

Certificate of Non-Use of Hazardous Substances

MaxLinear, Inc. certifies that as of the date of this Certificate of Non-Use of Hazardous Substances, the MaxLinear product listed below is certified as follows:

Environmental Category & Description		Details for: XR28V384IM48-F
RoHS Exempt	If "7a", "7(c)", or "15a", then product contains lead but is compliant meeting the requirements of Directive (EU) 2011/65 pursuant to either exemption 7a, 7(c), or 15a. See Appendix A.	N
RoHS	If "Y", then product is RoHS compliant meeting the requirements of Directive (EU) 2015/863 with no exemptions taken. See Appendix B.	Y
Halogen Free	If "Y", then product is halogen and lead (Pb) free. Green products meet RoHS requirements plus additional hazardous material restrictions. See Appendix C.	Y
REACH	If "Y", then product does not use any Substances of Very High Concern (SVHC) under REACH requirements. See Appendix D for a list of these substances. If "N", please see Appendix E for SVHC that is contained in this product	Y
TSCA	If "Y", then product is compliant and does not use any of the Toxic Substance Control Act (TSCA) restricted substances. See Appendix F for a list of these substances.	Y

MaxLinear, Inc.
Quality and Reliability
Jan 16, 2026

Appendix A | RoHS with Exemption

Exemption	Description
7a	Lead in high melting temperature type solders
7(c)	Electrical and electronic components containing lead in a glass or ceramic other than dielectric ceramic in capacitors, e.g. piezoelectronic devices, or in a glass or ceramic matrix compound.
15a	Lead in solders to complete a viable electrical connection between the semiconductor die and carrier within integrated circuit flip chip packages where at least one of the following criteria applies: <ul style="list-style-type: none"> a semiconductor technology node of 90 nm or larger a single die of 300 mm² or larger in any semiconductor technology node; stacked die packages with die of 300 mm² or larger, or silicon interposers of 300 mm² or larger

Appendix B | RoHS Directive (EU) 2015/863

Restricted Substance	Allowable Limit (at homogenous material level)
Cadmium (Cd)	100 ppm (0.01 weight %)
Mercury (Hg)	1000 ppm (0.10 weight %)
Lead (Pb)	1000 ppm (0.10 weight %)
Hexavalent Chromium (Cr6+)	1000 ppm (0.10 weight %)
Polybrominated biphenyls (PBB)	1000 ppm (0.10 weight %)
Polybrominated diphenyl ethers (PBDE)	1000 ppm (0.10 weight %)
Bis (2-Ethylhexyl) phthalate (DEHP)	1000 ppm (0.10 weight %)
Benzyl butyl phthalate (BBP)	1000 ppm (0.10 weight %)
Dibutyl phthalate (DBP)	1000 ppm (0.10 weight %)
Diisobutyl phthalate (DIBP)	1000 ppm (0.10 weight %)

Appendix C | Halogen Free

Restricted Substance	Allowable Limit	
Bromine (Br)	900 ppm	1500 ppm Total
Chlorine (Cl)	900 ppm	
Antimony (Sb (Sb ₂ O ₃))	900 ppm	

Appendix D | REACH 250 - Regulation (EC) No 1907/2006 (Threshold Limit 1000ppm (0.1% w/w))

