

NPN Transistors

MMBT3904 MARKING:1AM

SOT-23

MAXIMUM RATINGS ($T_a=25^{\circ}\text{C}$ unless otherwise noted)

Symbol	Parameter	Value	Unit
V_{CB0}	Collector-Base Voltage	60	V
V_{CE0}	Collector-Emitter Voltage	40	V
V_{EB0}	Emitter-Base Voltage	6	V
I_c	Collector Current	200	mA
P_c	Collector Power Dissipation	200	mW
$R_{\theta JA}$	Thermal Resistance From Junction To Ambient	625	$^{\circ}\text{C/W}$
T_j	Junction Temperature	150	$^{\circ}\text{C}$
T_{stg}	Storage Temperature	-55~+150	$^{\circ}\text{C}$

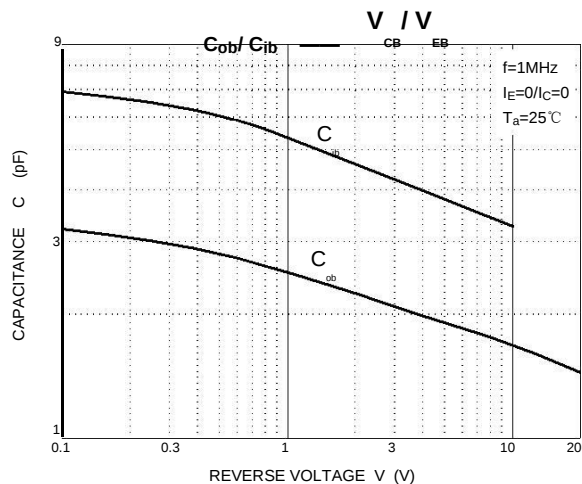
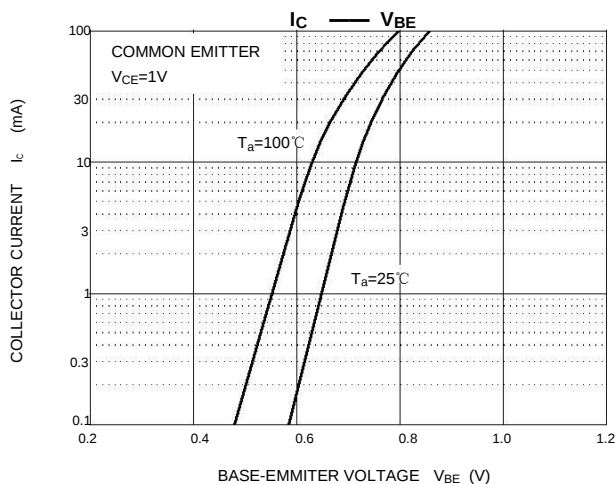
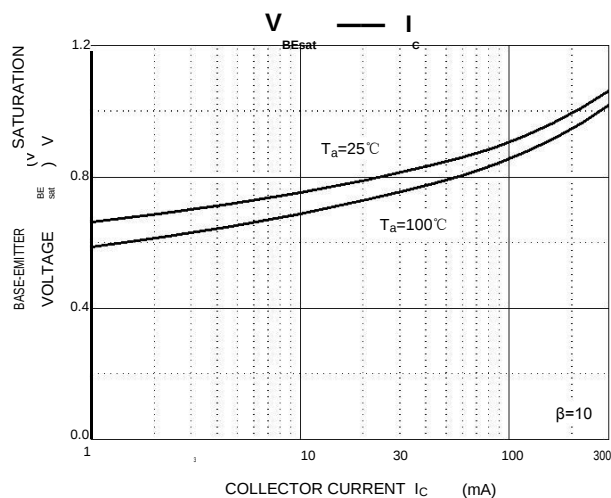
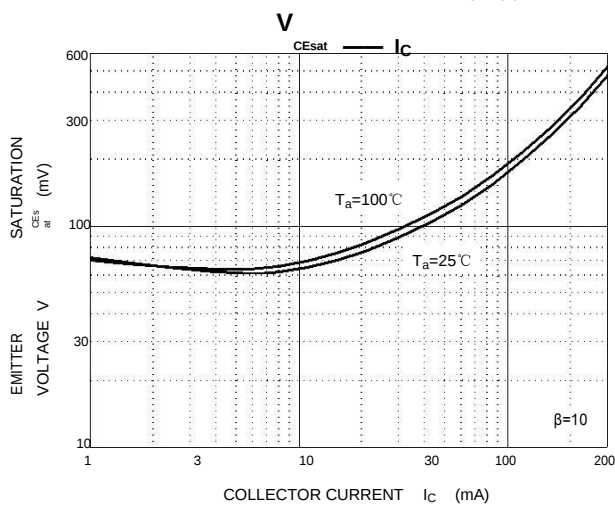
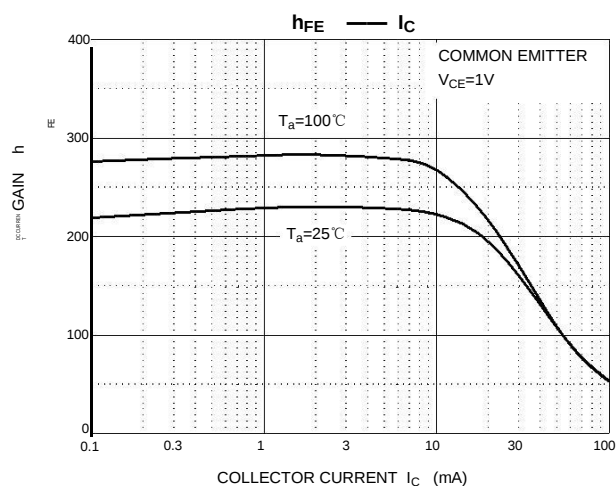
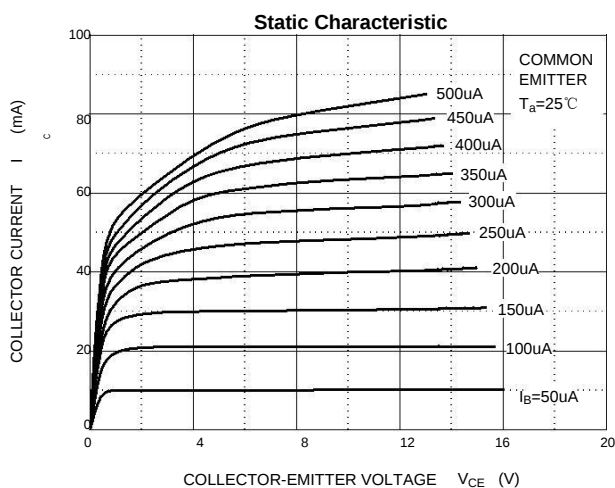


