

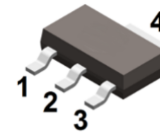
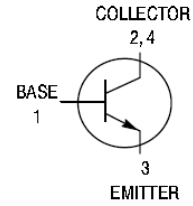


### Features

- Epitaxial planar die construction
- Ideal for low power amplification and switching
- Complementary PNP type available MMBT3906R

### Mechanical Data

- Case: SOT-223
- Molding compound: UL flammability classification rating 94V-0
- Terminals: Tin-plated; solderability per MIL-STD-202, Method 208



SOT-223

### Ordering Information

Part Number	Package	Shipping Quantity	Marking Code
MMBT3904R	SOT-223	4000 pcs / Tape & Reel	1AM

### Maximum Ratings (@ T<sub>A</sub> = 25°C unless otherwise specified)

Parameter	Symbol	Value	Unit
Collector-Base Breakdown Voltage	V <sub>CBO</sub>	60	V
Collector-Emitter Breakdown Voltage	V <sub>CEO</sub>	40	V
Emitter-Base Breakdown Voltage	V <sub>EBO</sub>	6	V
Collector Current (Continuous)	I <sub>C</sub>	0.2	A
Collector Current –Peak Pulse Width	I <sub>CM</sub>	0.2	A
Peak Base Current	I <sub>BM</sub>	0.1	A

### Thermal Characteristics

Parameter	Symbol	Value	Unit
Power Dissipation (Collector) <sup>*1</sup>	P <sub>D</sub>	1.15	W
Thermal Resistance (Junction-to-Ambient)	R <sub>θJA</sub>	108	°C/W
Junction Temperature	T <sub>J</sub>	-55 ~ +150	°C
Storage Temperature Range	T <sub>STG</sub>	-55 ~ +150	°C

Note1: Device mounted on a printed-circuit board, single-sided copper, tinplated, mounting pad for collector 1 cm<sup>2</sup>

