ALPHA® OM-353 is a Type 5, lead-free, Zero-halogen no-clean solder paste designed to impart excellent ultra fine feature printing performance and reflow effectively in an air environment.
# Content

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Key Attributes:

1. Suitable for both SAC305 and SACX Plus™0307 alloys
2. Air Reflow Capability
3. 180 µm circle size printing capability
4. Passes IPC 7095 Class III ultra low voids requirement for BGA
5. Gives excellent coalescence for 180µm small circle size
6. Excellent Head In Pillow (HIP) Resistance Capability
7. Also Applicable for T4 powder
<table>
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<th>Process Benefit</th>
<th>Property</th>
<th>Performance Capability</th>
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<tr>
<td>Print Process Window</td>
<td>Fine Feature Print Definition</td>
<td>Excellent Transfer Volume &amp; CpK Efficiency at 180µm circle size</td>
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<td></td>
<td>Tack/Stencil Life</td>
<td>Long Tack and Stencil Life</td>
</tr>
<tr>
<td></td>
<td>Print Speed Range</td>
<td>25 – 150 mm/sec (1 – 6”/sec)</td>
</tr>
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<td>Reflow Process Yield</td>
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<td>Air &amp; Nitrogen</td>
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<td></td>
<td>Resistance to Voids</td>
<td>Meet IPC 7905 Class 3 Requirements</td>
</tr>
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<td></td>
<td>Random Solder Balls</td>
<td>Preferable J-STD-004A &amp; JIS Level 2</td>
</tr>
<tr>
<td></td>
<td>Head In Pillow</td>
<td>Excellent</td>
</tr>
<tr>
<td></td>
<td>Residue Profile</td>
<td>Pin Testable</td>
</tr>
<tr>
<td></td>
<td>Coalescence</td>
<td>180 µm circle size</td>
</tr>
<tr>
<td></td>
<td>Flux Residue Cosmetics</td>
<td>Clear</td>
</tr>
<tr>
<td>Electrical Reliability</td>
<td>SIR</td>
<td>Pass J-STD-004B</td>
</tr>
<tr>
<td></td>
<td>Electromigration</td>
<td>Pass JIS-Z-3197-1999 8.5.4</td>
</tr>
<tr>
<td></td>
<td>J-STD-004B Classification</td>
<td>ROL0 (Halide Free)</td>
</tr>
<tr>
<td>Environmental</td>
<td>Halogen Content</td>
<td>Zero Halogen (No halogen intentionally added)</td>
</tr>
</tbody>
</table>
## Print Transfer Volume Efficiency

### DEK Horizon 03iX Printer; Print Speed: 100mm/s, Pressure: 0.8-kg/in, 4-mil stencil

<table>
<thead>
<tr>
<th>Pad Size (µm)</th>
<th>Output</th>
<th>SAC305 88.5-4-M20</th>
<th>SAC305 88.2-5-M20</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Volume % Threshold</td>
<td>CpK</td>
<td>Volume % Threshold</td>
</tr>
<tr>
<td>Snap Off</td>
<td>20 mm/s</td>
<td>150 mm/s</td>
<td>20 mm/s</td>
</tr>
<tr>
<td>180</td>
<td>15</td>
<td>20</td>
<td>0.0</td>
</tr>
<tr>
<td>190</td>
<td>20</td>
<td>40</td>
<td>0.4</td>
</tr>
<tr>
<td>200</td>
<td>35</td>
<td>45</td>
<td>0.6</td>
</tr>
<tr>
<td>210</td>
<td>50</td>
<td>60</td>
<td>1.4</td>
</tr>
<tr>
<td>220</td>
<td>60</td>
<td>65</td>
<td>2.8</td>
</tr>
<tr>
<td>230</td>
<td>60</td>
<td>60</td>
<td>2.9</td>
</tr>
<tr>
<td>240</td>
<td>60</td>
<td>60</td>
<td>3.1</td>
</tr>
<tr>
<td>250</td>
<td>60</td>
<td>60</td>
<td>3.4</td>
</tr>
</tbody>
</table>

