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TECHNICAL BULLETIN

ALPHA® EF-8300LR

Lead Free, Sn-Pb Capable Wave Flux

DESCRIPTION

ALPHA EF-8300LR is an active, halide free, rosin/resin free, low solids and no clean flux. It is designed to provide the attributes of excellent solderability and reliability in general and high-density boards in both Lead-Free and eutectic tin/lead processes. It is also designed to have low bridging on bottom side QFP's with 144-168 leads as well as superior performance in hole-fill and solder balling. Additionally, it provides good lead free solder joint cosmetics with an evenly spread, tack free residue.

READ ENTIRE TECHNICAL DATA SHEET BEFORE USING THIS PRODUCT

FEATURES & BENEFITS

Features for Pb-Free:

- Good hole-fill demonstrated by >96% yield on 10 mil holes.
- Low bridging performance on connectors.
- Good micro-solder ball performance in Lead-Free applications
- Pin testable
- Specifically designed for use on Cu-OSP PCBs

Benefits:

- Excellent Lead-Free soldering performance on various board finishes.
- Evenly spread, tack free residue.
- Capable for high density as well as general purpose Lead-Free soldering processes.
- Can be used in Pb free or Sn/Pb processes

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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. Conveyors, fingers and pallets should be cleaned. Alpha brand stencil cleaner is recommended for this process.

Flux Application: ALPHA EF-8300LR can be applied by spray or foam. 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.

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.

Operating Parameter	SAC 305 or low Ag SAC alloys	63/37 Sn/Pb
Amount of Flux Applied	Spray: 850 to 1200µg/in^2 of solids/in^2 for dual wave and 750 to 1000 µg/in^2 of solids/in^2 for single wave soldering	Spray: 850 to 1200µg/in^2 of solids/in^2 for dual wave and 600 to 900µg/in^2 of solids/in^2 for single wave soldering
Top-Side Preheat Temperature	80 to 110 °C	75 to 95 °C
Bottom side Preheat Temperature	0 to 40 °F (0 to 22 °C) vs. Top-Side	0 to 40 °F (0 to 22 °C) vs. Top-Side
Recommended Preheat Profile	Straight ramp to desired top-side temperature	Straight ramp to desired top-side temperature
Maximum Ramp Rate of Topside Temperature (to avoid component damage)	2 °C/second (3.5 °F/second) maximum	2 °C/second (3.5 °F/second) maximum
Conveyor Angle	5 to 8 ° (6 ° most common recommended by equipment manufacturers)	5 to 8 ° (6 ° most common recommended by equipment manufacturers)

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Operating Parameter	SAC 305 or low Ag SAC alloys	63/37 Sn/Pb
Conveyor Speed	1.5 to 2.0 meters/minute for single wave, 1.8 to 2.2 meters/minute for dual wave. ALPHA EF-8300LR is capable of running at a slower conveyor speed to accommodate certain types of Lead Free wave soldering process.	1.5 to 2.0 meters/minute for single wave, 1.8 to 2.2 meters/minute for dual wave
Contact Time in the Solder (includes Chip Wave and Primary Wave)	1.5 to 4.0 seconds (2½ to 3 seconds most common)	1.5 to 4.0 seconds (2½ to 3 seconds most common)
Solder Pot Temperature:	255 to 265 °C	240 to 250 °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).		

Flux Solids Control: If rotary drum spray fluxing, the flux solids will need to be controlled via thinner addition. For measuring the solids content, 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. When operating a rotary drum fluxer continuously, the acid number should be checked every eight hours (refer to Figure 1: ALPHA EF-8300LR Nomogram). Over time, debris and contaminants will accumulate in recirculating type flux applicators. For consistent soldering performance, dispose of spent flux every 40 hours of operation. After emptying the flux, the reservoir should be thoroughly cleaned with IPA.

Residue Removal: ALPHA EF-8300LR is a no-clean flux and the residues are designed to be left on the board. If desired, flux residues can be removed with ALPHA 2110 saponifier cleaner and with other commercially available solvent cleaners and saponifier cleaners.

