

ICEMOS M series SiC MOSFET Product Qualification Reliability Test Report

ICE14M120W4

Report Description

This report describes the characteristics of the product as it pertains to the device quality and reliability. The samples used for this qualification were taken from production lots that were manufactured and tested using our standard production processes and meet the device specifications.

The qualification test results of the product as outlined in this document are based on recognized industry standard reliability test methods.

Qualification Assessment

This product has successfully completed all qualification reliability testing to meet the recognized industry standards and is therefore granted “Full Qualification” status from 2026. This reliability report is subject to appropriate updates as required.

For additional information, please contact your IceMOS Sales Representative. (www.icemostech.com).

ISSUED BY: ICEMOS TECHNOLOGY

Product: ICE14M120 Bare Die and ICE14M120W4
Package: 1200V Typ 14.5mohm TO247-4L
MSL Level: MSL-1

Items	Test Description(Abbr.)	Test method.	Stress Condition	Sample Qty.	Electric al Reject	Result
1	Temperature Cycle(TCT)	JESD22-A104	1000 cycles, ΔT_a -55 to 150°C Transition time: approx. 15 min Hold time: approx. 5 min Test cycle: 1,000 cycles	77pcs*3lot	0/231	PASS
2	Unbiased HSAT, (UHAAT)	JESD22 A-118	96hrs T_a = 130 °C /85%RH,	77pcs*1lot	0/77	PASS
3	Steady State Gate Bias positive (HTGBP)	JESD22-A108	1000 hrs, VGS = +22V T_a = 175°C	77pcs*3	0/231	PASS
4	Steady State Gate Bias negative (HTGBN)	JESD22-A108	1000 hrs, VGS = -10V T_a = 175°C	77pcs*3	0/231	PASS
5	Steady State Reverse bias (HTRB)	Mil-Std. 750 Method 1038- Method A	1000 hrs, VDS = 1200V T_a = 175 °C	77pcs*3lot	0/231	PASS
6	Steady State Reverse bias (HTRB+)	Mil-Std. 750 Method 1038- Method A	1000 hrs, VDS = 1200V, VGS=-5V, T_a = 175 °C	77pcs*3lot	0/231	PASS
7	High Temp High Humidity Reverse Bias (H3TRB)	JESD22 A-101	1000 hrs, VDS = 960V T_a = 85°C, RH = 85%	77pcs*3lot	0/231	PASS
8	High Temp High Humidity Reverse Bias (H3TRB+)	JESD22 A-101	1000 hrs, VDS = 960V,Vgs=- 5V T_a = 85°C, RH = 85%	77pcs*3lot	0/231	PASS
9	Intermittent Operational Life (IOL)	Mil-Std. 750 Method 1037	$\Delta T_j \geq 100^\circ\text{C}$; ton/toff=3min/3min 1000 hrs	77pcs*3lot	0/231	PASS
10	ESD Human Body Model (ESDH)	AECQ101- RevA July 18 2005	Withstands ± 4000 V	30pcs*1 lot	0/30	PASS
11	ESD Charged Device Model (ESDC)	AECQ101- RevA Jan 29,2019	Withstands ± 1000 V	30pcs*1 lot	0/30	PASS
12	Physical Dimension (PD)	JESD22 B100B Jun 2006	Dimension	30pcs*1 lot	0/30	PASS
13	Whisker Growth Evaluation (WG)	AEC-Q005- Rev-A June 1,2010	Evaluation	3pcs*1 lot	0/3	PASS
14	Wire Bond Shear Strength (WBS)	AEC-Q101-003- REV-A July 18,2025	Test 120 bonding points from 20 devices	120p per 20pcs	0/20	PASS
15	Wire Bond Pull Strength (WBP)	MIL-STD-750- 2B Method 2037.1	Test 60 bond wires from 20 devices	60p per 20pcs	0/20	PASS
16	Die Shear, (DS)	MIL-STD-750- 2B Method 2017.3	Evaluation	10pcs*1lot	0/10	PASS
17	Terminal Strength (TS)	MIL-STD-750- 2B Method 2036.5	Evaluation	30pcs*1 lot	0/30	PASS

18	Solderability (SD)	EIA/IPC/JEDEC J-STD-002E	Evaluation	10pcs*1 lot	0/30	PASS
19	Dielectric Integrity (DI)	AEC-Q101-004	Evaluation	5pcs*1lot	0/5	PASS
20	Thermal Resistance (TR)	JESD24-3,24- 4,24-6	Evaluation	10 in total/3lots	0/10	PASS
21	Unclamped Inductive Switching, (UIS)	AEC-Q101-004- REV May 15,1996	Destructive test	10pcs*1 lot	0/10	PASS
22	Parametric Verification, (PV)	Datasheet spec	Test	25pcs*3 lot	0/75	PASS

Electrical Test Parameters

Electrical parameter tests shall be performed on the samples before and after the test; the test parameters, conditions, and acceptance criteria shall be in accordance with AEC-Q101.

Parameter	Test condition	Pass criteria	Test Items
IGSS1	VGS=10V, VDS=0V	Less than 5 times from initial value	HTRB/TC/IOL/HTGB
IGSS1	VGS=10V, VDS=0V	Less than 10 times from initial Value	H3TRB/UHAST
IGSS2	VGS=23V, VDS=0V	Less than 5 times from initial value	HTRB/TC/IOL/HTGB
IGSS2	VGS=23V, VDS=0V	Less than 10 times from initial Value	H3TRB/UHAST
VGS(TH)1	VDS=VGS, IDS=22mA	±20%	HTRB/TC/IOL/HTGB/H3TRB/UHAST
IDSS1	VDS=960V, VGS=0V	Less than 5 times from initial value	HTRB/TC/IOL/HTGB
IDSS1	VDS=960V, VGS=0V	Less than 10 times from initial Value	H3TRB/UHAST
IDSS2	VDS=1200V, VGS=0V	Less than 5 times from initial value	HTRB/TC/IOL/HTGB
IDSS2	VDS=1200V, VGS=0V	Less than 10 times from initial Value	H3TRB/UHAST
BVDSS1	ID=100μA	±20%	HTRB/TC/IOL/HTGB/H3TRB/UHAST
BVDSS2	ID=250μA	±20%	HTRB/TC/IOL/HTGB/H3TRB/UHAST
RDS(ON)1	VGS=15V, IDS=60A	±20%	HTRB/TC/IOL/HTGB/H3TRB/UHAST
RDS(ON)2	VGS=18V, IDS=60A	±20%	HTRB/TC/IOL/HTGB/H3TRB/UHAST
VSD1	VGS=-5V, ISD=100A	±20%	HTRB/TC/IOL/HTGB/H3TRB/UHAST

NOTE: The device's electrical test limits must meet the supplier's specifications. For IGSS/IDSS parameters with initial values less than 10 nA, the allowable leakage current after stress testing is: ≤100 nA for humidity testing, and ≤50 nA for all other tests.

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