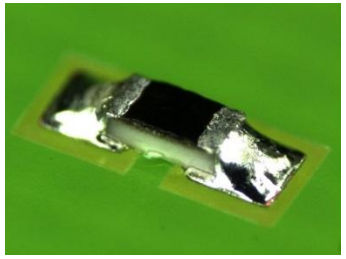
Reflow Process Window (Air)

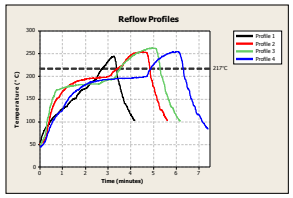
- LOCTITE GC 10 solder paste offers halogen containing reflow performance in a truly halogen free formulation
- GC 10 shows excellent coalescence onto a range of PCB and component finishes especially during long-hot profiles
- There is no single profile that works for all applications and each process should be assessed individually, under laboratory conditions the following profiles have been found to give good results
- These process window guidelines are suitable for Type 3 SAC powder



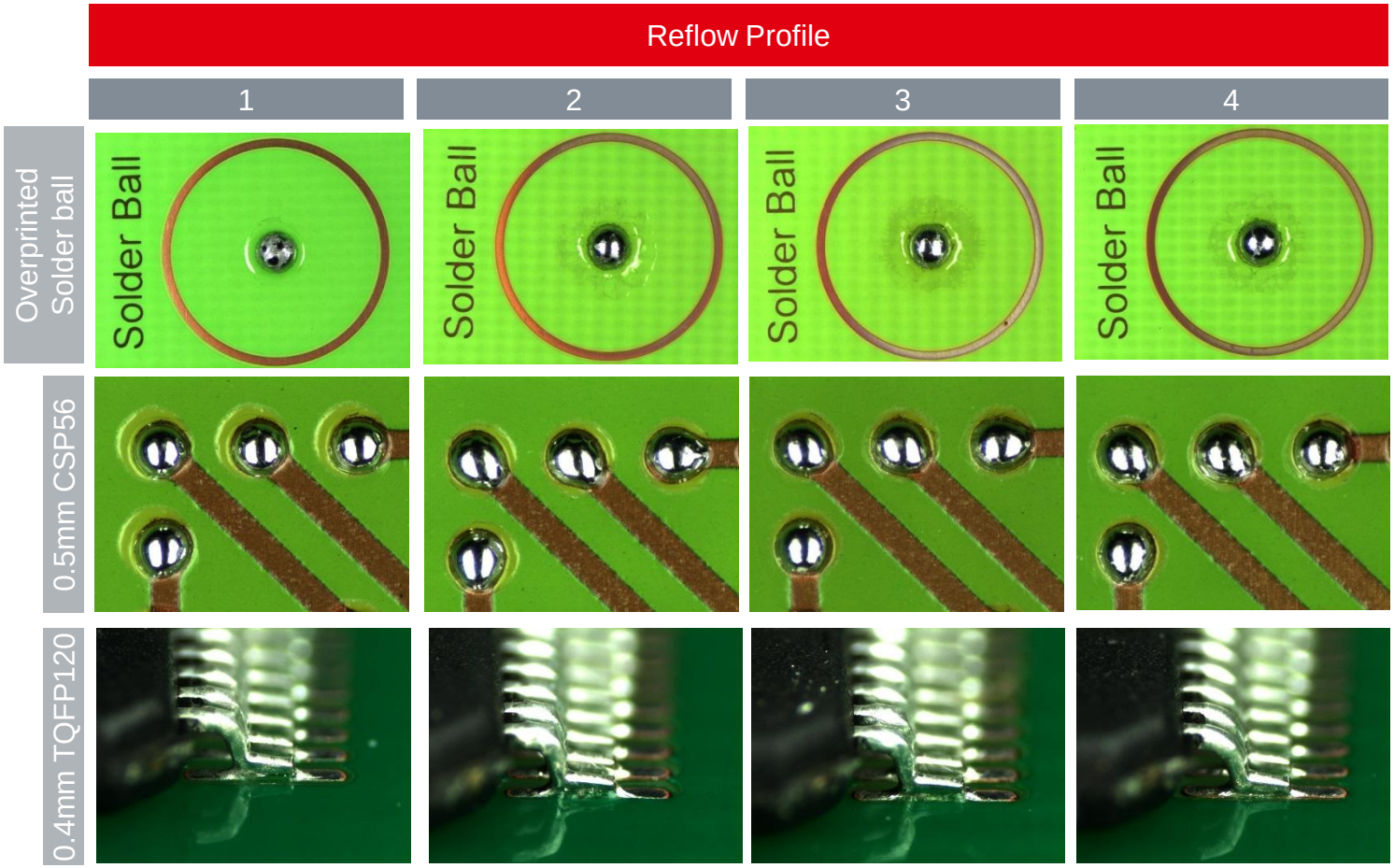
Profile	1	2	3	4
Peak Temp (°C)	244	254	260	255
Time to Peak (min)	3.3	4.5	5.1	6.0
Soak Time (150-200°C) (min)	(No Soak) 1.0	2.35	2.80	3.44
Time above Liquidus (min)	0.62	1.46	1.75	1.45
Time above Liquidus (sec)	37.2	87.6	105.0	87.0

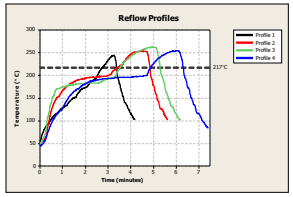
Operating Parameters (Reflow)

	Reflow Profile			
	1	2	3	4
1206 chips				
0603 chips				
0402 chips				

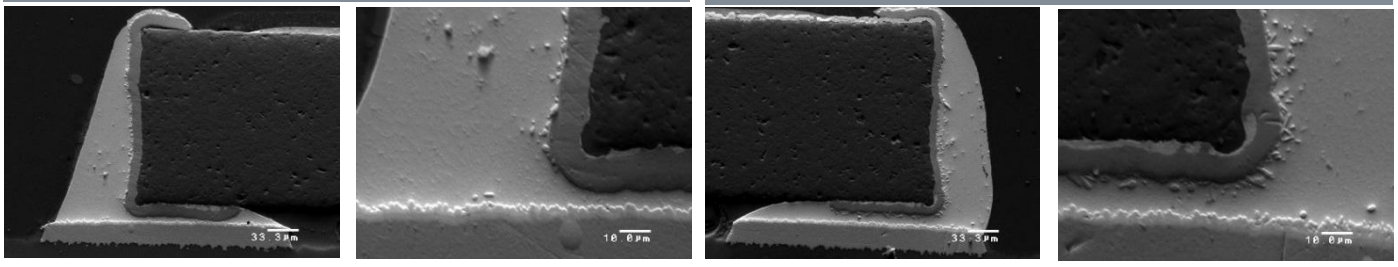
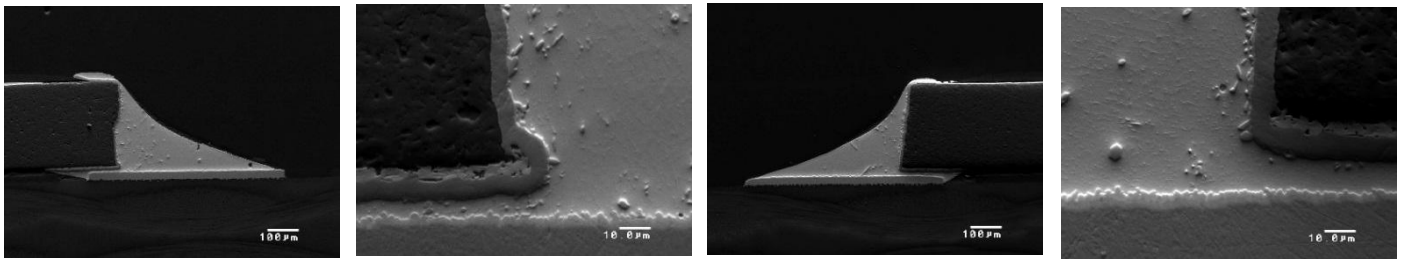
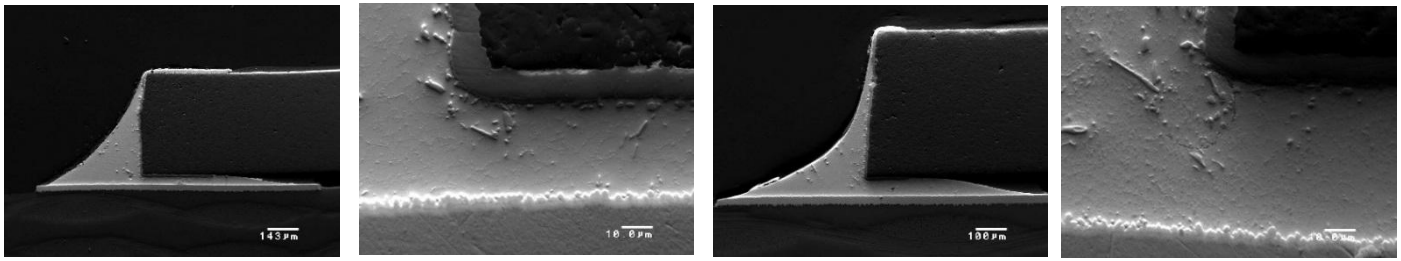


