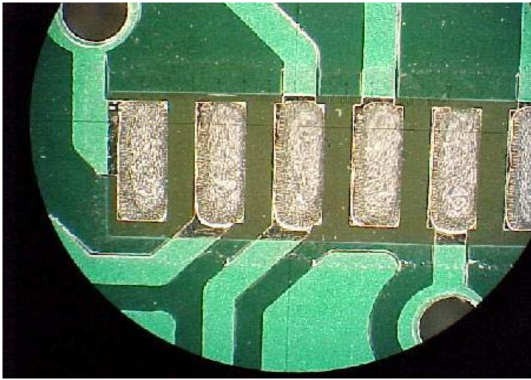
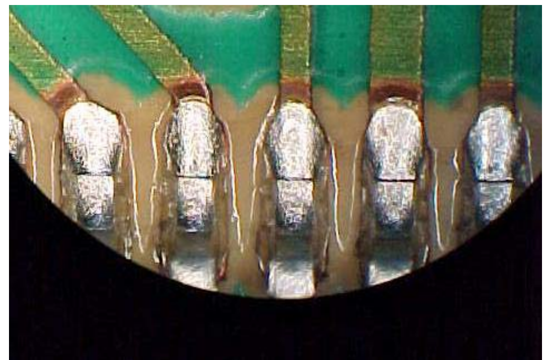
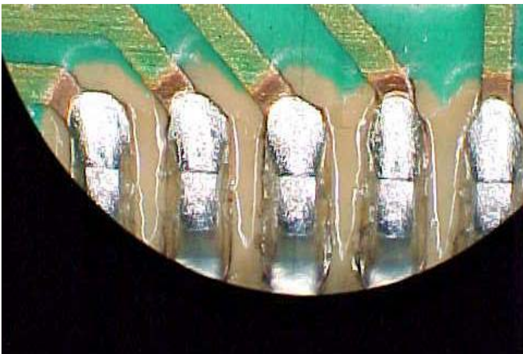
SIRIUS 1LF

NO-CLEAN LEAD FREE SOLDER PASTE







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SIRIUS 1LF

NO-CLEAN LEAD FREE SOLDER PASTE

I) INTRODUCTION:

SIRIUS™ 1LF IS A NO-CLEAN & LEAD FREE SOLDER PASTE.

CAREFULLY FORMULATED TO SOLDER ALL SURFACES, SIRIUS 1LF LET A VERY LOW VOLUME OF CLEARS RESIDUES AFTER SOLDERING. THIS PASTE IS DESIGNED TO OFFER A WIDE PROCESS WINDOW AND REDUCES SOLDER DEFECTS WITH A MINIMUM INCREASE OF TEMPERATURE COMPARING TO LEAD CONTENT PRODUCTS.
THE FLUX SYSTEM IS LONG LIFE, REDUCES PASTE WASTE AND COSTS.
THE RESIDUES ARE NON-CORROSIVE AND COMPLETELY BENIGN. THE SOLDER PASTE MEETS THE INTERNATIONAL TEST STANDARDS AND RECENT DIRECTIVES ABOUT HAZARDOUS SUBSTANCES.
TESTS AND QUALIFICATIONS INCLUDE CRITERIA FROM THE J-STD-004, -005, AND -006 SPECIFICATIONS (IPC-TM-650 TESTS METHODS).

II) PRODUCT PROFILE:

Alloy	Sn95.5Ag3.8Cu0.7	Sn96.5Ag3Cu0.5	Sn96Ag4
Particle size for grade 3	25-45 µm 1 to 1.8 mil	25-45 µm 1 to 1.8 mil	25-45 µm 1 to 1.8 mil
Application	Fine-Pitch (400µm) (15.75 mil) Ultra Fine Pitch in grade 5	Fine-Pitch (400µm) (15.75 mil) Ultra Fine Pitch in grade 5	Fine-Pitch (400µm) (15.75 mil) Ultra Fine Pitch in grade 5
Melting point "Eutectic"	217°C	217 – 219°C	221°C
Metal content	89.5 to 90.2 %	89.5 to 90.2 %	89.5 to 90.2 %
Viscosity	700–1000 Pa.s	700–1000 Pa.s	700–1000 Pa.s
Shelf life (5 to 10°C in jar)	12 month	12 month	12 month
Stencil life	>24 hours	>24 hours	>24 hours
Print speed	Up to 150 mm/s (6" /s)	Up to 150 mm/s (6" /s)	Up to 150 mm/s (6" /s)
Tack life	> 24 hours	> 24 hours	> 24 hours
Slump resistance	> 20mn at 80°C	> 20mn at 80°C	> 20mn at 80°C

Other standard alloys available on request.

