

Product	Bipolar Transistor	Package	DFN2020-3S (HUML2020L3)
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1. TEST RESULT

TEST DESCRIPTION	TEST CONDITION	STANDARD	n [pcs]	Pn [pcs]
Soldering Heat Resistance	(1) 260±5°C , 10sec. , Reflow Soldering , 2 times	JESD22-A111	22	0
	(2) 260±5°C , 10sec. , Solder-Bath		22	0
	(3) 350±10°C , 3sec. , Hand Soldering		22	0
Solderability	(1) 245±5°C , 3sec. , Reflow Soldering	J-STD-002	22	0
	(2) 245±5°C , 3sec. , Solder-Bath	JESD22-B102	22	0
Thermal 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 , 100hours	JESD22-A102	22	0
Load Life	25°C , Pc=Pc max. , 1000hours	-	22	0
High Temperature Reverse Bias	Ta=Tstg max. , Specified Bias , 1000hours	JESD22-A108	22	0
High Temperature Storage	Tstg max. , 1000hours	-	22	0
Low Temperature Storage	Tstg min. , 1000hours	-	22	0

2. CRITERIA

ITEM	CONDITION	CRITERIA	
Cutoff Current : I_{CBO}	Per specification	Within two times of the standard value.	
Cutoff Current : I_{EBO}	Per specification	Within two times of the standard value.	
DC Current Gain : hFE	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

