

# NPN Switching Transistor

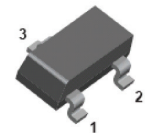
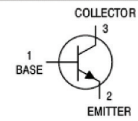


## Features:

- Epitaxial planar die construction.
- Complementary PNP type available (MMBT3906).
- Collector Current Capability  $I_C = 200\text{mA}$ .
- Collector-emitter Voltage  $V_{CE0} = 40\text{V}$ .

## Applications:

- General switching and amplification.



SOT-23

**Maximum Rating:** @  $T_A = 25^\circ\text{C}$  unless otherwise specified

Parameter	Symbol	Conditions	Min.	Max.	Unit
Collector-Base Voltage	$V_{CBO}$	Open Emitter	60	-	V
Collector-Emitter Voltage	$V_{CEO}$	Open Base	40	-	
Emitter-Base Voltage	$V_{EBO}$	Open Collector	6	-	
Collector Current (DC)	$I_C$		-	200	mA
Peak Collector Current	$I_{CM}$		-		
Peak Base Current	$I_{BM}$		-		
Total Power Dissipation	$P_{tot}$	$T_{amb} \leq 25^\circ\text{C}$	-	250	mW
Storage Temperature	$T_{stg}$		-65	+150	°C
Junction Temperature	$T_j$		-	150	
Operating Ambient Temperature	$T_{amb}$		-65	+150	

**Electrical Characteristics:** @  $T_A = 25^\circ\text{C}$  unless otherwise specified

Parameter	Symbol	Conditions	Min.	Max.	Unit
Collector Cut-off Current	$I_{CBO}$	$I_E = 0; V_{CB} = 30\text{V}$	-	50	nA
Emitter Cut-off Current	$I_{EBO}$	$I_C = 0; V_{EB} = 6\text{V}$	-		
DC Current Gain	$h_{FE}$	$V_{CE} = 1\text{V};$ $I_C = 0.1\text{mA}$	60	-	
		$I_C = 1\text{mA}$	80	-	
		$I_C = 10\text{mA}$	100	300	
		$I_C = 50\text{mA}$	60	-	
		$I_C = 100\text{mA}$	30	-	

