



CE Analytics LF Process Capability Validation Program

Updated 1/2/06

Overview

- Cookson Electronics Assembly Materials (CEAM) has partnered with Practical Components to offer a complete Lead-free Process Capability Validation program
- CEAM will supply a bundled offering of Kits and Services for validating an electronic assemblers **SMT, Thru-Hole, Mixed Technology** and/or **Rework** process capabilities
- The Lead-free Kits consist of:
 - Solder paste, Cored wire, an ALPHA Stencil and a CD with the data required for programming most assembly equipment
 - All the required Circuit Boards and components
- CE Analytical Services provides:
 - A comprehensive menu of testing and analysis ranging from simple microscopic inspection of board cosmetics and joint finish to full analysis of joint integrity and intermetallics using advanced cross sectioning and x-ray techniques. Validation based on comparison of processed boards versus IPC and J-Standards
- Once analyzed, the customer receives:
 - a detailed report summarizing the analysis
 - a certificate (if applicable) noting their process has been validated as LF capable

Program Benefits

- A single source to get the solder paste, boards, components, wire, and stencils they will need to set up and run a LF process
- Provides a validation of their LF process capabilities versus the IPC and J-Std requirement
- Proof of an assemblers LF process capabilities that can demonstrate to OEM customers
- Cost savings through smoother LF startups
 - dummy boards and components prevent consumption of production assemblies
- Time savings through process capability validation services and eliminate trial and error
- Leverage the experience of Cookson Electronics to provide insight into LF processing
- A tool for customers to gain confidence in their LF process techniques

Lead-Free Test Kit contents

- ALPHA® OM-338(M13) LF solder paste (SAC)
- ALPHACut® laser cut stencil
- ALPHA® Telecore Plus LF wire (SAC305)
- PCB test boards
 - Polyclad FR-370HR laminates
 - Enthone lead-free compatible pad finishes
 - ALPHALevel, Entek® Plus HT
- Standard lead-free components provided in popular industry types
 - Wide mix of SMT and Thru Hole components
- Aegis CircuitCAM, Checkpoint, ready to run CircuitCAM project files, digitized files of PCB and X,Y data
- Information CD including literature on Cookson Electronics' leading Lead-free products