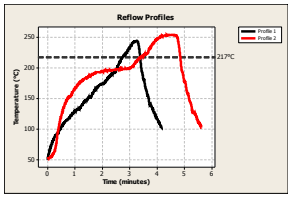
Operating Parameters (Reflow)



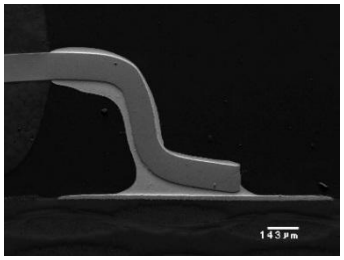
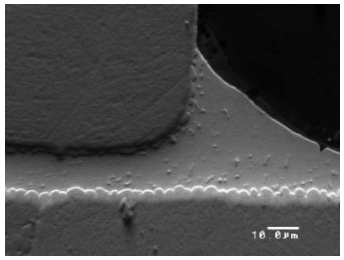
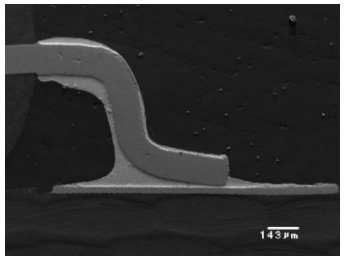
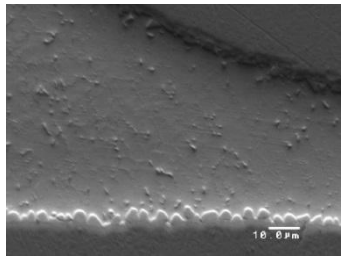
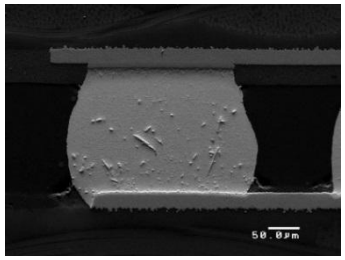
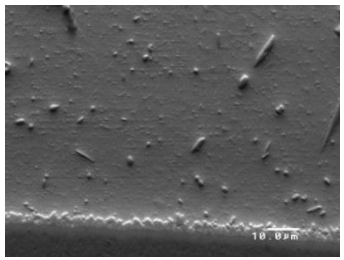
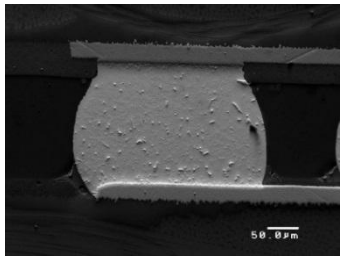
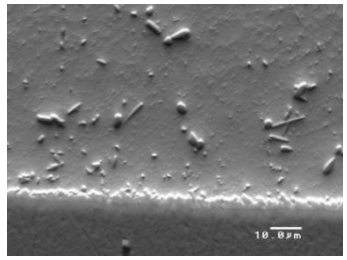


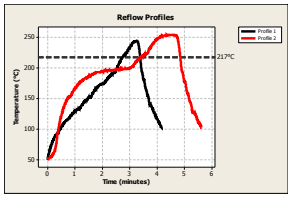
Operating Parameters (Reflow – GC10)

	Reflow Profile	
	2	4
0201 chips		
0402 chips		
1206 chips		



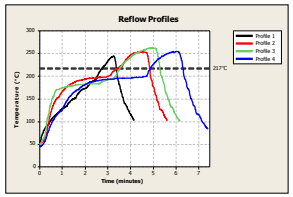
Operating Parameters (Reflow – GC10)

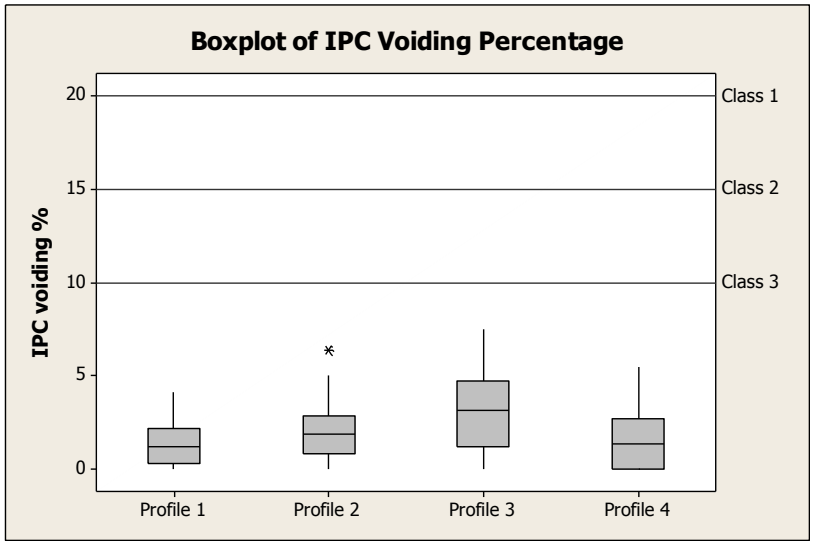
	Reflow Profile	
	1	2
0.4mm TQFP	 	 
0.5mm CSP56	 	 

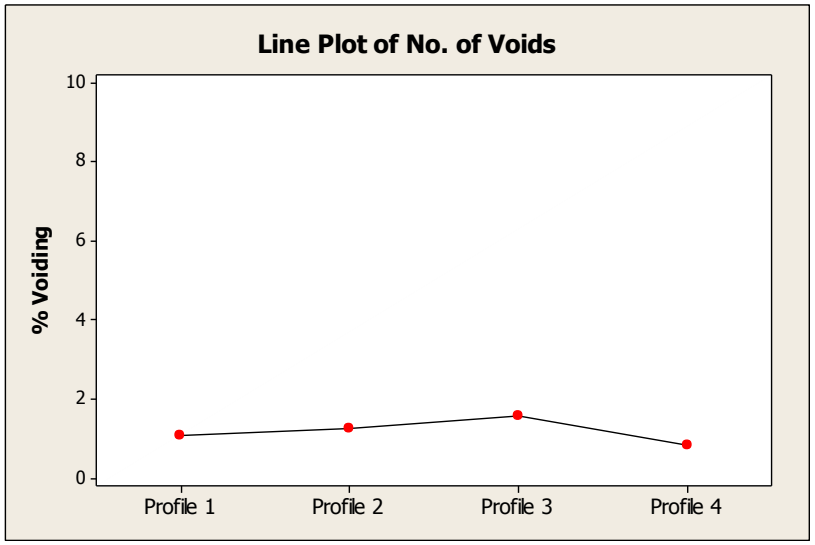


Operating Parameters
Voiding

- Void performance assessed using 4 different reflow profiles.
- 0.5mm CSP, 120µm stencil
- With component, 0.5mm CSP, SAC305 balls
- GC 10 shows low levels of voiding over a range of profiles
- Void Percentage analysed in accordance with IPC7095B





