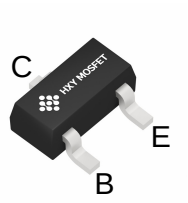
MMBT3904

NPN Plastic-Encapsulate Transistors

Features

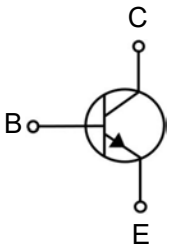
- Collector Current: I_C=0.2A
- Power Dissipation of 200mw



SOT-23

Package Marking and Ordering Information

Product ID	Pack	Marking	Qty(PCS)
MMBT3904	SOT-23	1AM	3000



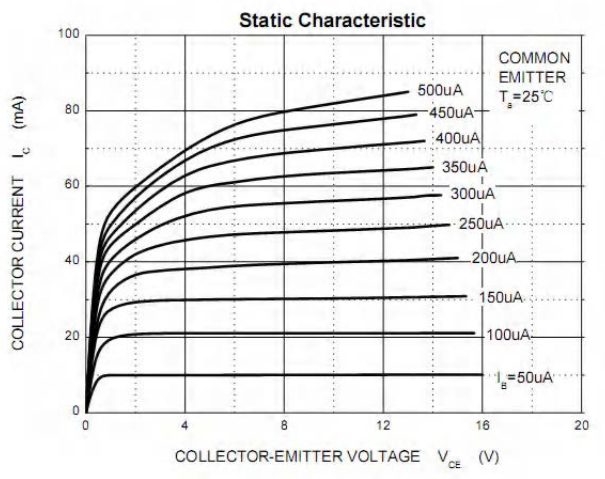
Maxmim Ratings (Ta=25℃ unless otherwise noted)

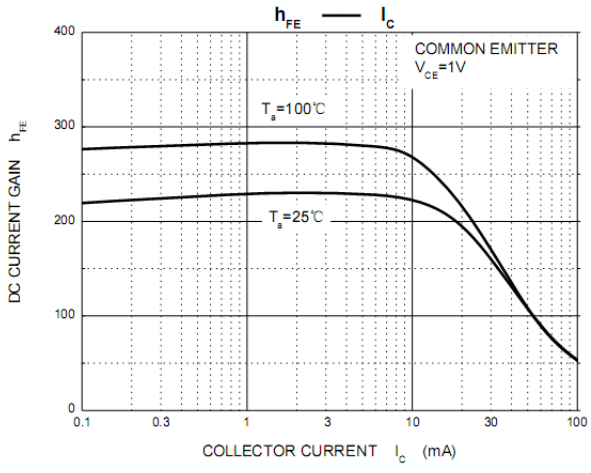
Parameter	Symbol	Limit	Unit
Collector-Base Voltage	V_{CBO}	60	V
Collector-Emitter Voltage	V_{CEO}	40	V
Emitter-Base Voltage	V_{EBO}	6	V
Collector Current	I_C	200	mA
Collector Power Dissipation	P_C	200	mW
Thermal Resistance From Junction To Ambient	$R_{\Theta JA}$	625	℃/W
Junction Temperature	T_j	150	℃
Storage Temperature	T_{stg}	-55～+150	℃

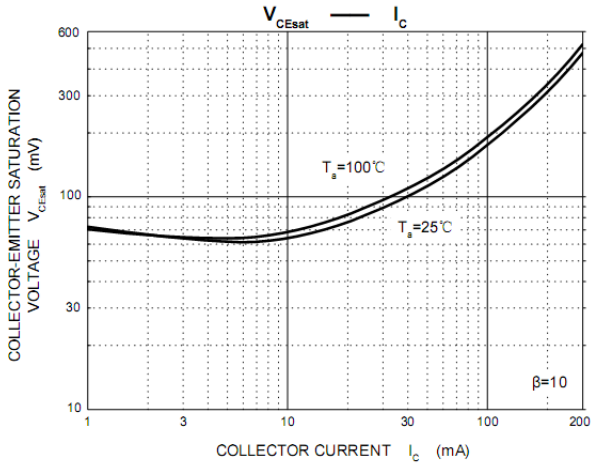
Electrcal Charcteristics (Ta=25℃unless otherwise specified)

