QR-0007:
Reliability Qualification Report for IRS216(6,8)D(S)PBF

Date: September 25th, 2006

Qualification Vehicle: IRS2166DSPBF and IRS2168DSPBF in 16L-SOICN package:

Based on the reliability test results, the qualification vehicles IRS2166DSPbF and IRS2168DSPbF in 16L-SOICN package passed standard International Rectifier Industrial-Level Qualification with MSL3 @ 260 °C. The handling, packing, shipping and use of the moisture/reflow sensitive surface mount devices need to be per IPC/JEDEC J-STD-033A spec.

Qualification Vehicle: IRS2166DPBF and IRS2168DPBF in 16L-PDIP package:

Based on the reliability test results, the qual vehicles IRS2166DPbF and IRS2168DPbF in 16L-PDIP package passed standard International Rectifier Industrial-Level Qualification.

Device and lot information

Rel Number	10270-1-2-3-4-5-6-7	
Product/Part #	IRS2166D(S)PBF and IRS2168D(S)PBF	
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 ID1: F3114251 Qual Lot#2/Lot ID2: F3114561 Qual Lot# 3/Lot ID3: F3114611 Qual Lot#4/Lot ID4: F3114611	Qual Lot#5/Lot ID5: F311425.1 Qual Lot#6/Lot ID6: F3114561 Qual Lot#7/Lot ID7: F312339.1
Package	16L-SOICN and 16L-PDIP	
Lead Finish Plating	100% Sn	
Assembly-Lot#/DC	Qual Lot#1/Lot ID1: IC1205DP / DC: 0603 Qual Lot#2/Lot ID2: IC1205DR-DS / DC: 0603 Qual Lot#3/Lot ID3: IC1205DO / DC: 0603 Qual Lot#4/Lot ID4: IC1205DUDDVDW / DC: 0606	Qual Lot#5/Lot ID5: IC1205DJ / DC: 0606 Qual Lot#6/Lot ID6: IC1205DL / DC: 0627 Qual Lot#7/Lot ID7: F312339.1 / DC: 0604
Moisture Sensitivity Level	16L-SOICN: MSL3 @ 260 °C Per JEDEC spec JA113 / JEDEC J-STD-020C (Test Samples were subjected to Precon prior to AC, TC & THB reliability tests, HTB and HTSL samples do not require precon). 16L-PDIP: does not requires MSL	
Reliability Test Location	IR Temecula, USA	

Reliability Test Results:

Samples from four wafer lots and three minimum assembly lots per package were tested in the following reliability tests to determine typical lifetime performance under industrial level qualification. The tests samples passed Autoclave (AC), Temperature Cycling (TC), Temperature Humidity Bias (THB), High Temperature Bias (HTB) and High Temperature Storage Life (HTSL) reliability test requirements.

The Stress Conditions and Results are as follows:

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

Device	Package	Lot ID	Hour	SS	Reject	Remark
IRS2168DSPBF	16L-SOICN	1	96	80	0	
IRS2168DSPBF	16L-SOICN	2	96	80	0	
IRS2166DSPBF	16L-SOICN	3	96	80	0	
IRS2168DPBF	16L-PDIP	4	96	80	0	
IRS2166DPBF	16L-PDIP	5	96	80	0	
IRS2166DPBF	16L-PDIP	6	96	80	0	

Reliability Test #2 - Temperature Cycling:
Test Duration: 1000 cycles
Test Condition: -55 °C to 150 °C (ΔT=205 °C, Dry-Air to Dry-Air)
Bias Condition: None
Electrical Testing: @ Room

Device	Package	Lot ID	Cycle	SS	Reject	Remark
IRS2168DS	16L-SOICN	1	1000	80	0	
IRS2168DS	16L-SOICN	2	1000	80	0	
IRS2166DS	16L-SOICN	3	1000	80	0	
IRS2168D	16L-PDIP	4	1000	80	0	
IRS2166D	16L-PDIP	5	1000	80	0	
IRS2166D	16L-PDIP	6	1000	80	0	

Reliability Test #3 - Temperature Humidity Bias (THB) Test:
Test Duration: 1000 hours
Test Condition: 85 °C, 85% RH
Bias Condition: IRS2166D/S: V_{CC}=14 V, V_{CT}=11 V, V_{BS}=14 V
IRS2168D/S: V_{CC}=14 V, V_{SD}=6 V, V_{BS}=14 V
Electrical Testing: @ Room

Device	Package	Lot ID	Hour	SS	Reject	Remark
IRS2168DSPBF	16L-SOICN	1	1000	80	0	
IRS2168DSPBF	16L-SOICN	2	1000	80	0	
IRS2166DSPBF	16L-SOICN	3	1000	80	0	
IRS2168DPBF	16L-PDIP	4	1000	80	0	
IRS2166DPBF	16L-PDIP	5	1000	80	0	
IRS2166DPBF	16L-PDIP	6	1000	80	0	

