ALPHA® LS-388

No-Clean Flux

DESCRIPTION

ALPHA LS-388 was specifically developed to deliver outstanding board cosmetics and to eliminate the tendency for solder balling and solder bridging, two types of defects which are normally associated with the use of the chip wave. Of all low solids (<4% solids) no-clean fluxes, **ALPHA LS-388** exhibits the lowest tendency for solder ball generation over a wide variety of solder masks during Wave Soldering and Selective Soldering operations. **ALPHA LS-388** should be considered for use by any assembler who has board designs which are sensitive to solder bridging, performs pin testing, or whose specification requires an extremely low frequency of solder balls.

ALPHA LS-388 is an active, low solids, no-clean flux. It is formulated with a proprietary mixture of organic activators. Several proprietary additives are formulated into **ALPHA LS-388** which act to reduce the surface tension between the solder mask and the solder, thereby, dramatically reducing the tendency of solder ball generation. The formulation of **ALPHA LS-388** is also designed to be more thermally stable, thereby, reducing the occurrence of solder bridging during dual wave soldering.

READ ENTIRE TECHNICAL DATA SHEET BEFORE USING THIS PRODUCT

FEATURES & BENEFITS

- Thermally stable activators provide the lowest solder bridging in a low-solids, no-clean flux for Wave Soldering and Selective Soldering
- Reduces the surface tension between solder mask and solder to provide the lowest solder ball frequency of any low solids, no-clean flux
- Very low level of non-tacky residue to reduce interference with pin testing and exhibit no visible residue
- Cleaning is not required which reduces operating costs
- IPC-J-STD-004 compliant for long term electrical reliability

APPLICATION GUIDELINES

Preparation: In order to maintain consistent soldering performance and electrical reliability, it is important to begin the process with circuit boards and components that meet established requirements for solderability and ionic cleanliness. It is suggested that assemblers establish specifications on these items with their suppliers and that suppliers provide Certificates of

Analysis with shipments and/or assemblers perform incoming inspection. A common specification for the ionic cleanliness of incoming boards and components is 5µg/in2 maximum, as measured by an ionic contamination tester.

Care should be taken in handling the circuit boards throughout the process. Boards should always be held at the edges. The use of clean, lint-free gloves is also recommended. When switching from one flux to another, the flux reservoir, flux tank and lines of the spray fluxer assembly should be purged with IPA.

Conveyors, fingers and pallets should be cleaned regularly with DI water, IPA or ALPHA SM-110 Solvent Cleaner to reduce the build-up of flux residues on the assembly edges.

Flux Application: ALPHA LS-388 is formulated to be applied by spray methods. A uniform coating of flux is essential to successful soldering. When spray fluxing, the uniformity of the coating can be visually checked by running a piece of cardboard over the spray fluxer or by processing a board-sized piece of tempered glass through the spray and then through the preheat section.

A proper preheat setting will help to achieve a goal of best soldering performance. Please refer below recommend preheat setting:

Operating Parameter	Recommendation
Flux application	Spray
Amount of Flux Applied	Single Wave: 200 to 0300µg/in^2 of solids Dual Wave: 250 to 600µg/in^2 of solids
Top Side Preheat Temperature	80 to 100 °C
Bottom Side Preheat Temperature	About 35 °C higher than top side
Maximum Ramp Rate of Topside Temperature (to avoid component damage)	2 °C/sec maximum
Conveyor Speed	1.5 to 2.2 m/min
Contact Angle	4 to 7°
Contact Time	1.5 to 3.5 sec (2 1.2 to 3 sec most common)
Solder Pot Temperature	240 to 260 °C
These are general guidelines which have proven to yield excellent results; however, depending upon your equipment, components, and circuit boards, your optimal settings may be different. In order to optimize your process, it is recommended to perform a design experiment, optimizing the most important variables (amount of flux applied, conveyor speed, topside preheat temperature, solder pot temperature and board orientation).	

Control: As with any flux with less than 5% solid content, specific gravity is not an effective measurement for assessing and controlling the solid content. Monitoring and controlling the acid number is recommended for maintaining the solid content. The acid number should be controlled from 11.4 to 12.6 mgKOH/gm. Alpha's Flux Solids Control Kit #3, a digital titrator, is suggested. Request Alpha's Technical Bulletin SM-458 for details on the kit and titration procedure.

Residue Removal: ALPHA LS-388 is a no-clean flux and the residues are designed to be left on the board. However, if desired, ALPHA LS-388 residues can be removed with ALPHA 2110 saponifier or ALPHA SM-110 solvent cleaner.

Touch-Up/Rework: Use of the Cleanline Write Flux Applicator with ALPHA NR-205 and ALPHA Telecore Series cored solder wire are recommended for hand soldering applications.

TECHNICAL DATA

Item	Typical Values	Item	Typical Values
Appearance	Clear, colorless to pale yellow liquid	Flash Point (T.C.C.)	12 °C (53 °F)
Solids Content, %wt/wt	1.7	Recommended Thinner	ALPHA 425
Specific Gravity @ 25 °C (77 °F)	0.802 ± 0.002	Shelf Life (from Date of Mfg.)	540 days
Acid Number, mg KOH/g	12.0 ± 0.6	IPC J-STD-004 Designation	ORL0
pH (5% aqueous solution)	2.6	Packaging Size	1, 5 and 55 gallons
Pounds per Gallon	6.7		

CORROSION & ELECTRICAL TESTING

Corrosion Test

Test		Requirement	Results
IPC	Silver Chromate Paper	No Detection of Halide	PASS
	Copper Mirror Test	No Complete Removal of Copper	PASS
	Copper Corrosion Test	No Evidence of Corrosion	PASS

IPC J-STD-004 Surface Insulation Resistance (All values in ohms.)

Test	Requirements	Results
"Comb-Down" Un-cleaned	1.0 X 10^8 minimum	6.5 X 10^8
"Comb-Up" Un-cleaned	1.0 X 10^8 minimum	1.4 X 10^9
Control Boards	2.0 X 10^8 minimum	3.3 X 10^9
Test Condition (per IPC-J-STD-004): 85 °C / 85% RH, 7 days, -50V; measurement at 100V; IPC board B-24 (0.4mm lines, 0.5mm spacing)		

Bellcore Electrochemical Migration Resistance (All values in ohms.)

Test	SIR (Initial)	SIR (Final)	Requirement	Result	Visual Result
"Comb-Up" Un-cleaned	6.2 X 10^{10}	3.8 X 10^{11}	SIR (Initial) / SIR (Final) < 10	PASS	PASS
"Comb-Down" Un-cleaned	1.4 X 10^{11}	1.2 X 10^{11}	SIR (Initial) / SIR (Final) < 10	PASS	PASS
Test Condition (Per GR-78-core, Issue 1): 65°C / 85% RH, 500 hours, 10V; measurement at 100V; IPC B-25 B Pattern (12.5mil lines, 12.5mil spacing)					

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

Inhalation of the flux solvent and volatilized activator fumes, which are generated at soldering temperatures, may cause headaches, dizziness and nausea. Suitable fume extraction equipment should be used to remove the flux from the work area. An exhaust at the exit end of the wave solder machine may also be needed to completely capture the fumes. Observe precautions during handling and use. Suitable protective clothing should be worn to prevent the material from coming in contact with skin and eyes.

ALPHA LS-388 contains a highly flammable solvent. The flux must not be used near open flames or near non-flameproof electrical equipment.

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 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