Proposed Update of ECSS-Q-ST-70-38C-1 Draft

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ECSS-Q-ST-70-38 C update

Start of the WG: June 2013

Number of CR from ESA: 47

Public review: Summer 2015

Number of DRRs from Public review (25th of September 2015): 247 (110 from Eurospace, 137 from ESA, 0 from CNES, 0 from DLR)

Status of the ECSS: Shall be re-submitted to Public review due to high number of changes following the review of the DRRs.

→ Cannot present you all the changes

Main proposed changes

1. Introduction of Sensitive parts and associated requirements

1. Clarification of number of parts to be verification tested

1. Introduction of electrical monitoring for parts other than Area Array Device

1. Modification of placement of parts on PCB

1. Change in pass/fail criteria for cracks in the solder joint

2. Modification of electrical monitoring for Area Array Devices

3. Integration of microsection guideline from ESA

1. Microsection requirements

2. Summary Tables template

Introduction of Sensitive parts and associated requirements

-Issue by ESA beginning of 2013 in a Memo TEC-QT/2012/206/CV

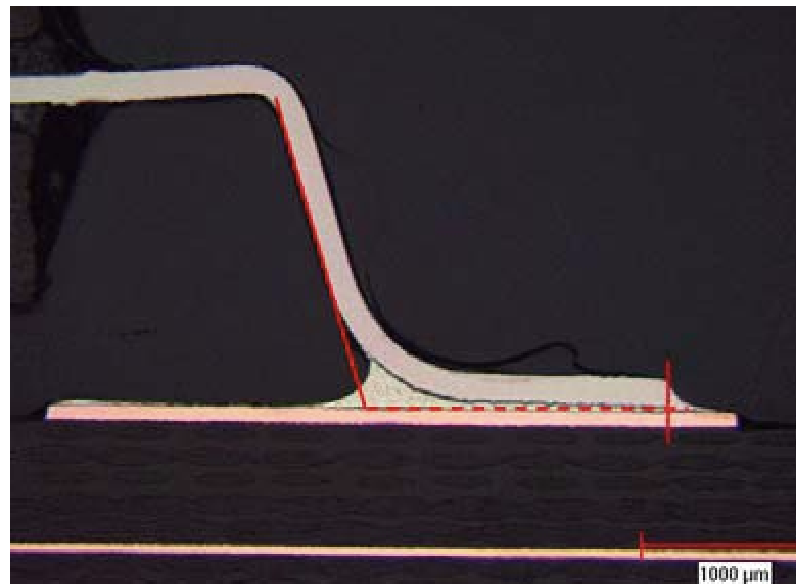
Actual reference: ESA-TECQTM-MO-1143 Issue 1 dated on 15th January 2016

Web link:

https://escies.org/#&panel1-1

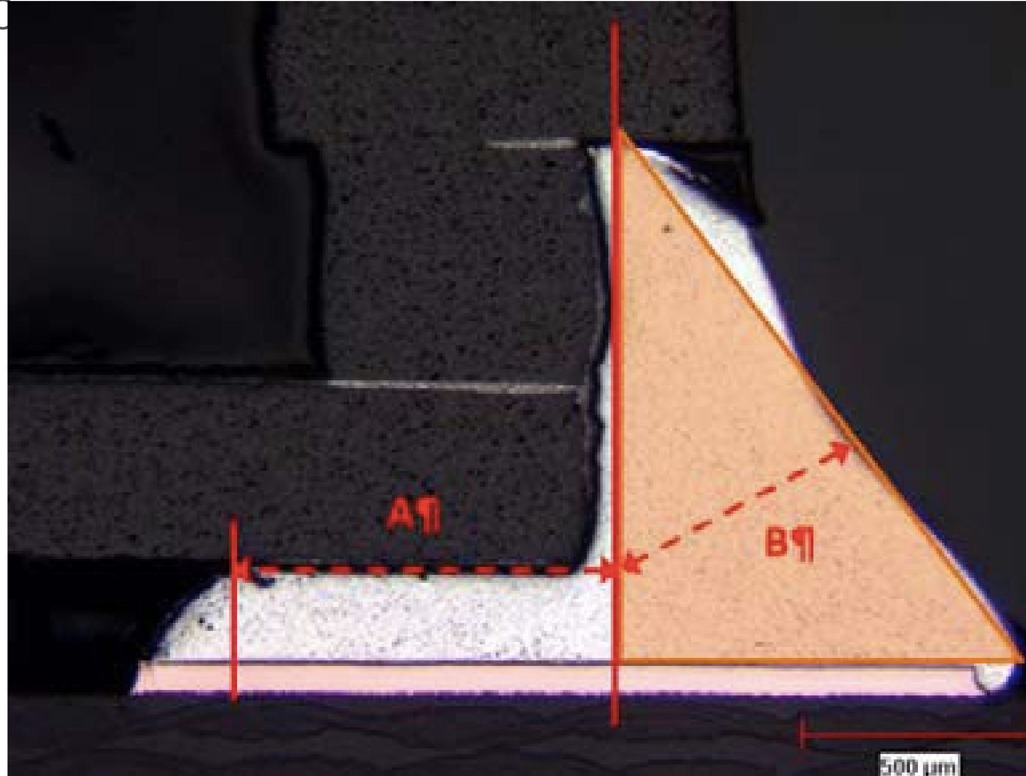
-Introduction of sensitive part in the ECSS-Q-ST-70-38 update standard

-devices prone to have cracks in critical zone exceeding 25% of the critical area for leaded devices and some leadless parts Melf...



Sensitive parts assembly

-devices prone to have cracks in critical zone exceeding of more than 75% of pass fail criteria (cracks smaller than 60% of A+B) for sensitive parts such as Chip parts, LCC



Sensitive parts assembly

-Requirement for the verification in compliance with ECSS-Q-ST-70-38

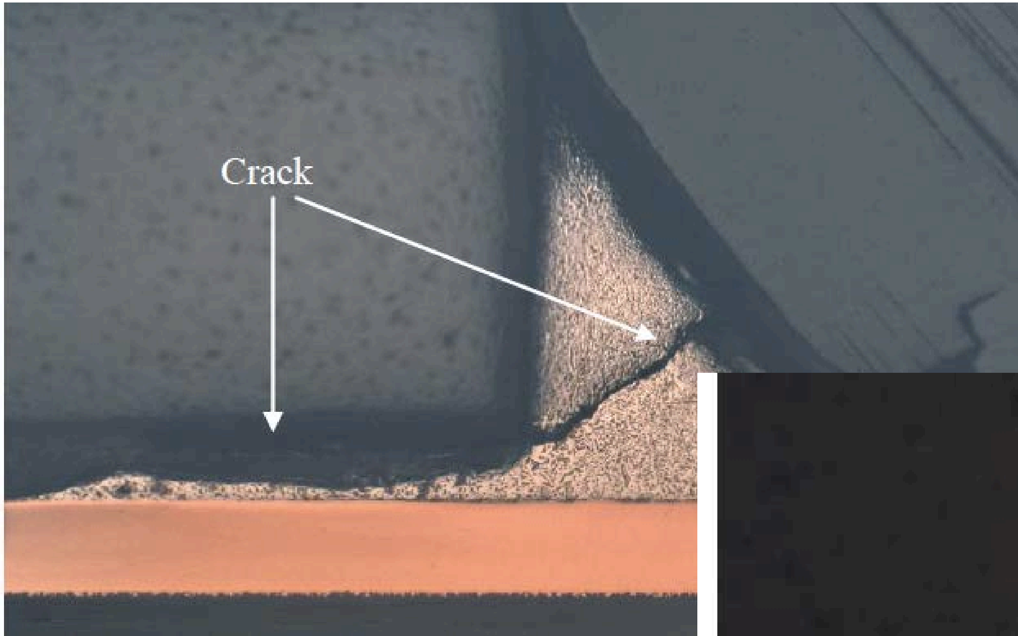
Minimum of 5 parts assembled by assembly configuration

