CVP-390 solder paste

ALPHA® CVP-390 Solder Paste

Product Guide

ZERO Halogen, no-clean, ultra low voids, pin testable, JIS Cu corrosion compliant lead-free-solder paste designed to exceed the expectations for first pass yield and throughput. SAC305 and Low Ag capable.

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ALPHA®CVP-390 Product Guide

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ALPHA® CVP-390 is a lead-free, ZERO-halogen, no-clean solder paste, that available in SAC305, SACX Plus™ 0807 and SACX Plus™ 0307 alloys, and is designed to exceed the expectations for first pass yield and throughput

ALPHA®CVP-390:

1. Passes IPC 7095 Class III ultra low voids requirement
2. Is both pin testable and JIS Cu corrosion compliant
3. Enables consistent printing capability up to 180μm (8mil) circles printed with a 80μm (3 mil) stencil. It also possess superior print volume deposit repeatability in a elevated temperature printing environment
4. Gives good coalescence up to <200 μm small circle size of CSP, even under the high preheat soak condition of 180 to 190°C for 60 seconds.

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Performance Summary

Process Benefit	CVP-390 Property	Performance Capability
Print Process Window	Fine Feature Print Definition	Excellent print definition & consistant volumetric performance - down to 180μm (8mil) diameter - 0.4mm (16mil) pitch QFP - Min Area Ratio of 0.6
	Temperature Window	Capable of printing in temperature from 20 - 32°C (68 - 90°F)
	Tack/Stencil Life	Long Tack and Stencil Life
	Print Speed Range	Wide Process Window from 25 - 150 mm/sec (1 - 6"/sec)
Reflow Yield	Peak Reflow Temperature	235 to 245°C (Optimal recommended: < 240◦C)
	Resistance to Voids	Meet IPC 7095 Class III requirements
	Resistance to Cold & Hot Slump	Preferable J-STD-004A and JIS Level 2
	Flux Residue Cosmetics	Clear
	Solder Spread	80%
	Random Solderballs	Preferable J-STD-004A and JIS Level 2
	Flux Residue Characteristics	Pin Testable & Pass JIS Cu Corrosion Test
Electrical Reliability	SIR	Meets/Exceeds JIS, J-STD-004B and Bellcore Requirements
	Electromigration Resistance	Meets/Exceeds JIS, Bellcore
	Halide Content	Halide Free
	J-STD-004B Classification	ROL0
Environmental	Halogen Content	Zero Halogen, No halogen intentionally added

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- Key Data Required to quantify the value delivered by CVP-390
  - First pass yield
  - Finest feature component
  - The major defects
  - The defects that cause a board to be scrapped
  - Total volume of boards manufactured per month
  - Value of finished board

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Pin Test Yield Value Word Equation

(CVP-390 Pin test yield – Pin test yield current product)
x
Total Number of Boards Processed
x
Profit margin per Assembled Board

+

Cost of Reworking PCB with Pin Test Failure
x
(CVP-390 Pin test yield – Pin test yield current product)
x
Total Number of Boards Processed

–

[(Price/kg of CVP-390 – Price/kg of Current Product)
x
Quantity of Solder Paste in Kg Used per Month]

=

Total Increased Value to Customer

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Low Ag Value Word Equation

(Cost of CVP-390 SAC305 – Cost of CVP-390 Low Ag)

x

Number of KGs paste used per line per shift

x

Number of Shifts

x

Number of Lines

=

Total Increased Value to Customer

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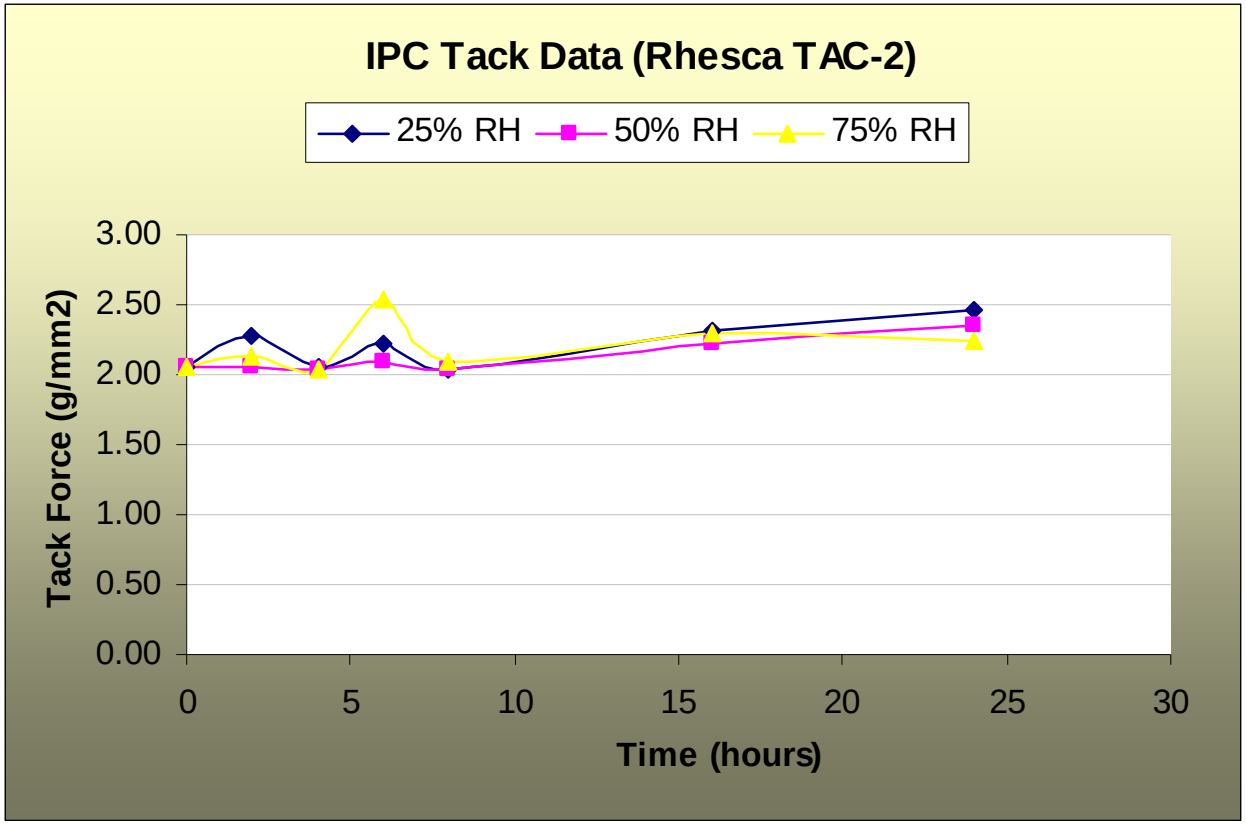
Tack Life – IPC (Rhesca TAC-2)

IPC J-STD-005 TM-650 2.4.44 Classification

Print Performance



Maintains consistent tack strength over 24 hours

Less than 1 unit change in tack when tested at a humidity range of 25% - 75% RH measured over a 24hours period

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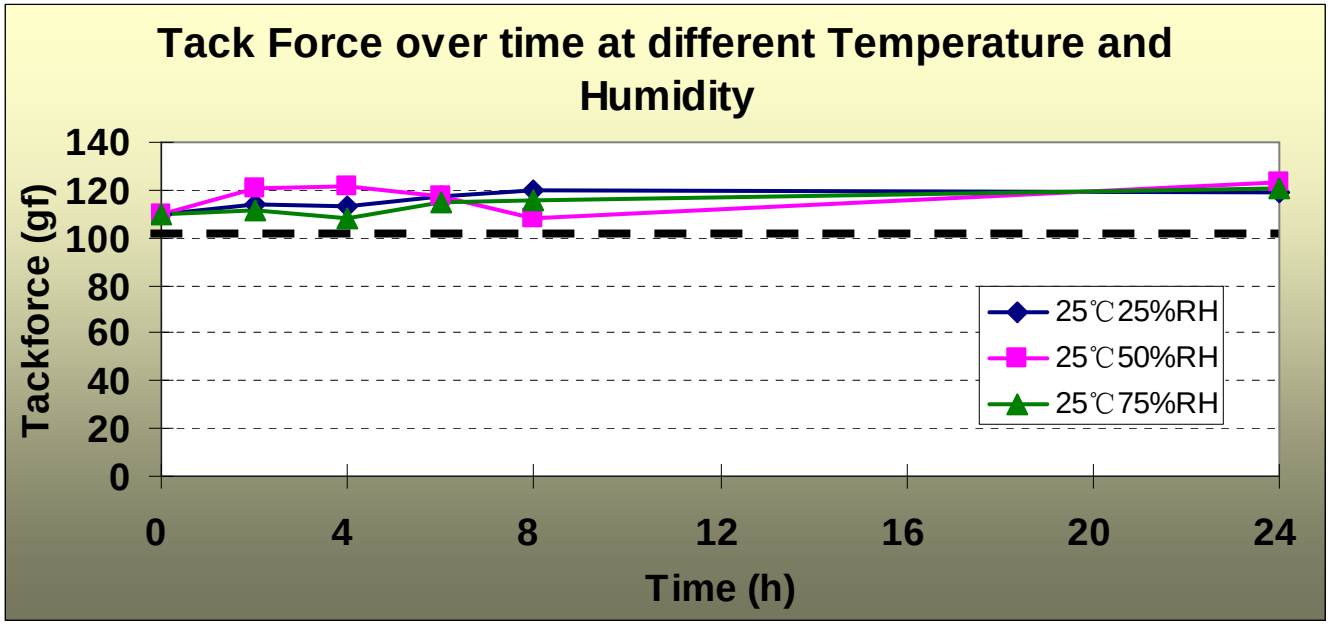
JIS Tack Life

Print Performance



Maintains consistent tack strength over 24 hours

Meets JIS Z3284-1994 Annex 9

Tack Force > 100gf for the 24-hr duration

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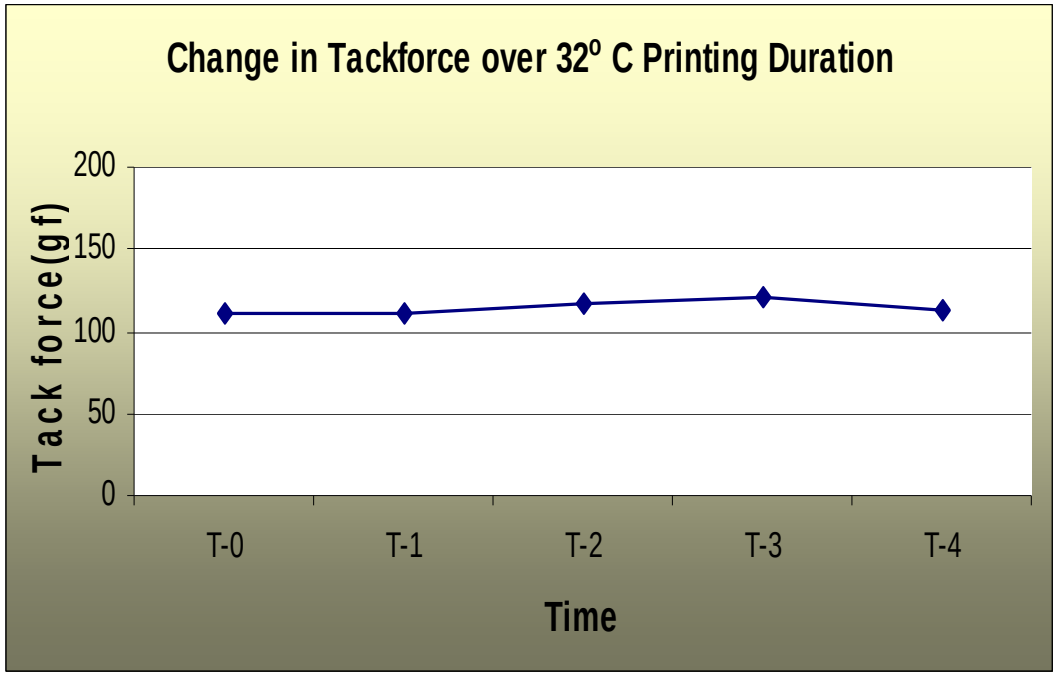
High Temperature Printing Duration Stability

Print Performance



No sticking to Squeegee after 4-hr print duration

Tack Force > 100gf is stable for 4-hr printing duration at 32°C

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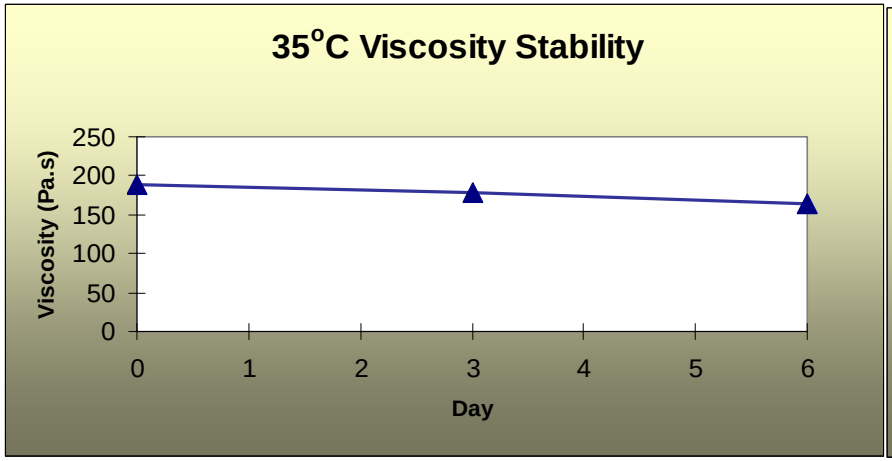
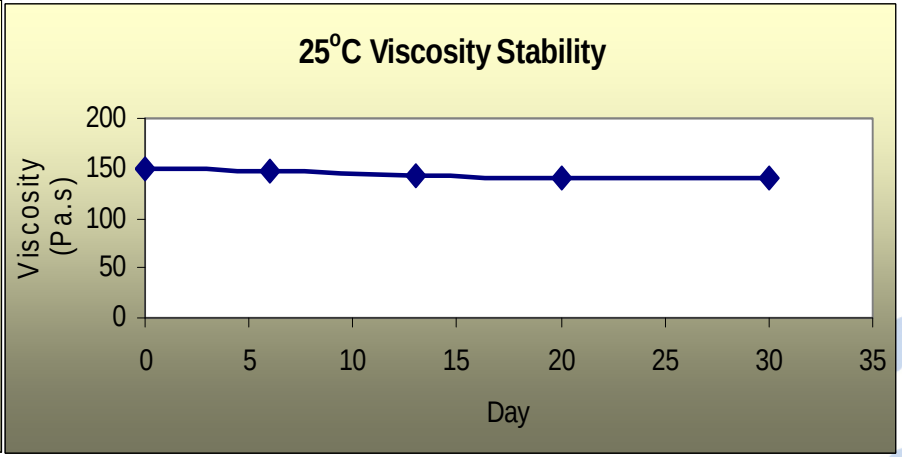
Viscosity Stability