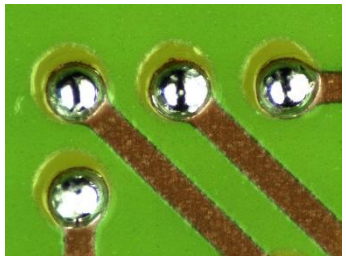
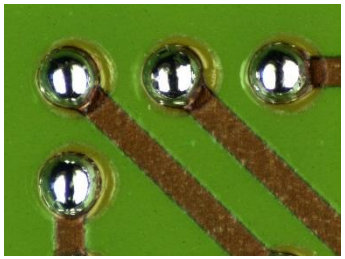
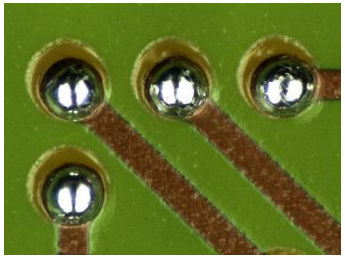
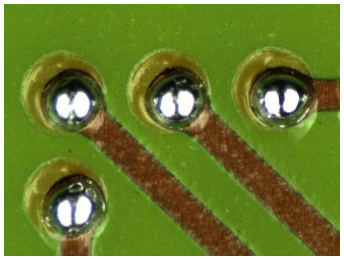
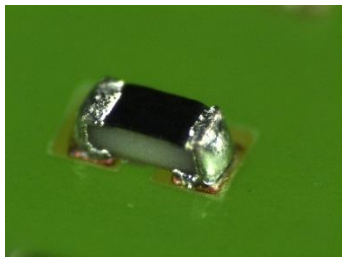
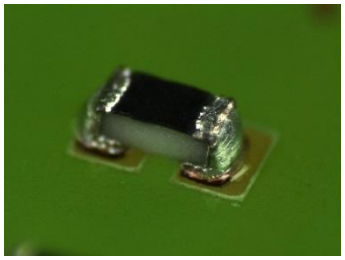
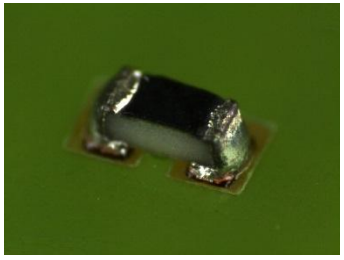
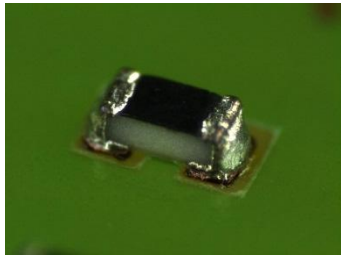
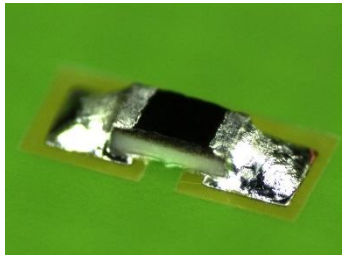
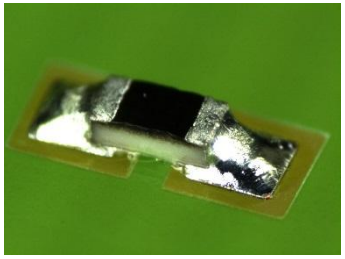
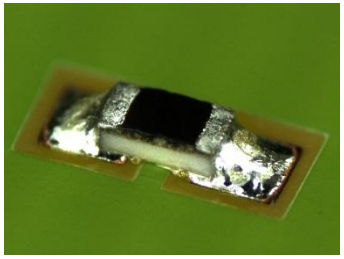
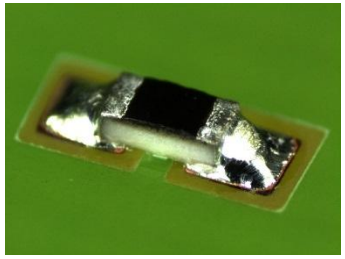


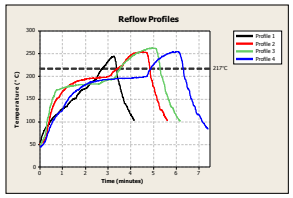
GC 10 meets IPC7095B class 3

Operating Parameters

2nd side reflow

2nd second side reflow profile

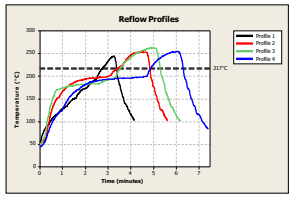
	1	2	3	4
0.5mm CSP 56				
0201				
0402				

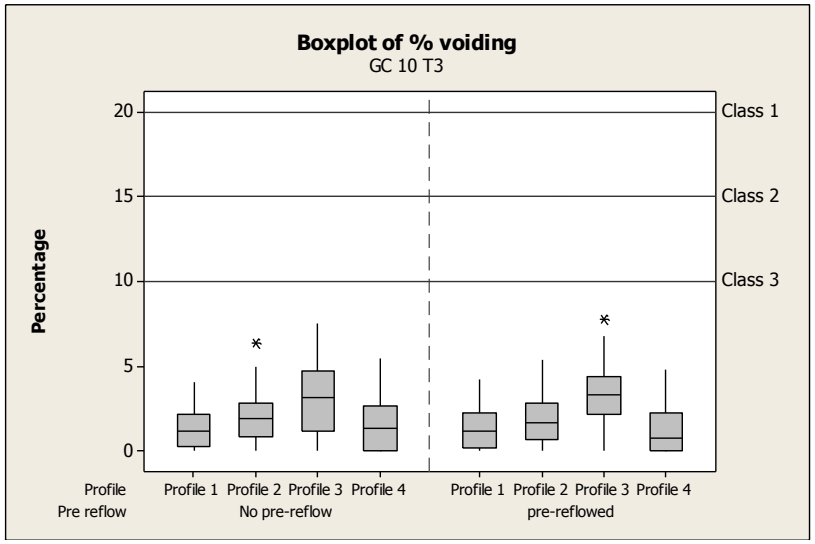


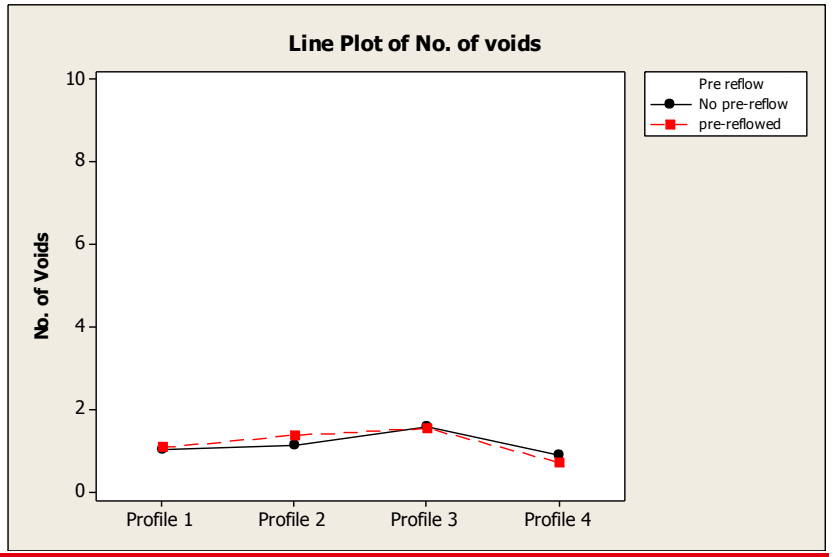
Operating Parameters

Voiding after 2nd side reflow

- Void performance assessed using 4 different reflow profiles.
- 0.5mm CSP, 120µm stencil
- With component, 0.5mm CSP, SAC305 balls
- GC 10 shows no deterioration in voiding with pre reflowed boards



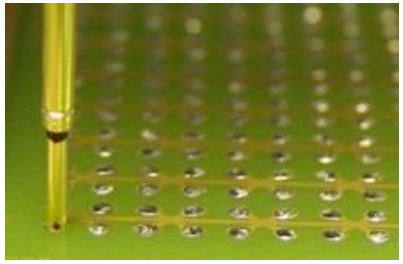


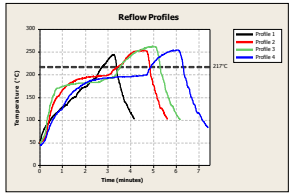


GC 10 meets IPC7095B class 3

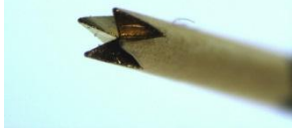
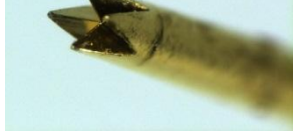
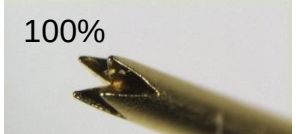
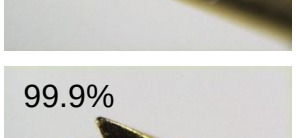
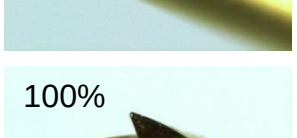
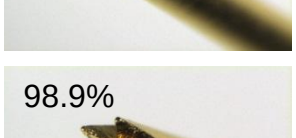
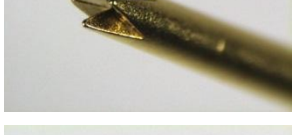
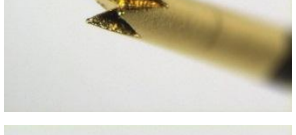
Operating Parameters

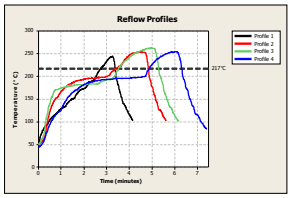
Pin Testing

Board	  
Stencil	100μm
Pads	500 pads per board, 2 boards tested
Probe	0.9mm 4 point plain crown light spring probe 100g spring force
Profiles	4 reflow profiles
No. of reflow	1, 2, 3 & 4 passes through oven
Atmosphere	Air & 1000ppm O_2
Time after reflow	1 day, 1 week

