FMBTA05-Q1 / FMBTA06-Q1

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FMBTA05-Q1 / FMBTA06-Q1

Drive NPN Transistor

Features

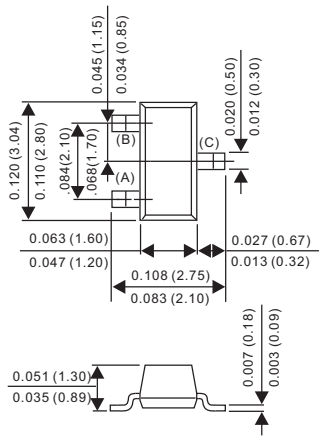
- Lead-free parts for green partner, exceeds environmental standards of MIL-STD-19500 /228
- Qualified to AEC-Q101 standards for high reliability.
- Suffix "-H" indicates Halogen-free part, ex. FMBTA05-Q1-H.

Mechanical data

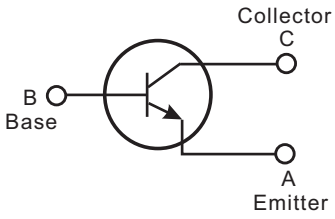
- Epoxy:UL94-V0 rated flame retardant
- Case : Molded plastic, SOT-23
- Terminals : Solder plated, solderable per MIL-STD-750, Method 2026
- Mounting Position : Any
- Weight : Approximated 0.008 gram

Package outline

SOT-23



Dimensions in inches and (millimeters)



Maximum ratings (AT T_A=25°C unless otherwise noted)

PARAMETER	CONDITIONS	Symbol	FMBTA05-Q1	FMBTA06-Q1	UNIT
Collector-Base voltage		V_{CBO}	60	80	Vdc
Collector-Emitter voltage		V_{CEO}	60	80	Vdc
Emitter-Base voltage		V_{EBO}	4.0		Vdc
Collector current		I_C	500		mAdc

Thermal Characteristics

Characteristics	CONDITIONS	Symbol	Max	UNIT
Total device dissipation FR-5 board (1)	T_A = 25°C	P_D	225	mW
	Derate above 25°C	P_D	1.8	mW/°C
Thermal resistance	Junction to ambient	$R_{\theta JA}$	556	°C/W
Total device dissipation alumina substrate(2)	T_A = 25°C	P_D	300	mW
	Derate above 25°C	P_D	2.4	mW/°C
Thermal resistance	Junction to ambient	$R_{\theta JA}$	417	°C/W
Operating temperature		T_J	-55 ~ +150	°C
Storage temperature		T_{STG}	-65 ~ +150	

1.FR-5 = 1.0 X 0.75 X0.062 in.
2.Alumina = 0.4 X 0.3 X 0.024 in. 99.5% alumina.
3. Pulse test: pulse width >=300μs, duty cycle<=2.0%
4. fT is defined as the frequency at which hfe extrapolates to unity.

FMBTA05-Q1 / FMBTA06-Q1

Characteristics (AT T_A=25°C unless otherwise noted)

Off Characteristics

PARAMETER	CONDITIONS	Symbol	Types	Min.	Max.	UNIT
Collector-Base breakdown voltage	I_c = 100μAdc, I_E = 0	$V_{(BR)CBO}$	FMBTA05-Q1	60	-	Vdc
			FMBTA06-Q1	80	-	
Collector-Emitter breakdown voltage(3)	I_c = 1.0mAdc, I_B = 0	$V_{(BR)CEO}$	FMBTA05-Q1	60	-	Vdc
			FMBTA06-Q1	80	-	
Emitter-Base breakdown voltage	I_E = 100μAdc, I_C = 0	$V_{(BR)EBO}$		4.0	-	Vdc
Collector Cutoff Current	V_{CE}=60Vdc, IB=0	I_{CES}		-	0.1	μAdc
Collector cutoff current	V_{CB} = 60Vdc, I_E = 0	I_{CBO}	FMBTA05-Q1	-	0.1	μAdc
	V_{CB} = 80Vdc, I_E = 0		FMBTA06-Q1	-	0.1	

