

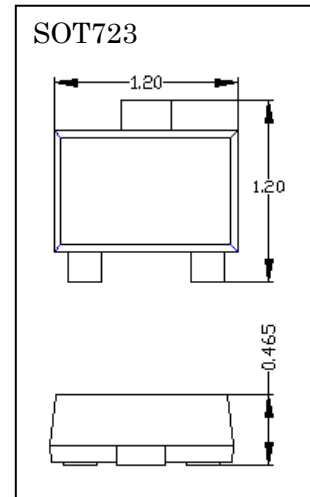
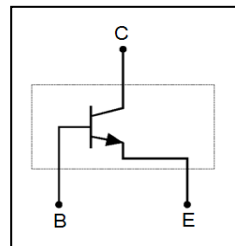
## DATA SHEET

### MMBT3904M

- ◇ Capable of 100 mWatts of Power Dissipation and 200mA  $I_c$
- ◇ Operating and Storage Junction Temperatures:  $-55^{\circ}\text{C}$  to  $150^{\circ}\text{C}$
- ◇ Small Outline Surface Mount Package
- ◇ RoHS compliant / Green EMC

| Device Marking Code |    |
|---------------------|----|
| MMBT3904            | 1N |

Circuit Diagram



#### Maximum Ratings ( $T_a=25^{\circ}\text{C}$ 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                 | 100             | mW                          |
| $R_{\theta JA}$ | Thermal Resistance From Junction To Ambient | 1250            | $^{\circ}\text{C}/\text{W}$ |
| $T_j$           | Junction Temperature                        | 150             | $^{\circ}\text{C}$          |
| $T_{stg}$       | Storage Temperature                         | $-55 \sim +150$ | $^{\circ}\text{C}$          |

#### Electrical Characteristics @ $25^{\circ}\text{C}$ Unless Otherwise Specified

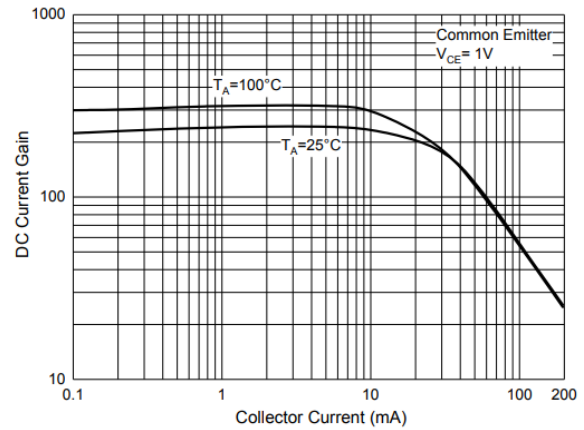
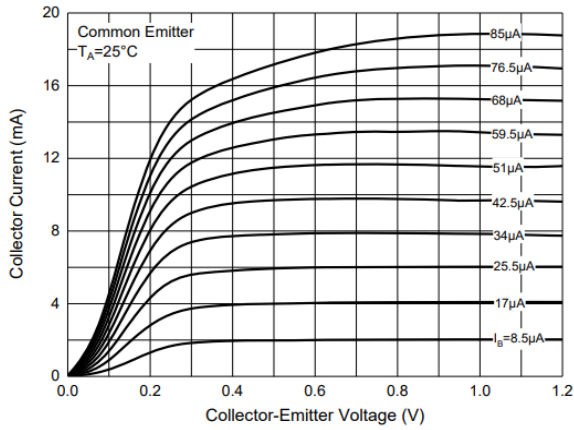
| Symbol    | Parameter                           | Test Conditions               | Min | Max | Units |
|-----------|-------------------------------------|-------------------------------|-----|-----|-------|
| $V_{CEO}$ | Collector-Emitter Breakdown Voltage | $I_C=1.0\text{mA}$ , $I_B=0$  | 40  |     | V     |
| $V_{CBO}$ | Collector-Base Breakdown Voltage    | $I_C=10\mu\text{A}$ , $I_E=0$ | 60  |     | V     |
| $V_{EBO}$ | Emitter-Base Breakdown Voltage      | $I_E=10\mu\text{A}$ , $I_C=0$ | 6   |     | V     |