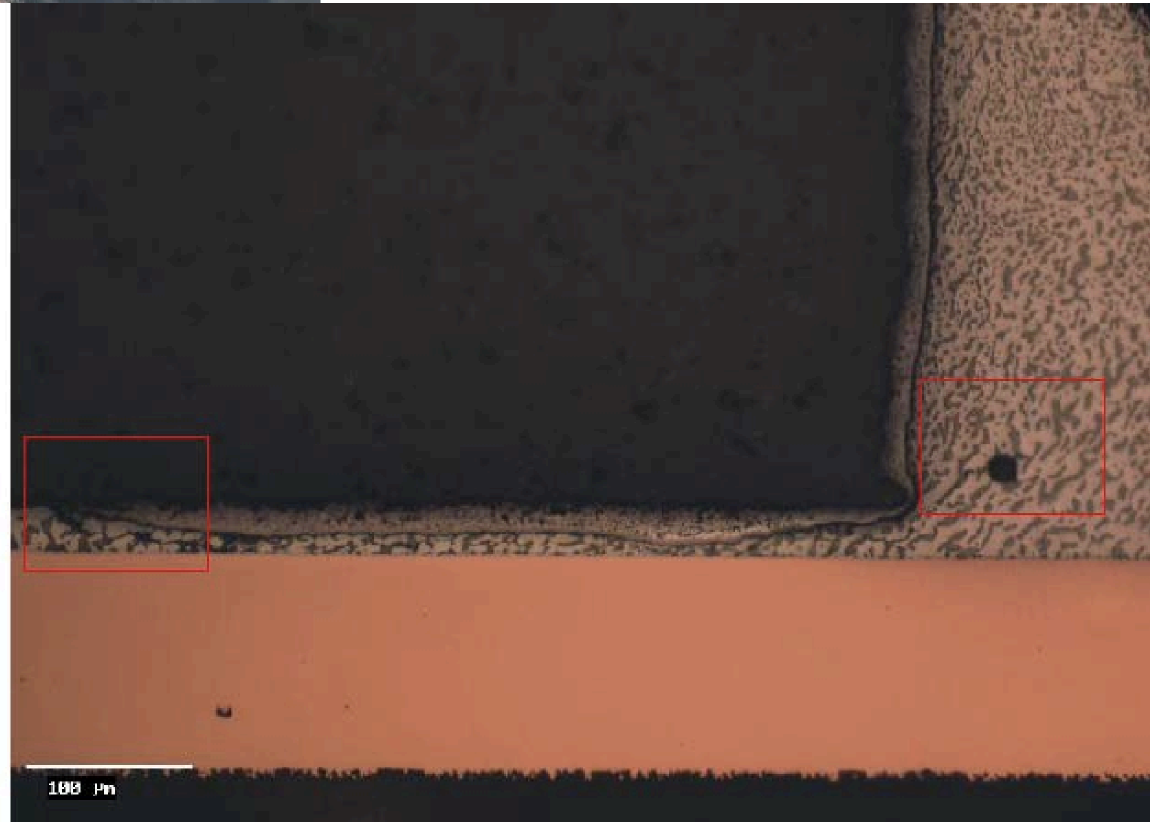
Minimum of 5 parts assembled to be microsectioned.

Most of the Resistors above R1206 fail actual verification due to excessive cracks in the solder joints

Most of LCCs (LCC3, LCC6,...) fail actual verification due to excessive cracks in the solder joints

R2512 and R2010 crack in solder joint





Sensitive parts assembly

- Listing in the PID, of each assembly company, of parts for which cracks have been identified in the critical area such that parts are considered as sensitive parts.

