

**QR-0001:
 Reliability Qualification Report for
 IRS2153DSPBF**

Date: August 5th, 2005
 MSL2 Upgrade Date: 08/24/05

Qualification Vehicle: IRS2153DSPBF in 8L-SOICN package:

Based on the reliability test results, the IRS2153DSPBF has passed standard International Rectifier industrial-level qualification with MSL3 at 260 °C peak reflow temperature (PRT). The handling, packing, shipping and use of the moisture/reflow sensitive surface mount devices need to be per IPC/JEDEC J-STD-033A spec.

MSL3 to MSL2 Reliability Qualification Upgrade (Date: 08/24/05):

Based on the CSAM test results on post MSL2 samples, the IRS2153DSPBF has passed standard International Rectifier Industrial-Level qualification with MSL2 at 260 °C peak reflow temperature (PRT).

Device and Lot Information

Reliability Number	3612A-01/3627A-01	
Product/Part #	IRS2153DSPBF	
Qualification Level	Lead-Free Industrial per COP800-08-Rev00	
Silicon Technology	600 V HVIC	
Silicon Generation	Gen 5	
Wafer Fab	Fab11	
Wafer-Lot#	Qual Lot#1 (Lot ID 1): F311300.1 Qual Lot#2 (Lot ID 2): F311304.1 Qual Lot#3 (Lot ID 3): F311305.1	
Package	SOICN-8L	
Lead Finish Plating	100% Sn	
Assembly-Lot#	Qual Lot#1 (Lot ID 1):IC0405IB Qual Lot#2 (Lot ID 2):IC0405JG Qual Lot#3 (Lot ID 3):IC0405BF	D/C: 0520 D/C: 0520 D/C: 0521
Moisture Sensitivity Level	The first trial qualified with MSL3 @ 260 °C Per JEDEC spec JA113 / JEDEC J-STD-020C (Test samples were subjected to preconditioning prior to AC, TC & THB reliability tests, HTB samples doesn't require preconditioning). MSL3 to MSL2 (PRT=260 °C) Upgrade – refer to below MSL2 appended report. <u>The MSL-Level for this report is MSL2</u>	
Reliability Test Location	IR Temecula, USA	

Reliability Test Results:

Samples from three wafer lots and three assembly lots were tested in the following reliability tests to determine typical lifetime performance under industrial level qualification. The tests samples passed AC, TC, THB and HTB reliability test requirements.

Stress Test Conditions and Results are as follows:

Reliability Test #1 - Autoclave Test (AC):
 Test Duration: 96 Hours
 Test Condition: +121 °C, 100% RH and 15 PSIG
 Bias Condition: None
 Electrical Testing: @ Room

Device	Lot ID	Hour	SS	Reject	Remark
IRS2153DSPBF	1	96	80	0	
	2	96	80	0	
	3	96	80	0	

Reliability Test #2 - Temperature Cycling (TC):
 Test Duration: 1000 Cycles
 Test Condition: -55 °C to 150 °C ($\Delta T=205$ °C, Dry-Air to Dry-Air)
 Bias Condition: None
 Electrical Testing: @ Room

Device	Lot ID	Cycle	SS	Reject	Remark
IRS2153DSPBF	1	1000	80	0	
	2	1000	80	0	
	3	1000	80	0	

Reliability Test #3 - Temperature Humidity Bias (THB) Test:
 Test Duration: 1000 Hours
 Test Condition: 85 °C, 85% RH
 Bias Condition: $V_{CC}/V_B=14$ V
 Electrical Testing: @ Room

Device	Lot ID	Hour	SS	Reject	Remark
IRS2153DSPBF	1	1000	80	0	
	2	1000	80	0	
	3	1000	80	0	

Reliability Test #4 - High Temperature Bias (HTB) Test:
 Test Duration: 1008 Hours
 Test Condition: $T_j=150$ °C
 Bias Condition: $V_{CC}=14$ V, $V_{BS}=14$ V, $V_S=480$ V
 Electrical Testing: @ Room

Device	Lot ID	Hour	SS	Reject	Remark
IRS2153DSPBF	1	1000	80	0	
	2	1000	80	0	
	3	1000	80	0	

Other Required Tests Results:

