ALPHA® EF-6850HF

HALOGEN-FREE, LOW SOLIDS, ALCOHOL BASED NO-CLEAN WAVE SOLDERING FLUX

DESCRIPTION

ALPHA EF-6850HF is a Halogen-Free, low solids, alcohol based, no clean flux for lead-free wave soldering. It is formulated for both standard and thicker, high-density PCBs used in Pb-free applications. It is designed for low bridging, as well as, to provide superior performance in pin testing, hole-fill and solderballing. Additionally, it provides good cosmetics with a uniform, tack free residue.

FEATURES & BENEFITS

Features:

- Halogen Free
- Unique activator / package
- Low surface tension
- Thermally stable
- Tack free residue

Benefits:

- Environmentally friendly. Complies with halogen free industry standards
- Produces highly reliable assemblies with excellent cosmetics and pin testability
- High through hole penetration rate and uniform SMT pad coverage
- Excellent soldering in both single and dual wave processing using SAC305 or other low silver alloys
- Pin testable, uniform, transparent, tack free residue

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 10 µg/in^2 maximum, as measured by an Omegameter with heated solution.

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 regularly to reduce the build-up of flux residues. ALPHA AutoClean 40 cleaner is recommended for this process.

FLUX APPLICATION: **ALPHA EF-6850HF** can be applied by spray, foam or wave application. A uniform coating of flux is essential to successful soldering. When applying flux, it is important to run a series of tests to ensure that the flux is being applied uniformly, that it is penetrating from top to bottom of the board on all holes to be soldered and to make sure that excessive amounts of flux are not being applied. There are various methods for conducting these tests. Consult with your local *Alpha Customer Technical Service Representative* for more information.

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OPERATING PARAMETER	SAC 305 or Low Ag SAC alloys
Amount of Flux Applied	Single : 1,200 – 1,600 µg/in^2 solids Dual : 1,400 – 2,000 µg/in^2 solids
Top-Side Preheat Temperature	90 - 120°C
Bottom side Preheat Temperature	110 - 140°C
Recommended Preheat Profile	Straight ramp to desired top-side temperature
Maximum Ramp Rate of Topside Temperature (to avoid component damage)	2°C/second (35°F/second) maximum
Contact Time in the Solder (includes Chip Wave and Primary Wave)	3 – 6 seconds
Solder Pot Temperature:	255-265°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. 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-6850HF** 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.

TECHNICAL SPECIFICATIONS

Physical Properties	Typical Values	Parameters/Test Method	Typical Values
Appearance	Clear, Light Amber	pH, 5% v/v aqueous solution	2.8
Solids Content, wt/wt	4.0%	Recommended Thinner	ALPHA 425
Specific Gravity @ 25°C (77°F)	0.793	Shelf Life	12 months
Acid Number (mg KOH/g)	21.47	IPC J-STD-004 Designation	ROL0
Flash Point (T.C.C.)	17°C		

SAFETY

Please refer to the Material Safety Data Sheet as the primary source of health and safety information. Inhalation of the volatilized flux 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.

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HALOGEN CLASS

Standard	Requirement	Test Method	Status
IEC 61249-2-21	Post soldering residues contain <900ppm each or total of <1500ppm Br or Cl from flame retardant source	**TM EN 14582** Solids extraction per IPC TM 2.3.34	PASS
JEDEC A Guideline for Defining "Low Halogen" Electronic products	Post soldering residues contain <1000ppm Br or Cl from flame retardant source		PASS

CORROSION & ELECTRICAL TESTING – SAC305 ALLOY

CORROSION TEST

Test		Requirement for ROL0	Results
IPC	Silver Chromate Paper IPC-TM 650 Test Method 2.3.33	No detection of halide	PASS
	Copper Mirror Test IPC-TM 650 Test Method 2.3.32	No complete removal of copper	PASS
	Copper Corrosion Test IPC-TM650 Test Method 2.6.15	No evidence of corrosion N/A	PASS
JIS	Copper Corrosion Test JIS Z3197-1999 Test Method 8.4.1	No evidence of corrosion	PASS

IPC J-STD-004B SURFACE INSULATION RESISTANCE

Test	Requirements (<1.0 x 10^8 allowed during initial 24 hrs.)	Results *(min. of all measurements recorded)*		
		< 24 Hrs	24 – 168 Hrs	Visual
"Comb-Down" Un-cleaned	> 1.0 x 10^8 Ω	6.8 x 10^{10} Ω	6.2 x 10^{10} Ω	PASS
"Comb-Up" Un-cleaned	> 1.0 x 10^8 Ω	1.4 x 10^{10} Ω	2.7 x 10^{10} Ω	PASS
Control Boards	> 1.0 x 10^9 Ω	1.8 x 10^{11} Ω	1.8 x 10^{11} Ω	NA
IPC Test Condition (per J-STD-004B TM2.6.3.7): IPC B-24 coupons, 12V, 40ºC, 90% RH, measurements recorded @ 20min intervals				

JIS STANDARD SURFACE INSULATION RESISTANCE

Test	Conditions	Requirements	Controls	Results
Initial	Ambient	> 1.0 x 10^{11} Ω	9.7 x 10^{11} Ω	9.8 x 10^{11} Ω
After 7 days	40°C / 90% RH	> 1.0 x 10^{10} Ω	1.0 x 10^{12} Ω	7.5 x 10^{11} Ω
Recovered	25°C/75% RH, 7 days	> 1.0 x 10^{11} Ω	1.0 x 10^{12} Ω	1.0 x 10^{12} Ω
All Measurements @ 100V, JIS Boards (0.32mm lines, 0.32 mm spacing, same as IPC B25 Boards).				

BELLCORE SURFACE INSULATION RESISTANCE

Test	Conditions	Requirements[1]	Results[1]
"Comb-Down" Un-cleaned	35°C/85% RH, 4 days	> 1.0 x 10^{11} Ω	3.6 x 10^{11} Ω
"Comb-Up" Un-cleaned	35°C/85% RH, 4 days	> 1.0 x 10^{11} Ω	> 1.0 x 10^{12} Ω
Control Boards	35°C/85% RH, 4 days	> 2.0 x 10^{11} Ω	> 1.0 x 10^{12} 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)[1]	SIR (Final)[1]	Requirement	Result	Visual Result
"Comb-Up" Un-cleaned	$1.0 \times 10^{11}\ \Omega$	$3.5 \times 10^{11}\ \Omega$	SIR (Initial)/SIR (Final) <10	0.29	PASS
"Comb-Down" Un-cleaned	$2.1 \times 10^{10}\ \Omega$	$6.5 \times 10^{10}\ \Omega$	SIR (Initial)/SIR (Final) <10	0.32	PASS
Control	$1.0 \times 10^{11}\ \Omega$	$5.9 \times 10^{11}\ \Omega$	Not applicable	0.17	PASS
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).					