

FMBTA05 / FMBTA06**List**

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FMBTA05 / FMBTA06

Drive NPN Transistor

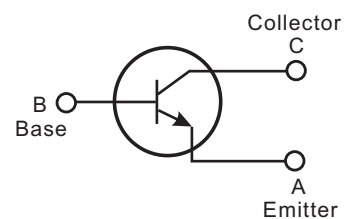
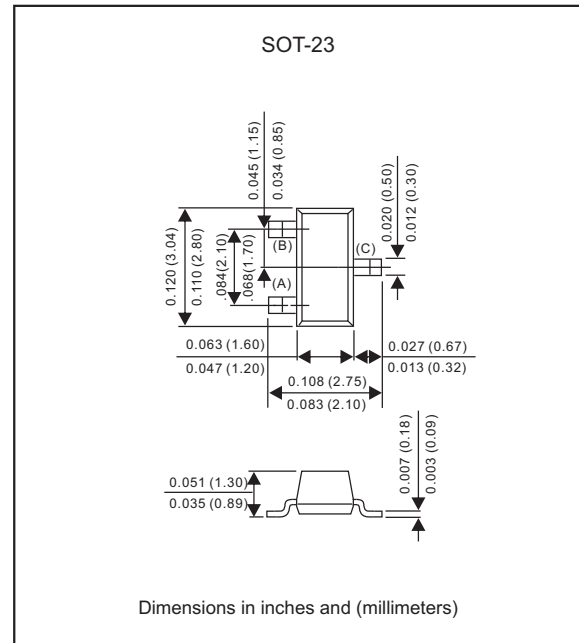
Package outline

Features

- Lead-free parts for green partner, exceeds environmental standards of MIL-STD-19500 /228
- Suffix "-H" indicates Halogen-free part, ex. FMBTA05-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	CONDITIONS	Symbol	FMBTA05	FMBTA06	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)	$T_A = 25^{\circ}\text{C}$	P_D	225	mW
	Derate above 25°C	P_D	1.8	mW/ $^{\circ}\text{C}$
Thermal resistance	Junction to ambient	$R_{\theta JA}$	556	$^{\circ}\text{C/W}$
Total device dissipation alumina substrate(2)	$T_A = 25^{\circ}\text{C}$	P_D	300	mW
	Derate above 25°C	P_D	2.4	mW/ $^{\circ}\text{C}$
Thermal resistance	Junction to ambient	$R_{\theta JA}$	417	$^{\circ}\text{C/W}$
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.
3. Pulse test: pulse width $\geq 300\mu\text{s}$, duty cycle $\leq 2.0\%$
4. f_T is defined as the frequency at which h_{fe} extrapolates to unity.

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

PARAMETER	CONDITIONS	Symbol	Types	Min.	Max.	UNIT
Collector-Base breakdown voltage	$I_c = 100\mu\text{Adc}$, $I_E = 0$	$V_{(BR)CBO}$	FMBTA05	60	-	Vdc
			FMBTA06	80	-	
Collector-Emitter breakdown voltage(3)	$I_c = 1.0\text{mAdc}$, $I_B = 0$	$V_{(BR)CEO}$	FMBTA05	60	-	Vdc
			FMBTA06	80	-	
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	μAdc
Collector cutoff current	$V_{CB} = 60\text{Vdc}$, $I_E = 0$ $V_{CB} = 80\text{Vdc}$, $I_E = 0$	I_{CBO}	FMBTA05	-	0.1	μAdc
			FMBTA06	-	0.1	