|                |                                      |                                  |      |      |     |
|----------------|--------------------------------------|----------------------------------|------|------|-----|
| $I_{CBO}$      | Collector-Base Cutoff Current        | $V_{CB}=30V, I_E=0$              |      | 100  | nA  |
| $I_{CEX}$      | Collector- Emitter Cutoff Current    | $V_{CE}=30V, V_{EB(OFF)}=3.0V$   |      | 50   | nA  |
| $I_{EBO}$      | Collector Cutoff Current             | $V_{EB}=5V, I_C=0$               |      | 100  | nA  |
| $h_{FE(1)}$    | DC Current Gain                      | $I_C=0.1mA, V_{CE}=1V$           | 40   |      |     |
| $h_{FE(2)}$    | DC Current Gain                      | $I_C=1mA, V_{CE}=1V$             | 70   |      |     |
| $h_{FE(3)}$    | DC Current Gain                      | $I_C=10mA, V_{CE}=1V$            | 100  | 300  |     |
| $h_{FE(4)}$    | DC Current Gain                      | $I_C=50mA, V_{CE}=1V$            | 60   |      |     |
| $V_{CE(sat)1}$ | Collector-Emitter Saturation Voltage | $I_C=10mA, I_B=1mA$              |      | 0.2  | V   |
| $V_{CE(sat)2}$ | Collector-Emitter Saturation Voltage | $I_C=50mA, I_B=5mA$              |      | 0.3  | V   |
| $V_{BE(sat)1}$ | Base-Emitter Saturation Voltage      | $I_C=10mA, I_B=1mA$              | 0.65 | 0.85 | V   |
| $V_{BE(sat)2}$ | Base-Emitter Saturation Voltage      | $I_C=50mA, I_B=5.0mA$            |      | 0.95 | V   |
| $f_T$          | Current Gain-Bandwidth Product       | $I_C=10mA, V_{CE}=20V, f=100MHz$ | 300  |      | MHz |

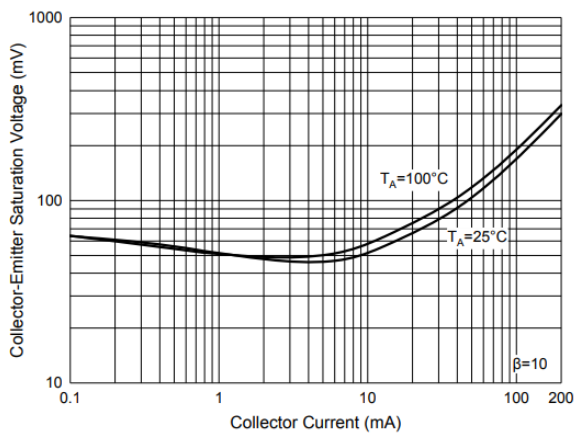
#### SWITCHING CHARACTERISTICS

| Symbol | Parameter    | Test Conditions  | Min | Max | Units |
|--------|--------------|--|-----|-----|-------|
| $t_d$  | Delay Time   | $V_{CC}=3.0V, V_{BE(off)}=-0.5V$<br>$I_C=10mA, I_{B1}=1.0mA$ |     | 35  | ns    |
| $t_r$  | Rise Time    |  |     | 35  | ns    |
| $t_s$  | Storage Time | $V_{CC}=3.0V, I_C=10mA$                                      |     | 200 | ns    |
| $t_f$  | Fall Time    | $I_{B1}=I_{B2}=1.0mA$  |     | 50  | ns    |

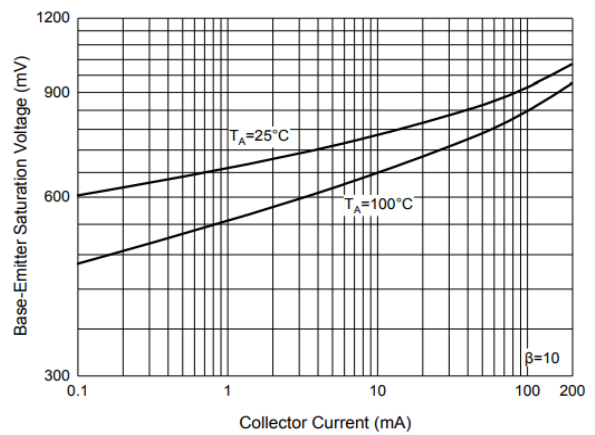
Typical Characteristics



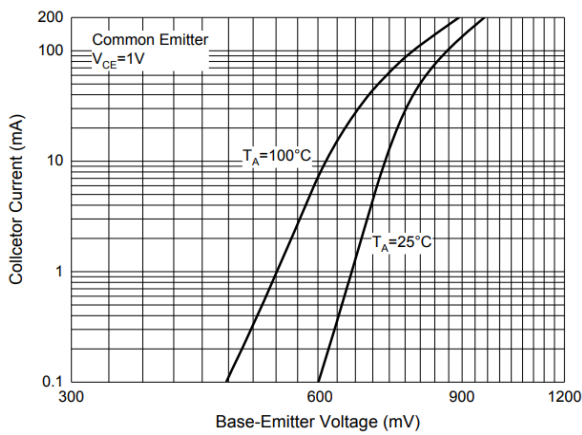
Static Characteristics



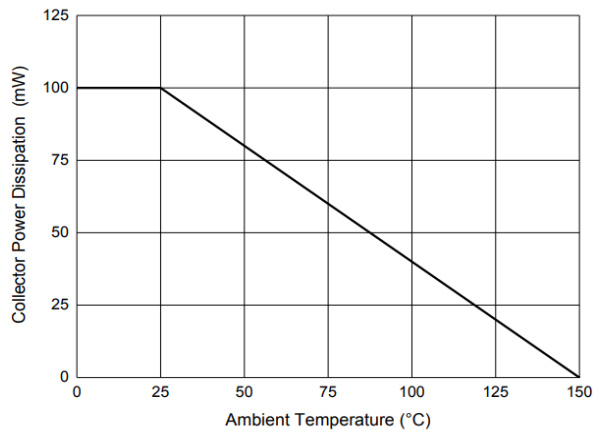
Base-Emitter Saturation Voltage Characteristics



