International
IOR Rectifier

TO-220 Full Pak

RoHS Compliance Document

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TO-220 Full Pak BOM 1

Component	Material Name	Material Mass (g)	Element Name Composition	CAS #	Substance Mass (g)	Material Analysis Weight (%)	% of Total Weight
Chip	Silicon	0.01207	Si	7440-21-3	0.01207	100%	1.0%
Encapsulant	Epoxy Resin	0.99330	SiO_2	7631-86-9	0.79464	80%	22.6%
			Epoxy	90598-46-2	0.14900	15%	1.9%
			Other	-	0.04966	5%	2.4%
Lead Frame	Copper	1.12350	Cu	7440-50-8	1.11788	99%	70.4%
			Sn	7440-31-5	0.00562	1%	0.1%
Die Attach	J-Alloy	0.00630	Sn	7440-31-5	0.00410	65%	0.4%
			Ag	7440-22-4	0.00158	25%	0.1%
			Sb	7440-36-0	0.00062	10%	0.1%
Wire Bond	Aluminum	0.00130	Al	7429-90-5	0.00130	100%	0.3%
Lead Finish	Matte Tin over Nickel*	0.00510	Ni	7440-02-0	0.00071	14%	0.0%
			Sn	7440-31-5	0.00439	86%	0.7%
			Total Weight (g)		**2.14157**		

*Tin whisker mitigation strategy is nickel under-plate.

TO-220 Full Pak BOM 2

Component	Material Name	Material Mass (g)	Element Name Composition	CAS #	Substance Mass (g)	Material Analysis Weight (%)	% of Total Weight
Chip	Silicon	0.01207	Si	7440-21-3	0.01207	100%	0.6%
Encapsulant	Epoxy Resin	0.99330	SiO_2	7631-86-9	0.79464	80%	37.1%
			Epoxy	90598-46-2	0.14900	15%	7.0%
			Other	-	0.04966	5%	2.3%
Lead Frame	Copper	1.12350	Cu	7440-50-8	1.11788	99%	52.2%
			Sn	7440-31-5	0.00562	1%	0.3%
Die Attach	J-Alloy	0.00630	Sn	7440-31-5	0.00410	65%	0.2%
			Ag	7440-22-4	0.00158	25%	0.1%
			Sb	7440-36-0	0.00062	10%	0.0%
Wire Bond	Aluminum	0.00130	Al	7429-90-5	0.00130	100%	0.1%
Lead Finish	Matte Tin*	0.00510	Sn	7440-31-5	0.00510	100%	0.2%
			Total Weight (g)		**2.14157**		

*Tin whisker mitigation strategy is 150 °C, 1 hour anneal within 24 hours of tin plating.

This part is compliant with EU Directive 2011/65/EU (RoHS Directive) and does not contain lead, mercury, cadmium (0.01%), hexavalent chromium, PBB or PBDE in concentrations greater than 0.1%, except as permitted by Annex (7).

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Test Definition	Test Conditions	Inspection Interval Class 1 and 2 Products	Total Duration Class 1 and 2 Products	Maximum Whisker Length (µm)
Room Temperature Humidity	30± 2°C/60± 3% RH	1000 hours	4000 hours	20
Temperature Humidity Unbiased	55± 3°C/85± 3% RH	1000 hours	4000 hours	20
Temperature Cycling	-40 to 55°C to 80 to 95°C, air to air, 10 min soak, approx 3	500 cycles	1500 cycles	45

Tin Whisker testing per JESD201, Environmental Acceptance Requirements for Tin Whisker Susceptibility of Tin and Tin Alloy Surface Finish

Tin Whisker Results (number of failing whiskers)

Test	1000 Hours	2000 Hours	3000 Hours	4000 Hours
Room Temperature Humidity Storage	0/40	0/40	0/40	0/40
Temperature Humidity	0/40	0/40	0/40	0/40
Test	**500 Cycles**	**1000 Cycles**	**1500 Cycles**	
Temperature Cycling	0/40	0/40	0/40	