

ALPHA® EF-2210-TF

VOC-Free, No-Clean Flux

DESCRIPTION

ALPHA EF-2210-TF is a VOC-Free, halide-free, rosin/resin-free, low solids no-clean flux which is among one of the highest activity VOC-free fluxes promoting defect-free soldering. **ALPHA EF-2210-TF** is designed to be a drop-in replacement for **ALPHA EF-2210** for any user wishing to use a NPE/OPE-Free formulation.

ALPHA EF-2210-TF is formulated with a proprietary mixture of organic activators which deliver excellent wetting and top-side hole filling, even with OSP coated bare copper boards which have undergone prior thermal excursions. Several proprietary additives are also included into the flux which act to reduce the surface tension between the solder mask and the solder, thereby dramatically reducing the tendency of solderball formation. The formulation of **ALPHA EF-2210-TF** is also designed to be more thermally stable; thereby, reducing the occurrence of solder bridging.

READ ENTIRE TECHNICAL DATA SHEET BEFORE USING THIS PRODUCT

FEATURES AND BENEFITS

- J-STD-004B SIR compliant for assemblies requiring this standard
- VOC-Free to help meet air quality regulations
- Exceptional wetting and excellent hole-filling even with OSP coated bare copper boards with prior reflows
- Thermally stable activators provide low solder bridging
- Reduces the surface tension between solder mask and solder to provide low solderball frequency
- Suitable for Selective Soldering process
- Excellent cosmetics; Very low level of non-tacky residue to reduce interference with pin testing
- Performs well in either Tin-Lead or Lead-Free processes

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 5 µg/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 regularly cleaned. DI Water can be used alone or, for more difficult conditions, IPA and **ALPHA SM-110** Solvent Cleaners have been found to be very useful.

FLUX APPLICATION: ALPHA EF-2210-TF is formulated to be applied by spray method. 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.

OPERATING PARAMETER	Recommendation
Amount of Flux Applied by Spray	<2000 µg/in ² of solids
Top-Side Preheat Temperature	95 to 115 °C (203 to 240 °F)
Bottom-Side Preheat Temperature	0 to +22 °C (0 to +70 °F) vs. Top-Side Temp.
Recommended Preheat Profile	Straight ramp to desired Top-Side Temp.
Maximum Ramp Rate of Topside Temperature (to avoid component damage)	2 °C/second (35 °F/second) max.
Conveyor Angle	5° to 8° (6° typical)
Conveyor Speed	1.0 to 6.5 ft/min
Contact Time in the Solder (includes Chip Wave and Primary Wave)	2 to 7 seconds (3 to 5 seconds most common)
Solder Pot Temperature for	Sn63/Pb37 Alloy: 235 to 260 °C (460 to 500 °F)
	Lead-Free Alloys (99.3Sn/0.7Cu, 96.5/3.5Ag, SAC305, SAC405, ALPHA SACX® Plus): 260 to 270 °C (500 to 520 °F)
<i>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).</i>	

FLUX SOLIDS CONTROL: If rotary drum spray fluxing, the flux solids will need to be controlled via thinner addition, in this case DI water, to replace evaporative losses of the flux solvent. As with any flux with less than 5% solids content, specific gravity is not an effective measurement for assessing and controlling the solids content. The acid number should be controlled to between 29.5 and 33.5. Alpha's Flux Solids Control Kit #3, a digital titrator, is suggested. 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 DI water.

RESIDUE REMOVAL: ALPHA EF-2210-TF is a no-clean flux and the residues are designed to be left on the board. If desired, flux residues can be removed with hot water.

TOUCH-UP/REWORK: Use of the ALPHA Cleanline Write Flux Applicator with **ALPHA NR205** flux and ALPHA cored solder is recommended for hand soldering applications.

TECHNICAL DATA

Item	Typical Values	Item	Typical Values
Appearance	Clear, Colorless Liquid	Recommended Thinner	DI Water
Solids Content, wt/wt%	4.0	Flash Point (T.C.C.)	None
Specific Gravity @ 25 °C (77 °F)	1.015 ± 0.003	Shelf Life (from Date of Mfg.)	540 Days
Acid Number (mg KOH/g)	31.5 ± 2.0	IPC J-STD-004 Designation	ORL0
pH	~2.2	VOC Content	<1%

CORROSION & ELECTRICAL TESTING

Corrosion Testing

Test	Requirements	Results
Copper Mirror Tests IPC J-STD-004; TM-650 2.3.32	No evidence of mirror breakthrough for L Classification	PASS
Copper Corrosion Test IPC J-STD-004; TM-650 2.6.15	No evidence of corrosion	PASS

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

Test	Condition	Requirement	Result
"Comb-Up" Uncleaned	85 °C/85% RH, 7 days	$>1.0 \times 10^8$	1.43×10^{11}
"Comb-Down" Uncleaned	85 °C/85% RH, 7 days	$>1.0 \times 10^8$	1.76×10^{10}
Control Boards	85 °C/85% RH, 7 days	$>1.0 \times 10^9$	1.90×10^{11}
IPC Test Condition (per IPC-TM-650 2.6.3.3): -48V, measurement @ 100V/IPC B-24 board (0.4 mm lines, 0.5 mm spacing).			

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

Test	Requirements ($<1.0 \times 10^9$ allowed during initial 24 hrs)	Result		
		<24 hrs	24 - 168 hrs	Visual
"Comb-Up" Uncleaned	$>1.0 \times 10^8$	4.07×10^8	1.28×10^{10}	PASS
Comb-Down" Uncleaned	$>1.0 \times 10^8$	2.75×10^8	1.21×10^9	PASS
Control	$>1.0 \times 10^9$	3.16×10^{11}	3.18×10^{11}	NA
IPC Test Condition (per IPC-TM-650 2.6.3.7): IPC B-24 coupons, 12V, 40°C, 90% RH, measurements recorded @ 20min intervals				

Bellcore Electrochemical Migration Resistance (All values in ohms)

Test Condition	SIR (Initial)	SIR (Final)	Requirement	Result
"Comb-Up" Uncleaned	1.93×10^{11}	5.08×10^{11}	$SIR(\text{Final}) > SIR(\text{Initial}) / 10$	PASS
Comb-Down" Uncleaned	1.50×10^{11}	1.42×10^{11}	$SIR(\text{Final}) > SIR(\text{Initial}) / 10$	PASS
Bellcore Test Condition (per GR-78 CORE Issue 1, September 1997, 13.1.4): 65°C/85% RH/500 Hours/10V, measurement @ 100V/IPC B-25B Pattern (12.5 mil lines, 12.5 mil spacing).				

SAFETY & WARNING

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.

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**

STORAGE

ALPHA EF-2100-TF should be stored in original containers and properly sealed. Keep from freezing. Material should be stored at 0 to 25 °C.

CONTACT INFORMATION

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

North America 300 Atrium Drive Somerset, NJ 08873, USA 800.367.5460	Europe Unit 2, Genesis Business Park Albert Drive Woking, Surrey, GU21 5RW, UK 01483.758400	Asia 8/F., Paul Y. Centre 51 Hung To Road Kwun Tong, Kowloon, Hong Kong 852.3190.3100
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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.

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