

FMBT5550 / FMBT5551

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FMBT5550 / FMBT5551

High Voltage Transistors
NPN Silicon

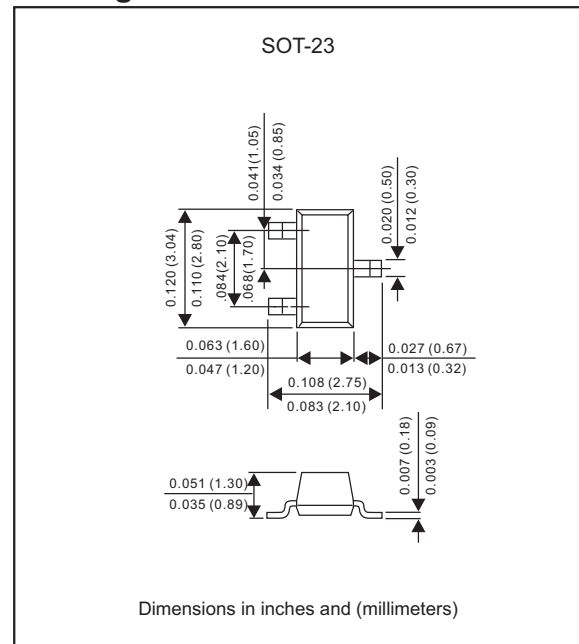
Features

- High collector-emitter breakdown voltage ($BV_{CEO} = 140V \sim 160V @ I_C = 1mA$)
- This device is designed for general purpose high voltage amplifiers and gas discharge display driving
- Epitaxial planar die construction
- Lead-free parts meet RoHS requirements
- Suffix "-H" indicates Halogen-free part, ex.FMBT5550-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

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

Parameter	Symbol	FMBT5550	FMBT5551	Unit
Collector-base voltage	V_{CBO}	160	180	V
Collector-emitter voltage	V_{CEO}	140	160	V
Emitter-base voltage	V_{EBO}	6.0		V
Collector current - continuous	I_C	600		mA

Thermal characteristics

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

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.

FMBT5550 / FMBT5551**Electrical characteristics** (AT $T_A=25^{\circ}\text{C}$ unless otherwise noted)**Off characteristics**