- Verification of assembly of sensitive parts every 4 years to ensure reliability of the assembly

Clarification of number of parts to be verification tested

- For Non sensitive parts a minimum of 3 parts by assembly configuration shall be assembled
    - Repair shall be demonstrated on the hand soldering configuration
    - 1 part by assembly configuration to be microsectioned

- For sensitive parts a minimum of 5 parts by assembly configuration shall be microsectioned
    - Repair shall be demonstrated on the hand soldering configuration
    - Minimum of 5 parts to be microsectioned by assembly configuration

Introduction of electrical monitoring for parts other than Area Array Device

- Exclude verification of assembly of the chip capacitors and SMDx package

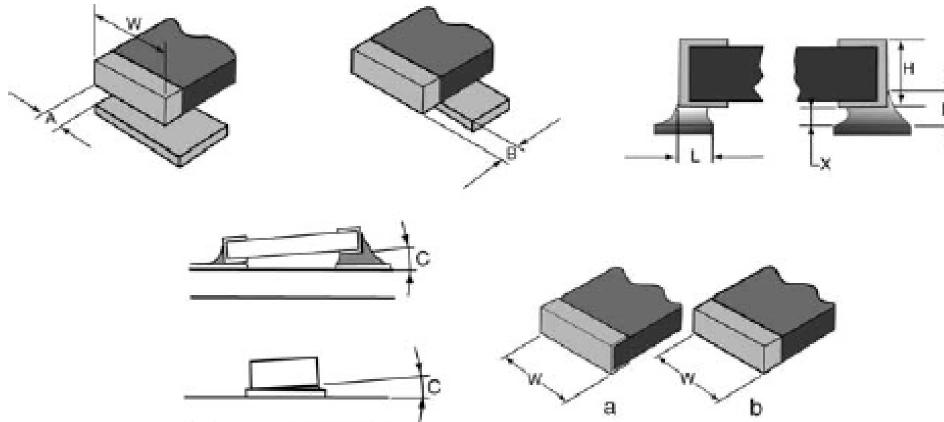
- Minimum of 32 parts to be assembled and tested by assembly configuration.

- In addition microsection at T0 after assembly
  - Non sensitive parts: 1 part to be assembled and microsectioned
  - Sensitive parts: 5 parts to be assembled and 3 to be microsectioned

- 1500 thermal cycles under electrical monitoring on the 32 parts

- A drift of less than 10 % of resistance shall be accepted when the electrical monitoring is performed and referenced to the first five cycles recorded

Modification of placement of parts on PCB



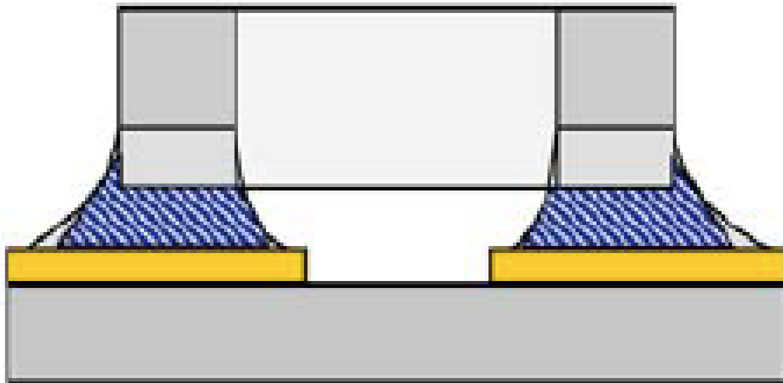
Parameter	Dimension	Dimension limits
Maximum side overhang	A	0,1 × W
End overhang	B	Not permitted
Minimum lap contact	L	~~0,13 mm~~75% single terminal length only 100% for sensitive device
Minimum fillet height	~~M~~E	X + 0,3 × H or X + 0,5 mm whichever is less
Solder Stand-off (elevation)	X	Present ~~up to 0,4 mm~~
Maximum tilt limit	C	10°
~~Minimum solder coverage of edges on terminal pad~~	-	~~75 %~~ ~~(see Annex E.1)~~

