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Revision History	
<i>*See Agile for Approvers and Approval Dates*</i>	
Rev.	Description of Change
-	Initial Release
A	Update to title, table 2 and 3
B	Deleted Table 4, added link for EU REACH Candidate List of substances of very high concern for Authorisation. Adding Cobalt to 10.0 Conflict Minerals. Renumbering adjustments.
C	Add US TSCA restrictions to Additional restricted substances - Table 2
D	Add IMDS definition at section 6 and requirements section 8.6., add links to IMDS to Appendix 3.

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1.0 General Purpose

Legislation regulating the Use of certain Substances in electrical and electronic equipment is in effect in multiple jurisdictions around the world, with additional legislation emerging on a regular basis. MACOM is committed to complying with this legislation. In order to be successful in this commitment, it is imperative that our suppliers are also committed to supporting our efforts.

This document establishes the criteria under which MACOM will ensure compliance with regulations concerning the Use and reporting of certain Substances relevant to its products.

This document does not negate nor in any way supersede International laws and regulations or industry standards. In the event of a conflict between the requirements stated in this document or any other MACOM documents, with any piece of legislation, the more restrictive of the requirements shall take precedence. Any ambiguity should be discussed and agreed in writing by MACOM.

2.0 Environmental Commitment

In addition to maintaining our Environmental Compliance System, this document will help MACOM to reach its overall environmental commitment. This includes:

- Avoid the Use of components or materials which may present a threat to the environment or human health during production, Use or via disposal waste at the end of our products' lifecycle.
- Comply with laws in markets that restrict or require disclosure of the presence of certain chemical Substances in our products.
- Minimize the adverse impact of our products on the environment.
- Minimize pollution during normal Use of our products.

3.0 Scope

The requirements of this specification apply to any new or current components or materials supplied to MACOM, including packing material Used to transport or store the products. This specification also applies to variations made to said components or materials which may have been previously supplied to MACOM. Unless otherwise stated, these policies and procedures are applicable to Suppliers to MACOM and its subsidiaries. The contents of this specification are based upon current conditions and are subject to change.

4.0 Supplier Responsibility

The Supplier is responsible for compliance with any and all pertinent legal requirements for all operations coordinated and materials or components specified or manufactured by the supplier. It is also the responsibility of the supplier to assure compliance with this specification for any subcontracted operations coordinated by the supplier and any materials or components specified by the supplier.

Supplier shall collaborate with MACOM in matters concerning compliance with all applicable international, national, state/provincial environmental laws and regulations, and shall provide all information and support required by MACOM.

MACOM requires its suppliers to maintain sufficient documentation regarding its products and packing materials to support all communications of their compliance status. Supplier must retain this documentation for a minimum of 5 years after the products have been supplied to MACOM.

Supplier compliance documentation must demonstrate the specific actions taken by the supplier to verify compliance. This include the specific actions taken by the supplier to ensure that its supply chain is compliant. This documentation must be kept on file by the supplier and made available to MACOM on request.

The required documentation can take the form of the following: Process Flows, Cross Contamination Controls, direct and indirect materials information pertinent to compliance, chemical approval and Use records and all pertinent certification documents including ISO certifications and customer certifications.

Please provide all requested data within 10 business days of request. Please note that you may receive ongoing requests for information as MACOM introduces new parts or products, and for information updates to ensure that your declarations continue to comply with current regulations.

As always, Suppliers are required to notify MACOM of any process, material or substance change to the item, implemented by the supplier. This change will require a resubmission of another full material disclosure that accurately reflects the new chemical and substance make-up of the product that they supply MACOM or its sub-contractors.

5.0 Supporting Documentation

- Purchase Order terms and Conditions
- Supplier Quality Manual ECP-QM-1000
- New vendor approval process – QP-236
- Quality supplier survey – QAF-391
- Sub-Contractor FAR process – QP-245
- Conflict Minerals Management System – CSR-1001

6.0 Terms and Definitions

Restricted Substance: Substance that is not permitted in materials supplied to MACOM above the stipulated threshold. Suppliers are required to provide evidence that the materials provided to MACOM meet these requirements

Reportable Substances: Substances which should be reported to MACOM if they exist in the material supplied to MACOM above the stipulated threshold.

Homogeneous material: A material that cannot be mechanically disjointed into different materials.

