

Delivery issue of D2PAK 7L,  
D2PAK WL, T0247AD, ST0-247,  
STO220

IRF BE TIJ assembly site

Executive Summary

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# Problem Statement

- › IRF has had a distressed supplier issue with one of our lead frame supplier's raw material providers. The raw material supplier was forced into bankruptcy and ordered to cease operations. The situation with the raw material supplier has led to a significant disruption in material supply to our lead frame supplier.
- › In order for our lead frame supplier to continue supply they needed to manufacture with a change in source and material from CuNiP to CuFeP alloy to meet our production demands.
- › This CuFeP alloy lead frame is used in other IRF volume products.
- › In order to ensure continuous supply to our customers, IRF BE Tijuana assembly site must manufacture the following products using the slightly different leadframe Cu alloy.

Product	1 <sup>st</sup> potential manufacture date	Effective Date Code
D2PAK 7L	March 1, 2016	1609
D2PAK WL	March 1, 2016	1609
T0-247AD (LL)	April 4, 2016	1614
Super T0-247	April 18th	1616
Super 220	May 23, 2016	1621

# Risk Assessment

- › IRF has analyzed this change and consider the conversion from CuNiP to CuFeP very low risk due to CuFeP is used in other IRF products and qualified on similar packages
  - IRF BE TIJ has experience in manufacturing
    - over 72 million of DPAK products using CuFeP alloy and source
    - over 889 million units across D2PAK, TO-220 & TO-247 products using CuFeP alloy from another source
  - IRF Reliability Engineering has qualified the CuFeP lead frame material in previous qualification reports summarized below with no failures

Package Style	Part Number	Alloy Name	Qty ( Units )	Qual Report	Date	Qual Level
D2PAK 3L	44-0069-03	CuFeP	308 M	20637 13410	10/3/2014 3/14/14	Industrial Automotive
D2PAK 5L	44-0079-01	CuFeP	14.6 M	11619	11/18/2011	Automotive
D2PAK 7L	44-0160-01	CuFeP	142 M	13290	1/14/2014	Automotive
D2PAK EIF VI 5L	44-0212	CuFeP	65.8 M	13462	9/30/2012	Automotive
D2PAK EIF VI 7L	44-0234-01	CuFeP	19.1 M	12765	3/8/2013	Automotive
	44-0216	CuFeP	8.1 M	12358	9/8/2010	Automotive
	44-0220-01	CuFeP	6.9 M	11849	2/11/2016	Automotive
TO-220 3L	44-0155-02	CuFeP	219 M	11813	3/14/2014	Automotive
TO-247 3L	44-0023-02		69.8 M	20285 20754	1/30/2013 6/23/14	Automotive Industrial
	44-1351		3.5 M	21311	9/23/2014	Automotive

# Next Steps

- › To ensure a smooth transition in our factory to the alternate lead frame material IRF will be doing the following:
  - In Process Monitor:
    - In order to safe launch this change, BE TIJ will increase control plan frequency
  - Supplemental product validation for each package type will begin as product becomes available for reliability testing:
 

<u>QP Plan #</u>	<u>Package type</u>
▪ QP22141	- D2PAK WL
▪ QP22142	- D2PAK 7L
▪ QP22144	- TO247 for IGBT & FETS
▪ QP22147	- STO247
▪ QP22148	- STO220
  - Final Qualification reports targeted between June 7, 2016 and July 29, 2016
  - Supply Plan
    - Continue to produce and put the new Cu Alloy product on hold in FG inventory pending PCN and/or customer approval

# Summary and Next Steps

## › Summary:

- IRF views this change as notifiable PCN and considers this very low risk based on similarities between Cu alloys, manufacturing experience and previous qualifications on similar products and materials
- Please advise any customer inquiries from this communication through your Customer Service or Sales contacts for resolution and advise approval of change to not disrupt supply



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