III) PHYSICAL AND APPLICATION TESTS – PASTE PERFORMANCE:

According to J-STD 004, 005, 006 and IPC-TM-650 tests methods.

III-1	Classification
III-2	Solder powder particle size
III-3	Metal content
III-4	Viscosity, Malcom profile
III-5	Shelf life
III-6	Printing Test – Speed
III-7	Stencil life – Abandon time
III-8	Tack test
III-9	Slump resistance
III-10	Solder balling test
III-11	Wetting test
III-12	Reflow capabilities

IV) RELIABILITY TESTS:

IV-1	Copper mirror
IV-2	Silver chromate
IV-3	Fluoride Spot
IV-4	Copper Corrosion
IV-5	Surface Insulation Resistance (SIR)
IV-6	Acid value
IV-7	Ionic contamination

V) PACKAGING:

PROFLOW 800g

*

RHEO PUMP CARTRIDGES 500g 1Kg

*

SYRINGES & CARTRIDGES of 30g 100g EFD, SEMCO, IWASHITA

*

JARS, 250g, 500g, 1Kg

III-1 Classification:

Alloy Designation	Flux Classification	Powder Size Type	Nominal Metal Content	Viscosity
Sn95.5Ag3.8Cu0.7	**ROL0**	25 – 45µm (1 to 1.8 mil)	89.5 to 90.2%	700- 1000 Pa.s

III-2 Solder powder particle size and distribution:

- **Powder classification: class 3**
- **Particle size: 25-45 µm (1 – 1.8 mil)**
- **See Appendix I: "QUALITY CERTIFICATE"**

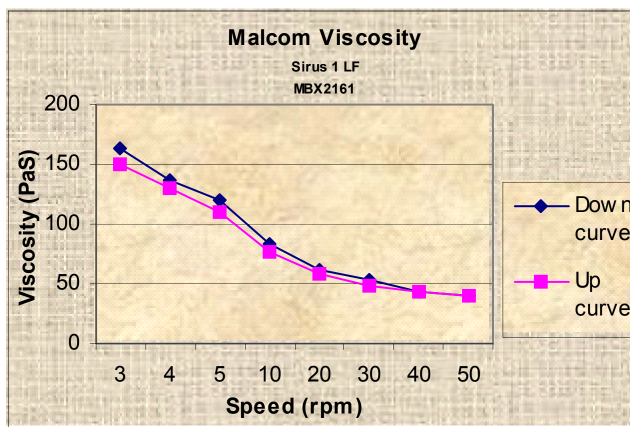
III-3 Metal content:

METHOD:

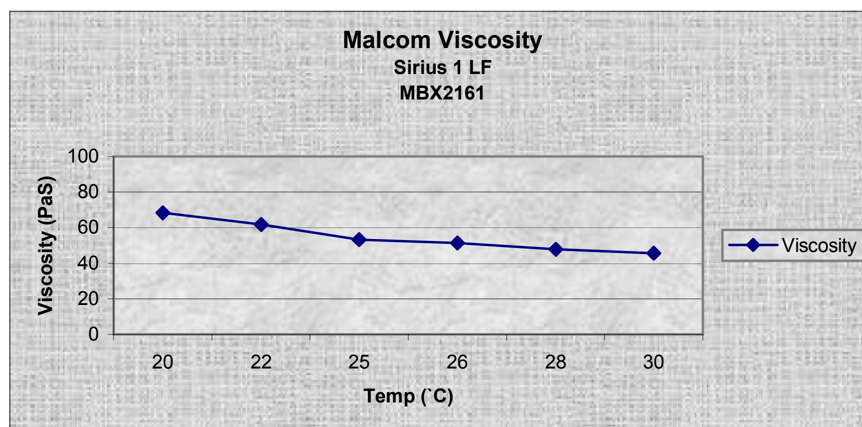
- **Weigh 20g of paste into aluminium boat.**
- **Melt paste into a slug**
- **Weigh cleaned slug and express mass as % of paste.**
- **Test in duplicate**
- **Results: see summary**

III-4 Rheology:

Malcom profile at regulated temperature: 25°C



Viscosity v/s Temperature at 30 rpm:



(Malcom)

Temperature in °C	20	22	24	26	28	30	33	34.5	20
Viscosity in Pa.s	890	810	730	648	583	499	450	401	890

III-5 Shelf-life:

SIRIUS 1LF has a shelf-life up to 12 months, stored at 5°C to 10°C.
For dispensing grade version the shelf life is reduced to 6 months.