- The term “homogeneous” means “of uniform composition throughout.” Examples of “homogeneous materials” are individual types of plastics, ceramics, glass, metals, alloys, paper, board, resins and coatings.
- The term “mechanically disjointed” means that the materials can, in principle, be separated by mechanical actions such as: unscrewing, cutting, crushing, grinding and abrasive processes.

Intentionally added: Deliberately Used in the formulation of a product where its continued presence is desired to provide a specific characteristic, appearance, property, attribute or quality.

Material: A material is made up of one or more Substances (e.g., an alloy is a material, which in turn is made up of a Number of Substances).

Nanomaterial - Definition is based on the European Commission Recommendation (2011/696/EU):

A natural, incidental or manufactured material containing particles, in an unbound state or as an aggregate or as an agglomerate and where, for 50% or more of the particles in the number size distribution, one or more external dimensions is in the size range 1 nm-100 nm. In specific cases and where warranted by concerns for the

environment, health, safety or competitiveness, the number size distribution threshold of 50% may be replaced by a threshold between 1 and 50%. By derogation from the above, fullerenes, graphene flakes and single wall carbon nanotubes with one or more external dimensions below 1 nm should be considered as nanomaterials.

Article: An object which during production is given a special shape, surface or design which determines its function to a greater degree than its chemical composition.

Substance: A chemical element or compound e.g., lead (a chemical element), lead oxide (a compound), polyvinyl chloride (a compound). Registry Numbers (RN) of the Chemical Abstracts System of the American Chemical Society ("CAS" Numbers) and/or European Chemical ("EC" Numbers) are attributed to all chemical elements and most of their compounds and should be Used for their identification. CAS Numbers and EC Numbers should be provided by the supplier when making a materials declaration.

Threshold level: The concentration level that defines the limit at or above which the presence of a substance in a product shall be declared based on the requirements of legislation or any other relevant requirement stated in this document.

Numerical threshold levels are provided in weight % (and parts per million, or ppm). The conversion to be Used to calculate ppm is 0.1 % = 1 000 ppm.

CAS Number: CAS Registry Numbers are unique numerical identifiers assigned by the "Chemical Abstracts Service" to every chemical described in the open scientific literature. The Registry maintained by CAS is an authoritative collection of disclosed chemical substance information.

Material declaration: A full disclosure list of all homogeneous materials and Substances contained with the item. It includes the chemical name, CAS Numbers, and weights/PPMs/percentage.

Full disclosure: The declaration of 100% of the composition of a subcomponents mass or of a raw material

Certificate of Conformance: Signed document stating supplier compliance to regulations where full disclosure is not possible.

Packaging Materials: Materials Used to assemble MACOM product into the final package for Use in a customer application. Examples of packaging materials include mould compounds, die attach epoxies, laminate substrates, Lead frames, plating materials, etc.

Packing materials: Material Used to protect electronic items from mechanical, environmental and electrical damage during transportation or storage. Packing material is discarded prior to the incorporation of the item into its end application. Examples;

- Labels hung directly on or attached to the product
- Sticky labels attached to another packing material
- Staples
- Bags (moisture barrier, ESD, etc)
- Packing reels (inserts and carrier tape)
- Desiccants
- Humidity indicating cards (HICs)
- Cushioning material (Bubble wrap, Styrofoam, packing peanuts, etc)

IMDS: International Material Data System is a global data repository that contains information on materials used by the automotive industry. Manufacturers of components and materials create IMDS data (MDSs (Material Data Sheet). All materials used for automobile are controlled by these datasheets. The usage of the browser based IMDS is free. Please refer for details to the IMDS homepage (<http://www.mdssystem.com>).

7.0 Relevant Legislation

The supplier shall comply with all relevant legislation plus amendments in force at an international, national and state/provincial level in particular in view of the obligation of the supplier to provide information on the chemical Substances constituting or contained in products sold or otherwise transferred to MACOM.