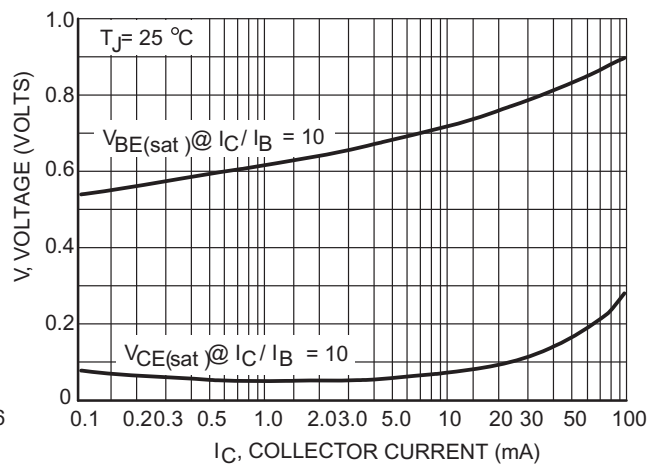
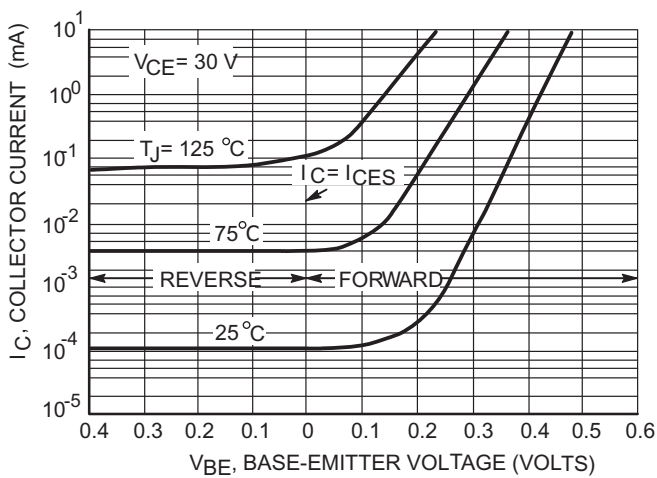
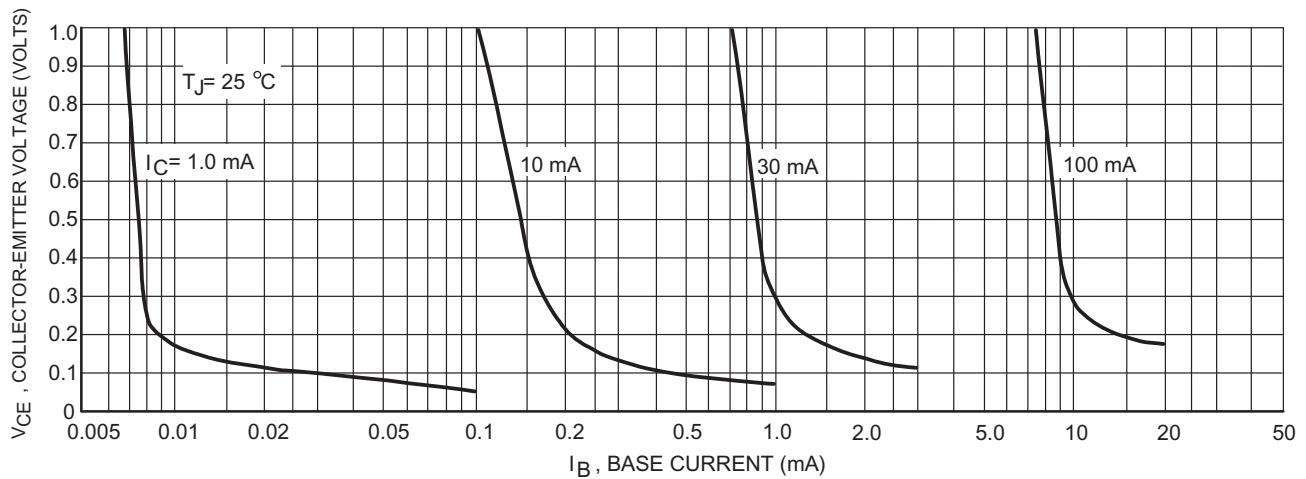
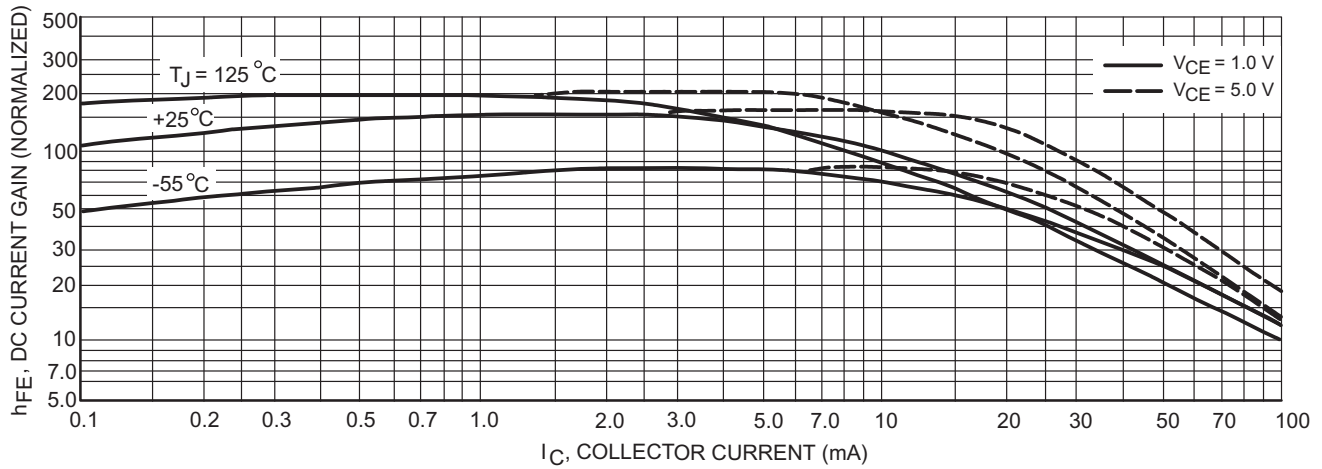
Parameter	Conditions	Symbol	Types	Min.	Max.	Unit
Collector-base breakdown voltage	$I_C = 100\mu\text{A}$, $I_E = 0$	$V_{(BR)CBO}$	FMBT5550	160	-	V
			FMBT5551	180	-	
Collector-emitter breakdown voltage(3)	$I_C = 1.0\text{mA}$, $I_B = 0$	$V_{(BR)CEO}$	FMBT5550	140	-	V
			FMBT5551	160	-	
Emitter-base breakdown voltage	$I_E = 10\mu\text{A}$, $I_C = 0$	$V_{(BR)EBO}$	Both Types	6.0	-	V
Collector cutoff current	$V_{CB} = 100\text{V}$, $I_E = 0$	I_{CBO}	FMBT5550	-	100	nA
	$V_{CB} = 120\text{V}$, $I_E = 0$		FMBT5551	-	50	
	$V_{CB} = 100\text{V}$, $I_E = 0$, $T_A = 100^{\circ}\text{C}$		FMBT5550	-	100	μA
	$V_{CB} = 120\text{V}$, $I_E = 0$, $T_A = 100^{\circ}\text{C}$		FMBT5551	-	50	
Emitter cutoff current	$V_{EB} = 4.0\text{V}$, $I_C = 0$	I_{EBO}	Both Types	-	50	nA