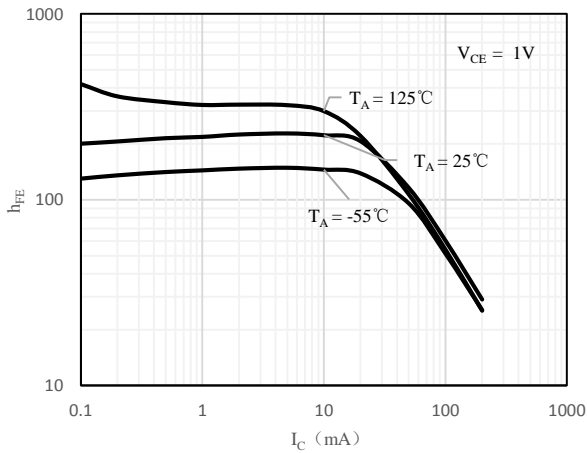


## Electrical Characteristics (@ $T_A = 25^\circ\text{C}$ unless otherwise specified)

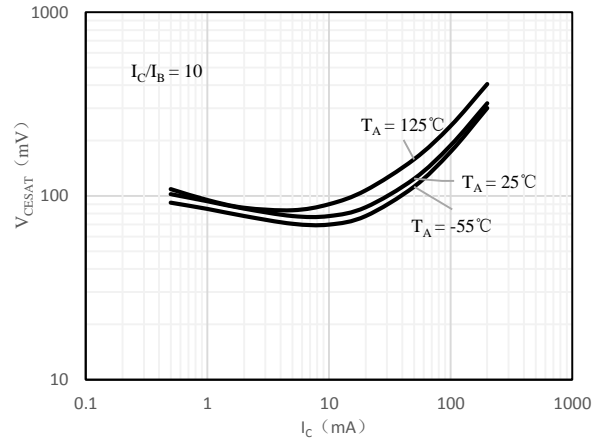
Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Collector-Base Breakdown Voltage	$V_{(BR)CBO}$	$I_C = 10\mu\text{A}, I_E = 0$	60	-	-	V
Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$	$I_C = 100\mu\text{A}, I_B = 0$	40	-	-	V
Emitter-Base Breakdown Voltage	$V_{(BR)EBO}$	$I_E = 10\mu\text{A}, I_C = 0$	6	-	-	V
Collector Cut-off Current	$I_{CBO}$	$V_{CB} = 30\text{V}, I_E = 0$	-	-	50	nA
Base Cut-off Current	$I_{EBO}$	$V_{EB} = 6\text{V}, I_C = 0$	-	-	50	nA
DC Current Gain	$h_{FE}$	$V_{CE} = 1\text{V}, I_C = 0.1\text{mA}$	60	-	-	-
		$V_{CE} = 1\text{V}, I_C = 1\text{mA}$	80	-	-	-
		$V_{CE} = 1\text{V}, I_C = 10\text{mA}$	100	-	300	-
		$V_{CE} = 1\text{V}, I_C = 50\text{mA}$	60	-	-	-
		$V_{CE} = 1\text{V}, I_C = 100\text{mA}$	30	-	-	-
Collector-emitter Saturation Voltage	$V_{CE(sat)}$	$I_C = 10\text{mA}, I_B = 1\text{mA}$	-	-	0.2	V
		$I_C = 50\text{mA}, I_B = 5\text{mA}$	-	-	0.3	V
Base-emitter Saturation Voltage	$V_{BE(sat)}$	$I_C = 10\text{mA}, I_B = 1\text{mA}$	0.65	-	0.85	V
		$I_C = 50\text{mA}, I_B = 5\text{mA}$	-	-	0.95	V
Output Capacitance	$C_{OBO}$	$V_{CB} = 5\text{V}, I_E = 0, f = 1\text{MHz}$	-	-	4	pF
Input Capacitance	$C_{IBO}$	$I_C = 0, V_{EB} = 0.5\text{V}, f = 1\text{MHz}$	-	-	8	pF
Transition Frequency	$f_T$	$I_C = 10\text{mA}, V_{CE} = 20\text{V}$ $f = 100\text{MHz}$	300	-	-	MHZ
Delay Time	$t_d$	$V_{CC} = 3\text{V}, V_{BE} = -0.5\text{V}$	-	-	35	ns
Rise Time	$t_r$	$I_C = 10\text{mA}, I_{B1} = 1\text{mA}$	-	-	35	ns
Storage Time	$t_s$	$V_{CC} = 3\text{V}, I_C = 10\text{mA}$	-	-	200	ns
Fall Time	$t_f$	$I_{B1} = I_{B2} = 1\text{mA}$	-	-	50	ns



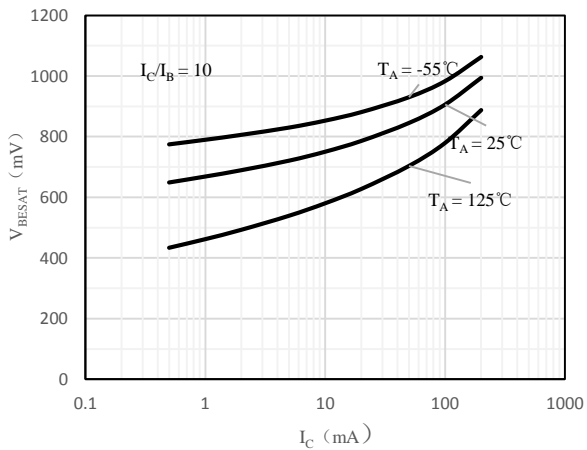
### Ratings and Characteristic Curves (@ $T_A = 25^\circ\text{C}$ unless otherwise specified)