Any emerging legislation in MACOM markets as identified by MACOM Corporation will also apply. Detailed requirements for all MACOM Suppliers can be found in the Tables and Appendix of this document. Such international, national and state/provincial laws, regulations and implementations include, but are not limited to;

- EU: Restriction of Hazardous Substances (RoHS) Directive 2011/65/EU & 2015/863/EU
- EU: Registration, Evaluation, Authorization and Restriction of Chemicals (REACH) EC 1907/2006,
- EU: EC 1005/2009 on Substances that deplete the ozone layer
- EU: Regulation No. 842/2006 on certain Fluorinated Greenhouse Gases
- EU: Persistent Organic Pollutants (EC/850/2004)
- EU: 2009/425/EC, Restrictions on marketing and Use of organostannic compounds
- EU: Commission Decision 2009/251/EC on Dimethylfumarate (DMF)
- EU: Directive 94/62/EC on Packaging and Packaging Waste amended with 2004/12/EC
- California (USA): Proposition 65, Safe Drinking Water and Toxic Enforcement Act of 1986,
- Canada: Prohibition of certain toxic Substances Regulations, 2012 SOR2012-285
- Canada: Environmental Protection Act SOR/2008/178
- Norway: Norway Product Regulations FOR-2004- 06-01-922
- Switzerland: Swiss Ordinance on the reduction of Risk from Chemical Products
- China: Administrative Measures for the restriction of the Use of hazardous Substances in electrical and electronic products (RoHS2), MIIT Order 32, 2016.
- Japan: Chemical Substances Control Law (CSCL), Law No. 117 of 1973,
- South Korea: Resource Recycling of Electrical and Electronic Equipment and Vehicles, Act No. 8405, 2007,
- Vietnam: Hazardous Substances in Electrical and Electronic Equipment, Circular No. 30/2011/TT-BCT,
- Turkey: Restriction on Use of Certain Hazardous Substances (RoHS) in Electrical and Electronic Equipment, Regulations, May 2008,
- India: E-waste (Management and Handling) Rules, Statutory Order 1035 (E), May 2011,
- International Standards for Phytosanitary Measures No. 15, ISPM – 15
- USA: Toxic Substance Control Act, 2021 Amendment Section 6(h)
- Montreal Protocol, 1987
- Rotterdam Convention, 1998
- Stockholm Convention, 2001

8.0 Demonstrating Compliance

8.1 Restricted and Reportable Substances

- Product & Packaging materials must be compliant with the substance restrictions in Table 1 & 2.
- Packing material must be compliance with the substance restrictions in Table 3.
- Supplier must report to MACOM if any product, packaging or packing materials containing EU REACH Reportable Substances in section 9.4.
- Supplier must report to MACOM if any product or packaging materials contains Substances from Table 5.

8.2 Documentation required by MACOM

Supplier must provide the following documentation for all components, packaging and packing material supplied;

- Material Declaration Form (MDF). Example of required format in Appendix 2.
 - Weight of the part/material
 - Chemical composition/% content of each CAS Numbered item
 - Surface finish detail
 - Relevant EU RoHS exemption
- Certificates of Conformance (CoC) for any trade secret items for EU RoHS and EU REACH
- SGS or other third party certification of material content is required to be provided by the supplier. See Appendix 1.

Suppliers are required to;

- Have a Conflict Minerals Program in place.
- Provide a Conflict Minerals Report in EICC-GeSI format annually
 - Use the most up to date template
 - Must fill out the template fully and correctly
 - Must list **ALL** smelters in their supply chain, including addresses & contact details.
- Ensure that all smelters in its supply chain engage with the Conflict Free Sourcing Initiative or other relevant bodies and smelters submit to an appropriate audit.

Compliance and Conflict Minerals information and reference material contained in Appendix 3.

8.3 Compliance Evaluation

All compliance documents will be reviewed. Any documents determined to be unacceptable will be identified and non-compliance issues will be raised with the supplier for resolution.

8.4 Deviations and Non Compliance

In the event that the material or component being supplied to MACOM does not meet one or more of the requirements of this specification, before or after the product has been delivered, the Supplier must notify MACOM so that joint action plans can be defined. This notification also applies if the supplier or a subcontractor(s) makes changes in their operations that will cause a material, component, assembly or product to no longer comply with this specification.

8.5 Audit

MACOM reserves the right to conduct audits and assessments of supplier's product information, hazardous substance management systems, documentation and facilities. Any issues arising from such audits will be addressed with the Supplier

8.6 IMDS

For Automotive parts it may be required for supplier, subcontractors and their vendors to submit material compliance data via IMDS system to MACOM. **MACOM IMDS ID: 227974**

IMDS is web based. Suppliers are responsible for creating their own account and complete training with third party IMDS certified trainer. Refer to <https://public.mdsystem.com/en/web/imds-public-pages/imds-training-courses>

9.0 Substances Restricted and Reportable

9.1 EU ROHS Directive – Substance Restrictions

Products, components and packaging materials supplied to MACOM must not contain the following Substances in excess of the threshold levels indicated. Maximum concentration values apply to each homogeneous material, rather than part or product itself. Suppliers must comply with all requirements relevant to the EU RoHS Directive, including incoming quality control, process management, and finished product inspections to ensure that products shipped to and for MACOM meet the requirements.

