BORN SEMICONDUCTOR

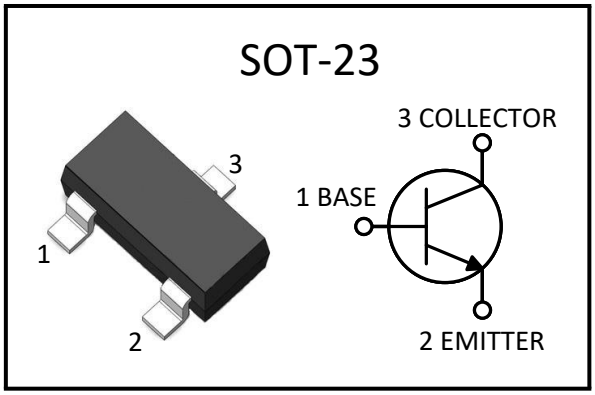
# MMBTH10

**NPN Plastic-Encapsulate Transistor**

## Features

- $V_{CE}$=25V
- $I_C$=50mA
- $f_T$=650MHZ @$V_{CE}$=10V, $I_C$=4mA,f=100MHz

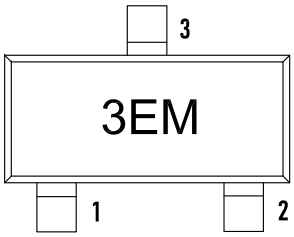
## Package




## General Description

- Epitaxial planar die construction
- SOT-23 Plastic Package

## Marking




## Ordering information

| Order code | Package | Marking | Base qty | Delivery mode |
|---|---|---|---|---|
| MMBTH10 | SOT-23 | 3EM | 3K | Tape and reel |

## Absolute Maximum Ratings @$T_A$=25°C unless otherwise noted

| Symbol | Parameter | Value | Unit |
|---|---|---|---|
| $V_{CBO}$ | Collector-Base Voltage | 30 | V |
| $V_{CEO}$ | Collector-Emitter Voltage | 25 | V |
| $V_{EBO}$ | Emitter-Base Voltage | 3 | V |
| $I_C$ | Collector Current | 50 | mA |
| $P_C$ | Collector Power Dissipation | 200 | mW |
| $R_{\theta JA}$ | Thermal Resistance From Junction To Ambient | 625 | °C/W |
| $T_J$ | Junction Temperature Range | -55 to +150 | °C |
| $T_{stg}$ | Storage Temperature Range | -55 to +150 | °C |

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**Revision: 2022-Jan-1-A**

# MMBTH10

**NPN Plastic-Encapsulate Transistor**

**Electrical Characteristics ($T_A$=25°C, unless otherwise specified)**

| Symbol | Parameter | Test condition | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $V_{(BR)CBO}$ | Collector-base breakdown voltage | $I_C$= 100μA, $I_E$=0 | 30 | – | – | V |
| $V_{(BR)CEO}$ | Collector-emitter breakdown voltage | $I_C$=1mA,$I_B$=0 | 25 | – | – | |
| $V_{(BR)EBO}$ | Emitter-base breakdown voltage | $I_E$=10μA,$I_C$=0 | 3 | – | – | |
| $I_{CBO}$ | Collector cut-off current | $V_{CB}$=25V,$I_E$=0 | – | – | 100 | nA |
| $I_{EBO}$ | Emitter cut-off current | $V_{EB}$=2V,$I_C$=0 | – | – | 100 | |
| $h_{FE}$ | DC current gain | $V_{CE}$=10V,$I_C$=4mA | 100 | – | 200 | – |
| $V_{CE(sat)}$ | Collector-emitter saturation voltage | $I_C$=4mA,$I_B$=0.4mA | – | – | 0.5 | V |
| $V_{BE(sat)}$ | Base-emitter saturation voltage | | – | – | 1.0 | |
| $V_{BE}$ | Base-emitter voltage | $V_{CE}$=10V,$I_C$=4mA | – | – | 0.95 | |
| $f_T$ | Transition frequency | $V_{CE}$=10V,$I_C$=4mA,f=100MHz | 650 | – | – | MHZ |
| $C_{ob}$ | Collector Output capacitance | $V_{CB}$=10V,$I_E$=0,f=1MHZ | – | – | 0.7 | pF |