**Bad** | **Good** | **Excellent**

### Acceptable Transfer Volume Efficiency Aperture Size Limit
- **88.5-4-M20:** ≥ 210µm
- **88.2-5-M20:** ≥ 180µm
T4 Print Transfer Volume Efficiency

4 mil Stencil_DEK

**OM-353_T4 Volume%**
Aperture Size 210µm

**OM-353_T4 Volume%**
Aperture Size 220µm

OM-353_T4: OM-353 SAC 305 88.5-4-M20

Good Transfer Volume Efficiency for Aperture Size

> 210µm
T5 Print Transfer Volume Efficiency

4 mil Stencil_DEK

OM-353_T5 Volume%
Aperture Size: 180um

OM-353_T5 Volume%
Aperture Size: 190um

OM-353_T5: OM-353 SAC 305 88.2-5-M20

Excellent Transfer Volume Efficiency for Aperture Size ≥ 180 µm
OM-353 T4 CpK = 1.39
Aperture Size: 210µm; 20mm/s Snap Off

OM-353 T4 CpK = 2.23
Aperture Size: 210µm; 150mm/sec Snap Off

Both Snap off of 20 mm/sec & 150 mm/sec generates excellent Transfer CpK Efficiency of ≥ 1.33 for 210µm
T5 Print Transfer CpK Efficiency

4 mil Stencil_DEK

OM-353_T5 CpK = 1.39
Aperture Size: 180µm; 20 mm/s snap off

OM-353_T5 CpK = 2.03
Aperture Size: 180µm; 150mm/s snap off

Both Snap off of 20 mm/sec & 150 mm/sec generates excellent Transfer CpK Efficiency of ≥ 1.33 for 180µm
Print Attributes Performance

<table>
<thead>
<tr>
<th>Print Attributes</th>
<th>SAC305 88.5-4-M20</th>
<th>SAC305 88.2-5-M20</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Response to Pause</td>
<td>Print Vol Repeatability</td>
</tr>
<tr>
<td>BGA_10 mils</td>
<td>&lt; 60%</td>
<td>&lt; 60%</td>
</tr>
<tr>
<td>BGA_12 mils</td>
<td>&gt; 60%</td>
<td>&gt; 60%</td>
</tr>
<tr>
<td>BGA_15 mils</td>
<td>&gt; 60%</td>
<td>&gt; 60%</td>
</tr>
<tr>
<td>BGA_20 mils</td>
<td>&gt; 60%</td>
<td>&gt; 60%</td>
</tr>
<tr>
<td>QFP_16 mils_90%</td>
<td>&gt; 60%</td>
<td>&gt; 60%</td>
</tr>
<tr>
<td>QFP_16 mils_100%</td>
<td>&gt; 60%</td>
<td>&gt; 60%</td>
</tr>
</tbody>
</table>

effective printing performance on BGA_10mils pads can be achieved using T5 powder
T4 Print Attributes

OM-353 SAC 305 88.5-4-M20

Out of Jar/Response to Pause_BGA56_12 mils Circles

Stencil Life BGA56_12 mil circles

Print Volume Repeatability_BGA56_12 mil circles
T5 Print Attributes

OM-353 SAC 305 88.2-5-M20

**Out of Jar/ Response to Pause_BGA56_10 mils Circles**

- **Theoretical Volume (393 cubic mils)**
- **60% of Theoretical Volume (236 cubic mils)**

<table>
<thead>
<tr>
<th>Condition</th>
<th>A. Out Of Jar</th>
<th>B. After 100 Kneads</th>
<th>C. After 2 Hour Pause</th>
</tr>
</thead>
<tbody>
<tr>
<td>Board Speed</td>
<td>1 inch/sec</td>
<td>2 inch/sec</td>
<td>4 inch/sec</td>
</tr>
<tr>
<td>Volume (cubic mils)</td>
<td>0</td>
<td>100</td>
<td>200</td>
</tr>
<tr>
<td></td>
<td>400</td>
<td>300</td>
<td>200</td>
</tr>
</tbody>
</table>