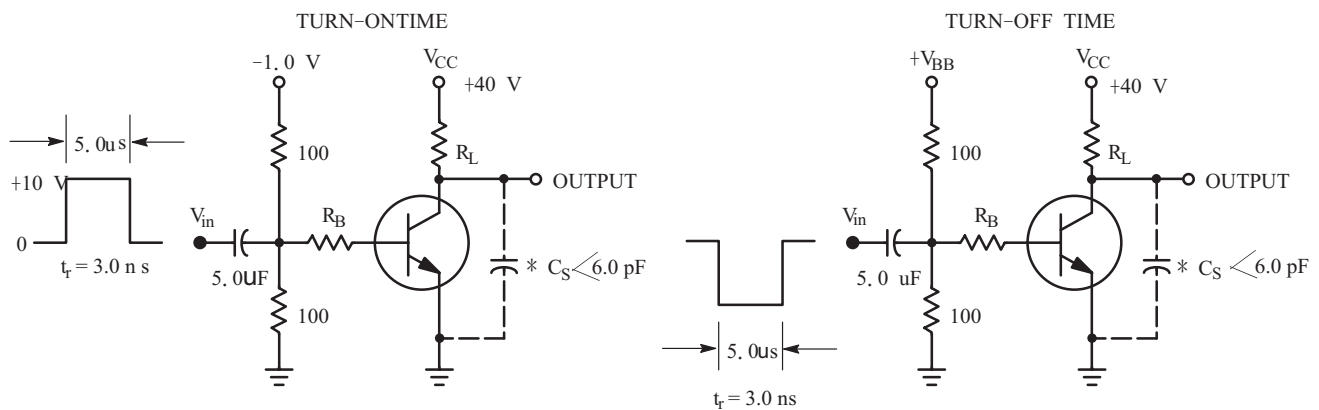
On Characteristics

PARAMETER	CONDITIONS	Symbol	Min.	Max.	UNIT
DCcurrent 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)	$I_c = 10\text{mA}$, $V_{CE} = 2.0\text{V}$, $f=100\text{MHz}$	f_T	100	-	MHz

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

FIG1. Switching Time Test Circuits

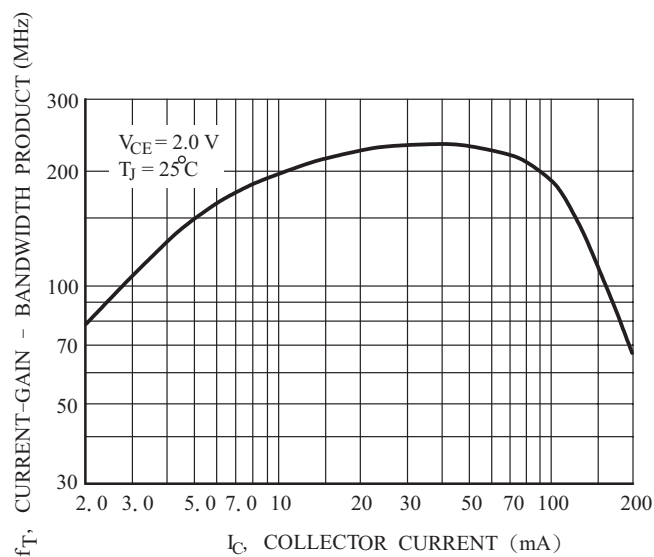


FIG2. Current-Gain Bandwidth Product

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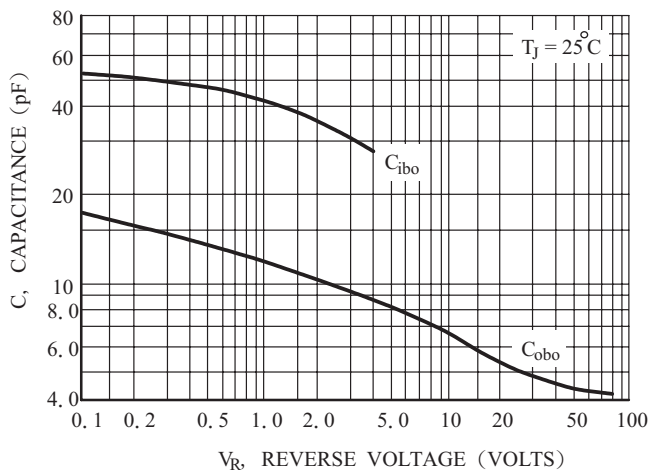


