Reliability Test Result

Product	IGBT	Package	THD	Type	RGS***

Test#	Test Description	Test Conditions	#Lots	#Tested	#Failed
3	External Visual		1	425	0
4	Parametric Verification		3	25	0
5	High Temperature Reverse Bias	1000H, Tj(max.), V=VCE(max.)	1	77	0
6	High Temperature Gate Bias	1000H, Tj(max.), V=VGE(max.)	1	77	0
7	Temperature Cycling	1000Cyc, MIN:-55℃ MAX:+150℃	1	77	0
8	Autoclave	96H, Ta=121℃, RH=100%, 15 psig	1	77	0
9	High Humidity High Temp. Reverse Bias	000H, Ta=85℃,85%RH, VCE=VCE(max	1	77	0
10	intermittent Operational Life	7,500Cyc, Ta=25℃, ΔTj≧125℃	1	77	0
11	ESD Characterization	HBM=H1C, CDM=C5	1	30	0
12	D.P.A.	Samples Completed Test #7 and #9	1	2	0
13	Physical Dimension		1	30	0
14	Terminal Strength		1	30	0
20	Resistance to Solder Heat		1	30	0
21	Solderability		1	10	0
23	Wire Bond Strength		1	10	0
24	Bond Shear		1	10	0
25	Die Shear		1	5	0

※ All tests are according to AEC-Q101 ver D.

Those tests were conducted for each manufacturing site.

3. Test description

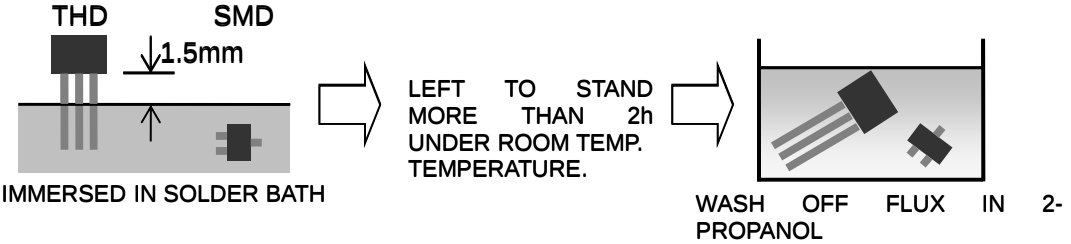
Test description	Test Condition	Failure criteria
1.Soldering heat resistance 1 *4	1) Solder Sn-3Ag-0.5Cu(Lead free) 2) <Method> Solder temperature 260±5℃ Immerse time 10±1s Leaded device：dip the leads once into solder bath the dipping depth should be up to the stopper when the specimen is provided with stopper, and up to 1 to 1.5mm from the body of the specimen when it is not provided with stopper. Surface mount device: dip the whole 3) After dipping, leave at room temperature for more than 2h	・Shall be no mechanical damage ・See ＊1 for failure criterion electrical characteristics
2.Soldering heat resistance 2 *4	1) Solder Sn-3Ag-0.5Cu(Lead free) 2) <Method> Solder temperature 350±10℃ Immerse time 3.5±0.5s Leaded device：dip the leads once into solder bath the dipping depth should be up to the stopper when the specimen is provided with stopper, and up to 1 to 1.5mm from the body of the specimen when it is not provided with stopper. Surface mount device: dip the whole 3) After dipping, leave at room temperature for more than 2h	・Shall be no mechanical damage ・See ＊1 for failure criterion electrical characteristics
3. Solderability *4	1) Solder Sn-3Ag-0.5Cu(Lead free) 2) Flux 2-propanol(IPA)(Rosin 25wt%) 3) <Method> Leader device:Immerse the leads into flux once TIL the point 1.0mm from the package body for 10s, then into solder bath of 245±5℃ TIL the point 1.0mm from the package body for 5±0.5s. (mini-mold surface mount device whole body to be immersed). Thereafter, leave for natural dry at room	・At least 95% of immersed surface must be covered by solder, which is confirmed through 10～20X magnifying glass
4. Heat shock *3	1) <Temperature.&Time> 95～100℃ → 0～5℃ (Liquid) 5min ← (Liquid) 5min 2) Freq. 100 cycles 3) After completion of test, leave at room temperature for more than 2h	・ See *1 for failure criteria on electrical characteristics.
5. Temperature cycle *3	1) <Temperature.&Time> -55℃ → 150℃ (AIR) 30min ← (AIR) 30min 2) Freq. 200 cycles 3) After completion of test, leave at room temperature for more than 2h	・ See *1 for failure criteria on electrical characteristics.
6. Temperature humidity bias *3	1) Ta=85±3℃ RH=85 $^{+5}_{-10}$ % 2) Time 1000h 3) VCE=BVCES(min) 4) After completion of test, leave at room temperature for more than 2h	・ See *1 for failure criteria on electrical characteristics.

7. Pressure cooker test *3	1) Ta=121℃、100%RH 2) P=203KPa{2atm} Time 100h 3) After completion of test, leave at room temperature for more than 2h	・See *1 for failure criteria on electrical characteristics.
8. High temperature reverse bias *3	1) Tj(max)±2℃ 2) Time 1000h 3) VCE=BVCES(min) 4) After completion of test, leave at room temperature for more than 2h	・SAME AS No.1
9. High temperature gate bias [only for FET] *3	1) Ta=Tj(max)±2℃ 2) Time 1000h 3) VGS=Maximum Rating 4) After completion of test, leave at room temperature for more than 2h	・SAME AS No.1
10. High temperature storage	1) Ta=Tstg(max) 2) Time 1000h 3) After completion of test, leave at room temperature for more than 2h	・SAME AS No.1
11. Low temperature storage	1) Ta=Tstg(min) 2) Time 1000h 3) After completion of test, leave at room temperature for more than 2h	・SAME AS No.1
12. Lead strength (Lead bend) [only for THD]	1) <Method> The sample body is fixed, and the terminal is to be bent by 90° twice, loading specified force to the axis direction.	・Shall be no mechanical damage, detachment, extention between the Lead and the package body
13. Lead strength (Lead pull)	1) <Method> The sample body is fixed, and keep pulling the lead in lead axis direction with specified load for 10±1s.	・Shall be no mechanical damage, detachment, extention between the Lead and the package body

4. Remark

*1 Failure criterion : According to the electrical characteristics specified by the specification

*2 Method of No.1,No.2



*3 Preconditioning

[only for SMD]

Soldering Heat resistance（reflow）is carried out after it is Leftunder the high temperature and the high humidity.(85℃,85%,168h) unless specially mentioned

*4 Preconditioning

Aging is done with the PCT device.(105℃,100%,1.22×105Pa,4h)