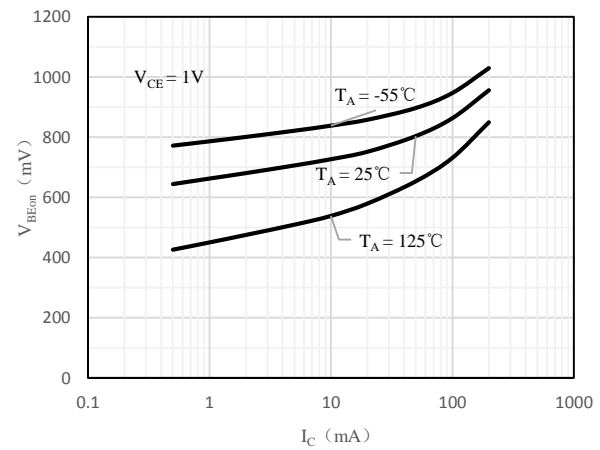
**Fig 1**  $h_{FE}$  vs.  $I_C$



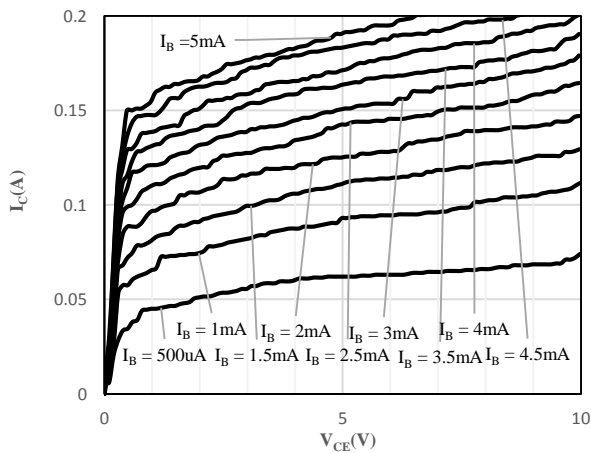
**Fig 2**  $V_{CE(sat)}$  vs.  $I_C$



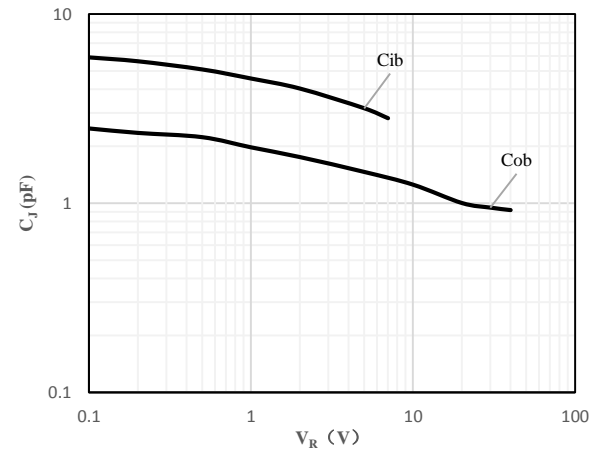
**Fig 3**  $V_{BE(sat)}$  vs.  $I_C$



**Fig 4**  $V_{BE(on)}$  vs.  $I_C$



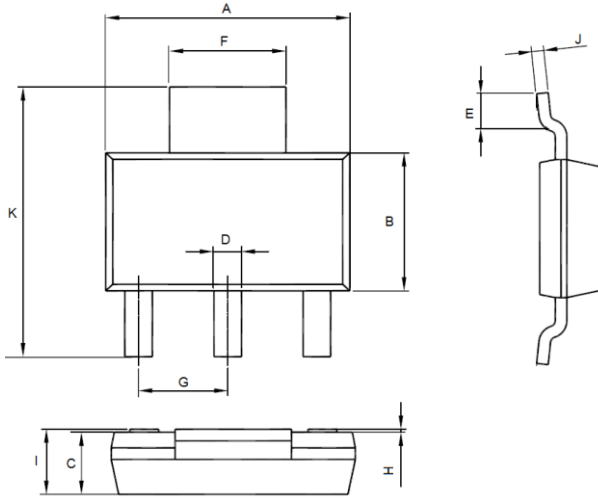
**Fig 5**  $I_C$  vs.  $V_{CE}$



**Fig 6**  $C_J$  vs.  $V_R$



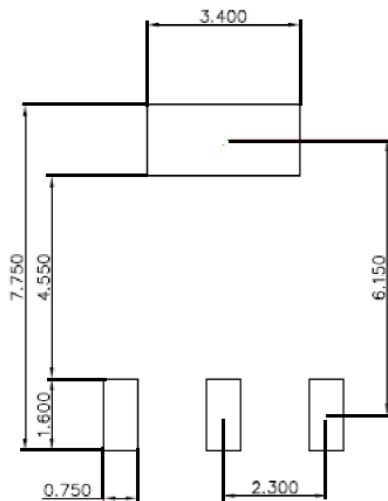
### Package Outline Dimensions (Unit: mm)



SOT-223		
Dimension	Min.	Max.
A	6.10	6.50
B	3.30	3.70
C	1.50	1.70
D	0.66	0.82
E	0.90	1.15
F	2.90	3.10
G	2.20	2.40
H	0.02	0.10
I	1.52	1.80
J	0.20	0.40
K	6.70	7.30

### Mounting Pad Layout (Unit: mm)

#### SOT-223



Package	Reel	Reel Size	Box	Box Size(mm)	Carton	Carton Size(mm)
SOT -223	2500pcs	13inch	2500pcs	336×336×48	20,000pcs	445×355×365