**Print Volume Repeatability_BGA56_10 mils circles**

- **Theoretical Volume (393 cubic mils)**
- **60% of Theoretical Volume (236 cubic mils)**

<table>
<thead>
<tr>
<th>Board Speed</th>
<th>1 inch/sec</th>
<th>2 inch/sec</th>
<th>4 inch/sec</th>
<th>6 inch/sec</th>
</tr>
</thead>
<tbody>
<tr>
<td>Volume (cubic mils)</td>
<td>0</td>
<td>100</td>
<td>200</td>
<td>300</td>
</tr>
<tr>
<td></td>
<td>400</td>
<td>300</td>
<td>200</td>
<td>100</td>
</tr>
</tbody>
</table>

**Stencil Life BGA256_10 mil Circles**

- **Theoretical Volume (393 cubic mils)**
- **50% of Theoretical Volume (196 cubic mils)**

<table>
<thead>
<tr>
<th>Time (hrs)</th>
<th>T-0</th>
<th>T-1</th>
<th>T-2</th>
<th>T-3</th>
<th>T-4</th>
<th>T-5</th>
<th>T-6</th>
<th>T-7</th>
<th>T-8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Volume (cubic mils)</td>
<td>0</td>
<td>100</td>
<td>200</td>
<td>300</td>
<td>400</td>
<td>300</td>
<td>200</td>
<td>100</td>
<td>0</td>
</tr>
</tbody>
</table>
High Temperature Stencil Life

28 - 30 °C/5 -16%RH

Printing Parameters:

• Print Speed: 50 mm/s
• Pressure: 0.65 kg/in
• Cleaning Frequency: After kneads, before printing board for volume measurement
• Cleaning Cycle: Dry/Dry(2 strokes)
• Cleaning Cycle after kneads: Dry/Vac/Vac/Dry(4 strokes)

Excellent High Temperature Resistant Stencil Life
JIS-Z-3284-1994 Annex 9 Tack Life

**50% RH JIS Mean Tack Force (gf)**

- OM-353 SAC 305 88.2-5-M20
- OM-353 SAC 305 88.5-4-M20

Tack Force > 100gf for the 24-hr duration
IPC-TM-650 2.4.44 J-STD005

50% IPC Mean Tack Force (g/mm²)

Tack Force variation of < 0.5 g/mm² meets IPC requirement of < 1.0 g/mm²
Cold Slump Test
JIS-Z-3284, Ambient Room Temperature

OM-353 SAC305
88.5-4-M20

OM-353 SAC305
88.2-5-M20
Typical Air Reflow Profile

217°C: SAC305/SACXPlus™ 0307
221°C: Sn96Ag4
1 - 1.3°C/s

170 - 180°C, 60 - 120 s
155 - 175°C for 60 - 100 s soak
3 - 4°C/s

1 - 2°C/s

235 to 245°C
45 - 90s TAL

Low Soak Profile is preferable

Applicable for SAC305, SACX Plus™ 0307 & Sn96Ag4
Hot Slump Test
JIS-Z-3284, Hot Plate 150°C for 1 minute

OM-353 SAC305
88.5-4-M20

OM-353 SAC305
88.2-5-M20
Hot Slump Test
IPC-TM-650 2.3.35 – 0.33 X 2.03 mm aperture size
OM-353 SAC 305 88.2-5-M20