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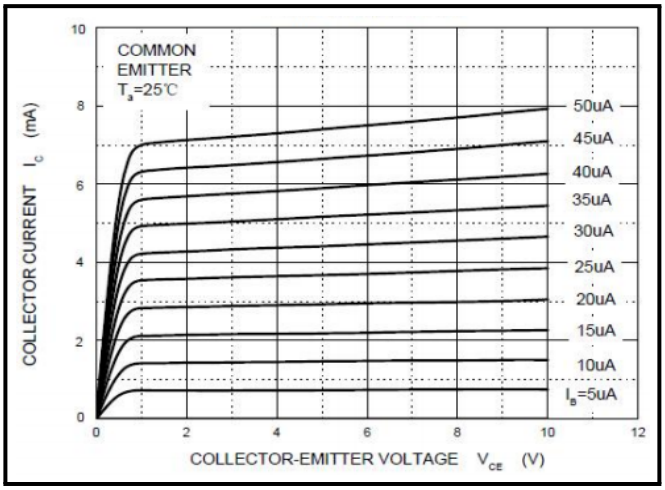
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# MMBTH10

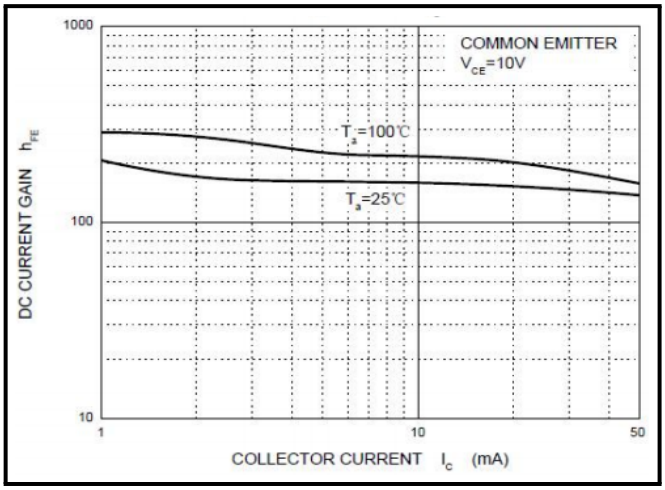
NPN Plastic-Encapsulate Transistor

## Typical Performance Characteristics($T_J$ = 25 °C, unless otherwise noted)

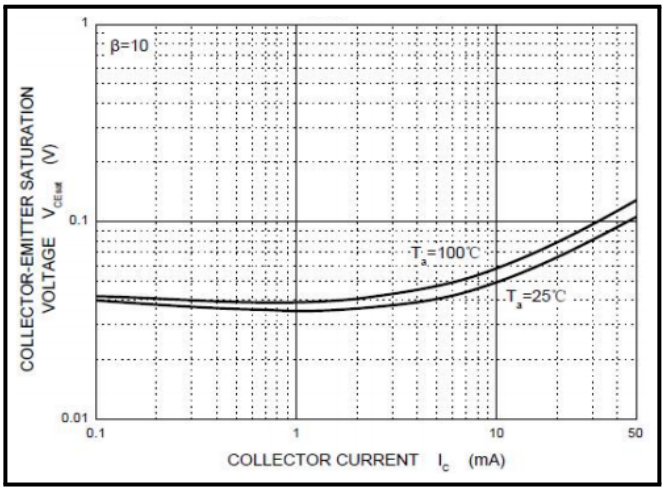
### Figure 1 :Static Characteristics



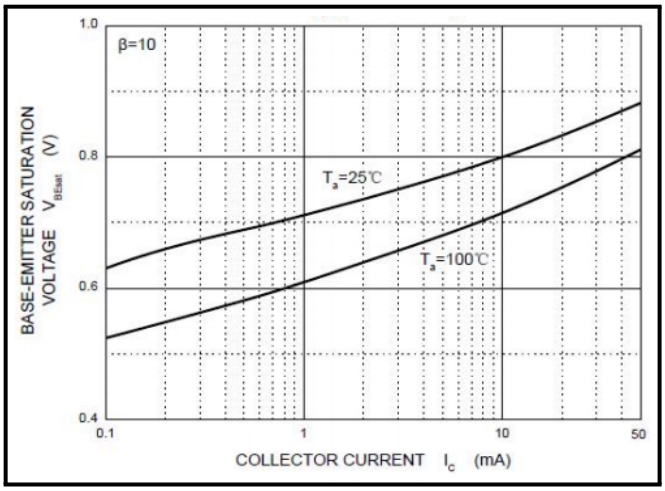

