MMBT3904M

NPN TRANSISTOR

Datasheet

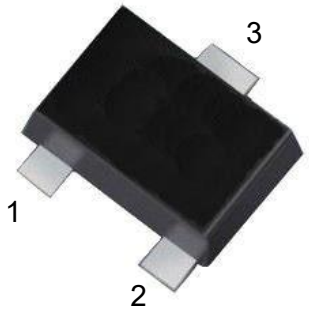
Features

- Low profile package
- Ideal for automated placement
- Complementary to MMBT3906M(PNP).
- Power Dissipation of 200mW
- High Stability and High Reliability
- RoHS Compliant

Mechanical Data

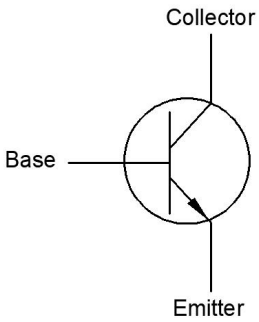
- Package: SOT-723
- Lead Finish:Matte Tin
- Case Material: “Green” Molding Compound.
- UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 3 per J-STD-020
- Tape Reel :8000pcs

Appearance & Symbol



Package：SOT-723

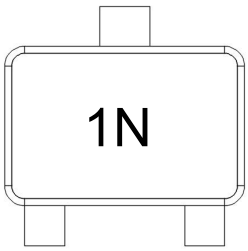
1：Base
2：Emitter
3：Collector



Applications

- amplifying signal
- Electronic switch
- Oscillating circuit
- variable resistance

Marking Information



1N= Marking Code

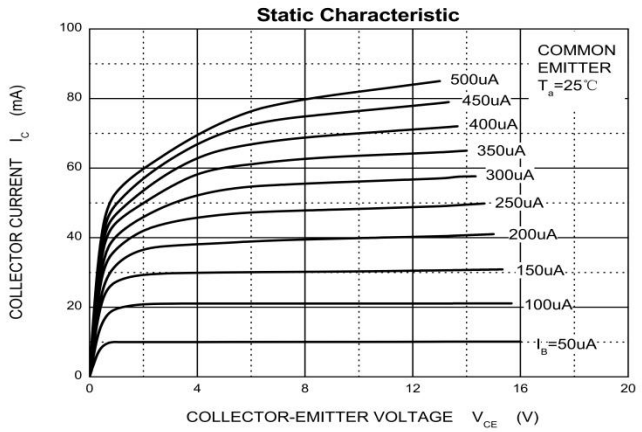
Absolute Maximum Ratings (T=25℃ unless otherwise noted)

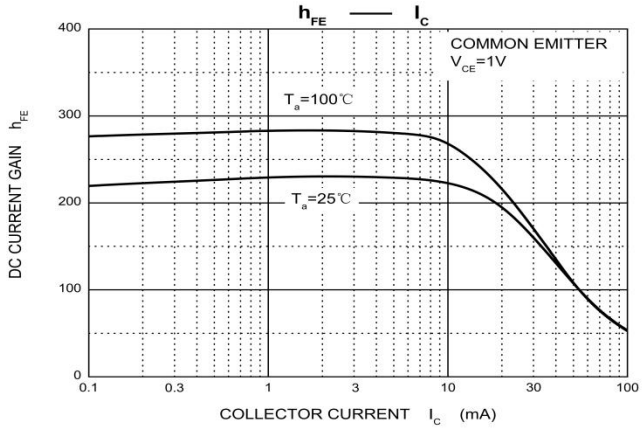
Parameter	Symbol	Value	Units
Collector-Base Voltage	V_{CBO}	60	V
Collector-Emitter Voltage	V_{CEO}	40	V
Emitter-Base Voltage	V_{EBO}	6	V
Collector Current - Continuous	I_C	200	mA
Collector Power Dissipation	P_C	100	mW
Thermal Resistance From Junction to Ambient	$R_{\theta JA}$	1250	℃/W
Operating Temperature Range	T_J	-55 to +150	℃
Storage Temperature Range	T_{STG}	-55 to +150	℃