FIG3. Capacitance

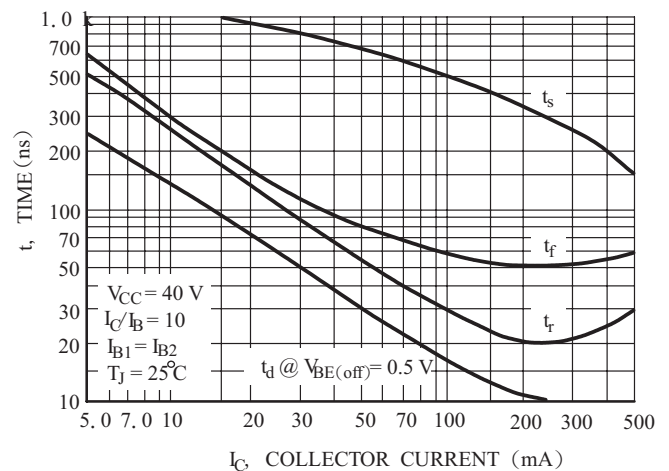


FIG4. Switching Time

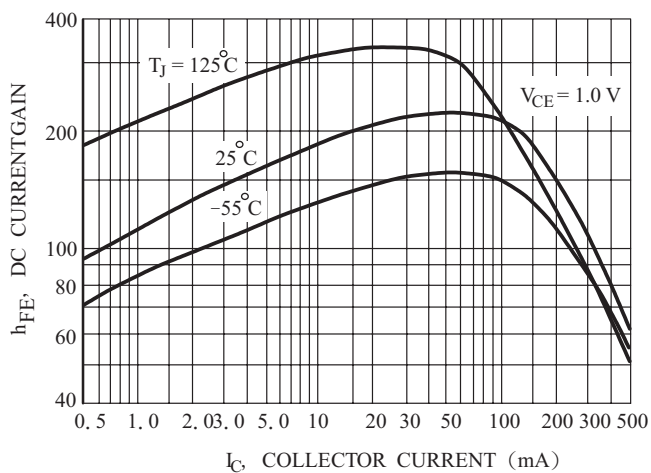


FIG5. DC Current Gain

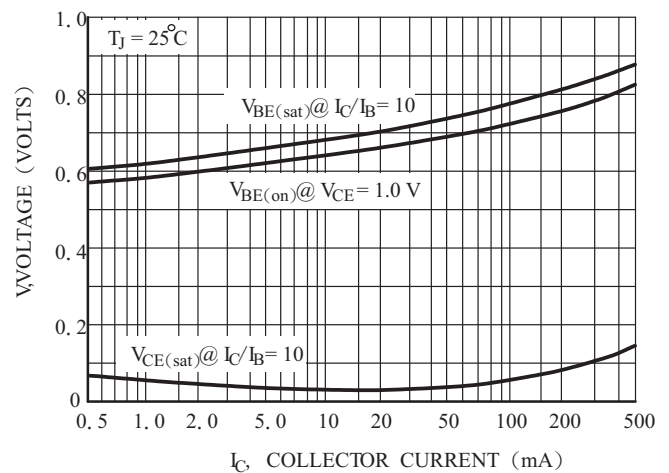


FIG6. "ON" Voltages

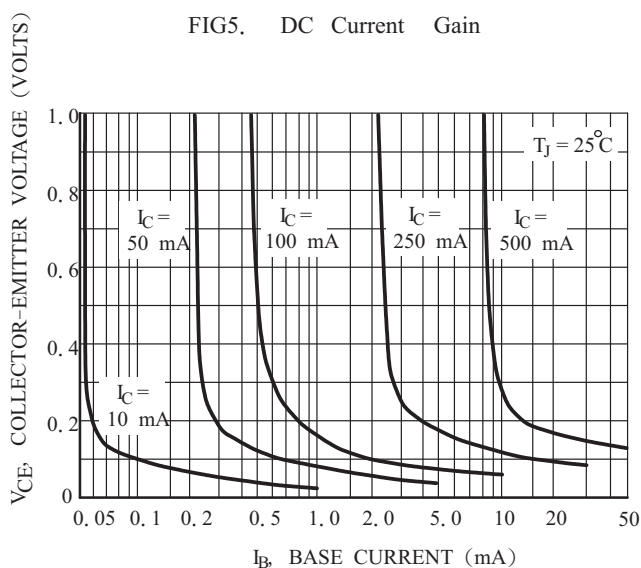


FIG7. Collector Saturation Region

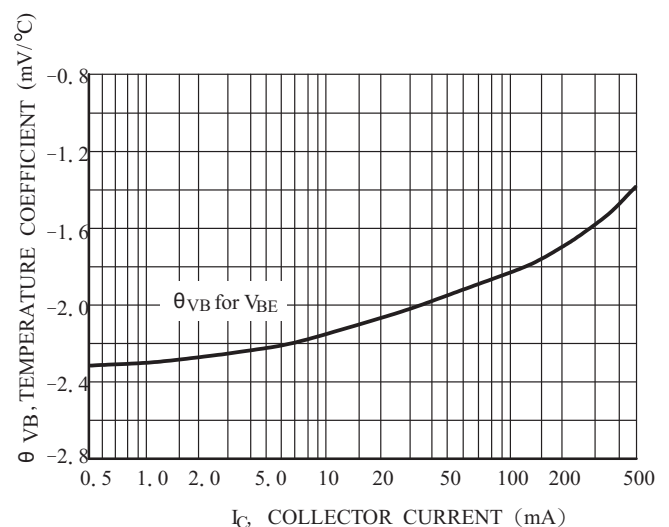
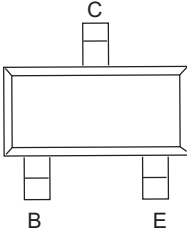
