

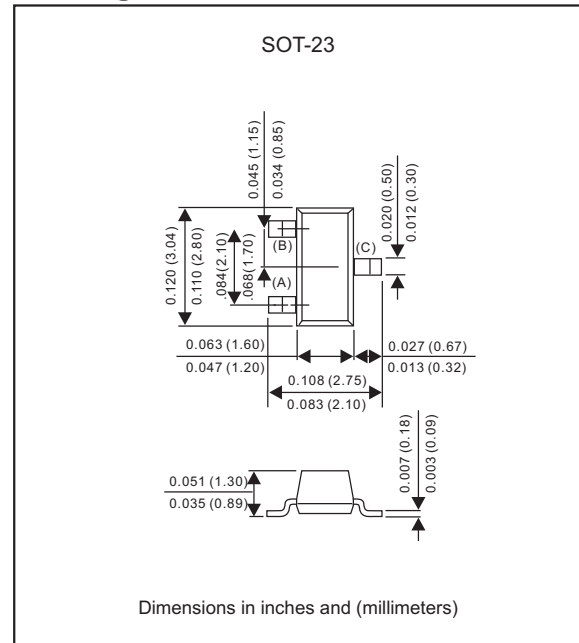
### Features

- High collector-emitter breakdown voltage.  
( $BV_{CEO} = 140V \sim 160V @ I_C = 1mA$ )
- This device is designed for general purpose high voltage amplifiers and gas discharge display driving.
- Epitaxial planar die construction.
- Lead-free parts for green partner, exceeds environmental standards of MIL-STD-19500 / 228
- Suffix "-H" indicates Halogen-free part, ex. MMBT5550-H.

### Mechanical data

- Epoxy: UL94-V0 rated flame retardant
- Case : Molded plastic, SOT-23
- Terminals : Solder plated, solderable per  
MIL-STD-750, Method 2026
- Mounting Position : Any
- Weight : Approximated 0.008 gram

### Package outline



### Maximum ratings (AT $T_A = 25^\circ C$ unless otherwise noted)

| PARAMETER                      | Symbol    | MMBT5550 | MMBT5551 | UNIT |
|--------------------------------|-----------|----------|----------|------|
| Collector-base voltage         | $V_{CBO}$ | 160      | 180      | V    |
| Collector-emitter voltage      | $V_{CEO}$ | 140      | 160      | V    |
| Emitter-base voltage           | $V_{EBO}$ | 6.0      |          | V    |
| Collector current - continuous | $I_C$     | 600      |          | mA   |

### Thermal characteristics

| Characteristics                                               | Symbol          | Max         | UNIT           |
|---------------------------------------------------------------|-----------------|-------------|----------------|
| Total device dissipation FR-5 board $T_A = 25^\circ C$<br>(1) | $P_D$           | 225         | mW             |
| Derate above $25^\circ C$                                     |                 | 1.8         | mW/ $^\circ C$ |
| Thermal resistance (1)<br>Junction to ambient                 | $R_{\theta JA}$ | 556         | $^\circ C/W$   |
| Total device dissipation alumina<br>substrate (2)             | $P_D$           | 300         | mW             |
| Derate above $25^\circ C$                                     |                 | 2.4         | mW/ $^\circ C$ |
| Thermal resistance (2)<br>Junction to ambient                 | $R_{\theta JA}$ | 417         | $^\circ C/W$   |
| Operating junction temperature range                          | $T_J$           | -55 to +150 | $^\circ C$     |
| Storage temperature range                                     | $T_{STG}$       | -55 to +150 | $^\circ C$     |

