

FMBT2907 / FMBT2907A

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FMBT2907 / FMBT2907A

600mA General Purpose PNP Epitaxial Planar Transistor

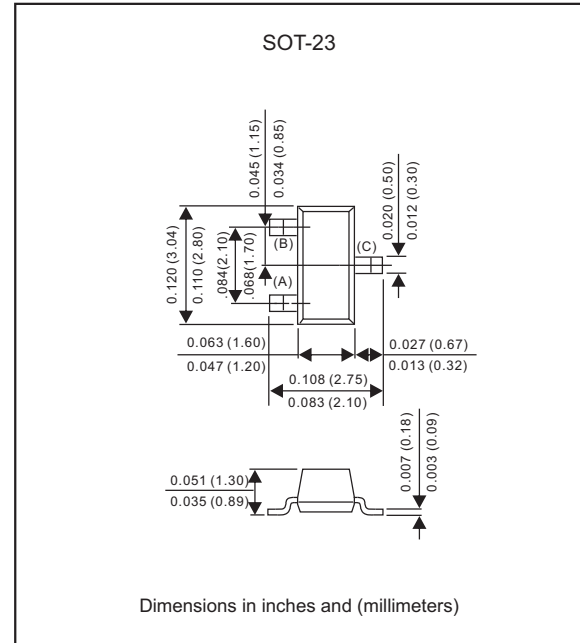
Package outline

Features

- High collector-emitter breakdown voltage.
($V_{CE0} = -60V @ I_C = -10mA$)
- PNP silicon epitaxial planar transistor, is designed for general purpose and amplifier applications.
- As complementary type, the NPN transistor FMBT2222/ FMBT2222A is recommended.
- Capable of 225mW power dissipation.
- Lead-free parts for green partner, exceeds environmental standards of MIL-STD-19500 /228
- Suffix "-H" indicates Halogen-free part, ex.FMBT2907-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	FMBT2907	FMBT2907A	UNIT
Collector-Base voltage		V_{CE0}	-40	-60	V
Collector-Emitter voltage		V_{CBO}	-60		V
Emitter-Base voltage		V_{EBO}	-5.0		V
Collector current		I_C	-600		mA
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		$^\circ\text{C}/\text{W}$
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		$^\circ\text{C}/\text{W}$
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.

FMBT2907 / FMBT2907A**ELECTRICAL CHARACTERISTICS** (TA = 25°C unless otherwise noted)

Characteristics	Symbol	Min	Max	Unit	
OFF CHARACTERISTICS					
Collector-Emitter Breakdown Voltage (IC = -10 mAdc, IB = 0)	FMBT2907 FMBT2907A	V(BR)CEO	-40 -60	- -	Vdc
Collector-Base Breakdown Voltage (IC = -10 µAdc, IE = 0)		V(BR)CBO	-60	-	Vdc
Emitter-Base Breakdown Voltage (IE = -10 µAdc, IC = 0)		V(BR)EBO	-5.0	-	Vdc
Collector Cutoff Current (VCE = -30 Vdc, VEB(off) = -0.5Vdc)		ICEX	-	-50	nAdc
Collector Cutoff Current (VCB = -50 Vdc, IE = 0)	FMBT2907 FMBT2907A	ICBO	-	-0.020	nAdc
(VCB = -50Vdc, IE = 0, TA = 125°C)	FMBT2907 FMBT2907A		-	-0.010	
	FMBT2907 FMBT2907A		-	-20 -10	
Base Cutoff Current (VCE = -30Vdc, VEB(off) = -0.5Vdc)	FMBT2907A	IB	-	-50	nAdc

ELECTRICAL CHARACTERISTICS (TA = 25°C unless otherwise noted) (Continued)

