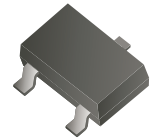


MMBT4401-HF (NPN)

RoHS Device

Halogen Free



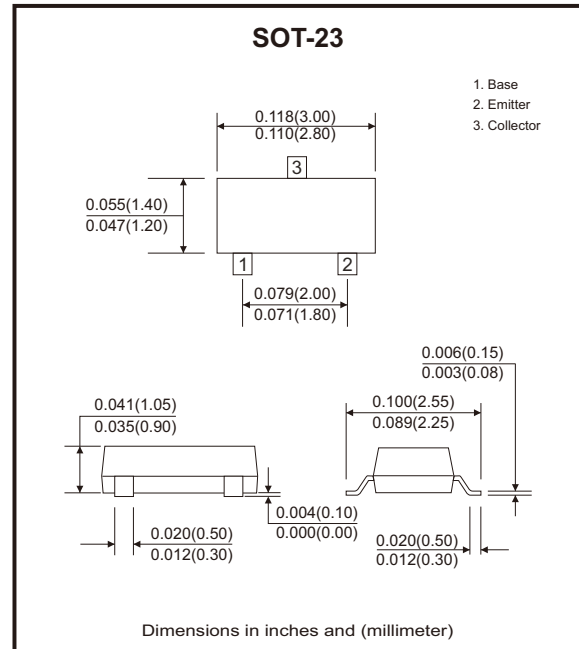
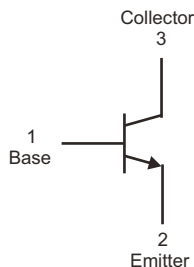
Features

- Power dissipation of 300mW.
- High stability and high reliability.

Mechanical data

- Case: SOT-23, molded plastic.
- Epoxy UL: 94V-0.
- Mounting position: Any.

Circuit Diagram



Maximum Ratings (at TA=25°C unless otherwise noted)

| Parameter | Symbol | Value | Unit |
|---|------------------|-------------|------|
| Collector-base voltage | V _{CB0} | 60 | V |
| Collector-emitter voltage | V _{CE0} | 40 | V |
| Emitter-base voltage | V _{EB0} | 6 | V |
| Collector current-continuous | I _c | 600 | mA |
| Collector power dissipation | P _c | 300 | mW |
| Junction temperature | T _J | 150 | °C |
| Storage temperature range | T _{STG} | -55 to +150 | °C |
| Thermal resistance from junction to ambient | R _{θJA} | 417 | °C/W |

Electrical Characteristics (at TA=25°C unless otherwise noted)

| Parameter | Symbol | Conditions | Min. | Typ. | Max. | Unit |
|--------------------------------------|---------------|---|------|------|------|------|
| Collector-base breakdown voltage | $V_{(BR)CBO}$ | $I_C = 100\mu A, I_E = 0$ | 60 | | | V |
| Collector-emitter breakdown voltage | $V_{(BR)CEO}$ | $I_C = 1mA, I_B = 0$ | 40 | | | V |
| Emitter-base breakdown voltage | $V_{(BR)EBO}$ | $I_E = 100\mu A, I_C = 0$ | 6 | | | V |
| Collector cut-off current | I_{CBO} | $V_{CB} = 50V, I_E = 0$ | | | 100 | nA |
| Collector cut-off current | I_{CEX} | $V_{CE} = 35V, V_{EB(off)} = 0.4V$ | | | 100 | nA |
| Emitter cut-off current | I_{EBO} | $V_{EB} = 5V, I_C = 0$ | | | 100 | nA |
| DC current gain | h_{FE1} | $V_{CE} = 1V, I_C = 0.1mA$ | 20 | | | |
| | h_{FE2} | $V_{CE} = 1V, I_C = 1mA$ | 40 | | | |
| | h_{FE3} | $V_{CE} = 1V, I_C = 10mA$ | 80 | | | |
| | h_{FE4} | $V_{CE} = 1V, I_C = 150mA$ | 100 | | 300 | |
| | h_{FE5} | $V_{CE} = 1V, I_C = 500mA$ | 40 | | | |
| Collector-emitter saturation voltage | $V_{CE(sat)}$ | $I_C = 150mA, I_B = 15mA$ | | | 0.40 | V |
| | | $I_C = 500mA, I_B = 50mA$ | | | 0.75 | V |
| Base-emitter saturation voltage | $V_{BE(sat)}$ | $I_C = 150mA, I_B = 15mA$ | | | 0.95 | V |
| | | $I_C = 500mA, I_B = 50mA$ | | | 1.20 | V |
| Transition frequency | f_T | $V_{CE} = 10V, I_C = 20mA, f = 100MHz$ | 250 | | | MHz |
| Delay time | t_d | $V_{CC} = 30V, V_{BE(off)} = -2V, I_C = 150mA, I_{B1} = 15mA$ | | | 15 | ns |
| Rise time | t_r | | | | 20 | ns |
| Storage time | t_s | $V_{CC} = 30V, I_C = 150mA, I_{B1} = I_{B2} = 15mA$ | | | 225 | ns |
| Fall time | t_f | | | | 60 | ns |