On characteristics

Parameter	Conditions	Symbol	Types	Min.	Max.	Unit
DC current gain	$I_C = 1.0\text{mA}$, $V_{CE} = 5.0\text{V}$	h_{FE}	FMBT5550	60	-	
			FMBT5551	80	-	
	$I_C = 10\text{mA}$, $V_{CE} = 5.0\text{V}$		FMBT5550	60	250	
			FMBT5551	80	250	
	$I_C = 50\text{mA}$, $V_{CE} = 5.0\text{V}$		FMBT5550	20	-	
			FMBT5551	30	-	
Collector-emitter saturation voltage	$I_C = 10\text{mA}$, $I_B = 1.0\text{mA}$	$V_{CE(sat)}$	Both Types	-	0.15	V
	$I_C = 50\text{mA}$, $I_B = 5.0\text{mA}$		FMBT5550	-	0.25	
			FMBT5551	-	0.20	
Base-emitter saturation voltage	$I_C = 10\text{mA}$, $I_B = 1.0\text{mA}$	$V_{BE(sat)}$	Both Types	-	1.0	V
	$I_C = 50\text{mA}$, $I_B = 5.0\text{mA}$		FMBT5550	-	1.2	
			FMBT5551	-	1.0	
Collector emitter cut-off	$V_{CB} = 10\text{V}$	I_{CES}	Both Types	-	50	nA
	$V_{CB} = 75\text{V}$			-	100	

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

Rating and characteristic curves (FMBT5550/FMBT5551)



Rating and characteristic curves (FMBT5550/FMBT5551)

