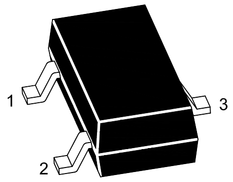
MMBT3904
NPN Transistor

Features

- For Switching and AF Amplifer Applications.
- Silicon Epitaxial Chip.

SOT-23
(TO-236)



1.Base 2.Emitter 3.Collector

Absolute Maximum Ratings (T_A = 25℃)

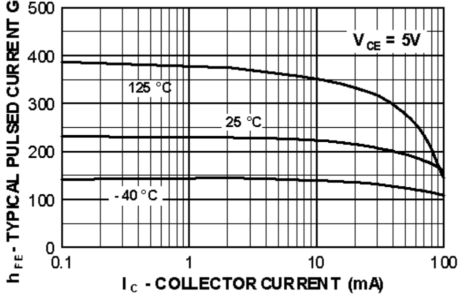
Parameter	Symbol	Value	Unit
Collector Base Voltage	V_{CBO}	60	V
Collector Emitter Voltage	V_{CEO}	40	V
Emitter Base Voltage	V_{EBO}	6	V
Collector Current	I_C	200	mA
Power Dissipation	P_D	350	mW
Junction Temperature	T_J	150	°C
Storage Temperature Range	T_{STG}	- 55 to + 150	°C

Electrical Characteristics at $T_A = 25$℃

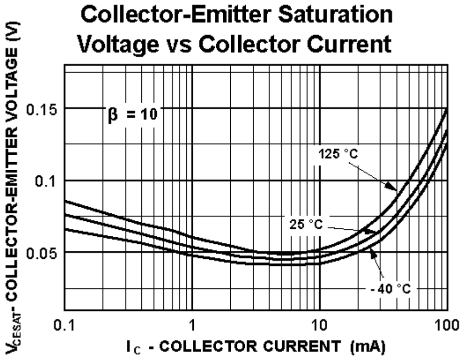
Parameter	Symbol	Min.	Max.	Unit
DC Current Gain				
at $V_{CE} = 1$ V, $I_C = 0.1$ mA	h_{FE}	40	-	-
at $V_{CE} = 1$ V, $I_C = 1$ mA	h_{FE}	70	-	-
at $V_{CE} = 1$ V, $I_C = 10$ mA	h_{FE}	100	300	-
at $V_{CE} = 1$ V, $I_C = 50$ mA	h_{FE}	60	-	-
at $V_{CE} = 1$ V, $I_C = 100$ mA	h_{FE}	30	-	-
Collector Base Cutoff Current at $V_{CB} = 30$ V	I_{CBO}	-	50	nA
Emitter Base Cutoff Current at $V_{EB} = 6$ V	I_{EBO}	-	50	nA
Collector Base Breakdown Voltage at $I_C = 10$ µA	$V_{(BR)CBO}$	60	-	V
Collector Emitter Breakdown Voltage at $I_C = 1$ mA	$V_{(BR)CEO}$	40	-	V
Emitter Base Breakdown Voltage at $I_E = 10$ µA	$V_{(BR)EBO}$	6	-	V
Collector Emitter Saturation Voltage				
at $I_C = 10$ mA, $I_B = 1$ mA	$V_{CE(sat)}$	-	0.2	V
at $I_C = 50$ mA, $I_B = 5$ mA	$V_{CE(sat)}$	-	0.3	V
Base Emitter Saturation Voltage				
at $I_C = 10$ mA, $I_B = 1$ mA	$V_{BE(sat)}$	0.65	0.85	V
at $I_C = 50$ mA, $I_B = 5$ mA	$V_{BE(sat)}$	-	0.95	V
Current Gain Bandwidth Product at $V_{CE} = 20$ V, $I_C = 10$ mA, f = 100 MHz	f_T	300	-	MHz
Collector Output Capacitance at $V_{CB} = 5$ V, $I_E = 0$, f = 1 MHz	C_{ob}	-	4	pF
Delay Time at $V_{CC} = 3$ V, $V_{BE} = 0.5$ V, $I_C = 10$ mA, $I_{B1} = 1$ mA	t_d	-	35	ns
Rise Time at $V_{CC} = 3$ V, $V_{BE} = 0.5$ V, $I_C = 10$ mA, $I_{B1} = 1$ mA	t_r	-	35	ns
Storage Time at $V_{CC} = 3$ V, $I_C = 10$ mA, $I_{B1} = -I_{B2} = 1$ mA	t_s	-	200	ns
Fall Time at $V_{CC} = 3$ V, $I_C = 10$ mA, $I_{B1} = -I_{B2} = 1$ mA	t_f	-	50	ns

Electrical Characteristics Curves

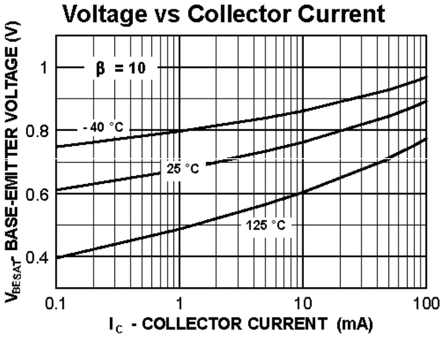
Typical Pulsed Current Gain vs Collector Current