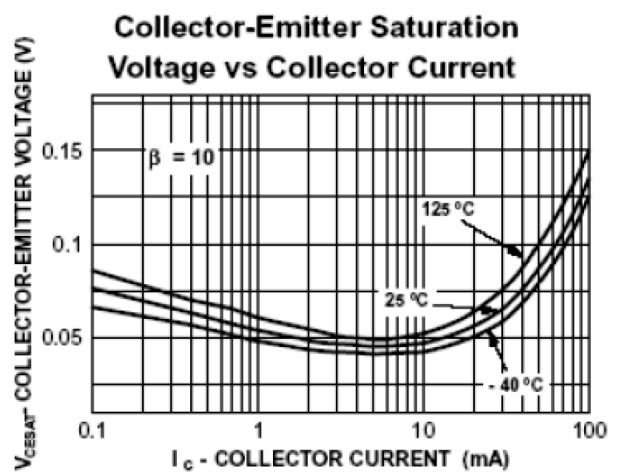
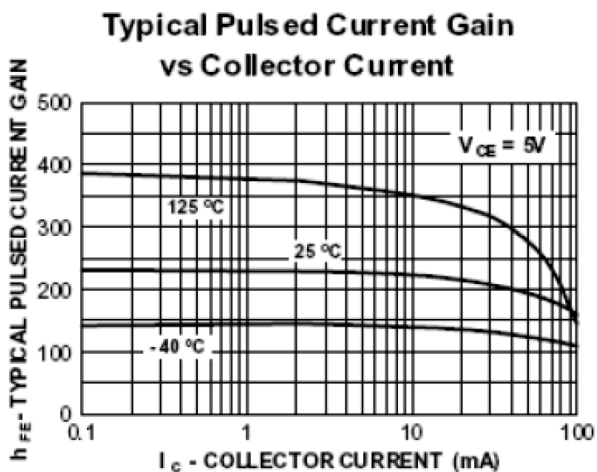
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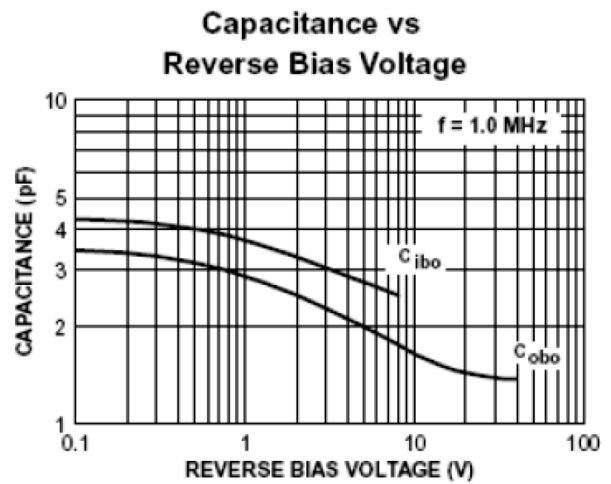
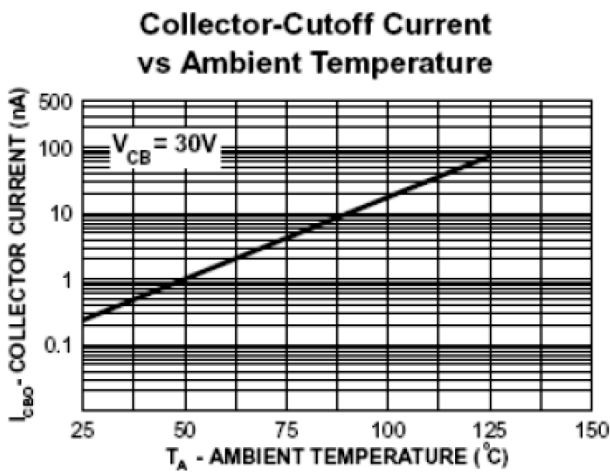
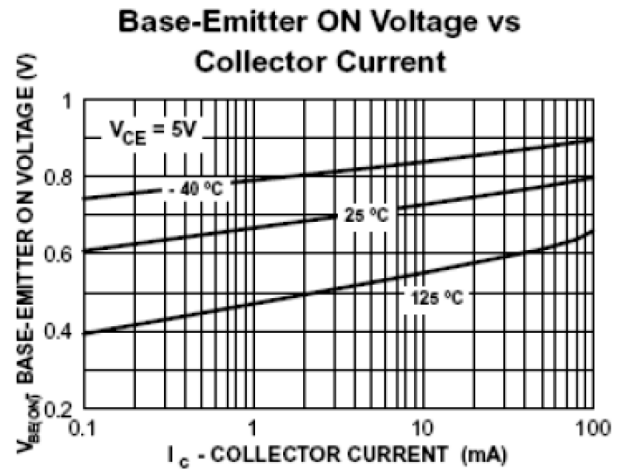
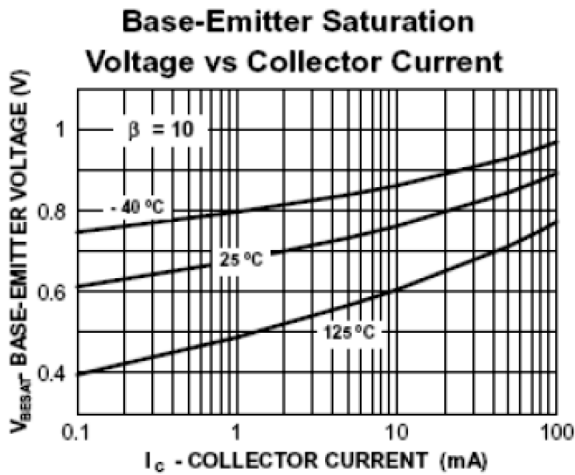
Parameter	Symbol	Conditions	Min.	Max.	Unit
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C = 10\text{mA}; I_B = 1\text{mA}$	-	200	mV
		$I_C = 50\text{mA}; I_B = 5\text{mA}$	-	300	
Base-emitter Saturation Voltage	$V_{BE(sat)}$	$I_C = 10\text{mA}; I_B = 1\text{mA}$	650	850	
		$I_C = 50\text{mA}; I_B = 5\text{mA}$	-	950	
Collector Capacitance	$C_c$	$I_E = I_e = 0; V_{CB} = 5\text{V}; f = 1\text{MHz}$	-	4	pF
Emitter Capacitance	$C_e$	$I_C = I_c = 0; V_{BE} = 500\text{mV}; f = 1\text{MHz}$	-	8	
Transition Frequency	$f_T$	$I_C = 10\text{mA}; V_{CE} = 20\text{V}; f = 100\text{MHz}$	300	-	MHz
Noise Figure	F	$I_C = 100\text{mA}; V_{CE} = 5\text{V}; R_S = 1\text{k}\Omega; f = 10\text{Hz to } 15.7\text{kHz}$	-	5	dB
Switching times (between 10% and 90% levels);					
Delay Time	$t_d$	$I_{Con} = 10\text{mA}; I_{Bon} = 1\text{mA}; I_{Boff} = -1\text{mA}$	-	35	ns
Rise Time	$t_r$		-		
Storage Time	$t_s$		-	200	
Fall Time	$t_f$		-	50	

