

MMBT3904M

NPN Plastic-
Encapsulate Transistor

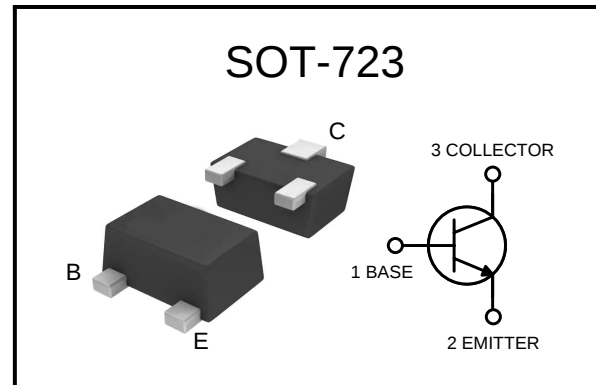
Features

- $V_{CE}=40V$
- $I_C=0.2A$
- $f_T=300MHz$ @ $V_{CE}=20V$, $I_C=10mA$, $f=100MHz$

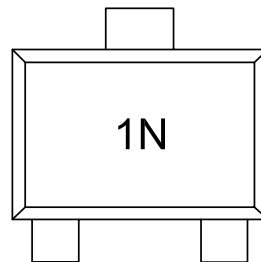
Description

- As complementary type the PNP transistor MMBT3906M is recommended
- Epitaxial planar die construction
- SOT-723 Plastic Package.

Package



Marking



Ordering information

Order code	Package	Marking	Base qty	Delivery mode
MMBT3904M	SOT-723	1N	8K	Tape and reel

Absolute Maximum Ratings @ $T_A=25^{\circ}C$ unless otherwise noted

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



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Electrical Characteristics ($T_A=25^{\circ}\text{C}$, unless otherwise specified)

Symbol	Parameter	Test condition	Min.	Typ.	Max.	Unit
$V_{(BR)CBO}$	Collector-base breakdown voltage	$I_C=10\mu\text{A}, I_E=0$	60	—	—	V
$V_{(BR)CEO}$	Collector-emitter breakdown voltage	$I_C=1\text{mA}, I_B=0$	40	—	—	
$V_{(BR)EBO}$	Emitter-base breakdown voltage	$I_E=10\mu\text{A}, I_C=0$	6	—	—	
I_{CEX}	Collector cut-off current	$V_{CE}=30\text{V}, V_{EB}(\text{off})=3\text{V}$	—	—	50	nA
I_{EBO}	Emitter cut-off current	$V_{EB}=5\text{V}, I_C=0\text{mA}$	—	—	100	nA
$h_{FE(1)}$	DC current gain	$V_{CE}=1\text{V}, I_C=0.1\text{mA}$	40	—	—	—
$h_{FE(2)}$		$V_{CE}=1\text{V}, I_C=1\text{mA}$	70	—	—	
$h_{FE(3)}$		$V_{CE}=1\text{V}, I_C=10\text{mA}$	100	—	300	
$h_{FE(4)}$		$V_{CE}=1\text{V}, I_C=50\text{mA}$	60	—	—	
$V_{CE(\text{sat})}$	Collector-emitter saturation voltage	$I_C=10\text{mA}, I_B=1\text{mA}$	—	—	0.2	V
		$I_C=50\text{mA}, I_B=5\text{mA}$	—	—	0.3	
$V_{BE(\text{sat})}$	Base-emitter saturation voltage	$I_C=10\text{mA}, I_B=1\text{mA}$	0.65	—	0.85	
		$I_C=50\text{mA}, I_B=5\text{mA}$	—	—	0.95	
t_d	Delay time	$V_{CC}=3\text{V}, V_{BE(\text{off})}=-0.5\text{V},$ $I_C=10\text{mA}, I_{B1}=1\text{mA}$	—	—	35	nS
t_r	Rise time		—	—	35	
t_s	Storage time	$V_{CC}=3\text{V}, I_C=10\text{mA}, I_{B1}=I_{B2}=1\text{mA}$	—	—	200	
t_f	Fall time		—	—	50	
f_T	Transition frequency	$V_{CE}=20\text{V}, I_C=10\text{mA}, f=100\text{MHZ}$	300	—	—	MHZ
C_{ob}	Output Capacitance	$V_{CB}=5\text{V}, I_E=0, f=1\text{MHZ}$	—	—	4	pF
C_{ib}	Input Capacitance	$V_{EB}=0.5\text{V}, I_C=0, f=1\text{MHZ}$	—	—	8	pF



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Typical Performance Characteristics($T_J = 25^\circ\text{C}$, unless otherwise noted)