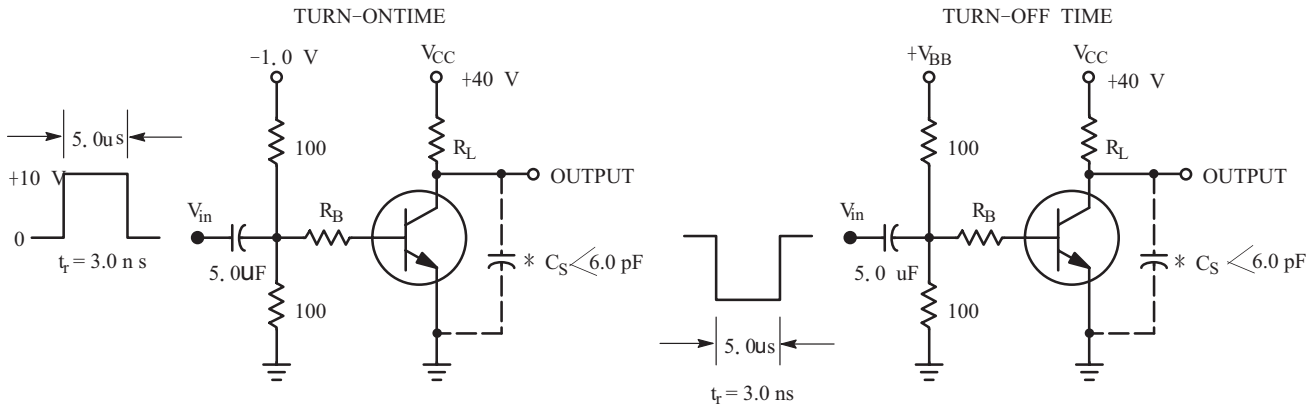
On Characteristics

PARAMETER	CONDITIONS	Symbol	Min.	Max.	UNIT
DCcurrent gain	I_c = 10mAdc, V_{CE} = 1.0Vdc	h_{FE}	100	-	-
	I_c = 100mAdc, V_{CE} = 1.0Vdc		100	-	
Collector-Emitter saturation voltage	I_c = 100mAdc, I_B = 10mAdc	$V_{CE(sat)}$	-	0.25	Vdc
Base-Emitter saturation voltage	I_c = 100mAdc, V_{CE} = 1.0Vdc	$V_{BE(on)}$	-	1.2	Vdc

Small Signal Characteristics

PARAMETER	CONDITIONS	Symbol	Min.	Max.	UNIT
Current Gain Bandwidth Product (4)	I_c = 10mA, V_{CE} = 2.0V, f=100MHz	f_T	100	-	MHz

FMBTA05-Q1 / FMBTA06-Q1



*Total Shunt Capacitance of Test Jig and Connectors
For PNP Test Circuits, Reverse All Voltage Polarities