Characteristics	Symbol	Min	Max	Unit			
ON CHARACTERISTICS							
DC Current Gain	hFE						
(IC = -0.1 mAdc, VCE = -10 Vdc)					FMBT2907 FMBT2907A	35 75	- -
(IC = -1.0 mAdc, VCE = -10 Vdc)					FMBT2907 FMBT2907A	50 100	- -
(IC = -10 mAdc, VCE = -10 Vdc)					FMBT2907 FMBT2907A	75 100	- -
(IC = -150 mAdc, VCE = -10 Vdc)					FMBT2907 FMBT2907A	100	300
(IC = -500 mAdc, VCE = -10 Vdc)					FMBT2907 FMBT2907A	30 50	- -
Collector-Emitter Saturation Voltage (IC = -150 mAdc, IB = -15mAdc) (IC = -500 mAdc, IB = -50mAdc)	VCE(sat)	- -	-0.4 -1.6	Vdc			
Base-Emitter Saturation Voltage (IC = -150 mAdc, IB = -15mAdc) (IC = -500 mAdc, IB = -50mAdc)	VBE(sat)	- -	-1.3 -2.6	Vdc			

FMBT2907 / FMBT2907A**ELECTRICAL CHARACTERISTICS** (T_A = 25°C unless otherwise noted) (Continued)

Characteristics	Symbol	Min	Max	Unit
SMALL-SIGNAL CHARACTERISTICS				
Current-Gain-Bandwidth Product (1),(2) (I _C = -50 mA _{dc} , V _{CE} = 20 V _{dc} , f = 100MHz)	f _T	200	-	MHz
Output Capacitance (V _{CB} = -10 V _{dc} , I _E = 0, f = 1.0MHz)	C _{obo}	-	8.0	pF
Input Capacitance (V _{EB} = -2.0 V _{dc} , I _C = 0, f = 1.0MHz)	C _{ibo}	-	30	pF

SWITCHING CHARACTERISTICS

Turn-On Time	(V _{CC} = -30 V _{dc} , I _C = -150 mA _{dc} , I _{B1} = -15 mA _{dc})	t _{on}	-	45	ns
Delay Time		t _d	-	10	
Rise Time		t _r	-	40	
Turn-Off Time	(V _{CC} = -60 V _{dc} , I _C = -150 mA _{dc} , I _{B1} = I _{B2} = -15 mA _{dc})	t _{off}	-	100	
Storage Time		t _s	-	80	
Fall Time		t _f	-	30	

1. Pulse Test: Pulse Width = 300 μs, Duty Cycle ≤ 2.0%.

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

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Switching time equivalent test circuits