Figure 1 : Static Characteristic

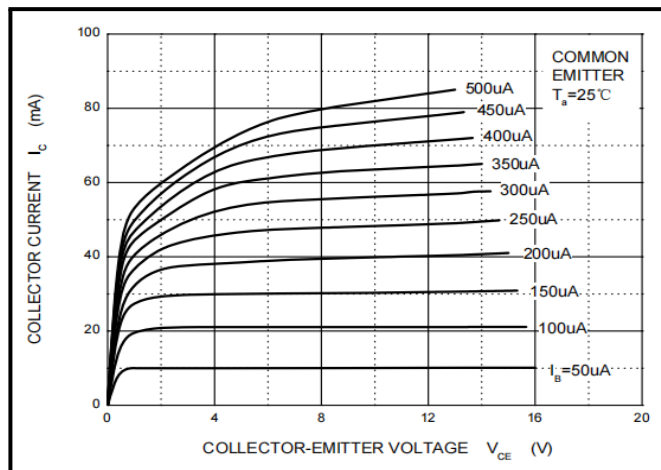


Figure 2 : $h_{FE} \sim I_C$

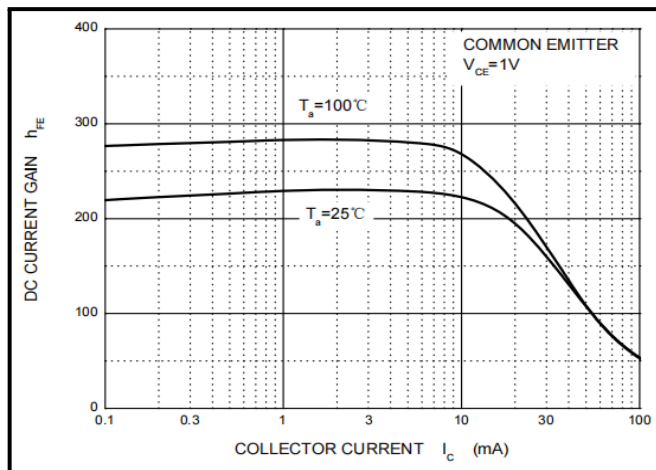


Figure 3 : $V_{CE(sat)} \sim I_C$

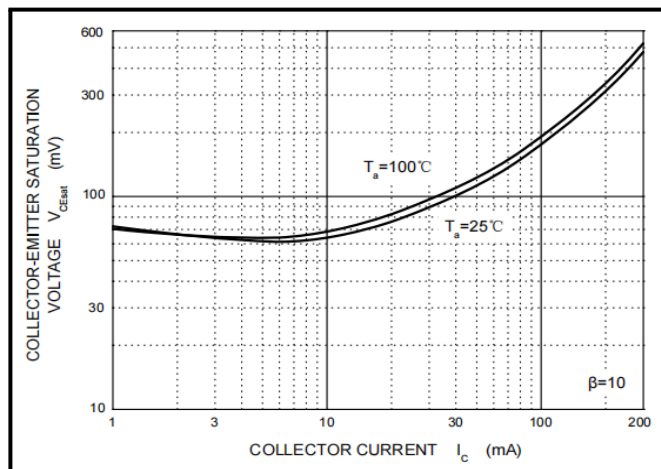
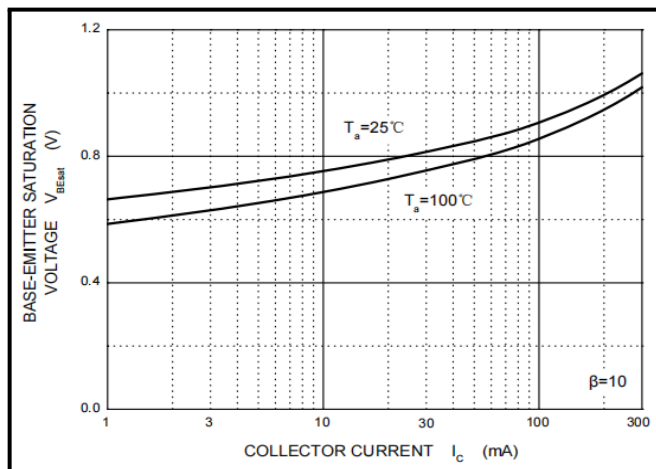