Reliability Test #4 - **High Temperature Bias (HTB) Test:**
Test Duration: 1000 Hours
Test Condition: T_j=150 °C
Bias Condition: IRS2166D/S: V_{CC}=14 V, V_{CT}= 11 V, V_{BS}=14 V, V_S=480 V
IRS2168D/S: V_{CC}=14 V, V_{SD}=6 V, V_{BS}=14 V, V_S=480 V
Electrical Testing: @ Room

Device	Package	Lot ID	Hour	SS	Reject	Remark
IRS2168DSPBF	16L-SOICN	1	1000	80	0	
IRS2168DSPBF	16L-SOICN	2	1000	80	0	
IRS2166DSPBF	16L-SOICN	3	1000	80	0	1 Cont Lo @ 168Hr, EOS per 06-00977*
IRS2166DSPBF	16L-SOICN	7	1000	80	0	
IRS2168DPBF	16L-PDIP	4	1000	79	0	
IRS2166DPBF	16L-PDIP	5	1000	79	0	
IRS2166DPBF	16L-PDIP	6	1000	80	0	

* Per JEDEC JESD47D Stress-Test-Driven Qualification of Integrated Circuits, §3.4: "If the cause of failure is the result of "mishandling" or EOS, the failure shall be discounted." http://www.jedec.org/

Reliability Test #5 - **High Temperature Storage Life (HTSL) Test:**
Test Duration: 1000 Hours
Test Condition: $T_{J/A}$=150 °C
Bias Condition: No bias required,
Electrical Testing: @ Room

Device	Package	Lot ID	Hour	SS	Reject	Remark
IRS2168DSPBF	16L-SOICN	2	1000	80	0	
IRS2166DSPBF	16L-SOICN	3	1000	45	0	
IRS2168DPBF	16L-PDIP	4	1000	45	0	
IRS2166DPBF	16L-PDIP	5	1000	45	0	

Other Required Test Results:

1. **Resistance to Solder Heat/Wave-Solder:** Test 30 devices from one lot per package/device-vehicle in accordance with JEDEC, JESD22A111 – Passed (reference report: IRS2168DSPBF/10270-1-RSH, IRS2168DPBF/10270-4-RSH, IRS2166DPBF/10270-5-RSH).
2. **Solderability:** Test 10 devices from one lot per package/device-vehicle in accordance with JESD-106-B – Passed (reference report: IRS2168DSPBF/10270-1-SLDR, IRS2168DPBF/10270-4-SLDR, IRS2166DPBF/10270-5-SLDR).
3. **ESD:** The following is the results of ESD tests that were performed by the R/D (Design Center) group.

Human Body Model ESD (100 pF/1500 Ω)	
Device: IRS2168DPBF Lot# C 0606DL DC: 629W Number of samples: 3 per test combination Test Date: 09/06/06 Test Method: Per JESD22-A114-B Classification Passed: Class 2 Parts passed after exposure to ESD pulse of 4000 V	
Test Pin Combination	Rating
All Pin Combinations	1 kV to 4 kV

Machine Model ESD (200 pF/ 0 Ω)	
Device: IRS2168DPBF Lot# C 0606DL DC: 629W Number of samples: 3 per test combination Test Date: 09/05/06 Test Method: Per EIA/JESD22-A115-A Classification Passed: Class C Parts passed after exposure to ESD pulse of 500 V	
Test Pin Combination	Rating
All Pin Combinations	500 V

Human Body Model ESD (100 pF/1500 Ω)	
Device: IRS2166DPBF Lot# C 0606BW DC: 627W Number of samples: 3 per test combination Test Date: 09/05/06 Test Method: Per JESD22-A114-B Classification Passed: Class 3A Parts passed after exposure to ESD pulse of 4500 V	
Test Pin Combination	Rating
All Pin Combinations	1 kV to 4.5 kV

Machine Model ESD (200 pF/ 0 Ω)	
Device: IRS2166DPBF Lot# C 0606BW DC: 627W Number of samples: 3 per test combination Test Date: 09/05/06 Test Method: Per EIA/JESD22-A115-A Classification Passed: Class C Parts failed after exposure to ESD pulse of 500 V	
Test Pin Combination	Rating
All Pin Combinations	500 V

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

Date: 23-AUG-06
Parts: IRS2168DPBF
Fab: Fab11
Date code: 629W
Lot Code: C 0606DL

Summary	NCH	PCH	
LO	0.9	See note	A
HO	0.4	See note	A
PFC	1.0	See note	A

Note: Test cannot be done due to the functionality of the product.

Date: 23-AUG-06
Parts: IRS2166DPBF
Fab: Fab11
Date code: 627W
Lot Code: C 0606BW

Summary	NCH	PCH		Notes
LO	0.7	1.8	A	NCH test breaks the part
HO	0.4	>2.0	A	NCH test breaks the part
PFC	0.5	See note	A	NCH test breaks the part

Note: Test cannot be done due to the functionality of the product.

End of report.