International
IOR Rectifier

20-Lead MLPQ
Lead Free and RoHS Compliance Document

Contents:

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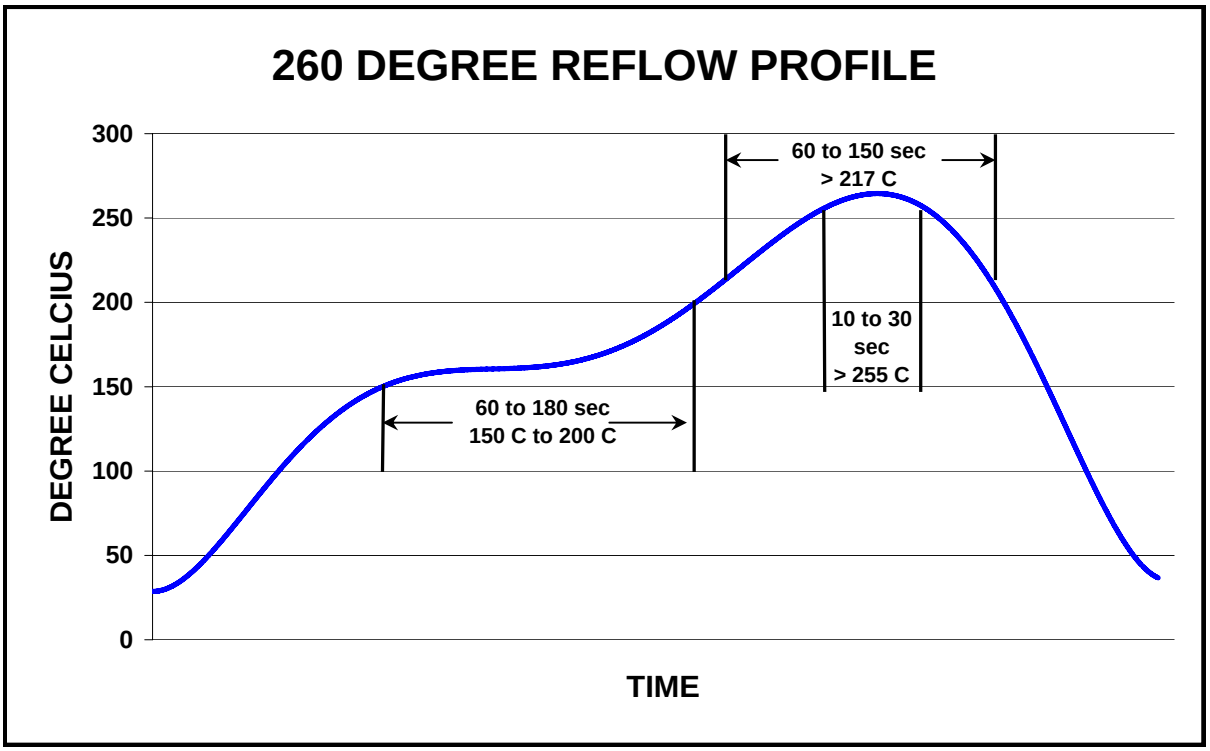
MLPQ 4x4

Component	Material Name	Material Mass (gr/ea)	Element Name Composition	Substance Mass (per device) g	Material Analysis Weight (%)	% of Total Weight
Chip	Silicon	0.00090	Si	0.00090	100%	2.2%
Encapsulant	Epoxy Resin	0.02147	SiO2	0.01998	93%	49.1%
			Epoxy	0.00142	7%	3.5%
			Other	0.00007	0%	0.2%
Lead Frame	Copper	0.01770	Cu	0.01721	97%	42.3%
			Other	0.00049	3%	1.2%
Die Attach	Silver Epoxy	0.00006	Ag	0.00005	85%	0.1%
			Epoxy	0.00001	10%	0.0%
			Other	0.00000	5%	0.0%
Wire bond	Gold	0.00035	Au	0.00035	100%	0.9%
Lead Finish	MatteTin	0.00022	Sn	0.00022	100%	0.5%

MSL2 at 260 C

Total Weight (g) **0.04070**



This part is compliant with EU Directive 2002/95/EC (RoHS) 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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MLPQ 4 x 4 Tin Whisker Report

Objective: To evaluate the Tin whisker growth for various test conditions on PBF products