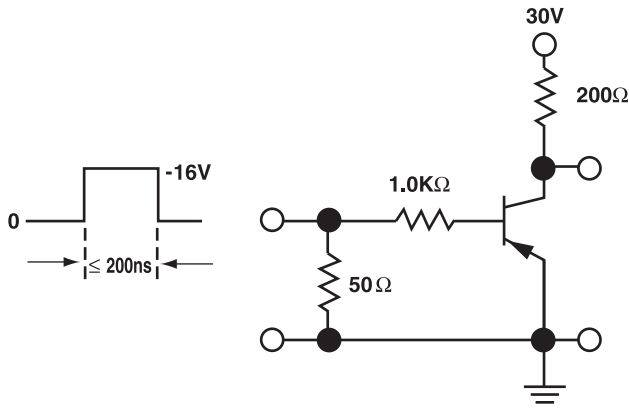


Fig 1. Saturated Turn-On Switching Time

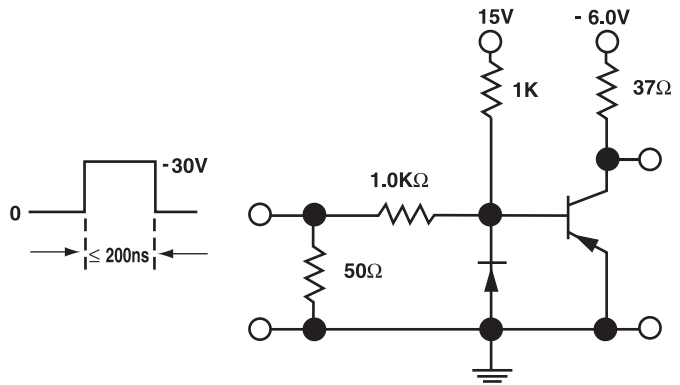


Fig 2. Saturated Turn-Off Switching Time

Typical Electrical Characteristics

FIG.3-Typical Pulsed Current Gain vs Collect Current

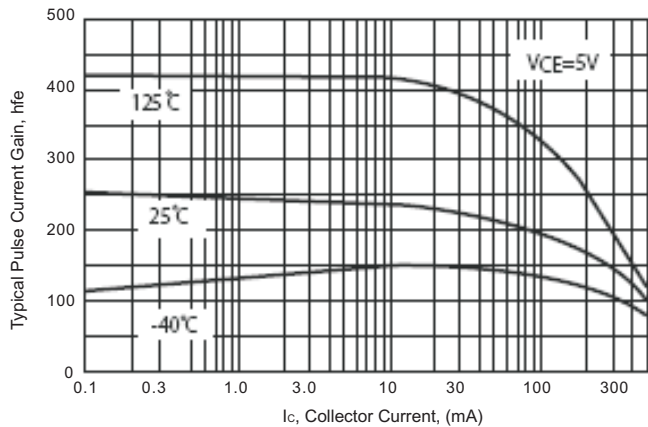


FIG.4-Collect-Emitter Saturation Voltage vs Collect Current

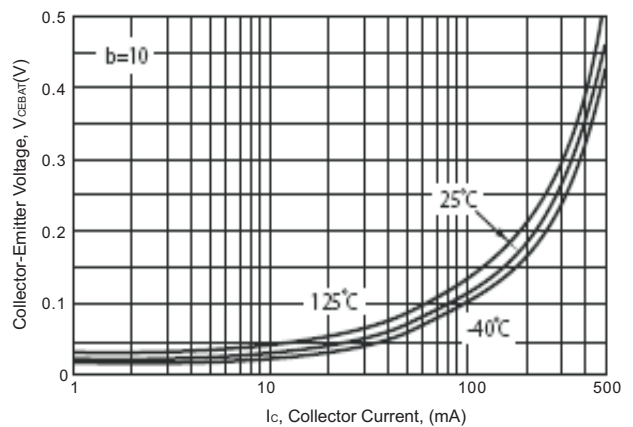


FIG.5-Base-Emitter Saturation Voltage vs Collector Current

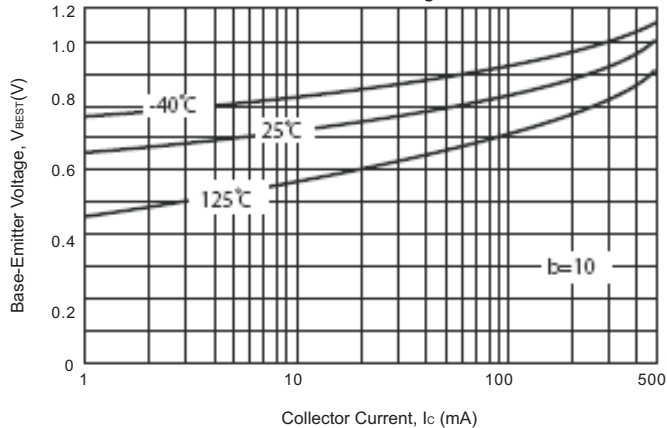
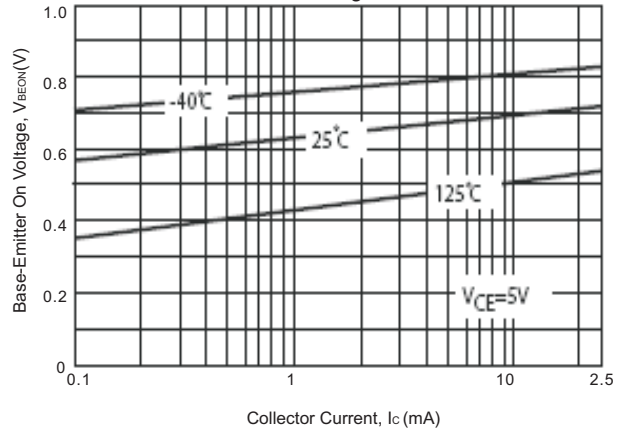


FIG.6-Base-Emitter On Voltage vs Collector Current



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FIG.7-Collect Cutoff Current vs Ambient Temperature

