

# FMBTA55 / FMBTA56

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# FMBTA55 / FMBTA56

## Driver PNP Transistor

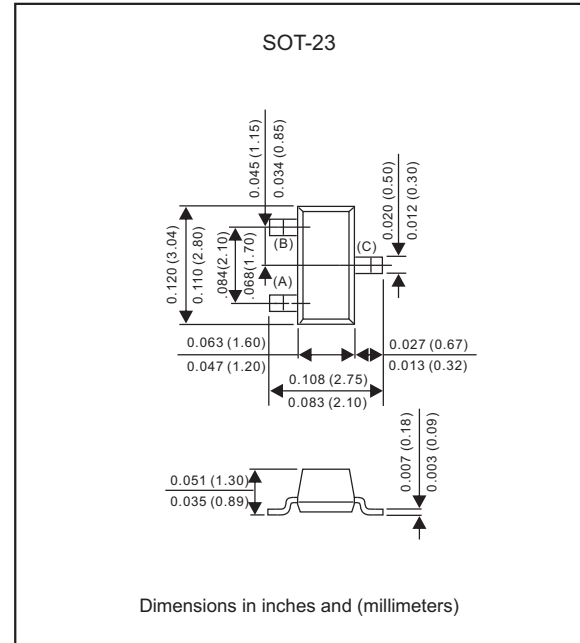
## Package outline

### Features

- Lead-free parts for green partner, exceeds environmental standards of MIL-STD-19500 /228
- Suffix "-H" indicates Halogen-free part, ex. FMBTA55-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



### Maximum ratings (AT $T_A=25^\circ\text{C}$ unless otherwise noted)

PARAMETER	SYMBOL	FMBTA55	FMBTA56	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 - continuous	$I_C$	-500		mAdc

### Thermal Characteristics

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

1. FR-5 = 1.0 X 0.75 X 0.062 in.

2. Alumina = 0.4 X 0.3 X 0.024 in. 99.5% alumina.

## FMBTA55 / FMBTA56

Electrical Characteristics (AT  $T_A=25^\circ\text{C}$  unless otherwise noted)

## Off Characteristics

PARAMETER	CONDITIONS	SYMBOL	Min.	Max.	UNIT
Collector-Base breakdown voltage FMBTA55 FMBTA56	$I_c = -100\mu\text{Adc}, I_E = 0$	$V_{(BR)CBO}$	-60 -80	- -	Vdc
Collector-Emitter breakdown voltage(3) FMBTA55 FMBTA56	$I_c = -1.0\text{mAdc}, I_B = 0$	$V_{(BR)CEO}$	-60 -80	- -	Vdc
Emitter-Base breakdown voltage	$I_E = -100\mu\text{Adc}, I_C = 0$	$V_{(BR)EBO}$	-4.0	-	Vdc
Collector Cutoff Current	$V_{CE} = -60\text{Vdc}, I_B = 0$	$I_{CES}$	-	-0.1	$\mu\text{Adc}$
Collector Cutoff current FMBTA55 FMBTA56	$V_{CB} = -60\text{Vdc}, I_E = 0$ $V_{CB} = -80\text{Vdc}, I_E = 0$	$I_{CBO}$	- -	-0.1 -0.1	$\mu\text{Adc}$

## On Characteristics

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

## Small Signal Characteristics

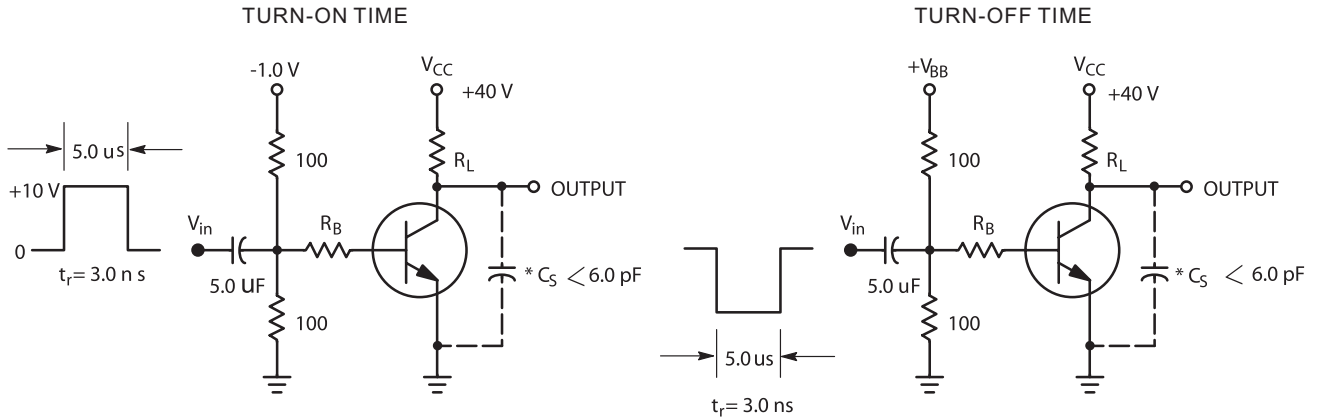
PARAMETER	CONDITIONS	SYMBOL	Min.	Max.	UNIT
Current Gain Bandwidth Product (4)	$I_c = -100\text{mA}, V_{CE} = -1.0\text{Vdc}, f=100\text{MHz}$	$f_T$	50	-	MHz