FIG1. Switching Time Test Circuits

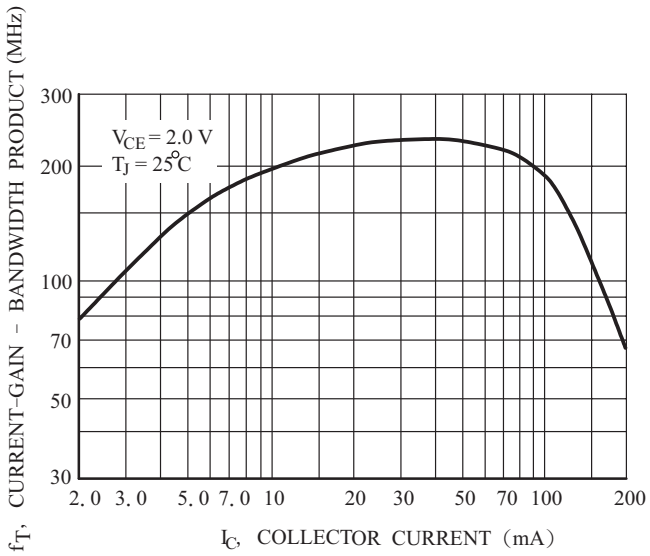


FIG2. Current-Gain Bandwidth Product

FMBTA05-Q1 / FMBTA06-Q1

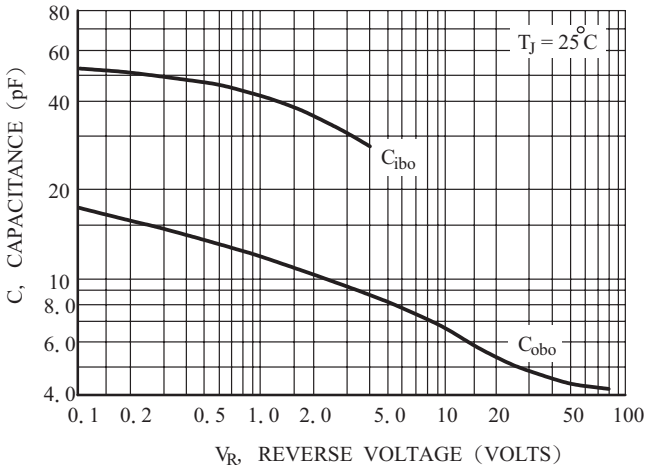


FIG3. Capacitance

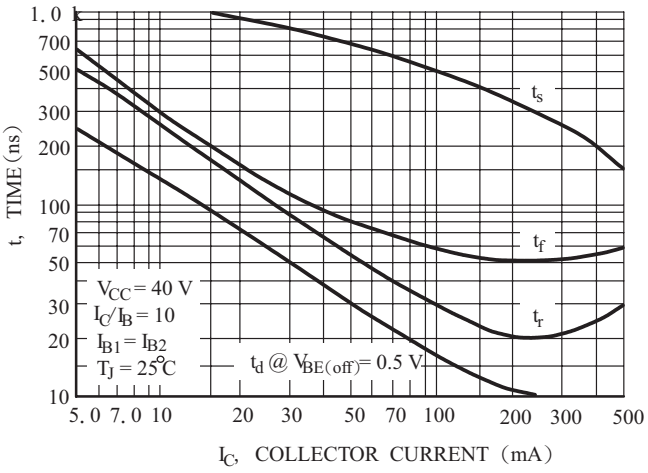


FIG4. Switching Time

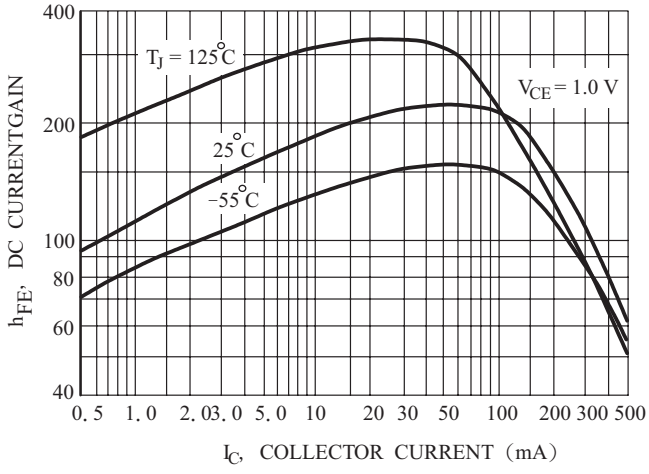


FIG5. DC Current Gain

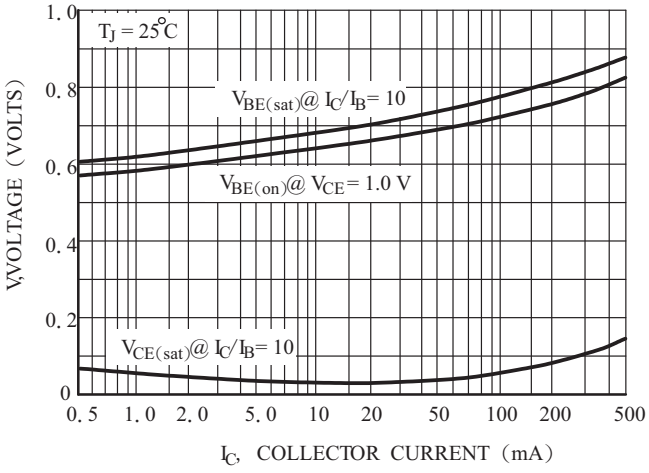


FIG6. "ON" Voltages