6-day Viscosity Stability

Storage Temperature : 35°C (95°F)
Viscosity : 146 – 162 Pas

1-month Viscosity Stability

Storage Temperature : 25°C (77°F)
Viscosity : 140 – 149 Pas

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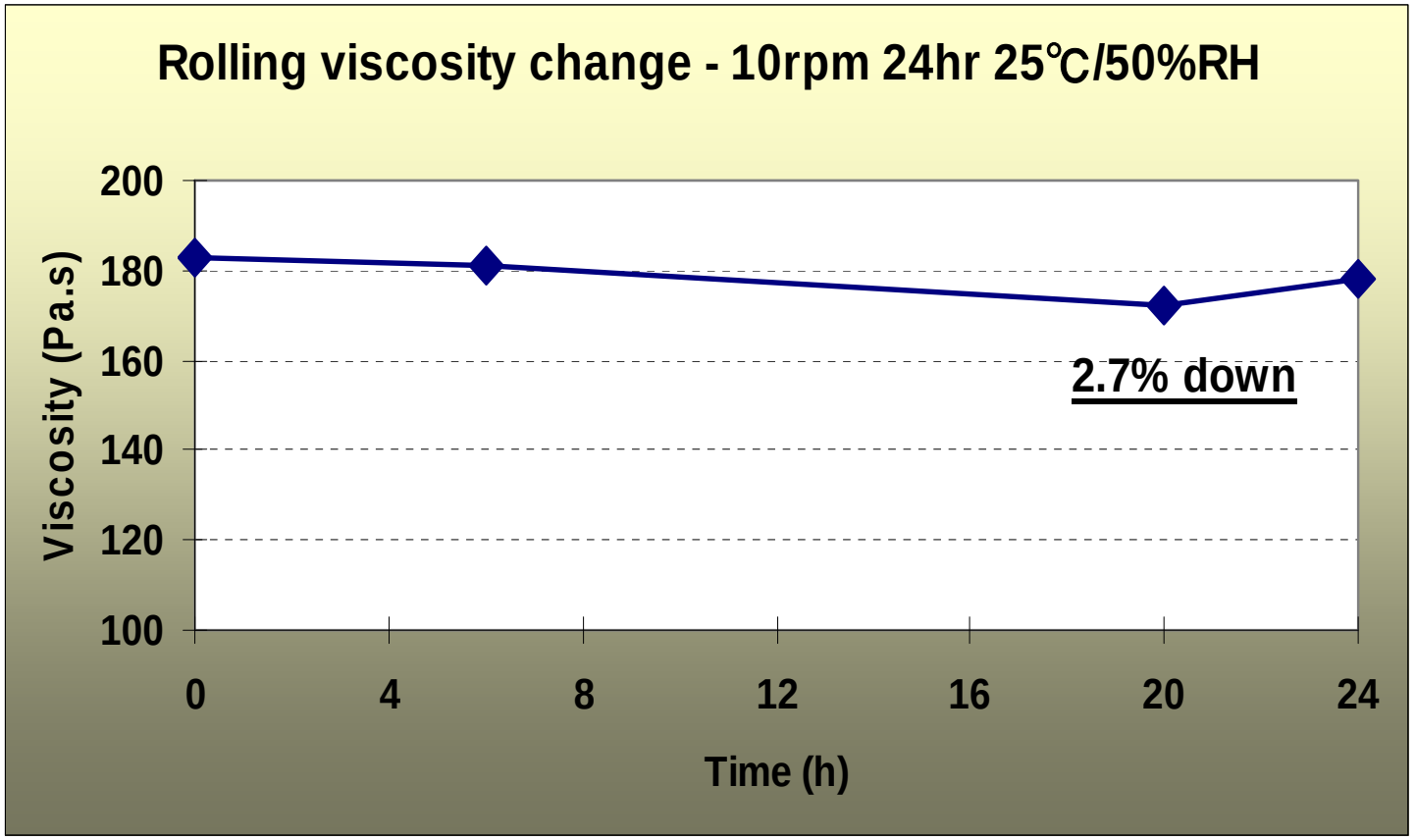
24-hr Continuous Rolling (Kneading) Process

Print Performance



Stable Viscosity measured readings at 0-hr, 6-hr, 20-hr and 24-hr - changes in viscosity is < 10%

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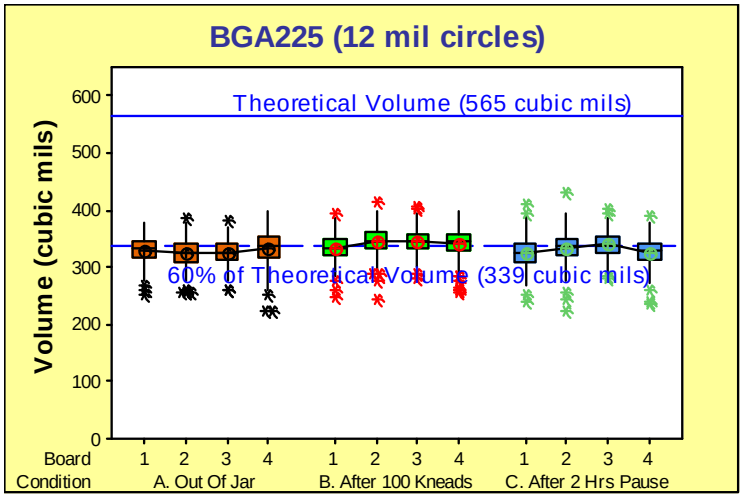
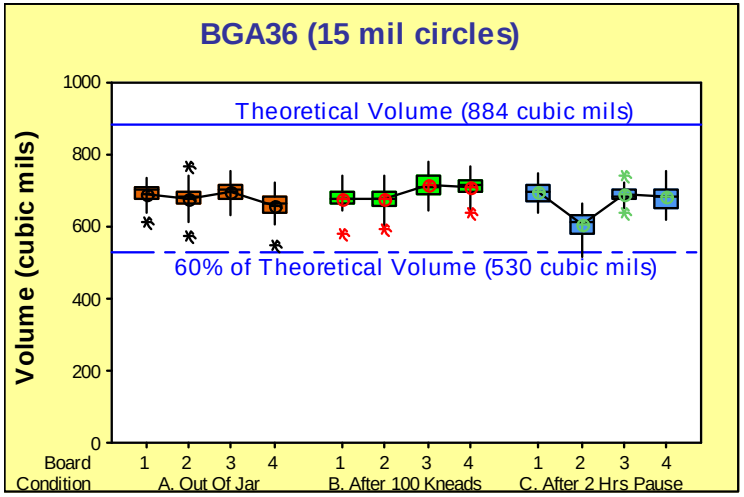
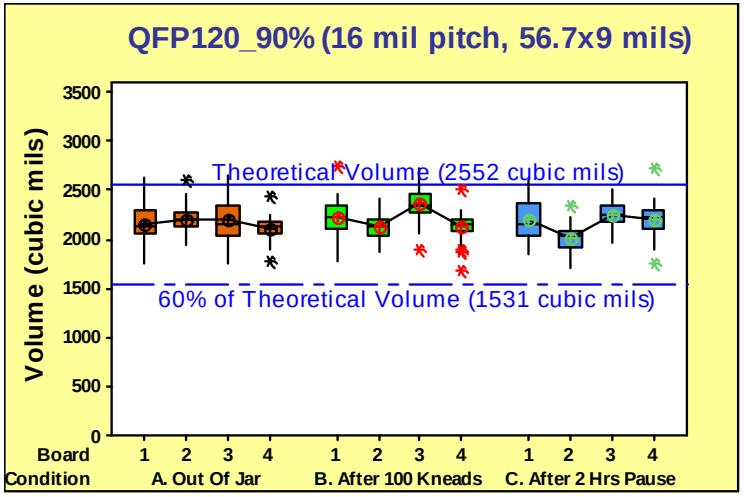
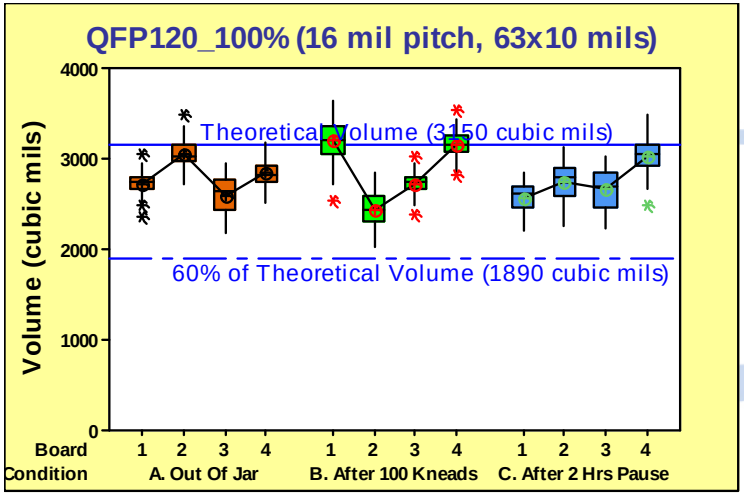
Print - Response to pause (5-mil Stencil, 25°C)

Print Performance









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Excellent Out of Jar & Response to Pause Performance

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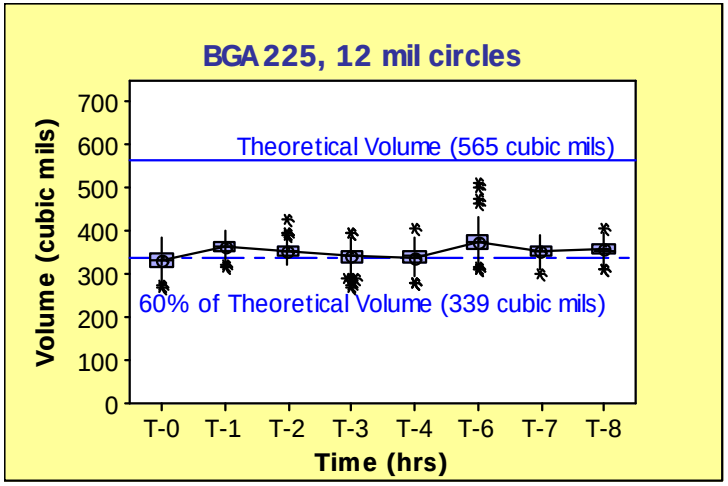
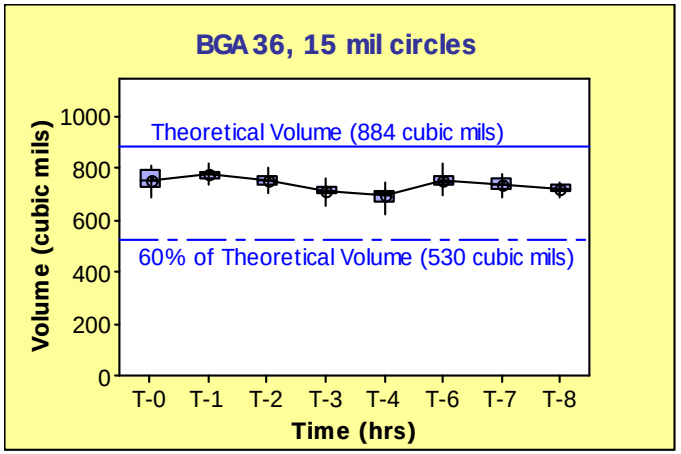
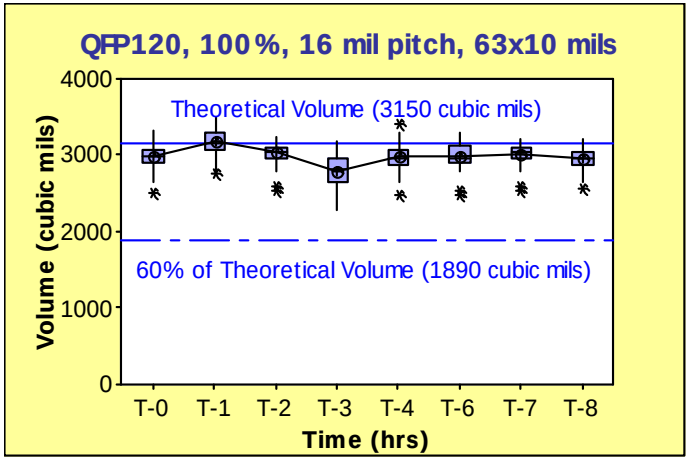
Print - Stencil Life (5-mil Stencil, 25°C)







Excellent 8-hour stencil life performance

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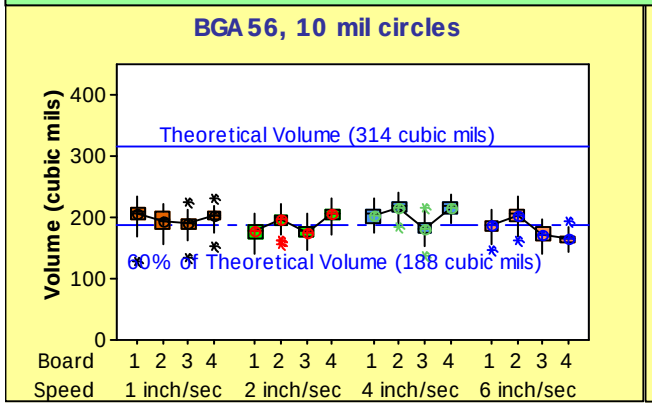
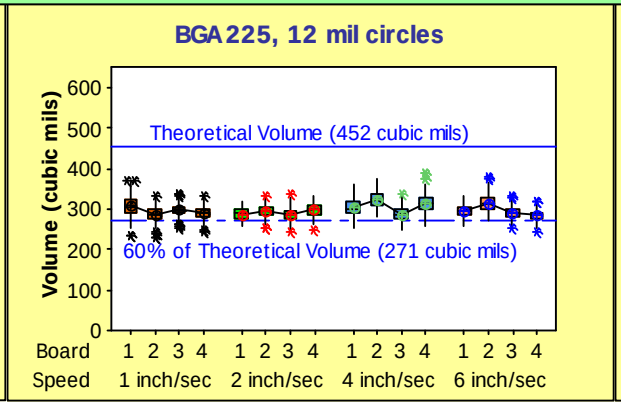
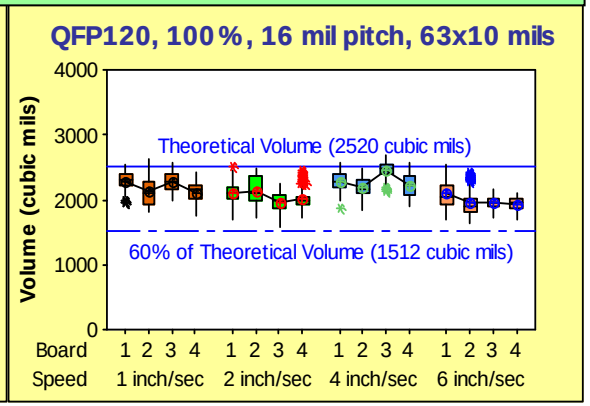
Print Volume Repeatability (25°C)

