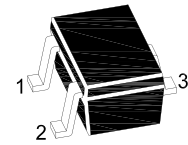


# MMBT3904E

## NPN Silicon General Purpose Transistor

For switching and amplifier applications.



1.Base 2.Emitter 3.Collector  
SOT-523 Plastic Package

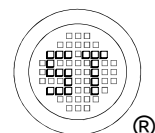
### Absolute Maximum Ratings ( $T_a = 25^\circ\text{C}$ )

Parameter	Symbol	Value	Unit
Collector Base Voltage	$V_{CBO}$	60	V
Collector Emitter Voltage	$V_{CEO}$	40	V
Emitter Base Voltage	$V_{EBO}$	6	V
Collector Current	$I_c$	200	mA
Power Dissipation	$P_{tot}$	150	mW
Junction Temperature	$T_j$	150	$^\circ\text{C}$
Storage Temperature Range	$T_{stg}$	- 55 to + 150	$^\circ\text{C}$

### Thermal Resistance

Parameter	Symbol	Max.	Unit
Thermal Resistance from Junction to Ambient <sup>1)</sup>	$R_{\theta JA}$	833	$^\circ\text{C/W}$

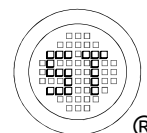
<sup>1)</sup> Device mounted on FR-4 substrate PC board, with minimum recommended pad layout.



# MMBT3904E

## Characteristics at $T_a = 25^\circ\text{C}$

Parameter	Symbol	Min.	Max.	Unit
DC Current Gain				
at $V_{CE} = 1\text{ V}$ , $I_C = 0.1\text{ mA}$	$h_{FE}$	40	-	-
at $V_{CE} = 1\text{ V}$ , $I_C = 1\text{ mA}$	$h_{FE}$	70	-	-
at $V_{CE} = 1\text{ V}$ , $I_C = 10\text{ mA}$	$h_{FE}$	100	300	-
at $V_{CE} = 1\text{ V}$ , $I_C = 50\text{ mA}$	$h_{FE}$	60	-	-
at $V_{CE} = 1\text{ V}$ , $I_C = 100\text{ mA}$	$h_{FE}$	30	-	-
Collector Base Cutoff Current at $V_{CB} = 30\text{ V}$	$I_{CBO}$	-	50	nA
Emitter Base Cutoff Current at $V_{EB} = 6\text{ V}$	$I_{EBO}$	-	50	nA
Collector Base Breakdown Voltage at $I_C = 10\text{ }\mu\text{A}$	$V_{(BR)CBO}$	60	-	V
Collector Emitter Breakdown Voltage at $I_C = 1\text{ mA}$	$V_{(BR)CEO}$	40	-	V
Emitter Base Breakdown Voltage at $I_E = 10\text{ }\mu\text{A}$	$V_{(BR)EBO}$	6	-	V
Collector Emitter Saturation Voltage at $I_C = 10\text{ mA}$ , $I_B = 1\text{ mA}$	$V_{CE(sat)}$	-	0.2	V
at $I_C = 50\text{ mA}$ , $I_B = 5\text{ mA}$		-	0.3	V
Base Emitter Saturation Voltage at $I_C = 10\text{ mA}$ , $I_B = 1\text{ mA}$	$V_{BE(sat)}$	0.65	0.85	V
at $I_C = 50\text{ mA}$ , $I_B = 5\text{ mA}$		-	0.95	V
Current Gain Bandwidth Product at $V_{CE} = 20\text{ V}$ , $I_C = 10\text{ mA}$ , $f = 100\text{ MHz}$	$f_T$	300	-	MHz
Collector Output Capacitance at $V_{CB} = 5\text{ V}$ , $f = 1\text{ MHz}$	$C_{ob}$	-	4	pF
Delay Time at $V_{CC} = 3\text{ V}$ , $V_{BE} = 0.5\text{ V}$ , $I_C = 10\text{ mA}$ , $I_{B1} = 1\text{ mA}$	$t_d$	-	35	ns
Rise Time at $V_{CC} = 3\text{ V}$ , $V_{BE} = 0.5\text{ V}$ , $I_C = 10\text{ mA}$ , $I_{B1} = 1\text{ mA}$	$t_r$	-	35	ns
Storage Time at $V_{CC} = 3\text{ V}$ , $I_C = 10\text{ mA}$ , $I_{B1} = -I_{B2} = 1\text{ mA}$	$t_s$	-	200	ns
Fall Time at $V_{CC} = 3\text{ V}$ , $I_C = 10\text{ mA}$ , $I_{B1} = -I_{B2} = 1\text{ mA}$	$t_f$	-	50	ns