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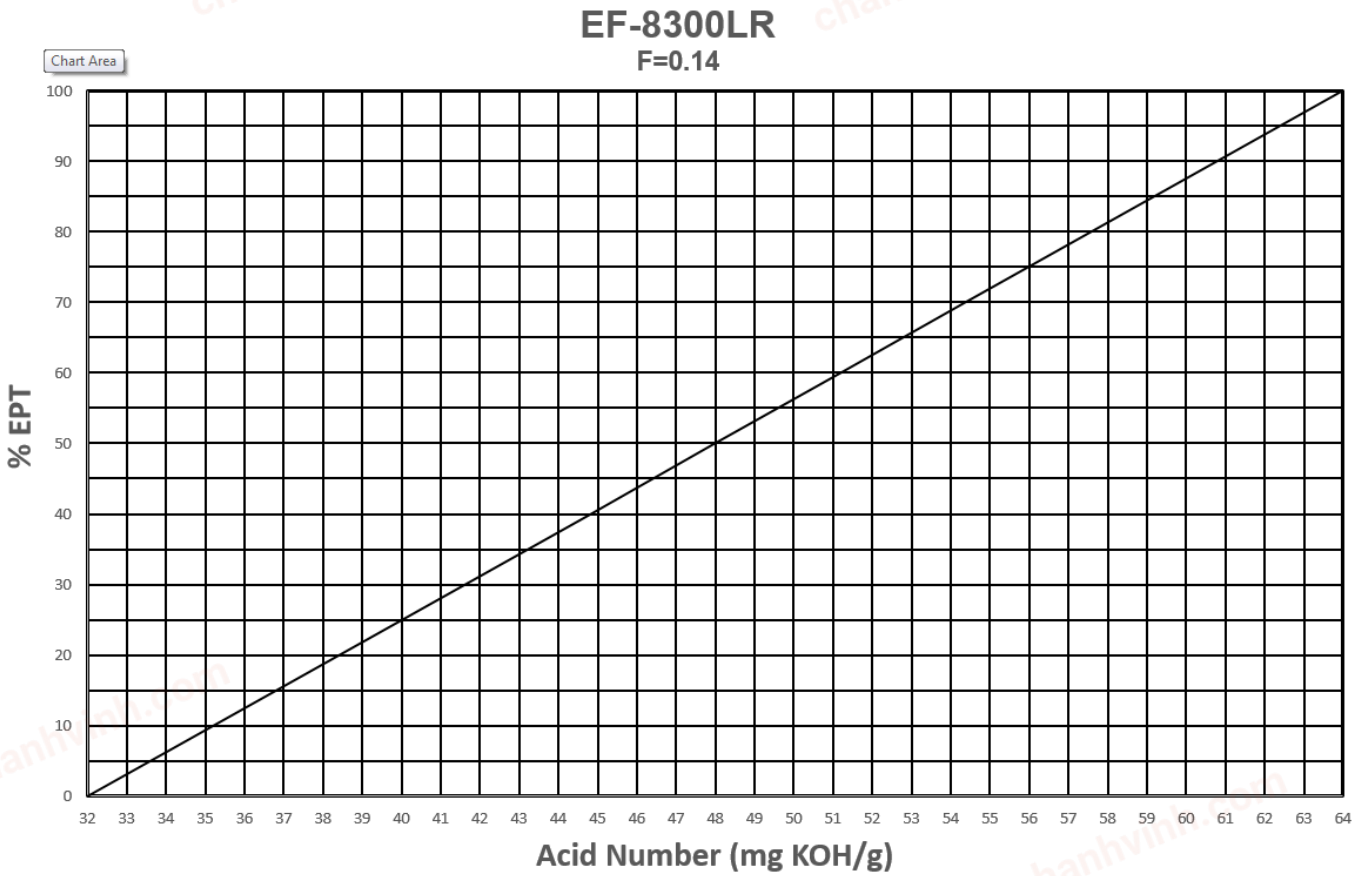


Figure 1: Nomogram

TECHNICAL DATA

Physical Properties	Typical Values	Parameters/Test Method	Typical Values
Appearance	Clear, Pale Yellow Liquid	pH, 5% v/v aqueous solution	3.0
Solids Content, wt/wt, %	4.0	Recommended Thinner	**ALPHA 425**
Specific Gravity @ 25 °C (77 °C)	0.801 ± 0.003	Shelf Life	360 days
Acid Number (mg KOH/g)	32.0 ± 2.0	IPC J-STD-004 Designation	ORM0
Flash Point (T.C.C.)	17 °C	Bellcore SIR	Pass

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CORROSION & ELECTRICAL TESTING

Corrosion Testing

Test	Requirement for ORM0	Results
Silver Chromate Paper IPC-TM 650 Test Method 2.3.33	No detection of halide	PASS
Copper Mirror Tests IPC-TM 650 Test Method 2.6.32	<50% removal of copper	< 50 % removal (M)
Copper Corrosion Test IPC-TM 650 Test Method 2.3.15	No evidence of corrosion	No Evidence of Corrosion

J-STD-004 Surface Insulation Resistance

Test	Conditions	Requirements	Results
"Comb-Down" Un-cleaned	85 °C/85% RH, 7 days	1.0×10^8 Ω minimum	4.5×10^9 Ω
"Comb-Up" Un-cleaned	85 °C/85% RH, 7 days	1.0×10^8 Ω minimum	7.0×10^9 Ω
Control Boards	85 °C/85% RH, 7 days	2.0×10^8 Ω minimum	7.2×10^9 Ω
IPC Test Condition (per J-STD-004): -50V, measurement @ 100V/IPC B-24 board (0.4 mm lines, 0.5 mm spacing).			

Bellcore Surface Insulation Resistance

Test	Conditions	Requirements	Results
"Comb-Down" Un-cleaned	35 °C/85% RH, 4 days	1.0×10^{11} Ω minimum	1.9×10^{11} Ω
"Comb-Up" Un-cleaned	35 °C/85% RH, 4 days	1.0×10^{11} Ω minimum	2.3×10^{11} Ω
Control Boards	35 °C/85% RH, 4 days	2.0×10^{11} Ω minimum	9.4×10^{11} Ω
Bellcore Test Condition (per GR 78-CORE, Issue 1: 48 Volts, measurement @ 100V/25 mil lines/50 mil spacing.			

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Bellcore Electromigration

Test	SIR (Initial)	SIR (Final)	Requirement	Result	Visual Result
"Comb-Up" Un-cleaned	1.4×10^{11} Ω	8.1×10^{11} Ω	SIR (Initial)/SIR (Final) < 10	PASS	PASS
"Comb-Down" Un-cleaned	4.9×10^{9} Ω	2.7×10^{10} Ω	SIR (Initial)/SIR (Final) < 10	PASS	PASS
Control	1.2×10^{11} Ω	7.8×10^{11} Ω	Not applicable	N/A	N/A
Bellcore Test Condition (per GR 78-CORE, Issue 1): 65 °C/85% RH/500 Hours/10V, measurement @ 100V/IPC B-25B Pattern (12.5 mil lines, 12.5 mil spacing).					

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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**

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

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