

FMBT5089**List**

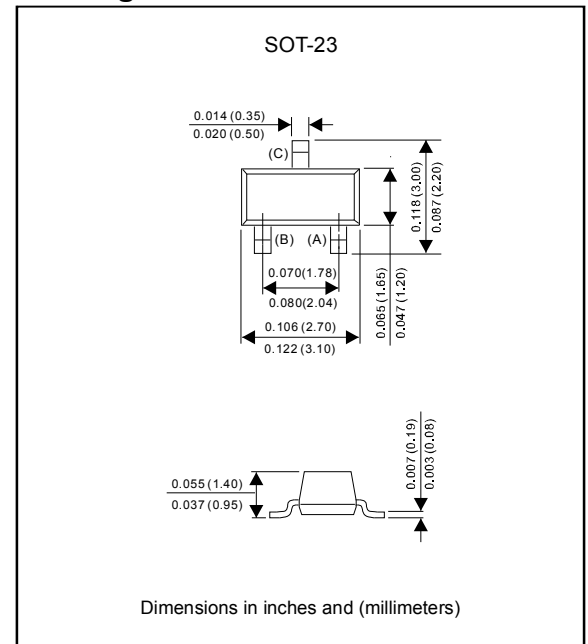
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FMBT5089**100mA, 25V NPN General Purpose Amplifier****Features**

- For low noise.
- Collector-emitter breakdown voltage.
($V_{(BR)CEO} = 25V \text{ Min. @ } I_C = 1mA$)
- General purpose amplifier applications.
- Collector current from 1 μA to 50mA.
- Lead-free parts for green partner, exceeds environmental standards of MIL-STD-19500 /228
- Suffix "-H" indicates Halogen free part, ex. FMBT5089-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)

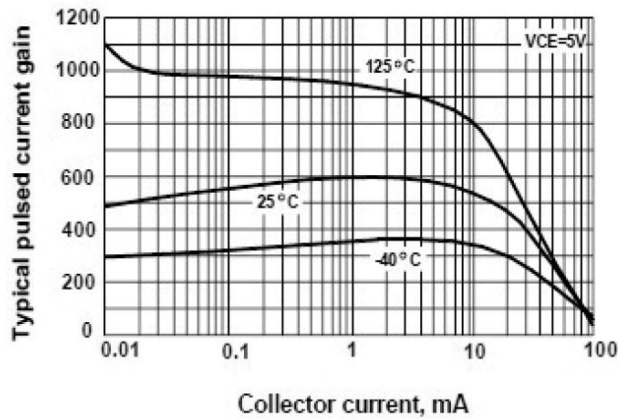
Parameter	Symbol	Value	Unit
Collector to base voltage	V_{CBO}	30	V
Collector to Emitter Voltage	V_{CEO}	25	V
Emitter to base voltage	V_{EBO}	4.5	V
Collector current	I_C	100	mA
Total power dissipation	P_D	200	mW
Thermal resistance, junction to ambient	$R_{\theta JA}$	357	$^\circ C$
Junction temperature	T_J	+150	$^\circ C$
Storage temperature range	T_{STG}	-55 ~ +150	$^\circ C$

Electrical characteristics (AT $T_A = 25^\circ C$ unless otherwise noted)