Print Performance

4 mil Thickness Stencil

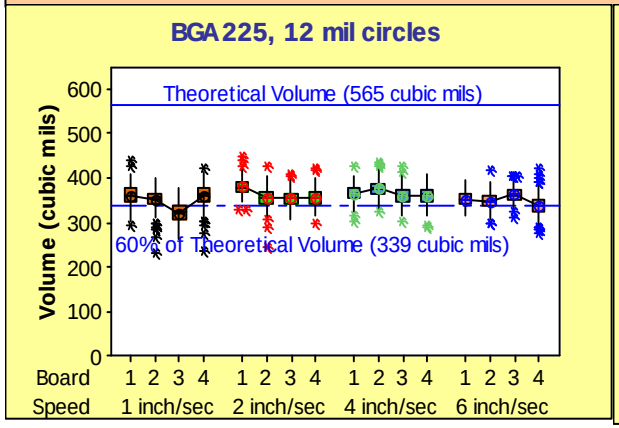


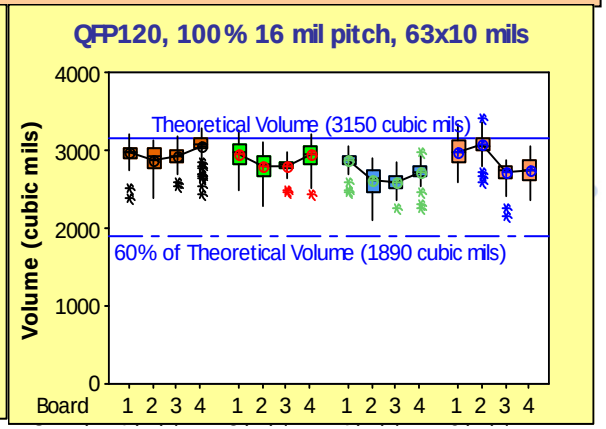




- **For 10 mil BGA circles a 4 mil stencil is recommended**

5 mil Thickness Stencil





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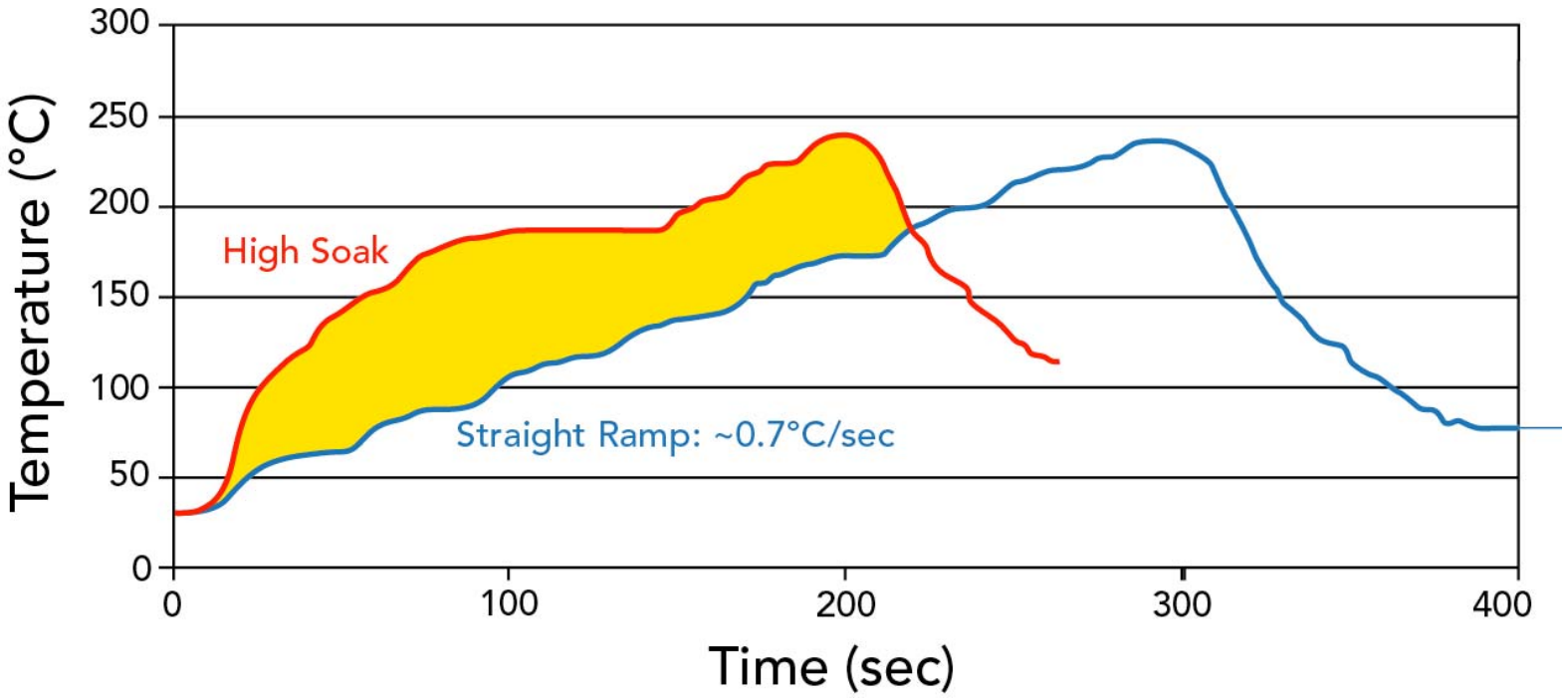
Reflow Performance

CVP-390 SAC305 Typical Reflow Profile



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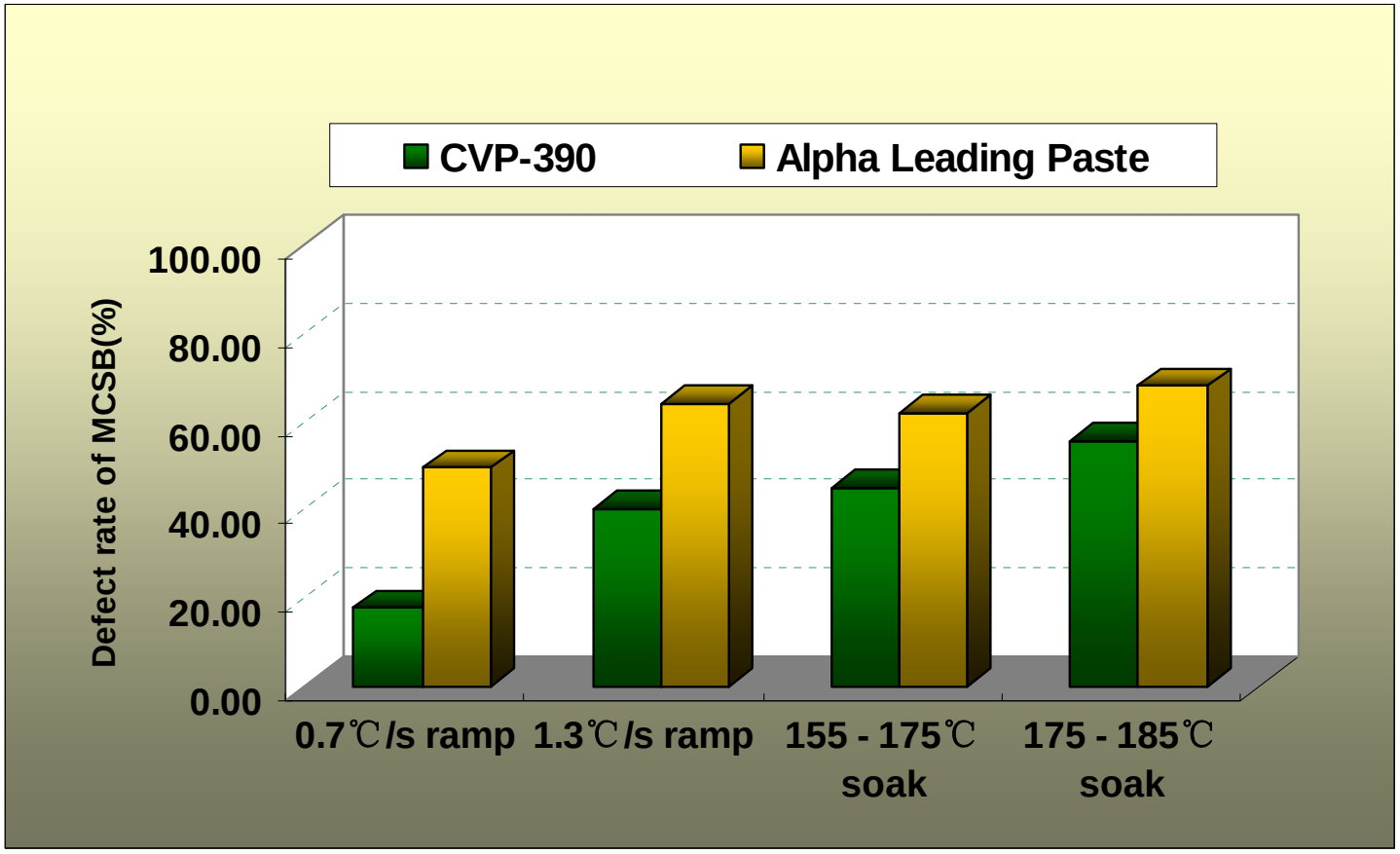
Mid Chip Solder Ball (MCSB) Test

Reflow Performance



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CVP-390 exhibited better MCSB performance

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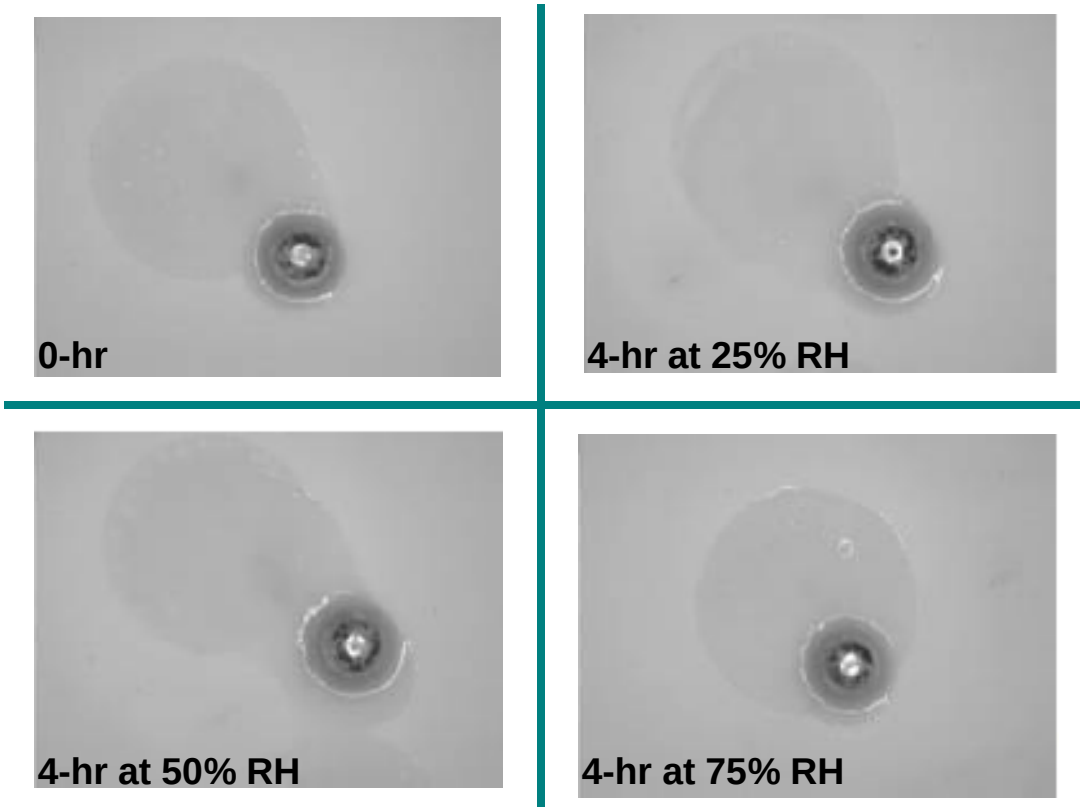
Random Solder Ball Test

