

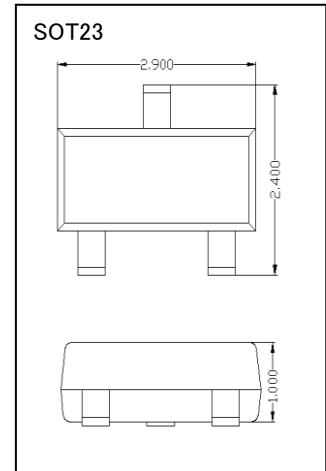
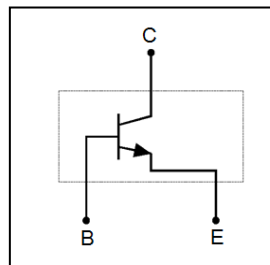
## DATA SHEET

### MMBT3904

- ◇ Complementary PNP Type Available (MMBT3906)
- ◇ Epoxy Meets UL 94 V-0 Flammability Rating
- ◇ Surface Mount SOT-23 Package
- ◇ Rohs Compliant / Green EMC

Device Marking Code	
MMBT3904	1AM

Equivalent Circuit



#### Maximum Ratings (Ta=25°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*	225	mW
$R_{\theta JA}$	Thermal Resistance From Junction To Ambient	556	°C/W
$T_j$	Junction Temperature	150	°C
$T_{stg}$	Storage Temperature	-55~+150	°C

\*Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.

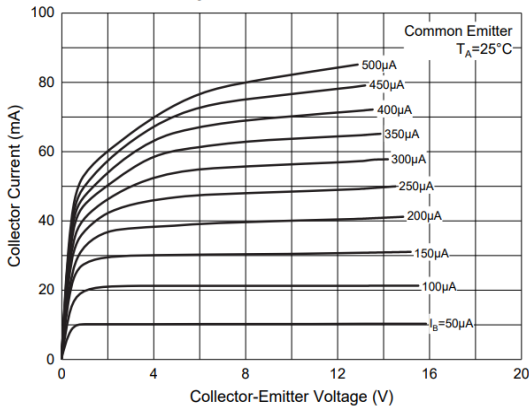
**Electrical Characteristics @ 25°C Unless Otherwise Specified**

Symbol	Parameter	Test Conditions	Min	Max	Units
$V_{(BR)CEO}$	Collector–Emitter Breakdown Voltage	$I_C=1.0mA, I_B=0$	40		V
$V_{(BR)CBO}$	Collector–Base Breakdown Voltage	$I_C=10\mu A, I_E=0$	60		V
$V_{(BR)EBO}$	Emitter–Base Breakdown Voltage	$I_E=10\mu A, I_C=0$	6.0		V
$I_{CBO}$	Collector Cutoff Current	$V_{CB}=30V, I_E=0$		50	nA
$I_{CEX}$	Collector Cutoff Current	$V_{CE}=30V, V_{BE}=3.0V$		50	nA
$h_{FE}$	DC Current Gain	$I_C=0.1mA, V_{CE}=1.0V$	40		
		$I_C=1.0mA, V_{CE}=1.0V$	70		
		$I_C=10mA, V_{CE}=1.0V$	100	300	
		$I_C=50mA, V_{CE}=1.0V$	60		
		$I_C=100mA, V_{CE}=1.0V$	30		
$V_{CE(sat)}$	Collector–Emitter Saturation Voltage	$I_C=10mA, I_B=1.0mA$		0.2	V
		$I_C=50mA, I_B=5.0mA$		0.3	
$V_{BE(sat)}$	Base–Emitter Saturation Voltage	$I_C=10mA, I_B=1.0mA$	0.65	0.85	V
		$I_C=50mA, I_B=5.0mA$		0.95	
$f_T$	Transition Frequency	$I_C=10mA, V_{CE}=20V, f=100MHz$	300		MHZ
$C_{obo}$	Output Capacitance	$V_{CB}=5.0V, I_E=0, f=1.0MHz$		4.0	PF
$C_{ibo}$	Input Capacitance	$V_{BE}=0.5V, I_C=0, f=1.0MHz$		8.0	PF
NF	Noise Figure	$I_C=100\mu A, V_{CE}=5.0V, R_S=1.0k\Omega, f=10Hz$ to 15.7kHz		5.0	dB

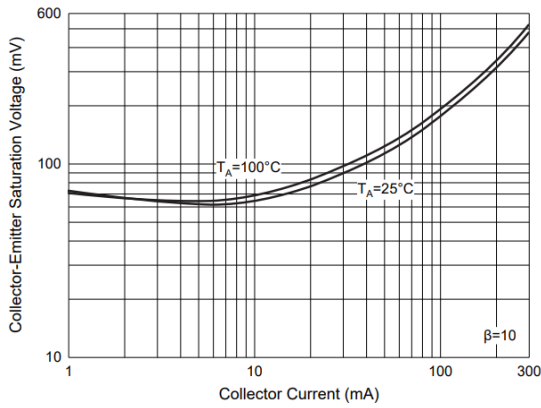
**Switching Characteristics**

Symbol	Parameter	Test Conditions	Min	Max	Units
td	Delay Time	$V_{CC}=3.0V, V_{BE}=0.5V$		35	ns
tr	Rise Time		$I_C=10mA, I_{B1}=1.0mA$		35
ts	Storage Time	$V_{CC}=3.0V, I_C=10mA$		200	ns
tf	Fall Time		$I_{B1}=I_{B2}=1.0mA$		50