# MMBT3904E

## Electrical Characteristics Curves

Fig. 1 Output Characteristics Curve

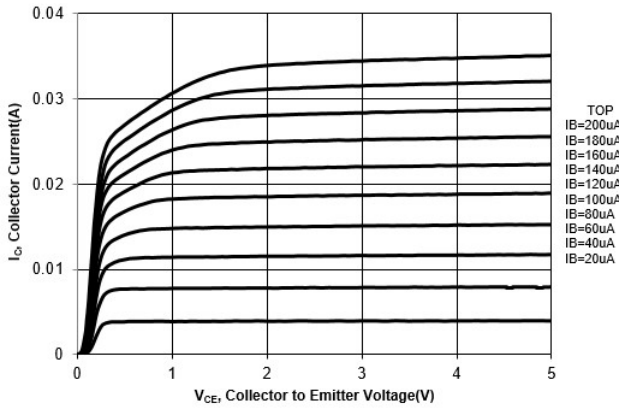


Fig. 2 Output Characteristics Curve

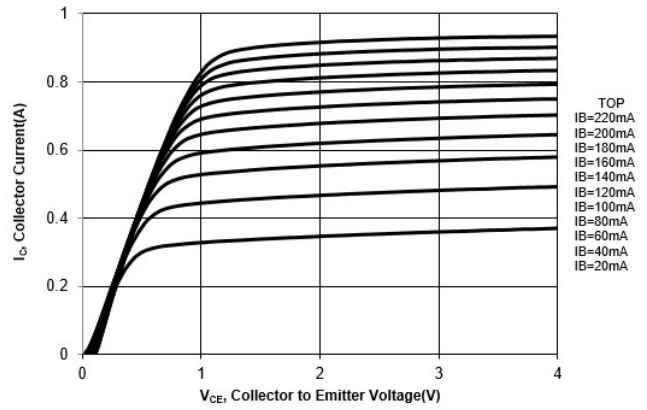


Fig. 3 Collector Current vs.  $V_{BE}$

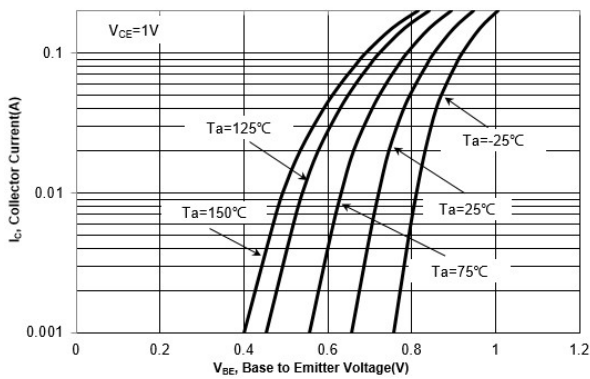
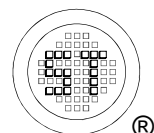
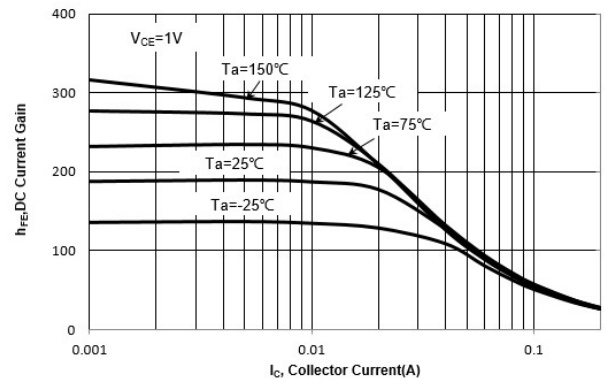