Reflow Performance

175°C Soak Profile, 240°C Peak Temperature



Pass JIS Level 2

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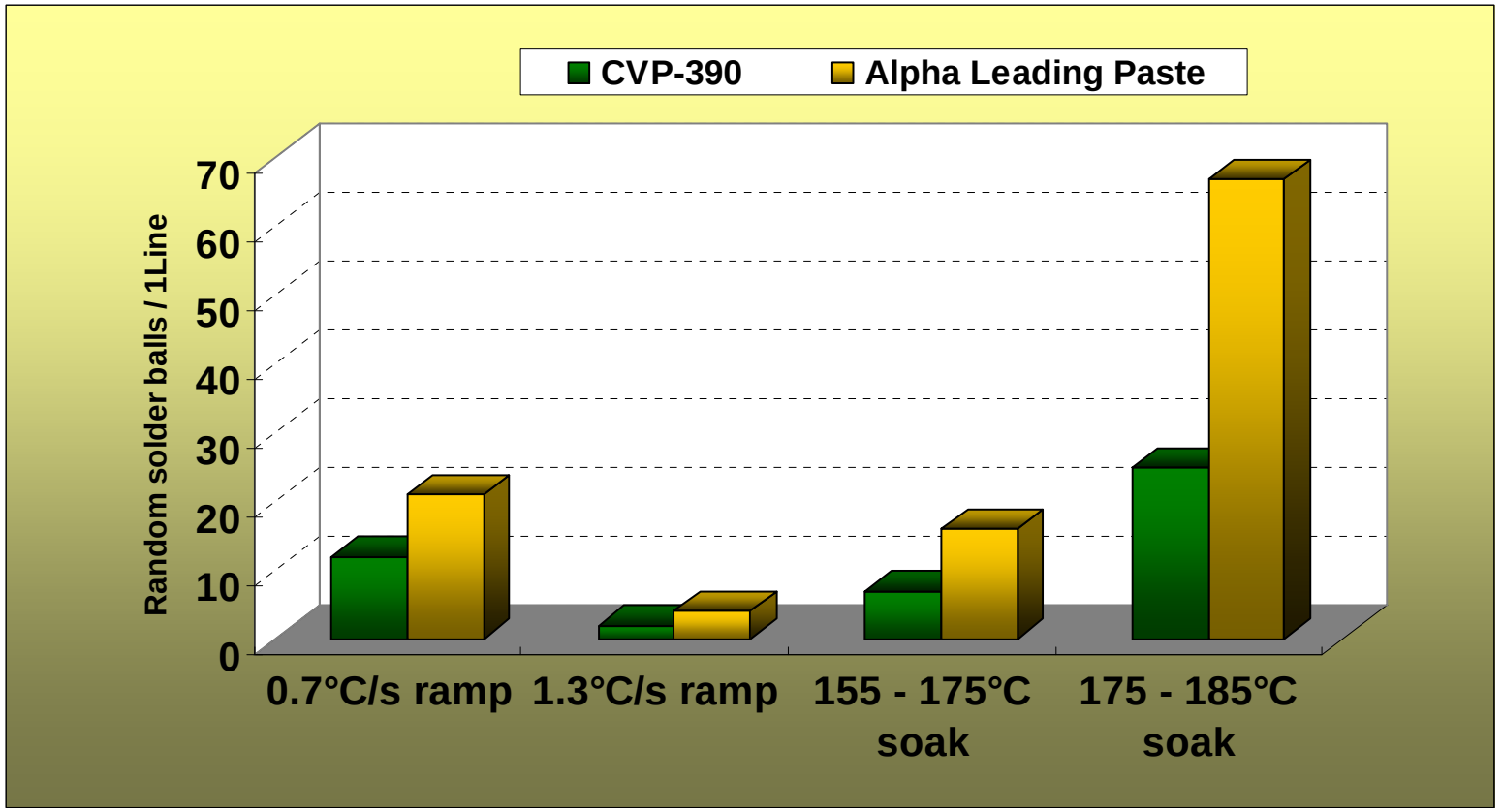
Cross Print Solder Ball Test

Reflow Performance



CVP-390 gives less random solder ball

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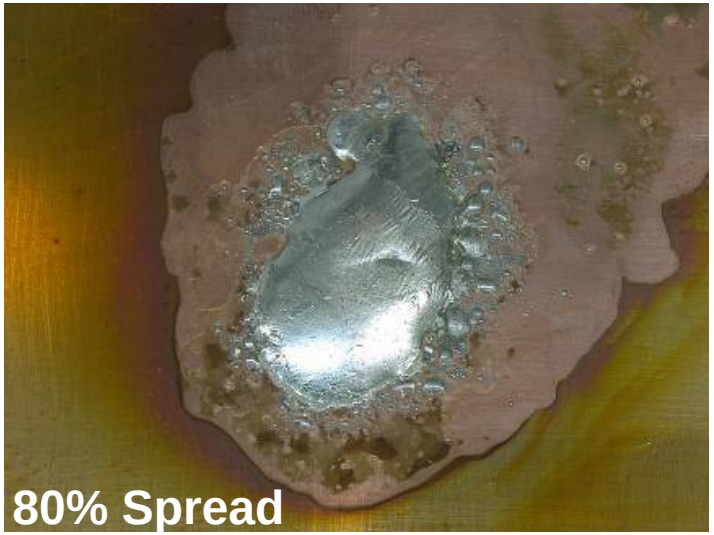
Reflow Performance

JIS ‘Solder Bath’ Spread Performance



SAC305

SACX Plus™ 0807

High spread performance with both SAC305 and low Ag alloys

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Flux Residue Tackiness

Reflow Performance

JIS Z 3197 8.5.1 Talc Test

The Talc Powder is easily brushed off, indicating the residue is not sticky

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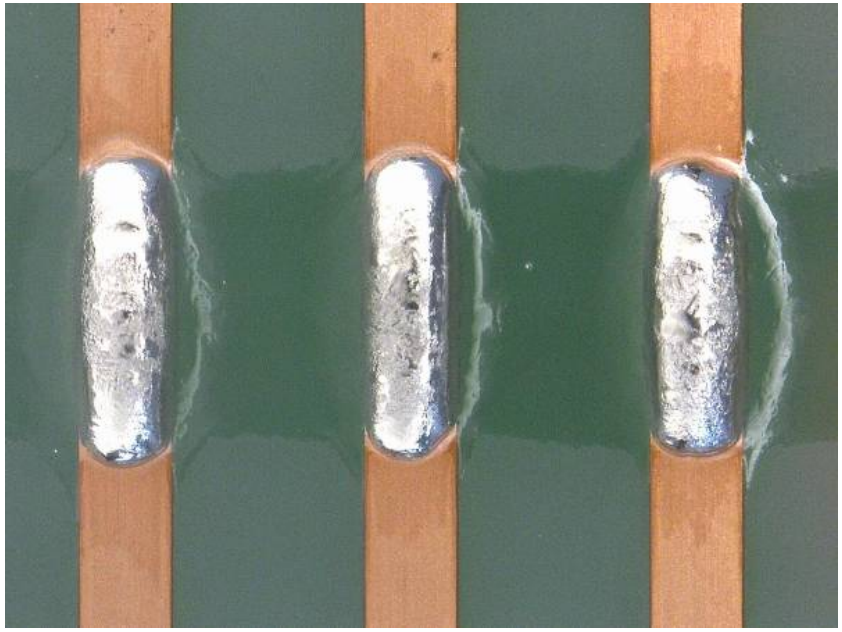
Flux Residue Cosmetics

High Soak Profile – 180-190°C soak for 60 seconds



Clear, colorless flux residue with no evidence of bubbles in flux and flux burning in copper substrate

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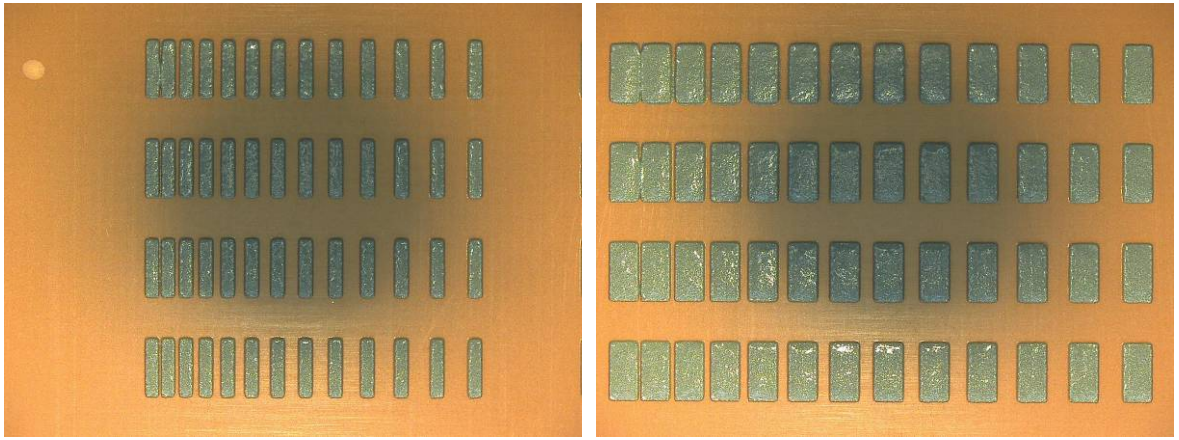
Cold & Hot Slump Test

Reflow Performance

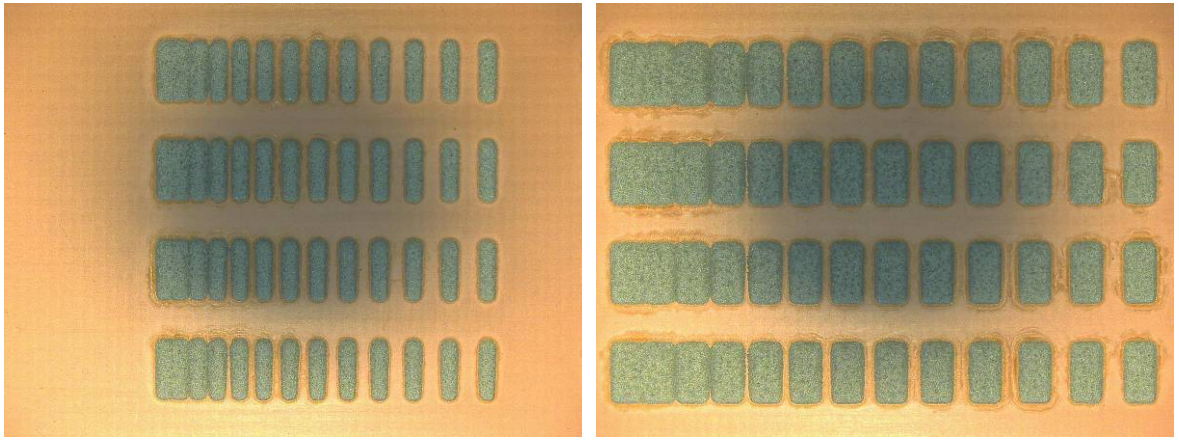
JIS-Z-3284 Annex 8, 3 minute soak at 150°C.

COLD Slump



Pass 0.2-mm

HOT Slump



Pass 0.4-mm

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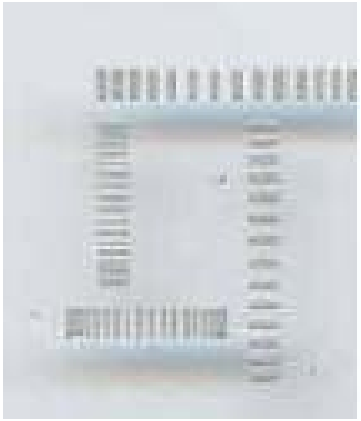
Hot Slump Test

Reflow Performance

IPC J-STD-005 TM-650 2.4.35
3 minute soak at 150°C for 10 minutes.

25% RH for 10 minutes



50% RH for 10 minutes

75% RH for 10 minutes

Pass 0.2-mm gap for Relative Humidity Exposure conditions before Reflow

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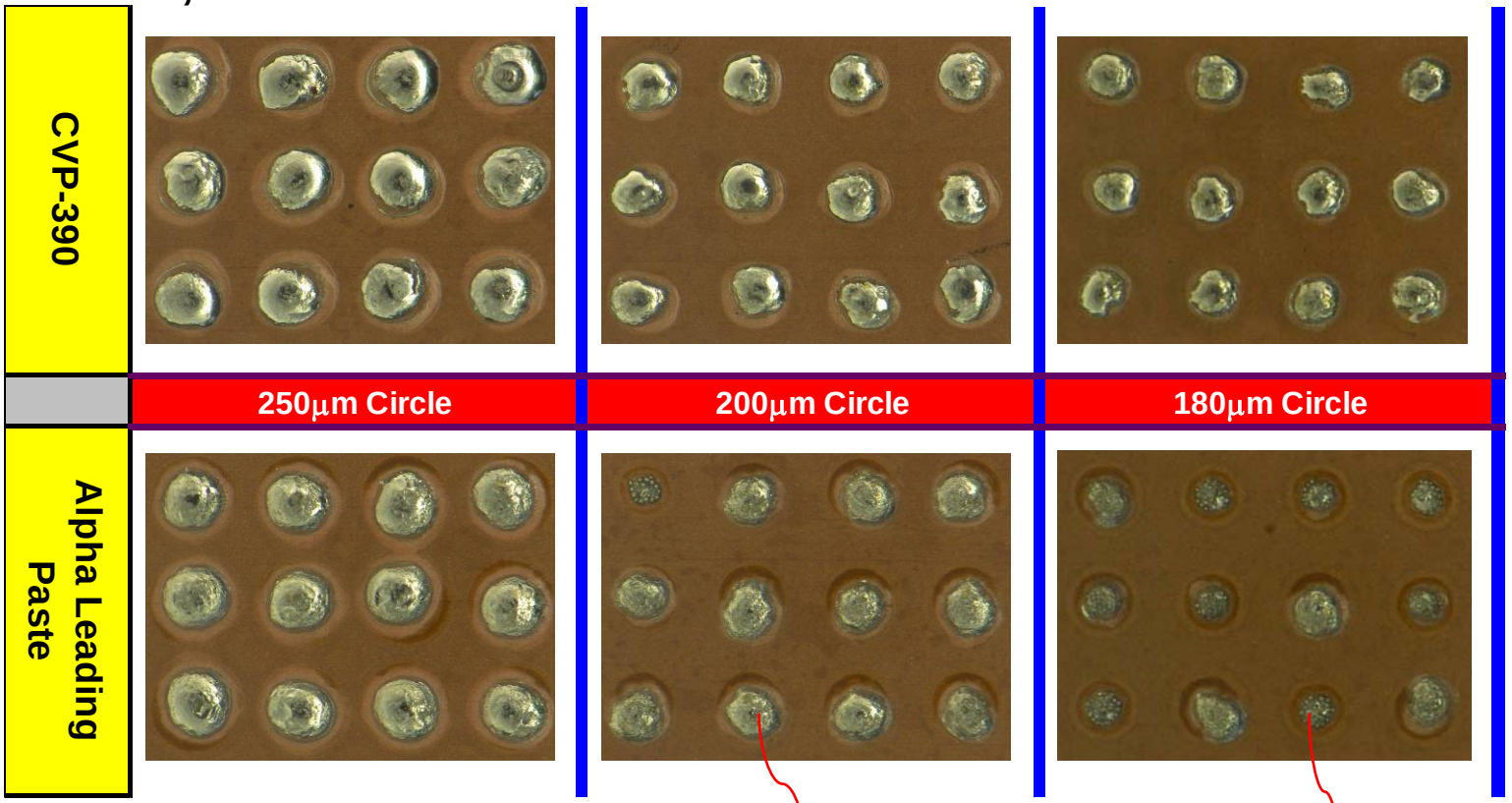
Fine Feature Coalescence Test – SAC305

Reflow Performance

175 - 180°C, 60 sec soak



Poor Coalescence Phenomena

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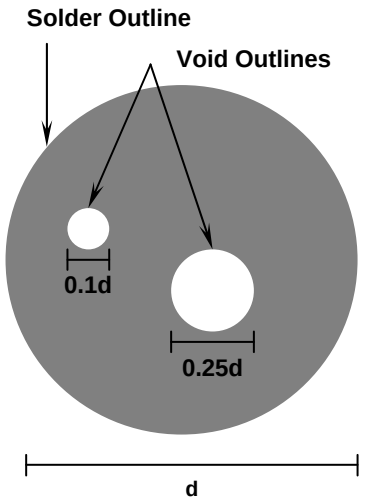
Reflow Yield: Application Note

Definition of Voiding Performance

Location of Void	Class I	Class II	Class III
Void in Solder (Solder Sphere)	60% of diameter = 36% of Area	42% of diameter = 20.25% of Area	30% of diameter = 9% of Area
Void at interface of Solder (Sphere) and Substrate	50% of diameter = 25% of Area	25% of diameter = 12.25% of Area	20% of diameter = 4% of Area



Example:
Total Void Diameter
0.10d +0.25d = 0.35d

IPC Criteria for Voids in BGAs, IPC 7095 7.4.1.6

The IPC criteria provide three classes of acceptance for both the solder sphere and the sphere-pad interface.

