ALPHA

TECHNICAL BULLETIN

ALPHA PF7723 2.5
No Clean Flux

DESCRIPTION

ALPHA PF7723 2.5 is an alcohol based, halide free synthetic flux used for the wave soldering of printed circuit boards. This product is suitable for use in the manufacture of commercial and high standard military or aerospace electronics. ALPHA PF7723 2.5 meets the requirements of the DIN 8511 classification F-SW33.

FEATURES & BENEFITS

- High surface insulation resistance resulting from very low solids content.
- Bright solder joints and residue free surface that does not require cleaning.
- The flux residues are dry and non-corrosive.
- Outstanding soldering results in SMD technology.
- The soldered boards are suited to in-circuit testing systems without cleaning.

APPLICATION

Low solids content fluxes are applied preferably by spraying or by wave soldering. ALPHA PF7723 2.5 can also be applied by foaming with a suitable fluxing station. Observing the following recommendations will improve the foaming of low solids content fluxes.

- Foam Generator Tube with max . 10µm size porosity.
- Fluxing nozzle as small as possible.
- Frequent cleaning of the Foam Generator Tube.
- Automatic level control of the flux with narrow minimal/maximal tolerance.
- Regular control and correction of the flux density with the ALPHA PF7723 2.5 thinner to maintain a constant solids content.

For best soldering results the preheating temperature should be adjusted to give a top of board temperature of 90°C-100°C

Titration is recommended for control of quality of flux and the analytical method will be supplied on request. We recommend the flux to be discarded after 40-80 hours of operation to keep the contamination of the soldered boards constant and at the lower possible temperature.

TECHNICAL SPECIFICATIONS

Parameters	Typical Values
Appearance	Clear, pal yellow solution
Solids content, wt/wt	2.5%
Acid number (mg KOH/g)	19.2 ± 1.5
Specific Gravity @ 25°C (77°F)	0.795
Pounds per gallon	
Flash point (T.C.C)	12°C (53°F)

Parameters/Test Method	Typical Values
pH (5% aqueous solution)	
Recommended Thinner	ALPHA PF7725T
Shelf life	
Container size availability	25Ltr
Bellcore TR-NWT-000078, Issue 3 complaint	
IPC J-STD-004 Designation	

CORROSION AND ELECTRICAL TESTING

CORROSION TESTING

Test	Requirement	Results
Copper Mirror (IPC/Bellcore Method)	No complete removal of copper	Passes
Halide – Silver Chromate Paper Test (IPC/Bellcore Method)	No detection of halide	Passes
IPC-SF-818 Copper Corrosion Test	No evidence of corrosion	Passes
IPC Flux Classification	Type L3NC	

SURFACE INSULATION RESISTANCE (All values in Ohms)

Method	Conditions	Requirement	Results
IPC-SF-818	85°/85% RH	1.1 x 10^{9} min	1.3 x 10^{9}
Class 3, Not cleaned	7 days		

BELLCORE-TR-NWT-000078, Issue 3

Comb Pattern “up” (uncleaned)	35°C/85% RH 5 days (4 days with bias voltage)	1.0 x 10^{11} min	9.3 x 10^{11}
Comb Pattern “down” (uncleaned)	35°C/85% RH 5 days (4 days with bias voltage)	1.0 x 10^{11} min	2.6 x 10^{12}
Control Boards	35°C/85% RH 5 days (4 days with bias voltage)	2.0 x 10^{11} min	3.2 x 10^{12}

ELECREOMIGRATION (Per Bellcore TR-NWT-000078, Issue 3, All values in Ohms)

Method	Conditions	SIR (Init.)*	Sir (Final)*	Visual
Comb Pattern “up”	85°C/85% RH 10 V. 500hrs with bias	10.2 x 10^{9}	6.7 x 10^{9}	No dendrites of corrosion
Comb Pattern “down”	85°C/85% RH 500hrs with 10 V bias	3.8 x 10^{9}	5.2 x 10^{9}	No dendrites of corrosion

HEALTH & SAFETY

Observe standard precautions for handling and use. Use in well ventilated areas. DO NO SMOKE. Avoid prolonged repeated contact with the skin and use of solvent resistant gloves. Avoid contact with eyes. Flammable, keep away from sparks and open flames. Remember empty containers can still be flammable hazard from residue vapours. Remover skin splashes by immediate washing with soap and water.