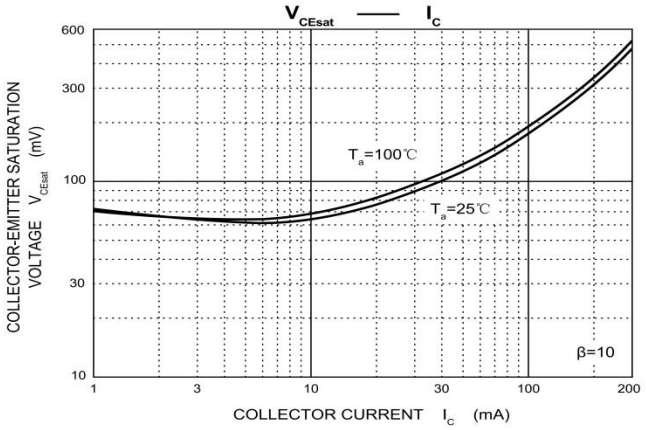
Electrical Characteristics (T=25℃ unless otherwise noted)

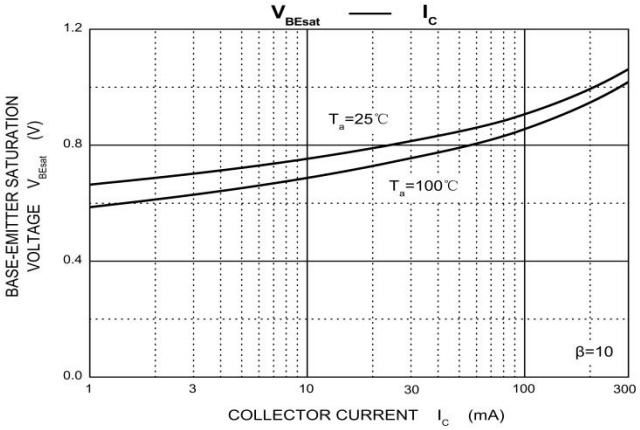
Parameter	Symbol	Test conditions	Min	Typ	Max	Unit
Collector-base breakdown voltage	$V_{(BR)CBO}$	I_C=10uA, I_E=0	60			V
Collector-emitter breakdown voltage	$V_{(BR)CEO}$	I_C=1mA, I_B=0	40			V
Emitter-base breakdown voltage	$V_{(BR)EBO}$	I_E=10uA, I_C=0	6			V
Collector cut-off current	I_{CEX}	V_{CE}=30V, V_{EB}(off)=3V			50	nA
Emitter cut-off current	I_{EBO}	V_{EB}=5V, I_C=0			100	nA
DC current gain	h_{FE}	V_{CE}=1V, I_C=0.1mA	40		300	
		V_{CE}=1V, I_C=1mA	70			
		V_{CE}=1V, I_C=10mA	100		300	
		V_{CE}=1V, I_C=50mA	60			
Collector-emitter saturation voltage	$V_{CE(sat)}$	I_C=10mA, I_B=1mA			0.2	V
		I_C=50mA, I_B=5mA			0.3	V
Base -emitter saturation voltage	$V_{BE(sat)}$	I_C=10mA, I_B=1mA	0.65		0.85	V
		I_C=50mA, I_B=5mA			0.95	V
Transition frequency	f_T	V_{CE}=20V, I_C=10mA,f=100MHz	300			MHz
Output capacitance	C_{ob}	V_{CB}=5V, I_E=0,f=1MHz			4	pF
Input capacitance	C_{ib}	V_{EB}=0.5V, I_C=0,f=1MHz			8	pF
Noise figure	NF	V_{CE}=5V,I_C=0.1mA,f=1MHz, Rs=1KΩ			5	dB
Delay time	t_d	V_{CC}=3V, $V_{BE(off)}$=0.5V I_C=10mA, I_{B1}=1mA			35	ns
Rise time	t_r				35	ns
Storage time	t_s	V_{CC}=3V, I_C=10mA, I_{B1}=I_{B2}=1mA			200	ns
Fall time	t_f				50	ns

