

## Plexus Materials Specification # 5502

### OVERVIEW

Plexus Materials Specification #5502 states that all parts purchased must meet the requirements of RoHS Directive 2011/65/EU as amended by (EU) 2015/863. The assembly will be built using tin-lead materials exercising the application exemption granted in the directive Annex, point #7. All parts must meet the Maximum Concentration Limit (MCV's) listed below with the exception to allow the use of Pb for the second level solder attachment of component leads.

### PLEXUS CORP. RESPONSIBILITIES

It is the responsibility of Plexus Corp. to incorporate Plexus Materials Specification #5502 into all applicable Purchase Order specifications where RoHS applies with the exemption stated above and tin/lead solder balls are required on Area Array packages.

### SUPPLIER RESPONSIBILITIES

It is the responsibility of all Plexus suppliers to comply with the minimum requirements defined within this specification for all components / assembly materials purchased globally by Plexus under this specification. Any exceptions to this specification need to be approved in writing by Plexus Corp.

### BANNED SUBSTANCES

Plexus will require compliance to the European Directive 2011/65/EU as amended by (EU) 2015/863, titled "Restriction of the use of certain Hazardous Substances in Electronic Equipment" for control of **lead, cadmium, hexavalent chromium, mercury, polybrominated biphenyls (PBB), polybrominated diphenyl ethers (PBDE), bis(2-Ethylhexyl) phthalate (PBB), benzyl butyl phthalate (BBP), dibutyl phthalate (DBP) or diisobutyl phthalate (DIBP)**. This legislation restricts the sale of electrical and electronic equipment throughout the entire EU territory after July 1<sup>st</sup>, 2006.

The following Maximum Concentration Limits (MCV's) will apply.

<b>Lead (Pb)</b>	0.1 % by weight	=	1000 mg/kg	=	1000 ppm
<b>Mercury (Hg)</b>	0.1 % by weight	=	1000 mg/kg	=	1000 ppm
<b>Cadmium (Cd)</b>	0.01 % by weight	=	100 mg/kg	=	100 ppm
<b>Chromium VI (Cr VI)</b>	0.1 % by weight	=	1000 mg/kg	=	1000 ppm
<b>Polybrominated Biphenyls (PBB)</b>	0.1 % by weight	=	1000 mg/kg	=	1000 ppm
<b>Polybrominated Diphenyls (PBDE)</b>	0.1 % by weight	=	1000 mg/kg	=	1000 ppm
<b>Bis(2-Ethylhexyl) phthalate (DEHP)</b>	0.1 % by weight	=	1000 mg/kg	=	1000 ppm
<b>Benzyl butyl phthalate (BBP)</b>	0.1 % by weight	=	1000 mg/kg	=	1000 ppm
<b>Dibutyl phthalate (DBP)</b>	0.1 % by weight	=	1000 mg/kg	=	1000 ppm
<b>Diisobutyl phthalate (DIBP)</b>	0.1 % by weight	=	1000 mg/kg	=	1000 ppm

These limit values will apply to each "homogenous material" within a component. "Homogenous Material" is defined as "a material that can not be mechanically disjointed into other materials". At a minimum, the requirement for the measurement of MCV's within a component must flow down to the source of the homogenous material and the data records of such must be retained by the source of the homogenous material for a minimum of four years after the sale of the product.

**Plexus Materials Specification # 5502**

**IDENTIFICATION FOR ALL PURCHASED ITEMS**

- All components / assembly materials should have the outer packaging boxes and inner package material (e.g. tray, tube, reel, jars, syringes, cartridges, etc.) marked indicating that the components / assembly materials are lead-free/RoHS compliant. This marking should also appear on the component package where room allows for such a marking. Also, components / assembly materials shall be marked per IPC 1066, "Marking, Symbols and Labels for Identification of Lead-Free and Other Reportable Materials in Lead-Free Assemblies, Components and Devices".
- All lead-free/RoHS compliant components / assembly materials should have a unique supplier part number assigned to allow easy identification and segregation from non-compliant components. Suffix or prefix additions to existing part number schemes are acceptable.

