Q100 Qualification Test Plan

Automotive Grade Level = 1 -40 to +125C MSL = 3

Supplier Name:	Power Integrations	**General Specification:**	AEC-Q100 Rev. H
Supplier Code:		**Supplier Wafer Fabrication:**	XFAB Lubbock, Texas, USA
Supplier Part Number:	SID1182KQ	**Supplier Wafer Test:**	XFAB Lubbock, Texas, USA
Supplier Contact:	Muhib Khan, Director of Quality & Reliability	**Supplier Assembly Site:**	Unisem (M) Berhad, Ipoh, Perak, Malaysia
Supplier Family Type:	Scale-iDriver	**Supplier Final Test Site:**	Unisem (M) Berhad, Ipoh, Perak, Malaysia
Device Description:	Single Channel IGBT/MOSFET Gate Driver	**Supplier Reliability Signature:**	
PPAP Submission Date:		**Customer Test ID:**	
Reason for Qualification:	New Part Qualification	**Customer Part Number:**	
Prepared by Signature:	Nick Stanco Date: 12/20/17	**Customer Approval Signature:**	Date:

Test	#	Reference	Test Conditions	Lots	S.S.	Total	Results Lot/Pass/Fail	Comments: (N/A =Not Applicable)
TEST GROUP A – ACCELERATED ENVIRONMENT STRESS TESTS								
PC	A1	JESD22 A113 J-STD-020	Preconditioning: (Test @ Rm) SMD only; Moisture Preconditioning for THB/HAST, AC/UHST, TC, & PTC; Peak Reflow Temp = 260C	Min. MSL = 3			MSL = 3	Passed
THB or HAST	A2	JESD22 A101 JESD22 A110	Temperature Humidity Bias: (Test @ Rm/Hot) 85C, 85% RH Highly Accelerated Stress Test: (Test @ Rm/Hot/) NA	3	77	231	0 of 231	Passed
AC or UHST or TH	A3	JESD22 A102 JESD22 A118 or JESD22-A101	Autoclave: (Test @ Rm) Unbiased Highly Accelerated Stress Test: (Test @ Rm) Temperature Humidity without Bias: (Test @ Rm) 110C, 85% RH	3	77	231	0 of 231	Passed
TC	A4	JESD22 A104	Temperature Cycle: (Test @ Hot) -40C/+125C Post-TC Bond Pull Passed	3	77	231	0 of 231	Passed
PTC	A5	JESD22 A105	Power Temperature Cycle: (Test @ Rm/Hot) -40C to +125C, biased 5 min on/5 min off	1	45	45	0 of 45	Passed
HTSL	A6	JESD22 A103	High Temperature Storage Life: (Test @ Rm/Hot) 150C	1	45	45	0 of 45	Passed

Test	#	Reference	Test Conditions	Lots	S.S.	Total	Results Lot/Pass/Fail	Comments: (N/A =Not Applicable)
TEST GROUP B – ACCELERATED LIFETIME SIMULATION TESTS								
HTOL	B1	JESD22 A108	High Temp Operating Life: (Test @ Rm/Cold/Hot) 125C	3	77	231	0 of 231	Passed
ELFR	B2	AEC-Q100-008	Early Life Failure Rate: (Test @ Rm/Hot) 125C	3	800	2400	0 of 2400	Passed
EDR	B3	AEC-Q100-005	NVM Endurance & Data Retention Test: (Test @ Rm/Hot) Not Applicable	3	77	231	of	N/A
TEST GROUP C – PACKAGE ASSEMBLY INTEGRITY TESTS								
WBS	C1	AEC-Q100-001 AEC-Q003	Wire Bond Shear Test: (Cpk > 1.67) 1.0 mil Wire Cpk for each of 3 lots:3.18, 3.08, 3.98 2.0 mil Wire Cpk for each of 3 lots: 3.85, 3.77, 3.62	30 bonds	5 parts Min.	90 bonds	0 of 90	All bonds passed
WBP	C2	Mil-STD-883, Method 2011 AEC-Q003	Wire Bond Pull: (Cpk > 1.67); Each bonder used 1.0 mil Wire Cpk for each of 3 lots: 2.24, 2.08, 2.32 2.0 mil Wire Cpk for each of 3 lots: 4.86, 2.86, 3.93	30 bonds	5 parts Min.	90 bonds	0 of 90	All bonds passed
SD	C3	JESD22 B102 JSTD-002D	Solderability: (>95% coverage) 8hr steam aging prior to testing 245C Solder DIp	1	15	15	0 of 15	Passed
PD	C4	JESD22 B100, JESD22 B108 AEC-Q003	Physical Dimensions: (Cpk > 1.67) All dimension meet Cpk >2	3	10	30	0 of 30	Passed
SBS	C5	AEC-Q100-010 AEC-Q003	Solder Ball Shear: (Cpk > 1.67); 5 balls from min. of 10 devices	3	50 balls		of	N/A
LI	C6	JESD22 B105	Lead Integrity: (No lead cracking or breaking); Through-hole only; 10 leads from each of 5 devices	1	50 leads		of	N/A
TEST GROUP D – DIE FABRICATION RELIABILITY TESTS								
EM	D1	JESD61	Electromigration: Per JEP 119	-	-	-	3	Data Available Passed
TDDB	D2	JESD35	Time Dependant Dielectric Breakdown:	-	-	-	3	Data Available Passed
HCI	D3	JESD60 & 28	Hot Carrier Injection: JESD28	-	-	-	3	Data Available Passed