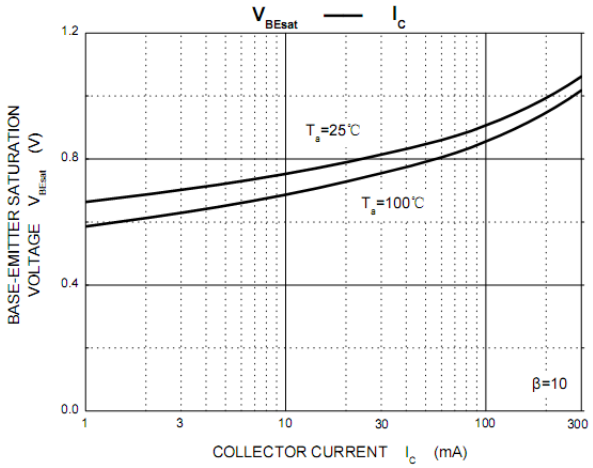
Parameter	Symbol	Test conditions	Min	Typ	Max	Unit
Collector-base breakdown voltage	$V_{(BR)CBO}$	I_C=10μA, I_E=0	60			V
Collector-emitter breakdown voltage	$V_{(BR)CEO}$	I_C=1mA, I_B=0	40			V
Emitter-base breakdown voltage	$V_{(BR)EBO}$	I_E=10μA, I_C=0	6			V
Collector cut-off current	I_{CEX}	V_{CE}=30V, $V_{EB(off)}$=3V			50	nA
Collector cut-off current	I_{CBO}	V_{CB}= 60V, I_E=0			100	nA
Emitter cut-off current	I_{EBO}	V_{EB}=5V, I_C=0			100	nA
DC current gain	$h_{FE(1)}$	V_{CE}=1V, I_C=10mA	100		300	
	$h_{FE(2)}$	V_{CE}=1V, I_C=50mA	60			
	$h_{FE(3)}$	V_{CE}=1V, I_C=100mA	30			
Collector-emitter saturation voltage	$V_{CE(sat)}$	I_C=50mA, I_B=5mA			0.3	V
Base-emitter saturation voltage	$V_{BE(sat)}$	I_C=50mA, I_B=5mA			0.95	V
Transition frequency	f_T	V_{CE}=20V,I_C=10mA, f=100MHz	300			MHz
Delay time	t_d	V_{CC}=3V, $V_{BE(off)}$=-0.5V I_C=10mA, I_{B1}=1mA			35	ns
Rise time	t_r	V_{CC}=3V, $V_{BE(off)}$=-0.5V I_C=10mA, I_{B1}=1mA			35	ns
Storage time	t_s	V_{CC}=3V, I_C=10mA, I_{B1}= I_{B2}=1mA			200	ns
Fall time	t_f	V_{CC}=3V, I_C=10mA, I_{B1}= I_{B2}=1mA			50	ns