All suppliers must comply with and provide details of specific exemptions used in all products supplied to MACOM. Annex III of the RoHS Directive contains details of these exemptions. Certain products specific to military and space application are not in scope for this restriction.

RoHS Restricted Substances	CAS Number	Typical Use	Regulations	Threshold
Cadmium (Cd) and cadmium compounds	Group	plating, pigments	EU 2011/65/EC	100ppm
Hexavalent chromium (Cr6+) – All forms	Group	conversion coatings, leather tanning	EU 2011/65/EC	1000ppm
Lead (Pb) and lead compounds	Group	various	EU 2011/65/EC	1000ppm
Mercury (Hg) and mercury compounds	Group	various	EU 2011/65/EC	1000ppm
Polybrominated Biphenyls (PBBs)	Group	various	EU 2011/65/EC	1000ppm
Polybrominated Diphenyl Ethers (PBDEs)	Group	various	EU 2011/65/EC	1000ppm

Title: MACOM Banned and Restricted Substances

Bis(2-Ethylhexyl) phthalate (DEHP)	117-81-7	Plasticizer	EU 2015/863/EC	1000ppm
Benzyl butyl phthalate (BBP)	85-68-7	Plasticizer	EU 2015/863/EC	1000ppm

RoHS Restricted Substances	CAS Number	Typical Use	Regulations	Threshold
Dibutyl phthalate (DBP)	84-74-2	Plasticizer	EU 2015/863/EC	1000ppm
Diisobutyl phthalate (DIBP)	84-69-5	Plasticizer	EU 2015/863/EC	1000ppm

Table 1: EU RoHS Directive: Substance Restriction

9.2 Additional Restricted Substances

Products, components and packaging materials supplied to MACOM must not contain the following Substances in excess of the threshold levels indicated.

Additional Restricted Substances	CAS Number	Typical Use	Regulation	Threshold
All Chlorofluorocarbons (CFC's)	Group	Solvents, refrigerants, propellants	EC/2037/2000 EPA ODP Class 1	0
All Halons	Group	Fire extinguishers	EEC/ 594/91	0
All Hydrobromofluorocarbons (HBFC's)	Group	Refrigerant	2009/1005/EU	0
All Hydrochlorofluorocarbons (HCFC's)	Group	Refrigerant	2009/1005/EU	0
All Hydrofluorocarbons (HFC's)	Group	Refrigerant	2009/1005/EU	0
All Fluorinated Greenhouse Gases (PFC, SF6, HFC)	Group	Refrigerant	EC/2006/842	0
Perfluorooctane sulfonic acid & derivatives (PFOS)	Group	Surface coating, surfactant	EC/850/2004	1000ppm
Perfluorooctanoic acid and its salts (PFOA)	335-67-1 3825-26-1 335-95-5 2395-00-8 335-93-3 335-66-0 376-27-2 3108-24-5	Electronics, adhesives, semiconductors, photographic coatings**	EU/2017/1000	25ppb**
Short Chain Chlorinated Paraffins (C10-C13)	Group	Plasticizer for PVC, flame retardant	EU 850/2004	0
Hexabromocyclododecane (HBCDD) and all major diastereoisomers	Group	Flame retardant	EEC/ 594/91	0
Polychlorinated Biphenyls (PCBs)	Group	Electrical insulation fluid, softening agent	REACH 1907/2006 Annex XVII	0