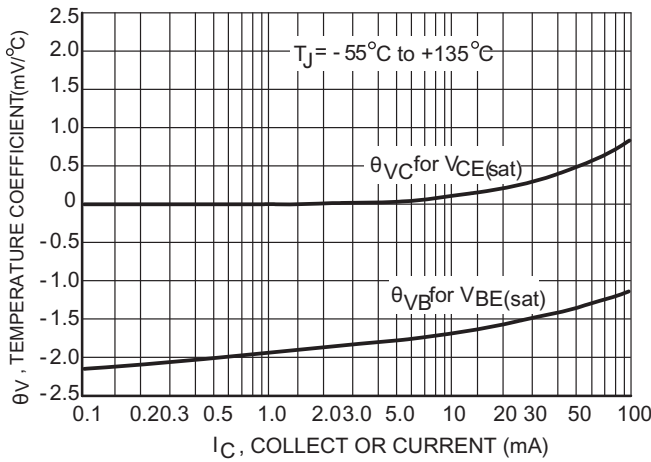
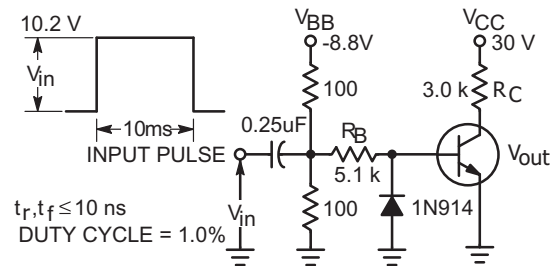