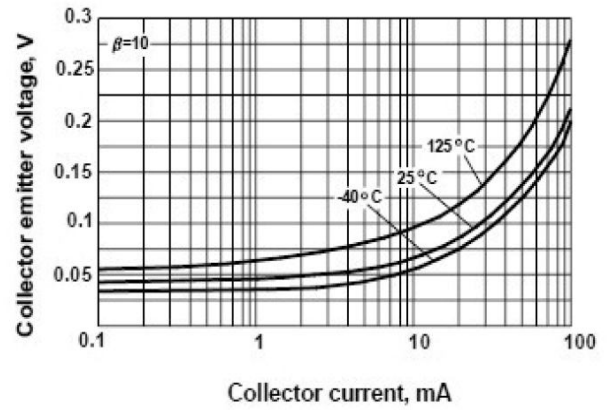
Parameter	Conditions	Symbol	Min.	Typ.	Max.	Unit
Collector cut off current	$V_{CB} = 30V$	I_{CBO}			50	nA
Emitter cut off current	$V_{EB} = 3V$	I_{EBO}			50	nA
	$V_{EB} = 4.5V$				100	
Collector saturation voltage	$I_C = 10mA, I_B = 1mA$	$V_{CE(SAT)}$			0.5	V
Base emitter voltage	$V_{CE} = 5V, I_C = 10mA$	$V_{BE(ON)}$			0.8	V
Collector emitter breakdown voltage	$I_C = 1mA$	$V_{(BR)CEO}$	25			V
Collector base breakdown voltage	$I_C = 100\mu A$	$V_{(BR)CBO}$	30			
Emitter base breakdown voltage	$I_E = 0.1mA$	$V_{(BR)EBO}$	5			V
DC current gain	$V_{CE} = 5V, I_C = 100\mu A$	h_{FE}	400		1200	
	$V_{CE} = 5V, I_C = 1mA$	h_{FE}	450			
	$V_{CE} = 5V, I_C = 10mA$	h_{FE}	400			
Small signal current gain	$V_{CE} = 5V, I_C = 1mA, f = 1KHZ$	h_{fe}	450	1800		
Transition Frequency	$V_{CE} = 5V, I_C = 500\mu A, f = 20MHZ$	f_T	50			MHZ
Collector base capacitance	$V_{CB} = 5V, f = 100KHZ$	C_{cb}			4	pF
Emitter base capacitance	$V_{BE} = 0.5V, f = 100KHZ$	C_{eb}			10	pF
Noise figure	$V_{CE} = 5V, I_C = 100\mu A, R_s = 10K\Omega, f = 10Hz \text{ to } 15.7KHZ$	NF			2	dB

Rating and characteristic curves (FMBT5089)

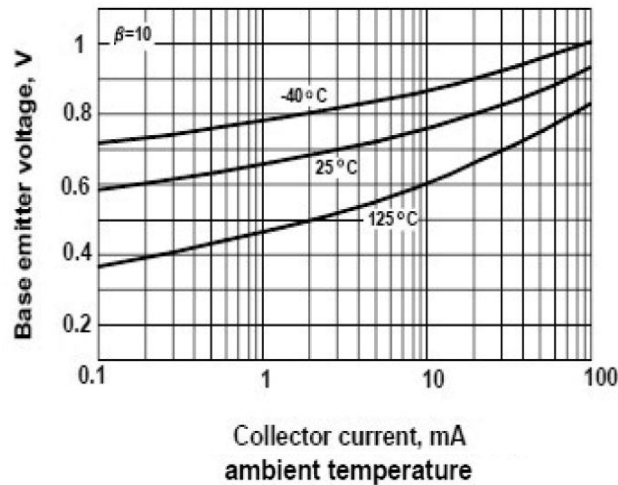
Typical pulsed current gain
vs. collector current



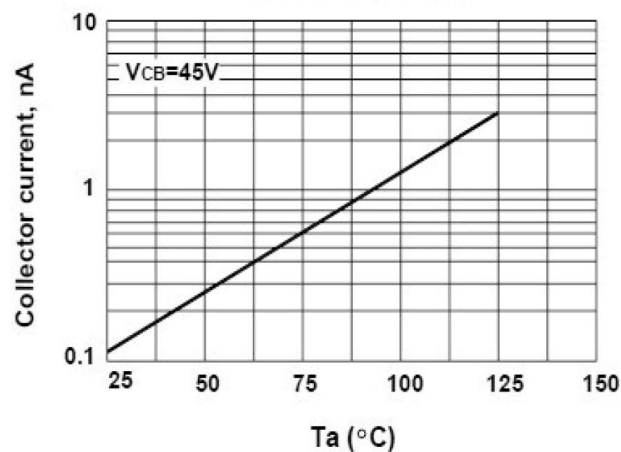
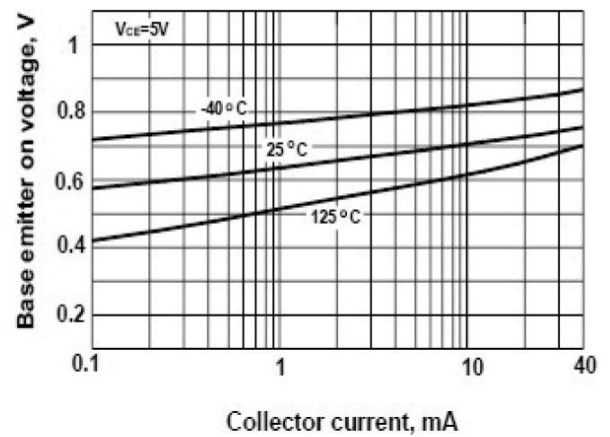
Collector emitter saturation
voltage vs. collector current