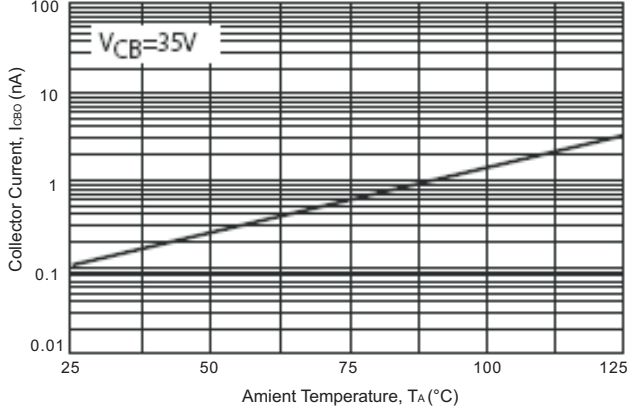
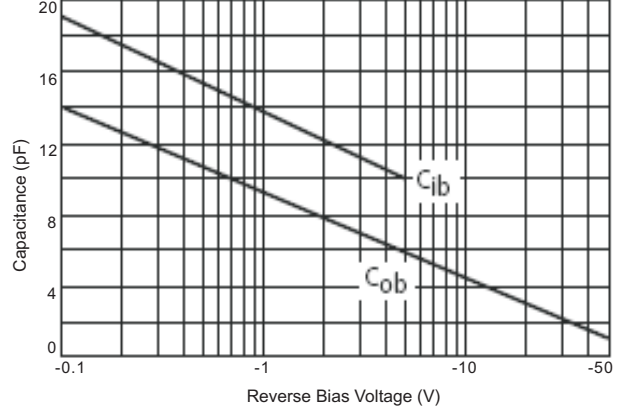


FIG.8-Input & Output Capacitance vs Reverse Bias Voltage



Typical Characteristics(Continued)

