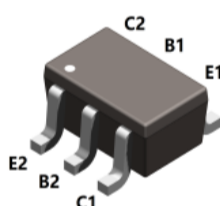


### Features

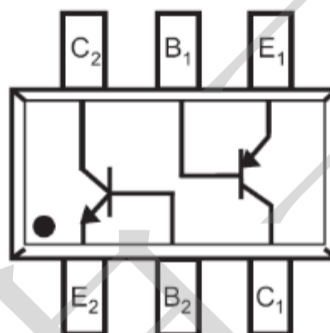
- Epitaxial planar die construction
- Two internal isolated NPN/PNP transistors in one package
- Ultra-small surface mount package



SOT-363

### Mechanical Data

- Case: SOT-363



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

| Parameter                      | Symbol    | NPN | PNP  | Unit |
|--------------------------------|-----------|-----|------|------|
| Collector-Base Voltage         | $V_{CBO}$ | 60  | -40  | V    |
| Collector-Emitter Voltage      | $V_{CEO}$ | 40  | -40  | V    |
| Emitter-Base Voltage           | $V_{EBO}$ | 6   | -5   | V    |
| Collector Current (Continuous) | $I_C$     | 0.6 | -0.6 | A    |
| Collector Current (Peak)       | $I_{CM}$  | 1.2 | -1.2 | A    |

### Thermal Characteristics

| Parameter                              | Symbol          | Value      | Unit               |
|----------------------------------------|-----------------|------------|--------------------|
| Power Dissipation *1                   | $P_D$           | 0.2        | W                  |
| Thermal Resistance Junction-to-Air *1  | $R_{\theta JA}$ | 625        | $^\circ\text{C/W}$ |
| Thermal Resistance Junction-to-Air *2  | $R_{\theta JA}$ | 350        | $^\circ\text{C/W}$ |
| Thermal Resistance Junction-to-Case *2 | $R_{\theta JC}$ | 250        | $^\circ\text{C/W}$ |
| Thermal Resistance Junction-to-Lead *2 | $R_{\theta JL}$ | 300        | $^\circ\text{C/W}$ |
| Operating Junction Temperature         | $T_J$           | -55 ~ +150 | $^\circ\text{C}$   |
| Storage Temperature Range              | $T_{STG}$       | -55 ~ +150 | $^\circ\text{C}$   |