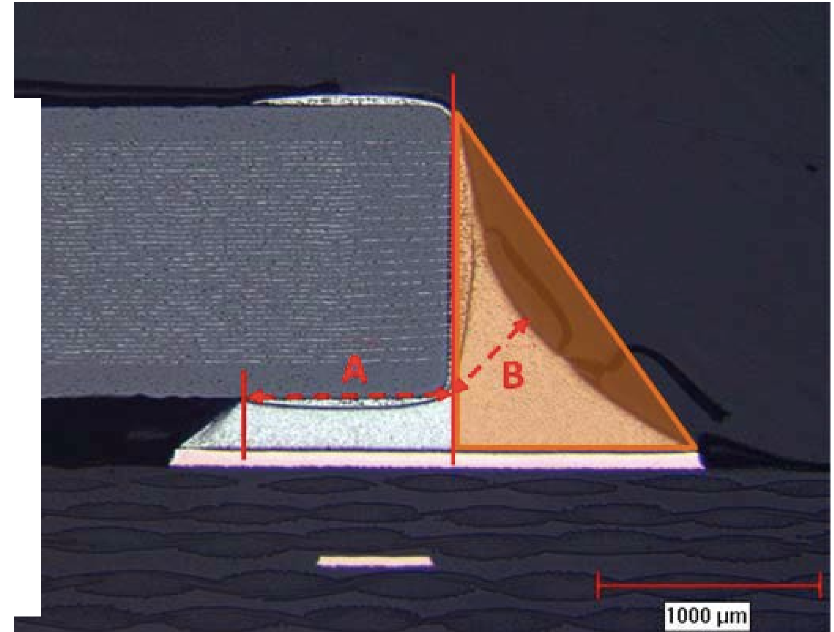
Change in pass/fail criteria for cracks in the solder joint