	Date of Inclusion: June 25, 2025
250	1,1,1,3,5,5,5-heptamethyl-3-[(trimethylsilyloxy)trisiloxane
249	Decamethyltetrasiloxane
248	Tetra(sodium/potassium) 7-[(E)-2-acetamido-4-[(E)-4-[[4-chloro-6-[[2-[[4-fluoro-6-[[4-(vinylsulfonyl)phenyl]amino]-1,3,5-triazine-2-yl)amino]propyl]amino]-1,3,5-triazine-2-yl]amino]
	Date of Inclusion: January 21, 2025
247	reaction mass of: triphenylthiophosphate and tertiary butylated phenyl derivatives
246	Perfluamine
245	Octamethyltrisiloxane
244	O,O,O-triphenyl phosphorothioate
243	6-[(C10-C13)-alkyl-(branched, unsaturated)-2,5-dioxypyrrolidin-1-yl]hexanoic acid
	Date of Inclusion: November 7, 2024
242	Triphenyl phosphate
	Date of Inclusion: June 27, 2024
241	Bis(a,a-dimethylbenzyl) peroxide
	Date of Inclusion: January 23, 2024
240	Oligomerisation and alkylation reaction products of 2-phenylpropene and phenol
239	Bumetizole (UV-326)
238	2-(dimethylamino)-2-[[4-methylphenyl)methyl]-1-[4-(morpholin-4-yl)phenyl]butan-1-one
237	2-(2H-benzotriazol-2-yl)-4-(1,1,3,3-tetramethylbutyl)phenol
236	2,4,6-tert-butylphenol
	Date of Inclusion: June 14, 2023
235	diphenyl(2,4,6-trimethylbenzoyl)phosphine oxide
234	bis(4-chlorophenyl) sulphone
	Date of Inclusion: January 17, 2023
233	reaction mass of 2,2,3,3,5,5,6,6-octafluoro-4-(1,1,1,2,3,3,3-heptafluoropropan-2-yl)morpholine and 2,2,3,3,5,5,6,6-octafluoro-4-(heptafluoropropyl)morpholine

232	Perfluoroheptanoic acid and its salts Ammonium perfluoroheptanoate potassium perfluoroheptanoate Perfluoroheptanoic acid Sodium perfluoroheptanoate
231	Melamine
230	Isobutyl 4-hydroxybenzoate
229	bis(2-ethylhexyl) tetrabromophthalate covering any of the individual isomers and/or combinations thereof
228	Barium diboron tetraoxide
227	4,4'-sulphonyldiphenol
226	2,2',6,6'-tetrabromo-4,4'-isopropylidenediphenol
225	1,1'-(ethane-1,2-diylbisoxyl)bis[2,4,6-tribromobenzene]
Date of Inclusion: June 10, 2022	
224	N-(hydroxymethyl)acrylamide
Date of Inclusion: January 17, 2022	
223	S-(tricyclo[5.2.1.02,6]deca-3-en-8(or 9)-yl O-(isopropyl or isobutyl or 2-ethylhexyl) O-(isopropyl or isobutyl or 2-ethylhexyl) phosphorodithioate
222	(+)-1,7,7-trimethyl-3-[(4-methylphenyl)methylene]bicyclo[2.2.1]heptan-2-one covering any of the individual isomers and/or combinations thereof (4-MBC)
221	tris(2-methoxyethoxy)vinylsilane
220	6,6'-di-tert-butyl-2,2'-methylenedi-p-cresol
Date of Inclusion: July 08, 2021	
219	Phenol, alkylation products (mainly in para position) with C12-rich branched alkyl chains from oligomerisation, covering any individual isomers and/ or combinations thereof (PDDP)
218	Orthoboric acid, sodium salt
217	Medium-chain chlorinated paraffins (MCCP) Medium-chain chlorinated paraffins (MCCP) (UVCB substances consisting of more than or equal to 80% linear chloroalkanes with carbon
216	Glutaral
215	4,4'-(1-methylpropylidene)bisphenol
214	2-(4-tert-butylbenzyl)propionaldehyde and its individual stereoisomers
213	2,2-bis(bromomethyl)propane1,3-diol (BMP); 2,2-dimethylpropan-1-ol, tribromo derivative/3-bromo-2,2-bis(bromomethyl)-1-propanol (TBNPA); 2,3-dibromo-1-propanol (2,3-DBPA)
212	1,4-dioxane
Date of Inclusion: January 19, 2021	
211	Diocetyl tin dilaurate, stannane, dioctyl-, bis(coco acyloxy) derivs., and any other stannane, dioctyl-, bis(fatty acyloxy) derivs. wherein C12 is the predominant carbon number of the fat
210	Bis(2-(2-methoxyethoxy)ethyl)ether
Date of Inclusion: June 25, 2020	
209	Dibutylbis(pentane-2,4-dionato-O,O')tin
208	Butyl 4-hydroxybenzoate
207	2-methylimidazole
206	1-vinylimidazole
Date of Inclusion: January 16, 2020	
205	Perfluorobutane sulfonic acid (PFBS) and its salts
204	Diisohexyl phthalate
203	2-methyl-1-(4-methylthiophenyl)-2-morpholinopropan-1-one
202	2-benzyl-2-dimethylamino-4'-morpholinobutylphenone
Date of Inclusion: July 16, 2019	
201	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propionic acid, its salts and its acyl halides
200	2-methoxyethyl acetate
199	4-tert-butylphenol
198	Tris(4-nonylphenyl, branched and linear) phosphite (TNPP)
Date of Inclusion: January 15, 2019	
197	1,7,7-trimethyl-3-(phenylmethylene)bicyclo[2.2.1]heptan-2-one
196	Pyrene
195	Phenanthrene
194	Fluoranthene
193	Benzo[k]fluoranthene
192	2,2-bis(4'-hydroxyphenyl)-4-methylpentane
Date of Inclusion: Jun 27, 2018	
191	Benzene-1,2,4-tricarboxylic acid 1,2 anhydride
190	Benzo[ghi]perylene
189	Decamethylcyclotetrasiloxane
188	Dicyclohexyl phthalate
187	Disodium octaborate
186	Dodecamethylcyclotetrasiloxane
185	Ethylenediamine
184	Lead NOTE: Does not exceed threshold levels specified in RoHS Directive (EU) 2015/863
183	Octamethylcyclotetrasiloxane
182	Terphenyl, hydrogenated
Date of Inclusion: Jan 15, 2018	
181	Benz[a]anthracene