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

| Parameter                            | Symbol        | Test Condition                                                  | Min. | Typ. | Max. | Unit |
|--------------------------------------|---------------|-----------------------------------------------------------------|------|------|------|------|
| Collector-Base Breakdown Voltage     | $V_{(BR)CBO}$ | $I_C = 100\mu\text{A}, I_E = 0$                                 | 60   | -    | -    | V    |
| Collector-Emitter Breakdown Voltage  | $V_{(BR)CEO}$ | $I_C = 1\text{mA}, I_B = 0$                                     | 40   | -    | -    | V    |
| Emitter-Base Breakdown Voltage       | $V_{(BR)EBO}$ | $I_E = 100\mu\text{A}, I_C = 0$                                 | 6    | -    | -    | V    |
| Collector Cut-off Current            | $I_{CBO}$     | $V_{CB} = 30\text{V}, I_E = 0$                                  | -    | -    | 100  | nA   |
| Collector Cut-off Current            | $I_{CEO}$     | $V_{CE} = 30\text{V}, I_B = 0$                                  | -    | -    | 100  | nA   |
| Emitter Cut-off Current              | $I_{EBO}$     | $V_{EB} = 5\text{V}, I_C = 0$                                   | -    | -    | 100  | nA   |
| DC Current Gain                      | $h_{FE}$      | $V_{CE} = 1\text{V}, I_C = 0.1\text{mA}$                        | 20   | -    | -    | -    |
|                                      |               | $V_{CE} = 1\text{V}, I_C = 1\text{mA}$                          | 40   | -    | -    | -    |
|                                      |               | $V_{CE} = 1\text{V}, I_C = 10\text{mA}$                         | 80   | -    | -    | -    |
|                                      |               | $V_{CE} = 1\text{V}, I_C = 150\text{mA}$                        | 100  | -    | 300  | -    |
| Collector-emitter Saturation Voltage | $V_{CE(sat)}$ | $I_C = 150\text{mA}, I_B = 15\text{mA}$                         | -    | -    | 0.4  | V    |
|                                      |               | $I_C = 500\text{mA}, I_B = 50\text{mA}$                         | -    | -    | 0.75 | V    |
| Base-emitter Saturation Voltage      | $V_{BE(sat)}$ | $I_C = 150\text{mA}, I_B = 15\text{mA}$                         | 0.75 | -    | 0.95 | V    |
|                                      |               | $I_C = 500\text{mA}, I_B = 50\text{mA}$                         | -    | -    | 1.2  | V    |
| Transition Frequency                 | $f_T$         | $I_C = 20\text{mA}, V_{CE} = 10\text{V}$<br>$f = 100\text{MHz}$ | 250  | -    | -    | MHz  |
| Collector Output Capacitance         | $C_{OBO}$     | $V_{CB} = 5\text{V}, I_E = 0, f = 1\text{MHz}$                  | -    | -    | 6.5  | pF   |
| Delay Time                           | $t_d$         | $V_{CC} = 30\text{V}, V_{BE(OFF)} = 2\text{V}$                  | -    | -    | 15   | ns   |
| Rise Time                            | $t_r$         | $I_C = 150\text{mA}, I_{B1} = 15\text{mA}$                      | -    | -    | 20   | ns   |
| Storage Time                         | $t_s$         | $V_{CC} = 30\text{V}, I_C = 150\text{mA}$                       | -    | -    | 225  | ns   |
| Fall Time                            | $t_f$         | $I_{B1} = I_{B2} = 15\text{mA}$                                 | -    | -    | 30   | ns   |

#### Notes:

1. Device mounted on a minimum recommended pad layout with 1oz copper that is on a single-sided 1.6mm FR4 PCB; the device is measured under still air conditions whilst operating in a steady-state.
2. The data tested by surface mounted on a 25.4mm \* 25.4mm \* 1mm FR4-epoxy P.C.B

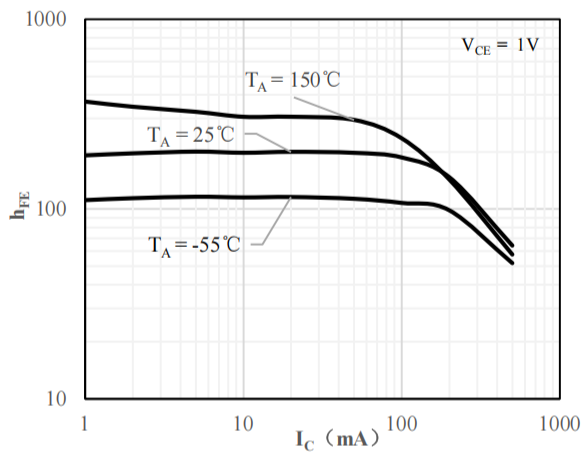
### Electrical Characteristics of PNP Transistor (@ $T_A = 25^\circ\text{C}$ unless otherwise specified)