### Figure 2 :$h_{FE}$—— $I_C$




### Figure 3 : $V_{CE(sat)}$—— $I_C$




### Figure 4 : $V_{BE(sat)}$—— $I_C$




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# MMBTH10

NPN Plastic-Encapsulate Transistor

## Typical Performance Characteristics($T_J$ = 25 °C, unless otherwise noted)

**Figure 5 :$I_C$—— $V_{BE}$**

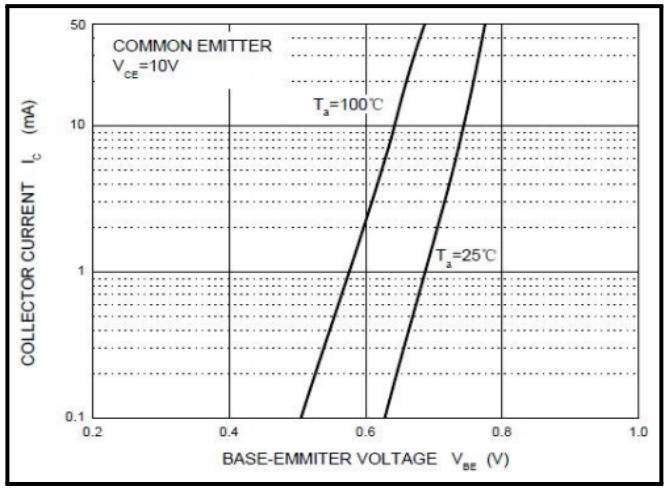



**Figure 6 :$C_{ob}$/$C_{ib}$—— $V_{CB}$/$V_{EB}$**

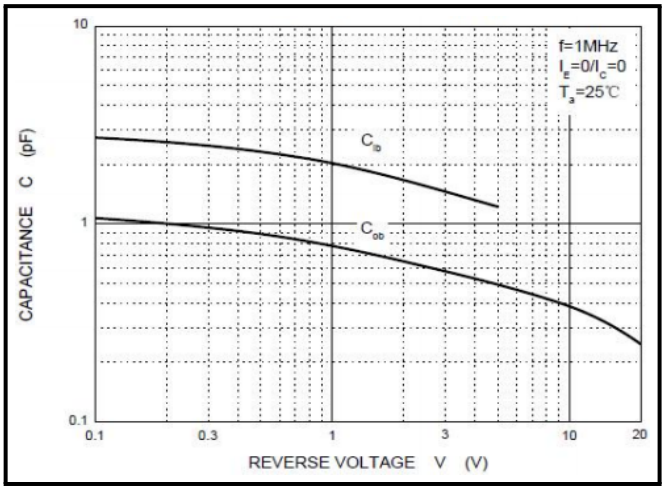



**Figure 7:$f_T$ —— $I_C$**

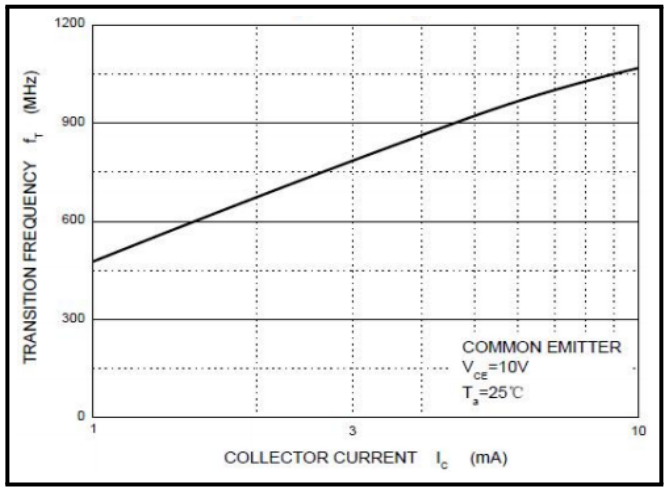
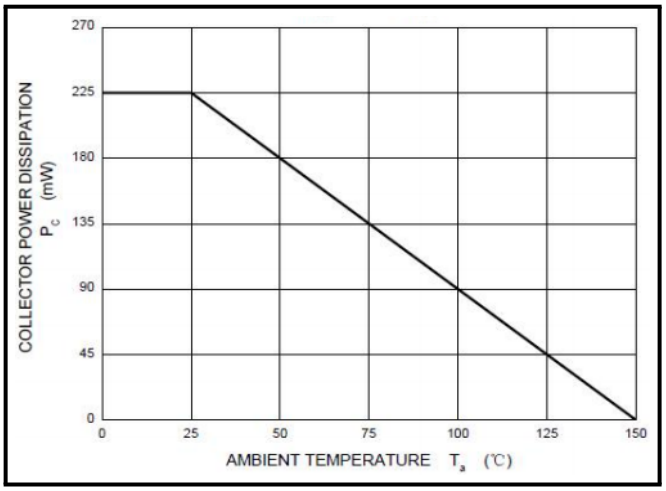