180	Cadmium carbonate
179	Cadmium hydroxide
178	Cadmium nitrate
177	Chrysene
176	Dodecachloropentacyclo[12.2.1.16,9.02,13.05,10]octadeca-7,15-diene ("Dechlorane Plus™")
175	Reaction products of 1,3,4-thiadiazolidine-2,5-dithione, formaldehyde and 4-heptylphenol, branched and linear (RP-HP)
Date of Inclusion: Jul 07, 2017	
174	Perfluorohexane-1-sulphonic acid and its salts (PFHxS)
Date of Inclusion: Dec 19, 2016	
173	p-(1,1-dimethylpropyl)phenol
172	4-heptylphenol, branched and linear
171	Nonadecafluorodecanoic acid (PFDA) and its sodium and ammonium salts
170	4,4'-isopropylidenediphenol (bisphenol A)
Date of Inclusion: Jun 20, 2016	
169	Benzo[def]chrysene(Benzo[a]pyrene)
Date of Inclusion: Dec 17, 2015	
168	1,3-propanesultone
167	2,4-di-tert-butyl-6-(5-chlorobenzotriazol-2-yl)phenol (UV-327)
166	2-(2H-benzotriazol-2-yl)-4-(tert-butyl)-6-(sec-butyl)phenol (UV-350)
165	Nitrobenzene
164	Perfluorononan-1-oic-acid and its sodium and ammonium salts
Date of Inclusion: Jun 15, 2015	
163	1,2-benzenedicarboxylic acid, di-C6-10-alkyl esters; 1,2-benzenedicarboxylic acid, mixed decyl and hexyl and octyl diesters with ≥ 0.3% of dihexyl phthalate (EC No. 201-559-5)
162	5-sec-butyl-2-[2,4-dimethylcyclohex-3-en-1-yl]-5-methyl-1,3-dioxane [1], 5-sec-butyl-2-(4,6-dimethylcyclohex-3-en-1-yl)-5-methyl-1,3-dioxane [2] [covering any of the individual stere
Date of Inclusion: Dec 17, 2014	
161	2-(2H-benzotriazol-2-yl)-4,6-ditertpentylphenol (UV-328)
160	2-benzotriazol-2-yl-4,6-di-tert-butylphenol (UV-320)
159	2-ethylhexyl 10-ethyl-4,4-diocetyl-7-oxo-8-oxa-3,5-dithia-4-stannatetradecanoate (DOTE)
158	Cadmium fluoride
157	reaction mass of 2-ethylhexyl 10-ethyl-4,4-diocetyl-7-oxo-8-oxa-3,5-dithia-4-stannatetradecanoate and 2-ethylhexyl 10-ethyl-4-[[2-[(2-ethylhexyl)oxy]-2-oxoethyl]thio]-4-octyl-7-oxo-8
156	Cadmium sulphate
Date of Inclusion: Jun 16, 2014	
155	1,2-Benzenedicarboxylic acid, dihexyl ester, branched and linear
154	Sodium perborate, perboric acid, sodium salt
153	Sodium peroxometaborate
152	Cadmium chloride
Date of Inclusion: Dec 16, 2013	
151	Cadmium sulphide
150	Disodium 4-amino-3-[[4'-[(2,4-diaminophenyl)azo][1,1'-biphenyl]-4-yl]azo] -5-hydroxy-6-(phenylazo)naphthalene-2,7-disulphonate (C.I. Direct Black 38)
149	Dihexyl phthalate
148	Imidazolidine-2-thione; (2-imidazoline-2-thiol)
147	Trixylyl phosphate
146	Disodium 3,3'-[[1,1'-biphenyl]-4,4'-diylbis(azo)]bis(4-aminonaphthalene-1-sulphonate) (C.I. Direct Red 28)
145	Lead di(acetate)
Date of Inclusion: Jun 20, 2013	
144	Cadmium
143	Ammonium pentadecafluorooctanoate (APFO)
142	Pentadecafluorooctanoic acid (PFOA)
141	Dipentyl phthalate (DPP)
140	4-Nonylphenol, branched and linear, ethoxylated
139	Cadmium oxide
Date of Inclusion: Dec 19, 2012	

