

ALPHA[®] PNC1502D

No-Clean, Lead-Free Solder Paste Halogen-Free, Low Voids, & Ultra Fine Feature

DESCRIPTION

ALPHA PNC1502D is a lead-free, halogen free, no-clean solder paste designed to enable consistent fine pitch printing capability, down to 180µm circle printed with 100µm thickness stencil. Its excellent print volume deposit repeatability also provides value by reducing defects associated with print process variability. Additionally, **ALPHA PNC1502D** achieves IPC7095 Class III voiding performance. **ALPHA PNC1502D** has a residue that can be cleaned easily in nPB based solvents, if needed.

READ ENTIRE TECHNICAL DATA SHEET BEFORE USING THIS PRODUCT

FEATURES AND BENEFITS

- **Long Stencil Life:** consistent performance for at least 8 hours of continuous printing without addition of new paste
- **Long, High Tack Force Life:** ensures high pick-and-place yields, good self-alignment
- **Wide Reflow Profile Window:** allows best quality solderability of complicated, high density PWB assemblies in both air and nitrogen reflow, using ramp and soak profiles, as high as 175 to 185 °C
- **Cleanability:** residue after reflow can be easily removed using nPB based cleaners, among others
- **Excellent Coalescence and Wetting Performance:** coalesced 180µm circle deposit, even at high soak profile environment
- **Excellent Solder Joint and Flux Residue Cosmetics:** after reflow soldering, even using long/high thermal soaking, without charring or burning
- **Excellent Voiding Performance:** Meets IPC7095 Class III Requirement
- **Halogen Content:** Halogen Free per IEC 61249-2-21
- **Residue:** Excellent Pin Testing property and Pass JIS Copper Corrosion Test
- **Safe and Environmentally Friendly:** Materials comply with RoHS and Halogen-free requirements (see table below), as well as TOSCA & EINECS

PRODUCT INFORMATION

<u>Alloys:</u>	SAC305 (96.5%Sn/3.0%Ag/0.5%Cu) Sn96%Ag4% For other alloys, contact your local Alpha Metals Office
<u>Powder Size:</u>	Type 5 (15 to 25µm per IPC J-STD-005)
<u>Packaging Sizes:</u>	500 gram jars, 600 gram syringe
<u>Flux Gel:</u>	Flux gel is available in 10 and 30 cc syringes for rework applications
<u>Lead Free:</u>	RoHS Directive EU/2015/863; amending Annex II of 2011/65/EU

APPLICATION GUIDELINES

Formulated for both standard and fine pitch stencil printing, at print speeds of between 25mm/sec (1"/sec) and 150mm/sec (6"/sec), with stencil thickness of 0.050mm (0.002") to 0.150mm (0.006"), particularly when used in conjunction with ALPHA Stencils. Blade pressures should be 0.21 to 0.36 kg/cm of blade (1.25 to 1.5 lbs/inch), depending upon the print speed. The higher the print speed employed, the higher the blade pressure that is required. The reflow process window will give high soldering yield with good cosmetics and minimized rework.

HALOGEN STATUS

ALPHA 1502D is a Halogen Free product and passes the standards listed in the Table 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	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 "Low Halogen" Electronics	Post soldering residues contain < 1000 ppm Br or Cl from flame retardant source		Pass

TECHNICAL DATA

Category	Results	Procedure/Remarks
Chemical Properties		
Activity Level	ROLO	IPC J-STD-004B
Halide Content	Halide free (by titration)	IPC J-STD-004B
Fluoride Spot Test	Pass	JIS-Z-3197-1999 8.1.4.2.4
Halogen Test Ag Chromate Test	Pass , Halogen Free	EN14582, by oxygen bomb combustion, Non-detectable (ND) at < 50 ppm
	Pass	IPC J-STD-004B
	Pass	JIS-Z-3197-1999 8.1.4.2.3
Copper Mirror Test	Pass	IPC J-STD-004B
Copper Corrosion Test	Pass (No evidence of Corrosion)	IPC J-STD-004B
Electrical Properties		
SIR (7 days, 40 °C/90%RH, 12 V bias)	Pass	IPC J-STD-004B TM-650 2.6.3.7 (Pass $\geq 1 \times 10^8$ ohm)
SIR (7 days, 40 °C/90%RH, 12 V bias) Electromigration	Pass	IPC J-STD-004B TM-650 2.6.3.7 (Pass $\geq 1 \times 10^8$ ohm)
Physical Properties		
Color	Clear, Colorless Flux Residue	
Tack Force vs. Humidity	Pass , > 100gf over 24 hours at 25%, 50% and 75 % Relative Humidity	JIS Z-3284-1994, Annex 9
	Pass , Change of <1g/mm ² over 24 hours at 25% and 75 % Relative Humidity	IPC J-STD-005 TM-650 2.4.44
Tack Force at 32 °C/35%RH, measured after 0, 1, 2, 3 & 4 hours print duration	> 100gf	JIS Z-3284-1994, Annex 9
Viscosity	88% metal load, Type 5 designated MXX for printing	Malcom Spiral Viscometer; J-STD-005