| Parameter                            | Symbol        | Test Condition                                                    | Min.  | Typ. | Max.  | Unit |
|--------------------------------------|---------------|-------------------------------------------------------------------|-------|------|-------|------|
| Collector-Base Breakdown Voltage     | $V_{(BR)CBO}$ | $I_C = -100\mu\text{A}, I_E = 0$                                  | -40   | -    | -     | V    |
| Collector-Emitter Breakdown Voltage  | $V_{(BR)CEO}$ | $I_C = -1\text{mA}, I_B = 0$                                      | -40   | -    | -     | V    |
| Emitter-Base Breakdown Voltage       | $V_{(BR)EBO}$ | $I_E = -100\mu\text{A}, I_C = 0$                                  | -5    | -    | -     | V    |
| Collector Cut-off Current            | $I_{CBO}$     | $V_{CB} = -30\text{V}, I_E = 0$                                   | -     | -    | -100  | nA   |
| Collector Cut-off Current            | $I_{CEO}$     | $V_{CE} = -30\text{V}, I_B = 0$                                   | -     | -    | -100  | nA   |
| Emitter Cut-off Current              | $I_{EBO}$     | $V_{EB} = -5\text{V}, I_C = 0$                                    | -     | -    | -100  | nA   |
| DC Current Gain                      | $h_{FE}$      | $V_{CE} = -1\text{V}, I_C = -0.1\text{mA}$                        | 30    | -    | -     | -    |
|                                      |               | $V_{CE} = -1\text{V}, I_C = -1\text{mA}$                          | 60    | -    | -     | -    |
|                                      |               | $V_{CE} = -1\text{V}, I_C = -10\text{mA}$                         | 100   | -    | -     | -    |
|                                      |               | $V_{CE} = -2\text{V}, I_C = -150\text{mA}$                        | 100   | -    | 300   | -    |
| Collector-emitter Saturation Voltage | $V_{CE(sat)}$ | $I_C = -150\text{mA}, I_B = -15\text{mA}$                         | -     | -    | -0.4  | V    |
|                                      |               | $I_C = -500\text{mA}, I_B = -50\text{mA}$                         | -     | -    | -0.75 | V    |
| Base-emitter Saturation Voltage      | $V_{BE(sat)}$ | $I_C = -150\text{mA}, I_B = -15\text{mA}$                         | -0.75 | -    | -0.95 | V    |
|                                      |               | $I_C = -500\text{mA}, I_B = -50\text{mA}$                         | -     | -    | -1.3  | V    |
| Transition Frequency                 | $f_T$         | $I_C = -20\text{mA}, V_{CE} = -10\text{V}$<br>$f = 100\text{MHz}$ | 200   | -    | -     | MHz  |
| Collector Output Capacitance         | $C_{OBO}$     | $V_{CB} = -10\text{V}, I_E = 0, f = 1\text{MHz}$                  | -     | -    | 8.5   | pF   |
| Delay Time                           | $t_d$         | $V_{CC} = -30\text{V}, V_{BE(OFF)} = -2\text{V}$                  | -     | -    | 15    | ns   |
| Rise Time                            | $t_r$         | $I_C = -150\text{mA}, I_{B1} = -15\text{mA}$                      | -     | -    | 20    | ns   |
| Storage Time                         | $t_s$         | $V_{CC} = -30\text{V}, I_C = -150\text{mA}$                       | -     | -    | 225   | ns   |
| Fall Time                            | $t_f$         | $I_{B1} = I_{B2} = -15\text{mA}$                                  | -     | -    | 30    | ns   |

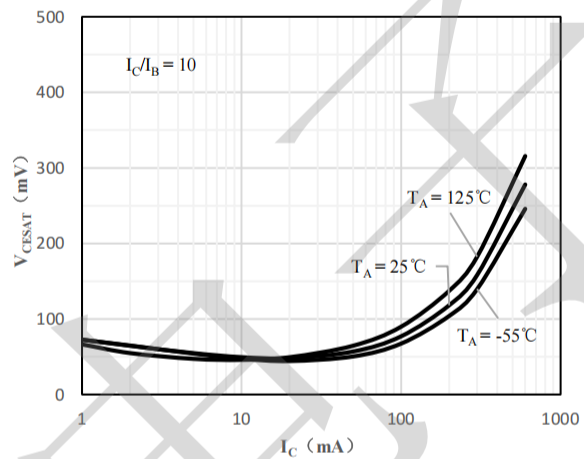
Notes:

- Device mounted on a minimum recommended pad layout with 1oz copper that is on a single-sided 1.6mm FR4 PCB; the device is measured under still air conditions whilst operating in a steady-state.
- The data tested by surface mounted on a 25.4mm \* 25.4mm \* 1mm FR4-epoxy P.C.B