138	Trilead dioxide phosphonate
137	Trilead bis(carbonate)dihydroxide
136	Tricosafuorodecanoic acid
135	Tetralead trioxide sulphate
134	Tetraethyllead
133	Sulfurous acid, lead salt, dibasic
132	Silicic acid, lead salt
131	Silicic acid (H ₂ Si ₂ O ₅), barium salt (1:1), lead-doped
130	Pyrochlore, antimony lead yellow
129	Pentalead tetraoxide sulphate
128	Pentacosafuorotridecanoic acid
127	Orange lead (lead tetroxide)
126	o-Toluidine
125	o-aminoazotoluene
124	N-pentyl-isopentylphthalate
123	N-methylacetamide
122	N,N-dimethylformamide
121	Methyloxirane (Propylene oxide)
120	Methoxyacetic acid
119	Lead titanium zirconium oxide
118	Lead titanium trioxide
117	Lead oxide sulfate
116	Lead monoxide (lead oxide)
115	Lead dinitrate
114	Lead cyanamidate
113	Lead bis(tetrafluoroborate)
112	Hexahydromethylphthalic anhydride
111	Heptacosafuorotetradecanoic acid
110	Henicosafuoroundecanoic acid
109	Furan
108	Fatty acids, C16-18, lead salts
107	Dioxobis(stearato)trilead
106	Dinoseb (6-sec-butyl-2,4-dinitrophenol)
105	Dimethyl sulphate
104	Diisopentylphthalate
103	Diethyl sulphate
102	Dibutyltin dichloride (DBTC)
101	Diazene-1,2-dicarboxamide (C,C'-azodi(formamide))
100	Cyclohexane-1,2-dicarboxylic anhydride [1], cis-cyclohexane-1,2-dicarboxylic anhydride [2], trans-cyclohexane-1,2-dicarboxylic anhydride [3] [The individual cis- [2] and trans- [3] ison
99	Bis(pentabromophenyl) ether (decabromodiphenyl ether; DecaBDE)
98	Biphenyl-4-ylamine
97	Acetic acid, lead salt, basic
96	[Phthalato(2-)]dioxotrilead
95	6-methoxy-m-toluidine (p-cresidine)
94	4-Nonylphenol, branched and linear
93	4-methyl-m-phenylenediamine (toluene-2,4-diamine)
92	4-Aminoazobenzene
91	4-(1,1,3,3-tetramethylbutyl)phenol, ethoxylated
90	4,4'-oxydianiline and its salts
89	4,4'-methylenedi-o-toluidine
88	3-ethyl-2-methyl-2-(3-methylbutyl)-1,3-oxazolidine
87	1-bromopropane (n-propyl bromide)
86	1,2-Diethoxyethane
85	1,2-Benzenedicarboxylic acid, dipentylester, branched and linear
	Date of Inclusion: Jun 18, 2012
84	α,α -Bis[4-(dimethylamino)phenyl]-4 (phenylamino)naphthalene-1-methanol (C.I. Solvent Blue 4) [with $\geq 0.1\%$ of Michler's ketone (EC No. 202-027-5) or Michler's base (EC No. 202-95
83	N,N,N',N'-tetramethyl-4,4'-methylenedianiline (Michler's base)
82	1,3,5-tris[(2S and 2R)-2,3-epoxypropyl]-1,3,5-triazine-2,4,6-(1H,3H,5H)-trione (β -TGIC)
81	Diboron trioxide
80	1,2-bis(2-methoxyethoxy)ethane (TEGDME; triglyme)
79	4,4'-bis(dimethylamino)-4''-(methylenamino)trityl alcohol [with $\geq 0.1\%$ of Michler's ketone (EC No. 202-027-5) or Michler's base (EC No. 202-959-2)]