Rating and Characteristic Curves (MMBT4401-HF)

Fig.1 - Static Characteristic

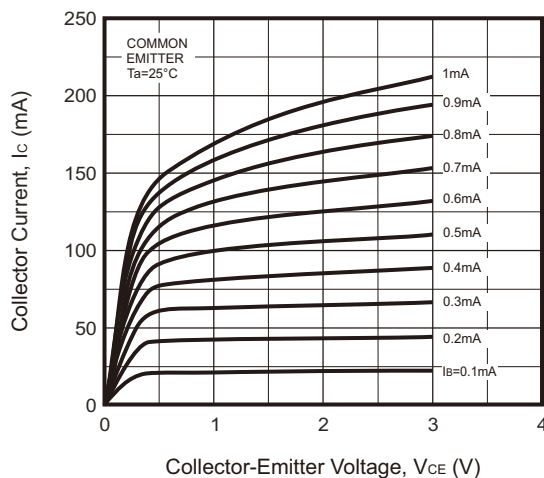
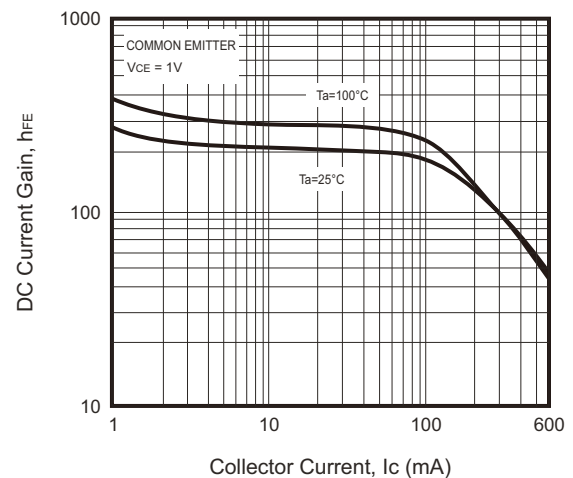


Fig.2 - $h_{FE} - I_C$



Rating and Characteristic Curves (MMBT4401-HF)