Base emitter saturation
voltage vs. collector current

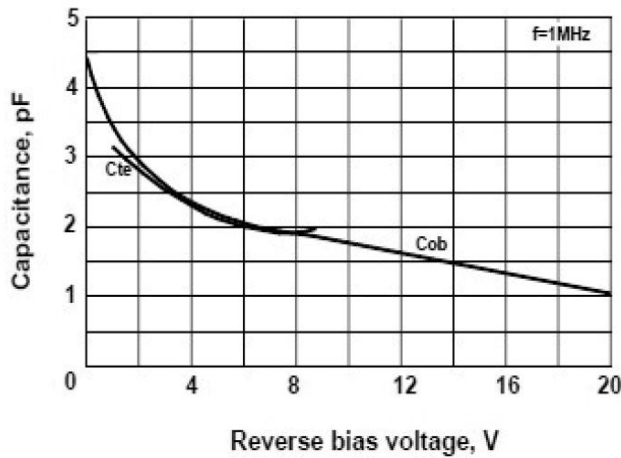


Base emitter on voltage
vs. collector current

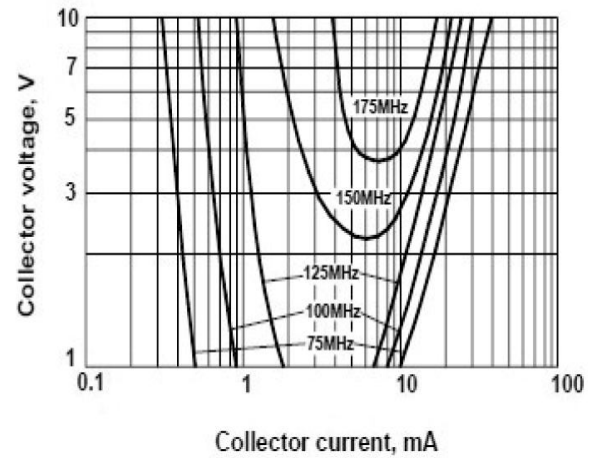


Rating and characteristic curves (FMBT5089)

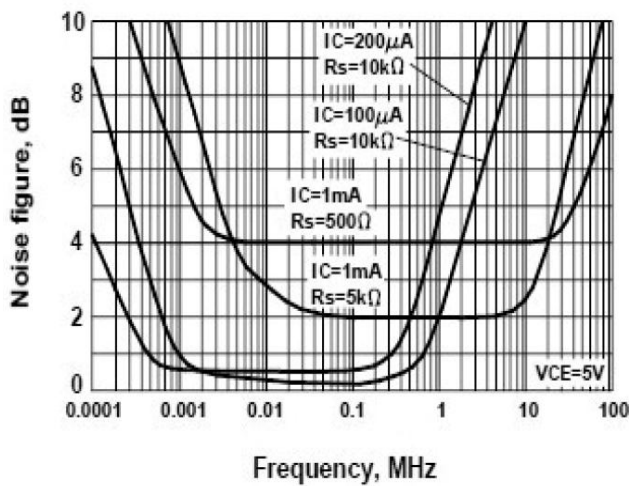
Input and output capacitance
vs. reverse bias voltage



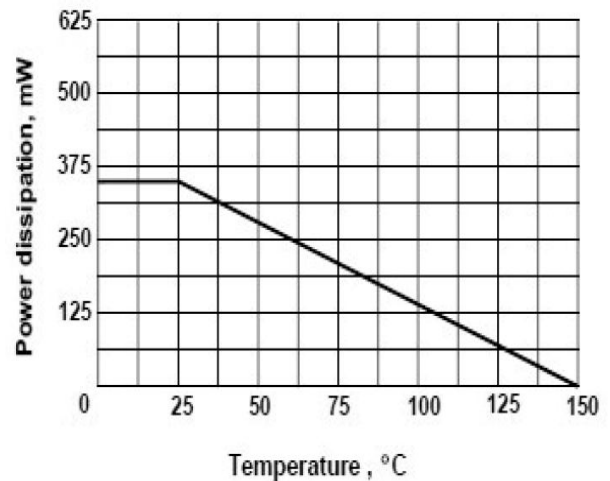
Contours of constant
gain bandwidth product



