MacDermid Alpha ELECTRONICS SOLUTIONS

TECHNICAL DATA SHEET

ALPHA® OM-565 HRL3 SOLDER PASTE

Next Generation, High Reliability, Low Temperature, No-Clean Solder Paste

DESCRIPTION

ALPHA OM-565 HRL3 low temperature solder paste is formulated for a broad range of assemblies to mitigate warpage induced defects in temperature sensitive chip-scale packages. This paste is designed to enable target reflow temperatures of 175 °C with superior wettability to minimize post reflow defects such as Non-Wet-Open (NWO) and Head-in-Pillow (HiP).

The **ALPHA OM-565** chemistry enhances electrochemical performance over existing low melting point solders including excellent compatibility when used in combination with other tested assembly products, such as rework fluxes and cored solder wires. The **HRL3** alloy offers superior thermomechanical and drop shock performance compared to existing low temperature solutions.

READ ENTIRE TECHNICAL DATA SHEET BEFORE USING THIS PRODUCT

FEATURES & BENEFITS

- Enables target peak reflow of 175 °C for excellent HiP/NWO performance
- Mitigates warpage induced defects such as hot tearing for temperature sensitive packages
- Compatibility with HRL3 alloy for enhanced thermomechanical and drop shock reliability
- Fine feature print capability down to 01005 component size
- 8-hour stencil life in ambient and elevated conditions
- Compatibility with contact rework applications
- Reflowable in Air and Nitrogen
- Zero-halogen

PRODUCT INFORMATION

Alloys:	HRL3
Powder Size:	Type 4, Type 5, Type 6
Packaging Sizes:	500-gram jars, 6-inch & 12-inch cartridges, 30cc syringes
Lead-Free:	Complies with Directive EU/2015/863; amending Annex II of 2011/65/EU

Note: For other alloys, powder sizes and packaging sizes, contact your local MacDermid Alpha Sales Office.

HALOGEN STATUS

Halogen Standards			
Standard	**Requirement**	**Test Method**	**Status**
BS EN 14582:2016	Zero-halogen (not intentionally added)	SGS Halogen Cl, Br - BS EN14582(2016) / Combustion	Not Detected
RoHS	RoHS Directive EU/2015/863; amending Annex II of 2011/65/EU. (Permissible Limit ≤1000 mg/kg & ≤100 mg/kg for cadmium and cadmium compounds)	IEC 62321:2013 & IEC 62321:2008	Pass
REACH	Concentrations of tested SVHC are ≤ 0.1% (w/w)	SGS In-House Method	Pass

TECHNICAL DATA

ALPHA OM-565 HRL3		
Category	**Results**	**Procedures/Remarks**
Chemical Properties		
Flux Classification	ROL0	IPC J-STD-004B
Copper Mirror Test	Low activity, no breakthrough	IPC J-STD-004B
Copper Corrosion Test	Low activity, no corrosion	IPC J-STD-004B/JIS Z 3197
Electrical Properties		
JIS SIR (7 days, 40 °C/93% RH)	Pass, $\geq 10^8$ Ohms for 7 days	JIS Z 3197:1999 (8.5.3)
IPC SIR (7 days, 85 °C/85% RH, 12V)	Pass, $\geq 10^8$ Ohms for 7 days	IPC J-STD-004C TM-650 2.6.3.7
IPC SIR (7 days, 40 °C/90% RH)	Pass, $\geq 10^8$ Ohms for 7 days down to 100 µm spacing	IPC J-STD-004B, IPC-TM-650 2.6.3.7
Bellcore SIR (5 days, 65 °C/85%RH)	Pass, $\geq 10^{11}$ Ohms for 5 days	Bellcore GR-78 Core Issue 1, September 1997 (Section 13)