1. FR-5 = 1.0 X 0.75 X 0.062 in.

2. Alumina = 0.4 X 0.3 X 0.024 in. 99.5% alumina.

### Electrical characteristics (AT $T_A=25^{\circ}\text{C}$ unless otherwise noted)

#### Off characteristics

| PARAMETER                              | CONDITIONS                                                 | Symbol        | Types      | Min. | Max. | UNIT          |
|----------------------------------------|------------------------------------------------------------|---------------|------------|------|------|---------------|
| Collector-base breakdown voltage       | $I_C = 100\mu\text{A}, I_E = 0$                            | $V_{(BR)CBO}$ | MMBT5550   | 160  | -    | V             |
|                                        |                                                            |               | MMBT5551   | 180  | -    |               |
| Collector-emitter breakdown voltage(3) | $I_C = 1.0\text{mA}, I_B = 0$                              | $V_{(BR)CEO}$ | MMBT5550   | 140  | -    | V             |
|                                        |                                                            |               | MMBT5551   | 160  | -    |               |
| Emitter-base breakdown voltage         | $I_E = 10\mu\text{A}, I_C = 0$                             | $V_{(BR)EBO}$ | Both Types | 6.0  | -    | V             |
| Collector cutoff current               | $V_{CB} = 100\text{V}, I_E = 0$                            | $I_{CBO}$     | MMBT5550   | -    | 100  | nA            |
|                                        | $V_{CB} = 120\text{V}, I_E = 0$                            |               | MMBT5551   | -    | 50   |               |
|                                        | $V_{CB} = 100\text{V}, I_E = 0, T_J = 100^{\circ}\text{C}$ |               | MMBT5550   | -    | 100  | $\mu\text{A}$ |
|                                        | $V_{CB} = 120\text{V}, I_E = 0, T_J = 100^{\circ}\text{C}$ |               | MMBT5551   | -    | 50   |               |
| Emitter cutoff current                 | $V_{EB} = 4.0\text{V}, I_C = 0$                            | $I_{EBO}$     | Both Types | -    | 50   | nA            |

#### On characteristics

| PARAMETER                            | CONDITIONS                                 | Symbol        | Types      | Min. | Max. | UNIT |
|--------------------------------------|--------------------------------------------|---------------|------------|------|------|------|
| DC current gain                      | $I_C = 1.0\text{mA}, V_{CE} = 5.0\text{V}$ | $h_{FE}$      | MMBT5550   | 60   | -    |      |
|                                      |                                            |               | MMBT5551   | 80   | -    |      |
|                                      | $I_C = 10\text{mA}, V_{CE} = 5.0\text{V}$  |               | MMBT5550   | 60   | 250  |      |
|                                      |                                            |               | MMBT5551   | 80   | 250  |      |
|                                      | $I_C = 50\text{mA}, V_{CE} = 5.0\text{V}$  |               | MMBT5550   | 20   | -    |      |
|                                      |                                            |               | MMBT5551   | 30   | -    |      |
| Collector-emitter saturation voltage | $I_C = 10\text{mA}, I_B = 1.0\text{mA}$    | $V_{CE(sat)}$ | Both Types | -    | 0.15 | V    |
|                                      | $I_C = 50\text{mA}, I_B = 5.0\text{mA}$    |               | MMBT5550   | -    | 0.25 |      |
|                                      |                                            |               | MMBT5551   | -    | 0.20 |      |
| Base-emitter saturation voltage      | $I_C = 10\text{mA}, I_B = 1.0\text{mA}$    | $V_{BE(sat)}$ | Both Types | -    | 1.0  | V    |
|                                      | $I_C = 50\text{mA}, I_B = 5.0\text{mA}$    |               | MMBT5550   | -    | 1.2  |      |
|                                      |                                            |               | MMBT5551   | -    | 1.0  |      |
| Collector emitter cut-off            | $V_{CB} = 10\text{V}$                      | $I_{CES}$     | Both Types | -    | 50   | nA   |
|                                      | $V_{CB} = 75\text{V}$                      |               |            | -    | 100  |      |