Table 2: MACOM additional Restricted Substance

Title: MACOM Banned and Restricted Substances

Additional Restricted Substances	CAS Number	Typical Use	Regulation	Threshold
Polychlorinated Naphthalenes (PCNs)	Group	Lubricant, paint, stabilizer, insulator, flame retardant	Japan Chemical Substances Control Law	0
All Polychlorinated Terphenyls (PCT)	Group	Insulation fluid impregnation, agent, softening agent, softening agent	REACH 1907/2006 Annex XVII	0
Dimethyl Fumarate (DMF)	624-49-7	Biocide, Mold inhibitor	2009/251/EC	0
Asbestos	Group	Insulator, filler, pigment, paint	REACH 1907/2006 Annex XVII	0
Radioactive Substances	Group	Optical properties, measuring devices, gauges, detectors	Radioactive Substances	0
Tri-substituted organostannic compounds	Group	Electrical insulation medium, plasticizers, flame retardant, dielectric sealant, coating for electrical wire	REACH 1907/2006 Annex XVII	0
Dibutyltin (DBT) compounds	Group	Stabilizer for PVC, curing catalyst for silicone resin and urethane resin	REACH 1907/2006 Annex XVII	0
Azocolourants and azodyes which form certain aromatic amines	Group	Textiles and Leather	REACH 1907/2006 Annex XVII	0
Creosotes	8001-58-9	Wood preservative, waterproofing agent, anti-fouling agent, lubricant, animal repellent, insecticide, animal dip, fungicide; component of roofing pitch, fuel oil; distillation product of coal tar, product of incomplete coal combustion	REACH 1907/2006 Annex XVII	0

Table 2: MACOM additional Restricted Substance

** See details of Perfluorooctanoic acid (PFOA) restriction and exceptions in Section 9.8.

Note: All CAS Numbers relevant to the above Groups of Substances can be found at <http://std.iec.ch/iec62474/iec62474.nsf/index> under Reference Substances

Title: MACOM Banned and Restricted Substances

Additional Restricted Substances	CAS Number	Typical Use	Regulation	Threshold
Decabromodiphenyl ether (DecaBDE)	1163-19-5	Thin flame retarded plastics such as heat shrink and nylon connectors	US TSCA Section 6(h) 2021	0
Phenol, isopropylated phosphate (3:1) (PIP (3:1))	68937-41-7	Flame retarded PVC, polyurethane foam, and BPA epoxies, Polyurea flame retarded lubricant (allowed)	US TSCA Section 6(h) 2021	0
2,4,6-Tris(tert-butyl)phenol (2,4,6-TTBP)	732-26-3	Lubricants	US TSCA Section 6(h) 2021	0.3% in chemicals only
Hexachlorobutadiene (HCBD)	87-68-3	Low Risk in articles, Intermediate of an intermediate (solvent of chlorine).	US TSCA Section 6(h) 2021	0
Pentachlorothiophenol (PCTP)	133-49-3	Vulcanizer, Butadiene or isoprene rubbers	US TSCA Section 6(h) 2021	1000ppm

Table 2: MACOM additional Restricted Substance

9.3 Packing Materials – Restricted Substances

Suppliers are required to comply with the EU Packaging Directive 94/62/EC and any subsequent amendments. This applies to all packing materials (paper, plastic, wood, etc). The maximum threshold levels can be seen below.

Relevant to;

- Primary
 - Product packaging, such as Tape and Reel
- Secondary
 - Grouped packaging, such as pizza box
- Tertiary
 - Transport packaging, such as pallet or shrink warp
- Paper & Labels
 - Packaging labels, insert materials, cushioning materials

Substances in Packaging and Paper Products	CAS Number	Typical Use	Regulation	Threshold
Sum of concentration levels of: - Lead - Cadmium - Mercury - Hexavalent Chromium	7439-92-1 7440-43-9 7439-97-6 18540-29-9	Paper, packaging materials	94/62/EC	100ppm Total for all 4 metals combined
Arsenic / Arsenic compound	Group	As wood preservative.	EU Directive 2003/2/EC	0
Formaldehyde	50-00-0	Preservative in wood panels	Lithuanian Hygiene Norm HN 96:2000 (Hygiene standards and regulations); Austria - BGB I 1990/194: Formaldehydverordnung, §2, 12/2/1990	0.0075 mass %

Table 3: EU Packaging Directive: Restricted Substances

ISPM 15 Requirements

ISPM affects all wood packaging materials (pallets, crates, etc) requiring that they be debarked and then heat treated or fumigated with methyl bromide and stamped or branded with a mark of compliance. Products exempt from ISPM 15 are made from alternative materials like paper, plastic or wood panel products (OSB, hardboard and plywood, etc)

9.4 EU Reach Regulation – Reportable Substances

For Substances at or above the threshold levels, suppliers must provide MACOM with information on the presence of the following substance in components, packaging or packing material. Suppliers are required to provide updated information every 6 months with each new listing published by the European Chemicals Agency.