ALPHA OM-565 HRL3		
Category	**Results**	**Procedures/Remarks**
IPC Electrochemical Migration	Pass, No visual evidence of corrosion, discoloration or electromigration for 596 hrs.	IPC J-STD-004B, IPC-TM-650 2.6.14.1
Physical Properties		
Residue Color	Soft and clear flux residue	
Tack Force vs. Time and Humidity	Pass, 24 hrs at 25%, 50% and 75% RH	JIS Z 3284:1994, Annex 9
Tack Force vs. Time and Humidity	Pass, 24 hrs at 25%, 50% and 75% RH	IPC J-STD-005, IPC-TM-650 2.4.44
Random Solder ball	Preferred	IPC J-STD-005, IPC-TM-650 2.4.43
Stencil Life at Ambient Condition	8-hrs consistent transfer efficiency	@ 25 °C/50% RH
Stencil Life at Elevated Condition	8-hrs consistent transfer efficiency	@ 32 °C/70% RH
Cold Slump (25 °C /50% RH)	Pass, no bridging above 0.20 mm	IPC J-STD-005A
Hot Slump (128 °C/10 min)	Pass, no bridging above 0.25 mm	IPC J-STD-005A
Dryness Test (Talc)	Pass, non-sticky post reflow residue	JIS Z 3197

PROCESSING GUIDELINES

The following process settings are offered as a process window guideline based on typical SMT assembly. The optimum process setting will need to be assessed for each individual process due to the variation in assembly processes across the electronics industry.

ALPHA OM-565 HRL3 solder paste is a Bi containing alloy and should be used only in conjunction with lead-free component packages.

A 0.60 to 0.90 paste volume to sphere volume ratio is recommended for hybrid BGA solder joints to optimize reliability performance.

Stencil: 0.10 mm (4.0 mil) thickness tested internally during product development. Stencil design is subject to many process variables. Contact your local MacDermid Alpha Technical Support for advice.

Aperture Design: ALPHA OM-565 HRL3 may be printed using various aperture designs. AR ≥ 0.59 or greater is optimal for printing.

Squeegee: Recommend Metal Squeegee angle 60°, 45°

Speed: Formulated for stencil printing at speeds between 25 mm/s (1.0 in/s) and 150 mm/s (6.0 in/s).

Pressure: Typical blade pressures for 30 cm (12 in) blade length are between 0.18 kg/cm (1.0 lb/in) to 0.29 kg/cm (1.6 lb/in) depending upon the print speed and quality of stencil/substrate gasket. Higher blade pressure is required to achieve a clean stencil surface for applications requiring higher print speed.

Paste Roll: Paste roll between 1.5 cm (0.60 in) to 2.0 cm (0.80 in) in diameter is recommended for optimum performance with paste additions made when roll reaches 1.0 cm (0.40 in) diameter (Min). Max roll size will depend upon blade.

Stencil Release Speed: >5.0 mm/s preferred.

ALPHA OM-565 residue is designed to remain on the board after reflow. Misprints and stencil cleaning to be done with IPA. Suitable stencil cleaners can also be used for stencil under wipe or offline stencil cleaning.

Storage & Handling: Refrigerate to guarantee stability at 0 to 10 °C (32 to 50 °F). When stored under these conditions, shelf life of ALPHA OM-565 HRL3 is 6 months. When refrigerated, warm up paste container to room temperature for up to 4 hours. Paste must be ≥19 °C (66 °F) before processing. It is recommended to verify paste temperature with a thermometer to ensure paste is at 19 °C (66 °F) or greater before use on a printer.

Do not remove worked paste from stencil and mix with unused paste in jar. This will alter the rheology of unused paste.