-Chip packages

Proposal

Actual





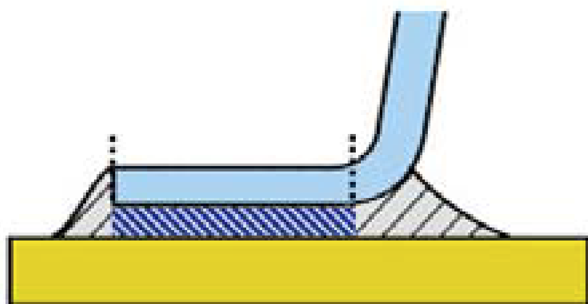
25% of critical area

Less than 60% of A+ B with max A

Change in pass/fail criteria for cracks in the solder joint

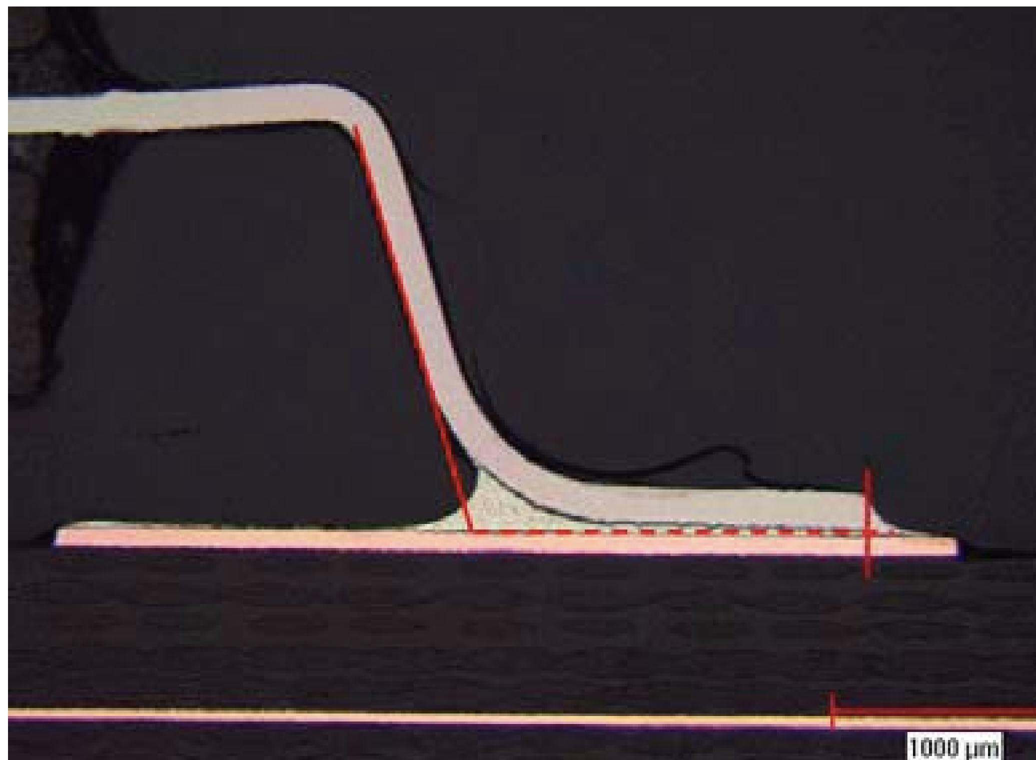
-Flat pack packages

Actual



Less than 25% of critical area

Proposal



Less than 33% of critical area
And for SOP
For long leads (more 5 mm)crack no longer than
50% of critical area when 5 parts are microsectioned

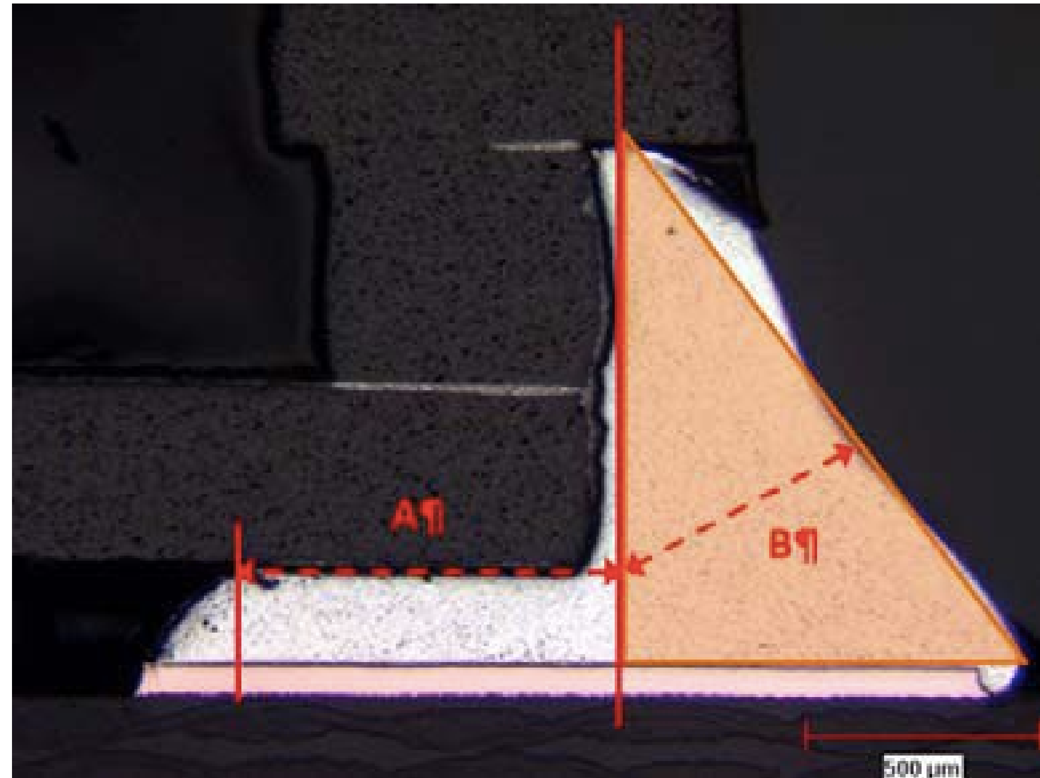
Change in pass/fail criteria for cracks in the solder joint