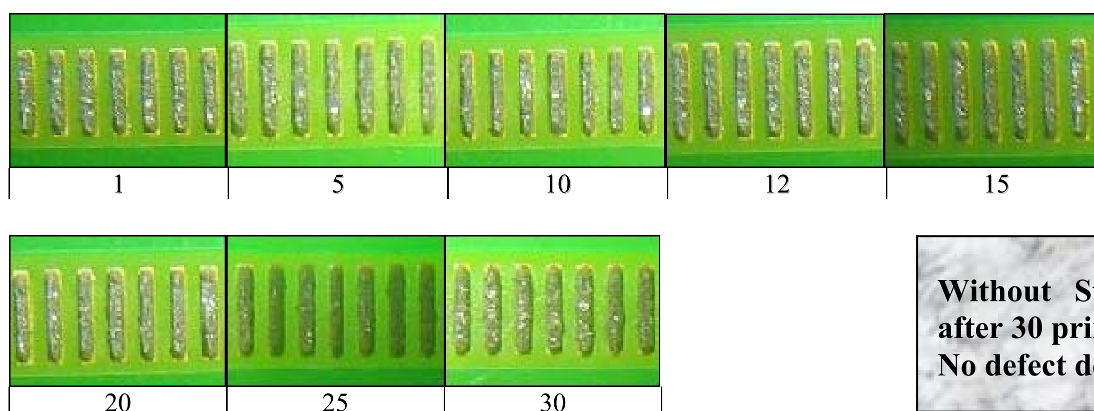
Stored at 5 to 10°C	0 Months	6 Months	12 Months
Activity	< 3 micro-balls	< 3 micro-balls	< 3 micro-balls

III-6 Printing test speed:

Performance verified on MPM, DEK, SM-TECH, EKRA.

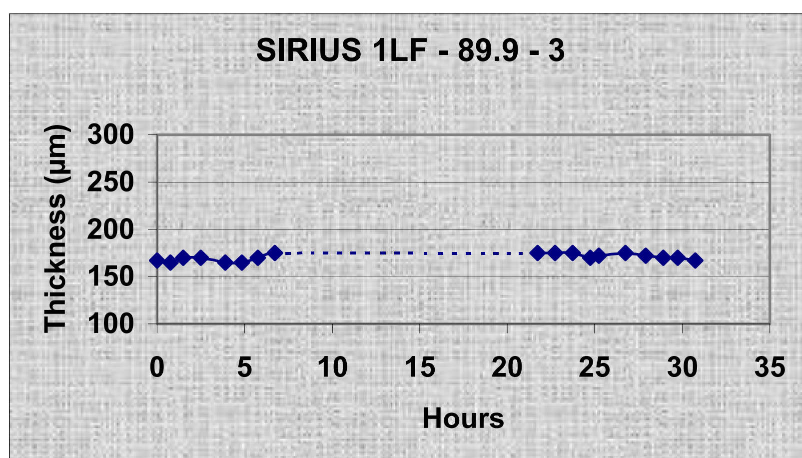
Squeegee speed	Up to 150 mm/s	Generally slower for fine pitch
Best results	50 to 100 mm/s 2 to 4" /s	Down to 25 with lower pressure
Squeegee pressure	5 – 10 Kg	Generally higher for fine pitch
Wipe frequency	> 20 prints	At high squeegee speed

Stencil cleaning: wipe frequency



Without Stencil Cleaning after 30 printing Cycles.
No defect detected.