Part No:
Package Type: MLPQ-48L 7X7 MLPQ 7 x 7 used as test
A

Test	LongTemperature Storage	Temperature Humidity Unbias	Temperature Cycling
Test Conditions	30+/-2°C, 70-85+/-3%RH	60+/-5°C, 93+3/-2%RH	-55 to 85°C
Test Status / Readpoint	NWF / 6 mo	NWF / 6 mo	NWF / 1000 cycles
Examples:			
Whisker Length (μm)	0	0	0

Abbreviation	NWF	WFA	WFO
Whisker length pass/fail criterion	No Whiskers Found Whisker length less than 10 um is considered insignificant	Whiskers found within acceptable range Whisker length less than 40 um is considered pass	Whiskers found over acceptable range Whisker length exceeding 40 um is considered fail

Sn Plating descriptions:

Plating thickness (μin): >300 to 800
Annealing conditions: 150°C for 1 hour
Plating finish: 100% Sn Matte

Sample size: 45 pieces per test
Reflow: 1X @ 255°C

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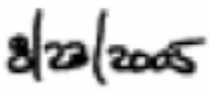
International Rectifier components and their homogeneous sub-components manufactured under the Lead Free Program [1] are in compliance with European Union Directive 2002/95/EC (RoHS Directive) of the European Parliament and of the Council of 27 January 2003. IR parts that have been identified as RoHS compliant do not exceed the maximum limit for following 6 designated substances.

Substance	**Maximum Limit (ppm)**
Cadmium (Cd)	100
Lead (Pb)	1000 [2]
Mercury (Hg)	1000
Hexavalent Chromium (Cr^{6+})	1000
Poly Brominated Biphenyls (PBB)	1000
Poly Brominated Diphenyl Ethers (PBDE)	1000

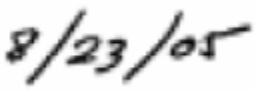
(1) Part numbers typically contain a "PBF" suffix
(2) Maximum limit (ppm) does not apply to applications for which exemptions have been granted by the RoHS Directive

Our statements in this letter regarding RoHS compliance and lead content do not extend to, or apply to any product subjected to unintended contamination, misuse, neglect, accident, improper installation, or to use in violation of instructions furnished by IR. We additionally note that IR products in certain specific large outline packages could contain high temperature solder die attach material having greater than 85% lead content, which is considered exempt from ELV Directive, Article 4(2)(a) by Annex II and RoHS Directive, Article 4(1) by Annex (7).

Authorized signatures for International Rectifier:

Name:  Greg Takagi Date: 

Position: Director, Global Environmental Health and Safety

Name:  Danny Narabal Date: 

Position: Director, Package Engineering

The information contained in this letter is being provided for informational purposes only and to clarify certain information concerning IR products. Nothing provided in this letter is (i) a representation, warranty or agreement to indemnification by IR, (ii) a statement which may form the basis of reliance by IR, (iii) a modification of any of the terms and conditions of sale agreed to in writing between IR and its customers with respect to any IR products, whether previously sold or to be sold in the future.

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Results:

	PBB/PDBE	Cr(VI)	PVC	Asbestos
Sample Name	ppm (wt.)	ppm (wt.)	ppm (wt.)	P/NP
Blank	<10.	<1.0	<1.0	NP
IRF4905PBF (TO-220)	<10.	<1.0	<1.0	NP
IRFP450PBF (TO-247)	<10.	<1.0	<1.0	NP
IRF740SPBF (D2-PAK)	<10.	<1.0	<1.0	NP
IRFR3707ZPBF (D-PAK)	<10.	<1.0	<1.0	NP
IRLL2705PBF (SOT-223)	<10.	<1.0	<1.0	NP
IRF6603 (DirectFET)	<10.	<1.0	<1.0	NP
IRLML6401TRPBF (Micro-3)	<10.	<1.0	<1.0	NP
IRLMS6802TRPBF (Micro-6)	<10.	<1.0	<1.0	NP
IRF7821PBF(SO-8)	<10.	<1.0	<1.0	NP
IR2153PBF (8L PDIP)	<10.	<1.0	<1.0	NP
IRF7503TRPBF (Micro-8)	<10.	<1.0	<1.0	NP
IR3086AMPBF (20L MLPQ)	<10.	<1.0	<1.0	NP