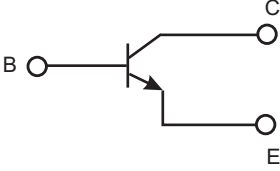


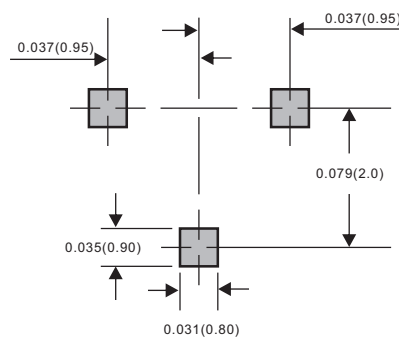
FIG8. Base-Emitter Temperature Coefficient

FMBTA05 / FMBTA06**Pinning information**

Pin	Simplified outline	Symbol
PinB Base PinC Collector PinE Emitter		

Marking

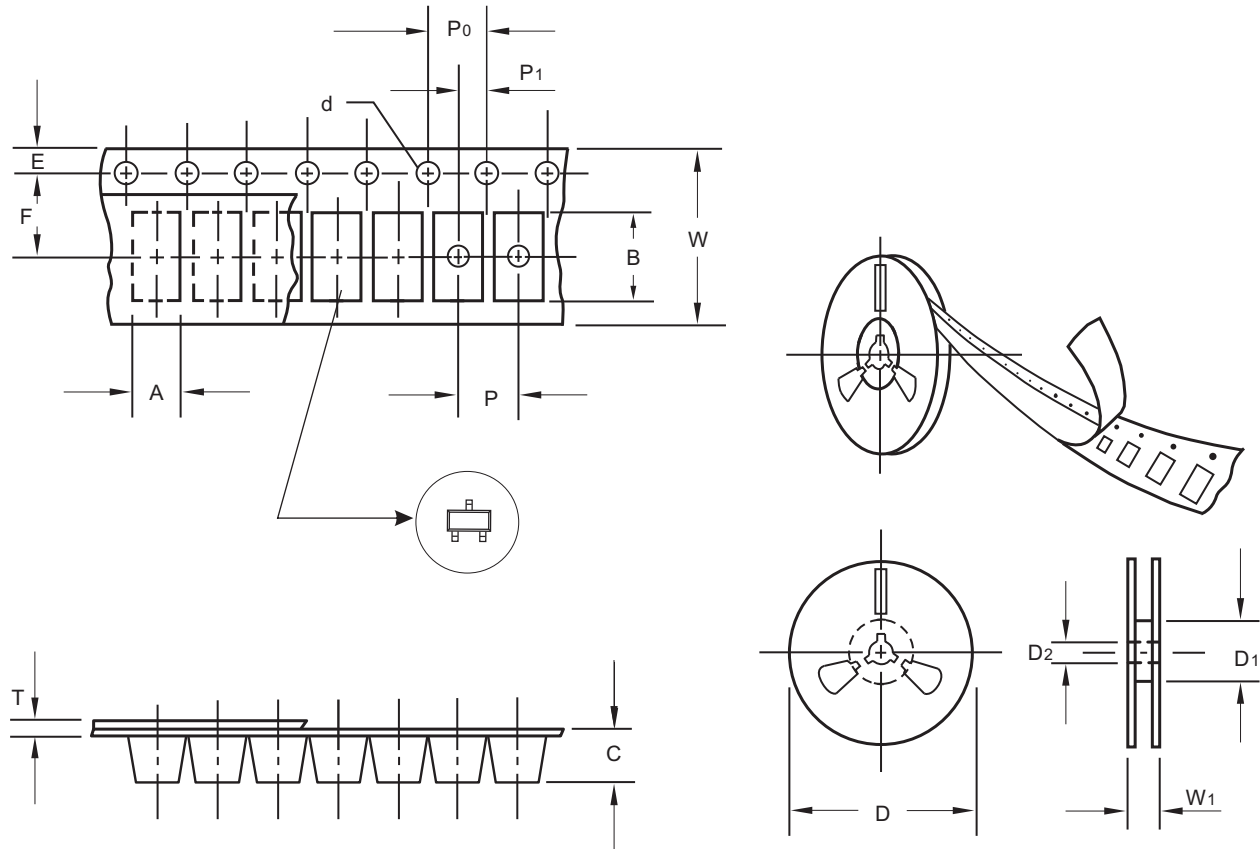
Type number	Marking code
FMBTA05	1H
FMBTA06	1GM