-LCCs

Actual

25% of critical area

Proposal

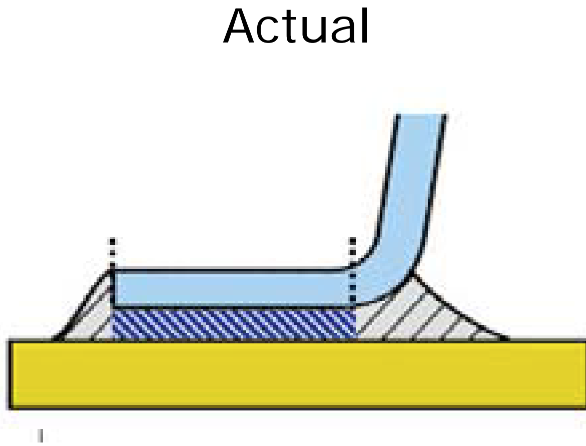


Crack length less than 60% of A+B and no crack in B area
OR
Crack less than A providing 100%coverage of castellation area with a convex solder joint.
Solder wetting length on the solder pad is more than castellation height

Change in pass/fail criteria for cracks in the solder joint

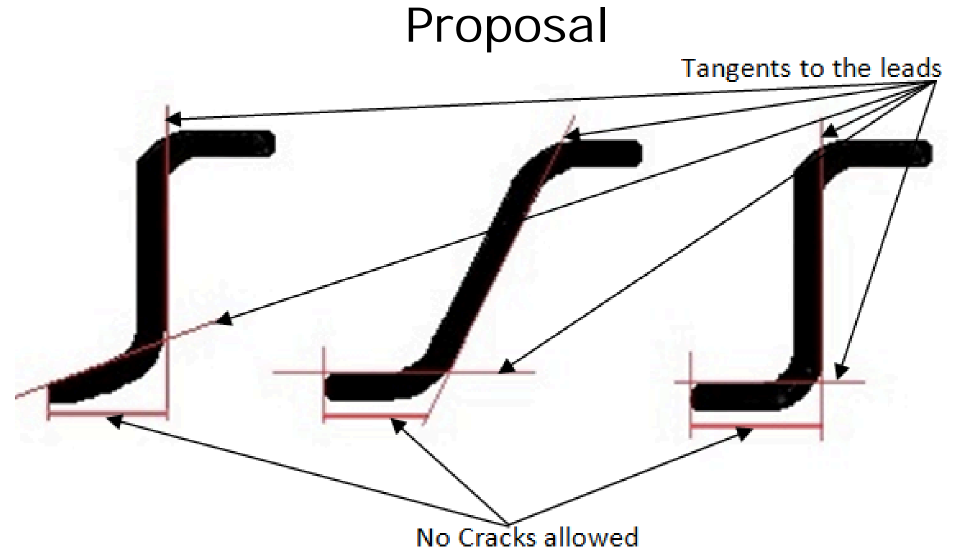
-Gull Wing such as TSOP

Actual



25% of critical area

Proposal



No cracks allowed

Modification of electrical monitoring for Area Array Devices

ESA memo TEC-QT/2009/1059/CV implemented in the standard with slight modification

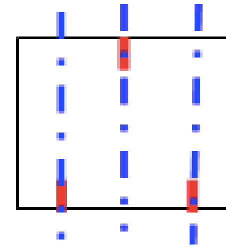
Actual	Proposal
500 thermal cycles with microsections and dye penetrant	Electrical monitoring until 1500 thermal cycles (-55/+100C)
Less than 25% of cracks of diameter of the terminal	Less than 10% resistance increase at during thermal cycles
Nominal assembly: 3 parts	nominal: 1 capability and 3 for verification
Repair: 1 part	Repair: 1 capability and 2 for verification