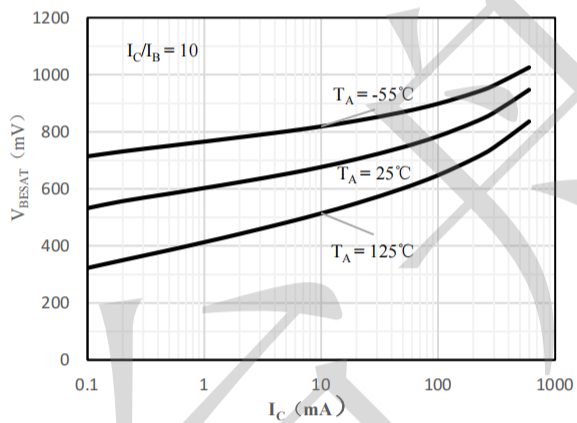
**Ratings and Characteristic Curves-NPN (@  $T_A = 25^\circ\text{C}$  unless otherwise specified)**



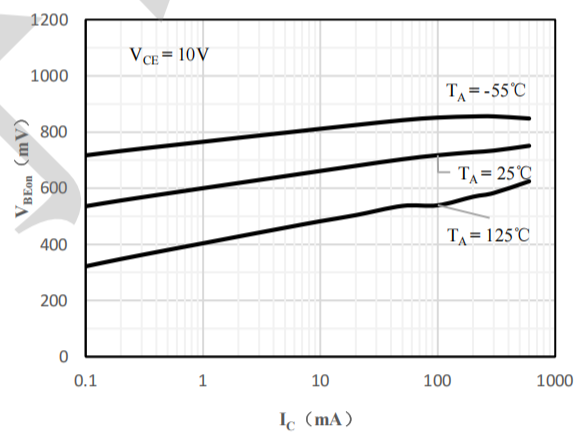
**Fig 1  $h_{FE}$  vs.  $I_C$**



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

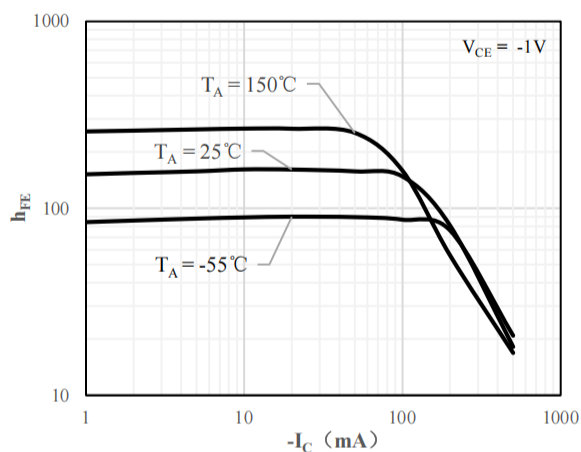


**Fig 3  $V_{BE(sat)}$  vs.  $I_C$**

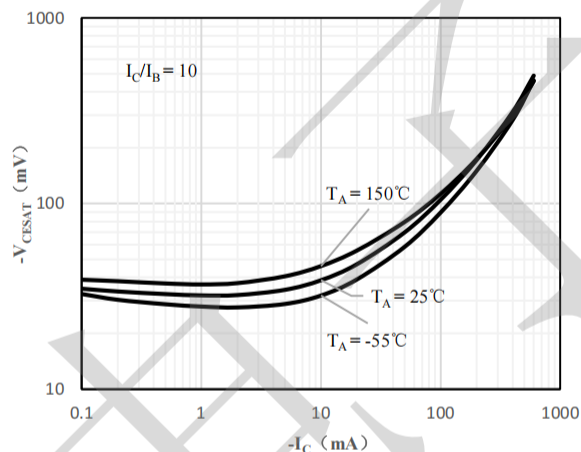


**Fig 4  $V_{BE(on)}$  vs.  $I_C$**

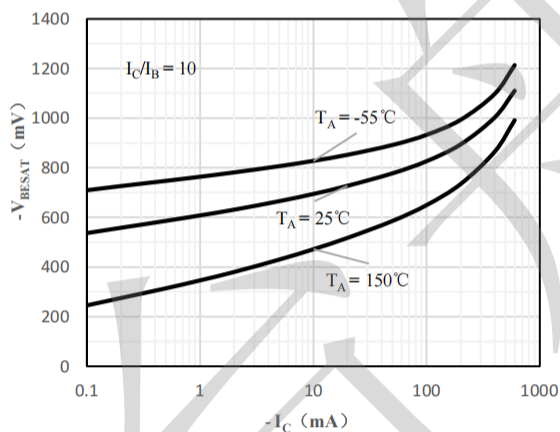