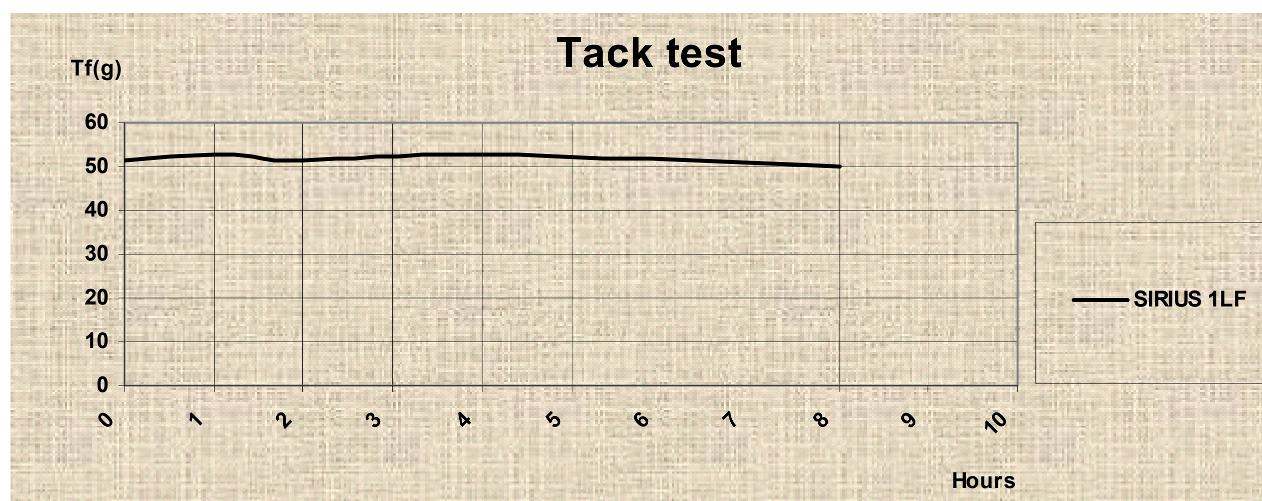
III-7 Stencil life – Abandon time:



Abandon time is more than 30 hours at ambient conditions.

(25°C +/-5°C)
(50% RH+/-10%)

III-8 Tack-test:



The Tack Force is virtually unchanged for the first 8 hours.

III-9 Slump resistance:

Slump resistance in accordance to IIW and J-STD-005 → Pass

IIW	24 hrs @ 25°C / 50% RH	20 mn @ 80°C
Type I	0.2	0.2
Type II	0.2	0.2

Stencil IPC-A-20 (0.1 mm Thick)					
Pad size 0.33 x 2.03			Pad size 0.2 x 2.03		
Spacing mm	Hor.	Vert.	Spacing mm	Hor.	Vert.
0.45	NO	NO	0.30	NO	NO
0.40	NO	NO	0.25	NO	NO
0.35	NO	NO	0.20	NO	NO
0.30	NO	NO	0.175	NO	NO
0.25	NO	NO	0.15	NO	NO
0.20	NO	NO	0.125	NO	NO
0.15	NO	NO	0.10	NO	NO
0.10	NO	NO	0.075	NO	NO
0.08	NO	NO			

Paste did not exhibit any bridged pads for the entire slump test.

Slump test

	Requested	Results
Class 3 (150µm)	I ≥ 0.2 mm	0.2 mm
	II ≥ 0.3 mm	0.2 mm

III-10 Solder balling test:

- **On alumina substrate:**

Test conditions: 25±2°C; 50±10%RH

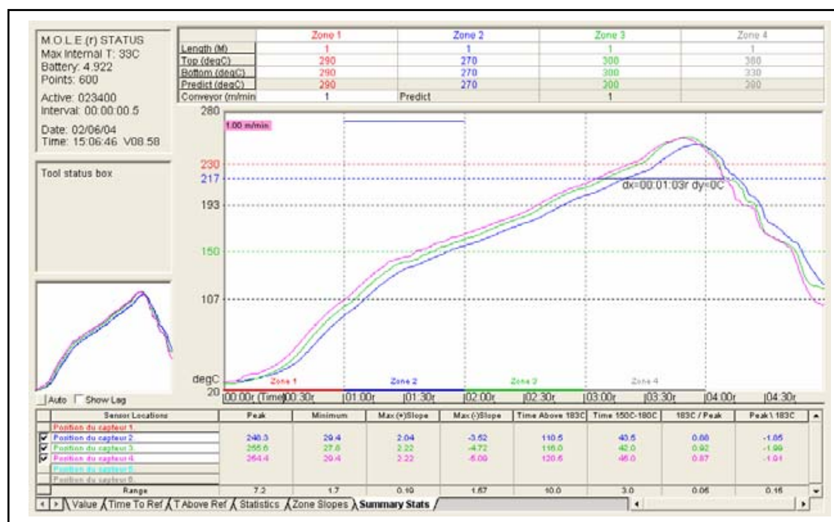
Spherical nice regular form.
No micro-balling observed after 4 hours
at ambient conditions.