3. Pulse test: pulse width  $\leq 300\mu\text{s}$ , duty cycle  $\leq 2.0\%$

4.  $f_T$  is defined as the frequency at which  $|h_{fe}|$  extrapolates to unity.

# Rating and characteristic curves (FMBTA55/FMBTA56)

FIG.1 Switching Time Test Circuits



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

FIG.2 Current-Gain Bandwidth Product

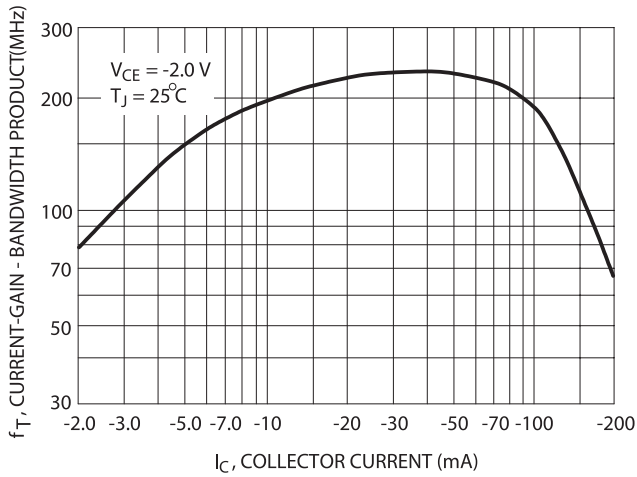


FIG.3 Capacitance

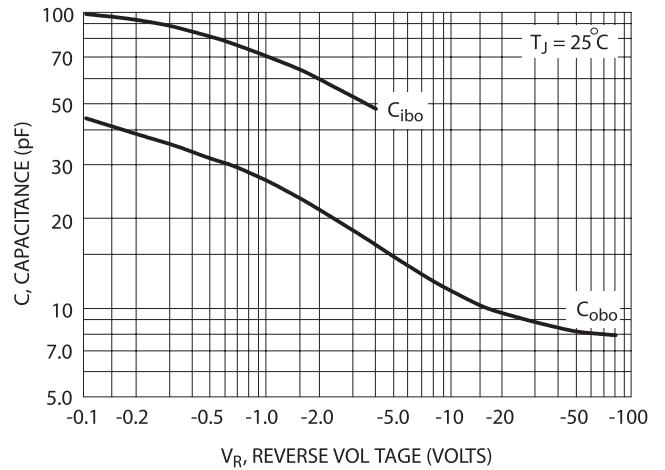


FIG.4 Switching Time

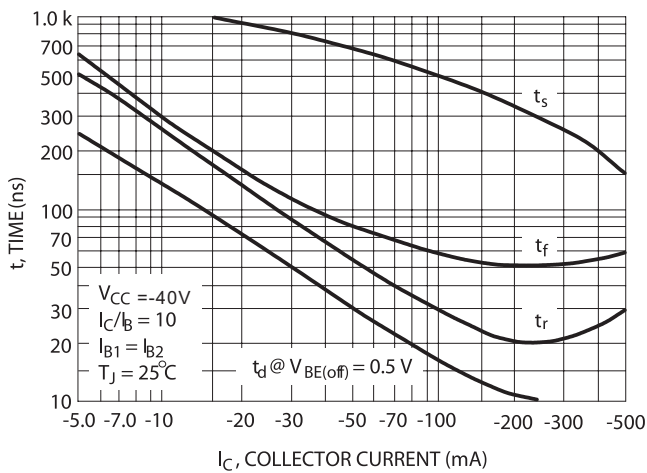
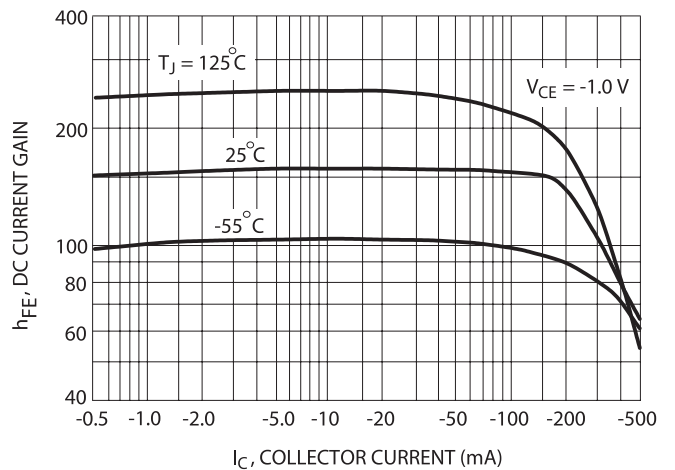