Test	#	Reference	Test Conditions	Lots	S.S.	Total	Results Lot/Pass/Fail	Comments: (N/A =Not Applicable)
NBTI	D4	JESD90	Negative Bias Temperature Instability: Per JP 001	-	-	-	1	Data Available Passed
SM	D5	JESD61, 87, & 202	Stress Migration: Per JEP 139 and JP 001	-	-	-	1	Data Available Passed

TEST GROUP E- ELECTRICAL VERIFICATION

Test	#	Reference	Test Conditions	Lots	S.S.	Total	Results Lot/Pass/Fail	Comments: (N/A =Not Applicable)
TEST	E1	User/Supplier Specification	Pre and Post Stress Electrical Test: Pre- and post- HTOL	All	All	All	0 of 231	Passed
HBM	E2	AEC-Q100-002	Electrostatic Discharge, Human Body Model: (Test @ Rm/Hot); (2KV HBM / Class 2 or better) Class 2	1	3	3	0 of 3 ESD Level = 2	Passed
CDM	E3	AEC-Q100-011	Electrostatic Discharge, Charged Device Model: (Test @ Rm/Hot); (750V corner leads, 500V all other leads / Class C4B or better) C5	1	3	3	0 of 3 ESD Level = C5	Passed at 750V on all pins
LU	E4	AEC-Q100-004	Latch-Up: (Test @ Rm/Hot) 125C	1	6	6	0 of 6	Passed
ED	E5	AEC-Q100-009 AEC-Q003	Electrical Distributions: (Test @ Rm/Hot/Cold) (where applicable, Cpk >1.67) -40C, 25C, 125C	3	30	90	0 of 90	Passed
FG	E6	AEC-Q100-007	Fault Grading:	-	-	-	Fault Grade Other (explain)	Not applicable to an asynchronous mixed signal device
CHAR	E7	AEC-Q003	Characterization: (Test @ Rm/Hot/Cold) Same as E5	-	-	-	Requested Data	Same as E5
EMC	E9	SAE J1752/3	Electromagnetic Compatibility (Radiated Emissions)	1	1	1		Passed
SC	E10	AEC Q100-012	Short Circuit Characterization	3	10	30		N/A. SID1182KQ is not a smart power device, and does not belong in a 12V system.
SER	E11	JESD89-1 JESD89-2 JESD89-3	Soft Error Rate	1	3	3		N/A. SIC1182KQ does not contain any non-volatile memory devices.
LF	E12	AEC-Q005	Lead (Pb) Free: (see AEC-Q005)	-	-	-	360	Passed

Test	#	Reference	Test Conditions	Lots	S.S.	Total	Results Lot/Pass/Fail	Comments: (N/A =Not Applicable)

TEST GROUP F – DEFECT SCREENING TESTS

Test	#	Reference	Test Conditions	Lots	S.S.	Total	Results Lot/Pass/Fail	Comments: (N/A =Not Applicable)
PAT	F1	AEC-Q001	Process Average Testing: (see AEC-Q001)	All	All	All	Reject units outside Avg.	Completed
SBA	F2	AEC-Q002	Statistical Bin/Yield Analysis: (see AEC-Q002)	All	All	All	Reject units outside criteria	Completed

TEST GROUP G – CAVITY PACKAGE INTEGRITY TESTS (for Ceramic Package testing only)

Test	#	Reference	Test Conditions	Lots	S.S.	Total	Results Lot/Pass/Fail	Comments: (N/A =Not Applicable)
MS	G1	JESD22 B104	Mechanical Shock: (Test @ Rm)	1	15	15	of	N/A
VFV	G2	JESD22 B103	Variable Frequency Vibration: (Test @ Rm)	1	15	15	of	N/A
CA	G3	MIL-STD-883 Method 2001	Constant Acceleration: (Test @ Rm)	1	15	15	of	N/A
GFL	G4	MIL-STD-883 Method 1014	Gross and Fine Leak:	1	15	15	of	N/A
DROP	G5	------------------	Drop Test: (Test @ Rm) MEMS cavity parts only. Drop part on each of 6 axes once from a height of 1.2m onto a concrete surface.	1	5	5	of	N/A
LT	G6	MIL-STD-883 Method 2004	Lid Torque:	1	5	5	of	N/A
DS	G7	MIL-STD-883 Method 2019	Die Shear:	1	5	5	of	N/A
IWV	G8	MIL-STD-883 Method 1018	Internal Water Vapor:	1	3	3	of	N/A