Where multiple voids exist, the dimensions will be added to calculate total voiding in the joint.

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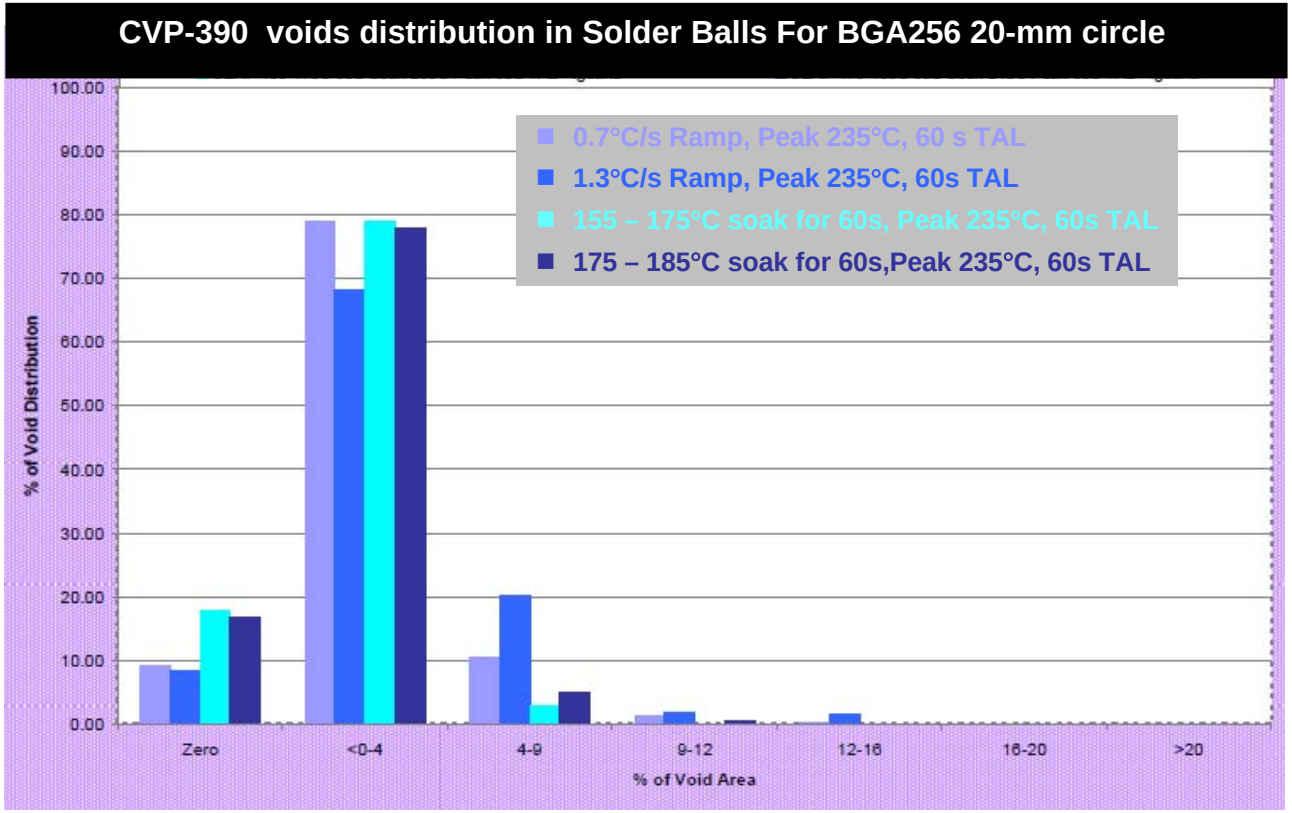
Voiding Performance – SAC305



- **Excellent, Low Voiding Performance**
  - **IPC7095 Class III, soak profiles**
  - **IPC7095 Class II, straight ramp profiles**

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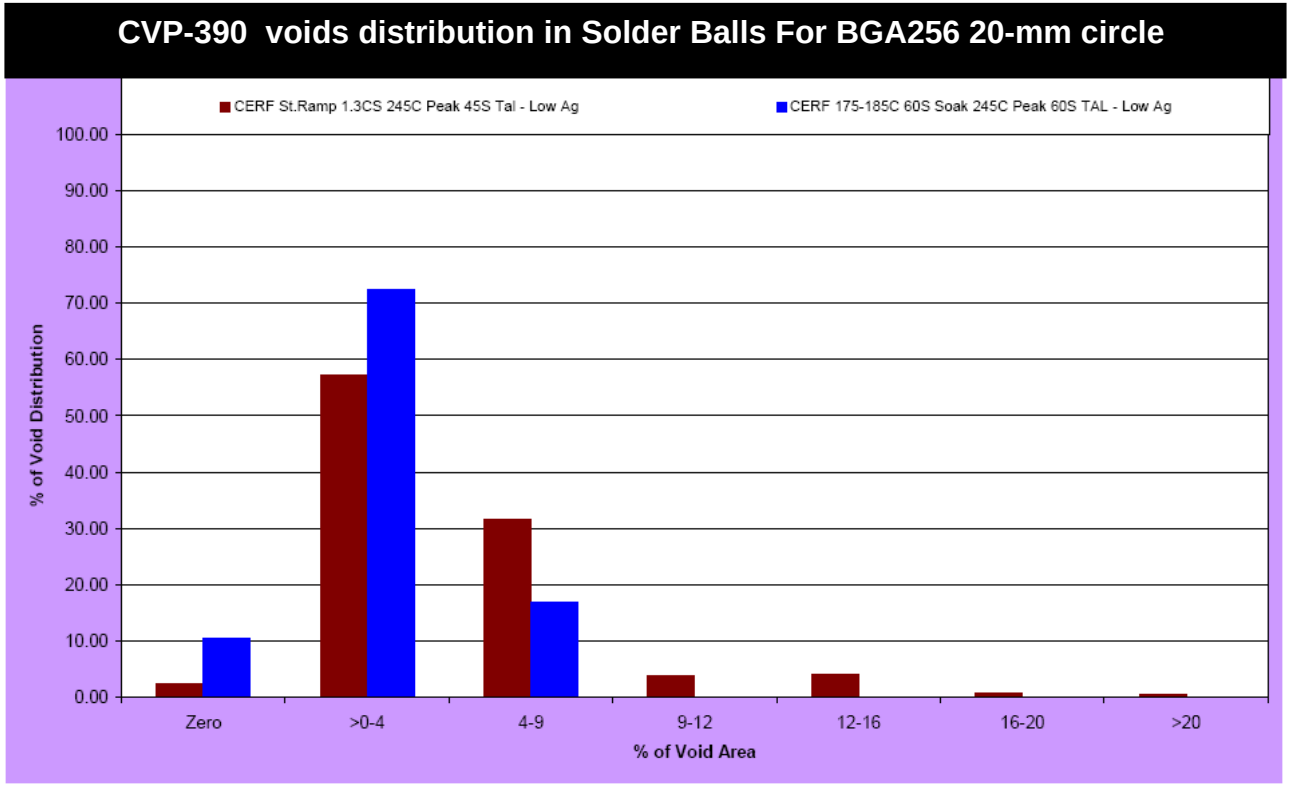
Voiding Performance – SACX Plus™ 0807

Reflow Performance



- **Excellent, Low Voiding Performance**
  - **IPC7095 Class III, soak profiles**
  - **IPC7095 Class II, straight ramp profiles**

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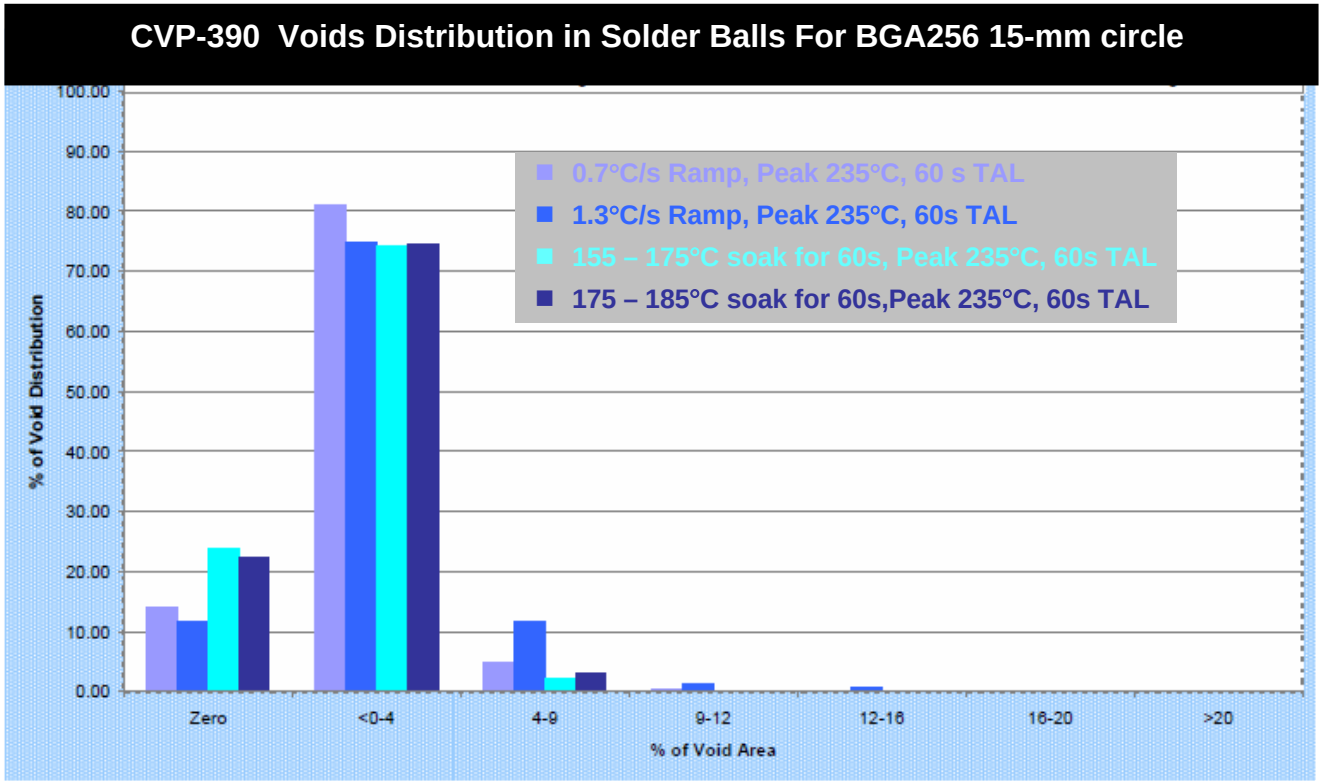
Voiding Performance – SAC305

Reflow Performance



- **Excellent, Low Voiding Performance**
  - **IPC7095 Class III, soak profiles**
  - **IPC7095 Class II, straight ramp profiles**