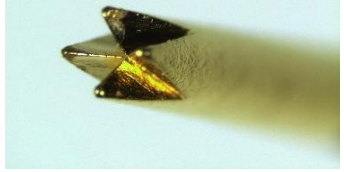
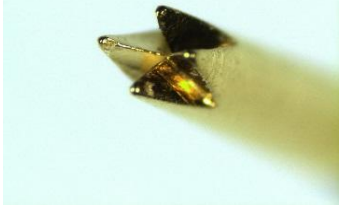
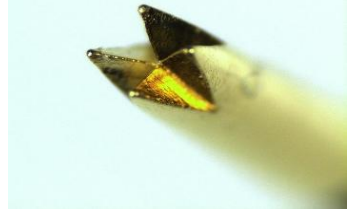
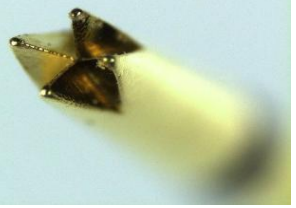
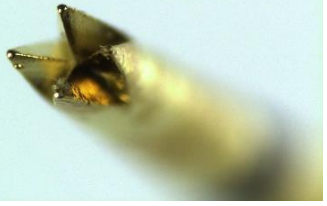
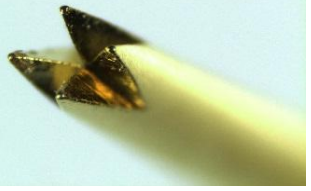
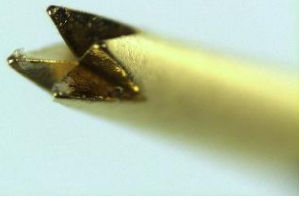
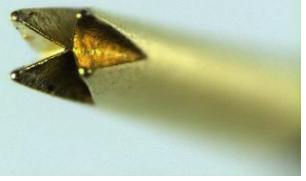
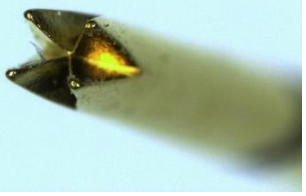
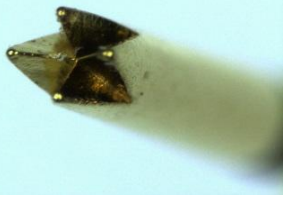
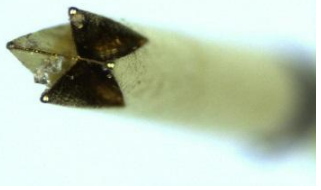
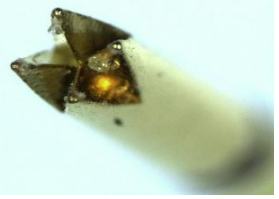


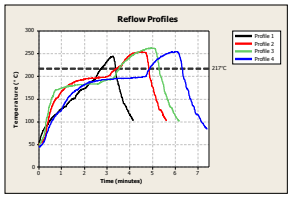
Operating Parameters
Pin Testing

	Reflow Profile (% after 1000 tests)			
	1	2	3	4
1 reflow	100% 	100% 	100% 	99.5% 
2 reflows	100% 	100% 	99.6% 	99.9% 
3 reflows	99.9% 	100% 	100% 	98.9% 
4 reflows	99.9% 	100% 	100% 	98.5% 



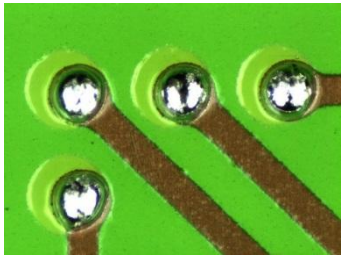
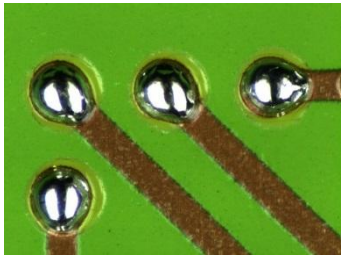
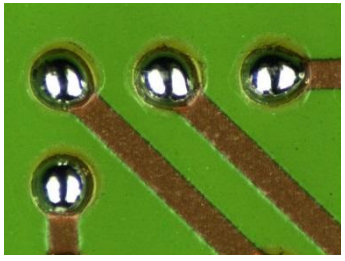
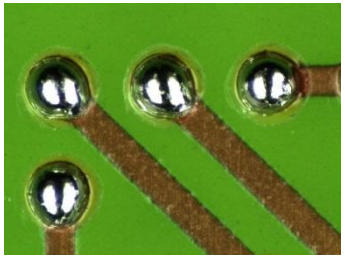
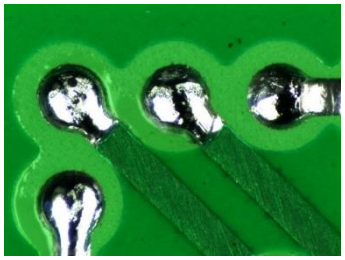
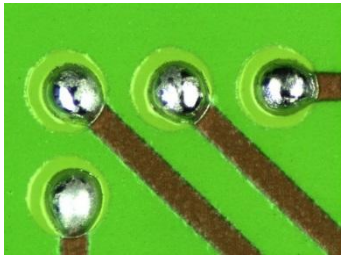
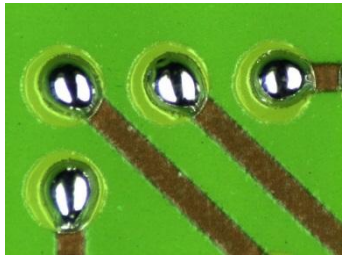
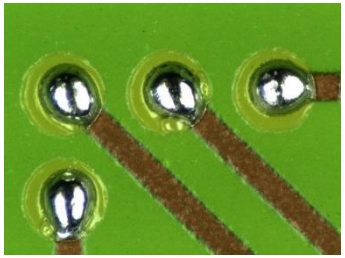
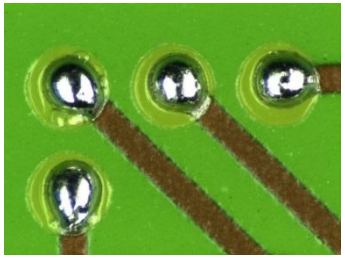
Operating Parameters
Pin Testing

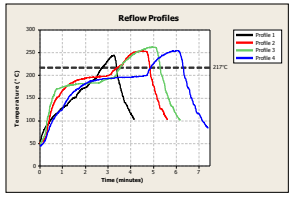
	Reflow Profile (% after 1000 tests)			
	1	2	3	4
Reflowed in N2	100% 	100% 	100% 	100% 
1 day after reflow	100% 	99.9% 	99.8% 	99.6% 
1 week after reflow	100% 	99.8% 	99.3% 	99.6% 



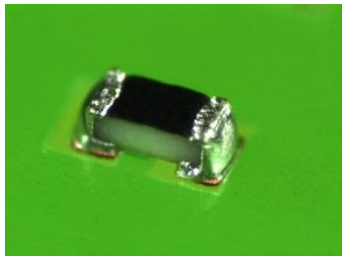
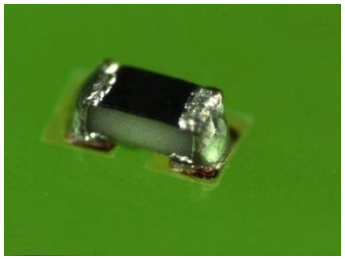
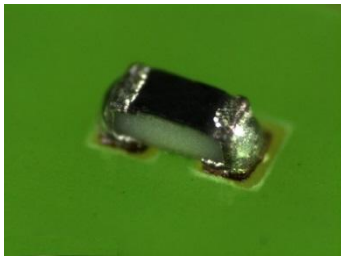
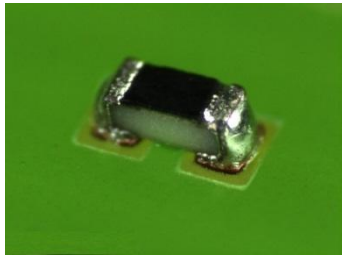
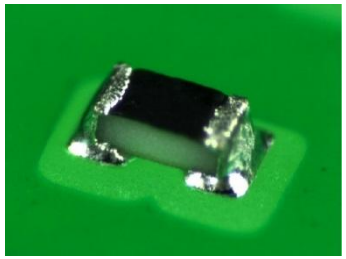
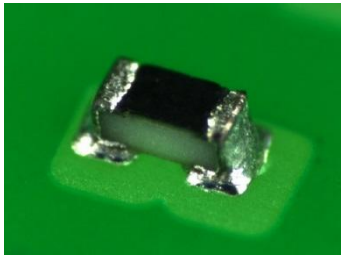
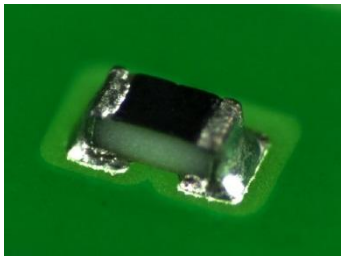
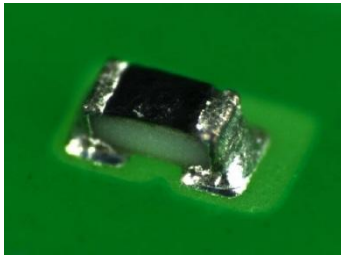
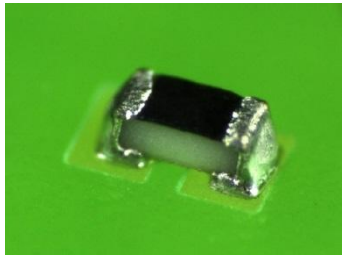
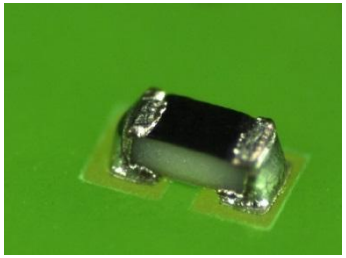
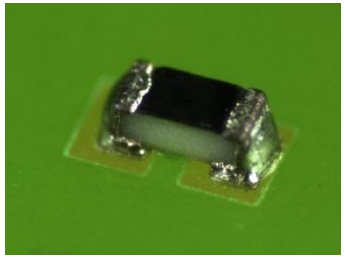
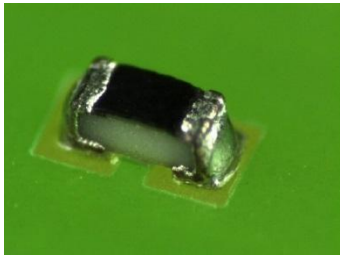
Operating Parameters
Surface Finish