FIG.9-Switching Times vs Collector Current

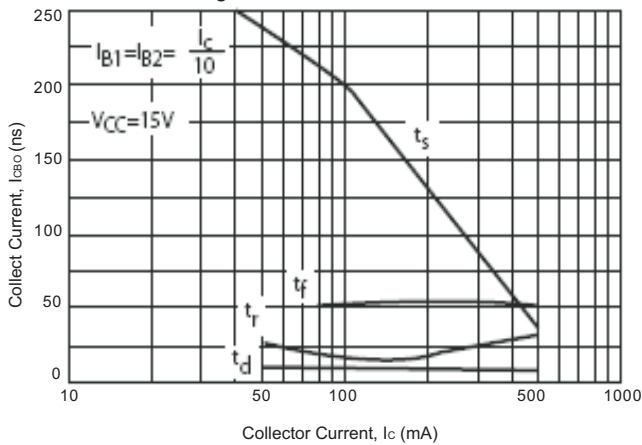


FIG.10-Turn On and Turn Off Times vs Collector Current

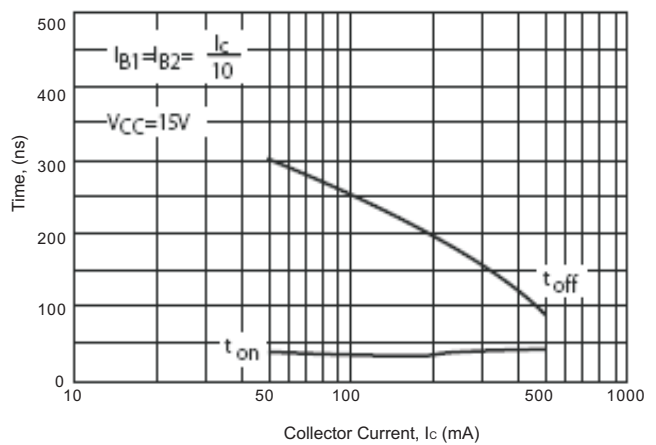


FIG. 11-Rise Time vs Collector & Turn On Base Current

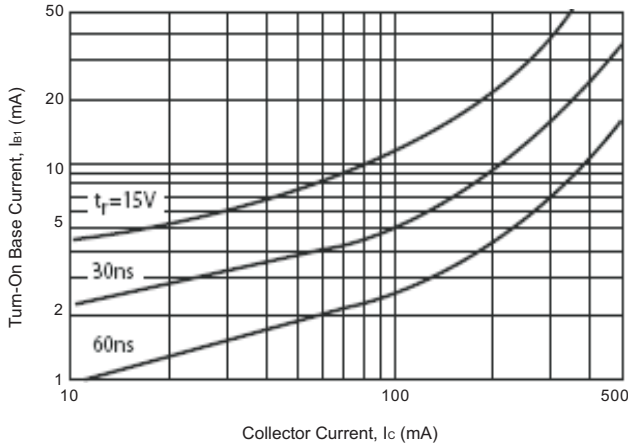
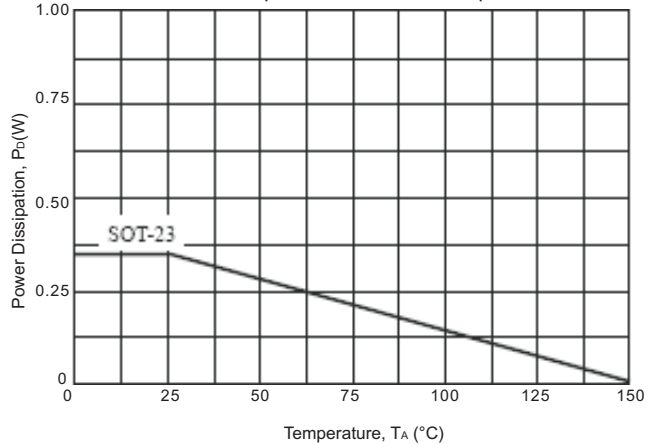
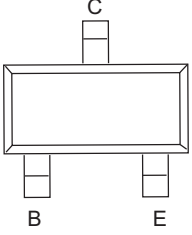
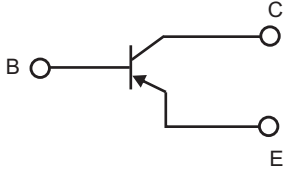


FIG.12-Power Dissipation vs Ambient Temperature



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Pinning information

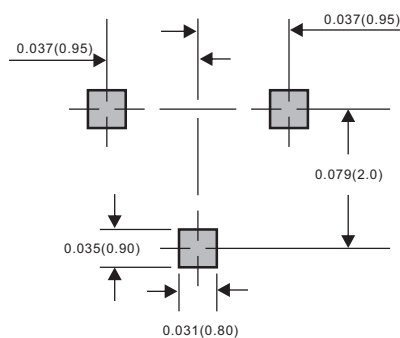
Pin	Simplified outline	Symbol
PinB Base PinC Collector PinE Emitter		