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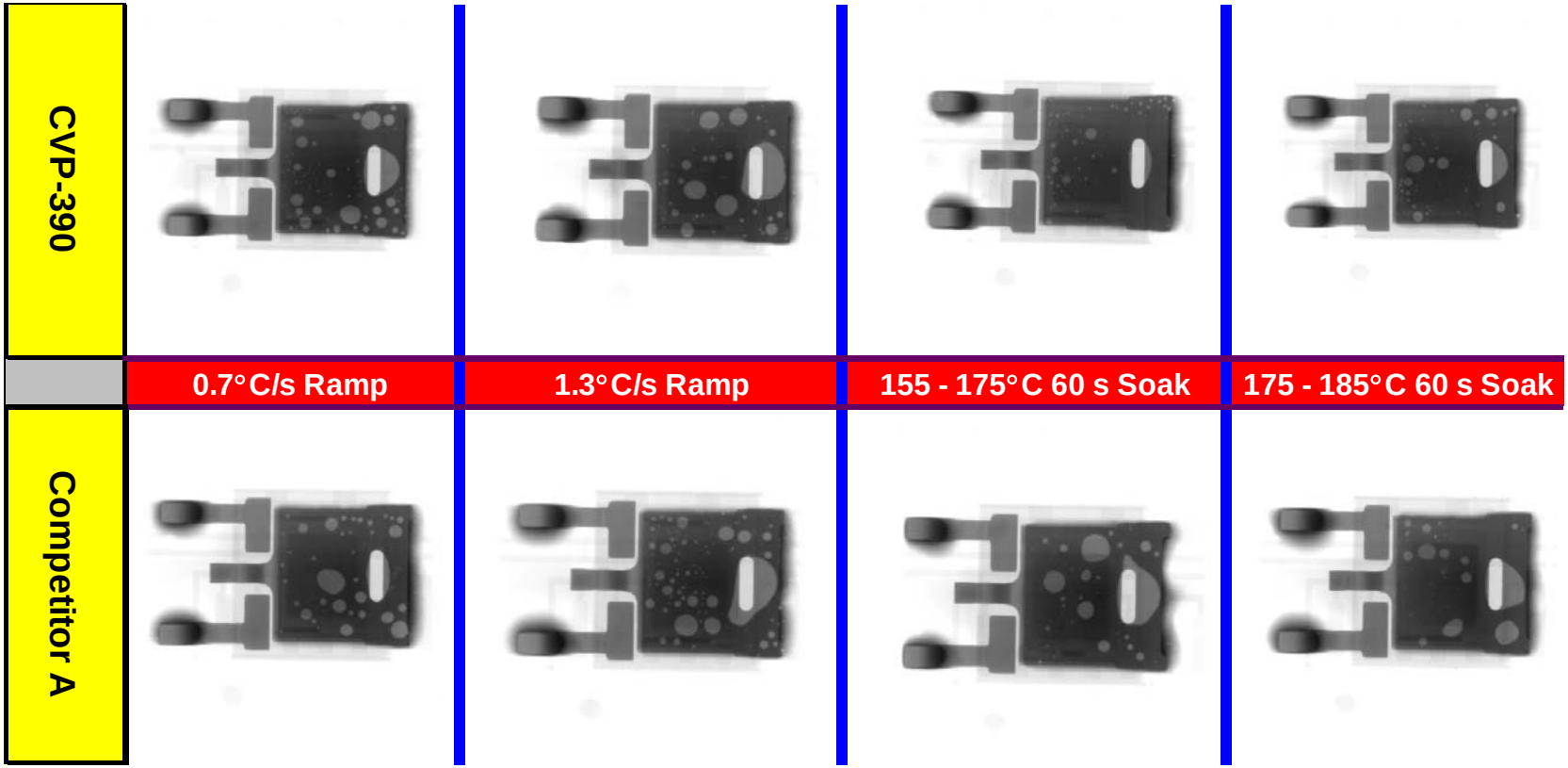
DPAK Voiding Performance – SAC305

Reflow Performance



CVP-390 demonstrates lower voiding performance

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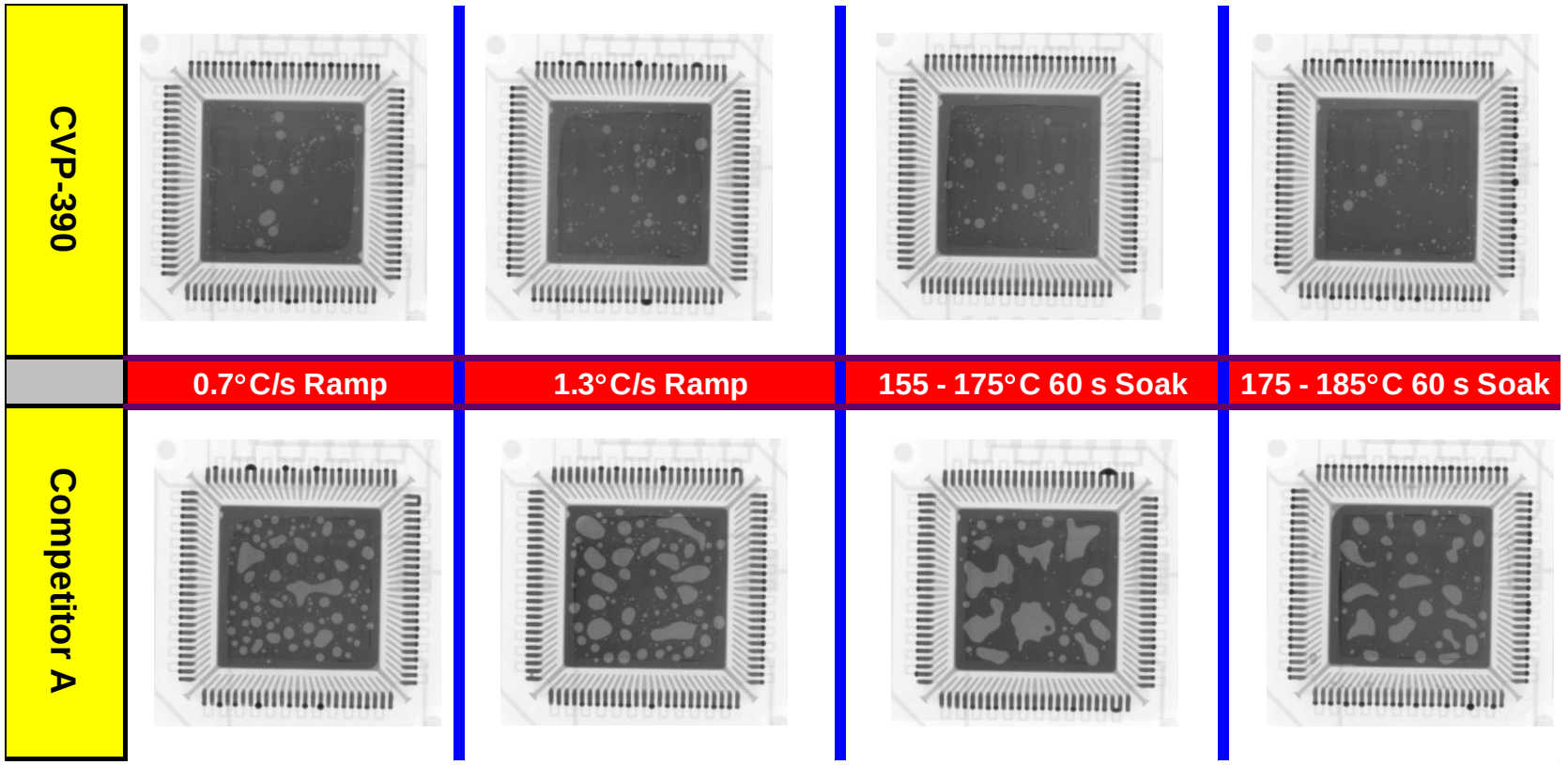
MLF Voiding Performance – SAC305

Reflow Performance



CVP-390 demonstrates lower voiding performance

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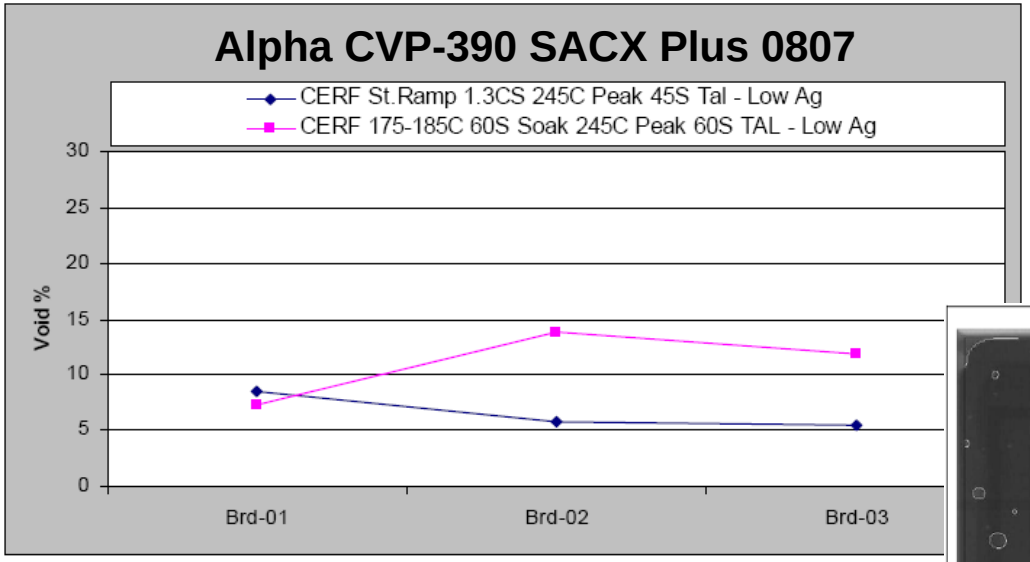
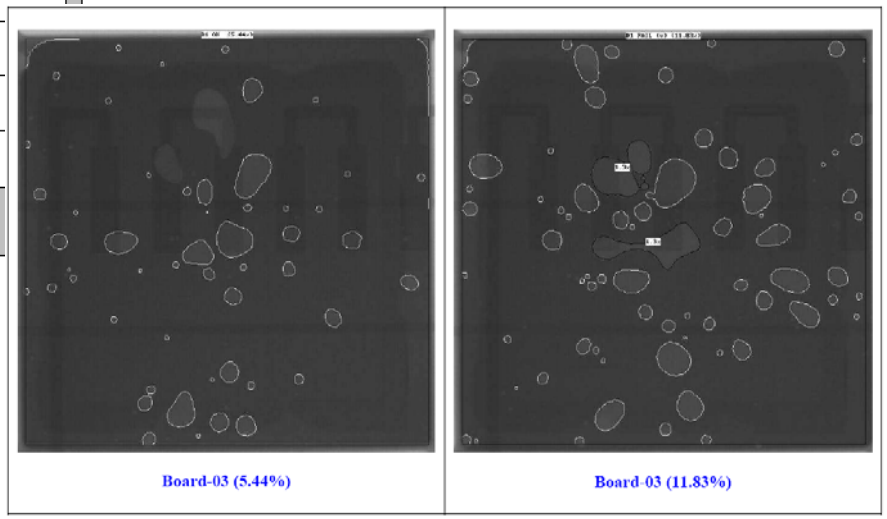
MLF Voiding Performance – SACX Plus™ 0807

Reflow Performance





CVP-390 maintains low voiding performance with Low Ag alloys

1.3°C/sec Straight Ramp, 245°C Peak, 45 sec TAL

175 - 185°C soak, 245°C Peak, 60 sec TAL

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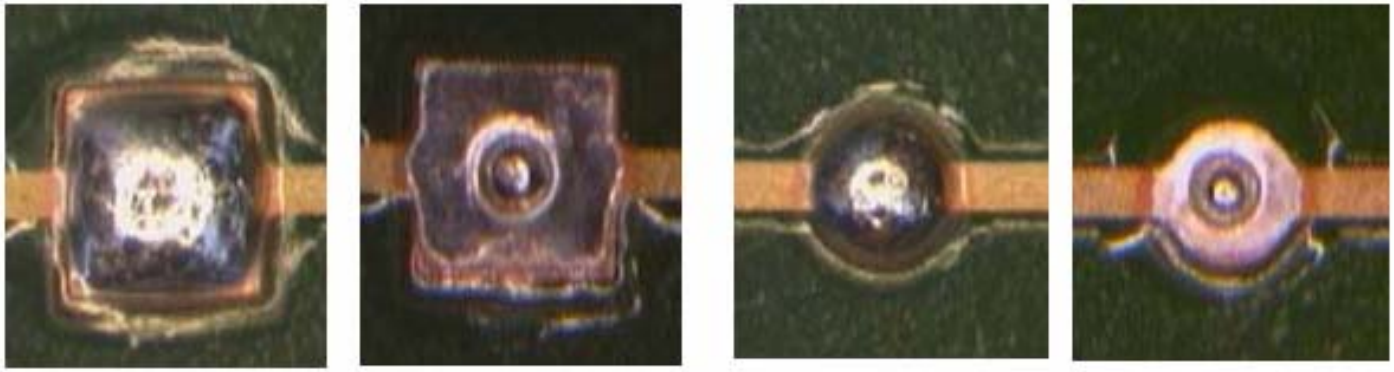
Flying Probe Pin Testing Vehicle & Test Method

Reflow Performance



Pad type: A B C D

A – 1.0 mm sq pads
B – 1.0 mm sq pads with 0.33 mm vias
C - 0.7 mm round pads
D – 0.7 mm round pads with 0.33 mm vias

All pads coated with Cu OSP (Entek Plus 106A)

Reflow : 238 degC peak, Probe : Sharp Chisel, 6.5 oz. force

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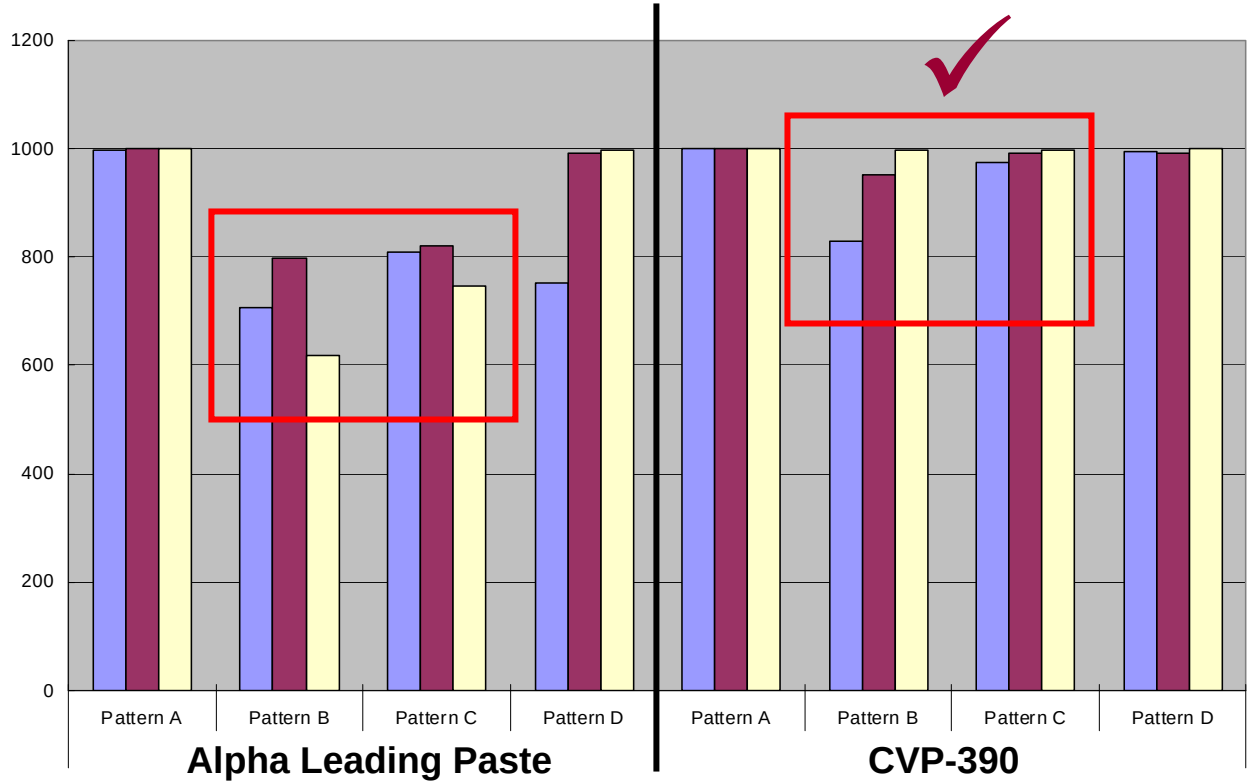
Flying Probe Pin Testing Test Results

