

# ALPHA<sup>®</sup> NR300-A2

## VOC-Free No-Clean Flux

### DESCRIPTION

**ALPHA NR300-A2** is a VOC-free halide-free, rosin/resin-free, low solids no-clean flux, which provides adequate activity. It is formulated with a proprietary mixture of organic activators and proprietary additives which deliver good wetting and top-side hole fill, significant reduction in solder bridging, solder balls, icicles and skips on difficult to solder assemblies.

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
- Thermally stable activators provide low solder bridging
- Reduces the surface tension between solder mask and solder to provide low solderball frequency
- Very low level of non-tacky residue to reduce interference with pin testing and good board cosmetics
- Assemblies produced can be coated with conformal coating without problems
- 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 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 NR300-A2 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.

**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 17.0 and 19.0. Alpha's Flux Solids Control Kit #3, a digital titrator, is suggested. Request Alpha's Reference Bulletin 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.

| Operating Parameter  | Recommendation                                       |
|--|--|
| Flux application   | Spray  |
| Amount of Flux Applied   | < 1000 µg/in <sup>2</sup> of solids                  |
| Top-Side Preheat Temperature   | 212 to 235 °F (100 to 113 °C)                        |
| Bottom side Preheat Temperature  | 5 to 40 °F (3 to 22 °C)                              |
| Recommended Preheat Profile  | Straight ramp to desired top-side temperature        |
| Maximum Ramp Rate of Topside Temperature<br>(to avoid component damage)  | 2 °C/second (3.5 °F/second) maximum                  |
| Conveyor Speed   | 3.5 to 6.5 feet/minute<br>(1.0 to 1.8 meters/minute) |
| Contact Angle  | 5 to 8° (6° most common)                             |
| Contact Time in the Solder<br>(includes Chip Wave and Primary Wave)  | 1.5 to 4.0 seconds<br>(2½ to 3 seconds most common)  |
| Solder Pot Temperature   | Sn63/Pb37 Alloy: 460 to 500 °F (235 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). |  |

**Residue Removal:** ALPHA NR300-A2 is a no-clean flux and the residues are designed to be left on the board. However, if desired, ALPHA NR300-A2 residues can be removed with hot water.

**Touch-Up/Rework:** Use of the ALPHA Cleanline Write Flux Applicator with ALPHA NR-205 flux and Alpha cored solder wire is 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.)           | NONE              |
| Solids Content, %wt/wt           | 2.1                                    | Recommended Thinner            | DI Water          |
| Specific Gravity @ 25 °C (77 °F) | 1.006 ± 0.003                          | Shelf Life (from Date of Mfg.) | 540 days          |
| Density @ 20 °C (68 °F), g/ml    | 1.006 ± 0.003                          | IPC J-STD-004 Designation      | ORL0              |
| Acid Number (mg KOH/g)           | 18.0 ± 1.0                             | Packaging Size                 | 1, 5 & 55 gallons |
| pH, as is @ 25 °C                | 3.0 ± 0.5                              |                                |                   |

### CORROSION & ELECTRICAL TESTING

#### Corrosion Test

| Test  | Requirement                   | Results |
|---|-------------------------------|---------|
| Silver Chromate Paper <sup>1</sup><br>IPC-TM 650 Test Method 2.3.33 | No detection of halide        | Pass    |
| Copper Mirror Tests <sup>1</sup><br>(Modified IPC/Bellcore Method)  | No complete removal of copper | Pass    |
| Copper Corrosion Test<br>IPC-TM 650 Test Method 2.6.15              | No evidence of corrosion      | Pass    |

<sup>1</sup> **Copper Mirror** and **Silver Chromate Paper** tests were performed using flux sample prepared by reconstituting with isopropyl alcohol after evaporation of its water vehicle at 80 °C for one hour as per footnote 1 of table 5, page 8 of IPC J-STD-004

**IPC J-STD-004 SURFACE INSULATION RESISTANCE** (All values shown are in ohms.)

| Test  | Conditions           | Requirements                  | Results                |
|---|----------------------|-------------------------------|------------------------|
| "Comb-Down" Uncleaned   | 85 °C/85% RH, 7 days | 1.0 x 10 <sup>8</sup> minimum | 4.1 x 10 <sup>9</sup>  |
| "Comb-Up" Uncleaned   | 85 °C/85% RH, 7 days | 1.0 x 10 <sup>8</sup> minimum | 4.4 x 10 <sup>9</sup>  |
| Control Boards  | 85 °C/85% RH, 7 days | 2.0 x 10 <sup>8</sup> minimum | 1.1 x 10 <sup>10</sup> |
| IPC Test Condition (per J-STD-004): -50V, measurement @ 100V/IPC B-24 board (0.4mm lines, 0.5mm spacing). |                      |                               |                        |

**BELLCORE SURFACE INSULATION RESISTANCE** (All values shown are in ohms.)

| Test   | Conditions           | Requirements                   | Results                |
|--|----------------------|--------------------------------|------------------------|
| "Comb-Down" Uncleaned  | 35 °C/85% RH, 5 days | 1.0 x 10 <sup>11</sup> minimum | 1.3 x 10 <sup>12</sup> |
| "Comb-Up" Uncleaned  | 35 °C/85% RH, 5 days | 1.0 x 10 <sup>11</sup> minimum | 5.0 x 10 <sup>12</sup> |
| Control Boards   | 35 °C/85% RH, 5 days | 2.0 x 10 <sup>11</sup> minimum | 1.7 x 10 <sup>12</sup> |
| Bellcore Test Condition (per GR 78-CORE, Issue 1): 48 Volts, measurement @ 100V/25 mil lines/50 mil spacing. |                      |                                |                        |

**BELLCORE ELECTROMIGRATION** (All values shown are in ohms.)

| Test  | SIR (Initial)         | SIR (Final)            | Requirement                   | Result | Visual Result |
|---|-----------------------|------------------------|-------------------------------|--------|---------------|
| "Comb-Up" Uncleaned   | 1.4 x 10 <sup>9</sup> | 2.1 x 10 <sup>9</sup>  | SIR (Initial)/SIR (Final) <10 | Pass   | Pass          |
| "Comb-Down" Uncleaned   | 7.0 x 10 <sup>9</sup> | 1.2 x 10 <sup>10</sup> | SIR (Initial)/SIR (Final) <10 | Pass   | 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). |                       |                        |                               |        |               |

**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**

The storage temperature for ALPHA NR300-A2 is 0 to 25 °C to prevent phase separation. Keep from freezing.

**CONTACT INFORMATION**

**To confirm this document is the most recent version, please contact  
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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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