Marking

Type number	Marking code
FMBT2907	M2B
FMBT2907A	2F

Suggested solder pad layout

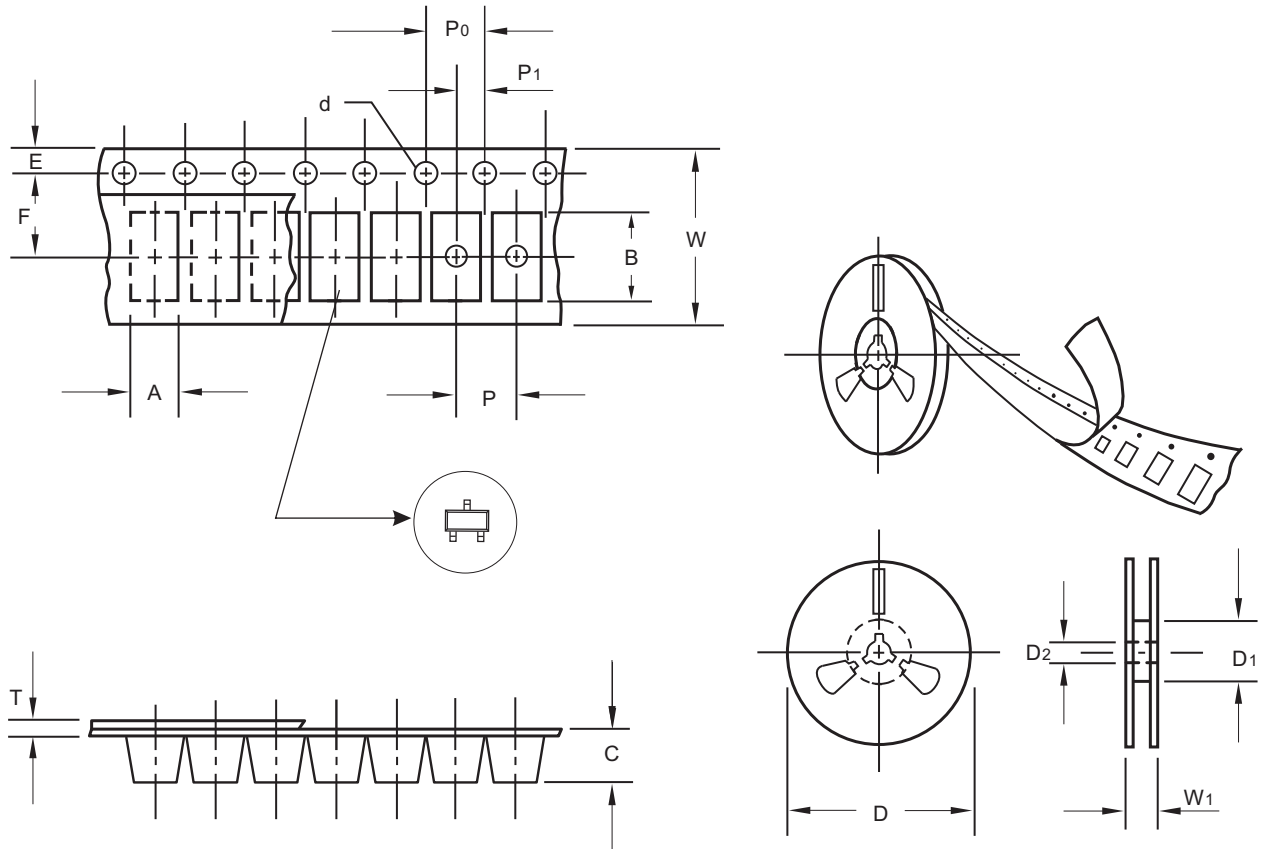
SOT-23



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.

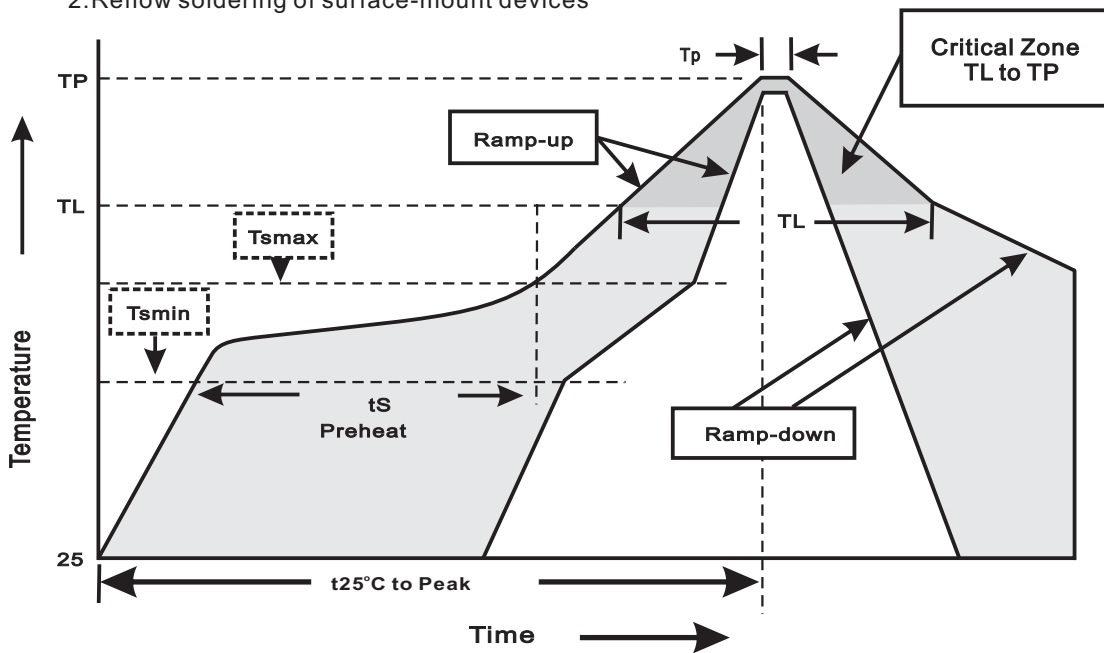
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Reel packing

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"	3000	4.0	30,000	183*183*123	178	383*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(T _{min}) -Temperature Max(T _{max}) -Time(min to max)(t _s)	150°C 200°C 60~120sec
T _{max} 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