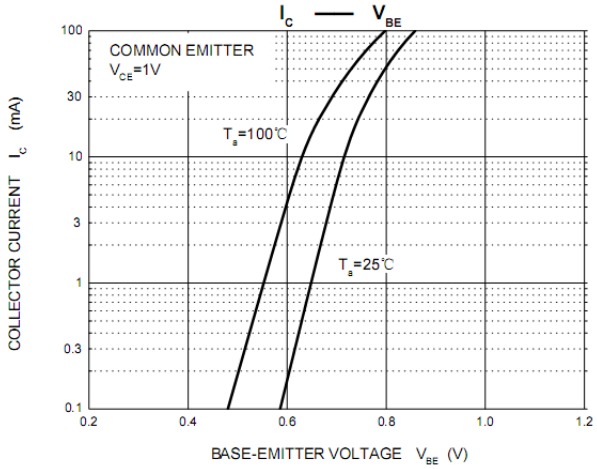
Typical Characteristics

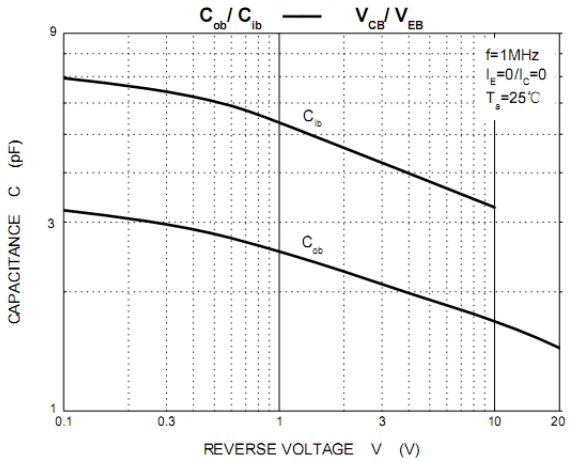


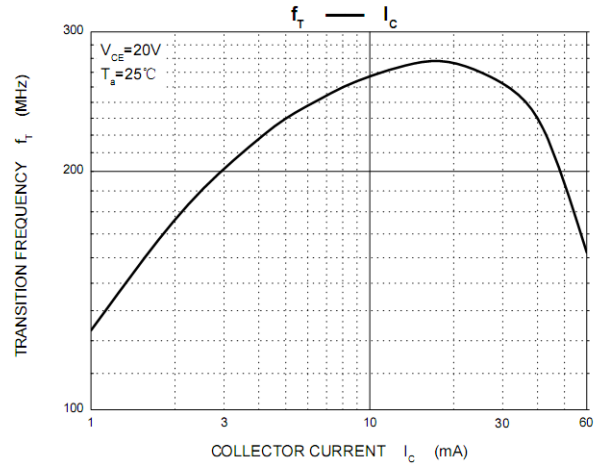


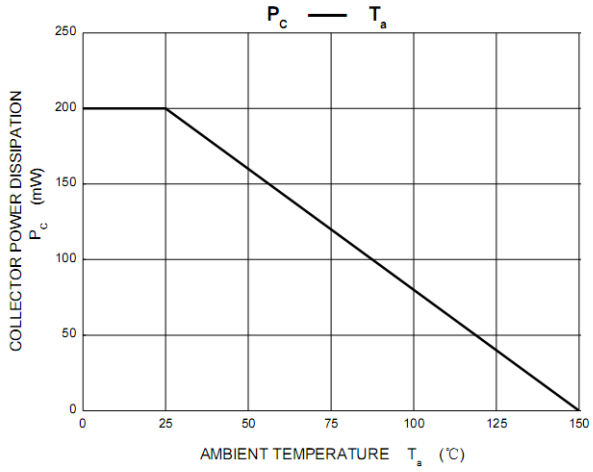

V_{CEsat} — I_C
COLLECTOR-EMITTER SATURATION VOLTAGE V_{CEsat} (mV)
600
300
100
30
10
T_a=100℃
T_a=25℃
β=10
1
3
10
30
100
200
COLLECTOR CURRENT I_C (mA)


V_{BEsat} — I_C
BASE-EMITTER SATURATION VOLTAGE V_{BEsat} (V)
1.2
0.8
0.4
0.0
T_a=25℃
T_a=100℃
β=10
1
3
10
30
100
300
COLLECTOR CURRENT I_C (mA)

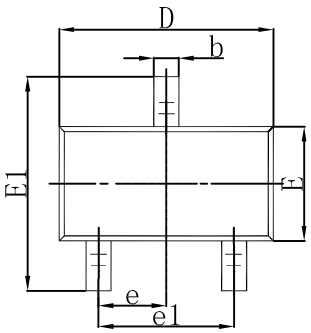

I_C — V_{BE}
COMMON EMITTER
V_{CE}=1V
COLLECTOR CURRENT I_C (mA)
100
30
10
3
1
0.3
0.1
T_a=100℃
T_a=25℃
0.2
0.4
0.6
0.8
1.0
1.2
BASE-EMITTER VOLTAGE V_{BE} (V)

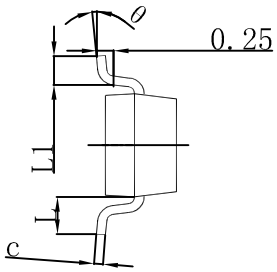

C_{ob} / C_{ib} — V_{CB} / V_{EB}
f=1MHz
I_E=0/I_C=0
T_a=25℃
CAPACITANCE C (pF)
9
3
1
C_{ib}
C_{ob}
0.1
0.3
1
3
10
20
REVERSE VOLTAGE V (V)

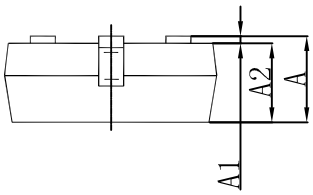

f_T — I_C
V_{CE}=20V
T_a=25℃
TRANSITION FREQUENCY f_T (MHz)
300
200
100
1
3
10
30
60
COLLECTOR CURRENT I_C (mA)


P_C — T_a
COLLECTOR POWER DISSIPATION P_C (mW)
250
200
150
100
50
0
0
25
50
75
100
125
150
AMBIENT TEMPERATURE T_a (℃)

SOT-23 Package Outline Dimensions

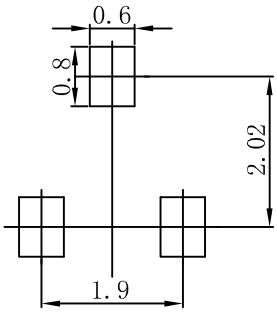






Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.900	1.150	0.035	0.045
A1	0.000	0.100	0.000	0.004
A2	0.900	1.050	0.035	0.041
b	0.300	0.500	0.012	0.020
c	0.080	0.150	0.003	0.006
D	2.800	3.000	0.110	0.118
E	1.200	1.400	0.047	0.055
E1	2.250	2.550	0.089	0.100
e	0.950 TYP		0.037 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:± 0.05mm.
3.The pad layout is for reference purposes only.

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