

Würth Electronics Midcom Inc.

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HALOGEN-FREE STATEMENT

Halogen is a chemical term that has stood 170+ years for the family of elements that includes fluorine, chlorine, bromine, iodine, and astatine. Iodine has not been found in Würth Electronic Midcom components, but would be detected in typical tests if it were present; astatine, being rare and radioactive, will not be present. Intentional halogen occurrence includes fluorine in fluoropolymers as wire insulation and modifiers in injection molding compounds and chlorine and bromine as flame retardant additives in tapes, coatings, and resin materials such as adhesives, potting, and molding compounds. Unintentional, minimal occurrence is due to random presence in the environment and industrial processes, especially of chlorine. In any case, halogens will not be present in their elemental forms, but in bound conditions as part of molecules.

Halogen content definitions and standards take into account the component type, for instance chips, printed circuit boards and laminates, or plastics, and consider whether halogen is present by natural means or intentional addition, or is part of a recognized flame retardant, or excludes fluorine and iodine.

Accommodating these considerations, specific concentrations of some, but not all, halogens are defined as the criteria for “halogen-free” even when halogens are present; similar criteria also define “low-halogen” and “BFR/CFR/PVC-free.” See table below for a partial list of halogen-free definitions and standards. Occasionally, authoritative references equivocate bromine (Br) and chlorine (Cl) with brominated or chlorinated flame retardants (BFR or CFR); this is a mistake as Br and Cl are elements and BFRs and CFRs are molecules and will lead to error in judging concentration.

Table: Abbreviated Examples of Halogen-free Definitions and Standards

Organization	Concentration, % (ppm)				
	Br	Cl	Br + Cl	BFR	CFR + PVC polymers
1	< 0.09 (900)	< 0.09 (900)	< 0.15 (1500)	n/a	n/a
2, 3, 4	≤ 0.09 (900)	≤ 0.09 (900)	< 0.15 (1500)	n/a	n/a
5	n/a	n/a	n/a	< 0.1 (1000)	< 0.1 (1000)
6	n/a	n/a	n/a	< 0.1 (1000)	< 0.1 (1000)

Bromine (Br), Chlorine (Cl), Brominated Flame Retardant (BFR), Chlorinated Flame Retardant (CFR), Polyvinylchloride (PVC)

- 1) Japan Electronics Packaging and Circuits Association JPCA-ES-01 (boards)
- 2) European Standard EN 61249-2-21 identical with IEC 61249-2-21 (boards)
- 3) IPC-Association Connecting Electronics Industries IPC-4101 (boards)
- 4) International Electronics Manufacturing Initiative (board and substrate laminates, non-halogenated epoxide)
- 5) International Electronics Manufacturing Initiative (plastics)
- 6) IBM Halogenated Flame Retardants and Polyvinylchloride Material Substances Specification, EC N28742

Würth Electronics Midcom use of product components purposely containing halogenated flame retardants sometimes leads to products that meet criteria for being halogen-free. Because of this arbitrary consequence and the variation in halogen-free definitions, Würth Electronics Midcom has decided not to redefine halogen to mean only chlorine and bromine. Also, free is not redefined to mean “below a certain level”, but retains the meaning “not united or mixed with” to describe the absence of intentional or functional materials; incidental amounts are of no consequence.

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Summarizing Würth Electronics Midcom's position: halogen means fluorine, chlorine, bromine, and iodine, but not astatine; free means the absence of intentional and functional halogen-bearing material. Thus, halogen-free means the absence of intentionally added fluorine-, chlorine-, bromine-, and iodine-bearing functional materials.

Awareness of the human and environmental consequences of materials has brought halogenated materials under critical evaluation, resulting in the restriction of their uses, including elimination in some cases. Products manufactured by Würth Electronics Midcom may contain halogenated materials by application of current technology to provide flame retardancy and insulation safety for meeting safety standard requirements in cooperation with customer demand for efficiency and package dimensions. Design changes are available to accommodate halogen restrictions, but will also require balancing subsequent changes of package dimensions or safety rating.

Additionally, products manufactured by Würth Electronics Midcom do not contain PVC.

A handwritten signature in black ink, reading 'John L. Hauber'. The signature is written in a cursive style with a large initial 'J'.

John Hauber
Materials Compliance Engineer

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