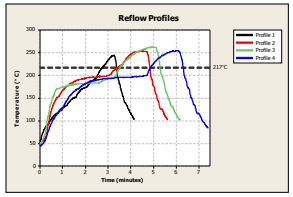
Reflow Profile (0.5mm CSP56)

	1	2	3	4
OSP Finish				
Silver Finish				
Tin Finish				

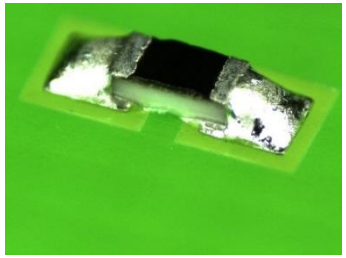
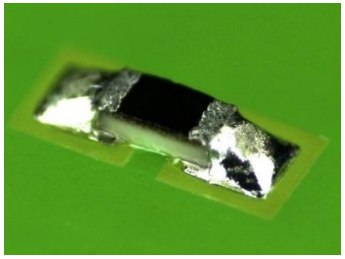
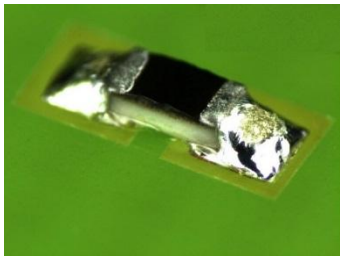
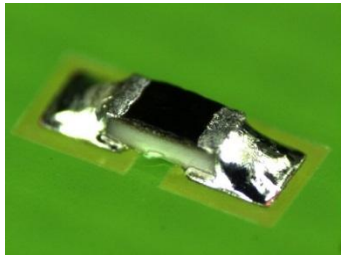
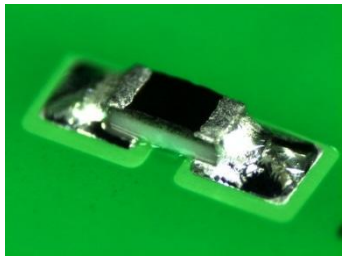
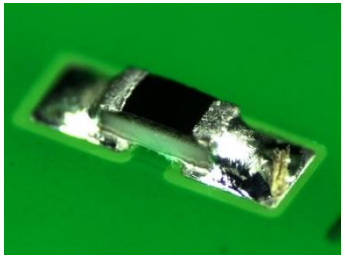
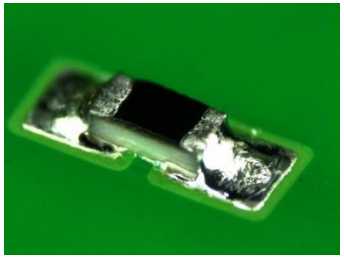
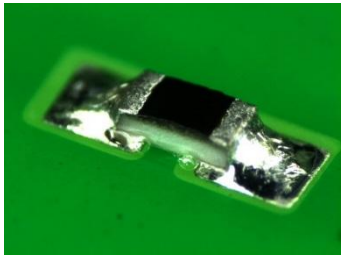
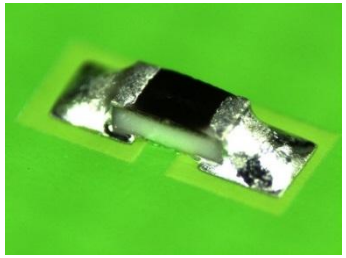
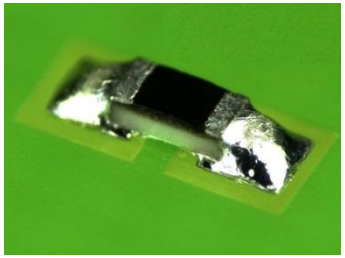
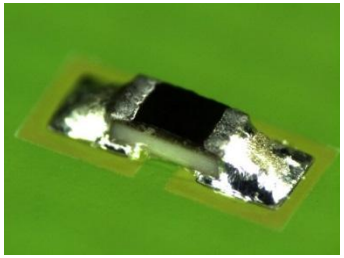
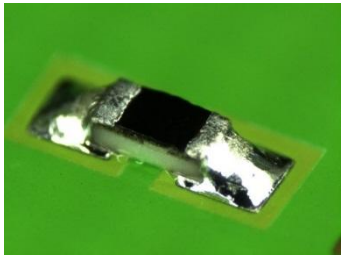


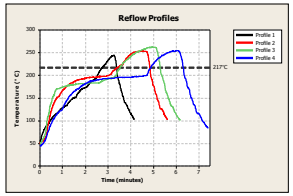
Operating Parameters
Surface Finish

	Reflow Profile (0201)			
	1	2	3	4
OSP Finish				
Silver Finish				
Tin Finish				



Operating Parameters
Surface Finish

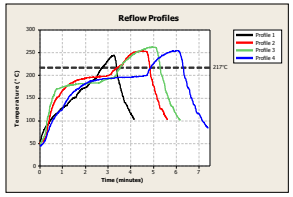
	Reflow Profile (0402)			
	1	2	3	4
OSP Finish				
Silver Finish				
Tin Finish				



Operating Parameters

Surface Finish

Reflow Profile (6.5mm overprinted solder ball)

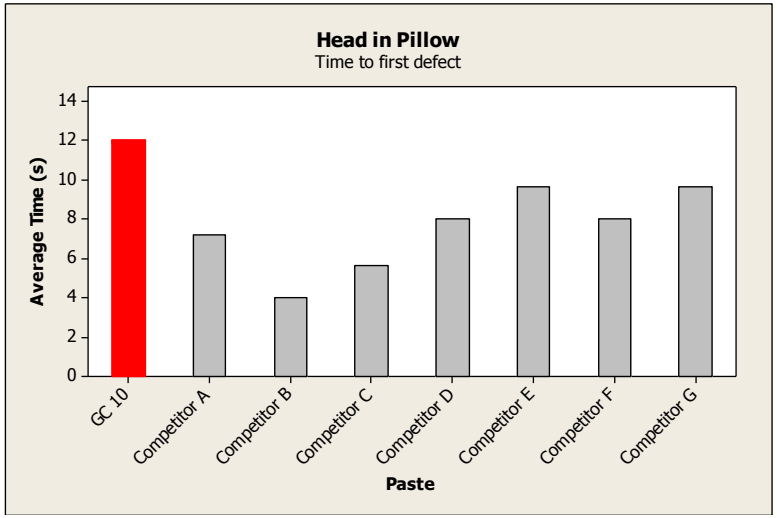


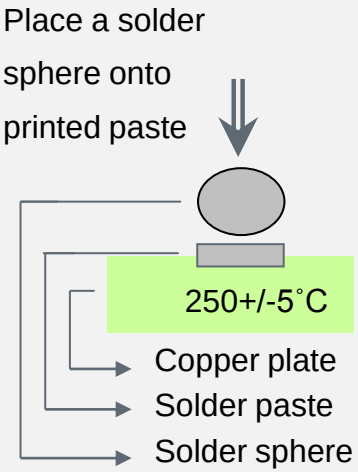
	1	2	3	4
OSP Finish	Solder Ball	Solder Ball	Solder Ball	Solder Ball
Silver Finish	Solder Ball	Solder Ball	Solder Ball	Solder Ball
Tin Finish	Solder Ball	Solder Ball	Solder Ball	Solder Ball