Fig. 4  $h_{FE}$  vs. Collector Current



## Electrical Characteristics Curves

Fig. 5  $V_{BE(sat)}$  vs. Collector Current

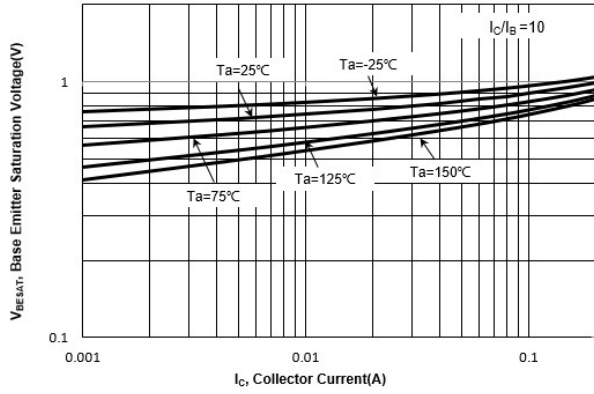


Fig. 6  $V_{CE(sat)}$  vs. Collector Current

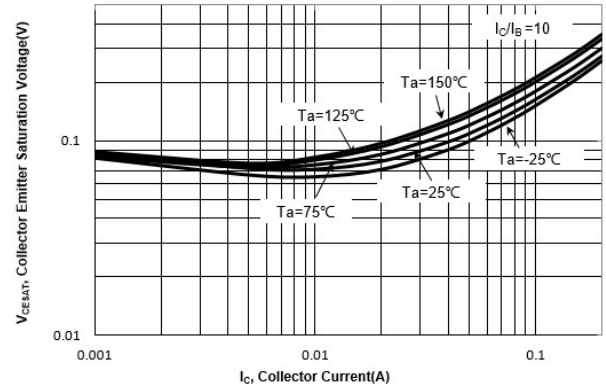


Fig 7. Output Capacitance

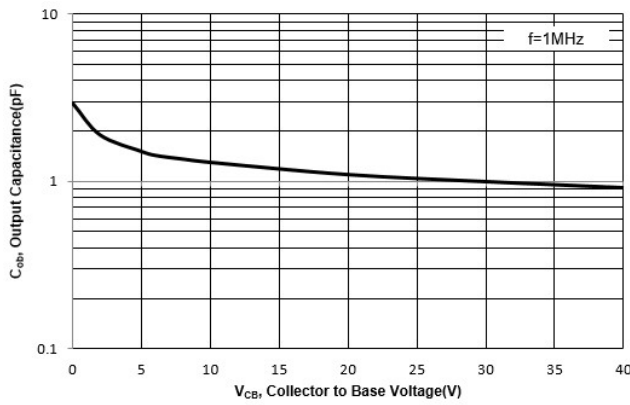
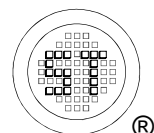
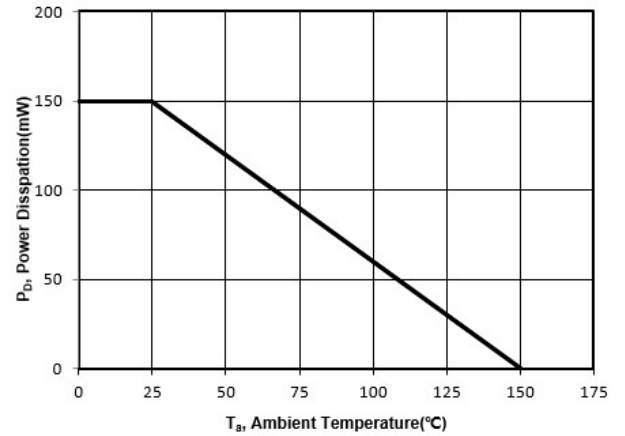