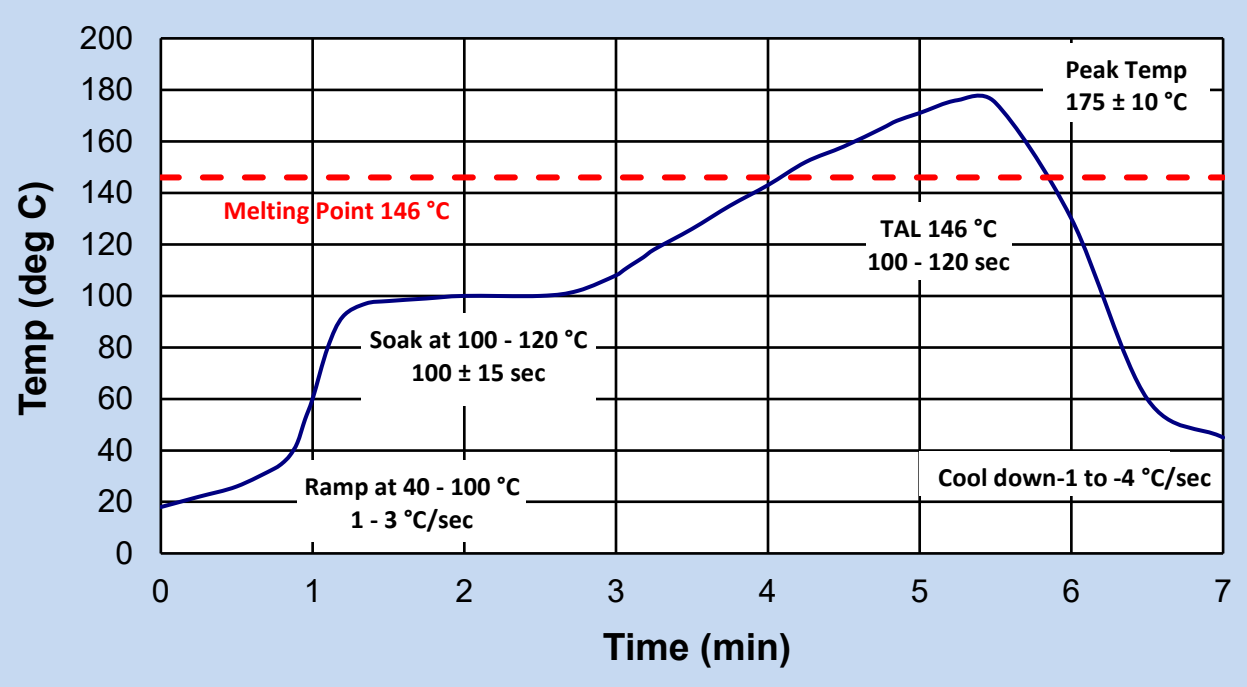
REFLOW PROFILES

Note: These are only recommendations. Equipment and assembly factors may require adjustments to be made to the reflow profile. MacDermid Alpha recommends using a soak reflow profile with 175 °C target peak reflow temperature.

ALPHA OM-565 HRL3 solder paste should be used only in conjunction with lead-free component packages.

Atmosphere: Capable of reflow in Air and Nitrogen environments.

ALPHA OM-565 HRL3 Typical Soak Reflow Profile Recommendation



RECYCLING SERVICES

We provide safe and efficient recycling services to help companies meet their environmental and legislative requirements and at the same time, maximize the value of their waste streams.

Our service collects solder dross, solder scrap, and various forms of solder paste waste. Please contact your local sales representative for recycling capabilities in your area.

SAFETY & WARNING

It is recommended that the company/operator read and review the Safety Data Sheets for the appropriate health and safety warnings before use. **Safety Data Sheets are available.**

CONTACT INFORMATION

www.macdermidalpha.com

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Also read carefully warning and safety information on the Safety Data Sheet. This data sheet contains technical information required for safe and economical operation of this product. READ IT THOROUGHLY PRIOR TO PRODUCT USE . Emergency safety directory assistance: US 1 202 464 2554, Europe + 44 1235 239 670, Asia + 65 3158 1074, Brazil 0800 707 7022 and 0800 172 020, Mexico 01800 002 1400 and (55) 5559 1588