

NPN SWITCHING TRANSISTOR

MMBT3904

FEATURES

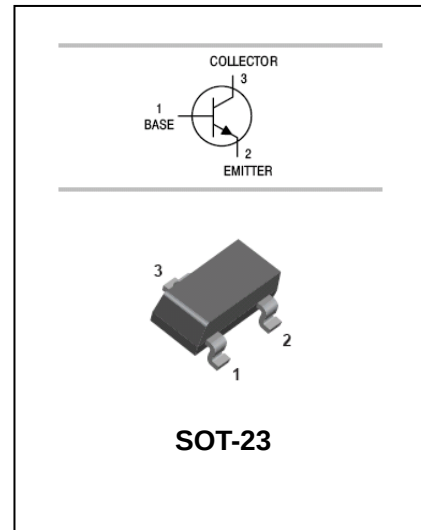
- Epitaxial planar die construction.
- Complementary PNP type available (MMBT3906).
- Collector Current Capability $I_C=200\text{mA}$.
- Collector-emitter Voltage $V_{CEO}=40\text{V}$.



Lead-free

APPLICATIONS

- General switching and amplification



ORDERING INFORMATION

Type No.	Marking	Package Code
MMBT3904	1AM	SOT-23

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	60	-	V
V_{CEO}	collector-emitter voltage	open base	40	-	V
V_{EBO}	emitter-base voltage	open collector	6	-	V
I_C	collector current (DC)		-	200	mA
I_{CM}	peak collector current		-	200	mA
I_{BM}	peak base current		-	100	mA
P_{tot}	total power dissipation	$T_{amb} \leq 25^\circ\text{C}$	-	250	mW
T_{stg}	storage temperature		-65	+150	$^\circ\text{C}$
T_j	junction temperature		-	150	$^\circ\text{C}$
T_{amb}	operating ambient temperature		-65	+150	$^\circ\text{C}$

Note Transistor mounted on an FR4 printed-circuit board.

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ELECTRICAL CHARACTERISTICS @ Ta=25°C unless otherwise specified