FIG.5 DC Current Gain



## Rating and characteristic curves (FMBTA55/FMBTA56)

FIG.6 "On" Voltage

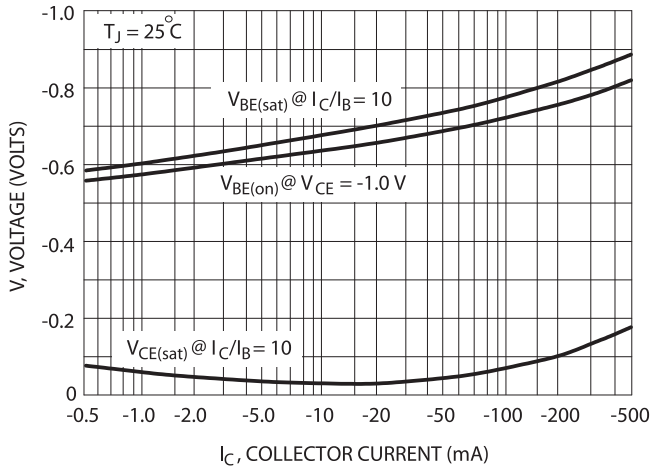


FIG.7 Collector Saturation Region

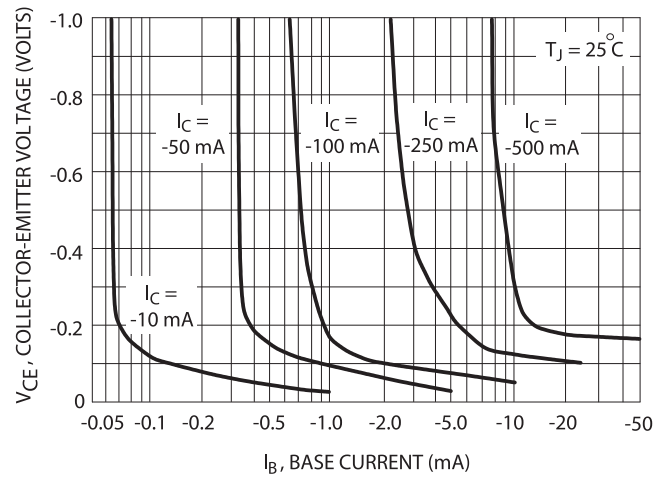
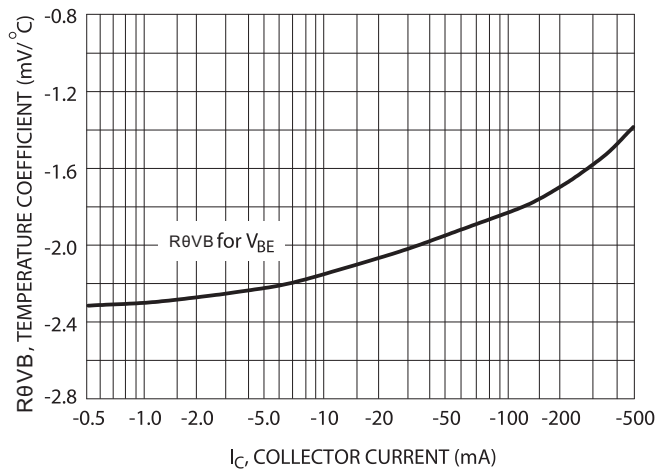