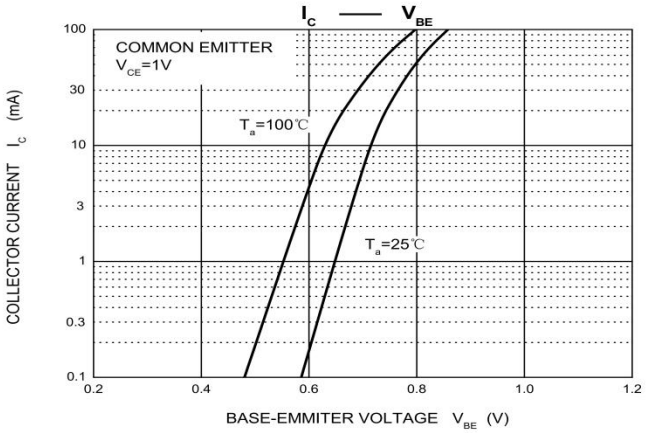
Typical Characteristics

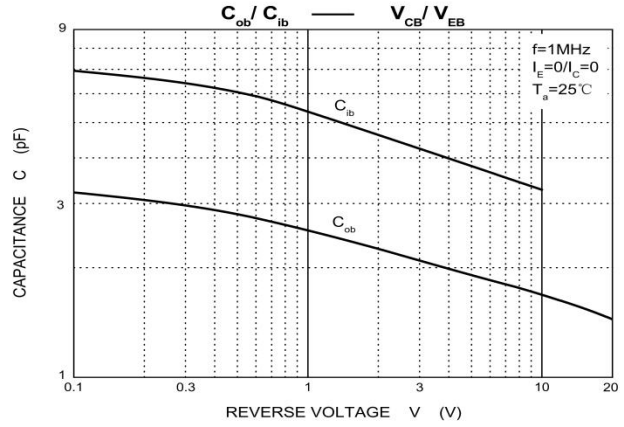


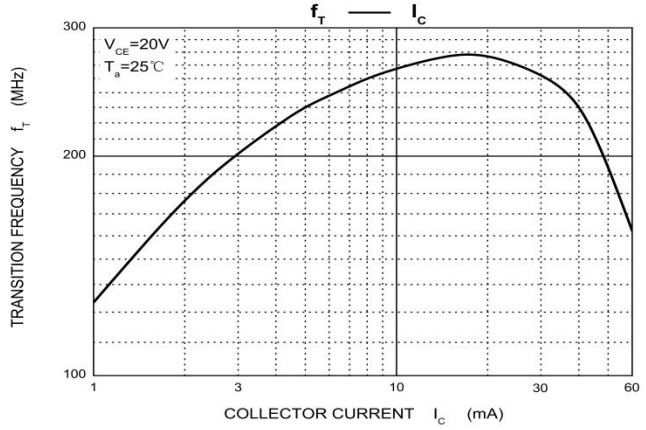


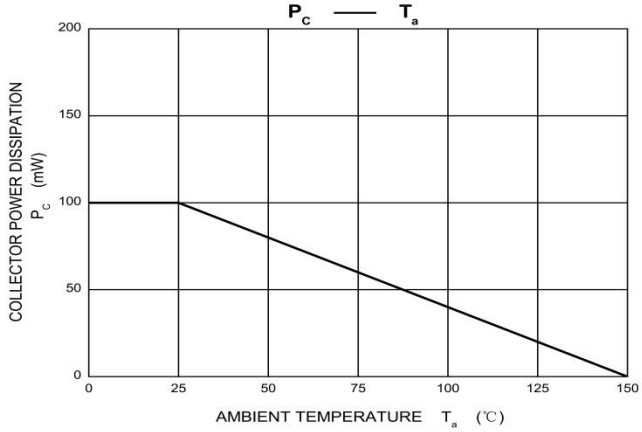






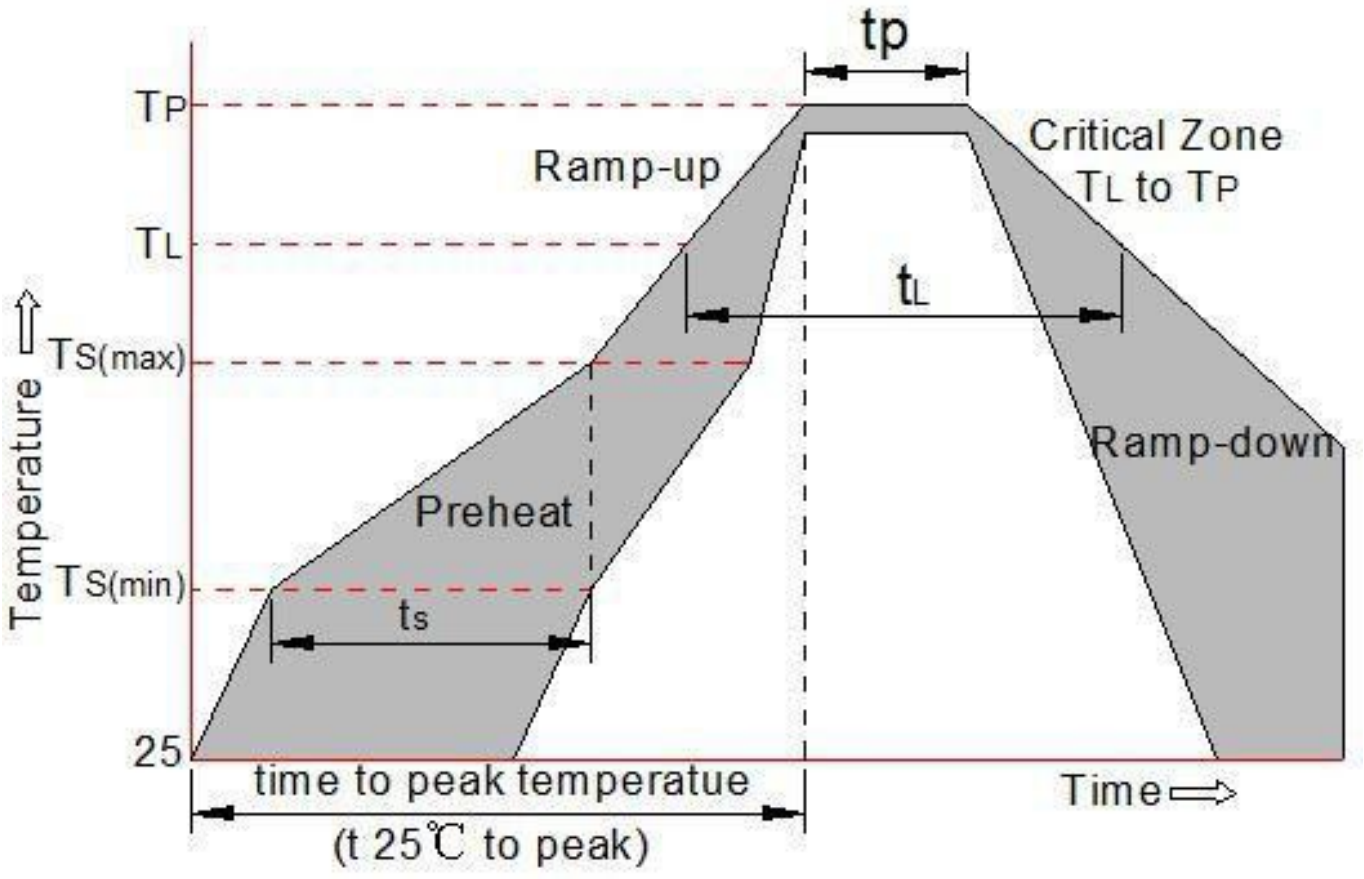




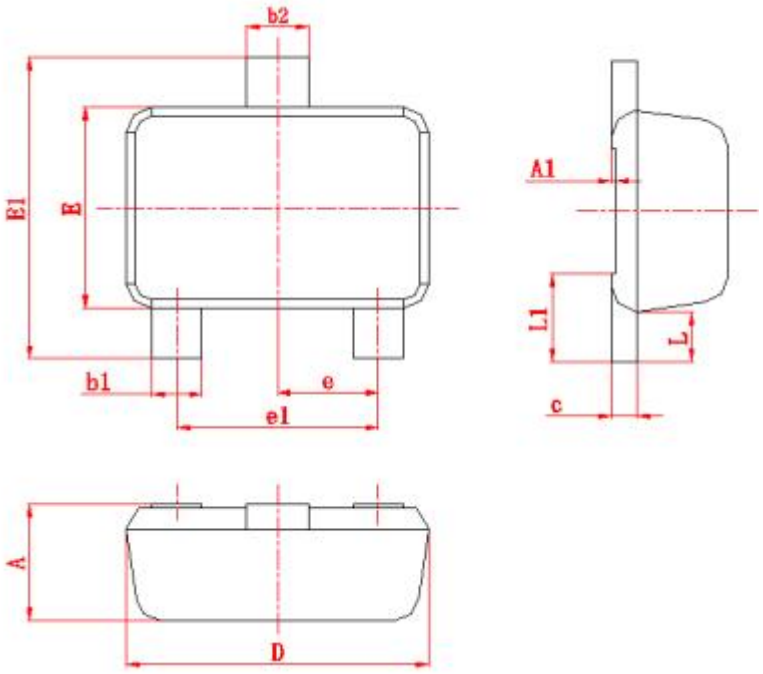


Soldering parameters

Reflow Condition		Pb-Free assembly (see as bellow)
Pre Heat	-Temperature Min ($T_{s(min)}$)	+150℃