Figure 4 : $V_{BE(sat)} \sim I_C$



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Figure 5 : I_C — V_{BE}

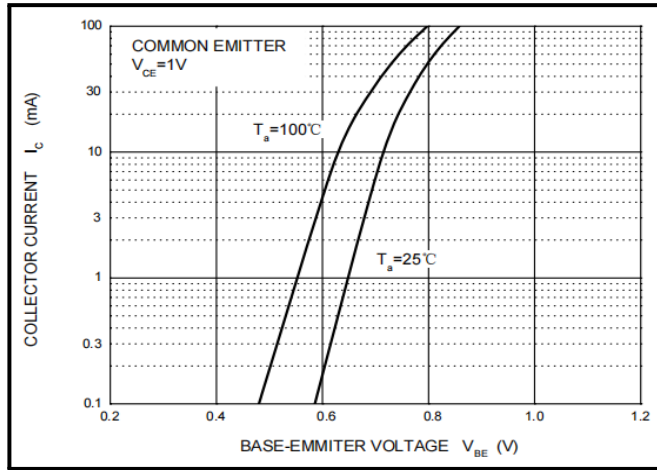


Figure 6 : C_{ob}/C_{ib} — V_{CB}/V_{EB}

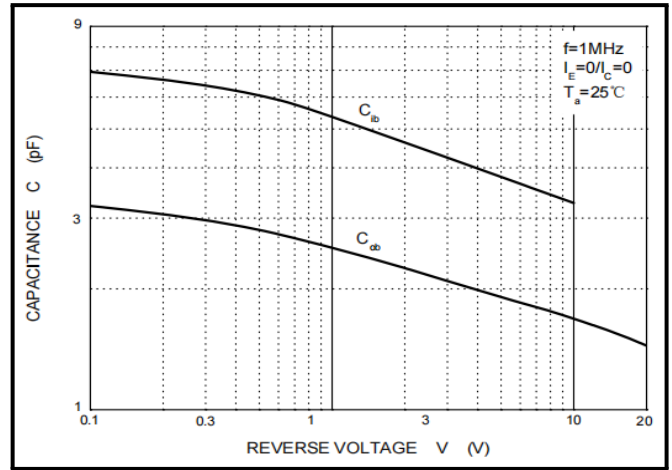


Figure 7 : f_c — I_C

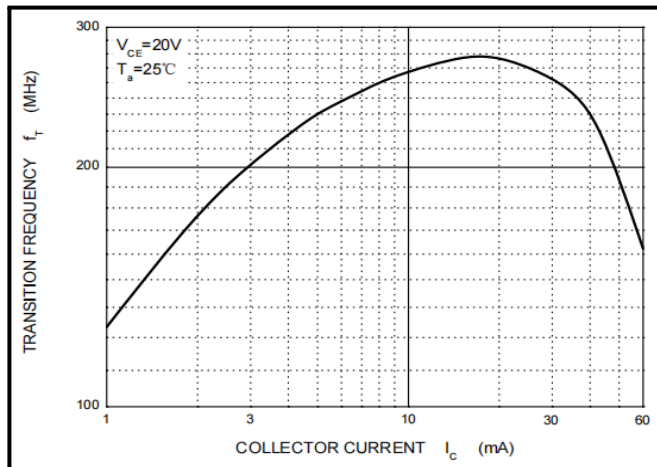
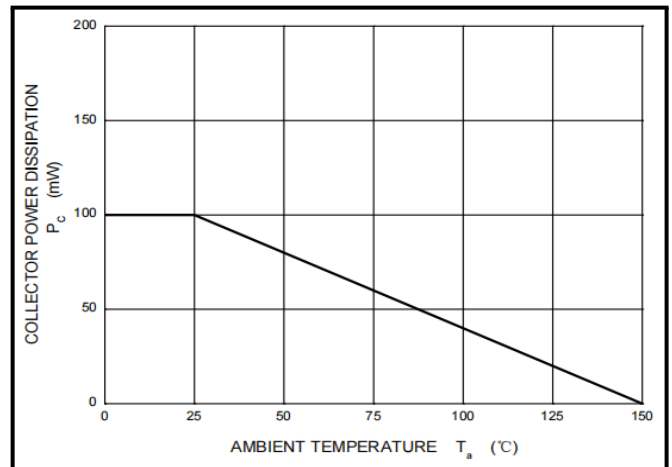


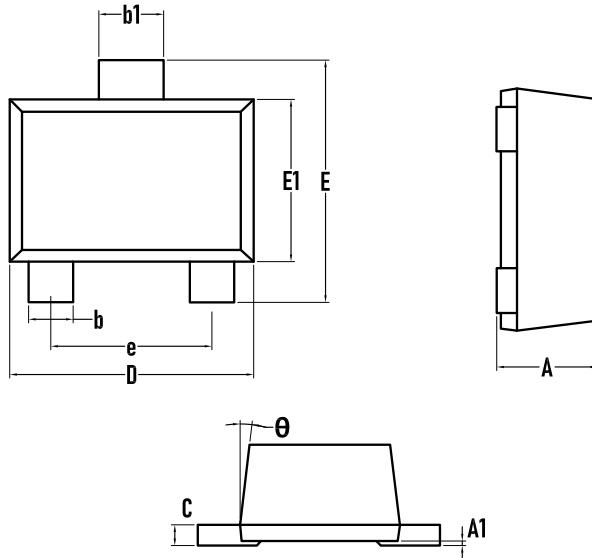
Figure 8 : P_C — T_a



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Outline Drawing – SOT-723



SYMBOL	MILLIMETER	
	MIN.	MAX
A	0.430	0.500
A1	0.000	0.050
b	0.170	0.270
b1	0.270	0.370
C	0.080	0.150
D	1.150	1.250
E	1.150	1.250
E1	0.750	0.850
e	0.800TYP.	
θ	0°	7°