**Ratings and Characteristic Curves-PNP (@  $T_A = 25^\circ\text{C}$  unless otherwise specified)**



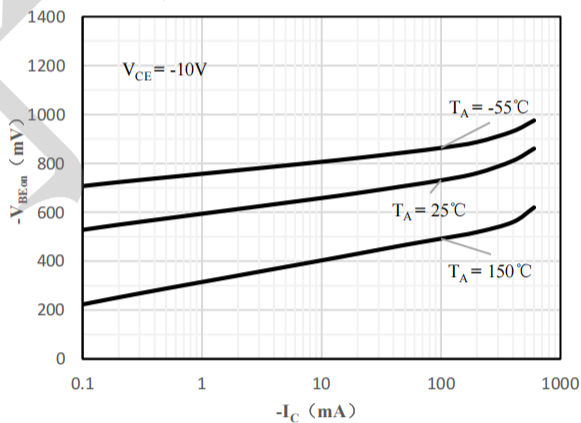
**Fig 1  $h_{FE}$  vs.  $I_C$**



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



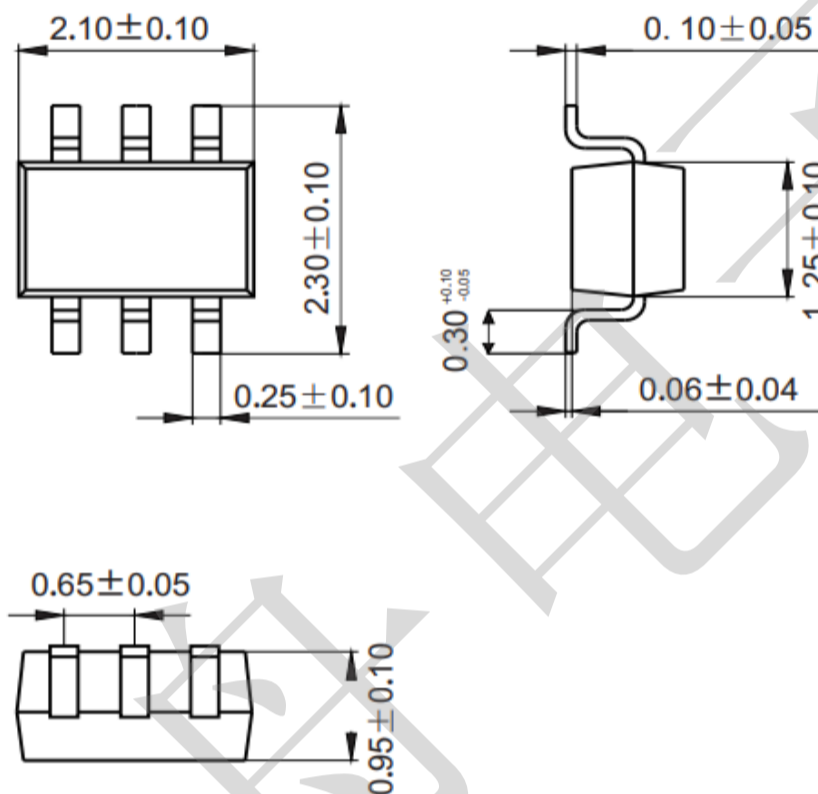
**Fig 3  $V_{BE(sat)}$  vs.  $I_C$**



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

**Package Outline Dimensions** (Unit: mm)

**SOT-363**



**Mounting Pad Layout** (Unit: mm)

