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MEMO

Date	05/12/2013	**Ref**	QT/2013/730/SH
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To	PCB manufacturers	**Copy**	PCB/SMT WG

Subject: Cleanliness requirements for PCB manufacturers

1 SCOPE

The scope of the present memo is to define best practices and recommendations on cleanliness for PCB manufacturers that are ESA qualified in accordance with ECSS-Q-ST-70-10.

The contamination control plan and the specific recommendations outlined in this memo will be a recurring agenda point for future visits and audits of PCB manufacturers.

2 BACKGROUND

PCBs have failed due to latent short circuits in various projects. The root cause for these failures has not been conclusively identified. However, it has been widely acknowledged that random contamination inside the dielectric PCB material is of high concern. Contamination can comprise of fibers in laminate or on prepreg layers and may originate from the PCB manufacturing processes or from the base material supply chain. The presence of fiber contamination is the suspected root cause for latent short circuits in PCBs.

Cleanliness of base materials has been addressed to the base material supply chain.

High resistance electrical test method has been specified [QT/2013/681/SH] as risk mitigation on PCBs.

3 CLEANLINESS CONTROL PROCEDURE

Following visits of ESA to PCB manufacturers with specific focus on cleanliness of process and the lay-up area, the following best practices have been formulated. PCB manufacturers that are ESA qualified in accordance with ECSS-Q-ST-70-10 are recommended to establish a cleanliness control procedure that includes the following:

1. Cleaning of
    a. prepreg sheets,
    b. etched innerlayers,
2. Success criteria and verification of the efficiency of cleaning, at least by inspection under UV and bright light;
3. Restriction of the use of materials (e.g. for separator sheets or transport trays) that charge statically and that may attract fibers;
4. Clean room practices in lay-up area.

4 CLEAN ROOM PRACTICES

It is recommended that clean room practices in lay-up area include the following:

General measures in room

a. Overpressure
b. Filtered air supply
c. Protective clothing (shoes, hat, coat, gloves) that do not release fibers
d. Prevention of sticky surfaces or cavities in furniture where fibers may collect
e. Monitoring of airborne contamination in room
f. General clean room class 100’000 or better

Local measures at lay-up area

g. Laminar flow bench for lay-up of PCBs
h. De-ionisation equipment at lay-up area
i. Local monitoring of particulate contamination in laminar flow bench
j. Local clean room class 1’000 or better under laminar flow bench

It is recommended that cleaning of prepreg sheets and etched inner layers is performed by using vacuum hovering. Use of roller or wipes is deemed less efficient but can provide an alternative.

It is recommended to locate the motor parts for any vacuum hovering outside of the room.

The possible use of particle counters should allow for the presence of prepreg dust.