FIG. 5 Temperature Coefficients



Values Shown are for $I_C @ 10\text{ mA}$

FIG. 6 Switching Time Test Circuit

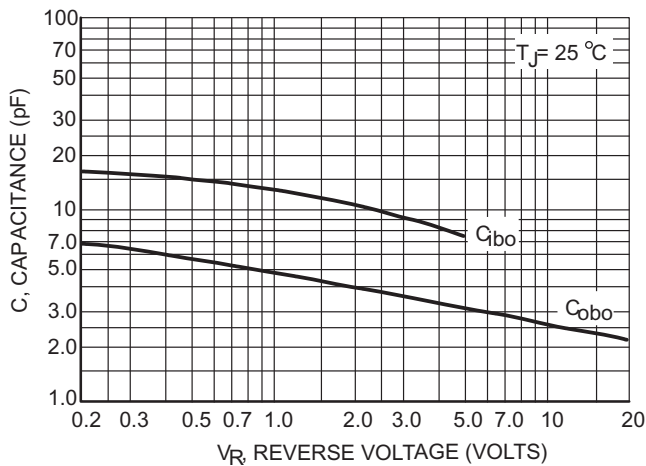


FIG. 7 Capacitances

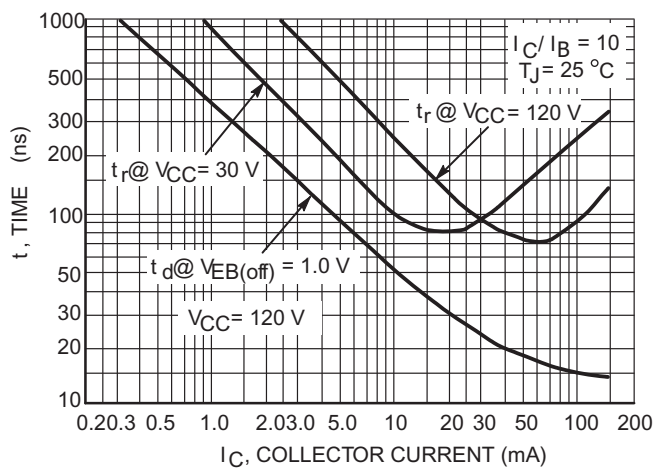


FIG. 8 Turn-On Time

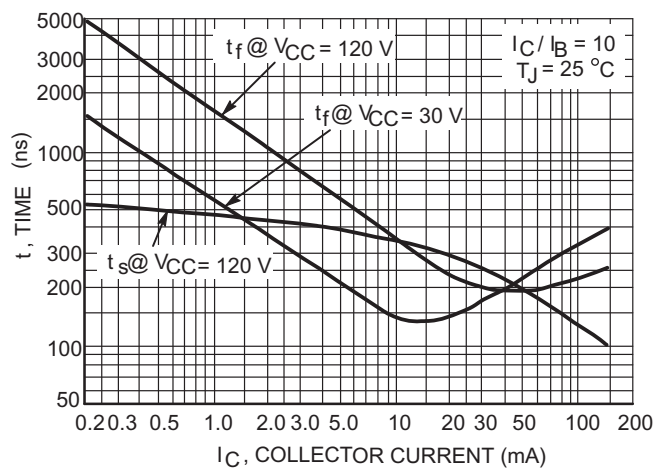
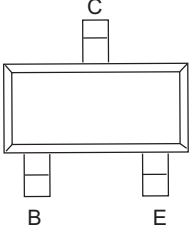
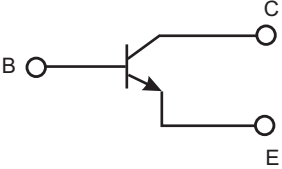


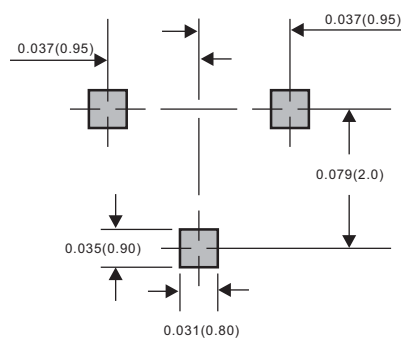
FIG. 9 Turn-Off Time

FMBT5550 / FMBT5551**Pinning information**

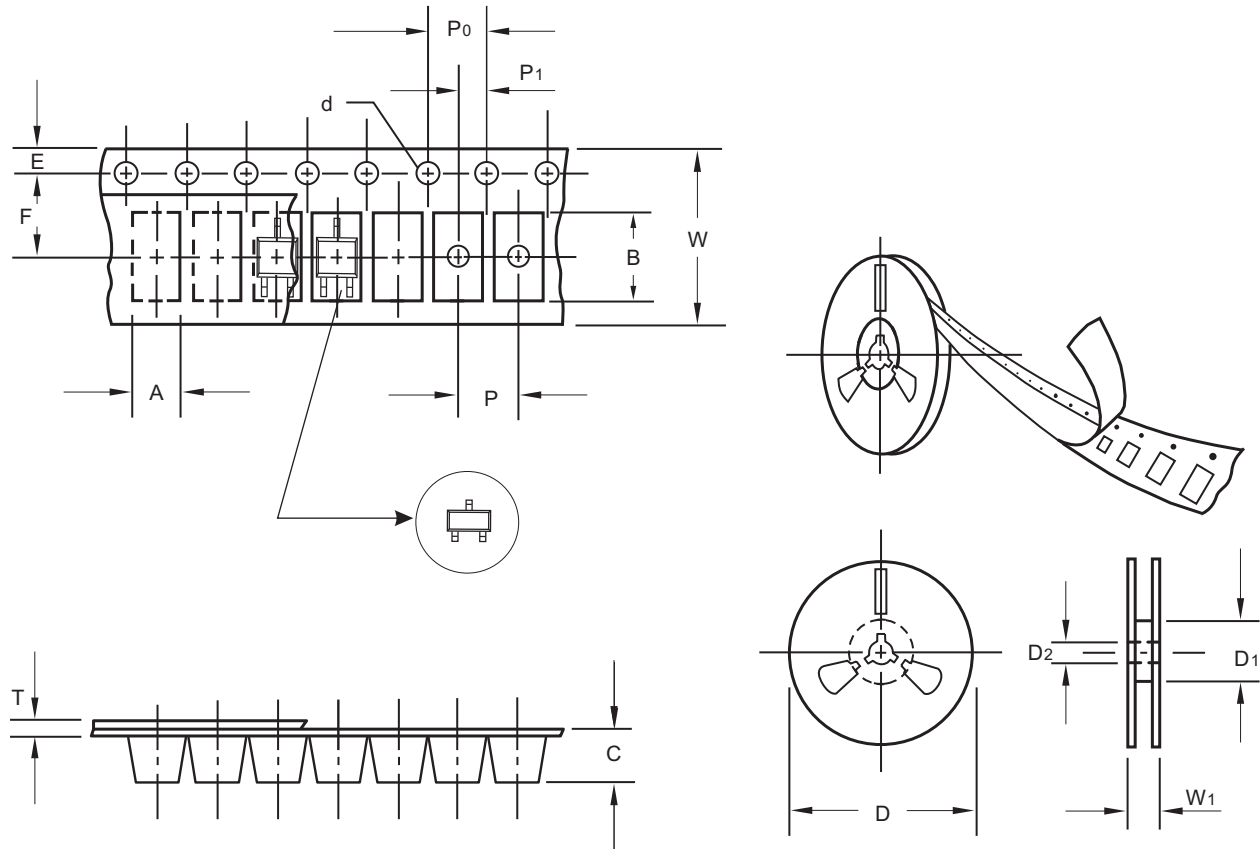
Pin	Simplified outline	Symbol
PinB Base PinC Collector PinE Emitter		