78	Lead(II) bis(methanesulfonate)
77	Formamide
76	[4-[4,4'-bis(dimethylamino) benzhydrylidene]cyclohexa-2,5-dien-1-ylidene]dimethylammonium chloride (C.I. Basic Violet 3) [with ≥ 0.1% of Michler's ketone (EC No. 202-027-5) or Michler's ketone (EC No. 202-027-5)]
75	1,2-dimethoxyethane; ethylene glycol dimethyl ether (EGDME)
74	[4-[[4-anilino-1-naphthyl][4-(dimethylamino)phenyl]methylene]cyclohexa-2,5-dien-1-ylidene] dimethylammonium chloride (C.I. Basic Blue 26) [with ≥ 0.1% of Michler's ketone (EC No. 202-027-5) or Michler's ketone (EC No. 202-027-5)]
73	1,3,5-Tris(oxiran-2-ylmethyl)-1,3,5-triazine-2,4,6-trione (TGIC)
72	4,4'-bis(dimethylamino)benzophenone (Michler's ketone)
Date of Inclusion: Dec 19, 2011	
71	4-(1,1,3,3-tetramethylbutyl)phenol
70	N,N-dimethylacetamide
69	Phenolphthalein
68	Lead diazide, Lead azide
67	Lead dipicrate
66	1,2-dichloroethane
65	Calcium arsenate
64	Dichromium tris(chromate)
63	2-Methoxyaniline; o-Anisidine
62	Pentazinc chromate octahydroxide
61	Arsenic acid
60	Potassium hydroxyoctaoxodizincatedichromate
59	Formaldehyde, oligomeric reaction products with aniline
58	Lead styphnate
57	Trilead diarsenate
56	Zirconia Aluminosilicate Refractory Ceramic Fibres
55	Bis(2-methoxyethyl) phthalate
54	Aluminosilicate Refractory Ceramic Fibres
53	Bis(2-methoxyethyl) ether
52	2,2'-dichloro-4,4'-methylenedianiline
51	Cobalt dichloride
Date of Inclusion: Jun 20, 2011	
50	1,2-Benzenedicarboxylic acid, di-C6-8-branched alkyl esters, C7-rich
49	1,2-Benzenedicarboxylic acid, di-C7-11-branched and linear alkyl esters
48	Strontium chromate
47	1-Methyl-2-pyrrolidone
46	1,2,3-Trichloropropane
45	2-Ethoxyethyl acetate
44	Hydrazine
Date of Inclusion: Dec 15, 2010	
43	Cobalt(II) diacetate
42	Cobalt(II) sulphate
41	2-Ethoxyethanol
40	Acids generated from chromium trioxide and their oligomers. Names of the acids and their oligomers: Chromic acid, Dichromic acid, Oligomers of chromic acid and dichromic acid.
39	2-Methoxyethanol
38	Chromium trioxide
37	Cobalt(II) carbonate
36	Cobalt(II) dinitrate
Date of Inclusion: Jun 18, 2010	
35	Trichloroethylene
34	Potassium dichromate
33	Tetraboron disodium heptaoxide, hydrate
32	Ammonium dichromate
31	Boric acid
30	Sodium chromate
29	Disodium tetraborate, anhydrous
28	Potassium chromate
Date of Inclusion: Mar 30, 2010	
27	Acrylamide