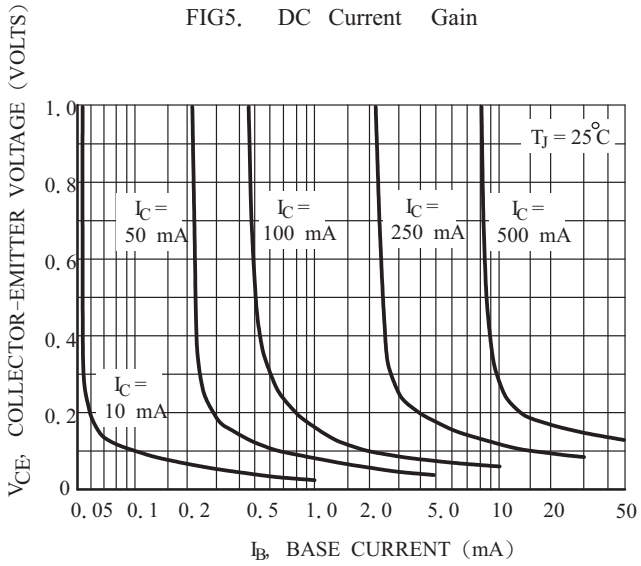


FIG7. Collector Saturation Region

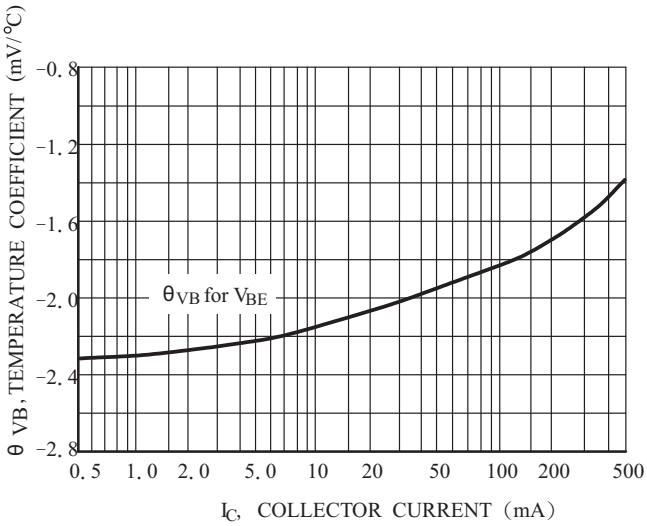
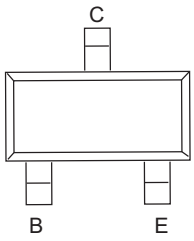
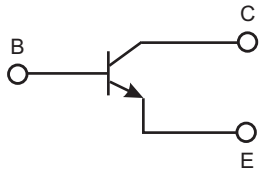


FIG8. Base-Emitter Temperature Coefficient

FMBTA05-Q1 / FMBTA06-Q1

Pinning information

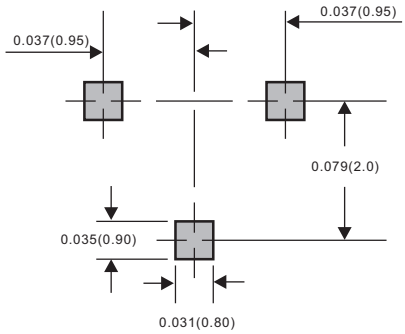
Pin	Simplified outline	Symbol
PinB Base PinC Collector PinE Emitter		

