

Product	MOSFET	Package	TO-220AB
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## 1. TEST RESULT

TEST DESCRIPTION	TEST CONDITION	STANDARD	n [pcs]	Pn [pcs]
Soldering Heat Resistance	260±5°C , 10sec. , Solder-Bath	JESD22-A111	22	0
	350±5°C , 3sec. , Hand Soldering		22	0
Solderability	245±5°C , 3sec. , Solder-Bath	JESD22-B102	22	0
Heat Shock	0°C ~ 100°C , 100cycles	-	22	0
Temperature Cycle	-55±5°C←→150±5°C , 200cycles	JESD22-A104	22	0
High Temp. High Humidity Reverse Bias	85±2°C, 85±5%RH, Specified Bias ,1000hours	JESD22-A101	22	0
Pressure Cooker Test	121±2°C , 100%RH , 203kPa , 96hours	JESD22-A102	22	0
Load Life	25°C , P <sub>C</sub> =P <sub>D</sub> max. , 1000hours	-	22	0
High Temperature Reverse Bias	T <sub>a</sub> =T <sub>stg</sub> max. , Specified Bias , 1000hours	JESD22-A108	22	0
High Temperature Gate Bias	T <sub>stg</sub> max. , Applied Bias : V <sub>GSS</sub> (max), 1000hours	-	22	0
High Temperature Storage	T <sub>stg</sub> max. , 1000hours	-	22	0
Low Temperature Storage	T <sub>stg</sub> min. , 1000hours	-	22	0
Intermittent Operation Life	T <sub>a</sub> =25°C±5°C , ON 130sec /OFF 230sec, P <sub>c</sub> max., 10,000 cycles	EIAJ ED-4701/100 Test Method 106	22	0
Lead strength (lead bend)	Forcing 10N, Bending 90°,twice	EIAJ ED-4701/400 Test Method 401	22	0
Lead strength (lead pull)	Sample body fixed, pulling lead axis direction, 20N , 10±1sec.	JEITA ED-4701/400 Test Method 401	22	0

## 2. CRITERIA

ITEM	CONDITION	CRITERIA	
Gate-Source Leakage : I <sub>GSS</sub>	Per specification	Within two times of the standard value.	
Zero Gate Voltage Drain Current : I <sub>DSS</sub>	Per specification	Within two times of the standard value.	
Forward Transfer Admittance :  Y <sub>fs</sub>	Per specification	Changing rate of ±20%	
Physical	Visual check	No outstanding change in physical.	
Solderability	Visual check	Reflow Soldering	Immersed surface, other than the end of pin as cut-surface, must be covered by solder.
		Solder-Bath	More than 95% of the electrode must be covered with solder.

## 3. JUDGEMENT

No failure is observed from each test item.