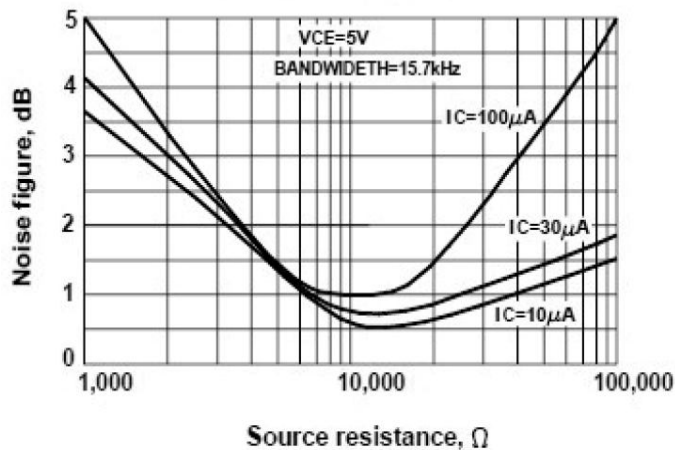
Noise figure vs. frequency



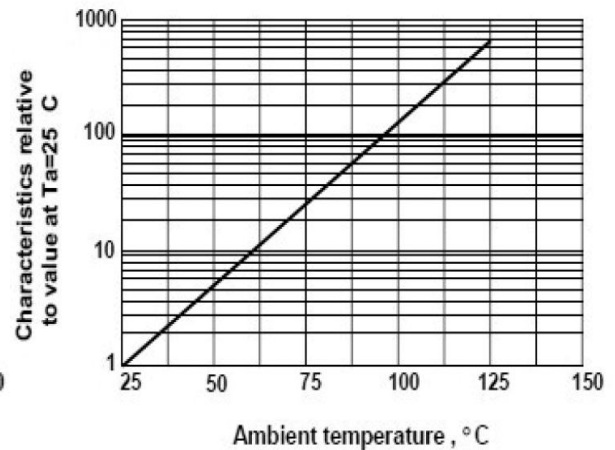
Power dissipation vs.
ambient temperature



Wideband noise frequency
vs. source resistance

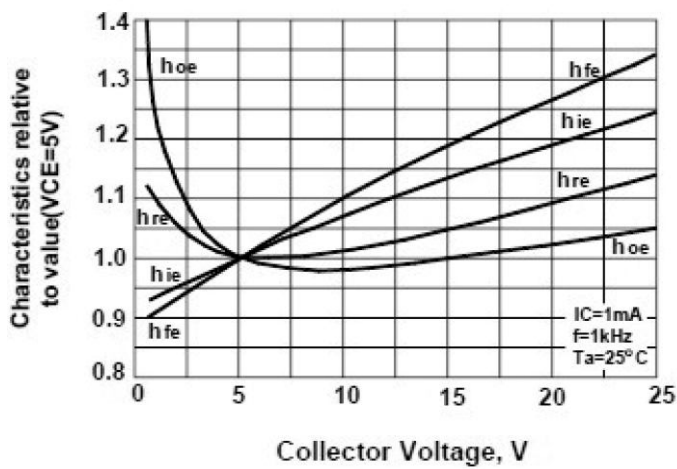


Normalized collector cutoff current
vs. ambient temperature

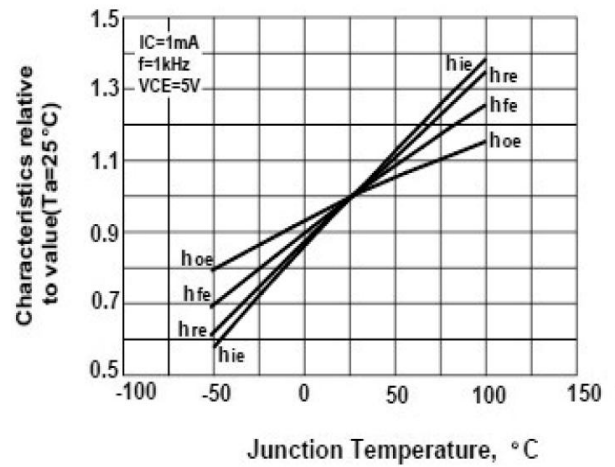


Rating and characteristic curves (FMBT5089)