Marking

Type number	Marking code
FMBTA05-Q1	1H
FMBTA06-Q1	1GM

Suggested solder pad layout

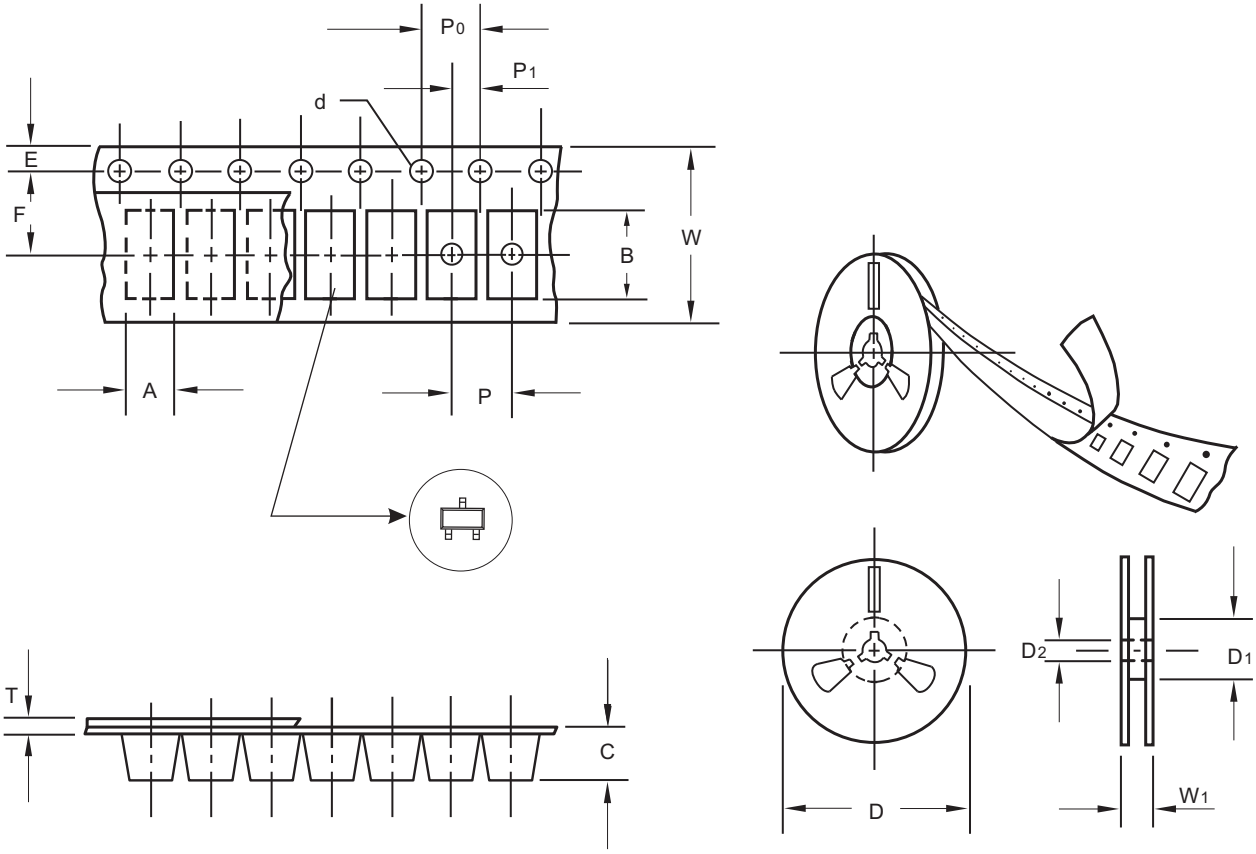
SOT-23



Dimensions in inches and (millimeters)

FMBTA05-Q1 / FMBTA06-Q1

Packing information



unit:mm

Item	Symbol	Tolerance	SOT-23
Carrier width	A	0.1	3.15
Carrier length	B	0.1	2.77
Carrier depth	C	0.1	1.22
Sprocket hole	d	0.1	1.50
13" Reel outside diameter	D	2.0	-
13" Reel inner diameter	D_1	min	-
7" Reel outside diameter	D	2.0	178.00
7" Reel inner diameter	D_1	min	55.00
Feed hole diameter	D_2	0.5	13.00
Sprocket hole position	E	0.1	1.75
Punch hole position	F	0.1	3.50
Punch hole pitch	P	0.1	4.00
Sprocket hole pitch	P_0	0.1	4.00
Embossment center	P_1	0.1	2.00
Overall tape thickness	T	0.1	0.23
Tape width	W	0.3	8.00
Reel width	W_1	1.0	12.0

Note:Devices are packed in accor dance with EIA standar RS-481-A and specifications listed above.