Suggested solder pad layout**SOT-23**

Dimensions in inches and (millimeters)

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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.

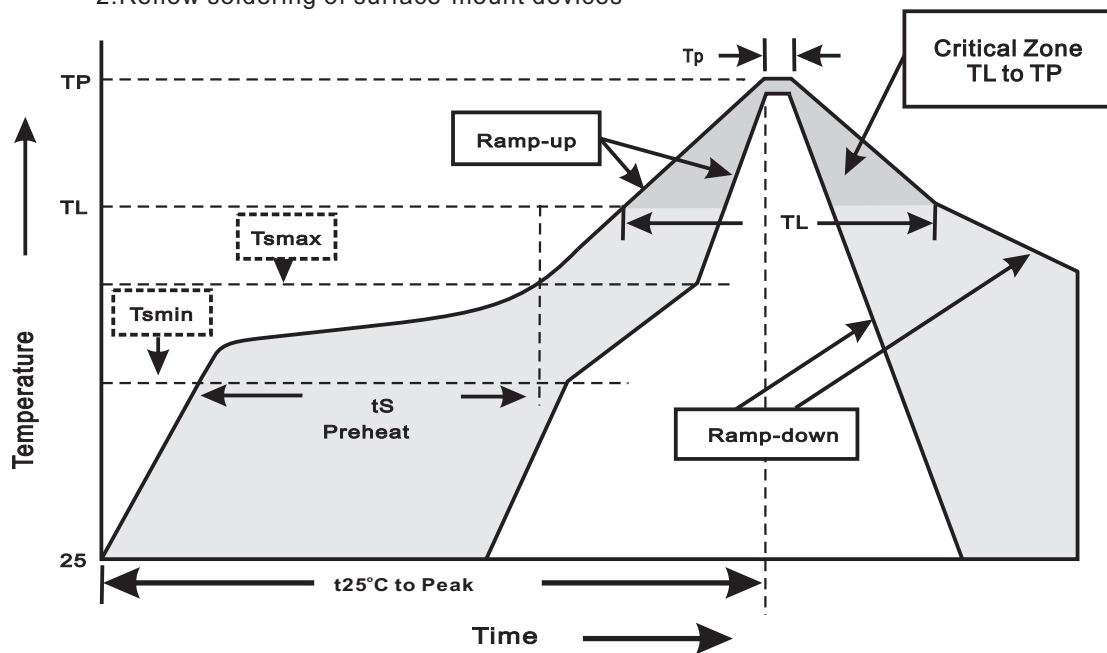
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Reel packing

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

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High reliability test capabilities

Item Test	Conditions
1. Steady State Operating Life	TA=25°C P _o =225mW Test Duration:1000hrs
2. High Temperature Reverse Bias	T _j =150°C, V _{ce} =80% related volage, Test Duration:1000hrs
3. Temperature Cycle	-55°C(15min) to 150°C(15min) Air to Air Transition Time<20sec Test Cycles: 1000cycle
4. Autoclave	P=2atm Ta=121°C RH=100% Test Duration: 96hrs
5. High Temperature Storage Life	Ta=150°C Test Duration: 1000hrs
6. Solderability	245°C, Test Duration: 5sec
7. High Temperature High Humidity Reverse Bias	Ta=85°C, 85%RH, V _{ce} =80% related volage, Test Duration: 1000hrs
8. Resistance to Soldering Heat	260°C, Test Duration: 10sec