EU REACH Candidate List of substances of very high concern for Authorisation (SVHCs) can be found on the bellow link:

- <http://echa.europa.eu/candidate-list-table>

The screenshot shows the ECHA website interface. At the top, there is a navigation bar with the ECHA logo and menu items: About Us, Contact, Jobs, and a search bar. Below this is a secondary navigation bar with categories: LEGISLATION, CONSULTATIONS, INFORMATION ON CHEMICALS (highlighted), and SUPPORT. The main content area is titled "Candidate List of substances of very high concern for Authorisation" and includes a note about its publication in accordance with Article 59(10) of the REACH Regulation. There are two "Notes" sections: one detailing authentic versions and numerical identifiers, and another detailing other numerical identifiers. A "FURTHER INFORMATION" sidebar on the right provides links to more information, data, and reasons for inclusion. Below the text is a "Filter the list" link and a table of results. The table shows one entry for Perfluorobutane sulfonic acid (PFBS) and its salts, with columns for Substance name, EC No., CAS No., Date of inclusion, Reason for inclusion, Decision, and IUCLID dataset.

Substance name	EC No.	CAS No.	Date of inclusion	Reason for inclusion	Decision	IUCLID dataset
Perfluorobutane sulfonic acid (PFBS) and its salts	-	-	16/01/2020	Equivalent level of concern having probable serious effects to human health (Article 57(f))	ECHA_01_2020.pdf	

9.5 Substances Restricted in Manufacturing Process

Substance Group/Substance	CAS Number	Banned Application
Methylene chloride	75-09-2	All Applications
Tetrachloroethylene	127-18-4	All Applications
Trichloroethylene	79-01-6	All Applications
Trichlorobenzene	120-82-1	All Applications
Nonylphenol	25154-52-3	All Applications
Nonylphenol ethoxylate (Nonylphenolpolyglycoethers)	9016-45-9	All Applications
CFCs –Chlorofluorocarbons	Several	All Applications
HCFCs –Hydrochlorofluorocarbons	Several	All Applications
Halons	Several	All Applications
Bromochloromethane	74-97-5	All Applications
Carbon tetrachloride	56-23-5	All Applications
Methyl bromide	74-83-9	All applications
n-bromopropane	106-94-5	All Applications
1.1.1-trichloroethane	71-55-6	All Applications
Perfluorooctane sulfonic acid and its derivatives (PFOS)	Several	All Applications***
Acrylamide	1979-06-01	All Applications

Table 4: Substance Restricted in Manufacturing Process

*** See section 9.9 Perfluorooctane sulfonic acid and its derivatives

9.6 Nanomaterials

Nanomaterials are chemical substances or materials with particle sizes between 1 to 100 nanometres (nms) in at least one dimension. Due to the increased specific surface area by volume, nanomaterials may have different characteristics compared to the same material without nanoscale features. Therefore, the physico-chemical properties of nanomaterials may differ from those of the bulk substances or particles of a larger size.

Nanotechnology is rapidly expanding. A large number of products containing nanomaterials are already on the European market (e.g. batteries, coatings). Nanomaterials offer technical and commercial opportunities, but may pose risks to the environment and raise health and safety concerns for humans and animals.

Please report any uses of Nanomaterials to MACOM.

9.7 Substances Under Observation

Any Use of Substances in the list of Substances under Observation in MACOM's products are recommended to have alternatives available. No end date is set for when, or if the Substances under Observation will become restricted or banned.

- a) Antimony and its compounds, such as for example antimony trioxide
- b) Beryllium and its compounds
- c) Bismuth and its compounds
- d) Nickel and its alloys, except in steel alloys
- e) Aromatic amines

9.8 PFOAs – EU/2017/1000

From July 2020, PFOA and its salts shall not be used in the production of, or placed on the market in;

- Another substance, as a constituent in;
- A mixture;
- An article;

Above a concentration equal to or above 25ppb of PFOA, including its salts or 1000ppb of one or a combination of PFOA-related substances.

From July 2022, the above restriction will apply to;

- Equipment used in to manufacture semi-conductors;
- Latex printing inks

From July 2023, the above restriction will apply to;

- Plasma nano-coatings

Exceptions to restriction

The above restriction shall **not** apply to a substance, constituent of another substance or mixture that is used;

- In photo-lithography processes for semiconductors or in etching processes for compound semiconductors, **or** the article produced as a result of this process;
- Concentrated fire-fighting foam mixtures placed on the market before July 2020.