Pass Gap of at least 0.3-mm
Hot Slump Test

IPC-TM-650 2.3.35 - 0.20 X 2.03 mm aperture size

OM-353 SAC 305 88.2-5-M20

Pass Gap of at least 0.3-mm
Random Solder Ball Test

OM-353 SAC 305 88.2-5-M20

Excellent Random Solder Ball Performance
Cross Print Random Solder Ball Test

OM-353 SAC 305 88.2-5-M20

Low Soak Profile better than High Soak Profile
Coalescence Test

*OM-353 SAC 305 88.2-5-M20*

Complete coalescence, brightly reflow solder

**Low Soak**
- 0-hr, 0.16-mm
- 15-hr Rolling, 0.16-mm
- 6-hr ambient, 0.16-mm

**High Soak**
- 0-hr, 0.16-mm
- 15-hr Rolling, 0.16-mm
- 6-hr ambient, 0.16-mm
Wetting Test on 6.5-cm deposit

OM-353 SAC 305 88.2-5-M20

0-hr, 0.16-mm
15-hr Rolling, 0.16-mm
6-hr ambient, 0.16-mm

Low Soak

Brightly reflowed solder with no de-wetting phenomena
**JIS Z 3197-1999 Spread Performance**

250°C, 30sec in air

<table>
<thead>
<tr>
<th>OM-353 SAC 305 88.2-5-M20</th>
<th>OM-353 SACX Plus™ 88.2-5-M20</th>
</tr>
</thead>
<tbody>
<tr>
<td>84.6% Spread</td>
<td>91% Spread</td>
</tr>
</tbody>
</table>

Excellent Spread Property
JIS Z 3197 8.5.1 Dryness Test
OM-353 SAC 305 88.2-5-M20

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

No leftover of Talc Powder on Residue
Reflow Yield: Application Note

Definition of Voiding Performance

<table>
<thead>
<tr>
<th>Location of Void</th>
<th>Class I</th>
<th>Class II</th>
<th>Class III</th>
</tr>
</thead>
<tbody>
<tr>
<td>Void in Solder (Solder Sphere)</td>
<td>60% of diameter</td>
<td>42% of diameter</td>
<td>30% of diameter</td>
</tr>
<tr>
<td></td>
<td>= 36% of Area</td>
<td>= 20.25% of Area</td>
<td>= 9% of Area</td>
</tr>
<tr>
<td>Void at interface of Solder (Sph</td>
<td>50% of diameter</td>
<td>25% of diameter</td>
<td>20% of diameter</td>
</tr>
<tr>
<td>ere) and Substrate</td>
<td>= 25% of Area</td>
<td>= 12.25% of Area</td>
<td>= 4% of Area</td>
</tr>
</tbody>
</table>

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.

Example:
Total Void Diameter

$0.10d + 0.25d = 0.35d$
Void% for BGA256 20 Mil in Air Reflow
OM-353 SAC305 88.5-4-M20

Excellent Low Voiding Performance for Soak Profiles, meeting IPC 7095 Class III
Void% for BGA256 20 Mil in Air Reflow
OM-353 SAC305 88.2-5-M20

Reflow Performance

Good Low Voiding Performance for Soak Profiles, meeting IPC 7095 Class III
Void% for BGA256 20 Mil in Air Reflow
OM-353 SACXPlus™0307 88.5-4-M20

- Voids Performance meets IPC 7095 Class II
- Soak Profiles gave the best IPC 7095 Class II voids performance
Void% for BGA256 20 Mil in Air Reflow
OM-353 SACXPlus™0307 88.2-5-M20

Soak Profiles gave the best voids performance

- 1.3°C St. Ramp 230°C Peak 45s TAL
- 160°-60s Soak 236°C Peak 60s TAL
- 175°C-60s Soak 240°C 60s TAL
Head In Pillow (HIP) in Air Reflow
Profile: 160°C 90 s Soak, 60s TAL, 240°C Peak

- Excellent HIP Resistance For OM-353 products
- Best HIP Resistance exhibited for SACX Plus™ 0307 products
Pads Design For Pin Test