In order to carry out your full COSHH assessment, please consult the product Material Safety Data Sheet (MSDS).4
+

European Headquarters:
Cookson Electronics Assembly Materials
Forsyth Road, Sheerwater
Woking, Surrey
GU21 5RZ. United Kingdom
Tel: +44 (0) 1483 793100
Fax: +44 (0) 1483 793101

www.alphametals.com

Worldwide Headquarters
Cookson Electronics Assembly Materials
600 Route 440
Jersey City, New Jersey 07304
USA
Tel: +1 (201) 434 6778
Fax: +1 (201) 434 7508

Regional Offices

Belgium:	Tel: +32 (0) 14 44 50 00
France:	Tel: +33 (0) 2 41 49 00 11
Germany:	Tel: +49 (0) 203 55540
Ireland:	Tel: +353 (0) 1 842 1172
Italy:	Tel: +39 (0) 2 38 33 11
Hungary:	Tel: +36 (0) 24 460 720
Netherlands:	Tel: +31 (0) 35 695 5411

SM-465-5

ALPHA ROSIN FLUX 800 (RF-800)

NO-CLEAN FLUX

ALPHA RF-800 provides the broadest process window for a no-clean flux with less than 5% solids content. ALPHA RF-800 is designed to provide excellent soldering results (low defects rates), even when the surfaces to be soldered (component leads and pads) are not highly solderable. RF800 works particularly well with bare copper boards protected with organic or rosin/resin coatings and with tin-lead coated PCB's. ALPHA RF-800 is used successfully in both tin-lead and lead-free applications.

GENERAL DESCRIPTION

ALPHA RF-800 is a very active, low solids, no-clean flux. It is formulated with a proprietary activator system. A small percentage of rosin is added for enhanced thermal stability. The activators are designed to provide the broadest operating window for a low solids, no-clean flux, while maintaining a high level of long-term electrical reliability. After wave soldering, **ALPHA RF-800** leaves a low level of non-tacky residue, which is easily penetrable in pin testing.

FEATURES & BENEFITS

- Highly active for excellent soldering and low defect rates.
- Low level of non-tacky residue to reduce interference with pin testing.
- Cleaning is not required which reduces operating costs.
- Reduces the surface tension between solder mask and solder to significantly reduce solder ball frequency.
- Meets Bellcore requirements for long-term electrical reliability.

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^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. When switching from one flux to another, the use of a new foam stone is recommended (for foam fluxing).

Conveyors, fingers and pallets should be cleaned. SM-110 Solvent Cleaner has been found to be very useful for these cleaning applications. When foam fluxing, do not use hot fixtures or pallets. Hot fixtures/pallets will deteriorate the foam head.

FLUX APPLICATION – ALPHA RF-800 is formulated to be applied by foam, wave or spray methods. When foam fluxing, the foam fluxer should be supplied with compressed air which is free of oil and water. Keep the flux tank full at all times. The flux level should be maintained 1 inch to 1-½ inches above the top of the stone. Adjust the air pressure to produce the optimum foam height with a fine, uniform foam head.

8-24/06

A uniform coating of flux is essential to successful soldering. When using the foam or wave method of application, an air knife is recommended after the fluxing operation. An air knife will help ensure that the flux is uniformly distributed across the board and will remove the excess flux.

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.

GENERAL GUIDELINES FOR MACHINE SETTINGS

OPERATING PARAMETER	SAC305/SACX0307	63Sn/37Pb
Amount of Flux Applied	Single Wave: 1000-1200 µg/in^2 of solids Dual Wave: 1100-1500 µg/in2 of solids	Foam: 1,000 - 2,000 µg/in^2 of solids Spray: 750 - 1,500 µg/in^2 of solids
When foam fluxing ...... Foam Stone Pore Size	20 -50 µm	20 -50 µm
Distance that top of stone is submerged below flux	1 - 1½ inches (25 - 40 mm)	1 - 1½ inches (25 - 40 mm)
Foam Fluxer Chimney Opening	3/8 - 1/2 inch (10-13 mm)	3/8 - 1/2 inch (10-13 mm)
When foam fluxing, use an Air Knife...... Air Knife Hole Diameter	1 - 1.5 mm	1 - 1.5 mm
Distance Between Holes	4 - 5 mm	4 - 5 mm
Distance from Fluxer to Air Knife	4 - 6 inches (10-15 cm)	4 - 6 inches (10-15 cm)
Air Knife Angle Back toward Fluxer from Perpendicular	3° - 5°	3° - 5°
Topside Preheat Temperature	190° - 247°F (85° - 120°C)	190°F – 230°F (85°C - 110°C)
Bottomside Preheat Temperature	about 65°F (35°C) higher than topside	about 65°F (35°C) higher than topside
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°-8° (6° most common)	5°-8° (6° most common)
Conveyor Speed	3 – 6 feet/minute (.9 – 1.8 meters/minute)	4 - 6 feet/minute (1.2 - 1.8 meters/minute)
Contact Time in the Solder (includes Chip Wave and Primary Wave)	1.5 - 3.5 seconds (2-2½ seconds most common)	1.5 - 3.5 seconds (2-2½ seconds most common)
Solder Pot Temperature	490° - 520°F (250° - 270°C)	460° – 500°F (235°-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 designed experiment, optimizing the most important variables (amount of flux applied, conveyor speed, preheat temperatures, and solder pot temperature).		