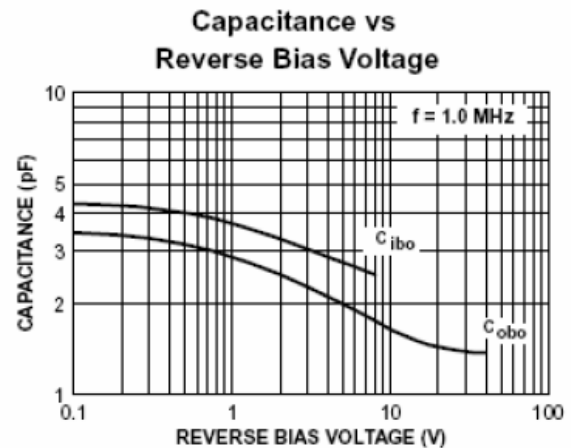
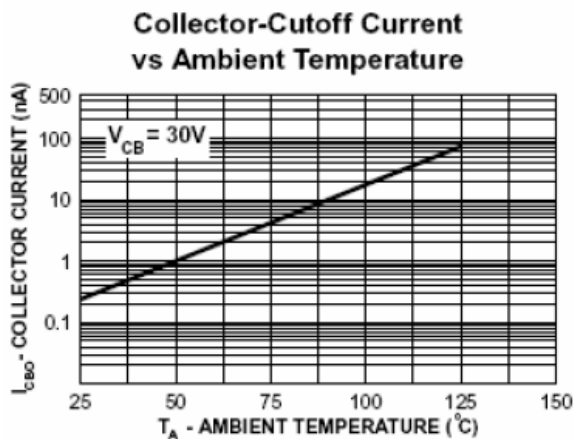
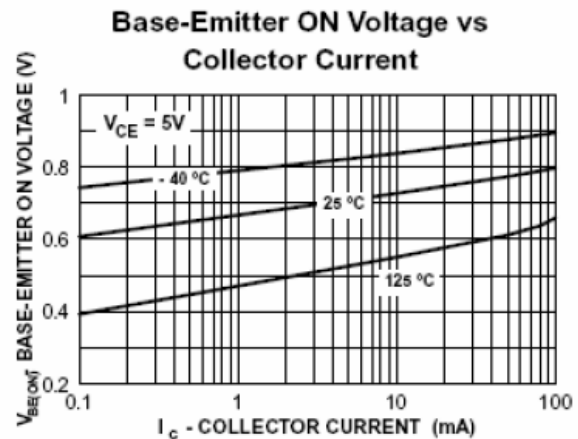
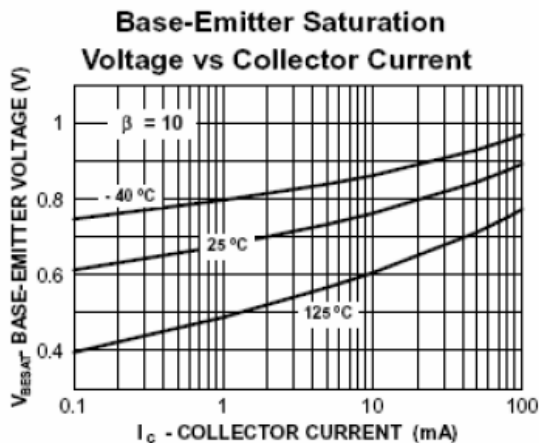
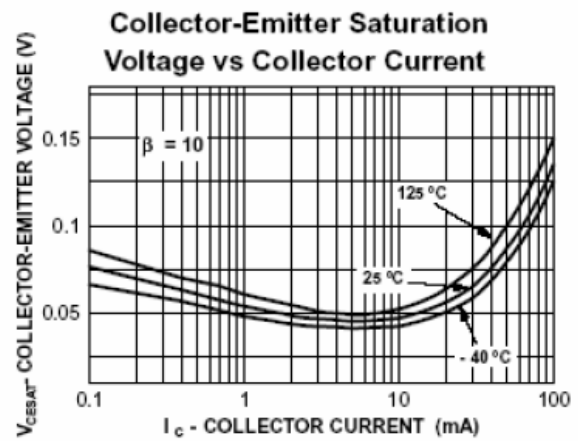
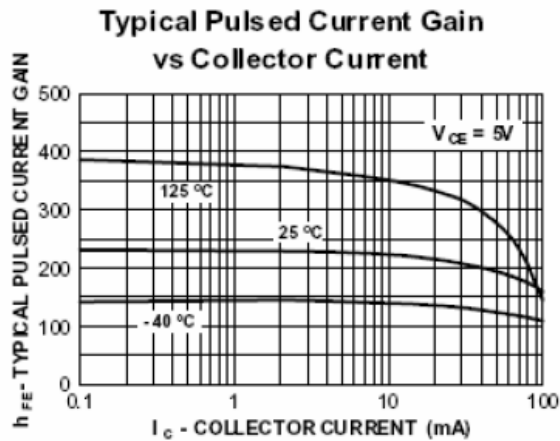
SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
I_{CBO}	collector cut-off current	$I_E = 0; V_{CB} = 30\text{ V}$	-	50	nA
I_{EBO}	emitter cut-off current	$I_C = 0; V_{EB} = 6\text{ V}$	-	50	nA
h_{FE}	DC current gain	$V_{CE} = 1\text{ V};$ $I_C = 0.1\text{ mA}$ $I_C = 1\text{ mA}$ $I_C = 10\text{ mA}$ $I_C = 50\text{ mA}$ $I_C = 100\text{ mA}$	60 80 100 60 30	- - 300 - -	
V_{CEsat}	collector-emitter saturation voltage	$I_C = 10\text{ mA}; I_B = 1\text{ mA}$	-	200	mV
		$I_C = 50\text{ mA}; I_B = 5\text{ mA}$	-	300	mV
V_{BEsat}	base-emitter saturation voltage	$I_C = 10\text{ mA}; I_B = 1\text{ mA}$	650	850	mV
		$I_C = 50\text{ mA}; I_B = 5\text{ mA}$	-	950	mV
C_c	collector capacitance	$I_E = I_e = 0; V_{CB} = 5\text{ V};$ $f = 1\text{ MHz}$	-	4	pF
C_e	emitter capacitance	$I_C = I_c = 0; V_{BE} = 500\text{ mV};$ $f = 1\text{ MHz}$	-	8	pF
f_T	transition frequency	$I_C = 10\text{ mA}; V_{CE} = 20\text{ V};$ $f = 100\text{ MHz}$	300	-	MHz
F	noise figure	$I_C = 100\text{ mA}; V_{CE} = 5\text{ V};$ $R_S = 1\text{ k}\Omega; f = 10\text{ Hz to } 15.7\text{ kHz}$	-	5	dB
Switching times (between 10% and 90% levels);					
t_d	delay time	$I_{Con} = 10\text{ mA}; I_{Bon} = 1\text{ mA};$ $I_{Boff} = -1\text{ mA}$	-	35	ns
t_r	rise time		-	35	ns
t_s	storage time		-	200	ns
t_f	fall time		-	50	ns