Marking

Type number	Marking code
FMBT5550	M1F
FMBT5551	G1

Suggested solder pad layout**SOT-23**

Dimensions in inches and (millimeters)

FMBT5550 / FMBT5551**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

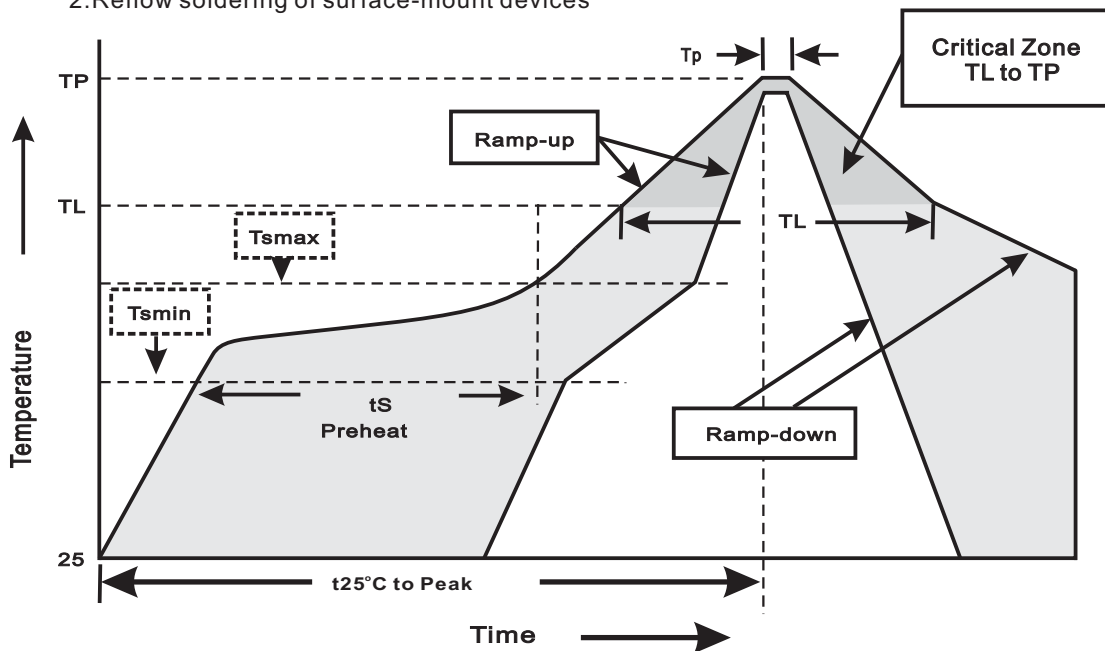
Note: Devices are packed in accordance with EIA standard RS-481-A and specifications listed above.

FMBT5550 / FMBT5551**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*123*183	178	382*257*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(T _{smmin}) -Temperature Max(T _{smmax}) -Time(min to max)(t _s)	150°C 200°C 60~120sec
T _{smmax} 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

FMBT5550 / FMBT5551**High reliability test capabilities**

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