3. Pulse test : pulse width  $\leq 300\mu\text{s}$ , duty cycle  $\leq 2.0\%$ .

## Rating and characteristic curves

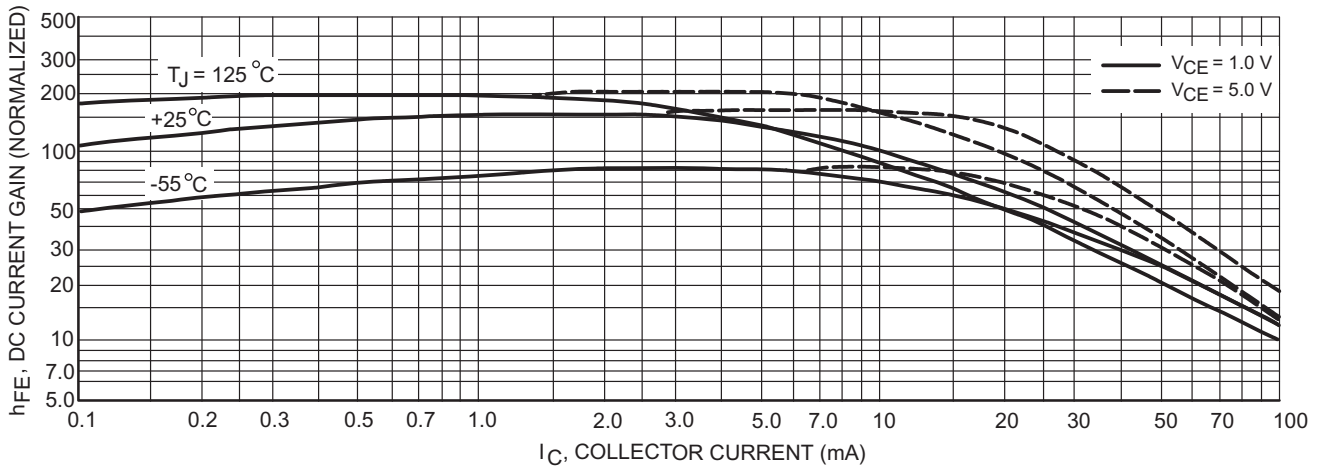


FIG.1 DC Current Gain

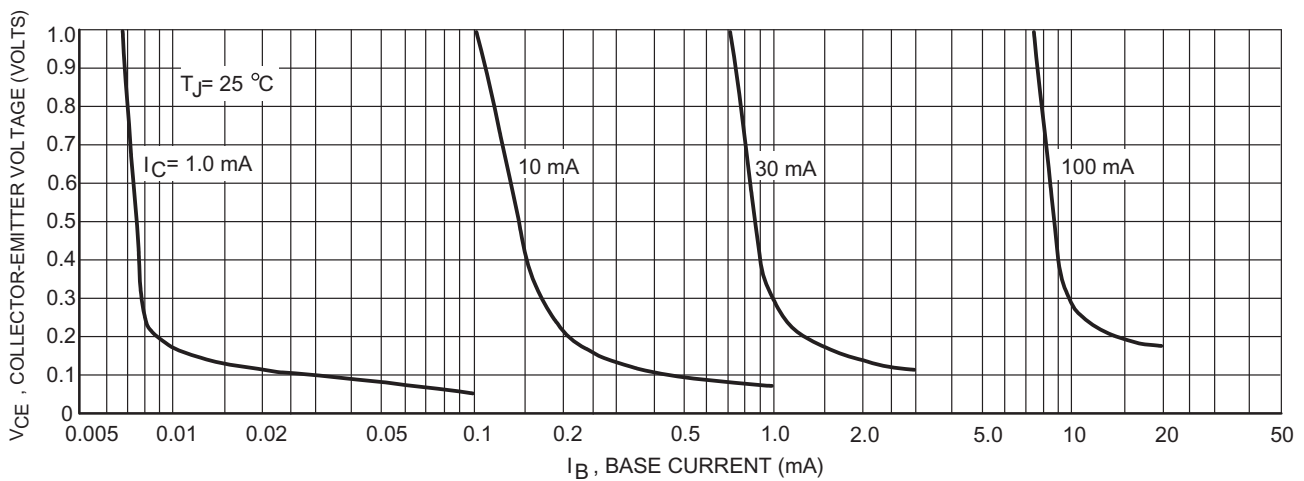


FIG. 2 Collector Saturation Region