FIG.8 Base-Emitter Temperature Coefficient



# FMBTA55 / FMBTA56

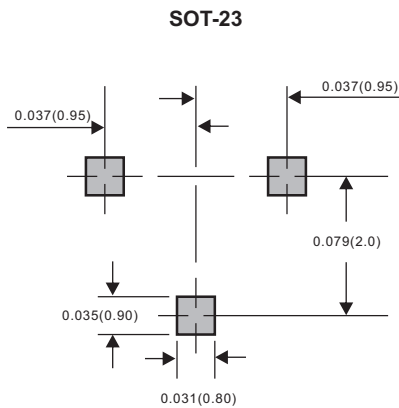
## Pinning information

Pin	Simplified outline	Symbol
PinB Base PinC Collector PinE Emitter		

## Marking

Type number	Marking code
FMBTA55	2H
FMBTA56	2GM

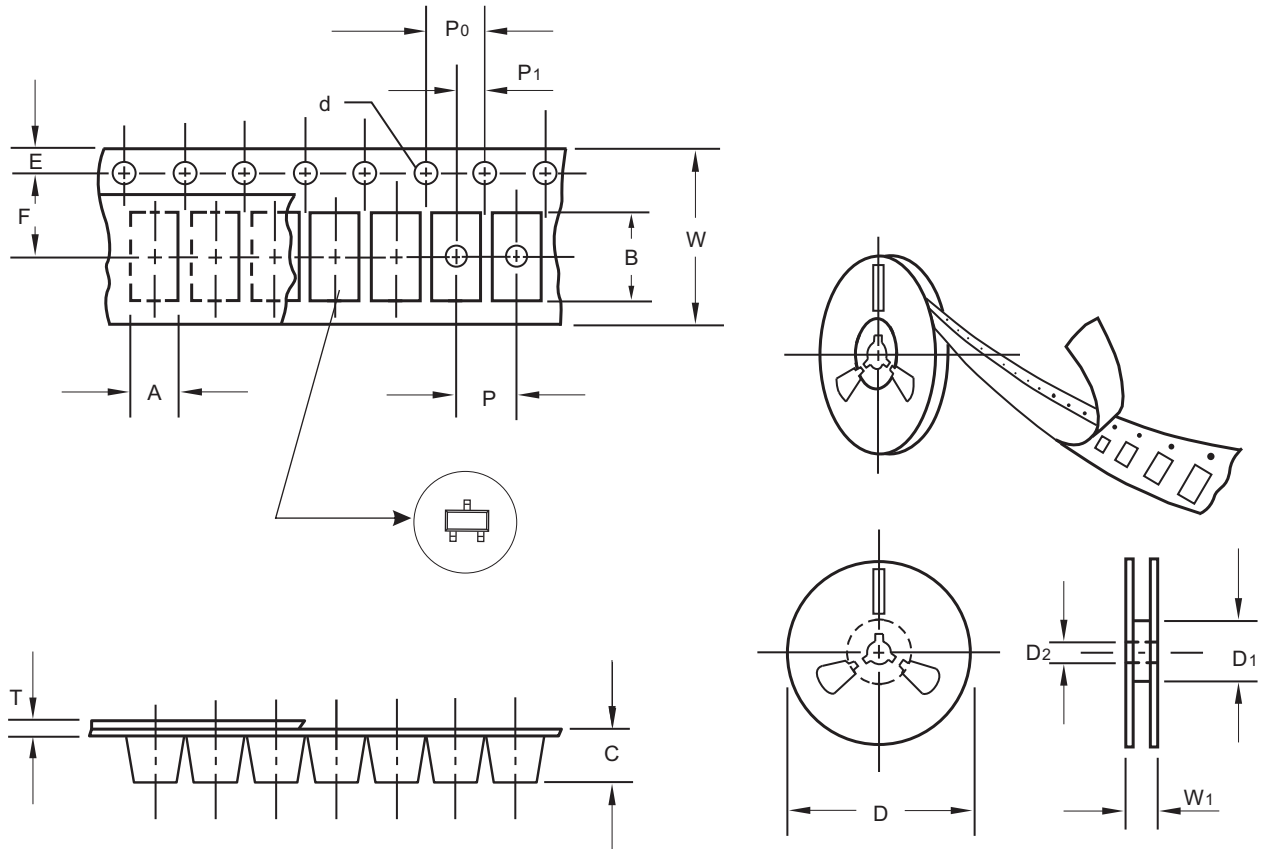
## Suggested solder pad layout



Dimensions in inches and (millimeters)

# FMBTA55 / FMBTA56

## 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	D1	min	-
7" Reel outside diameter	D	2.0	178.00
7" Reel inner diameter	D1	min	55.00
Feed hole diameter	D2	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	P0	0.1	4.00
Embossment center	P1	0.1	2.00
Overall tape thickness	T	0.1	0.23
Tape width	W	0.3	8.00
Reel width	W1	1.0	12.0

Note: Devices are packed in accordance with EIA standard RS-481-A and specifications listed above.