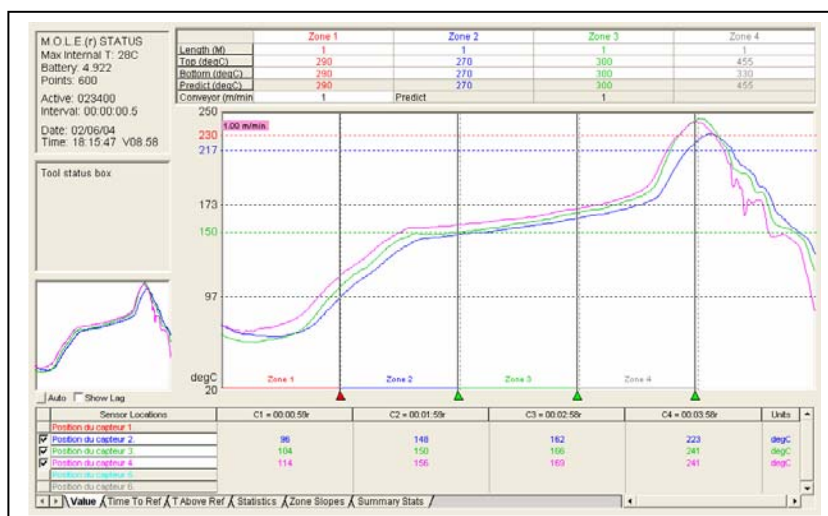
t = 2 hours Satellites < 3	t = 4 hours Satellites < 3

III-11 Wetting test:

Test conditions	After 4 hrs 23°C 50% RH	After 4 hrs 23°C 83% RH
High reflow profile (See below)	Class 2*	Class 2*
Low reflow profile (See below)	Class 2*	Class 2*

*Class 2= Wetting surface corresponds to printing area.

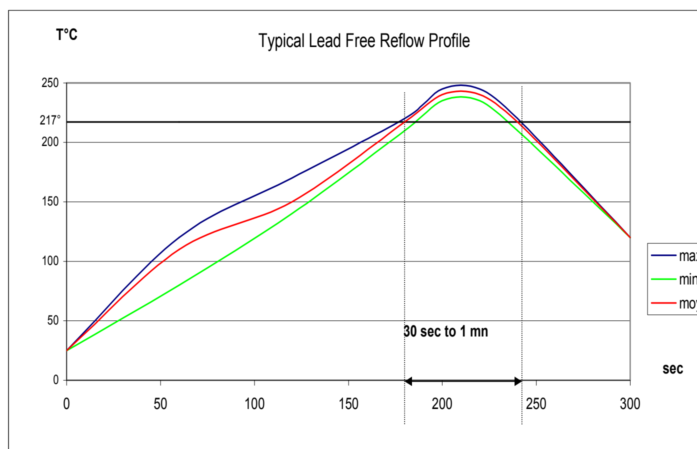




III-12 Reflow:

Reflow process capability:

- Infrared or convection (air and nitrogen)
- Vapour phase.
- Hot air.
- Hot plate.
- Laser
- Induction



Both reflow profile available, symmetric or asymmetric, with preheat plateau or constant increasing slope.

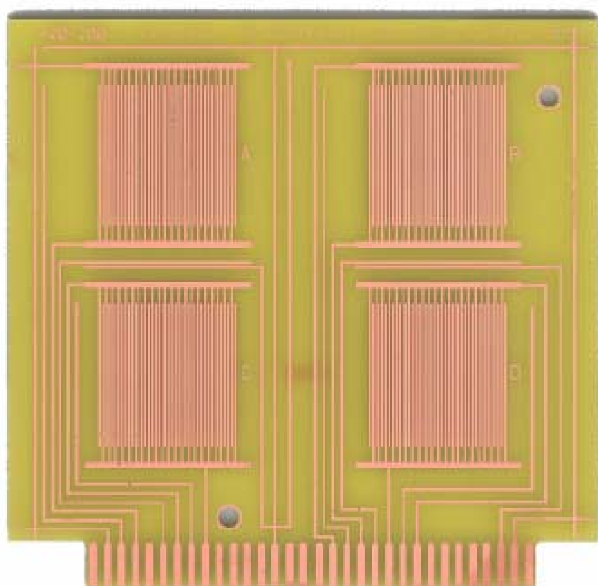
The solder paste offers a wide window during the reflow process. This enables the soldering of boards of varying thermal mass.