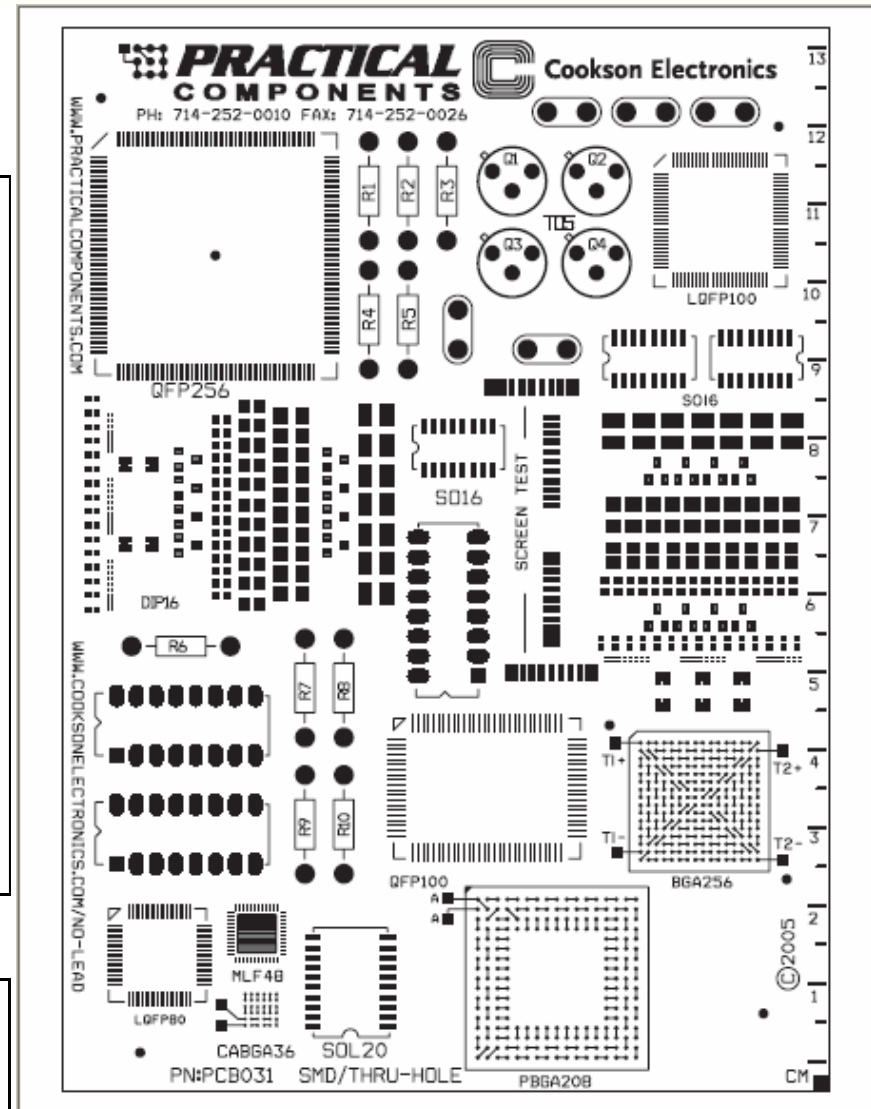
Board and Parts

SMT Components

Part Description	Finish	Qty per Board	Qty Per Kit
0402SMR-PA-LF-1K	100%Sn	40	1K-Reel
0603SMR-PA-LF-1K	100%Sn	40	1K-Reel
0805SMR-PA-LF-1K	100%Sn	40	1K-Reel
1206SMR-PA-LF-1K	100%Sn	40	1K-Reel
1210SMR-PA-LF-500	100%Sn	20	500-Reel
SOT23-TR-LF-500	100%Sn	20	500-Reel
SO16GT-3.8mm-LF	100%Sn	3	96-Tube
SO20GT-7.6mm-LF	100%Sn	1	38-Tube
PDIP16T-DC-SnCu	Sn/Cu	3	75 (Tubes of 25)
TO5-3-B-Sn	100%Sn	4	96-Bulk
1/4-W-AR-TR-LF-0	100%Sn	10	300/Reel
RM-.200"-LF	100%Sn	2	48-Bulk
A-QFP100-14x20mm-.65mm-3.9-LF	100%Sn	1	24-Tray
PBGA169-1.5mm-23mm-DC-LF	Sn/Ag/Cu	1	24-Tray
A-PBGA256-1.0mm-17mm-DC-LF	Sn/Ag/Cu	1	24-Tray
SOD80TR-LF-500	100%Sn	10	250-Reel
A-QFP256-28mm-.4mm-2.6-Sn	100%Sn	1	24-Tray
A-CABGA36-.8mm-6mm-DC-LF	Sn/Ag/Cu	1	24-Tray
A-MLF48-7mm-.5mm-DC-LF	100%Sn	1	43-Tube
LQFP100-14mm-.5mm-2.0-LF	98.5Sn/1.5Cu	1	24-Tray
0201SMR-PA-LF	100%Sn	100	1250-Reel
Cookson Saber Board		1	24

Thru-Hole Components

PDIP16T-DC-SnCu	Sn/Cu	3	75 (Tubes of 25)
TO5-3-B-Sn	100%Sn	4	96-Bulk
1/4-W-AR-TR-LF-0	100%Sn	10	300/Reel
RM-.200"-LF	100%Sn	2	48-Bulk



Service Level Descriptions

alpha

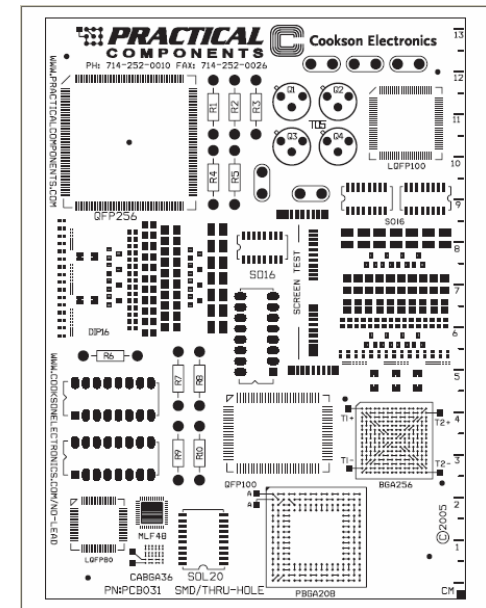
Review	Validation Level 1	Validation Level 2
<p>1. Lead-free Test Kit</p> <p>2. Visual Examination: General Inspection of up to 24 boards, components, and solder connections with stereomicroscope</p> <p>3. Microscopic Examination: A total of 4 SMT and / or Through Hole components are cross sectioned and analyzed for interfacial reaction layers, micro structural integrity, coating integrity and identification of general defects</p> <p>4. Reporting: Observations, photographic documentation, interpretation of pertinent findings and recommendations, if applicable</p>	<p>1. Lead-free Test Kit</p> <p>2. Process Capability Validation:</p> <p>a) General Inspection of up to 24 boards, components, and solder connections with stereomicroscope versus 10 IPC and J-Std solder connection requirements.</p> <p>b) A total of 4 SMT and / or 4 Through Hole components from the boards are cross sectioned and analyzed for:</p> <ul style="list-style-type: none"> • Solder wetting and fillet quality versus the IPC and J-Std requirements • Interfacial reaction layers, micro structural and coating integrity with identification of general defects <p>3. Reporting: Observations, photographic documentation, interpretation of pertinent findings and recommendations, if applicable</p> <p><i>A Lead-free Process Capability Validation Certificate will be issued to customers who demonstrate the ability to establish a compliant process.</i></p>	<p>1. Lead-free Test Kit</p> <p>2. Capability Validation:</p> <p>a) General Inspection of up to 24 boards, components, and solder connections with stereomicroscope versus 10 IPC and J-Std solder connection requirements.</p> <p>b) A total of 12 SMT and / or 12 Through Hole components from the boards are cross sectioned and analyzed for:</p> <ul style="list-style-type: none"> • Solder wetting and fillet quality versus the IPC and J-Std requirements • Interfacial reaction layers, micro structural and coating integrity with identification of general defects <p>3. Voiding: A total of 2 BGA256 components from two boards are measured for void size distribution by void area and checked against IPC-A-610C std.</p> <p>4. Reporting: Observations, photographic documentation, interpretation of pertinent findings and recommendations, if applicable</p> <p><i>A Lead-free Process Capability Validation Certificate will be issued to customers who demonstrate the ability to establish a compliant process.</i></p>