Category	Results	Procedure/Remarks
Viscosity Stability at 25°C for 20 days	Pass	Malcom Spiral Viscometer
Continuous Viscosity Measurement at 25 °C for 24 hours	Pass	Malcom Spiral Viscometer
Coalescence Test	Able to reflow at < 200 µm Cu pad circle size	Internal
Solder Ball	Preferred	IPC J-STD-005 TM-650 2.4.43
Stencil Life	>8 hours	@ 50% RH 23 °C (74 °C)
Cold Slump	No bridge for 0.2 mm space	JIS-Z-3284-1994 Annex 7
	Not tested	IPC J-STD-005 TM-650 2.4.35
Hot Slump	No bridge for 0.4 mm space	JIS-Z-3284-1994 Annex 8
	Not tested	IPC J-STD-005 TM-650 2.4.35

PROCESSING GUIDELINES

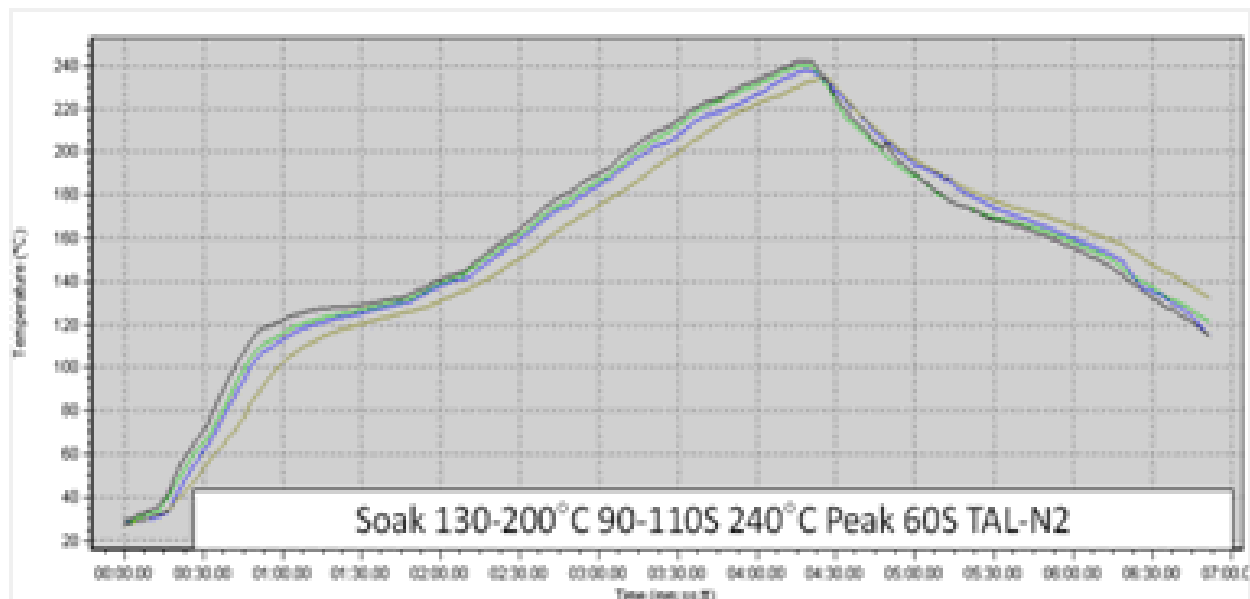
Storage & Handling	Printing	Reflow (See Fig. 1)	Cleaning
<ol style="list-style-type: none"> 1. Refrigerate to guarantee stability @ 0 to 10 °C (32 to 50 °F). When stored under these conditions, the shelf life of PNC1502D is 6 months. 2. Paste can be stored for 2 weeks at room temperature up to 25°C(77°F) prior to use 3. When refrigerated, warm up paste container to room temperature for up to 4 hours. Paste must be 19 °C (66 °F) before processing. Verify paste temperature with a thermometer to ensure paste is at 19 °C (66 °F) or greater before set up of printer. 4. Paste can be manually stirred before use. A rotating/Centrifugal force mixing operation is not required. If a rotating/centrifugal force mixing is used, 30 to 60 seconds at 300 RPM is adequate. 5. Do not remove worked paste from stencil and mix with unused paste in jar. This will alter the rheology of unused paste. 6. These are starting recommendations and all process settings should be reviewed independently. 	<p>Stencil: Recommend ALPHA CUT, ALPHA NICKEL-CUT, ALPHA TETRABOND®, or ALPHA FORM stencils @ 0.100 to 0.150 mm (4 to 6 mil) thick for 0.4 to 0.5 mm (0.016" or 0.020") pitch. Stencil design is subject to many process variables. Contact your local Alpha Metals stencil site for advice.</p> <p>Squeegee: Metal (recommended)</p> <p>Pressure: 0.21 to 0.36 kg/cm of blade (1.25 to 2.0 lbs/inch)</p> <p>Speed: 25 to 150 mm per second (1 to 6 inches per second).</p> <p>Paste Roll: 1.5 to 2.0 cm diameter and make additions when roll reaches 1-cm (0.4") diameter (min). Max roll size will depend upon blade.</p> <p>Stencil Release Speed: 1 to 5 mm/sec.</p> <p>Lift Height: 8 to 14mm (0.31 to 0.55")</p>	<p>Atmosphere: Clean-dry air or nitrogen atmosphere.</p> <p>Profile (SAC Alloys): Straight Ramp: 0.7 °C/sec & 1.3 °C/sec ramp profiles, 45 to 60 TAL.