Collector-Emitter Saturation Voltage Characteristics



Base-Emitter Saturation Voltage Characteristics



Base-Emitter Voltage Characteristics

Collector Power Derating Curve

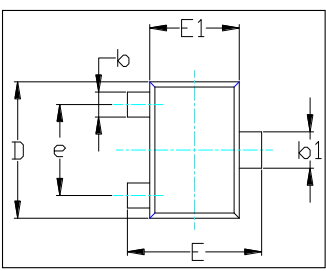
ORDERING INFORMATION

| Device    | Package | Shipping                        | Tape wide | Emboss pitch | Tape specification | Notes |
|-----------|---------|---------------------------------|-----------|--------------|--------------------|-------|
| MMBT3904M | SOT723  | Tape & Reel<br>8000pcs /7" Reel | 8mm       | 4mm          | Conductive         |       |

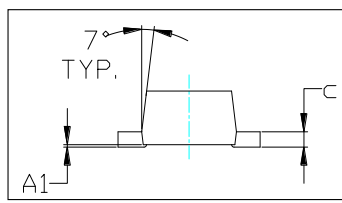
PACKAGE DIMENSIONS

**Package outline : SOT723**

**Top view**

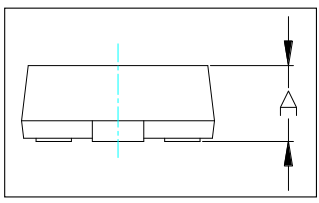


**Side view**

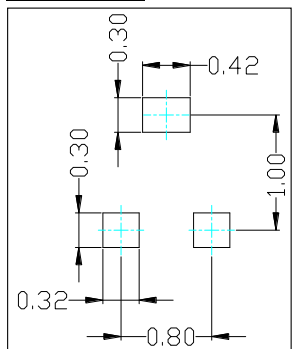


| SYMBOL | DIMENSIONS IN MILLIMETER |       |
|--------|--------------------------|-------|
|        | MIN                      | MAX   |
| A      | 0.430                    | 0.500 |
| A1     | 0.000                    | 0.050 |
| b      | 0.170                    | 0.270 |
| b1     | 0.270                    | 0.370 |
| c      | 0.080                    | 0.150 |
| D      | 1.150                    | 1.250 |
| E      | 1.150                    | 1.250 |
| E1     | 0.750                    | 0.850 |
| e      | 0.800 TYP.               |       |
| θ      | 0°                       | 7°    |

**Front view**



**Soldering Pattern**



**Notice:**

1. Lead plating: Pb free solder
2. Lead thickness includes solder plating
3. Lead frame: CAC-5
4. Other Tolerance: ±0.05
5. Dimensions are exclusive of Burrs, Mold Flash and Tie Bar extrusions
6. Unit: mm

## 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 [amsem manufacturer](#):*

Other Similar products are found below :

[BC559C](#) [MCH4017-TL-H](#) [MMBT-2369-TR](#) [BC546/116](#) [NJVMJD148T4G](#) [NTE16](#) [NTE195A](#) [IMX9T110](#) [2N4401-A](#) [2N6728](#) [2SA1419T-TD-H](#) [2SB1204S-TL-E](#) [2SC5488A-TL-H](#) [FMC5AT148](#) [2N2369ADCSM](#) [2N2907A](#) [2N3904-NS](#) [2N5769](#) [2SC4618TLN](#) [CPH6501-TL-E](#) [US6T6TR](#) [BAX18/A52R](#) [BC556/112](#) [IMZ2AT108](#) [MMST8098T146](#) [MCH6102-TL-E](#) [BC846B-13-F](#) [2N3879](#) [30A02MH-TL-E](#) [NTE13](#) [NTE282](#) [NTE323](#) [NTE350](#) [NTE81](#) [JANTX2N2920L](#) [JANSR2N2907AUB](#) [CMLT3946EG TR](#) [SNSS40600CF8T1G](#) [CMLT3906EG TR](#) [GRP-DATA-JANS2N2907AUB](#) [GRP-DATA-JANS2N2222AUA](#) [MMDT3946FL3-7](#) [2N4240](#) [JANS2N3019](#) [MSB30KH-13](#) [2N2221AUB](#) [2SD1815T-TL-E](#) [2N6678](#) [2N2907Ae4](#) [JAN2N3507](#)