***Test kit is not required for purchase of services**

- Submitted boards must be representative of the final assembly after internal inspection.
- Requires a minimum of 6 PCB's for each solder / surface finish combination
- For Rework Validation - only those parts that have been reworked will be cross sectioned (min. 1 part per board submitted)
- Rework boards must be submitted separate from SMT, Thru-Hole or Mixed Tech boards
- Only one solder / surface finish combination is included in the kit price. Added charges apply if more combinations are needed

Parts for Cross Sectioning and XRay

	SMT	Thru-Hole	Mixed Tech	Rework
BGA	X		X	<i>Based on parts reworked and submitted</i>
Capacitors / Resistors	X		X	
Gull-wing IC's (multiple)	X		X	
PDIP (multiple)		X	X	
TO5 - Transistors		X	X	
Axial Resistors / Diodes		X	X	



Final Report

- Cookson's highly trained lab personnel perform a careful evaluation of the Pb-free PCB's submitted to ensure that the assembler exhibits the necessary capabilities to produce boards that fully comply with the appropriate IPC and J Standards.

Some of the evaluation criteria include:

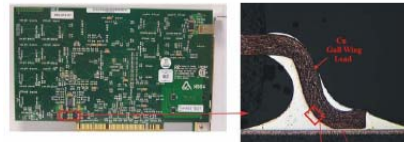
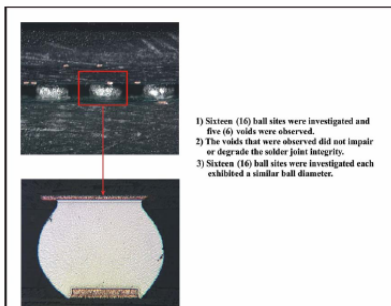
Dewetting / Non-Wetting
Fractured/Cracked Joint
Incomplete Reflow
Heel Fillet Height
Interfacial Reaction Layers
Microstructural Joint Integrity
Coating Integrity

8.2.12 Surface Mount Area Array
Table 8 - 12 Dimensional Criteria - Surface Mount Area Array Features

Feature	Class	Class 1,2,3	Classification
Alignment	8.2.12.1	Solder ball offset does not violate minimum electrical clearance	Pass
Solder Ball Spacing	8.2.12.2	Solder ball offset does not violate minimum electrical clearance	Pass
Solder Connection	8.2.12.3	No solder bridging, DVA solder balls contact and wet to the lead forming a continuous electrical bond on the connection	Pass
Voids	8.2.12.4	25% or less voidage in a ball away image area.	Pass
Under-Fill or Sticking Material	8.2.12.5	Required underfill or sticking material is present and completely cured.	Pass

Note 1 Design induced voids, e.g. recesses in lead, are excluded from this criteria. In such cases acceptance criteria will need to be established between the manufacturer and user.

Note 2 Manufacturers may use test or analysis to develop alternative acceptance criteria for testing that consider the end-use environment.



The photomicrograph (right) reveal a good Cu/Sn intermetallic compound (IMC) reaction layer between the solder and the Cu Gull Wing lead.



The photomicrograph (left) reveal a good Ni-Sn intermetallic compound (IMC) reaction layer between the solder and the Ni plating on the board.

Sample Report Pages

Capabilities Validation

Assemblers who demonstrate the ability to produce Pb-free PCB's that comply with applicable IPC, JSTD and other accepted industry standards receive a validation certificate



CE Analytics
Lead-Free Process Validation Certificate

This certificate confirms that the Lead-Free SMT process analyzed for XXX Generic Manufacturing
1234 Anystreet, Citytown, ST 00000
 has been approved as a Cookson Lead-Free Process based on strict adherence to the IPC Standard for Lead-Free.

Process Description: Lead-free SMT Process

Validation Report Number and Date: 1234567 | Month 00,0000

Lead-Free Process Partner: John Doe, Business Title

Cookson Electronics Authorization: _____





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