ELECTRICAL CHARACTERISTICS ($T_a=25^{\circ}\text{C}$ unless otherwise specified)

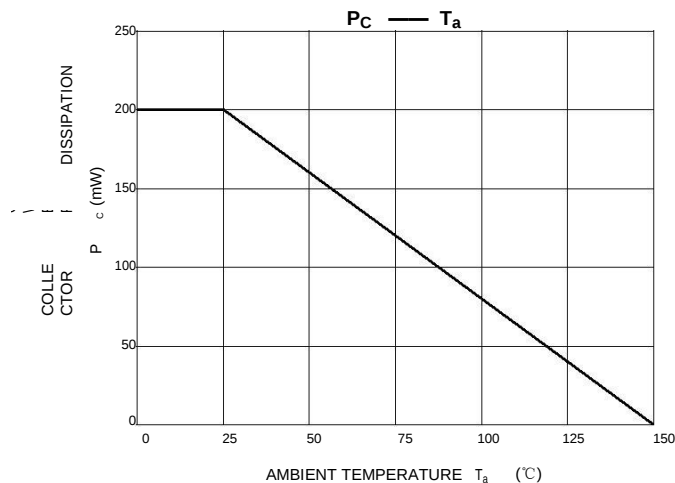
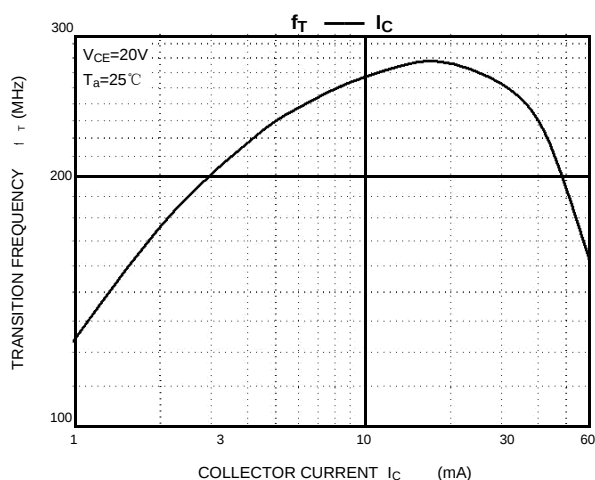
Parameter	Symbol	Test conditions	Min	Typ	Max	Unit
Collector-base breakdown voltage	$V_{(BR)CBO}$	$I_c=10\mu\text{A}$, $I_E=0$	60			V
Collector-emitter breakdown voltage	$V_{(BR)CEO}$	$I_c=1\text{mA}$, $I_B=0$	40			V
Emitter-base breakdown voltage	$V_{(BR)EBO}$	$I_E=10\mu\text{A}$, $I_c=0$	6			V
Collector cut-off current	I_{CEX}	$V_{CE}=30\text{V}$, $V_{EB(off)}=3\text{V}$			50	nA
Collector cut-off current	I_{CBO}	$V_{CB}=60\text{V}$, $I_E=0$			100	nA
Emitter cut-off current	I_{EBO}	$V_{EB}=5\text{V}$, $I_c=0$			100	nA
DC current gain	$h_{FE(1)}$	$V_{CE}=1\text{V}$, $I_c=10\text{mA}$	100		300	
	$h_{FE(2)}$	$V_{CE}=1\text{V}$, $I_c=0.1\text{mA}$	40			
	$h_{FE(3)}$	$V_{CE}=1\text{V}$, $I_c=100\text{mA}$	30			
Collector-emitter saturation voltage	$V_{CE(sat)}$	$I_c=50\text{mA}$, $I_B=5\text{mA}$			0.30	V
Base-emitter saturation voltage	$V_{BE(sat)}$	$I_c=50\text{mA}$, $I_B=5\text{mA}$			0.95	V
Transition frequency	f_T	$V_{CE}=20\text{V}$, $I_c=10\text{mA}$, $f=100\text{MHz}$	250			MHz
Delay time	t_d	$V_{CC}=3\text{V}$, $V_{BE(off)}=-0.5\text{V}$, $I_c=10\text{mA}$, $I_{B1}=1\text{mA}$			35	ns