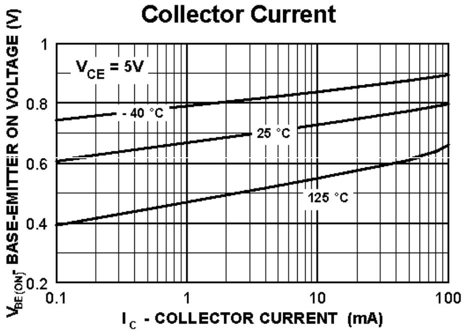
Collector-Emitter Saturation Voltage vs Collector Current



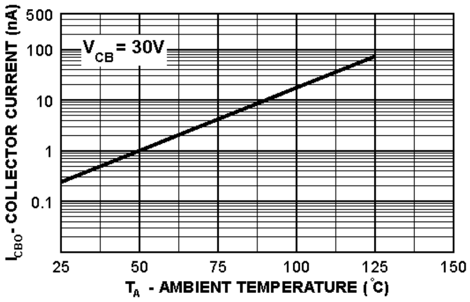
Base-Emitter Saturation Voltage vs Collector Current



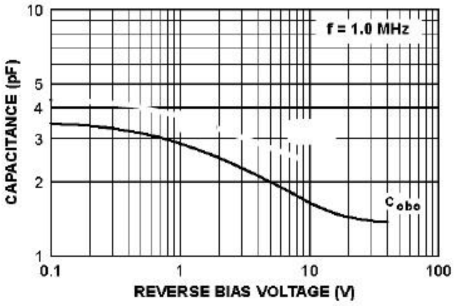
Base-Emitter ON Voltage vs Collector Current



Collector-Cutoff Current vs Ambient Temperature



Capacitance vs Reverse Bias Voltage



I_C − V_{BE}

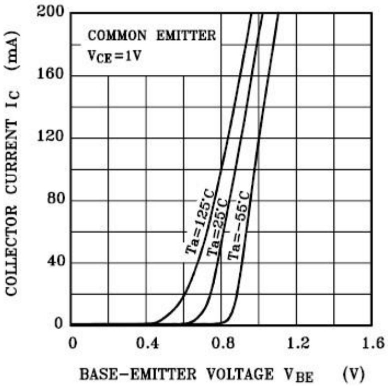
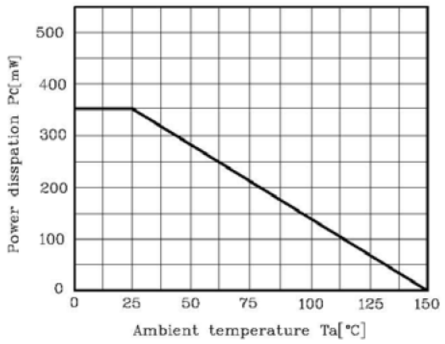
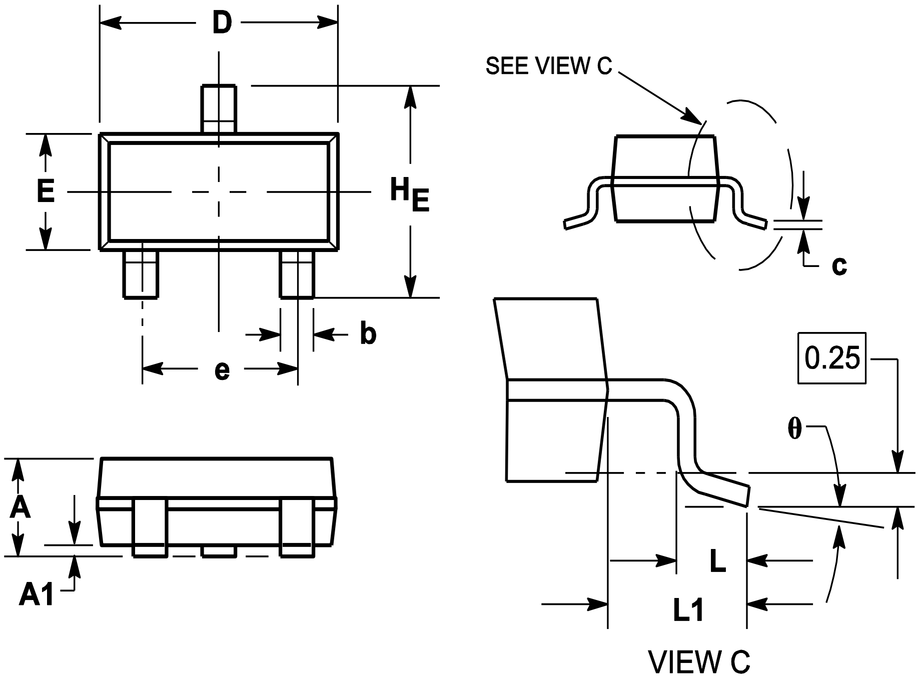


Fig. 1 P_C-T_a



Package Outline (SOT-23)



Symbol	Dimensions in millimeter		
	Min.	Typ.	Max.
A	0.900	1.025	1.150
A1	0.000	0.050	0.100
b	0.300	0.400	0.500
c	0.080	0.115	0.150
D	2.800	2.900	3.000
E	1.200	1.300	1.400
H_E	2.250	2.400	2.550
e	1.800	1.900	2.000
L1	0.550REF		
L	0.300		0.500
θ	0°		8°

Ordering Information

Device	Package	Reel Dimension (inch)	Shipping Quantity
MMBT3904	SOT-23	7	3,000