

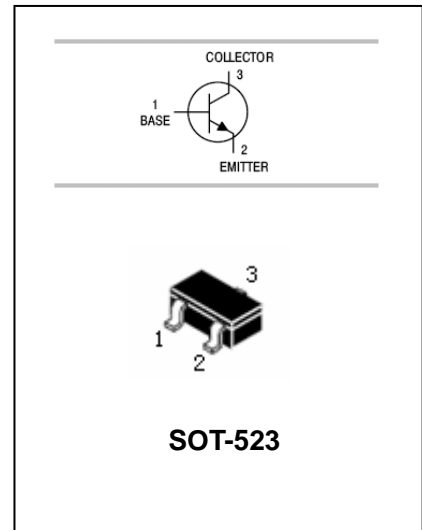


## NPN SWITCHING TRANSISTOR

## MMBT3904T

### FEATURES

- Epitaxial planar die construction.
- Complementary PNP type available (MMBT3906T).
- Collector Current Capability  $I_c=200\text{mA}$ .
- Collector-emitter Voltage  $V_{CE0}=40\text{V}$ .



### APPLICATIONS

- General switching and amplification.

### ORDERING INFORMATION

Type No.	Marking	Package Code
MMBT3904T	1N	SOT-523

### MAXIMUM RATING @ $T_a=25^\circ\text{C}$ unless otherwise specified

SYMBOL	PARAMETER	MMBT3904T	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 (DC)	200	mA
$P_d$	Power dissipation	150	mW
$R_{\theta JA}$	Thermal resistance, junction to Ambient	833	$^\circ\text{C}/\text{W}$
$T_{stg}$	storage temperature range	-50 to +150	$^\circ\text{C}$
$T_j$	junction temperature	150	$^\circ\text{C}$



**NPN SWITCHING TRANSISTOR**

**MMBT3904T**

**ELECTRICAL CHARACTERISTICS @ Ta=25°C unless otherwise specified**

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
$V_{(BR)CBO}$	Collector-base breakown voltage	$I_C=10\mu A, I_E=0$	60		
$V_{(BR)CEO}$	Collector- emitter breakown voltage	$I_C=1.0mA, I_B=0$	40		
$V_{(BR)BEO}$	Emitter-base breakown voltage	$I_E=10\mu A, I_C=0$	6		
$I_{CBO}$	Collector cut-off current	$I_E=0, V_{CB}=30V$		50	nA
$I_{EBO}$	Emitter cut-off current	$I_C=0, V_{EB}=5V$		50	nA
$I_{CEX}$	collector cut-off current	$V_{CE}=30V, V_{EB(OFF)}=3.0V$		50	nA
$I_{BL}$	Base cut-off current	$V_{CE}=30V, V_{EB(OFF)}=3.0V$		50	nA
$h_{FE}$	DC current gain	$V_{CE}=1V, I_C=0.1mA$ $V_{CE}=1V, I_C=1mA$ $V_{CE}=1V, I_C=10mA$ $V_{CE}=1V, I_C=50mA$ $V_{CE}=1V, I_C=100mA$	40 70 100 60 30	300	
$V_{CE(sat)}$	collector-emitter saturation voltage	$I_C=10mA; I_B=1mA$ $I_C=50mA; I_B=5mA$		200 300	mV
$V_{BE(sat)}$	base-emitter saturation voltage	$I_C=10mA; I_B=1mA$ $I_C=50mA; I_B=5mA$	650	850 950	mV
$C_{obo}$	Output capacitance	$I_E=0, V_{CB}=5V, f=1MHz$		4	pF
$C_{ibo}$	Input capacitance	$I_C=0, V_{BE}=0.5V, f=1MHz$		8	pF
$f_T$	transition frequency	$I_C=10mA, V_{CE}=20V, f=100MHz$	300		MHz
NF	noise figure	$I_C=100\mu A, V_{CE}=5V,$ $R_S=1k\Omega; f=1.0MHz$		5	dB
$t_d$	delay time	$I_C=10mA, I_{B1}=1mA, V_{BE(off)}=-0.5V$	-	35	ns
$t_r$	rise time	$V_{CC}=3.0V$	-	35	ns
$t_s$	storage time	$V_{CC}=3.0V, I_C=10mA$	-	200	ns
$t_f$	fall time	$I_{B1}=I_{B2}=1mA$	-	50	ns



