

International Rectifier – Temecula Reliability Laboratory

QS-9000 and ISO-9000 Certified Facility; SQ-1000 Certified Laboratory

HEXFET America Facility: 41915 Business Park Drive Temecula, CA 92590 Phone 909-676-7500 Fax 909-676-9154

QUALIFICATION REPORT

Title	D2Pak Pb free Qualification
Product/Part # *	Gen 3, 5, 7, 10.2 10.5 and derivatives D2Pak N-channel devices
Qualification Level	Q101 or current qualification level
MSL	MSL1 @260°C
Silicon Technology	FET

REVISION HISTORY

#	Date	Author	Description of Changes
A	2/22/04	Rel. Engr.	Initial Draft

INTRODUCTION

In compliance with worldwide Industry initiative of “Lead Free” material for semiconductor fabrication, IR is proposing the conversion of the existing 85%Pb/15%Sn solder plating process to a 100% Sn plating process for the assembly of D2Pak devices.

In addition to the qualification of this new plating process, the surface mount reflow temperature of these D2Pak devices will be increased to 260°C, according to the Industry “Lead-free” board mount requirements.

SUMMARY/CONCLUSION

Based on the results of reliability stress testing, the D2Pak N-channel devices are qualified for Pb free applications.

This qualification is limited to devices with Thermal Resistance rating of 0.75°C/Watt and above.

The surface mount reflow temperature for these devices should not exceed 260°C.

Reliability Engineer

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QUALIFICATION TEST RESULTS

Part Type	IRF3808S
Tests	Test: Temperature Cycling R#: 2825A3 Conditions: -55°C/150°C Duration: 1000 cycles Quantity: 1 lot x 77 devices Failures: 0 failures
	Test: High Humidity, High Temperature Reverse Bias (H3TRB) R#: 2825B3 Conditions: 85°C/85%RH/60V Duration: 1000 hours Quantity: 1 lot x 77 devices Failures: 0 failures
	Test: High Temperature Reverse Bias R#: 2825C2 Conditions: 175°C/60V Duration: 1000 hours Quantity: 1 lot x 77 devices Failures: 0 failures
	Test: Autoclave R#: 2825F3 Conditions: 121°C/100%RH/15psig Duration: 96 hours Quantity: 1 lot x 77 devices Failures: 0 failures

Part Type	IRFZ24NS
Tests	Test: Temperature Cycling R#: 2825A4 Conditions: -55°C/150°C Duration: 1000 cycles Quantity: 1 lot x 77 devices Failures: 0 failures
	Test: Autoclave R#: 2825F4 Conditions: 121°C/100%RH/15psig Duration: 96 hours Quantity: 1 lot x 77 devices Failures: 0 failures

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Part Type	IRFS11N50A
Tests	Test: Temperature Cycling R#: 2825A7 Conditions: -55°C/150°C Duration: 1000 cycles Quantity: 1 lot x 77 devices Failures: 0 failures
	Test: High Humidity, High Temperature Reverse Bias (H3TRB) R#: 2825B7 Conditions: 85°C/85%RH/100V Duration: 1000 hours Quantity: 1 lot x 77 devices Failures: 0 failures
	Test: High Temperature Reverse Bias R#: 2825C8 Conditions: 150°C/400V Duration: 1000 hours Quantity: 1 lot x 77 devices Failures: 0 failures
	Test: High Temperature Gate Bias R#: 2825D8 Conditions: 150°C/24V Duration: 1000 hours Quantity: 1 lot x 77 devices Failures: 0 failures
	Test: Intermittent Operating Life (Power Cycling) R#: 2825E7 Conditions: $\Delta T_j = 100^\circ\text{C}$ Duration: 8,572 cycles Quantity: 1 lot x 77 devices Failures: 0 failures
	Test: Autoclave R#: 2825F7 Conditions: 121°C/100%RH/15psig Duration: 96 hours Quantity: 1 lot x 77 devices Failures: 0 failures
	Test: Autoclave R#: 2825F7 Conditions: 121°C/100%RH/15psig Duration: 96 hours Quantity: 1 lot x 77 devices Failures: 0 failures

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Part Type	IRF3710ZS
Tests	Test: Temperature Cycling R#: 2825A13 Conditions: -55°C/150°C Duration: 1000 cycles Quantity: 1 lot x 77 devices Failures: 0 failures
	Test: High Humidity, High Temperature Reverse Bias (H3TRB) R#: 2825B13 Conditions: 85°C/85%RH/80V Duration: 1000 hours Quantity: 1 lot x 77 devices Failures: 0 failures
	Test: High Temperature Reverse Bias R#: 2825C14 Conditions: 175°C/80V Duration: 1000 hours Quantity: 1 lot x 77 devices Failures: 0 failures

Part Type	IRFS31N20D
Tests	Test: Temperature Cycling R#: 2825A15 Conditions: -55°C/150°C Duration: 1000 cycles Quantity: 1 lot x 77 devices Failures: 0 failures
	Test: High Humidity, High Temperature Reverse Bias (H3TRB) R#: 2825B15 Conditions: 85°C/85%RH/100V Duration: 1000 hours Quantity: 1 lot x 77 devices Failures: 0 failures
	Test: High Temperature Reverse Bias R#: 2825C16 Conditions: 175°C/160V Duration: 1000 hours Quantity: 1 lot x 77 devices Failures: 0 failures
	Test: High Temperature Gate Bias R#: 2825D16 Conditions: 175°C/24V Duration: 1000 hours Quantity: 1 lot x 77 devices Failures: 0 failures
	Test: Autoclave R#: 2825F30 Conditions: 121°C/100%RH/15psig Duration: 96 hours Quantity: 1 lot x 77 devices Failures: 0 failures