## 4. TEST DESCRIPTION

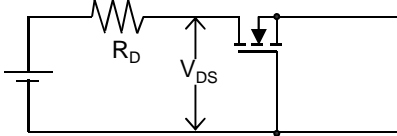
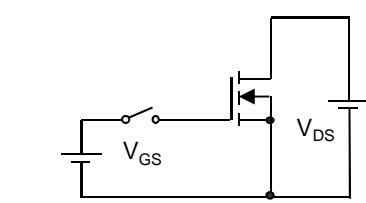
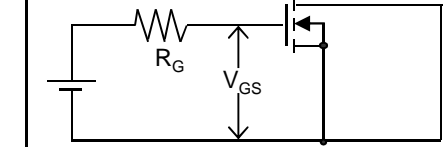
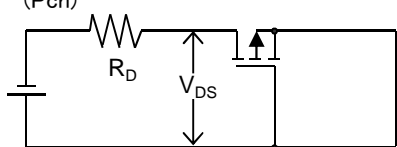
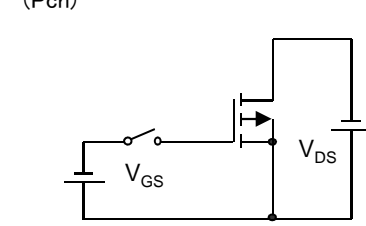
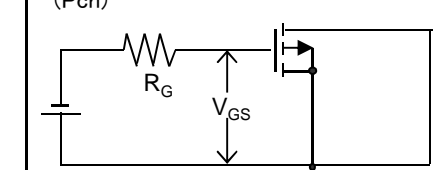
TEST DESCRIPTION	TEST CONDITION	CRITERIA
1. Soldering Heat Resistance	Preconditioning: High temperature high humidity storage (85°C/ 85%RH) 168hours 1. Reflow Solder paste: Sn-3Ag-0.5Cu Peak temperature: 260 +/- 5°C, Peak time: 10s 2. Solder bath Solder: Sn-3Ag-0.5Cu Solder temperature: 260 +/- 5°C, Immerse time: 10s 3. Solder iron Solder: Sn-3Ag-0.5Cu Solder temperature: 350 +/- 5°C, Soldering time:3s	1) Shall be no mechanical damage 2) See *1 for failure criteria on electrical characteristics.
2. Solderability *5	1. Reflow Solder paste: Sn-3Ag-0.5Cu Peak temperature: 245 +/- 5°C, Peak time: 3s 2. Solder bath Solder: Sn-3Ag-0.5Cu Solder temperature: 245 +/- 5°C, Immerse time: 3s	Reflow: Soldered edge, other than the end of pin as cut-surface, must be covered with solder fillet. Solder bath: More than 95% of the electrode must be covered with solder.
3. Heat Shock *4	100 +0/-5 °C (Boiled water) 0 +5/-0 °C (Iced water) each 5min per cycle Change within 10s, Duration: 100cycles	See *1 for failure criteria on electrical characteristics.
4. Temperature Cycle *4	150 +/-5 °C (Air chamber) -55 +/-5 °C (Air chamber) each 30min per cycle Change within 5min, Duration: 200cycles	See *1 for failure criteria on electrical characteristics.
5. High Temp. High Humidity Reverse Bias *4	Ta=85±2°C, 85 +/- 5 %RH, Applied specified bias *2 Duration: 1000hour	See *1 for failure criteria on electrical characteristics.
6. Pressure Cooker Test *4	Ta=121±2°C, 100%RH, P=203kPa {2atm} Duration: 96hour	See *1 for failure criteria on electrical characteristics.
7. Load Life *4	Ta=25±5°C Applied power *2 : P <sub>C</sub> /P <sub>D</sub> (max) Duration: 1000hour	See *1 for failure criteria on electrical characteristics.
8. High Temperature Reverse Bias *4	Ta=Tstg(max) Applied specified bias *2 Duration: 1000hour	See *1 for failure criteria on electrical characteristics.
9. High Temperature Gate Bias *4	Ta=Tstg(max) Applied bias *2: V <sub>GSS</sub> (max) Duration: 1000hour	See *1 for failure criteria on electrical characteristics.
10. High Temperature Storage	Ta=Tstg(max) Duration: 1000hour	See *1 for failure criteria on electrical characteristics.
11. Low Temperature Storage	Ta=Tstg(min) Duration: 1000hour	See *1 for failure criteria on electrical characteristics.
12. Intermittent Operation Life *3	Ta=25±5°C Applied power *2: P <sub>C</sub> /P <sub>D</sub> (max) ON 130s/OFF 230s per cycle Duration: 10,000cycles	See *1 for failure criteria on electrical characteristics.
13. Lead strength (lead bend)	The sample body is fixed, and the terminal is to be bent by 90° twice, loading specified force to the axis direction. (JEITA ED-4701/400)	Shall be no mechanical damage, detachment, extension between the lead and the package body.
14. Lead Strength (Lead Pull)	The sample body is fixed, and kept pulling the lead in lead axis direction with specified load for 10±1s.	Shall be no mechanical damage, detachment, extension between the lead and the package body.

**5.REMARK**

\*1 Criteria for electrical characteristics.

MOSFET
<ul style="list-style-type: none"> <li>• <math>I_{DSS} &gt; \text{Standard} \times 2</math></li> <li>• <math>I_{GSS} &gt; \text{Standard} \times 2</math></li> <li>• <math>\frac{\Delta Y_{fs}}{Y_{fs}} &gt; \pm 20\%</math></li> </ul>

\*2 Bias Circuit

HTRB/ HTRB	LL/TFT	HTGB
<p>(Nch)</p>  <p><math>V_{DS} = V_{(BR)DSS} (\text{max.})</math> or <math>0.8 \times V_{(BR)DSS} (\text{max.})</math></p>	<p>(Nch)</p> 	<p>(Nch)</p>  <p><math>V_{GS} = V_{GSS} (\text{max.})</math></p>
<p>(Pch)</p>  <p><math>V_{DS} = -V_{(BR)DSS} (\text{max.})</math> or <math>-0.8 \times V_{(BR)DSS} (\text{max.})</math></p>	<p>(Pch)</p> 	<p>(Pch)</p>  <p><math>V_{GS} = V_{GSS} (\text{max.})</math></p>

Bias for Power devices may be reduced as per individual specification.

\*3 Apply to only power transistors and power mosfet. (Over 1W of PC/PD)

\*4 Preconditioning : Soldering heat resistance (RSH) (260°C,10s) is carried out.

\*5 Preconditioning : AGING is done with the PCT device. (105°C,100%,1.22x10<sup>5</sup>Pa,4h)

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