Note Pulse test:  $t_p \leq 300\text{ms}; d \leq 0.02$ .

**Typical Characteristics:** @  $T_A = 25^\circ\text{C}$  unless otherwise specified



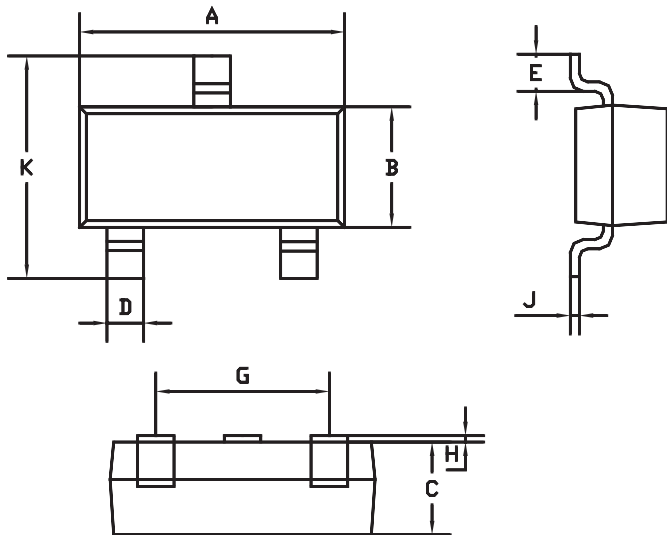
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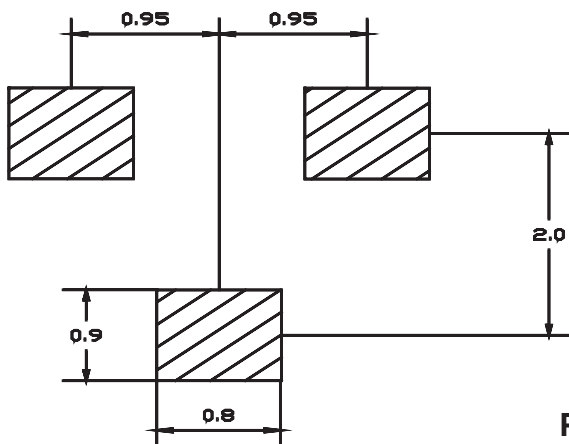


## Package Outline:



SOT-23		
Dim	Min.	Max.
A	2.85	2.95
B	1.25	1.35
C	1 Typical	
D	0.37	0.43
E	0.35	0.48
G	1.85	1.95
H	0.02	0.1
J	0.1 Typical	
K	2.35	2.45
All Dimensions in mm		

## Soldering Footprint:



Dimensions : Millimetres

## Part Number Table

Description	Part Number
Transistor, Bipolar, NPN, 40V, 200mA, SOT-23	MMBT3904-7-F

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