**PROCESSING REQUIREMENTS FOR SOLDERED COMPONENTS**

As RoHS compliance includes process and reliability requirements for component / assembly materials the following requirements must be followed for all RoHS compliant soldered components:

Logistics

- Changes to existing parts to incorporate lead-free/RoHS compliance should be published to Plexus per JESD46-B. Any component changes related to environmental compliance, the manufacturing process or second level interconnect (final assembly of printed circuit board assembly) compatibility are to be considered a major change.
- Product discontinuances of existing parts should be published to Plexus per JESD48-A.
- All manufacturers who provide notification that they will be producing lead-free/RoHS compliant products should provide a product roadmap to their customers indicating the planned changes and implementation timetable. Availability and life cycle information for both current and lead-free/RoHS compliant products should be specified.
- Sample devices and qualification data should be available to customers prior to the release of the PCN or introduction of the new product.

Compatibility & Testing

- Second level termination interconnect compatibility:
  - a) It is the supplier's responsibility to ensure that all Area Array packages only contain tin/lead solder balls.
  - b) It is the supplier's responsibility to ensure that all other components supplied to Plexus are compatible with tin/lead solder processes.
- Handling, packing, shipping and use executed per IPC J-STD-033 @ the current revision.
- Pass solderability testing per IPC/EIA J-STD-002 @ the current revision. Both no-clean and aqueous clean solder paste and wave solder flux should be included. Solder joint reliability testing (per IPC-A-9701) for SnPb alloy solder pastes.
- Mechanical shock and vibration (per AEC-Q100-Rev E/Mil-Std 883).
- High temperature storage (per AEC-Q100-Rev E/JESD22-A103-A).
- Tin whisker growth (Reference current revision of JP002 and JESD201).
- MSL testing for non-hermetic Solid State Surface Mount Devices:
  - a) Component moisture sensitivity levels (MSL) should not exceed the current levels. Wherever possible, testing should include old vs. new part comparisons. MSL testing should follow IPC/JEDEC J-STD-020 @ the current revision, with the exception that 6 heat cycles for area array packages and 4 heat cycles for other components should be included in pre-conditioning. *(The 6 heat cycle requirement reflects the maximum heat cycles an area array package should encounter)*
  - b) *All Components shall be capable of withstanding at least one rework cycle per J-STD-020 @ the current revision.*

**Plexus Materials Specification # 5502**

Identification for soldered components

- Device datasheets should clearly indicate the termination metallization, maximum component temperature rating, recommended & absolute reflow profile limits, and the moisture sensitivity rating. If this information is not present on the datasheet, a clear reference stating where it is located should be included.
- Plexus supports the efforts of industry associations and consortia working to provide globally accepted standards for labeling or marking of products. All products that use solder to attach the device/component shall be marked per IPC 1066, "Marking, Symbols and Labels for Identification of Lead-Free and Other Reportable Materials in Lead-Free Assemblies, Components and Devices".

**CERTIFICATION REQUIREMENTS TO PLEXUS**

Basic Certification requirements:

Date, company name, part name, part number, mfg, mfg PN, identification of the maximum assembly process temperature, a statement of compliance to the European Directive 2011/65/EU as amended by (EU) 2015/863. Acceptable CoC language is 2011/65/EU or 2011/65/EU as amended by (EU) 2015/863. All CoCs referencing 2011/65/EU alone will be interpreted by Plexus as being compliant to the amendment of (EU) 2015/863. A signature (may be electronic) and title of authorized certifier, indication whether the mfg part number has a discrete RoHS compliant mfg part number and is RoHS compliant by definition. Acceptable date/lot codes or date/lot code range if not a discrete RoHS compliant mfg part number must be included. It is preferred the supplier also list all the homogenous materials containing the six banned substances with the substance/material ppm or % of each material by weight for each of the 10 substances listed above. If a part is compliant because of an exemption cited in the EU RoHS Directive at the time of the shipment, the supplier must identify the exemption.

Frequency of certification from Supplier to Plexus Corp. will vary as follows:

Every shipment – A certification is required if the mfg part number is not RoHS discrete (compliance tracked only by date code, lot code, labeling and /or marking) and the mfg has produced RoHS non-compliant parts under this part number inside of 1 year, or the mfg is currently producing both RoHS compliant and non-compliant parts purchased under the same mfg part number. The certification shall include the PO number and quantity in addition to the Basic Certification requirements.

Upon request – A certification is required to be submitted to Plexus within 7 days and must include the maximum concentration values of the 10 RoHS restricted substances for each homogenous material within the product by listing the substance/material ppm or percentage in addition to the Basic Certification requirements.

The supplier is responsible for using applicable 3<sup>rd</sup> party testing to obtain the MCV's for substances when internal testing is not sufficient, the validity of a sub-tier supplier's declaration is uncertain or a claim exists that disputes the existing data. The supplier must have the data available or the certification retained for a minimum of 4 years after the sale of product.