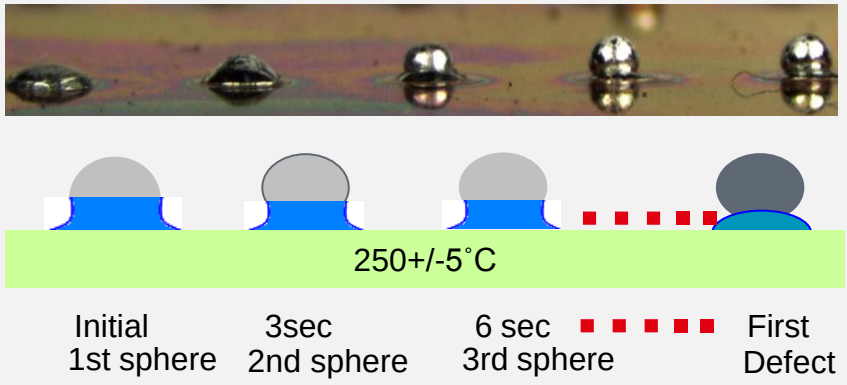
Reliability and Specification Testing

Head in Pillow Test

- Print solder paste on a Cu plate, 0402 pad, stencil thickness 125µm.
- When the solder paste starts to melt, place a solder sphere (SAC305, 0.76mm diameter) on the printed solder paste
- Place another sphere after 3sec, 6 sec, 9sec… until the solder sphere no-longer coalesces
- Flux activity at elevated temperatures – up to 20% longer than industry standard – helping to reduce HiP

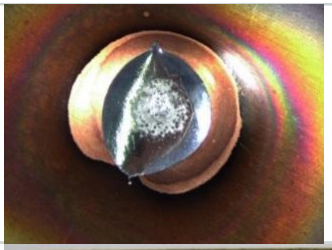






Reliability and Specification Testing

J-STD- 004B

Standard	Test	Result	
ANSI/ J-STD-004B	Cu Corrosion	Pass	
	Cu Mirror	Pass	
	Halogen	Pass	(no added halogen)
	Surface Insulation Resistance	Pass	6.0×10^{11} Ohms after 7days
	Electromigration	Pass	5.0×10^{10} Ohms after 21days

GC 10 J-STD-004B classification ROL0

Reliability and Specification Testing

3rd Party Testing

- SGS report for GC 10
- Sample reflowed flux residue
- Reference EN14582/IC Analysis
- To meet halogen free requirements
- Br<900ppm, Cl <900ppm, and combined <1500ppm

- Halogen – Fluorine - ND
- Halogen – Chorine - ND
- Halogen – Bromine – ND
- Halogen – Iodine – ND

SGS

Test Report No. : CE/2015/61413 Date : 2015/06/12 Page: 2 of 4

HENKEL CORPORATION
14000 JAMBOREE ROAD, IRVINE, CALIFORNIA, 92606 U.S.A.

Test Result(s)

PART NAME No.1 : GRAY PASTE

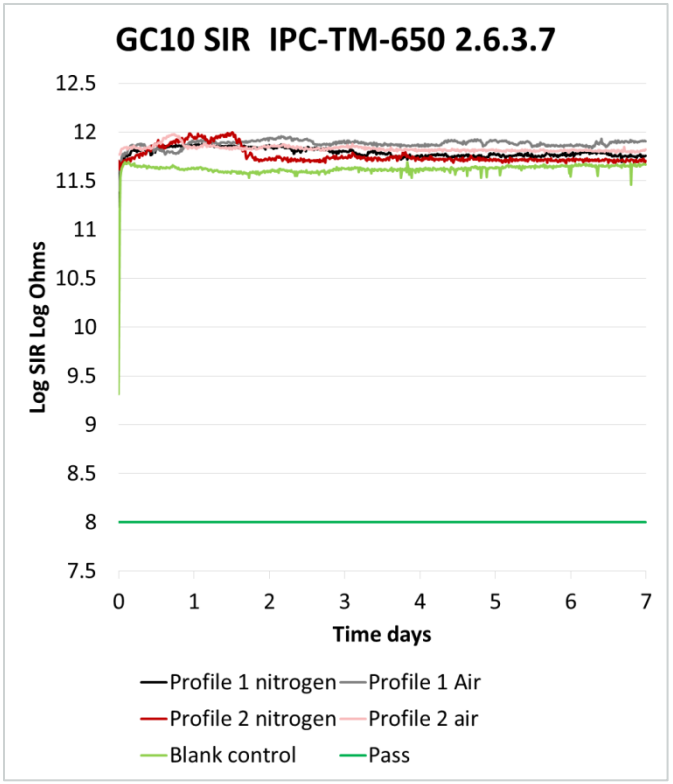
Test Item(s)	Unit	Method	MDL	Result No.1
Halogen				
Halogen-Fluorine (F) (CAS No.: 14762-94-8)	mg/kg	With reference to BS EN 14582:2007. Analysis was performed by IC.	50	n.d.
Halogen-Chlorine (Cl) (CAS No.: 22537-15-1)	mg/kg		50	n.d.
Halogen-Bromine (Br) (CAS No.: 10097-32-2)	mg/kg		50	n.d.
Halogen-Iodine (I) (CAS No.: 14362-44-8)	mg/kg		50	n.d.

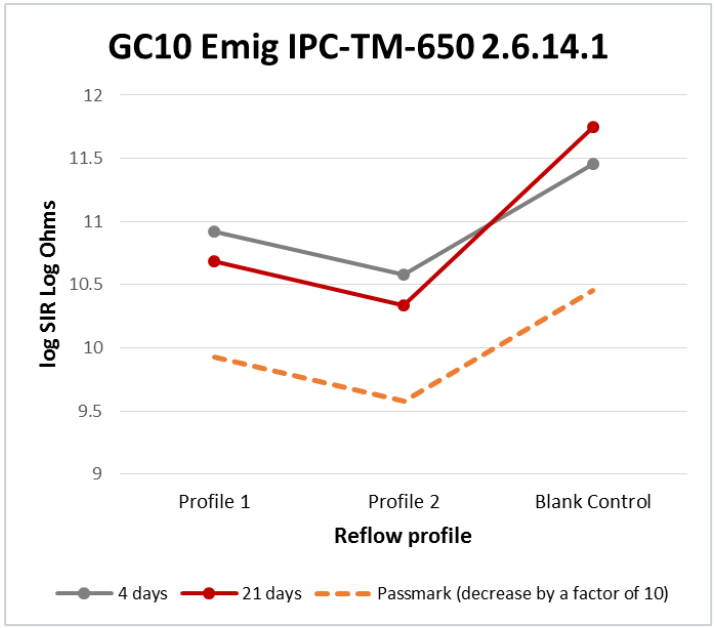
Note :
1. mg/kg = ppm; 0.1wt% = 1000ppm
2. n.d. = Not Detected
3. MDL = Method Detection Limit

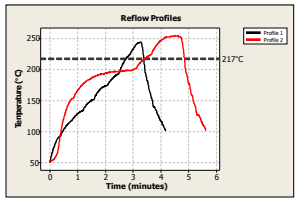
GC 10 has no detectable halogen and is designated as halogen free