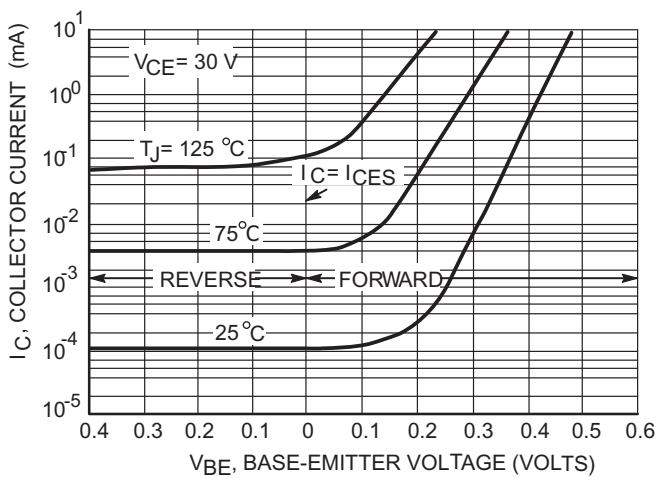


FIG. 3 Collector Cut-Off Region

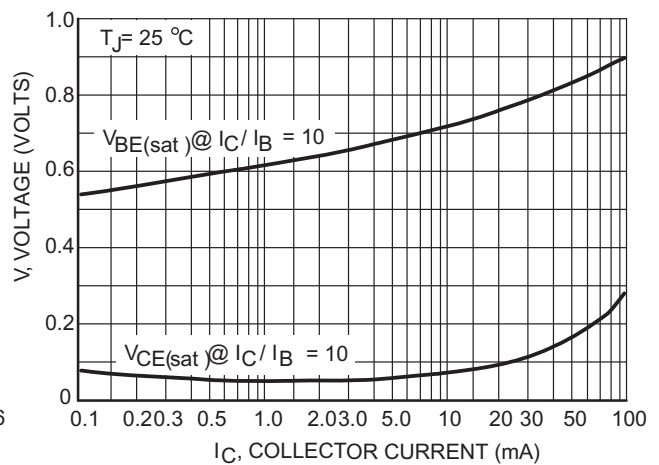


FIG. 4 "On" Voltages

## Rating and characteristic curves

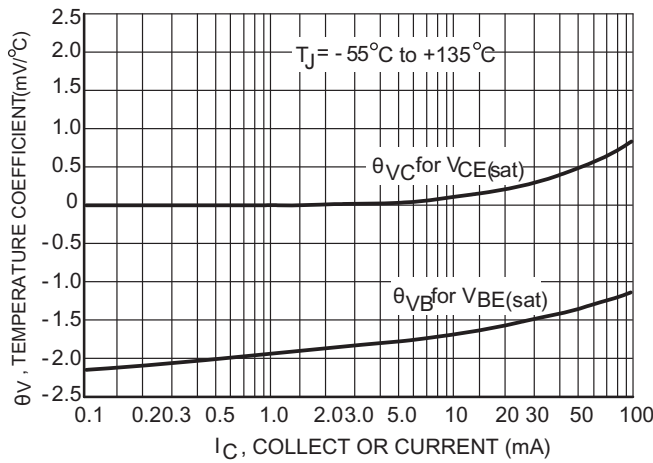
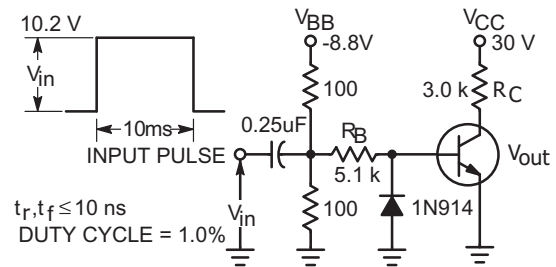