1. **CSAM:** 100% CSAM on Pre AC & TC and sample CSAM after AC, TC & THB Rel Tests – No die top delamination - Passed.
2. **Destructive Physical Analysis:** on end of test (EOT) of TC and THB tests (SS = 1 unit/test/lot) – Passed (reference report: 05-3272/3612A-01-A1 and 05-3725/3612A-01-B1)
3. **Resistance to Solder Heat/Wave-Solder:** Test 30 devices from one lot per package/device-vehicle in accordance with JECC, JESD22A111 – Passed (reference report: 3347A-14-R27).
4. **Solderability:** Test 15 devices from one lot per package/device-vehicle in accordance with JESD-106-B – Passed (reference report: 3347A-14-S27).
5. **ESD:** The following is the results of ESD tests that were performed by the R/D (Design Center) group.

Device: IRS2153DPBF
 Lot# ICO5JE
 Number of samples: 3 per test combination
 Test Date: 06/15/04

Human Body Model ESD (100 pF/1500 Ω)	
Test Pin Combination	Rating
All Pin Combinations	2500 V

Machine Model ESD (200 pF/ 0 Ω)	
Test Pin Combination	Rating
VS-HO	100 V
All other pin combinations	500 V

6. **LATCH-UP:** The following is the results of the LU test that was performed by the R/D (Design Center) group.

Device: IRS2153DPBF
 Lot#: IC0405IB
 Number of samples per test: 3 devices per test

HO > VB	Latches up @ 800 mA
HO < VS	Latches up @ 600 mA
LO > VCC	Latches up @ 1.2 A
LO < COM	Latches up @ 1.6 A

End of report. See below for MSL2 upgrade.

MSL3 to MSL2 RELIABILITY QUALIFICATION UPGRADE REPORT (Project# 3627A-01):

Purpose:

The purpose of this qualification is to qualify and upgrade the moisture sensitivity level of 8L-SOIC package for IRS2153DS (HVIC, 600 V) from MSL3 to MSL2 at a peak reflow temperature of 260 °C, per JEDEC J-STD-20C.

Reliability Test Results:

Samples from two assembly lots of IRS2153DS were subjected to the following MSL2 test to determine the SO8 package moisture sensitivity level 2 performances. The MSL2 samples passed pre and post parametric and CSAM tests. The CSAM tests did not show any die top delamination for MSL2. The % mean shift difference between the parametric electrical testing of MSL2 and MSL3 are insignificant and both MSL2 and MSL3 show 0% die top delam. Based on the Moisture Sensitivity Level 2 test, the 8L-SOICN package of IRS2153DSPBF met the industrial level requirement and is qualified as MSL2 level. All the devices passed pre and post parametric testing for MSL2.

The Moisture Sensitivity Level test, electrical testing, and CSAM results are as follows:

MSL2 (Qual Lot/SS=2/22)

Pre Parametric Electric Testing
 Pre CSAM All Devices
 125 °C Bake for 24 Hours
 MSL2 (85 °C/60% RH for 168 Hours)
 3X Reflow at 260 °C Peak Temperature
 Post Parametric Electric Testing
 Post CSAM All Devices

MSL3 (Ctrl Lot/SS=1/22)

Pre Parametric Electric Testing
 Pre CSAM All Devices
 125 °C Bake for 24 Hours
 MSL3 (30 °C/60% RH for 192 Hours)
 3X Reflow at 260 °C Peak Temperature
 Post Parametric Electric Testing
 Post CSAM All Devices

Lot/Package/Device Info		MSL2 (PRT=260 °C)				MSL3 (PRT=260 °C)			
		Before MSL2		After MSL2		Before MSL3		After MSL3	
Lot Number	Package/Device/Fab	ET	Die-Top Delam	ET	Die-Top Delam	ET	Die-Top Delam	ET	Die-Top Delam
IC0505BF (MSL2)	8L-SOICN/IRS2153DS/11	0/22	0/22	0/22	0/22	-	-	-	-
IC0405IB (MSL2)	8L-SOICN/IRS2153DS/11	0/22	0/22	0/22	0/22	-	-	-	-
IC0405BF (MSL3)*	8L-SOICN/IRS2153DS/11	-	-	-	-	0/22	0/22	0/22	0/22

*control

End of upgrade report.