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Part Type	IRF3415S
Tests	Test: Temperature Cycling R#: 2825A17 Conditions: -55°C/150°C Duration: 1000 cycles Quantity: 1 lot x 77 devices Failures: 0 failures
	Test: High Humidity, High Temperature Reverse Bias (H3TRB) R#: 2825B17 Conditions: 85°C/85%RH/100V Duration: 1000 hours Quantity: 1 lot x 77 devices Failures: 0 failures
	Test: High Temperature Reverse Bias R#: 2825C18 Conditions: 175°C/120V Duration: 1000 hours Quantity: 1 lot x 77 devices Failures: 0 failures
	Test: High Temperature Gate Bias R#: 2825D18 Conditions: 175°C/20V Duration: 1000 hours Quantity: 1 lot x 77 devices Failures: 0 failures
	Test: Autoclave R#: 2825F17 Conditions: 121°C/100%RH/15psig Duration: 96 hours Quantity: 1 lot x 77 devices Failures: 0 failures
	Test: Autoclave R#: 2825F17 Conditions: 121°C/100%RH/15psig Duration: 96 hours Quantity: 1 lot x 77 devices Failures: 0 failures

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Part Type	IRF1404S
Tests	Test: Temperature Cycling R#: 2825A19 Conditions: -55°C/150°C Duration: 1000 cycles Quantity: 1 lot x 77 devices Failures: 0 failures
	Test: High Humidity, High Temperature Reverse Bias (H3TRB) R#: 2825B19 Conditions: 85°C/85%RH/32V Duration: 1000 hours Quantity: 1 lot x 77 devices Failures: 0 failures
	Test: High Temperature Reverse Bias R#: 2825C21 Conditions: 175°C/32V Duration: 1000 hours Quantity: 3 lots x 77 devices Failures: 0 failures
	Test: High Temperature Gate Bias R#: 2825D21 Conditions: 175°C/20V Duration: 1000 hours Quantity: 1 lot x 77 devices Failures: 0 failures
	Test: Autoclave R#: 2825F19 Conditions: 121°C/100%RH/15psig Duration: 96 hours Quantity: 1 lot x 77 devices Failures: 0 failures
	Test: Autoclave R#: 2825F19 Conditions: 121°C/100%RH/15psig Duration: 96 hours Quantity: 1 lot x 77 devices Failures: 0 failures

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Part Type	IRF2804S
Tests	Test: Temperature Cycling R#: 2825A23 Conditions: -55°C/150°C Duration: 1000 cycles Quantity: 1 lot x 77 devices Failures: 0 failures
	Test: High Humidity, High Temperature Reverse Bias (H3TRB) R#: 2825B23 Conditions: 85°C/85%RH/32V Duration: 1000 hours Quantity: 1 lot x 77 devices Failures: 0 failures
	Test: High Temperature Reverse Bias R#: 2825C24 Conditions: 175°C/32V Duration: 1000 hours Quantity: 1 lot x 77 devices Failures: 0 failures
	Test: High Temperature Gate Bias R#: 2825D24 Conditions: 175°C/20V Duration: 1000 hours Quantity: 1 lot x 77 devices Failures: 0 failures
	Test: Intermittent Operating Life (Power Cycling) R#: 2825E23 Conditions: $\Delta T_j = 100^\circ\text{C}$ Duration: 8,572 cycles Quantity: 1 lot x 77 devices Failures: 0 failures
	Test: Autoclave R#: 2825F23 Conditions: 121°C/100%RH/15psig Duration: 96 hours Quantity: 1 lot x 77 devices Failures: 0 failures
	Test: Autoclave R#: 2825F23 Conditions: 121°C/100%RH/15psig Duration: 96 hours Quantity: 1 lot x 77 devices Failures: 0 failures

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Part Type	IRFS38N20D
	Test: High Humidity, High Temperature Reverse Bias (H3TRB) R#: 2825B9 Conditions: 85°C/85%RH/100V Duration: 1000 hours Quantity: 1 lot x 77 devices Failures: 0 failures
	Test: High Temperature Reverse Bias R#: 2825C10 Conditions: 175°C/160V Duration: 1000 hours Quantity: 1 lot x 77 devices Failures: 0 failures
	Test: High Temperature Gate Bias R#: 2825D10 Conditions: 175°C/24V Duration: 1000 hours Quantity: 1 lot x 77 devices Failures: 0 failures
	Test: Autoclave R#: 2825F9 Conditions: 121°C/100%RH/15psig Duration: 96 hours Quantity: 1 lot x 77 devices Failures: 0 failures

Part Type	IRFBG20L
	Test: High Humidity, High Temperature Reverse Bias (H3TRB) R#: 2825B25 Conditions: 85°C/85%RH/100V Duration: 1000 hours Quantity: 1 lot x 77 devices Failures: 0 failures
	Test: High Temperature Reverse Bias R#: 2825C25 Conditions: 150°C/800V Duration: 1000 hours Quantity: 1 lot x 76 devices Failures: 0 failures
	Test: Autoclave R#: 2825F25 Conditions: 121°C/100%RH/15psig Duration: 96 hours Quantity: 1 lot x 77 devices Failures: 0 failures