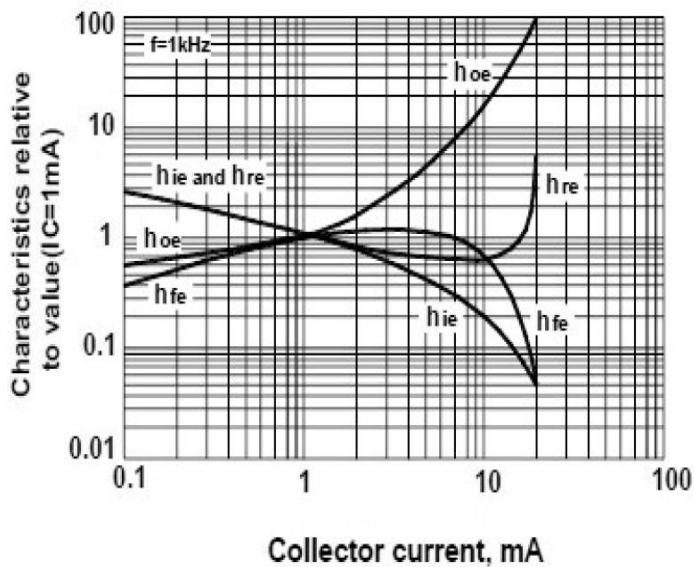
Typical common emitter characteristics



Typical common emitter characteristics

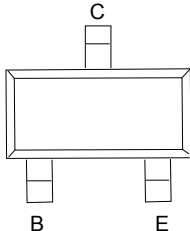
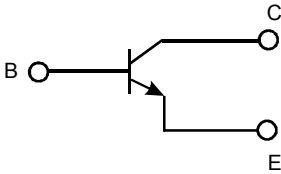


Typical common emitter characteristics



FMBT5089

Pinning information

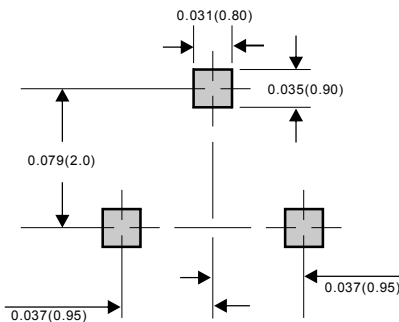
Pin	Simplified outline	Symbol
PinB Base PinC Collector PinE Emitter		