Reflow Performance



Flying probe pin test yield number of hits <10 ohm (N=3), Max.1000

CVP-390 demonstrates better pin testing

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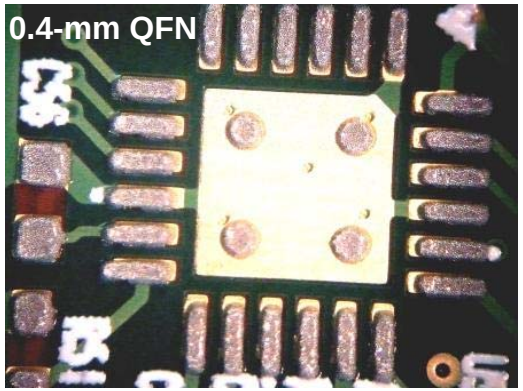
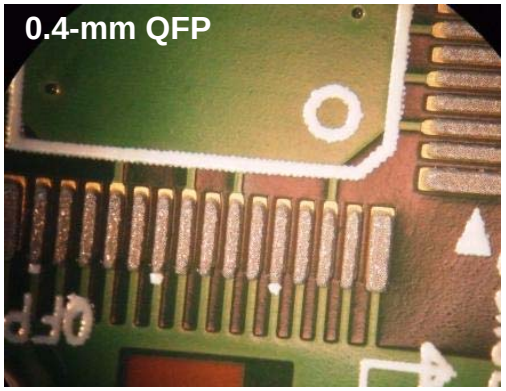
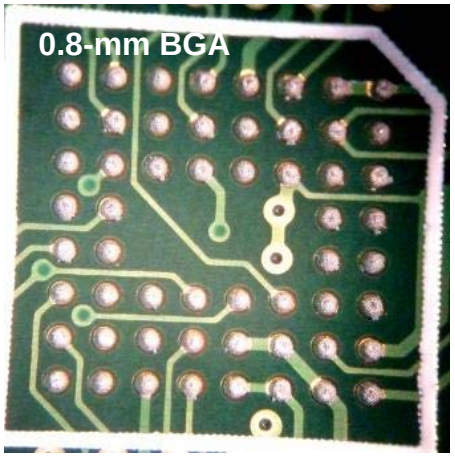
Excellent Print Deposits

Field Trial Performance







- Printing Parameters
  - Print Speed: 40 mm/s
  - Separation Speed: 3 mm/s
  - Environmental conditions 25°C/21%RH

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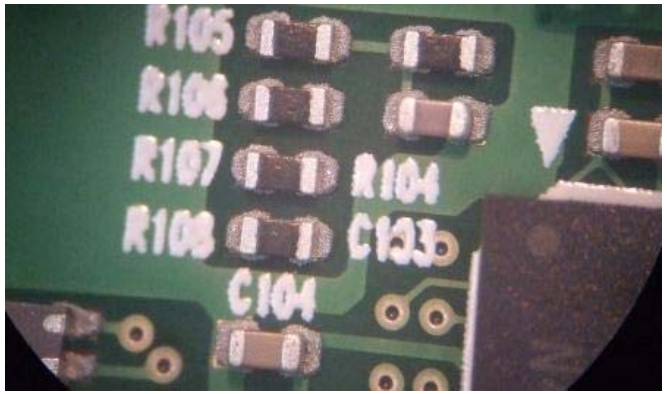
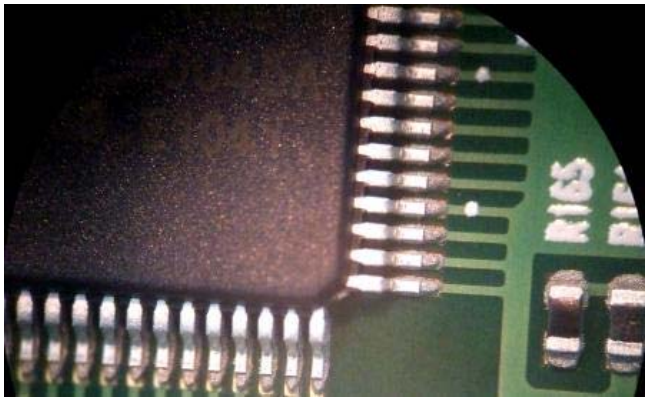
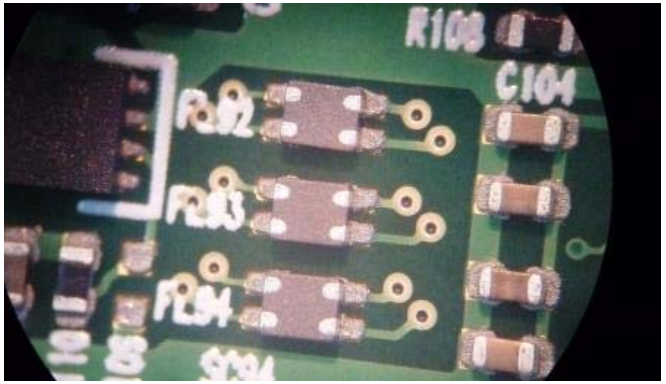
CVP-390 solder paste

Good Placement Performance

Field Trial Performance







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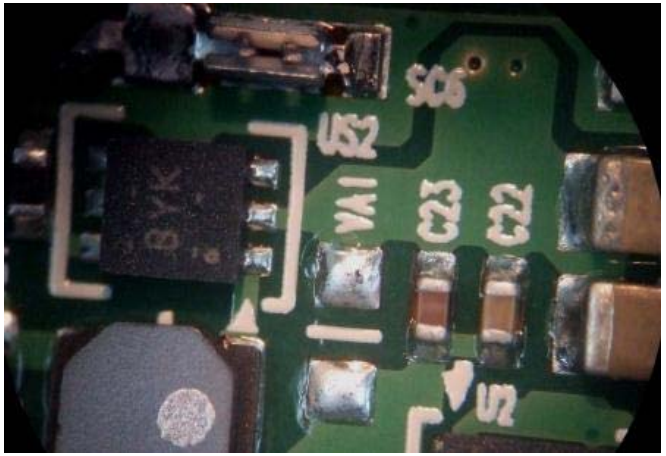
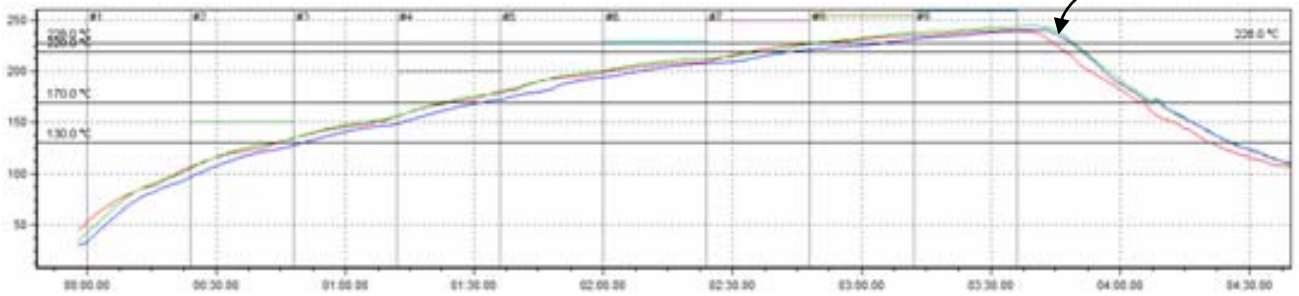
Excellent, Bright Solder Joints Formation

Field Trial Performance



Time Above Liquidus Profile		
Probe	≥ 228°C (secs)	Peak (°C)
1	54	240
2	60	244
3	44	241
Mean	53	242

Temperature (°C)



Time (minutes)

Preheat Profile			
Probe	RT to 130°C (sec)	RT to 170°C (sec)	RT to 228°C (secs)
1	44	85	170
2	44	83	170
3	50	92	185
Mean	46	87	175

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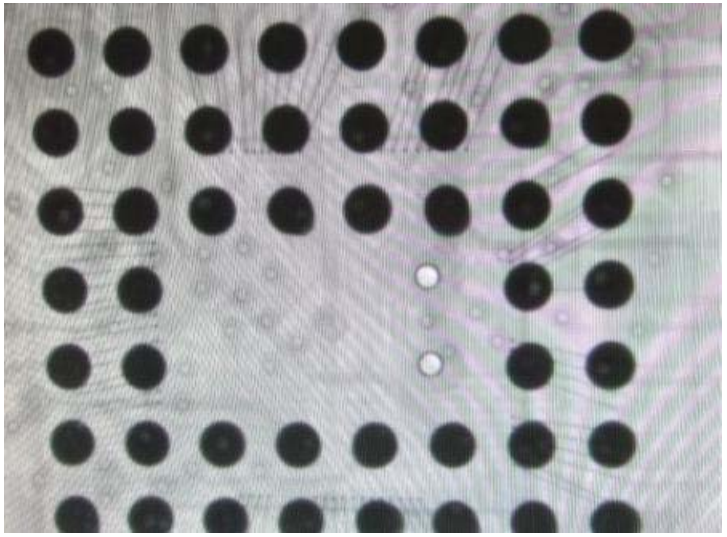
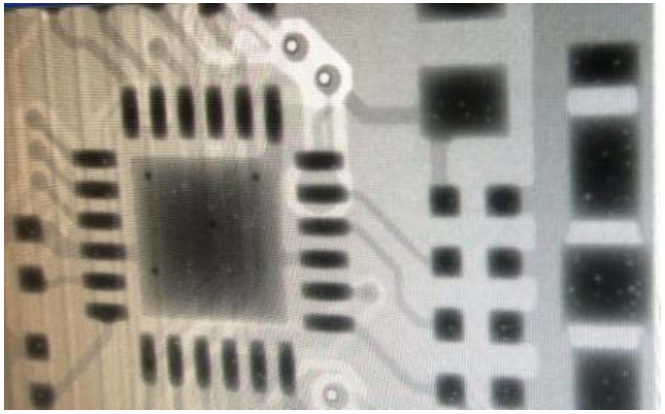
Excellent Voids Performance

Field Trial Performance



0.8-mm pitch BGA



0.4-mm QFN

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CVP-390 solder paste

SGS

Test Report No: 10214815(4) R1 Date: 23-Nov-10 Page 2 of 4

Test Result(s):

Sample Description : Paste Flux PNC1017N (CVP-390)

Test Item(s):	Unit	Method	Results	MDL
Halogen				
Halogen - Bromine (Br)	mg/kg	With reference to BS EN 14582. Analysis was performed by IC	n.d.	50
Halogen - Chlorine (Cl)	mg/kg	With reference to BS EN 14582. Analysis was performed by IC	n.d.	50
Total (Br + Cl)	mg/kg	---	n.d.	---

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

Lab Analyst(s): Jenny

'Zero Halogen' Product

(Meets the Halogen Standards Below)

Halogen Standards			
Standard	**Requirement**	**Test Method**	**Status**
JEITA ET-7304 *Definition of Halogen Free Soldering Materials*	< 1000 ppm Br, Cl, F in solder material solids	**TM EN 14582** *Solids extraction per IPC TM 2.3.34*	Pass
IEC 612249-2-21	Post Soldering Residues contain < 900 ppm each or total of < 1500 ppm Br or Cl from flame retardant source		Pass
JEDEC *A Guideline for Defining "LowHalogen" Electronic*	Post soldering residues contain < 1000 ppm Br or Cl from flame retardant source		Pass
Zero Halogens *- No halgonated compounds have been intentionally added to this product*			

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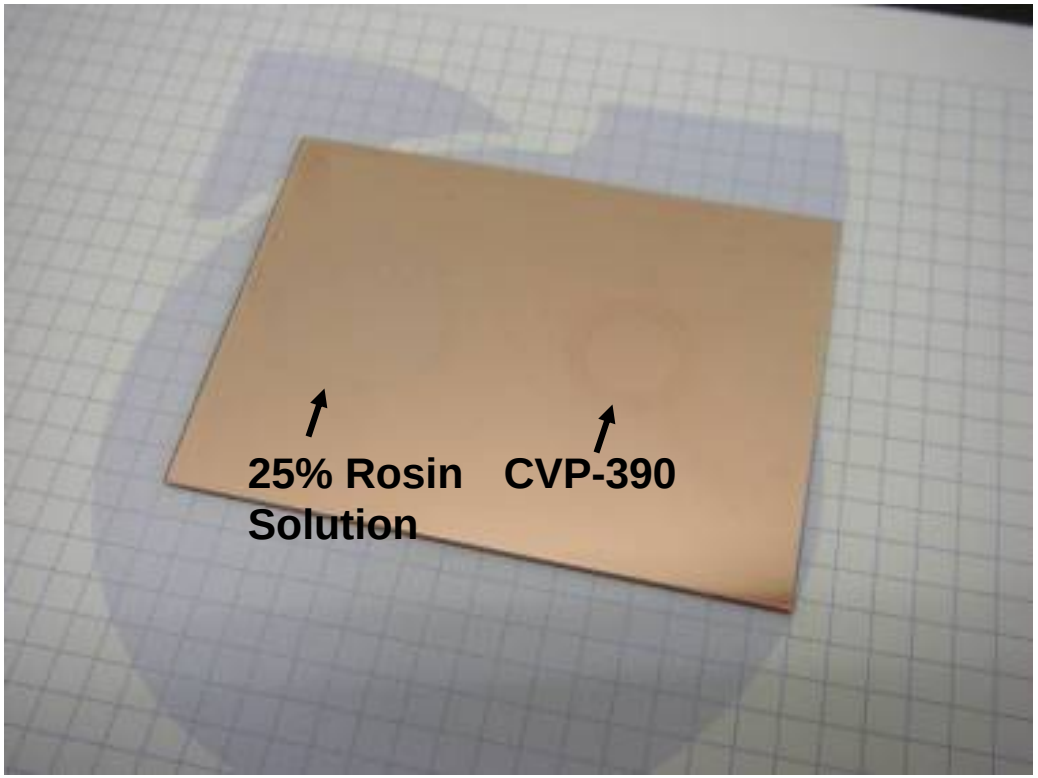
Reliability