	Date of Inclusion: Jan 13, 2010
26	Lead sulfochromate yellow (C.I. Pigment Yellow 34)
25	Lead chromate molybdate sulphate red (C.I. Pigment Red 104)
24	Anthracene oil
23	2,4-Dinitrotoluene
22	Anthracene oil, anthracene paste, anthracene fraction
21	Anthracene oil, anthracene-low
20	Tris(2-chloroethyl)phosphate
19	Diisobutyl phthalate
18	Lead chromate
17	Anthracene oil, anthracene paste
16	Pitch, coal tar, high temp.
15	Anthracene oil, anthracene paste, distn. lights
	Date of Inclusion: Oct 28, 2008
14	Lead hydrogen arsenate
13	Benzyl butyl phthalate (BBP)
12	Bis (2-ethylhexyl)phthalate (DEHP)
11	5-tert-butyl-2,4,6-trinitro-m-xylene (musk xylene)
10	Diarsenic trioxide
9	Bis(tributyltin)oxide (TBTO)
8	Triethyl arsenate
7	Diarsenic pentaoxide
6	Sodium dichromate
5	Dibutyl phthalate (DBP)
4	4,4'-Diaminodiphenylmethane (MDA)
3	Alkanes, C10-13, chloro (Short Chain Chlorinated Paraffins)
2	Anthracene
1	Hexabromocyclododecane (HBCDD) and all major diastereoisomers identified: Alpha-hexabromocyclododecane Beta-hexabromocyclododecane Gamma-hexabromocyclododecane

Appendix E | REACH Substance intentionally added (See page 1, Environmental Category & Description, if applicable to this product.)

Restricted Substance	Where used	CAS Number	Threshold Limit
4,4'-Isopropylidenediphenol (Bisphenol A)	Substrate laminate	80-05-7	>0.1% w/w

Appendix F | TSCA

Restricted Substance	CAS Number	Threshold Limit
2,4,6-Tris(tert-butyl)phenol (2,4,6-TTBP)	732-26-3	>0.3% w/w
Hexachlorobutadiene (HCBd)	87-68-3	>0% w/w
Pentachlorothiophenol (PCTP)	133-49-3	>1% w/w
Decabromodiphenyl ether (DecaBDE)	1163-19-5	>0% w/w
Phenol, isopropylated phosphate (3:1) (PIP 3:1)	68937-41-7	>0% w/w