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

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



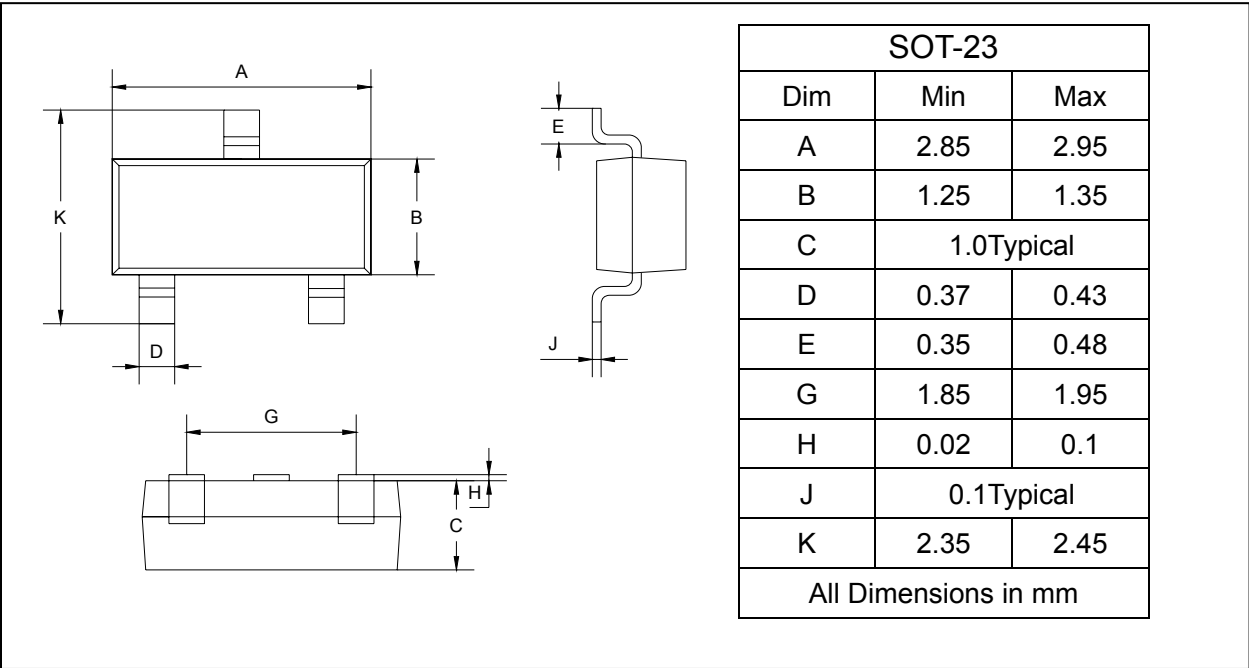
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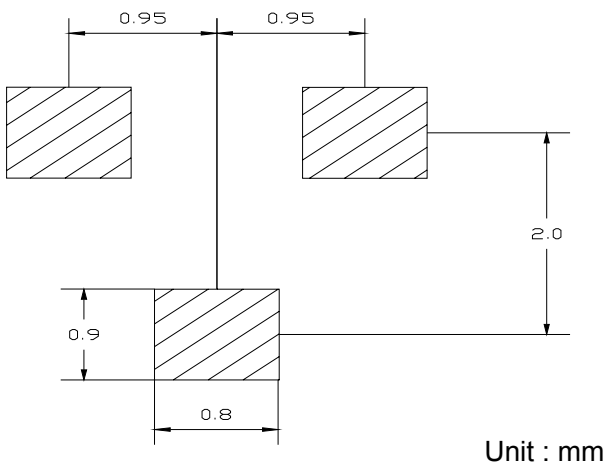
PACKAGE OUTLINE

Plastic surface mounted package

SOT-23



SOLDERING FOOTPRINT



PACKAGE INFORMATION

Device	Package	Shipping
MMBT3904	SOT-23	3000/Tape&Reel