9.9 Perfluorooctane sulfonic acid and its derivatives – EC/850/2004

Perfluorooctane sulfonic acid and its derivatives (PFOs) are restricted by Regulation (EC) 850/2004 on persistent organic pollutants. PFOs shall not be present in substances or mixtures above a concentration of 10 mg/kg.

There are exceptions to restriction for: Photoresists or antireflective coatings for photolithography processes or photographic coatings.

10.0 Conflict Minerals

All suppliers of components and packaging material are required to provide a Conflict Minerals Report on an annual basis containing information on all smelters and refiners of the Conflict Minerals in their supply chain. A Conflict Minerals Reporting Template (CMRT) is required for products containing Tin, Tantalum, Tungsten and Gold. A Cobalt Reporting Template (CRT) is required for products containing Cobalt.

For the purposes of this specification, Conflict minerals are defined as Tin, Tungsten, Tantalum, Gold and Cobalt See Appendix 3 for further information.

Conflict Minerals	CAS Number	Typical Use	Regulation	Threshold
Tin	7440-31-5	Electronic components, solders, wire	U.S. Dodd-Frank Wall Street Reform Act section 1502 on Congo Conflict Minerals	0
Tantalum	7440-25-7	Capacitors	U.S. Dodd-Frank Wall Street Reform Act section 1502 on Congo Conflict Minerals	0
Tungsten	7440-33-7	Lighting filaments	U.S. Dodd-Frank Wall Street Reform Act section 1502 on Congo Conflict Minerals	0
Gold	7440-57-5	Electronic components, connectors	U.S. Dodd-Frank Wall Street Reform Act section 1502 on Congo Conflict Minerals	0
Cobalt	7440-48-4	Lithium-ion batteries for electric automobiles, mobile phones and laptop computers	Responsible Minerals Initiative	0

Table 5: Substance Under Observation

Appendix 1 - Testing Requirements

Suppliers, including subcontractors are required to carry out independent testing of all component and packaging materials supplied to MACOM.

All laboratory reports must originate from an IPC 17025 certified lab, either internal or third party. Testing should be carried out to the IEC 62321 standard. Test reports should be updated every 24 months.

MACOM reserve the right to test the material composition of any material, component, assembly or product supplied to MACOM in order to determine compliance with this specification.

EU RoHS Metals
Cadmium (Cd)
Lead (Pb)
Mercury (Hg)
Chromium VI (Cr6+)
EU RoHS Polybrominated Biphenyls (PBBs)
See IEC 62474 link below for substance details
EU RoHS Polybrominated Diphenyl Ethers (PBDEs)
See IEC 62474 link below for substance details
EU RoHS Phthalates (Not necessary for metals and ceramic materials)
Bis (2-ethylhexyl) phthalate (DEHP)
Butyl benzyl phthalate (BBP)
Dibutyl phthalate (DBP)
Diisobutyl phthalate (DIBP)
EU REACH Reportable Substances
See Page 13
Halogen Content (Not necessary for metals and ceramic materials)
Chlorine (Cl)
Bromine (Br)

Table 6: Testing Requirements

Title: MACOM Banned and Restricted Substances

Appendix 2: Required format for Supplier Material Declarations

All supplier of components, packaging and packing materials must provide MACOM with a material declaration in the shared format.

MACOM.
Partners from RF to Light

MATERIALS DECLARATION FORM

PART NUMBER / PART DESCRIPTION: _____ PN XXXX

Subparts (Subpart No.)	Description	Weight (mg)†	Qty Per	Overall Weight (mg)	Substance Name	Substance Weight in mg	CAS Number	Compliance Statement for Trade Secret items / Additional Information	Exemption	SGS (Please in-bed document to each part number)	MSDS (Please in-bed document to each part number)
100001111	Die	0.0273	2	0.0546	Si	0.0546	7440-21-3				
100002222	Lead Frame	2.3500	1	2.3500	Cu	2.2928	7440-50-8				
					Fe	0.0536	7439-89-6				
					Pb	0.0001	7439-92-1				
					P	0.0006	7723-14-0				
					Zn	0.0030	7440-66-6				
100003333	Die Attach Material	0.0600	1	0.0600	Ag	0.0474	7440-22-4				
					Epoxy Resin	0.0060	Trade Secret				
					Others	0.0006	Trade Secret				
					1,4-Bis (2,3-Epoxypropoxy) Butane	0.0060	2425-79-8				
100004444	Gold Wire	0.1000	1	0.1000	Gold	0.1000	7440-57-5				
100005555	Lead Finish	0.2102	1	0.2102	Sn	0.2102	7440-31-5				
100006666	Mold Compound	5.4700	1	5.4700	Epoxy resin	0.0109	Trade Secret				
					Phenol resin	0.1034	Trade Secret				
					Silica	4.8081	60676-86-0; 7631-86-9				
					Carbon Black	0.0432	1333-86-4				
					Metal hydroxide	0.4923	Trade Secret				
				Overall Weight		8.2448					