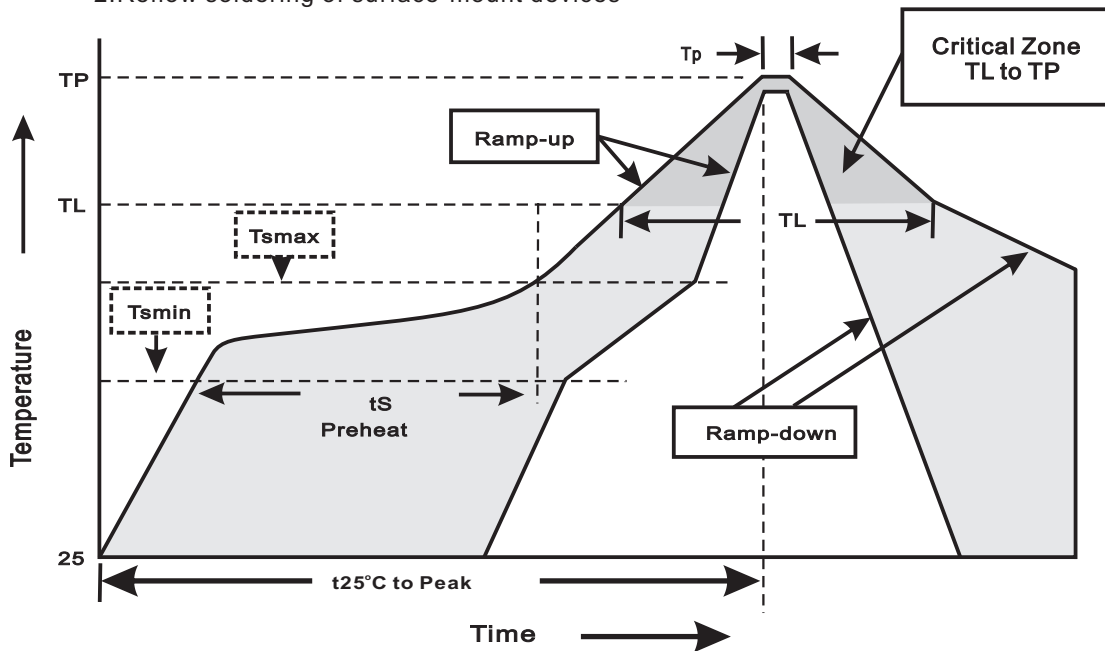
# FMBTA55 / FMBTA56

## 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(TL to TP)	<3°C/sec
Preheat -Temperature Min(Tsmin) -Temperature Max(Tsmax) -Time(min to max)(ts)	150°C 200°C 60~120sec
Tsmax to TL -Ramp-upRate	<3°C/sec
Time maintained above: -Temperature(TL) -Time(tL)	217°C 60~260sec
Peak Temperature(TP)	255°C-0/+5°C
Time within 5°C of actual Peak Temperature(tp)	10~30sec
Ramp-down Rate	<6°C/sec
Time 25°C to Peak Temperature	<6minutes



**FMBTA55 / FMBTA56****High reliability test capabilities**

Item Test	Conditions
1. Steady State Operating Life	$T_A=25^{\circ}\text{C}$ $P_o=225\text{mW}$ Test Duration:1000hrs
2. High Temperature Reverse Bias	$T_j=150^{\circ}\text{C}$ , $V_{ce}=80\%$ related volage, Test Duration:1000hrs
3. Temperature Cycle	$-55^{\circ}\text{C}$ (15min) to $150^{\circ}\text{C}$ (15min) Air to Air Transition Time<20sec Test Cycles: 1000cycle
4. Autoclave	$P=2\text{atm}$ $T_a=121^{\circ}\text{C}$ $\text{RH}=100\%$ Test Duration: 96hrs
5. High Temperature Storage Life	$T_a=150^{\circ}\text{C}$ Test Duration: 1000hrs
6. Solderability	$245^{\circ}\text{C}$ , Test Duration: 5sec
7. High Temperature High Humidity Reverse Bias	$T_a=85^{\circ}\text{C}$ , 85%RH, $V_{ce}=80\%$ related volage, Test Duration: 1000hrs
8. Resistance to Soldering Heat	$260^{\circ}\text{C}$ , Test Duration: 10sec