ALPHA® JP-500

Lead-Free, Zero Halogen, No Clean Solder Paste for Jet Printing

DESCRIPTION

ALPHA JP-500 is a lead-free, no-clean solder paste designed for use in Jet Printers. **ALPHA JP-500** features a rheology capable of standard dispensing or high thru put jetting. **ALPHA JP-500** is formulated to offer best in class in circuit pin test yields, high electrical reliability, all in a zero halogen flux formulation.

Outstanding reflow process window delivers good soldering on CuOSP, lead free HASL, Immersion Silver, Immersion tin and ENIG surface finishes. **ALPHA JP-500** is formulated to deliver excellent visual joint cosmetics. Additionally, **ALPHA JP-500** is rated ROL0 per IPC J-STD-004.

READ ENTIRE TECHNICAL DATA SHEET BEFORE USING THIS PRODUCT

FEATURES & BENEFITS

- Maximizes reflow yield for lead-free processing, allowing full alloy coalescence at circular dimensions as small as 0.25mm (0.010”)
- Excellent deposit consistency with high process capability index across all board designs
- Designed for use with the Mycronic Jet Printers
- Zero Halogen (no halogen intentionally added to the formulation)
- Wide reflow profile window with good solderability on various board / component finishes
- Excellent solder and flux cosmetics after reflow soldering
- Reduction in random solderballing levels, minimizing rework and increasing first time yield
- Excellent pin-test yield for single and double reflow
- Meets highest IPC 7095 voiding performance classification of Class III
- Excellent reliability properties, zero halide material
- Capable of high reflow yield without the use of nitrogen

PRODUCT INFORMATION

Alloys:	SAC305 (96.5%Sn/3.0%Ag/0.5%Cu) SAC405 (95.5%Sn/4.0%Ag/0.5%Cu) For other alloys, contact your local Alpha Sales Office
Powder Size:	Type 5, Type 6
Packaging Sizes:	Iwashita 30 cc dispensers
Flux Gel:	JP-500 Flux Gel is available in 10cc and 30cc syringes for rework applications.
Lead Free:	Complies with RoHS Directive 2011/65/EU

APPLICATION GUIDELINES

Formulated for dispensing and jet printing applications.

Jet Printing Speed and Accuracy – Solder Paste[5]	
Rated speed (cph equivalent) [1]	30 000 cph
Reference board throughput [2]	28 000 cph
Single dot repeatability 3s (X, Y) [3]	54 µm
Single dot accuracy @ Cpk=1.33 (X, Y) [3]	80 µm
Deposit accuracy @ Cpk=1.33 (X, Y) QFP100C [4]	33 µm
Deposit accuracy @ Cpk=1.33 (X, Y) 0603 [4]	40 µm
Deposit repeatability 3s (X, Y) QFP100C [4]	19 µm
Deposit repeatability 3s (X, Y) 0603 [4]	24 µm

[1]Keeps pace with a P&P machine rated at 30 000 cph. Application dependent
[2]For reference board information, see page 4
[3]At default jetting height, 0.65 mm over the PCB
[4]Calculated value from single dot accuracy
[5]Per MYDATA MY500 Jet Printer Spec Sheet – April 2010

Dot Range – Solder Paste[5]	
Minimum dot diameter [6]	0.33 mm (0.013”)
Maximum dot diameter	0.47 mm (0.019”)
Minimum dot volume [6]	5 nl
Maximum dot volume	15 nl
Single dot volume repeatability (5 nl dots)	12%
Single dot volume repeatability (15 nl dots)	8%
Deposit volume repeatability, QFP100C [7]	4%
Deposit volume repeatability, 0603 [7]	3.5%

[5]Per MYDATA MY500 Jet Printer Spec Sheet – April 2010
[6]Dot diameter and dot volume required for 0.4 mm QFP, 0.5 mm BGA and 0201 components
[7]Calculated value from single dot repeatability

TECHNICAL DATA

Category	Results	Procedures/Remarks
Chemical Properties		
Activity Level	ROL0 = J-STD Classification	IPC J-STD-004A
Halide Content	Halide free (by titration). Passes Ag Chromate Test	IPC J-STD-004A
Halogen Content	Zero halogen, no halogen intentionally added	EN14582, by oxygen bomb combustion, Non detectable (ND) at < 50 ppm
Copper Mirror Test	**Pass**	IPC J-STD-004A
Copper Corrosion Test	**Pass**, (No evidence of Corrosion)	IPC J-STD-004A
Electrical Properties		
SIR (IPC 7 days @ 85 °C/85% RH)	**Pass**, 4.1 x 10^9 ohms	IPC J-STD-004A (Pass ≥ 1 x 10^8 ohm min)
SIR (Bellcore 96 hrs @ 35 °C/85%RH)	**Pass**, 8.4 x 10^{11} ohms	Bellcore GR78-CORE (Pass ≥ 1 x 10^{11} ohm min)
Electromigration (Bellcore 500 hours @ 65 °C/85%RH 10V)	Initial = x 10^{10} ohms Final = x 10^{11} ohms	Bellcore GR78-CORE (Pass=final > initial/10)

