Continental Device India Limited
An ISO/TS 16949, ISO 9001 and ISO 14001 Certified Company

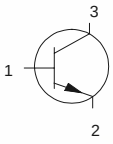
**SOT-23 Formed SMD Package** **CMBT4401**

# *SILICON PLANAR EPITAXIAL TRANSISTOR*

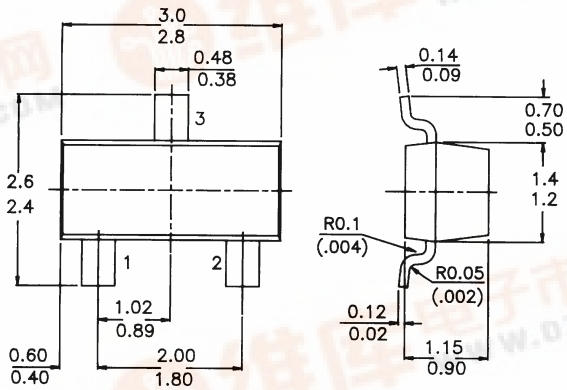
*N–P–N transistor*

***Marking***
*CMBT4401 = 2X*

**Pin configuration**
1 = BASE
2 = EMITTER
3 = COLLECTOR




*PACKAGE OUTLINE DETAILS*
*ALL DIMENSIONS IN mm*




***ABSOLUTE MAXIMUM RATINGS***

| | | | | |
|---|---|---|---|---|
| *Collector–emitter voltage* | $V_{CEO}$ | *max.* | *40* | *V* |
| *Collector current (DC)* | $I_C$ | *max.* | *600* | *mA* |
| *DC current gain* | | | | |
| $I_C$ = 150 mA; $V_{CE}$ = 1 V | $h_{FE}$ | *min.* | *100* | |
| | | *max.* | *300* | |
| *Total power dissipation up to $T_{amb}$ = 25 °C* | $P_{tot}$ | *max* | *250* | mW |

***RATINGS*** *(at $T_A$ = 25°C unless otherwise specified)*

| | | | | |
|---|---|---|---|---|
| *Limiting values* | | | | |
| *Collector–emitter voltage* | $V_{CEO}$ | *max.* | *40* | *V* |
| *Collector–base voltage* | $V_{CBO}$ | *max.* | *60* | *V* |
| *Emitter–base voltage* | $V_{EBO}$ | *max.* | *6* | *V* |
| *Collector current (DC)* | $I_C$ | *max.* | *600* | *mA* |
| *Total power dissipation up to $T_{amb}$ = 25°C* | $P_{tot}$ | *max* | *250* | mW |
| *Storage temperature range* | $T_{stg}$ | | *–55 to +150* | *° C* |
| *Junction temperature* | $T_j$ | *max.* | *150* | *° C* |

***THERMAL RESISTANCE***

| | | | | |
|---|---|---|---|---|
| *From junction to ambient* | $R_{th\ j-a}$ | = | 500 | K/W |

***CHARACTERISTICS***

$T_{amb}$ = 25 °C unless otherwise specified

| | | | | |
|---|---|---|---|---|
| *Collector–emitter breakdown voltage* | | | | |
| $I_C$ = 1.0 mA; $I_B$ = 0 | $V_{(BR)CEO}$ | > | 40 | V |
| *Collector–base breakdown voltage* | | | | |
| $I_C$ = 100 µA; $I_E$ = 0 | $V_{(BR)CBO}$ | > | 60 | V |
| *Emitter–base breakdown voltage* | | | | |
| $I_E$ = 100 µA; $I_C$ = 0 | $V_{(BR)EBO}$ | > | 6 | V |
| *Base cut–off current* | | | | |
| $V_{CE}$ = 35 V; $V_{EB}$ = 0.4 V | $I_{BEX}$ | < | 0.1 | µA |
| *Collector cut–off current* | | | | |
| $V_{CE}$ = 35 V; $V_{EB}$ = 0.4 V | $I_{CEX}$ | < | 0.1 | µA |
| *D.C. current gain* | | | | |
| $I_C$ = 0.1 mA; $V_{CE}$ = 1 V | $h_{FE}$ | > | 20 | |
| $I_C$ = 1.0 mA; $V_{CE}$ = 1 V | $h_{FE}$ | > | 40 | |
| $I_C$ = 10 mA; $V_{CE}$ = 1 V | $h_{FE}$ | > | 80 | |
| $I_C$ = 150 mA; $V_{CE}$ = 1 V | $h_{FE}$ | | 100 to 300 | |
| $I_C$ = 500 mA; $V_{CE}$ = 2 V | $h_{FE}$ | > | 40 | |
| *Saturation voltage* | | | | |
| $I_C$ = 150 mA; $I_B$ = 15 mA | $V_{CEsat}$ | < | 0.4 | V |
| | $V_{BEsat}$ | | 0.75 to 0.95 | V |
| $I_C$ = 500 mA; $I_B$ = 50 mA | $V_{CEsat}$ | < | 0.75 | V |
| | $V_{BEsat}$ | < | 1.2 | V |
| *Transition frequency* | | | | |
| $f$ = 100 MHz; $I_C$ = 20 mA; $V_{CE}$ = 10 V | $f_T$ | > | 250 | MHz |
| *Collector–base capacitance* | | | | |
| $I_E$ = 0; $V_{CB}$ = 5 V; $f$ = 100 kHz | $C_{cb}$ | < | 8 | pF |
| *Emitter–base capacitance* | | | | |
| $I_C$ = 0; $V_{BE}$ = 0.5 V; $f$ = 100 kHz | $C_{eb}$ | < | 30 | pF |
| *Input impedance; f = 1 kHz;* | | | | |
| $I_C$ = 1 mA; $V_{CE}$ = 10 V | $h_{ie}$ | min. | 1 | kΩ |
| | | max. | 8 | kΩ |
| *Voltage feed–back ratio* | | | | |
| $I_C$ = 1 mA; $V_{CE}$ = 10 V; $f$ = 1 kHz | $h_{re}$ | min. | $0.1 \times 10^{-4}$ | |
| | | max. | $30 \times 10^{-4}$ | |
| *Small–signal curent gain; f = 1 kHz;* | | | | |
| $I_C$ = 1 mA; $V_{CE}$ = 10 V | $h_{fe}$ | min. | 40 | |
| | | max. | 500 | |

| | | | |
|---|---|---|---|
| *Output admittance; f = 1 kHz;* | | | |
| $I_C$ = 1 mA; $V_{CE}$ = 10 V | $h_{oe}$ | *min.* | 1 µS |
| | | *max.* | 30 µS |
| *Switching times (resistive load)* | | | |
| *Turn–on time* | | | |
| $I_C$ = 150 mA; $I_{B1}$ = 15 mA; | | | |
| $V_{CC}$ = 30 V; $V_{EB}$ = 2 V | | | |
| *delay time* | $t_d$ | *max.* | 15 ns |
| *rise time* | $t_r$ | *max.* | 20 ns |
| *Turn–off time* | | | |
| $I_C$ = 150 mA; $V_{CC}$ = 30 V; | | | |
| $I_{B1}$ = $I_{B2}$ = 15 mA | | | |
| *storage time* | $t_s$ | *max.* | 225 ns |
| *fall time* | $t_f$ | *max.* | 30 ns |

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