# NPN SWITCHING TRANSISTOR

# MMBT3904T

TYPICAL CHARACTERISTICS @  $T_a=25^\circ\text{C}$  unless otherwise specified

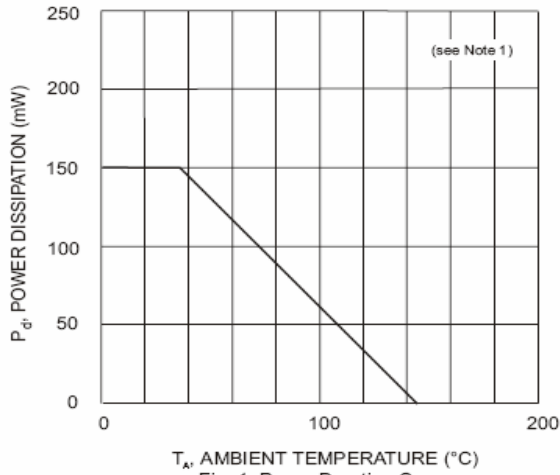


Fig. 1, Power Derating Curve

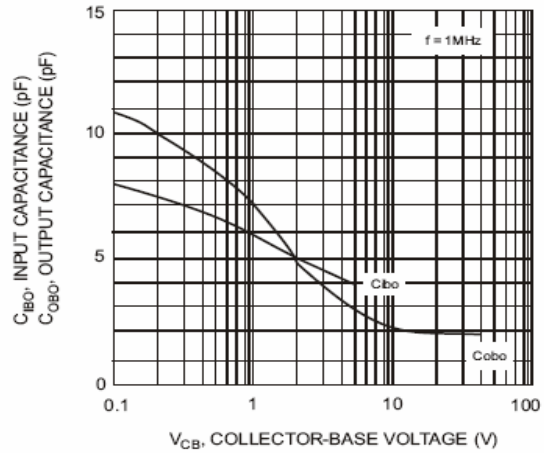


Fig. 2, Input and Output Capacitance vs. Collector-Base Voltage

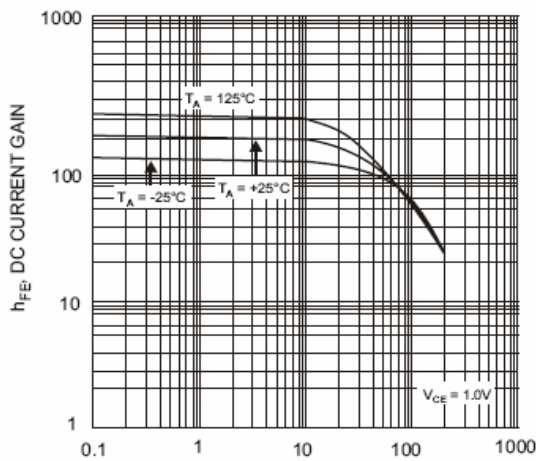


Fig. 3, Typical DC Current Gain vs. Collector Current

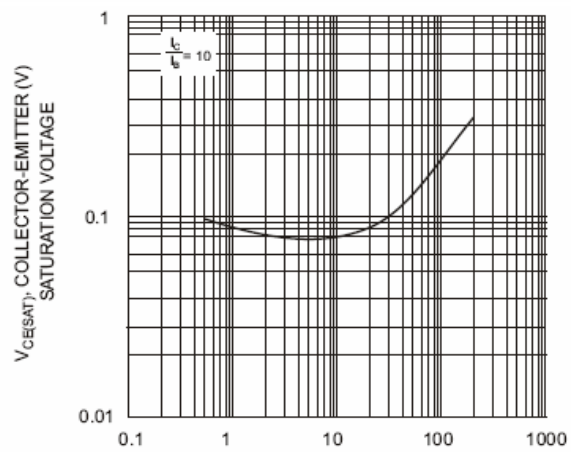