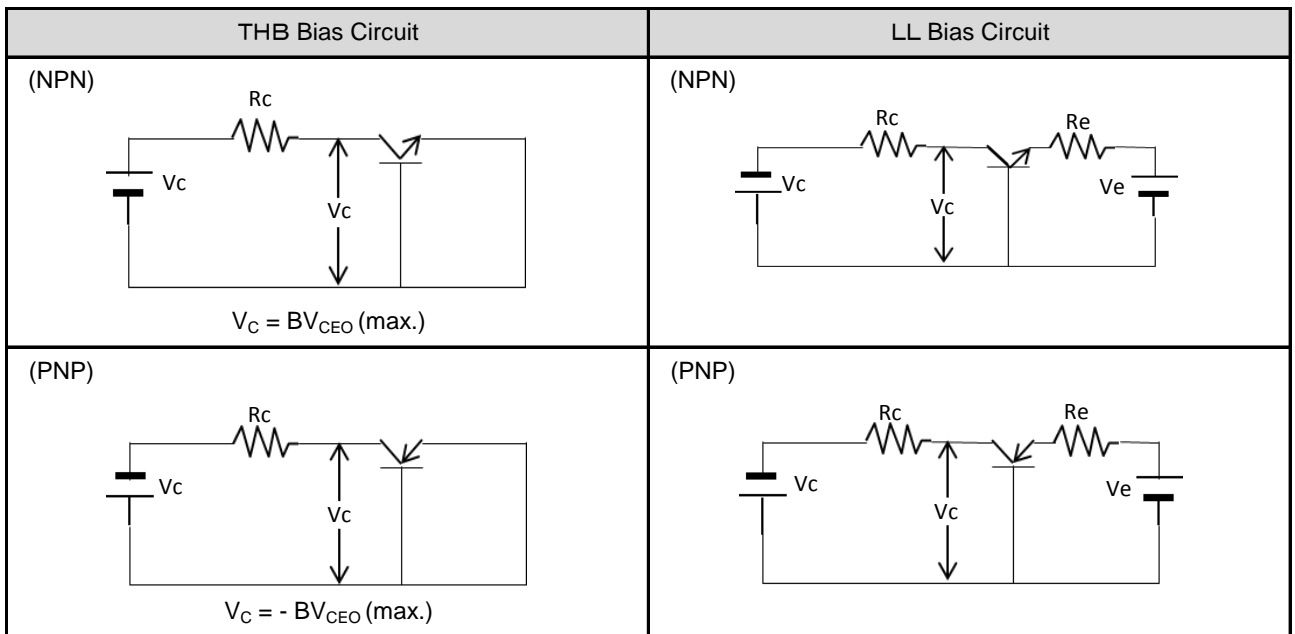
TEST DESCRIPTION	TEST CONDITION	CRITERIA
1. Soldering Heat Resistance *4	① 1) Reflow Soldering, 260±5°C(peak) , 10 sec. , 2 times 2) After reflow soldering, leave at room temp. for more than 2h.	• Shall be no mechanical damage. • See (*1) for criteria on electrical characteristics.
	② *3 1) Dip the whole body once into solder bath. 260±5°C, 10±1sec Solder : Sn-3Ag-0.5Cu (Lead free) 2) After dipping, leave at room temp. for more than 2h.	• Shall be no mechanical damage. • See (*1) for criteria on electrical characteristics.
	③ 1) Hand Soldering, 350±10°C , 3sec. 2) After testing, leave at room temp. for more than 2h.	• Shall be no mechanical damage. • See (*1) for criteria on electrical characteristics.
2. Solderability *5	① 1) Reflow Soldering, 245±5°C(peak) , 3sec. Solder : Sn-3Ag-0.5Cu (Lead free)	• Immersed surface, other than the end of pin as cut-surface, must be covered by solder.
	② *3 While body to be immersed, for 10 sec., then into solder bath of 245±5°C. Thereafter leave for natural dry at room temp. then wash off flux in 2-propanol. Solder : Sn-3Ag-0.5Cu (lead free) Flux : 2-propanol(IPA) (rosin 25wt%)	At least 95% of immersed surface, other than the end of pin as cut-surface, of must be covered by solder, which is observed through 10~20X magnifying glass.
3. Thermal Shock *6	1) Temp. & Time (Change within 10 sec.) 95~100°C (Liquid) , 5min ↔ 0~5°C (Liquid) , 5min 2) Freq. 100cycles. After completion of test, leave at room temp. for more than 2h.	See (*1) for criteria on electrical characteristics.
4. Temperature Cycle *6	1) Temp. & Time (Change within 5 sec.) 55°C (air) , 30min ↔ 150°C (air) , 30min 2) Freq. 200cycles. After completion of test, leave at room temp. for more than 2h.	See (*1) for criteria on electrical characteristics.
5. High Temp. High Humidity Reverse Bias *6	1) Ta=85±3°C, RH=75~90%、Time : 1000h 2) See (*2) for the THB bias. 3) After completion of test, leave at room temp. for more than 2h.	See (*1) for criteria on electrical characteristics.
6. Pressure Cooker Test *6	1) Ta=121°C, 100%RH, P=203KPa [2atm] 2) Time : 100h 3) After completion of test, leave at room temp. for more than 2h.	See (*1) for criteria on electrical characteristics.
7. Load Life *6	1) Ta=25±5°C, P _C /P _C (max), Time : 1000h 2) See (*2) for the THB bias. 3) After completion of test, leave at room temp. for more than 2h.	See (*1) for criteria on electrical characteristics.
8. High Temperature Reverse Bias *6	1) Ta=Tstg(max)±2°C, Time : 1000h 2) See (*2) for the THB bias. 3) After completion of test, leave at room temp. for more than 2h.	See (*1) for criteria on electrical characteristics.
9. High Temperature Storage	1) Ta=Tstg(max), Time : 1000h 2) After completion of test, leave at room temp. for more than 2h.	See (*1) for criteria on electrical characteristics.
10. Low Temperature Storage	1) Ta=Tstg(min), Time : 1000h 2) After completion of test, leave at room temp. for more than 2h.	See (*1) for criteria on electrical characteristics.

*** REMARK**

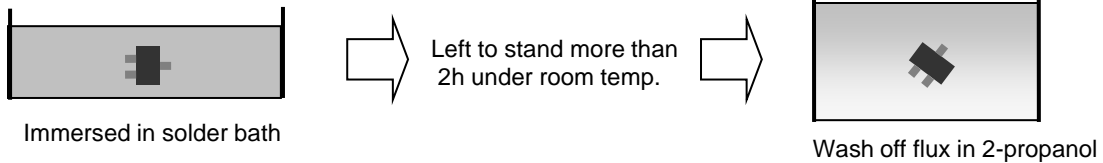
*1 Criteria for electrical characteristics.

Transistors
<ul style="list-style-type: none"> • $I_{CBO} > \text{Standard} \times 2$ • $I_{EBO} > \text{Standard} \times 2$ • $\frac{\Delta hFE}{hFE} > \pm 20\%$ (Darlington Transistor : $\pm 40\%$)

*2 Bias Circuit



*3 Method of test 1, test 2



*4 Preconditioning : The test is carried out after it is left under the high temperature and the high humidity.(85°C,85%,168h)

*5 Preconditioning : Aging is done with the PCT device. (105°C,100%,1.22x10⁵Pa,4h)

*6 Preconditioning : Soldering heat resistance(260°C,10s) is carried out. (Reflow Soldering)

Notes

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