Pad A

Pad B

Pad C

Pad D
Profile for Pin Test

<table>
<thead>
<tr>
<th>Positive Slope (°C/sec)</th>
<th>Rise Time (130.0 - 200.0°C) (mm:ss.tt)</th>
<th>Time Above Liquidus (217.0°C) (mm:ss.tt)</th>
<th>Peak Temperature (°C)</th>
<th>Delta T (°C)</th>
<th>Negative Slope (°C/sec)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.61</td>
<td>01:34.30</td>
<td>01:00.60</td>
<td>240.9</td>
<td></td>
<td>-2.83</td>
</tr>
</tbody>
</table>
Flying Probe Pin Test

OM-353 pin test results are comparable to that of Alpha leading paste, Alpha A.
Probe Image After 12,000 Hits

Sharp Chisel probe of 6.5-oz pressure

OM-353

Air

Nitrogen

No observable Residue Accumulation on tip of probe for OM-353

Alpha A
Post Residue Performance by TGA

OM-353 registered the lowest residue level

<table>
<thead>
<tr>
<th>Product</th>
<th>Flux content</th>
<th>Residue at 250°C</th>
<th>Residue at 350°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alpha A _T4</td>
<td>11.7</td>
<td>7.5%</td>
<td>4.2%</td>
</tr>
<tr>
<td>Alpha B _T4</td>
<td>11.2</td>
<td>6.2%</td>
<td>3.1%</td>
</tr>
<tr>
<td>Competitor T4</td>
<td>11.75</td>
<td>6.95%</td>
<td>4.75%</td>
</tr>
<tr>
<td>OM-353 T5</td>
<td>11.8</td>
<td>5.5%</td>
<td>2.88%</td>
</tr>
</tbody>
</table>

TGA condition:
- Initial Temperature: 30°C
- Ramp: 10°C/min
- Final Temperature: 350°C
- Atmosphere: Air
Residual Spread Behavior
Soak 130 - 200°C, 110 s, 240°C peak, 60 s TAL profile

Large Area wetting – Rectangle (220 x 420mil)

Wetting Pad – Circle (5mm)

OM-353 residue tend not to spread and stays on the pool of solder
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
Copper Corrosion Test
JIS-Z-3197-1999

No Evidence of Green Corrosion

Initial

OM-353 SAC305, Reflow Side Plate
OM-353 SAC305, Cover Plate

After 96-hr 40° C/ 90% RH

OM-353 SACPlus™0307, Reflow Side Plate
OM-353 SACPlus™0307, Cover Plate
Copper Corrosion Test
IPC J-STD-004B TM-650 2.6.15

OM-353 SAC305: Before Testing
OM-353 SAC305: After 10 days of exposure to 40degC/93%RH

OM-353 SACX Plus™ 0307 : Before Testing
OM-353 SACX Plus™ 0307: After 10 days of exposure to 40degC/93%RH

No Evidence of Green Corrosion
Fluoride Spot Test
JIS-Z-3197-1999 8.1.4.2.4

No change in coloration of purple lake to yellow concludes the absence of Fluoride in the formulation
## IPC SIR (ohm) J-STD-004B 3.4.1.4