FMBTA05-Q1 / FMBTA06-Q1

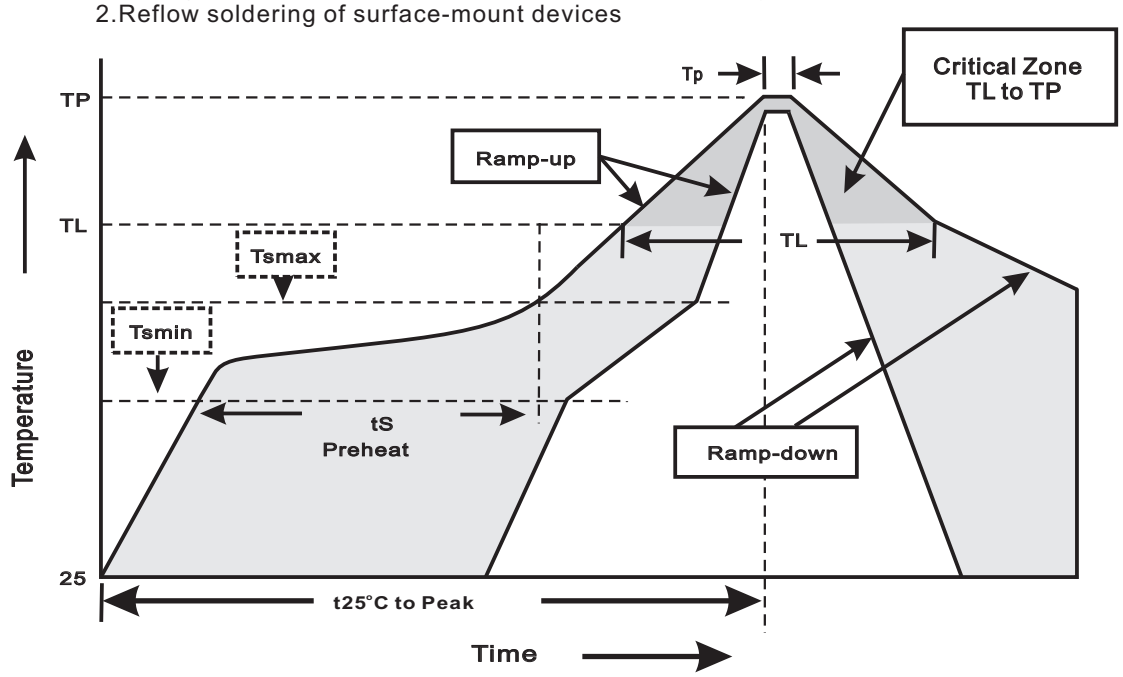
Reel packing

PACKAGE	REEL SIZE	REEL (pcs)	COMPONENT SPACING (m/m)	BOX (pcs)	INNER BOX (m/m)	REEL DIA, (m/m)	CARTON SIZE (m/m)	CARTON (pcs)	APPROX. GROSS WEIGHT (kg)
SOT-23	7"	3,000	4.0	30,000	183*183*123	178	382*262*387	240,000	11.6

Suggested thermal profiles for soldering processes

1.Storage environment: Temperature=5°C~40°C Humidity=55%±25%

2.Reflow soldering of surface-mount devices



3.Reflow soldering

Profile Feature	Soldering Condition
Average ramp-up rate(T_L to T_P)	<3°C/sec
Preheat -Temperature Min(Tsmin) -Temperature Max(Tsmax) -Time(min to max)(t_s)	 150°C 200°C 60~120sec
Tsmax to T_L -Ramp-upRate	 <3°C/sec
Time maintained above: -Temperature(T_L) -Time(t_L)	 217°C 60~260sec
Peak Temperature(T_P)	255°C-0/+5°C
Time within 5°C of actual Peak Temperature(t_P)	10~30sec
Ramp-down Rate	<6°C/sec
Time 25°C to Peak Temperature	<6minutes

FMBTA05-Q1 / FMBTA06-Q1

High reliability test capabilities

Item Test	Conditions	Reference
1. MSL Preconditioning	24hr bake@125℃+168hrs@85℃ /85%RH+3xIR@260℃+1flux immersion+alcohol+DI H2O rinse	JESD22-A113
2. Intermittent Operating Life	Ta=25?, ΔTj≥100? On/Off=2min Test Duration:1000hrs	MIL-STD-750E METHOD 1037
3. High Temperature Reverse Bias	V_{CE}=80%B_{VCEO} (Tj=150℃)Test Duration:1000hrs	JESD22-A108
4. High Temperature Storage Life	Ta=125℃ Test Duration:1000hrs	JESD22 A-103
5. Temperature Cycle	-55℃（15min）to 150℃（15min）Test Cycles:1000cycles	JESD22 A-104
6. Autoclave	P=2atm Ta=121℃ RH=100% Test Duration:96hrs	JESD22 A-102
7. Solderability	245±5℃ for 5sec	J-STD-002
8. Moisture Resistance	Ta=85℃/85% Relative humidity Test Duration:1000hrs	MIL-STD-750E METHOD 1021.2
9. Resistance To Solder Heat	260±5℃ for 10sec	JESD22 B-106
10. High Temperature High Humidity Reverse Bias	Ta=85℃, 85%RH, V_{CE}=80%B_{VCEO} Test Duration:1000hrs	JESD22-A101