Reliability and Specification Testing

IPC J-STD 004B





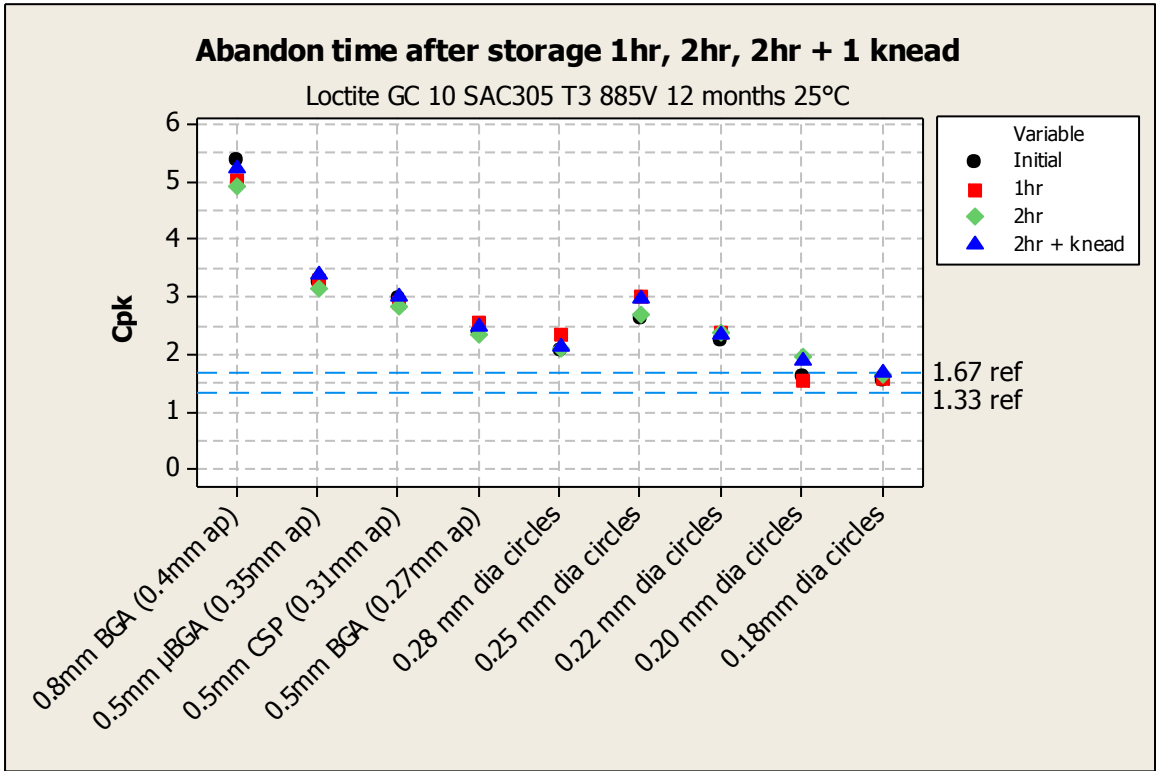


Contents

Operating Parameters: Storage

Printing After Storage 12 months 25°C

- **Print Capabilities**
- Excellent print capability after storage for 12 months @ 25°C
- No knead cycle required after 2hrs abandon down to 0.22mm round apertures

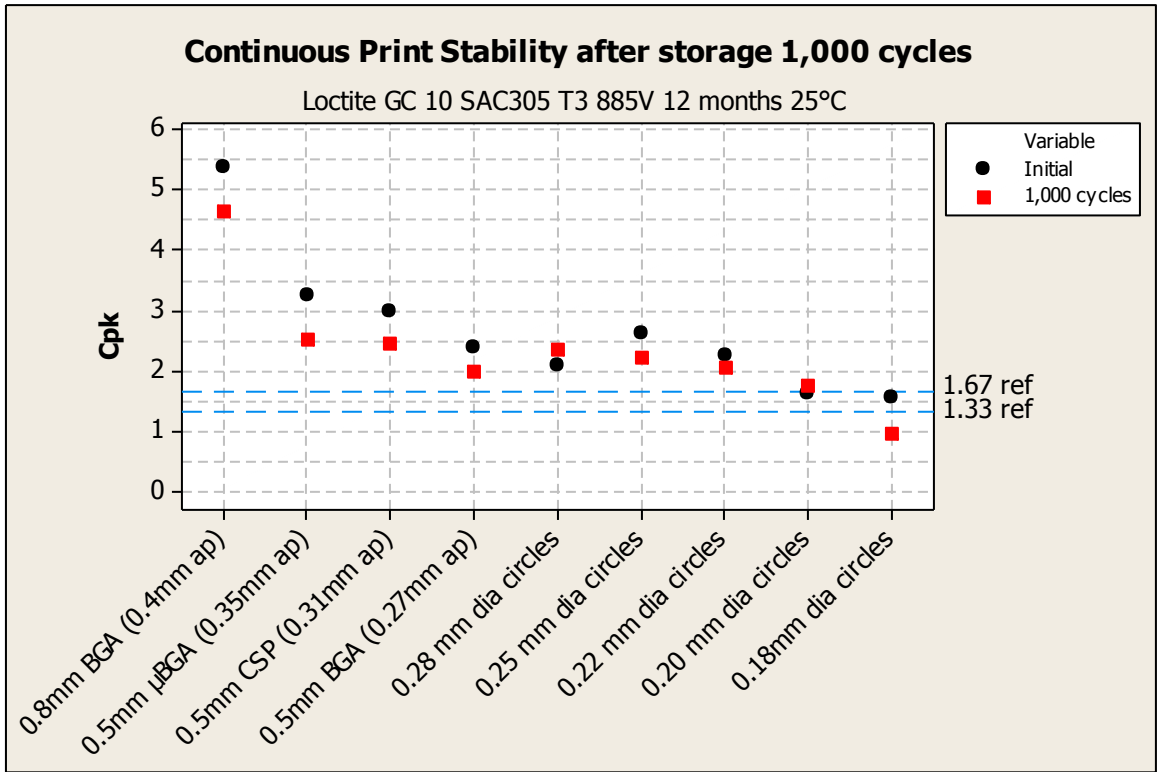


0.8mm BGA – 0.18mm round apertures, 120µm stencil thickness, 60mm/s, Fast separation, 250mm squeegee, 10kg

Operating Parameters: Storage

Printing After Storage 12 months 25°C

- **Print Capabilities**
- Excellent print capability after storage for 12 months @ 25°C
- Excellent print performance after 1000 cycles down to 0.22mm round apertures

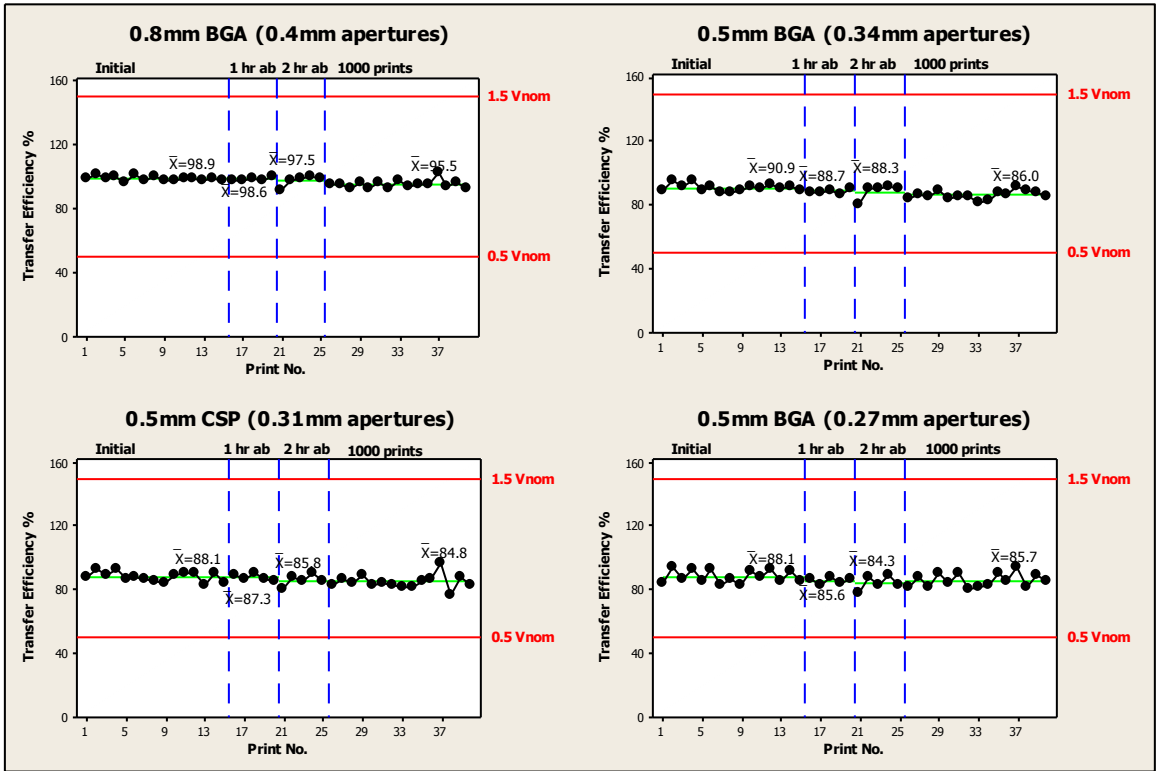


0.8mm BGA – 0.18mm round apertures, 120µm stencil thickness, 60mm/s, Fast separation, 250mm squeegee, 10kg

Operating Parameters: Storage

Printing After Storage 12 months 25°C

- **Transfer Efficiencies**
- Excellent print capability after storage for 12 months @ 25°C
- No knead cycle required after 2hrs abandon
- Excellent print performance after 1000 cycles