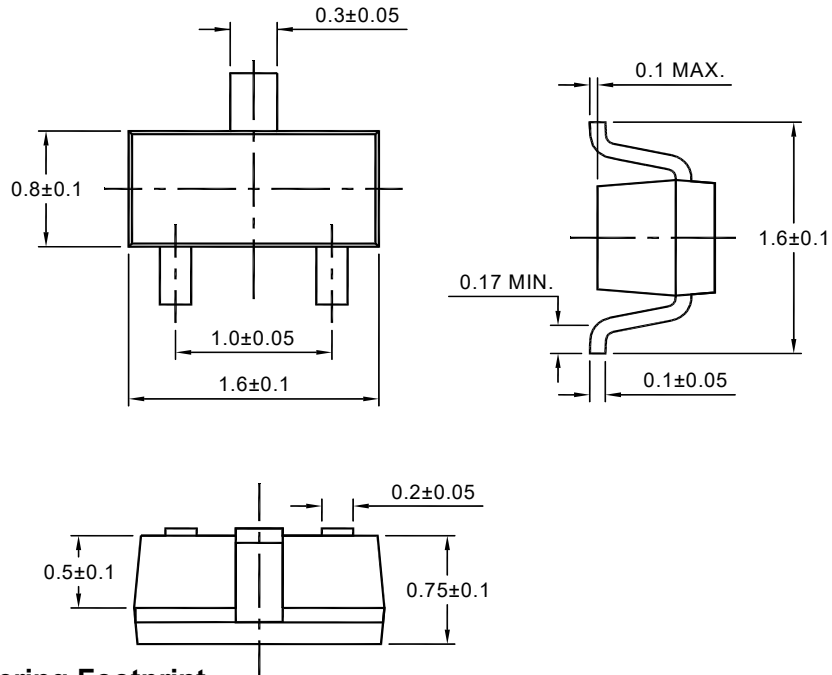
Fig 8. Power Derating Curve



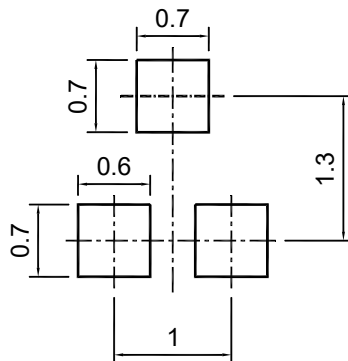
# MMBT3904E

## Package Outline (Dimensions in mm)

SOT-523



## Recommended Soldering Footprint



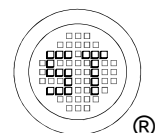
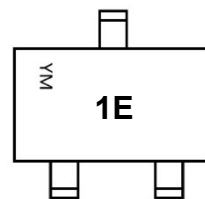
## Packing information

Package	Tape Width (mm)	Pitch		Reel Size		Per Reel Packing Quantity
		mm	inch	mm	inch	
SOT-523	8	$4 \pm 0.1$	$0.157 \pm 0.004$	178	7	4,000

## Marking information

- " 1E " = Part No.
- " YM " = Date Code Marking
- " Y " = Year
- " M " = Month

Font type: Arial



## X-ON Electronics

Largest Supplier of Electrical and Electronic Components

*Click to view similar products for [Bipolar Transistors - BJT category](#):*

*Click to view products by [Semtech manufacturer](#):*

Other Similar products are found below :

[BC559C](#) [MCH4017-TL-H](#) [MMBT-2369-TR](#) [BC546/116](#) [NJVMJD148T4G](#) [NTE16](#) [NTE195A](#) [IMX9T110](#) [2N4401-A](#) [2N4403](#) [2N6728](#)  
[2SA1419T-TD-H](#) [2SA2126-E](#) [2SB1204S-TL-E](#) [FMC5AT148](#) [2N2369ADCSM](#) [2N2907A](#) [2N3904-NS](#) [2N5769](#) [2SC4618TLN](#) [CPH6501-](#)  
[TL-E](#) [MCH4021-TL-E](#) [Jantx2N5416](#) [US6T6TR](#) [BAX18/A52R](#) [BC556/112](#) [IMZ2AT108](#) [MMST8098T146](#) [UMX21NTR](#) [MCH6102-TL-E](#)  
[TTA1452B,S4X\(S](#) [2N3879](#) [NTE13](#) [NTE282](#) [NTE323](#) [NTE350](#) [NTE81](#) [JANTX2N2920L](#) [JANTX2N3735](#) [JANSR2N2222AUB](#)  
[CMLT3946EG TR](#) [SNSS40600CF8T1G](#) [CMLT3906EG TR](#) [GRP-DATA-JANS2N2907AUB](#) [GRP-DATA-JANS2N2222AUA](#)  
[MMDT3946FL3-7](#) [2N4240](#) [JANS2N3019](#) [MSB30KH-13](#) [2N2221AUB](#)