

# ALPHA<sup>®</sup> EF-2102

## VOC-Free No-Clean Flux

### DESCRIPTION

**ALPHA EF-2102** is a VOC-free, halide-free, rosin/resin-free, low solids no-clean flux which provides a high activity VOC-free Bellcore compliant flux for defect-free soldering. **ALPHA EF-2102** is designed to be a drop in replacement for **ALPHA EF-2202** and any user wishing to use a Tetraglyme free formulation. **ALPHA EF-2102** is formulated with a proprietary mixture of organic activators which deliver excellent wetting and top-side hole fill, even with OSP coated bare copper boards which have undergone prior thermal excursions. Several proprietary additives are also formulated into **ALPHA EF-2102** which reduce the surface tension between the solder mask and the solder thereby; dramatically reducing the tendency of solder ball generation. The formulation of **ALPHA EF-2102** 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 & BENEFITS

- Bellcore compliant for assemblies requiring this standard
- VOC-free to help meet air quality regulations
- Exceptional wetting for excellent hole-fill 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
- Very low level non-tacky residue to reduce interference with pin testing and good board cosmetics
- Tetraglyme Free formula

### 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/in<sup>2</sup> 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 SM-110 Solvent Cleaner has been found to be very useful for these cleaning applications.

**Flux Application:** ALPHA EF-2102 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	Spray: <1200 µg/in <sup>2</sup> of solids
Top-Side Preheat Temperature	220 to 235 °F (104 to 113 °C)
Bottom Side Preheat Temperature	0 to 40 °F (0 to 22 °C) vs. Top-Side
Recommended Preheat Profile	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
Conveyor Angle	5 to 8° (6° most common)
Conveyor Speed	3.5 to 6.5 feet/minute (1.0 to 1.8 meters/minute)
Contact Time in the Solder (includes Chip Wave and Primary Wave)	1.5 to 4.0 seconds (2 to 3 seconds most common)
Solder Pot Temperature: Sn63/Pb37 Alloy Lead-Free Alloys (99.3Sn/0.7Cu, 96.5Sn/3.5Ag, SAC305, SAC405, ALPHA SnCX Plus & ALPHA SACX Plus)	465 to 500 °F (240 to 260 °C) 490 to 510 °F (255 to 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, 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 28.0 and 32.0. 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 DI water.

**Residue Removal:** ALPHA EF-2102 is a no-clean flux and the residues are designed to be left on the board. If desired, flux residues can be removed with commercially available solvent cleaners.

**Touch-up/Rework:** Use of the ALPHA Cleanline Write Flux Applicator with ALPHA NR205 flux and ALPHA Telecore Series cored solder is recommended for hand soldering applications.

#### TECHNICAL DATA

Physical Properties	Typical Values	Parameters/Test Method	Typical Values
Appearance	Clear, Colorless Liquid	pH, as is	2.4
Solids Content, wt/wt	3.5	Recommended Thinner	DI Water
Specific Gravity @ 25°C (77°C)	1.012 ± 0.003	Shelf Life (from date of Mfg)	540 days
Acid Number (mg KOH/g)	30.0 ± 2.0	VOC Content (ASTM D2369)	1.5 %
Flash Point (T.C.C.)	NONE	IPC J-STD-004 Designation	ORL0

**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](http://MacDermidAlpha.com/assembly-solutions/knowledge-base)**

**STORAGE**

Keep from freezing. Store between 0 to 25 °C. Store material sealed and in original container.

**CONTACT INFORMATION**

**To confirm this document is the most recent version, please contact  
 Assembly@MacDermidAlpha.com  
[www.macdermidalpha.com](http://www.macdermidalpha.com)**

<p><b>North America</b>          109 Corporate Blvd.          South Plainfield, NJ 07080, USA          800.367.5460</p>	<p><b>Europe</b>          Unit 2, Genesis Business Park          Albert Drive          Woking, Surrey, GU21 5RW, UK          01483.758400</p>	<p><b>Asia</b>          8/F., Paul Y. Centre          51 Hung To Road          Kwun Tong, Kowloon, Hong Kong          852.3190.3100</p>
---	---	---

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

DISCLAIMER: All statements, technical information and recommendations contained herein are based on tests we believe to be reliable, but the accuracy or completeness thereof is not guaranteed. No statement or recommendation shall constitute a representation unless set forth in an agreement signed by officers of seller and manufacturer. NO WARRANTY OF MERCHANTABILITY, WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE OR ANY IMPLIED WARRANTY IS MADE. The following warranty is made in lieu of such warranties and all other warranties, express, implied, or statutory. Products are warranted to be free from defects in material and workmanship at the time sold. The sole obligation of seller and manufacturer under this warranty shall be to replace any noncompliant product at the time sold. Under no circumstances shall manufacturer or seller be liable for any loss, damage or expense, direct, indirect, incidental or consequential, arising out of the inability to use the product. Notwithstanding the foregoing, if products are supplied in response to a customer request that specifies operating parameters beyond those stated above, or if products are used under conditions exceeding said parameters, the customer by acceptance or use thereof assumes all risk of product failure and of all direct, indirect, incidental and consequential damages that may result from use of the products under such conditions, and agrees to exonerate, indemnify, defend and hold harmless MacDermid, Incorporated and its affiliates therefrom. No suggestion for product use nor anything contained herein shall be construed as a recommendation to use any product in a manner that infringes any patent or other intellectual property rights, and seller and manufacturer assume no responsibility or liability for any such infringement.

© 2019 MacDermid, Inc. and its group of companies. All rights reserved. "(R)" and "TM" are registered trademarks or trademarks of MacDermid, Inc. and its group of companies in the United States and/or other countries.