
		Approved	
		Specification	
Document #:	700489	Revision:	1
Process Owner:	Ronald Barr	Effective Date:	Jul 29, 2019
Title:	Qualification Report TP65H070LDG, TP65H070LSG		

1. Purpose
 - a. The purpose of this specification is to document the Qualification Report for all TP65H070LDG AND TP65H070LSG parts
2. Scope
 - a. The products listed in section 1 are fully qualified and released to production.
 - b. Qualification test results on these products may reference existing qualification results of similar products per the use of generic data as defined in section 2.2 of AEC-Q101 Rev D1
 - c. Each of the referenced part numbers share the same major assembly process and material elements as defined in Stress Test qualification for Automotive Grade Semiconductors, AEC-Q101 and are considered to be part of the same qualification family.
3. Qualification Process
 - a. All Fab Lots were processed separately with a discrete amount of time between lots. All lots were assembled using the same Assembly House, on the same assembly line. All lots undergo Final Test using the documented test flow and are screened against documented test limits as appropriate to their part number. All processes and test conditions are documented and maintained under revision control as part of the Transphorm Quality Management System.
 - b. Documented process and test conditions that are used for qualification of products are designated "Process of Record". Changes to the Process of Record are managed through the Process/Product Change Notification Procedure, which is part of the Transphorm Quality Management System.
4. ESD Results: 3 parts pass for each test
 - a. Standard Used: ANSI/ESDA/JEDEC JS-002-2018

Product Family	CDM	HBM	
TP65H070L	≥ 2000V / C7	± 450V / 1A	

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5. Mechanical Tests

Test Name	Sample	Result
Wire bond strength	3 lots, 1 unit per lot, all wires	0 Fails PASS
Bond Shear	3 lots, 1 unit per lot, all balls	0 Fails PASS
Die Shear	3 lots, 2 unit per lot, all die	0 Fails PASS

6. Reliability Testing

- a. Failed devices are analyzed for root cause and correction. Only a representative sample needs to be analyzed, though some level of analysis will be applied to every failed part. Acceptable root cause and corrective action and successful demonstration of corrective and preventative actions will constitute successful qualification of a device. The part and/or qualification family can be qualified as long as containment of any problems is demonstrated until corrective and/or preventative actions are in place.

7. Electrical Test Parameters


- a. Components submitted for qualification testing must meet all datasheet parameters before and after stress testing
- b. Components for qualification testing must also meet the requirements for parameter shift as defined in section 2.5 of AEC Q101-Rev-D1 as defined:
 - i. All post stress test electrical parameters must be within plus or minus 20% of the initial reading prior to initiating stress test with the exception of leakage tests that must be within 10 times the initial value for moisture related tests and 5 times initial value for all other stress tests.
 - ii. Parameter shift limits for any leakages nominally below 100nA are not required due to limitations of the measurement accuracy and repeatability.

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8. Electrical Reliability Qualification Test Results

TEST	SYMBOL	CONDITIONS	SAMPLE	RESULT
Moisture/Reflow Sensitivity	MSL-3	MSL-3 Pb-free T _C = 260°C	9 lots 25 units per lot 225 total parts	0 Fails PASS
High Temperature Reverse Bias	HTRB	T _J = 150°C V _{DS} = 520V 1000 HRS	3 lots 25 parts per lot 75 total parts	0 Fails PASS
Highly Accelerated Temp and Humidity Test	HAST	130°C, 85% RH 33.3 PSI Bias = 100V 96 HRS MSL pre-con	3 lots 25 parts per lot 75 total parts	0 Fails PASS
Temperature Cycle	TC	-40°C / 125°C 2 Cycles / HR 500 Cycles MSL pre-con	3 lots 25 parts per lot 75 total parts	0 Fails PASS
Power Cycle	PC	25°C / 125°C ΔT = 100°C 7500 Cycles	3 lots 25 parts per lot 75 total parts	0 Fails PASS
High Temperature Gate bias	HTGB	150°C 1000 HRS V _{GSS} = 18V	3 lots 25 parts per lot 75 total parts	0 Fails PASS
Unbiased Highly Accelerated Temp and Humidity Test	UHAST	130C, 85%RH, 33.3 PSI, 96 Hrs MSL pre-con	3 lots 25 parts per lot 75 total parts	0 Fails PASS

Parts for Power Cycle and Temperature Cycle will be mounted to printed circuit board.

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9. Referenced Documents

- a. AEC-Q101: Stress Test Qualification for Automotive Grade Discrete Semiconductors
- b. JESD47: Stress-Test Driven Qualification of Integrated Circuits
- c. MIL-PRF-38535: Performance specification-Integrated Circuits Manufacturing General Specification for Department of Defense
- d. JESD22-A108C: High Temperature Reverse Bias (HTRB)
- e. JESD22-A110D: Highly Accelerated Temperature and Humidity Stress Test (HAST)
- f. JESD22-A104D: Temperature Cycle (TC)
- g. JESD22-A122: Power Cycle (PC)
- h. JS-001-2012: Electrostatic Discharge Human Body Model
- i. J-STD-020D.1: Moisture/Reflow Sensitivity Classification
- j. JESD22-A102: Pre-conditioning
- k. M2011: Wirebond strength
- l. JESD22-B116: Bond Shear

10. Signature Approval



Ronald Barr
 VP Quality
 July 29, 2019