Rise time	t_r	$V_{CC}=3\text{V}$, $V_{BE(off)}=-0.5\text{V}$, $I_c=10\text{mA}$, $I_{B1}=1\text{mA}$			35	ns
Storage time	t_s	$V_{CC}=3\text{V}$, $I_c=10\text{mA}$, $I_{B1}=I_{B2}=1\text{mA}$			200	ns
Fall time	t_f	$V_{CC}=3\text{V}$, $I_c=10\text{mA}$, $I_{B1}=I_{B2}=1\text{mA}$			50	ns

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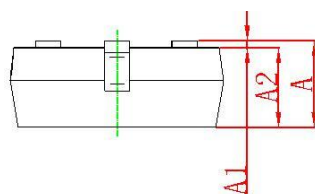
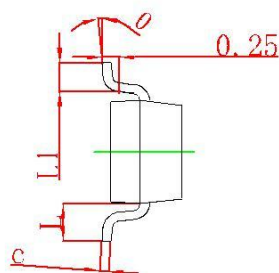
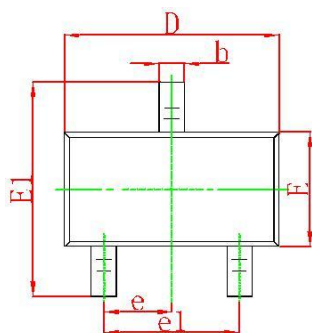
Typical Characteristics



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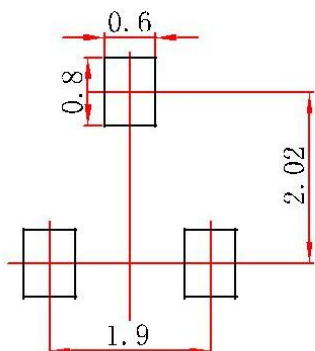


SOT-23 Package Outline Dimensions



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.900	1.150	0.035	0.045
A1	0.000	0.100	0.000	0.004
A2	0.900	1.050	0.035	0.041
b	0.300	0.500	0.012	0.020
c	0.080	0.150	0.003	0.006
D	2.850	3.090	0.110	0.118
E	1.200	1.400	0.047	0.055
E1	2.250	2.550	0.089	0.100
e	0.950 TYP		0.037 TYP	
e1	1.800	2.000	0.071	0.079
L	0.550 REF		0.022 REF	
L1	0.300	0.500	0.012	0.020
θ	0°	8°	0°	8°

SOT-23 Suggested Pad Layout



Note:

1. Controlling dimension: in millimeters.
2. General tolerance: ± 0.05 mm.
3. The pad layout is for reference purposes only.