FIG.5 Temperature Coefficients



Values Shown are for  $I_C @ 10\text{ mA}$

FIG.6 Switching Time Test Circuit

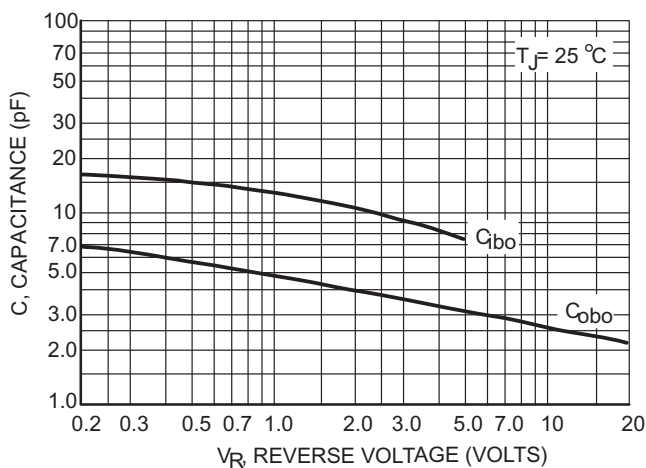


FIG.7 Capacitances

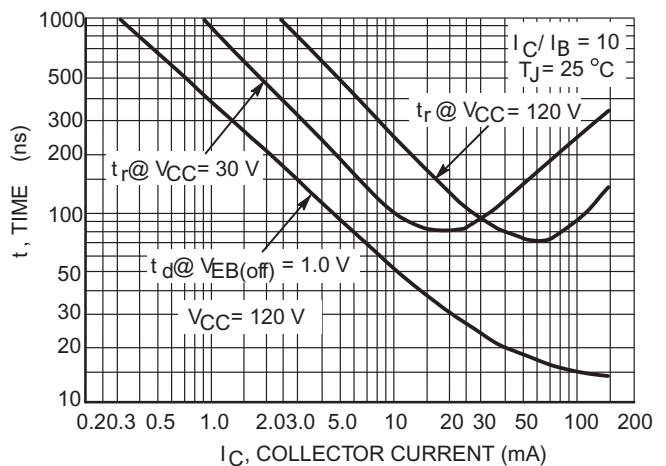


FIG.8 Turn-On Time

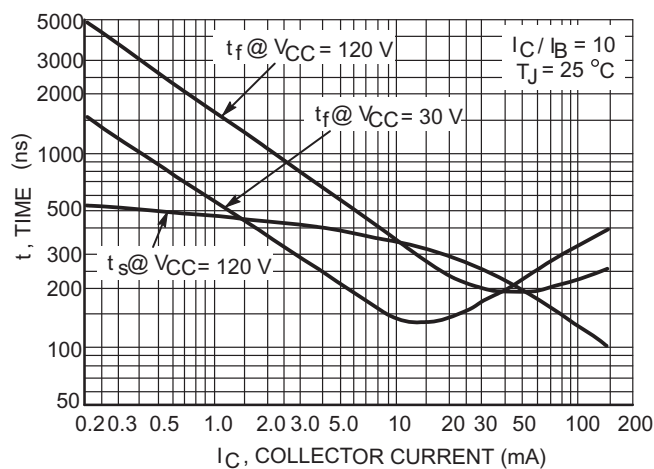
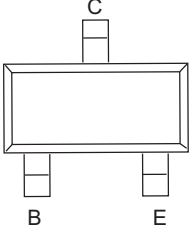
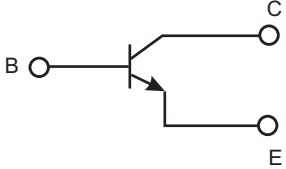


FIG.9 Turn-Off Time

### Pinning information

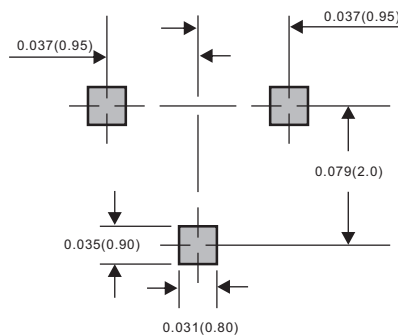
| Pin                                         | Simplified outline                                                                | Symbol                                                                              |
|---------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| PinB Base<br>PinC Collector<br>PinE Emitter |  |  |

### Marking

| Type number | Marking code |
|-------------|--------------|
| MMBT5550    | M1F          |
| MMBT5551    | G1           |

### Suggested solder pad layout

#### SOT-23



Dimensions in inches and (millimeters)

### Reel packing

| PACKAGE | REEL SIZE | REEL (pcs) | COMPONENT SPACING (m/m) | BOX (pcs) | INNER BOX (m/m) | REEL DIA, (m/m) | CARTON SIZE (m/m) | CARTON (pcs) | APPROX. GROSS WEIGHT (kg) |
|---------|-----------|------------|-------------------------|-----------|-----------------|-----------------|-------------------|--------------|---------------------------|
| SOT-23  | 7"        | 3,000      | 4.0                     | 30,000    | 183*123*183     | 178             | 382*257*387       | 240,000      | 11.6                      |