<table>
<thead>
<tr>
<th>Period</th>
<th>&lt; 24-hr</th>
<th>24 - 168-hr</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>OM-353, SAC305</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Board 1</td>
<td>1.8E+11</td>
<td>1.2E+11</td>
</tr>
<tr>
<td></td>
<td>1.8E+11</td>
<td>1.2E+11</td>
</tr>
<tr>
<td></td>
<td>4E+11</td>
<td>1.1E+11</td>
</tr>
<tr>
<td></td>
<td>5.5E+11</td>
<td>1E+11</td>
</tr>
<tr>
<td>Board 2</td>
<td>1.9E+11</td>
<td>1.3E+11</td>
</tr>
<tr>
<td></td>
<td>1.9E+11</td>
<td>1.1E+11</td>
</tr>
<tr>
<td></td>
<td>1E+11</td>
<td>1.4E+11</td>
</tr>
<tr>
<td></td>
<td>7.1E+09</td>
<td>1.2E+11</td>
</tr>
<tr>
<td>Board 3</td>
<td>2.2E+11</td>
<td>2.2E+11</td>
</tr>
<tr>
<td></td>
<td>9.1E+09</td>
<td>1.6E+11</td>
</tr>
<tr>
<td></td>
<td>2E+11</td>
<td>1.6E+11</td>
</tr>
<tr>
<td></td>
<td>1.9E+11</td>
<td>1.6E+11</td>
</tr>
<tr>
<td><strong>Geometric Mean</strong></td>
<td><strong>8.4E+10</strong></td>
<td><strong>1.3E+11</strong></td>
</tr>
<tr>
<td><strong>Control</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Board 1</td>
<td>3.4E+10</td>
<td>2.4E+10</td>
</tr>
<tr>
<td></td>
<td>4.5E+09</td>
<td>4.9E+10</td>
</tr>
<tr>
<td></td>
<td>1.1E+10</td>
<td>3.4E+10</td>
</tr>
<tr>
<td></td>
<td>9.9E+09</td>
<td>3.2E+10</td>
</tr>
<tr>
<td><strong>Geometric Mean</strong></td>
<td><strong>1.1E+10</strong></td>
<td><strong>3.3E+10</strong></td>
</tr>
</tbody>
</table>

OM-353 SAC305 Pass IPC J-STD-004B requirement

No evidence of greening & Electromigration
**IPC SIR (ohm) J-STD-004B 3.4.1.4**

<table>
<thead>
<tr>
<th>Period</th>
<th>&lt; 24-hr</th>
<th>24 - 168-hr</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>OM-353, SACX Plus 0307</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Board 1</td>
<td>1.6E+11</td>
<td>1.2E+11</td>
</tr>
<tr>
<td></td>
<td>1.3E+11</td>
<td>1.4E+11</td>
</tr>
<tr>
<td></td>
<td>9.1E+10</td>
<td>9.7E+10</td>
</tr>
<tr>
<td></td>
<td>1.4E+11</td>
<td>6.6E+10</td>
</tr>
<tr>
<td>Board 2</td>
<td>1.2E+11</td>
<td>1.1E+11</td>
</tr>
<tr>
<td></td>
<td>1.2E+11</td>
<td>1.1E+11</td>
</tr>
<tr>
<td></td>
<td>1.1E+11</td>
<td>1E+11</td>
</tr>
<tr>
<td></td>
<td>1.1E+11</td>
<td>1E+11</td>
</tr>
<tr>
<td>Board 3</td>
<td>9.7E+10</td>
<td>1.2E+11</td>
</tr>
<tr>
<td></td>
<td>1.2E+11</td>
<td>1.2E+11</td>
</tr>
<tr>
<td></td>
<td>1.3E+11</td>
<td>1.1E+11</td>
</tr>
<tr>
<td></td>
<td>1.3E+11</td>
<td>1.2E+11</td>
</tr>
<tr>
<td>Geometric Mean</td>
<td>1.2E+11</td>
<td>1.1E+11</td>
</tr>
<tr>
<td><strong>Control</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Board 1</td>
<td>4.5E+09</td>
<td>3.7E+10</td>
</tr>
<tr>
<td></td>
<td>7.3E+09</td>
<td>4.5E+10</td>
</tr>
<tr>
<td></td>
<td>6.7E+09</td>
<td>4.3E+10</td>
</tr>
<tr>
<td></td>
<td>4.8E+09</td>
<td>4.1E+10</td>
</tr>
<tr>
<td>Geometric Mean</td>
<td>5.7E+09</td>
<td>4.1E+10</td>
</tr>
</tbody>
</table>

**OM-353 SACX Plus™ 0307 Pass IPC J-STD-004B requirement**

No evidence of greening & Electromigration
Electromigration JIS-Z-3197-1999 8.5.4

