MEMO

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To	Companies having ESA Approved Summary Tables or under verification programme	**Copy**	PA Managers

Subject: Identified critical devices for the assembly as per ECSS-Q-ST-70-38 on PCB laminates

During the past years some failures on solder joints or in devices have been identified at the completion of the environmental testing performed in compliance with the ECSS-Q-ST-70-38C.

It is the intention of ESA to inform industry, when not already done in order to prevent the use of these devices or to identify possible corrective actions.

The list of devices is not exhaustive and some devices may be missing. In the future, this list will be updated every time new failures are documented.
The criticality has been identified when the failures in the solder joints and/or in the devices have been noticed in many occasions by different end users.
In many cases it has also be concluded that failures could occur to a process not compliant to the component manufacturer assembly recommendations. In these cases the component was not considered as critical. In general, these failures have been identified thanks to the improvement of the quality of the microsections requested by ESA in the last years as well as increase of number of microsectioned devices and terminals.

Some of the failures identified in the table may result to the large temperature range used during the thermal cycles and may not appear when the temperature range is reduced. Reduction of temperature range will result in an increase of number of cycles.

In addition to the failures listed in Table 1, a failure due to excessive conformal coating has also been identified.
It is recommended that conformal coating is used such that it does not negate the stress relief and does not fully encapsulate the devices. Indeed during thermal cycling the conformal coating is responsible to additional stress and may lead at some extend to cracks in the solder joints.
Once verification test in compliance with the ECSS-Q-ST-70-38C have been completed and are considered successful, the amount of conformal coating shall not be modified since otherwise the ESA Approval status will no more be valid.

Component	Package type	Type of failure	Recommendations and or notes
Chip Resistor	R1206, R2010, R2512	Cracks in the solder joint	- To increase the stand off. Such corrective action may not be sufficient.
Chip Capacitors	Any	Crack in the ceramic initiated at the end termination	- To follow component manufacturer recommendations (preheating of the board, device and limited temperature) - Rework of such capacitors shall not be performed. In case of rework needed replacement of the device is recommended.
	LCCs	Crack in the solder joint	-Degolding and preheating temperature used to be compliant to component manufacturer datasheet - To increase the stand off -To solder the device upside down and add gull wing terminations (need of verification in compliance with ECSS). Change of solder footprint is required. - To solder upside down and have long wiring implemented. - Not to consider any verification by similarity for such package.
Tantalum capacitors	CWR06	Crack in the device. Crack in the epoxy between the tantalum and the terminal.	- Use of TAJ/ CWR packages for which the temperature is not directly spread to the package.
	SMDs (SMD0.5, SMD1, SMD2, SMD5C)	Crack in the ceramic	-Procurement of package with terminations when possible which require a change of design of the solder footprint. - Assembly upside down using thermal adhesive and addition of wires or ribbons. This configuration may not be adapted for high thermal dissipation need.
Oscillator	JLCC4 with bottom brazed terminals	Crack in the solder joint	- Failure due to stiffness of the terminals combined with missing stress relief.
Stacked devices	SOP from 3D+	-Crack in the solder	-Procurement of devices with

		joint -Unacceptable per ECSS-Q-ST-70-38C solder height at heel when hand soldering -No possible visual inspection possible due to the shape of the terminals -Restrictive soldering temperature (reflow and Hand soldering)	shortened leads (around 3 mm instead of 5 mm)
Stacked capacitors	CNCXX	- poor wetting due to finish type 10 (Ag 98%) -poor co-planarity of the leads	- To pre-tin the device
Photo transistor	Pill from micropac	- Cracks in the solder joint of the two small terminals	- To degold and pretin at temperature compliant to the component manufacturer recommendations. - Not to solder the bottom part on the PCB but to make a wiring connection.
inductor	Coilcraft inductor AE235 type	Poor wetting of the terminals	-To request coilcraft for additional cleaning of the terminal to remove the contamination from the enamel present on the terminal.
	Enamel wire	Short due to damaged enamel	-Recommendation to add an insulation (kapton, brady label, filled varnish...) to avoid contact with metallic traces..

Table 1: List of identified critical devices for the assembly as per ECSS-Q-ST-70-38 on PCB laminates.