Category	Results	Procedures/Remarks
Physical Properties (Using 87% Metal, Type 5 Powder)		
Color	Clear, Colorless Flux Residue	SAC 305, SAC405 alloy
Tack Force vs. Humidity (t=8 hours)	**Pass** -Change of <1 g/mm^2 over 24 hours at 25% and 75% Relative Humidity	IPC J-STD-005
	Pass -Change of <10% when stored at 25±2°C and 50±10% relative humidity.	JIS Z3284 Annex 9
Viscosity	87% metal load, T5 powder designated M11 for jetting viscosity (typical) at 10 RPM Malcom	Malcom Spiral Viscometer; J-STD-005
Solderball	**Acceptable** (SAC305 and SAC405 alloys)	IPC J-STD-005
	Pass, Class 1	DIN Standard 32 513, 4.4
Spread	**Pass**	JIS-Z-3197: 1999 8.3.1.1
Slump	**Pass**	IPC J-STD-005 (10 min 150°C)
	Pass	DIN Standard 32 513, 5.3
	Pass	JIS-Z-3284-1994 Annex 8

PROCESSING GUIDELINES

Storage-Handling	Jetting Or Dispensing	Reflow	Cleaning
• Refrigerate @ 0 to 10 °C (32 to 50 °F) to guarantee stability. • Shelf life of refrigerated paste is up to six months. • Paste can be stored for 2 weeks at room temperatures up to 25 ˚C (77 °F) prior to use. • When refrigerated, warm-up of 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 setup. • Dispensing and Jetting can be performed at temperatures up to 29 to 31 °C (84 to 87 °F). • Do not remove worked paste from cartridge and mix with unused paste. This will alter rheology of unused paste. • These are starting recommendations and all process settings should be reviewed independently.	Designed for use with jetting or dispensing systems.	Atmosphere: Clean-dry air or nitrogen atmosphere. Profile (SAC Alloys): Acceptable reflow / coalescence and IPC Class III voiding were obtained for the range of profiles depicted below. Note 1: Refer to component and board supplier data for thermal properties at elevated temperatures. Lower peak temperatures require longer TAL for improved joint cosmetics.	ALPHA JP-500 residue is designed to remain on the board after reflow. If cleaning of the reflowed residue is required, ALPHA BC-2200 aqueous cleaner is recommended. For solvent cleaning, agitation for 5 min in the following cleaners is recommended: - ALPHA SM-110E Misprints and unreflowed paste may be cleaned with - ALPHA SM-110E - ALPHA SM-440 - ALPHA BC-2200

PROCESSING GUIDELINES

Reflow Profile Window: The following reflow profile guidelines are intended to provide a window where acceptable coalescence and reaction of the solder paste alloy with base metals to form uniform and continuous intermetallic can occur. They assume that good quality electronics grade materials are used. Please note that the requirements may vary greatly due to the extreme variation in materials that are used in SMT assembly. Proper wetting angles are an indication that an intermetallic has been formed.

Parameter	Guideline	Additional Information
Atmosphere	**Air or N_2**	Smaller paste deposits or extended range may require nitrogen reflow and/or shorter total reflow time to achieve complete coalescence.
Alloy Melting Point (MP) Range	SAC305: 217 to 220 °C	These values are used to determine some reflow parameters below.

REFLOW PROFILES

Reflow Guidelines for Straight Ramp Profile		
Reflow Parameter	**Target Range**	**Extended Range***
40 °C to Liquidus	150 to 210 sec	130 to 270 sec
Straight Ramp	0.85 to 1 °C/sec	0.7 to 1.5 °C/sec
Time Above Liquidus	40 to 50 sec	35 to 90 sec
Peak Temperature	238 to 245 °C	238 to 260 °C
Cool Down from Peak to Solidus	> -3 °C/sec	-1°C to -8 °C/sec
Total Time from 40 °C to Peak	175 to 245 sec	140 to 300 sec

Reflow Guidelines for Soak Profile		
Reflow Parameter	**Target Range**	**Extended Range***
40 °C to Liquidus	150 to 210 sec	130 to 270 sec
Initial Ramp from 40 °C to Start Soak Temp.	1.5 to 1.75 °C/sec	1 to 2 °C
Soak Temperature Start and End Points	150 to 180 °C	140 to 190 °C
Soak Time	60 to 90 sec	60 to 120 sec
Ramp from End Soak Temp. to Liquidus	0.75 to 1.25 °C/sec	0.5 to 1.5 °C
Time Above Liquidus	40 to 50 sec	35 to 90 sec
Peak Temperature	238 to 245 °C	238 to 260 °C
Cool Down from Peak to Solidus	>3 °C/sec	-1 to -8 °C/sec
Total Time from 40 °C to Peak	175 to 245 sec	150 to 325 sec

* Proper caution should be exercised when using extended range parameters as materials other than the solder paste may be stressed.

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 AlphaAssembly.com**

CONTACT INFORMATION

To confirm this document is the most recent version, please contact Assembly@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 directory assistance: Chemtrec 1 - 800 - 424 - 9300.