OM-353 SAC305 Solder Paste

- 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 ohm
### Test Report

**No:** 10325499(1a)  
**Date:** 13-Jan-14  
**Page:** 2 of 4

**Test Result(s):**

**Sample Description:** Paste Flux OM-353

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

**Note:**

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

**Lab Analyst(s):** Jenny

---

**Halogen Status**

- **‘Zero Halogen’ Product**
- **Meets the Halogen Standards Below**

<table>
<thead>
<tr>
<th>Standard</th>
<th>Requirement</th>
<th>Test Method</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>JEITA ET-7304</strong></td>
<td><strong>Definition of Halogen Free Soldering Materials</strong></td>
<td><em>TM EN 14582</em></td>
<td>Pass</td>
</tr>
<tr>
<td>&lt; 1000 ppm Br, Cl in solder material solids</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>IEC 612249-2-21</strong></td>
<td>Post Soldering Residues contain &lt; 900 ppm each or total of &lt; 1500 ppm Br or Cl from flame retardant source</td>
<td><em>TM EN 14582</em></td>
<td>Pass</td>
</tr>
<tr>
<td><strong>JEDEC</strong></td>
<td>Post soldering residues contain &lt; 1000 ppm Br or Cl from flame retardant source</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Zero Halogen</strong></td>
<td>No halogenated compounds have been intentionally added to this product</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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# OM-353 Products Key Attributes

<table>
<thead>
<tr>
<th>Key Attributes</th>
<th>SAC305 Powder Size</th>
<th>SACXPlus™0307 Powder Size</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>T4</td>
<td>T5</td>
</tr>
<tr>
<td><strong>Alloy</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SACXPlus™0307</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SAC305</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Print Transfer Efficiency</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bad</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neutral</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Good</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Excellent</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Random Solder Ball</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bad</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neutral</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Good</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Excellent</td>
<td></td>
<td></td>
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<tr>
<td><strong>Low Voids</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bad</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neutral</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Good</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Excellent</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>HIP Resistance</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bad</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neutral</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Good</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Excellent</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
• **Product Value Propositions are**
  – Zero Halogen
  – Fine Feature Printing
  – IPC 7095 Class III Ultra Low Voids Performance
  – Exhibit Excellent HIP Resistance Performance
  – Is Pin Testable
  – Excellent small circle sizes coalescence
  – Pass JIS Cu Corrosion Test

• **Targeted Applications**
  – Applicable for use with T5 powder for both N₂ & air reflow

• **Value Created Offerings**
  – Improved Throughput and Yield for Fine Features
Other Leading Solder Paste Products

No Clean, Lead-free

- ALPHA CVP-390
- ALPHA OM-338 PT
- ALPHA OM-340

No Clean, Low Temperature Lead-free

- ALPHA CVP-520

No Clean, SnPb

- ALPHA OM-5100
- ALPHA OM-5300

Water Soluble, SnPb

- ALPHA WS-809

Water Soluble, Lead-free

- ALPHA WS-820
Global Manufacturing Sites

AMERICAS
- Illinois, USA
- Pennsylvania, USA
- Mexico City, Mexico
- Monterrey, Mexico
- Manaus, Brazil
- Sao Paulo, Brazil

EUROPE
- Woking, England
- Turnhout, Belgium
- Cholet, France
- Budapest, Hungary
- ’s-Hertogenbosch, The Netherlands
- Naarden, The Netherlands

ASIA-PACIFIC
- Shenzhen, China
- Shanghai, China
- Chennai, India
- Hiratsuka, Japan
- Sihung City, Korea
- Singapore
- Taoyuan, Taiwan
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Georgia
Illinois
Mass.
New Jersey
Ohio
Pennsylvania
Texas
Ontario, Canada
Guadalajara, Mexico
Tijuana, Mexico
Buenos Aires, Argentina
Tierra del Fuego, Argentina
Sao Paulo, Brazil
Manaus, Brazil

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Delhi, India
Hyderabad, India
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Vietnam

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- Rhode Island, USA
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- Monterrey, Mexico
- Buenos Aires, Argentina
- Tierra Del Fuego, Argentina
- Sao Paulo, Brazil
- Manaus, Brazil

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