Copper Mirror Corrosion Test –

IPC J-STD-004A/JIS-Z-3197-1999 8.4.2



No breakthrough in the Cu layer – Pass Copper Mirror Corrosion Test

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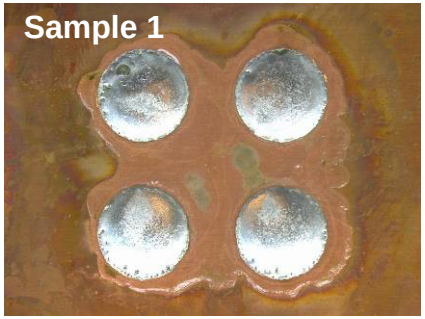
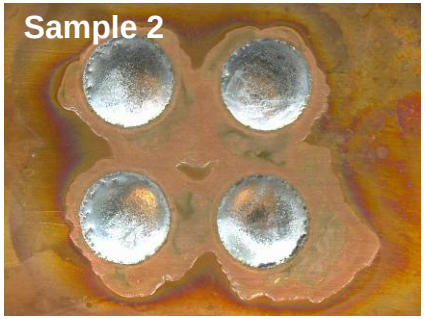
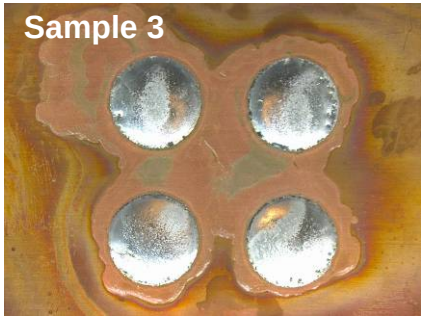
Copper Corrosion Test
IPC J-STD-004B/JIS-Z-3197-1986

Reliability







After 40°C/90%RH exposure for 96 hours

No Evidence of Green Corrosion

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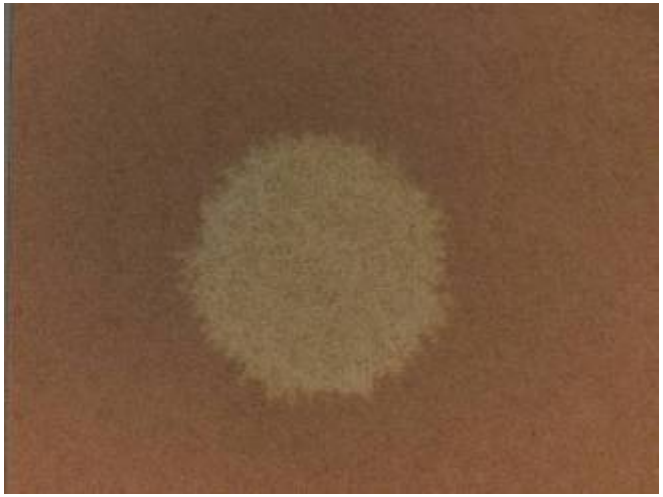
Reliability

Ag Chromate Test
IPC J-STD-004A/JIS Z 3197 8.1.4.2.3



Reference

CVP-390

No presence of white patch

Pass Silver Chromate Test

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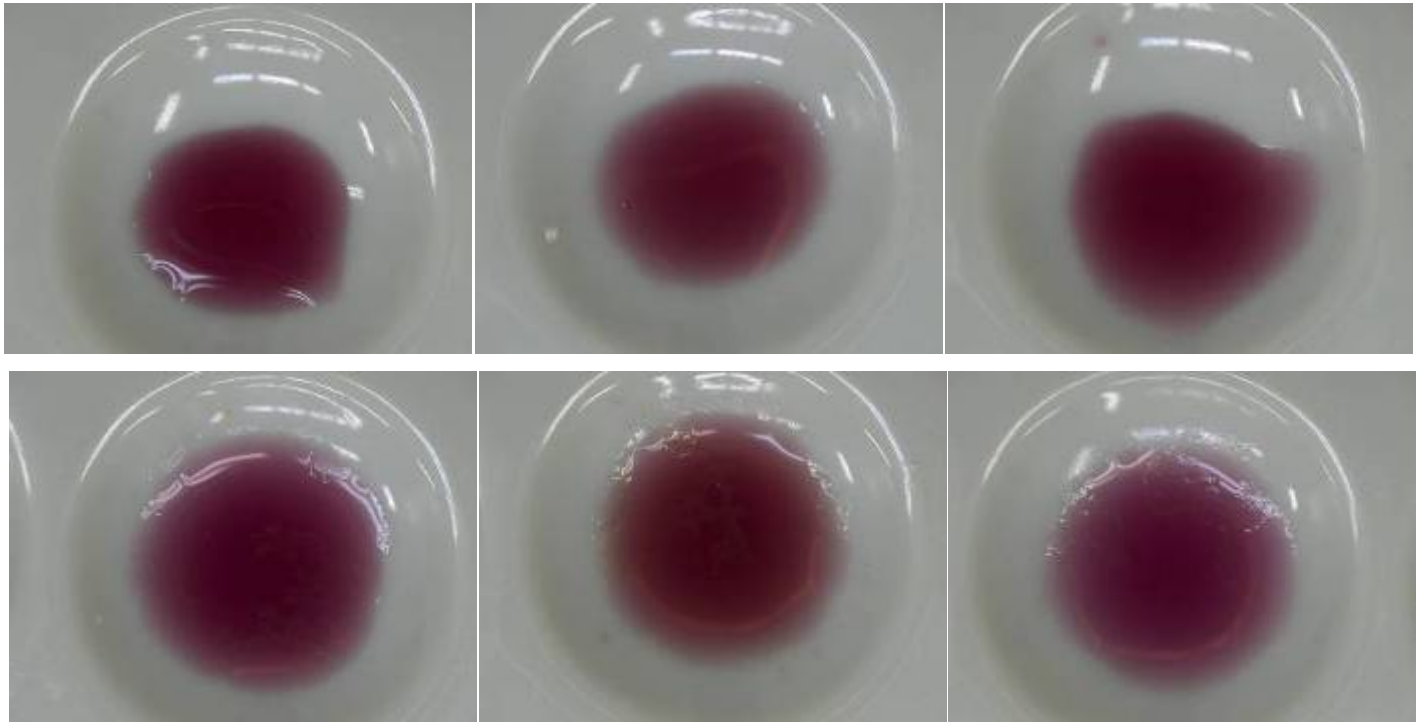
Fluoride Spot Test
JIS-Z-3197-1999 8.1.4.2.4

Reliability



Reference

CVP-390

No change in coloration of purple lake to yellow concludes the absence of Fluoride in the formulation

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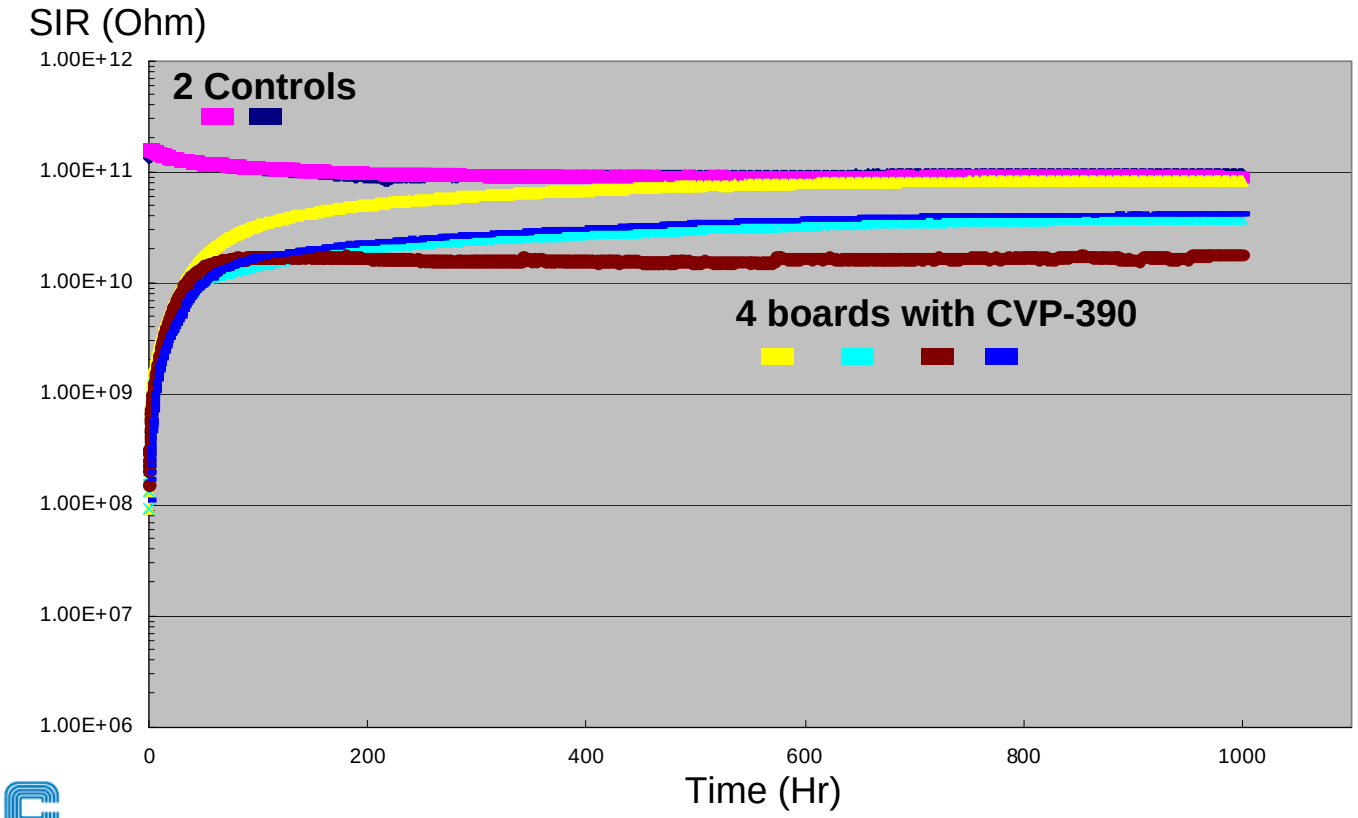
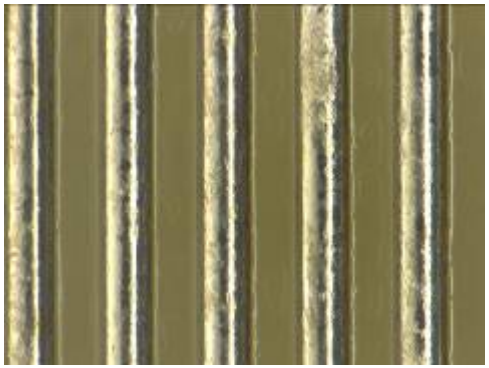
Reliability

Electrical Reliability Data JIS-Z-3197-1999 8.5.4

Passed JIS ECM 85°C/85%RH 48V DC 1000 hours test





- **No Dendrite Growth after 1,000hr at 85°C/85%RH 48V**
- **SIR Value 1.0E+10**

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Equipment : Espec Ion migration tester

Bias Voltage : 48VDC

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Summary

- Product Value Propositions are
  - IPC 7095 Class III Ultra Low Voids Performance
  - Fine Feature Printing and Coalescence
  - Wider Reflow Process Window
  - Zero Halogen
  - Excellent Pin Testing Performance
  - Pass JIS Cu Corrosion Test
- Targeted Applications
  - Consumer Electronics, Handheld Devices, Mother Board, Server Boards
- Value Created Offerings
  - Improved Throughput and Yield

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Leading Products:

No Clean, SnPb

- •ALPHA OM-5100
- •ALPHA OM-5300

No Clean, Lead-free

- • ALPHA OM-338 T
- •ALPHA OM-338 PT
- • ALPHA OM-340
- •ALPHA CVP-390
- •ALPHA CVP-360
- •ALPHA OM-234HF

No Clean, Low Temperature Lead-free

- •ALPHA CVP-520

Water Soluble, SnPb

- • ALPHA WS-809

Water Soluble, Lead-free

- • ALPHA WS-820

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Global Manufacturing Sites

AMERICAS

California, USA
Florida, USA
Illinois, USA
New York, USA
Pennsylvania, USA
Mexico City, Mexico
Monterrey, Mexico
Manaus, Brazil
Sao Paulo, Brazil

EUROPE

Woking, England
Turnhout, Belgium
Cholet, France
Budapest, Hungary
Hatar, Hungary
Naarden, Netherlands
East Kilbride, Scotland

ASIA-PACIFIC

Hong Kong, China
Guangxi, China
Shenzhen, China
Shanghai, China
Chennai, India
Hiratsuka, Japan
Sihung City, Korea
Singapore
Taoyuan, Taiwan

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Global Sales Support

AMERICAS

California, USA
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New Jersey, USA
Pennsylvania, USA
Ontario, Canada
Guadalajara, Mexico
Buenos Aires, Argentina
Sao Paulo, Brazil

EUROPE

Woking, England
Turnhout, Belgium
Cholet, France
Langenfeld, Germany
Hatar, Hungary
Dublin, Ireland
Milano, Italy
Naarden, Netherlands
East Kilbride, Scotland

ASIA-PACIFIC

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Shenzhen, China
Beijing, China
Chengdu, China
Guangxi, China
Nanjing, China
Shanghai, China
Suzhou, China
Tianjin, China
Xiamen, China
Bangalore, India
Chennai, India
Hiratsuka, Japan
Sihung City, Korea
Penang, Malaysia
Muntinlupa, Philippines
Singapore
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Bangkok, Thailand
Thomastown, Australia
Auckland, New Zealand
Vietnam

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Global Customer Technical Support

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Buenos Aires, Argentina
Sao Paulo, Brazil
Manaus, Brazil

EUROPE

Woking, England
Turnhout, Belgium
Cholet, France
Langenfeld, Germany

ASIA-PACIFIC

Hong Kong, China
Shenzhen, China
Beijing, China
Shanghai, China
Suzhou, China
Tianjin, China
Bangalore, India
Chennai, India
Hiratsuka, Japan
Sihung City, Korea
Penang, Malaysia
Singapore
Taoyuan, Taiwan

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