Marking

Type number	Marking code
FMBT5089	1R

Suggested solder pad layout

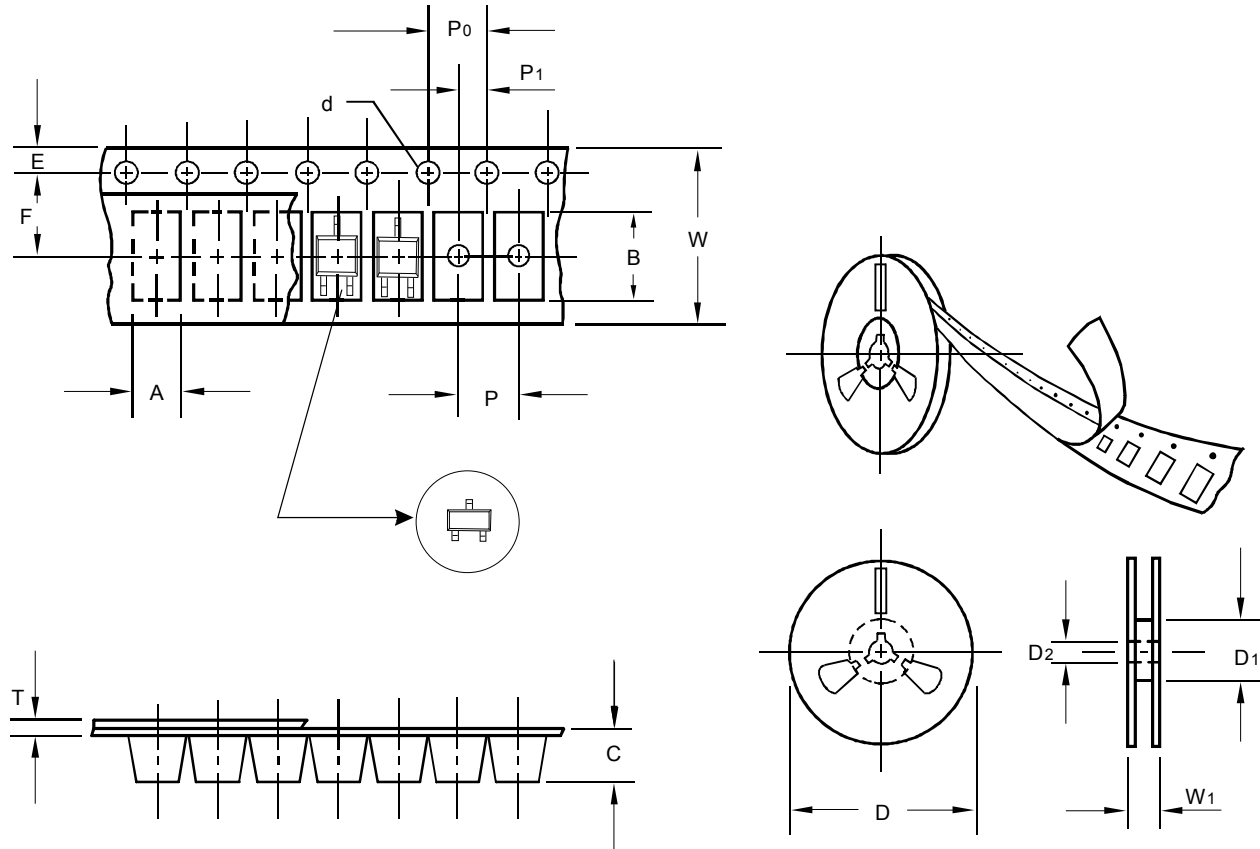
SOT-23



Dimensions in inches and (millimeters)

FMBT5089

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.

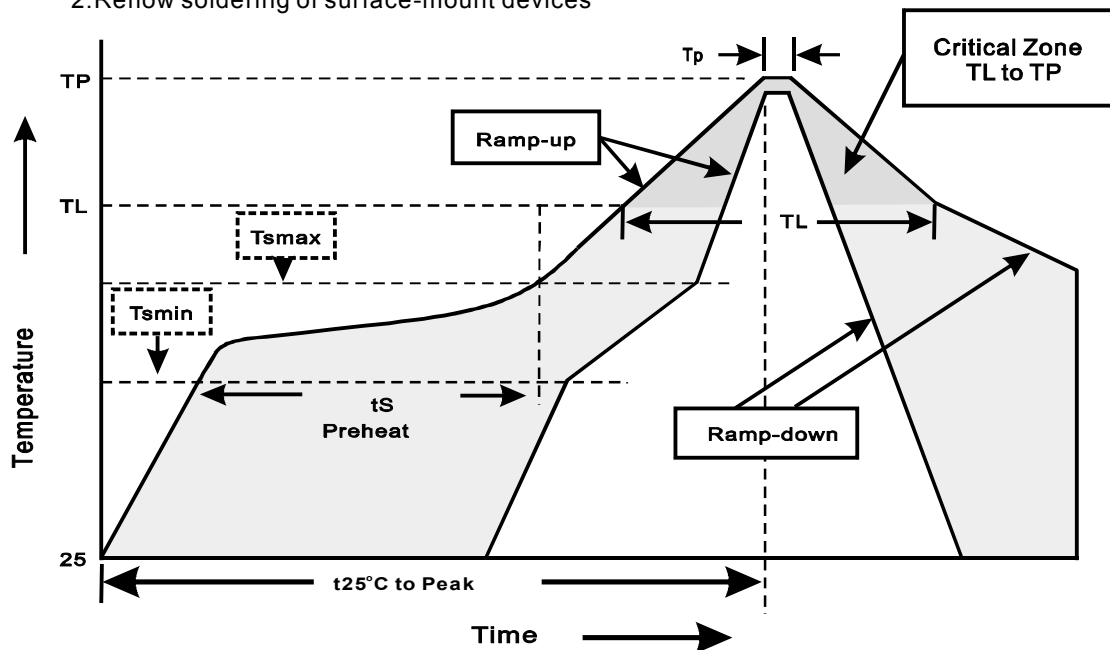
FMBT5089

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