</p> <p>Soak: 155 to 175 °C, 60 to 100 sec soak profiles have been determined to give optimal results. If required, good results are also achievable with high soak temperature profiles of 175 to 185 °C for 60 s. Typical peak temperature is 235 to 245 °C.</p> <p>Note 1: Keeping the peak temperature below 241 °C may reduce the number and size of BGA and QFN voids.</p> <p>Note 2: Refer to component and board supplier data for thermal properties at elevated temperatures. Lower peak temperatures require longer TAL for improved joint cosmetics.</p>	<p>ALPHA PNC1502D residue is designed to remain on the board after reflow. If reflowed residue cleaning is required, a nPB based cleaner is recommended in a dipping bath or spray or ultrasonic system.</p> <p>Misprints and stencil cleaning may be done with IPA, ALPHA SM-110E, ALPHA SM-440, and Bioact™ SC-10E cleaners.</p> <p>Bioact is a registered trademark of Petroferm.</p>

REFLOW PROFILES

Parameter	Guideline
Atmosphere	Air or N2
SAC305	217 to 221 °C Melting Range

Setting Zone*	Optimal Dwell Period	Extended Window
40 to 221 °C	2:30 to 4:30 min.	<5:00 min.
170 to 221 °C	0:30 to 2:00 min.	<2:30 min.
120 to 221 °C	1:25 to 3:00 min.	<3:30 min.
TAL (217 to 221 °C)	45 to 90 sec.	Not Recommended
Peak temperature	235 to 245 °C	Compatible with most common surface finishes. (ENTEK HT, ENTEK OM, Alpha Star, ENIG, SACX HASL, ImSn). Coldest point on the PCB can be as low as 230 °C. Paste can withstand 250 °C during reflow.
Joint cool down rate	1 to 6 °C/second	Recommended to prevent surface cracking issues.

Above recommendations are for SAC305.



For alternative alloys, please follow the liquidus temperature of the respective alloy.

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 or [link here](#).



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 at MacdermidAlpha.com/assembly-solutions/knowledge-base.**

STORAGE

ALPHA PNC1502D should be stored in a refrigerator upon receipt at 0 to 10 °C (32-50 °F). ALPHA PNC1502D should be permitted to reach room temperature before unsealing its package prior to use (see handling procedures on page 5). This will prevent moisture condensation build up in the solder paste.

CONTACT INFORMATION

To confirm this document is the most recent version, please contact Assembly@MacDermidAlpha.com

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

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