MACOM	Name
Complied	

Appendix 2: Required format for Supplier Material Declarations (continued)

The following information is required;

- Part Number/Part Description
 - Top level Part Number or assembly Number for which the declaration is relevant
- Subparts
 - Individual Number for each subpart within the top level part or assembly
- Description
 - Materials/Subclass description of the individual subparts.
 - Example: Die, Mold Compound, Lead frame, Die Attach, Wire, Lead finish
- Weight
 - Weight of individual subpart in (g) or (mg)
- Quantity Per
 - Number of subparts within the top level part or assembly
- Overall Weight
 - The total weight of subpart in (g) or (mg).
- Substance name
 - Full chemical name of the substance.
- Substance Weight
 - Substance weight should be percentages, milligrams or grams
 - Sum of substance weight in % must add up to 100% of weight of the subpart
- CAS Number
 - Accurate CAS Numbers must be provided for each substance
 - Trade secret can be entered here if the substance is proprietary, however, supplier must provide a **signed** Certificate of Conformance for any trade secret Substances or lab test report to prove that the materials are compliant to the regulatory requirement.
- Compliance Statement for Trade Secret items / Additional information
 - Supplier must include a statement “RoHS and REACH Compliant Material” for any trade secret items
 - Surface finish Substances must also be highlighted
- RoHS Exemptions
 - Supplier must list any RoHS exemptions relevant to the part or subpart.al format only
 - Example: Exemption 7(a) for High Temperature Solder
- SGS Reports
 - Supplier must attach the SGS / lab test report for each of the homogeneous material.
- MSDS
 - Supplier must attach the MSDS for each of the homogeneous material.

Appendix 3 – Compliance & Conflict Minerals Information

Compliance Information

- MACOM Environmental Compliance Mailbox: product_compliance@macom.com
 - Submitting Supplier Compliance data and test reports
 - Information requests regarding Compliance
 - Reporting grievances
- EU RoHS and EU REACH Statement
 - <http://www.macom.com/about/sustainability-quality--reliabil>
- IEC 62474 Database – All restricted and reportable Substances relevant to electronic products
 - <http://std.iec.ch/iec62474/iec62474.nsf/MainFrameset>
- EU RoHS Directive
 - <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32011L0065&from=EN>
- EU REACH Candidate List
 - <http://echa.europa.eu/candidate-list-table>
- EU REACH Authorisation List
 - <http://echa.europa.eu/addressing-chemicals-of-concern/authorisation/recommendation-for-inclusion-in-the-authorisation-list/authorisation-list>
- IMDS
 - <https://www.mdssystem.com>
 - <https://public.mdssystem.com/en/web/imds-public-pages/imds-training-courses>

Conflict Minerals Information

- MACOM Conflict Minerals Mailbox: conflictminerals@macom.com
 - Submitting Supplier Conflict Minerals data and CMRTs
 - Information requests regarding Conflict Minerals
 - Reporting grievances
- MACOM Conflict Minerals Policy
 - <http://www.macom.com/about/sustainability-quality--reliabil>
- Conflict Minerals Reporting template
 - <http://www.responsiblemineralsinitiative.org/reporting-templates/cmrt/>
- RMAP Assessment Process:
 - <http://www.responsiblemineralsinitiative.org/responsible-minerals-assurance-process/>
- Smelters & Refiners:
 - <http://www.responsiblemineralsinitiative.org/smelters-refiners-lists/>
- OECD Due Diligence
 - <https://www.oecd.org/investment/due-diligence-guidance-for-responsible-business-conduct.htm>
- SEC Final Rule
 - <http://www.sec.gov/rules/final/2012/34-67716.pdf>
- Cobalt Reporting Template
 - <http://www.responsiblemineralsinitiative.org/reporting-templates/cobalt-reporting-template/>