FLUX SOLIDS CONTROL - If foam, wave, or rotary drum, spray fluxing, the flux solids will need to be controlled via thinner addition 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. Monitoring and controlling the acid number is recommended for maintaining the solids content. The acid number should be controlled to between 17 and 19. 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 the foam fluxer continuously, the acid number should be checked every two to four 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 and foam stone should be thoroughly cleaned with flux thinner.

RESIDUE REMOVAL – **ALPHA RF-800** is a no-clean flux and the residues are designed to be left on the board. However, if desired, RF800 residues can be removed with Alpha 2110 Saponifier.

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

TECHNICAL SPECIFICATIONS

Parameters	Typical Values	Parameters/Test Method	Typical Values
Appearance	Pale, yellow liquid	Ph (5% aqueous solution)	3.4
Solids Content, wt/wt	4.1	Recommended Thinner	Alpha 425
Acid Number (mg KOH/g)	18 ± 1	Shelf Life	18 Months
Specific Gravity @ 25°C (77°F)	0.794 ± 0.003	Container Size Availability	1, 5, and 55 Gal.
Pounds Per Gallon	6.6	Bellcore TR-NWT-000078, Issue 3 Compliant	Yes
Flash Point (T.C.C.)	56°F (13°C)	IPC J-STD-004 Designation	ROL0

CORROSION AND ELECTRICAL RELIABILITY TESTING

Corrosion Testing	Requirements	Results
Silver Chromate Paper Test	No Detection of Halide	Passes
Copper Mirror Test	No Complete Removal of Copper	Passes
IPC Copper Corrosion Test		No Corrosion (Type L)

SURFACE INSULATION RESISTANCE (all values in ohms)

Test Condition	Requirement	Results
Bellcore "Comb-Down" - Uncleaned	1.0×10^{11} minimum	4.5×10^{11}
Bellcore "Comb-Up" – Uncleaned	1.0×10^{11} minimum	6.7×10^{11}
Bellcore Control Board	2.0×10^{11} minimum	1.6×10^{12}
IPC J-STD-004 Comb-Down Uncleaned	1.0×10^{8} minimum	1.1×10^{10}
IPC J-STD-004 Comb-Up Uncleaned	1.0×10^{8} minimum	9.8×10^{9}
IPC J-STD-004 Control Board		1.1×10^{10}

Bellcore Test Condition (per TR-NWT-000078, Issue 3): 35°C/85%RH/120 Hours/-48 volts, measurement @ 100V/ 25 mil lines/50 mil spacing.

IPC Test Condition (per J-STD-004): 85°C/85%RH/168 Hours/-50V, measurement @ 100V/IPC B-24 board (0.4 mm lines, 0.5 mm spacing).

ELECTROMIGRATION (all values in ohms)

Test Condition	SIR (Initial)	SIR (Final)	Requirement	Result	Visual Result
Bellcore "Comb-Up" Uncleaned	3.6×10^{9}	3.8×10^{9}	SIR (Initial)/SIR (Final) < 10	Passes	No Dendrites or Corrosion
Bellcore "Comb-Down" Uncleaned	2.8×10^{9}	4.0×10^{9}	SIR (Initial)/SIR (Final) < 10	Passes	No Dendrites or Corrosion

Bellcore Test Condition (per TR-NWT-000078, Issue 3): 85°C/85%RH/500 Hours/10V, measurement @ 100V/IPC B-25 B Pattern (12.5 mil lines, 12.5 mil spacing)

HEALTH & SAFETY

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

ALPHA RF-800 flux contains a highly flammable solvent with a flashpoint of 56°F (13°C). The flux must not be used near open flames or near non-flameproof electrical equipment.

6-30-06