	-Temperature Max($T_{s(max)}$)	+200℃
	-Time (Min to Max) (ts)	60-180 secs.
Average ramp up rate (Liquid us Temp (T_L) to peak)		3℃/sec. Max
$T_{s(max)}$ to T_L - Ramp-up Rate		3℃/sec. Max
Reflow	-Temperature(T_L) (Liquid us)	+217℃
	-Temperature(t_L)	60-150 secs.
Peak Temp (T_p)		+260(+0/-5)℃
Time within 5℃ of actual Peak Temp (t_p)		30 secs. Max
Ramp-down Rate		6℃/sec. Max
Time 25℃ to Peak Temp (T_P)		8 min. Max
Do not exceed		+260℃

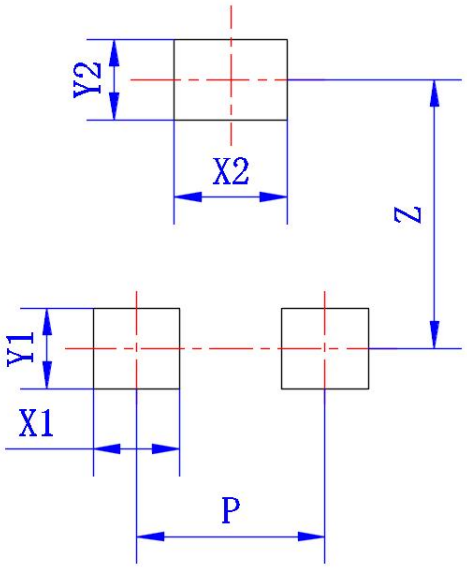


Package mechanical data



Symbol	Dimension in Millimeters	
	min	max
A	0.43	0.5
A1	0	0.05
D	1.15	1.25
E	0.75	0.85
E1	1.15	1.25
e	(0.4)	
e1	0.7	0.9
b1	0.15	0.25
b2	0.25	0.35
c	0.08	0.15
L	0.12	0.28
L1	(0.3)	

Suggested Land Pattern



Symbol	Dimension in Millimeters
	typ
X1	(0.4)
X2	(0.45)
Y1	(0.4)
Y2	(0.4)
P	(0.8)
Z	(1.1)