Integration of microsection guideline from ESA

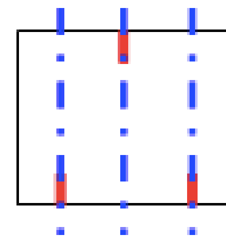
ESA memo guideline TEC-QT/2010/38/CV has been introduced in the new ECSS-Q-ST-70-38 Draft

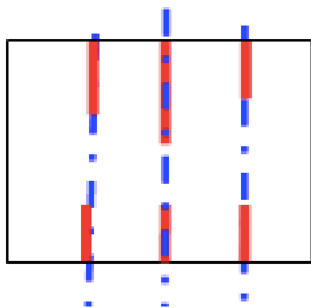
-LCCs:

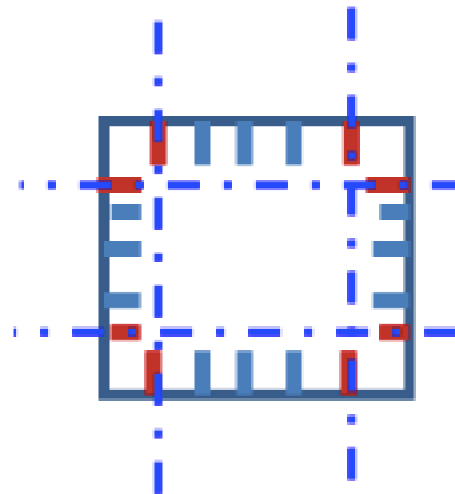
Without ground connection



With ground connection

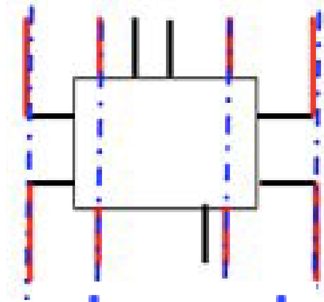




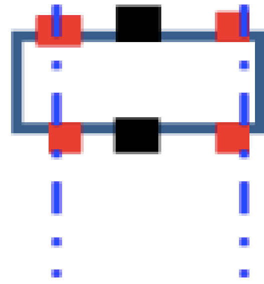


Integration of microsection guideline from ESA

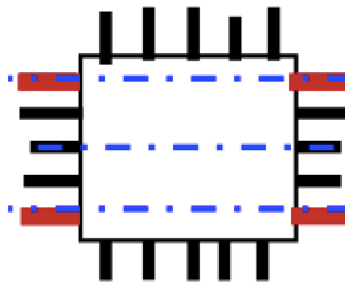
-FP with spider leads



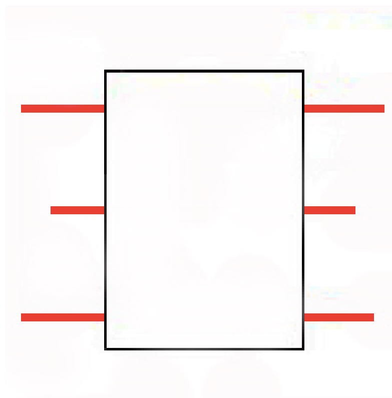
-chip network



-CQFP



-SOP



Microsection requirements

-inspection with magnification of 50 to 200 times except for part with low stand off for which magnification shall be 500 times

-Microsections to be performed by Recommended laboratories

- -Serma (in France)
- -Hytek (in Denmark)
- -ZVE (in Germany)
- -Tecnalia (in Spain)
- -Spur (in UK)
- -IIS (in Italy)

- In house microsectioning providing demonstration of the quality of the microsectioning

New Summary Tables template

-Type of the chip capacitors (type 1, type 2)

-Manufacturer of the device

-information such as lead thickness, lead width...

- BB, MB, TB

-lead materials

-Artificial stand off

-in house Degolding/ pretinning

-in house lead forming

Thank you for your attention