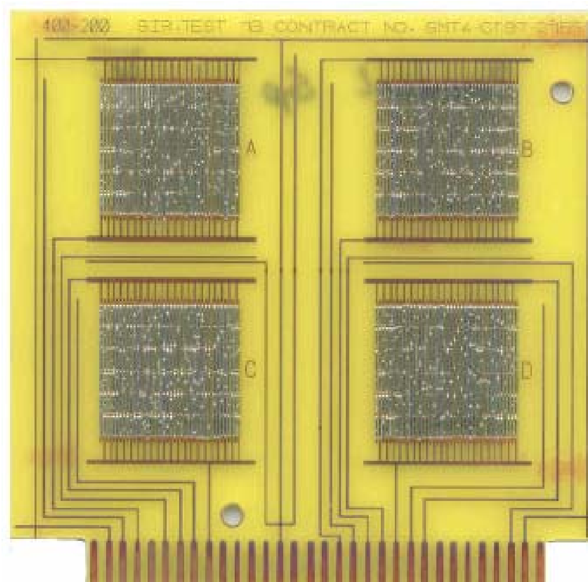
SIRIUS 1LF

NO-CLEAN LEAD FREE SOLDER PASTE

IV) RELIABILITY TESTS:

	Test	J-STD-004
IV-1	Copper mirror	Pass
IV-2	Silver chromate	Pass
IV-3	Fluoride Spot	Pass
IV-4	Copper Corrosion	Pass
IV-5	S.I.R. test	Pass





Insulation measurement on virgin substrate:

$> 10^{10}\ \Omega$

Insulation measurement on soldered substrate:

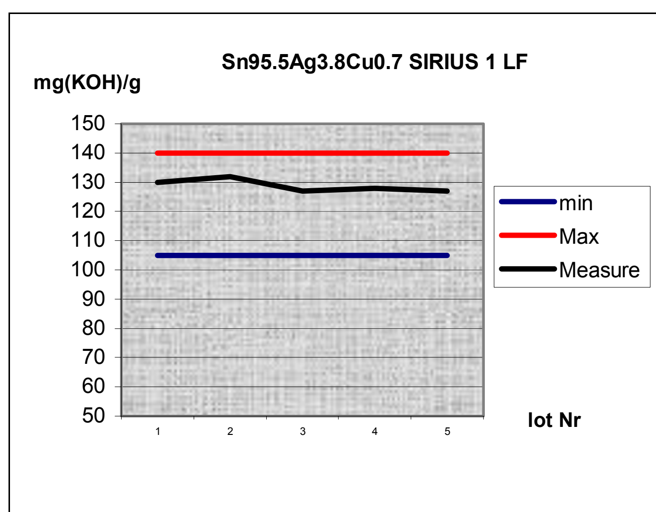
$> 10^{8}\ \Omega$

PASS

IV-6) Acid Value

- METTLER TOLEDO DL50 TITRIMETER

105 mgKOH/g < AV< 140 mgKOH/g



IV-7) Ionic Contamination:

Solution of test: 75/25 solution (Isopropylic alcohol / deionised water)
Board IPC-B-24

Limit*	→ **2.15** (µg NACL equivalent /cm²)
Result	→ **< 1** (µg NACL equivalent /cm²)

*(IPC- J-STD-001C § 8.3.6 IPC-TM-650, 2.3.25C)

V) PACKAGING:

Proflow® 800g

Rheo pump cartridges

Syringes & Cartridges of 30g 100g EFD, SEMCO, IWASHITA

JARS 250g, 500g, 1Kg

APPENDIX: TRACE LABORATORIES REPORT.

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ANSI/IPC-J-STD-004A
SOLDER PASTE TEST REPORT
FOR
MBO SIRIUS 1 LF SOLDER PASTE
ABSTRACT

MBO SIRIUS 1 LF Solder Paste was tested by Trace Laboratories - Central.

The Copper Mirror test revealed **no removal of copper** by the solder paste.

The solder paste was found to contain **no chloride** by the use of silver chromate paper.

No fluorides were evidenced by the spot test for fluoride(s).

The sample was shown to result in **no evidence of corrosion** after testing in accordance with IPC-TM-650, Method 2.6.15, "Corrosion Test".

The sample was tested for tack in accordance with IPC-TM-650, Method 2.4.44. The solder paste was found to have an **average tack force of 49.9 grams** over the eight-hour test period.

Sample test boards were prepared with Sirius 1 LF and tested for ionic cleanliness. All samples **easily met the requirement for residual ionic cleanliness**.

Surface insulation resistance testing per IPC-TM-650, method 2.6.3.3 resulted in measurements above $1x10^8$ ohms for the tested flux at the end of both 96 hours and 168 hours. Samples **easily met the requirements of surface insulation resistance testing**.

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