**Figure 8:$P_C$ ——$T_A$**



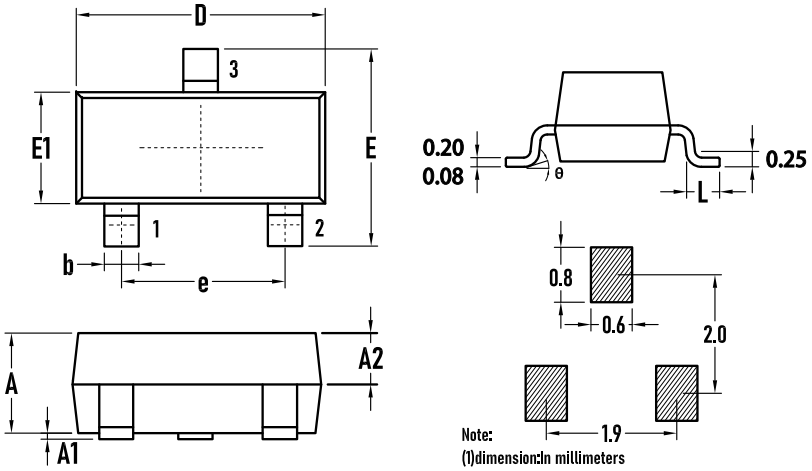

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# MMBTH10

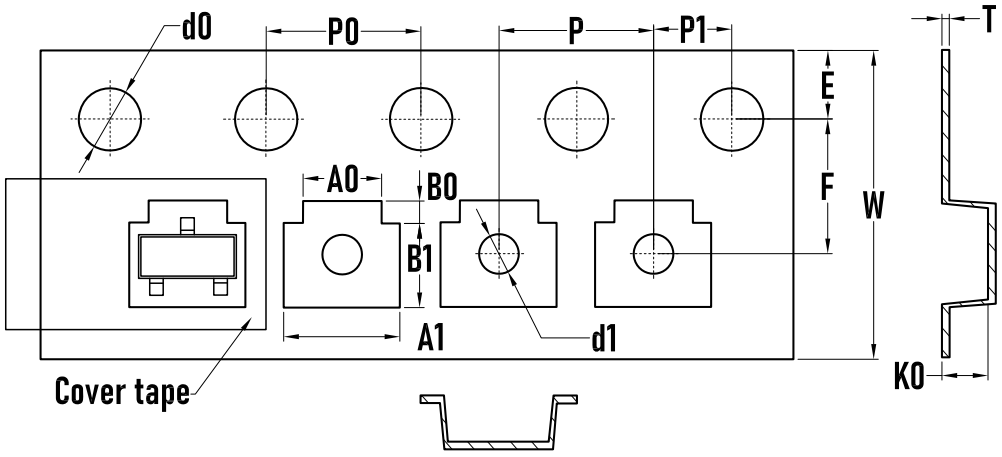
**NPN Plastic-Encapsulate Transistor**

## Outline Drawing - SOT-23



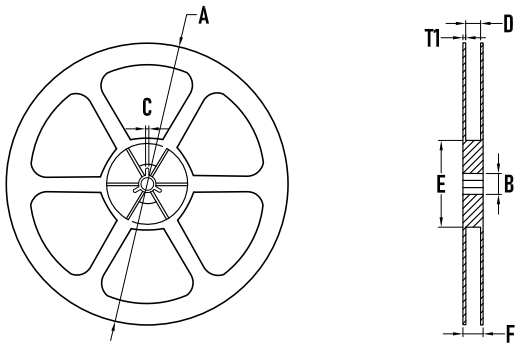

| SYMBOL | MILLIMETER | | |
|---|---|---|---|
| | MIN. | Typ. | MAX. |
| A | 0.90 | 1.00 | 1.10 |
| A1 | 0.01 | – | 0.10 |
| A2 | 0.50 | 0.60 | 0.70 |
| D | 2.80 | 2.90 | 3.00 |
| b | 0.25 | 0.35 | 0.45 |
| E | 2.10 | 2.30 | 2.50 |
| E1 | 1.20 | 1.30 | 1.40 |
| e | 1.80 | 1.90 | 2.00 |
| L | 0.25 | 0.35 | 0.45 |
| θ | 0 | – | 8° |

## Packaging Tape - SOT-23




| SYMBOL | MILLIMETER |
|---|---|
| A0 | 2.10±0.10 |
| A1 | 3.10±0.10 |
| B0 | 0.65±0.10 |
| B1 | 2.75±0.10 |
| d0 | 1.55±0.10 |
| d1 | 1.00±0.05 |
| E | 1.75±0.10 |
| F | 3.50±0.10 |
| K0 | 1.10±0.10 |
| P | 4.00±0.10 |
| P0 | 4.00±0.10 |
| P1 | 2.00±0.10 |
| W | 8.00±0.30 |
| T | 0.20 ±0.05 |

## Packaging Reel




| SYMBOL | MILLIMETER |
|---|---|
| A | 177.8±0.2 |
| B | 3.1 |
| C | 13.50 |
| D | 9.6±0.3 |
| E | 75±0.2 |
| F | 12.3±0.3 |
| T1 | 1.0±0.2 |
| Quantity | 3000PCS |

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