Fig. 4, Typical Collector-Emitter Saturation Voltage vs. Collector Current

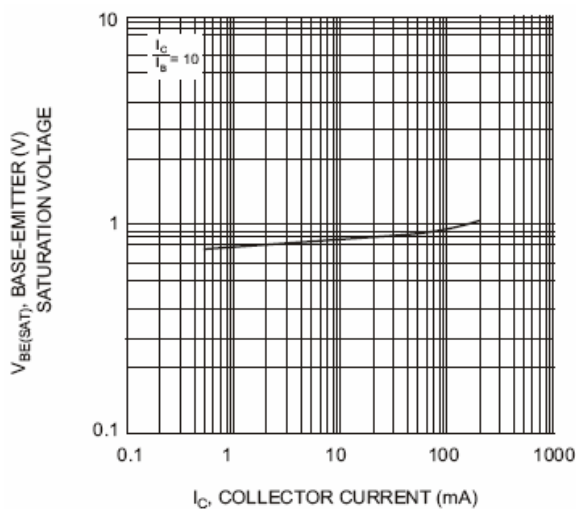


Fig. 5, Typical Base-Emitter Saturation Voltage vs. Collector Current



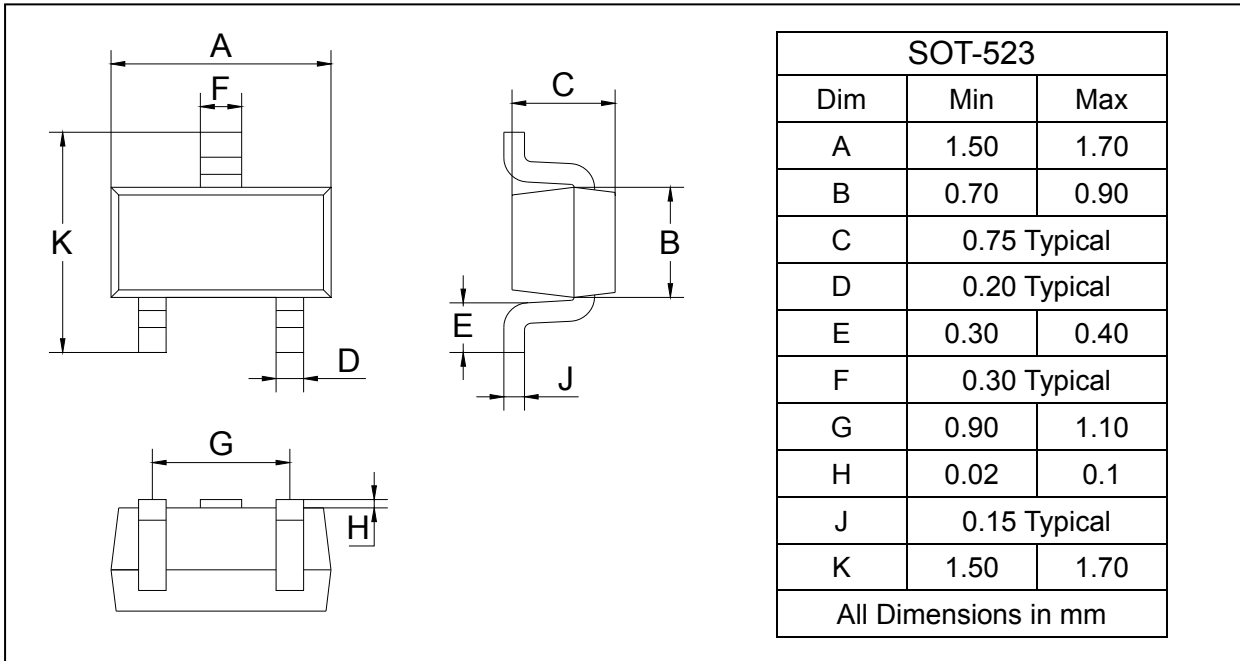
**NPN SWITCHING TRANSISTOR**

**MMBT3904T**

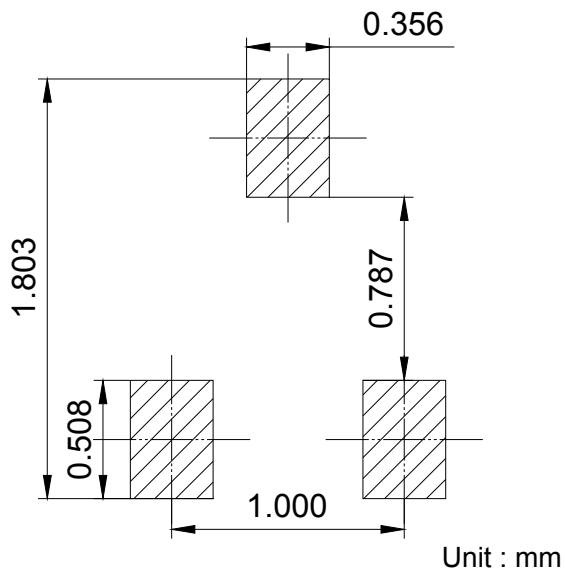
**PACKAGE OUTLINE**

Plastic surface mounted package

SOT-523



**SOLDERING FOOTPRINT**



**PACKAGE INFORMATION**

Device	Package	Shipping
MMBT3904T	SOT-523	3000/Tape&Reel