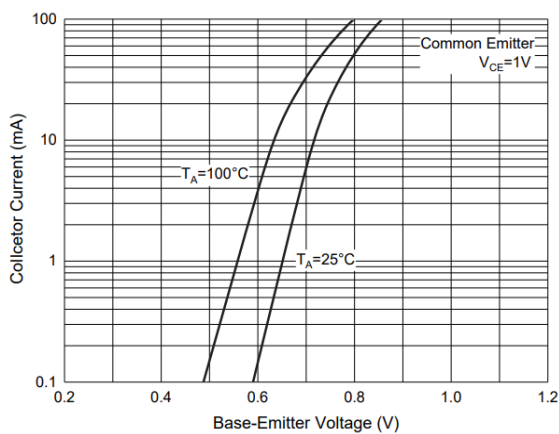
**Curve Characteristics**



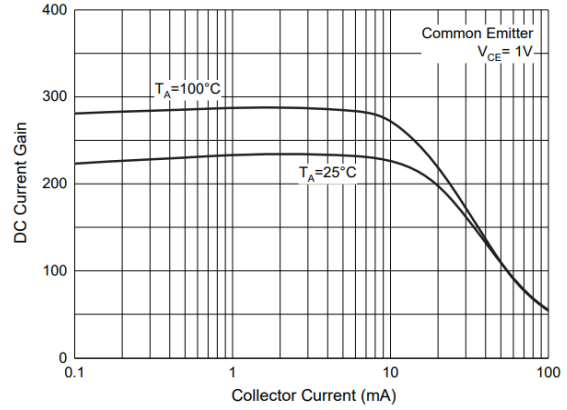
**Static Characteristics**



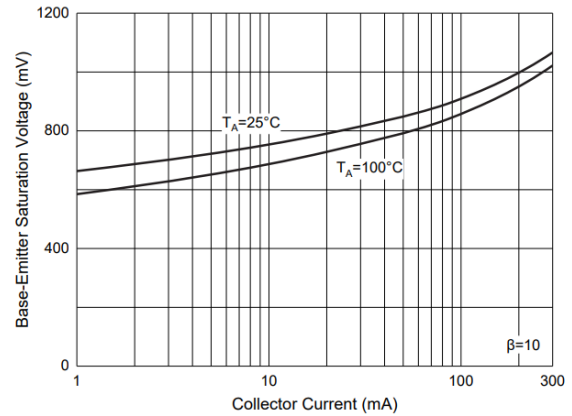
**Collector-Emitter Saturation Voltage Characteristics**



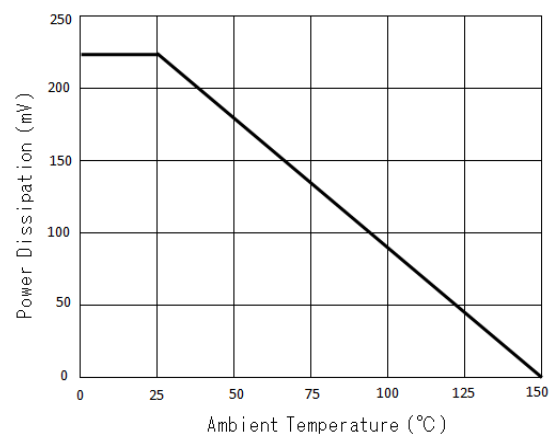
**Base-Emitter Voltage Characteristics**



**DC Current Gain Characteristics**



**Base-Emitter Saturation Voltage Characteristics**



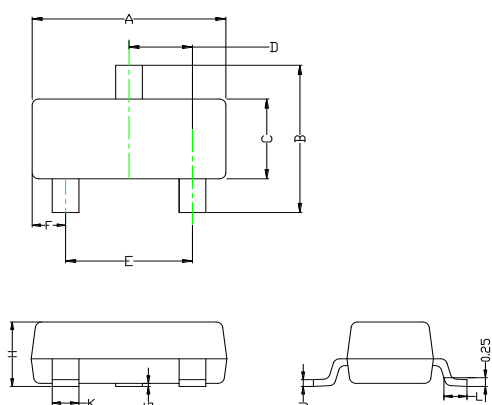
**Collector Power Derating Curve**

**Ordering Information**

Device	Package	Shipping	Tape wide	Emboss pitch	Tape specification	Notes
MMBT3904	SOT23	Tape & Reel 3000pcs /7" Reel	8mm	4mm	Conductive	

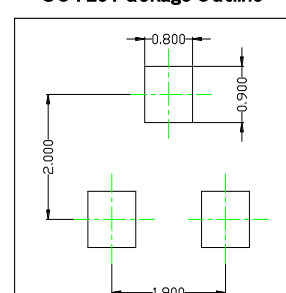
**Package Dimensions**

**Package outline : SOT23**



Symbol	Dimensions in mm	
	Min.	Max.
A	2.800	3.040
B	2.100	2.640
C	1.200	1.400
D	0.890	1.030
E	1.780	2.050
F	0.450	0.600
G	0.013	0.100
H	0.900	1.110
J	0.085	0.180
K	0.370	0.510
L	0.300	0.500

**SOT23 Package Outline**



**Land Pattern Recommendation**

**Notice:**

- Lead plating: Pb free solder
- Lead thickness includes solder plating
- Lead frame: CAC-5
- Other Tolerance:  $\pm 0.05$

**NOTICE**

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