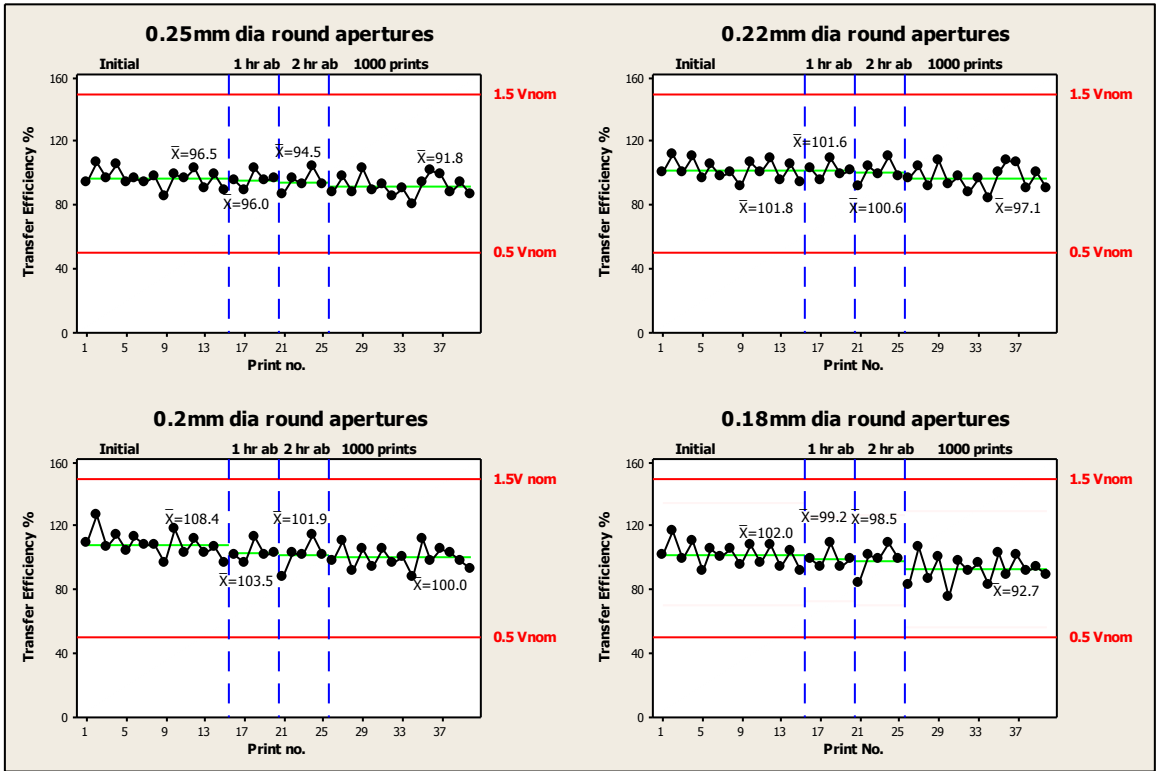


0.8mm BGA – 0.5mm BGA, 120µm stencil thickness, 60mm/s, Fast separation, 250mm squeegee, 10kg

Operating Parameters: Storage

Printing After Storage 12 months 25°C

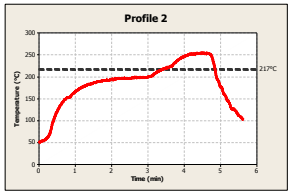
- **Transfer Efficiencies**
- Excellent print capability after storage for 12 months @ 25°C
- No knead cycle required after 2hrs abandon
- Excellent print performance after 1000 cycles

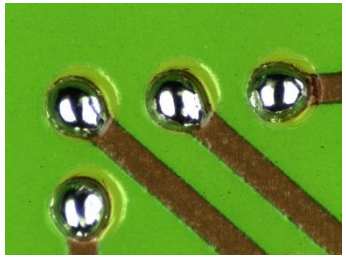
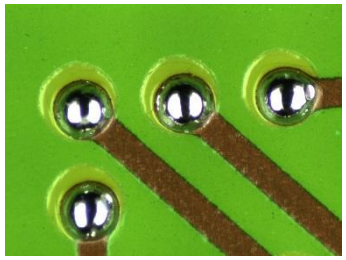
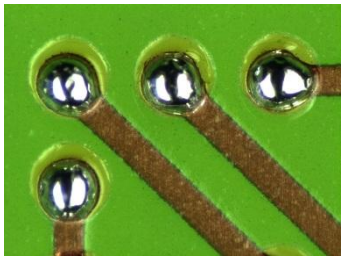
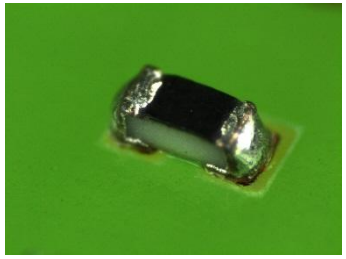
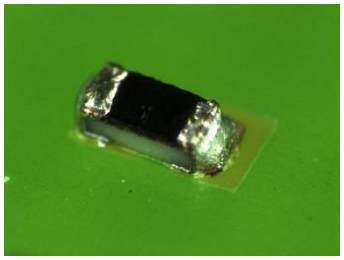
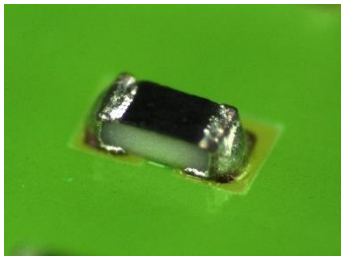
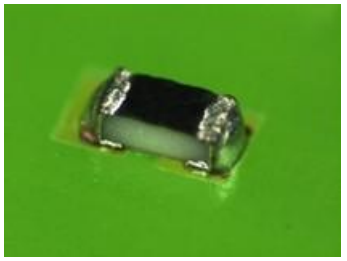
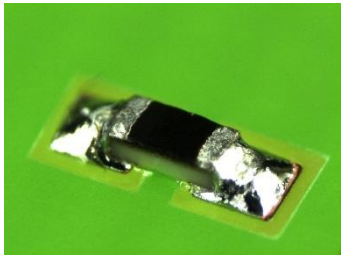
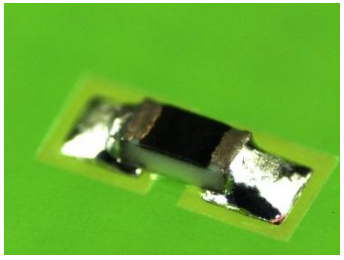
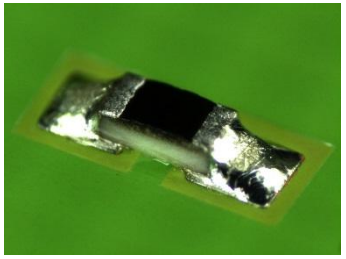
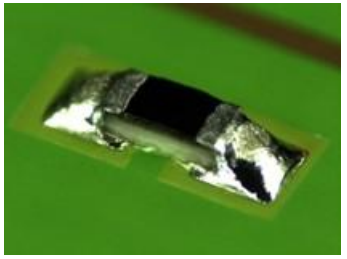


0.25mm – 0.18mm round apertures, 120µm stencil thickness, 60mm/s, Fast separation, 250mm squeegee, 10kg

Operating Parameters: Storage

Reflow After Storage to 12months 25°C



	After Paste storage			
	Initial	1m 40°C	6m 25°C	12m 25°C
0.5mm CSP				
0201				
0402				

Contents

GC 10: Performance Summary

Flux

- Halogen-free flux: passes IC with pretreatment IPC-TM-650 2.3.34/EN14582
- Halogen-free flux classification: ANSI/J-STD-004 Rev. B for a type ROL0 classification

Paste

- Suitable for printing up to 125mm/s (5”/s)
- Optimized for long hot soak reflow profiles
- Excellent coalescence in air & nitrogen atmosphere
- Excellent humidity resistance
- Excellent solderability on challenging surface finishes, including CuNiZn
- Colourless residues for easy post-reflow inspection
- Long 12 month shelf-life when stored below 25°C

Thank you!

LOCTITE®

Henkel Excellence is our Passion

X-ON Electronics

Largest Supplier of Electrical and Electronic Components

Click to view similar products for loctite ***manufacturer:***

Other Similar products are found below :

2257357 2139180 LOC-MIKSER2 406 5366, 310ML 603, 10ML 403, 50G 2472691 2701, 50ML 542, 250ML 572, 50ML 3526 8106, 1L 5800, 50ML MM01057 1188112 LOC-5615/400ML 97262 983438 3463, 114G 2700, 50ML 40945 MM01056 386862 984569 5400, 50ML 5990, 40ML SUPERLUBE OIL, 375ML MM01939 98472 GC 10 TYPE 3 (JAR) 660, 50ML SUPER GLUE GLASS, 3G 6300, 50ML 2023641 LT 5075 290 GC 10 TYPE 4 (JAR) 495, 50G 243, 250ML LOC-638-10 641, 10ML 496, 50G 2472659 98473 5660, 40ML 4080, 50G 55, 160M 98455 5368, 310ML