Fig.3 - V_{BEsat} — I_c

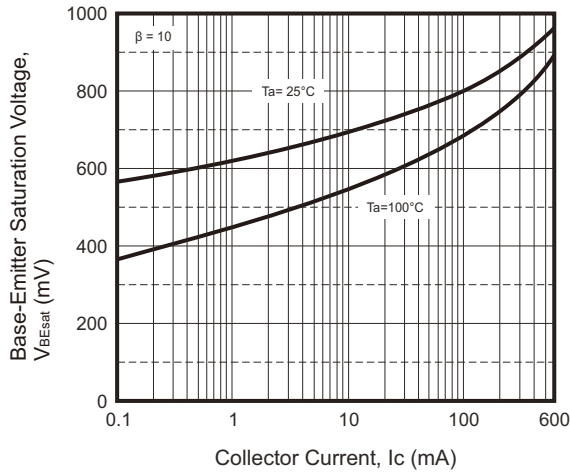


Fig.4 - V_{CEsat} — I_c

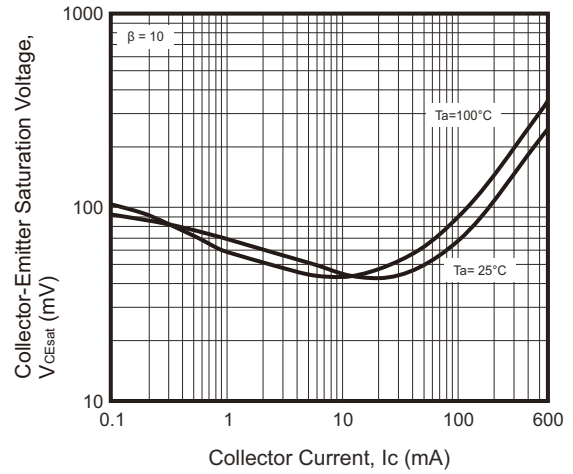


Fig.5 - I_c — V_{BE}

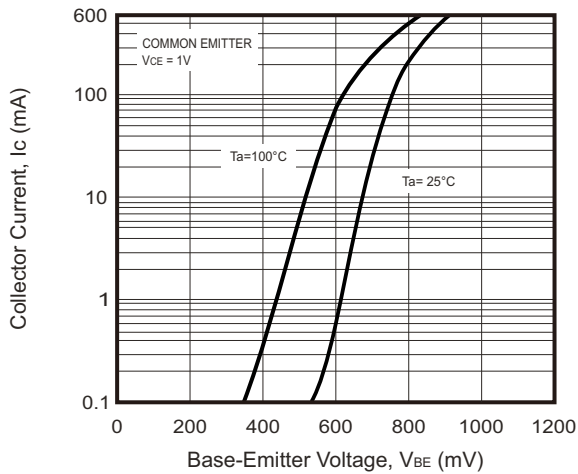


Fig.6 - f_T — I_c

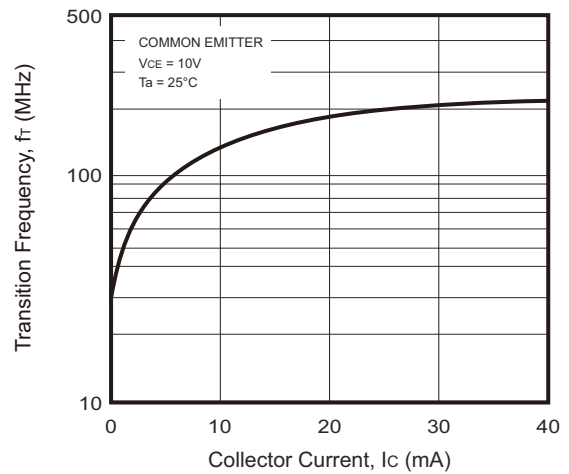


Fig.7 - C_{ob}/C_{ib} — V_{CB}/V_{EB}

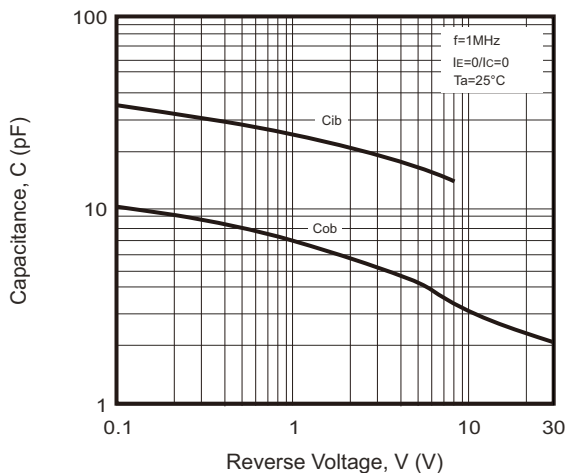
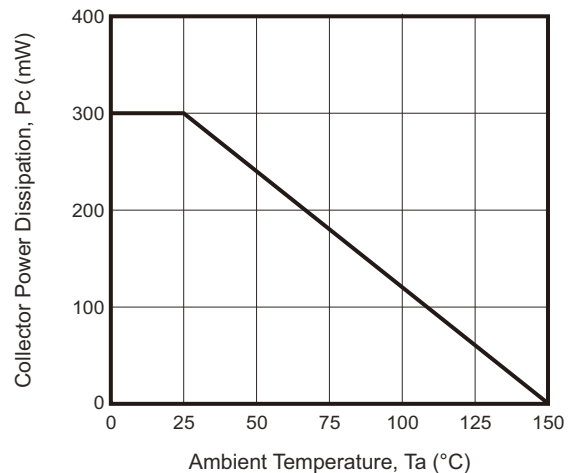
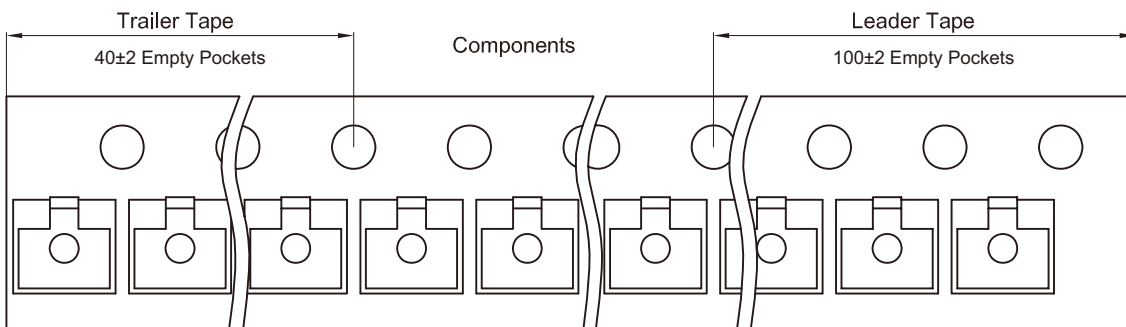
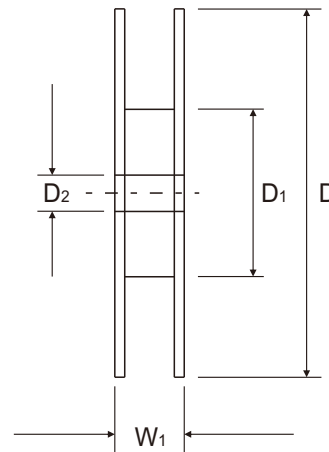
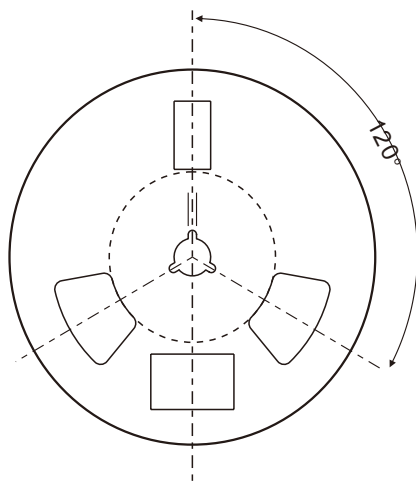
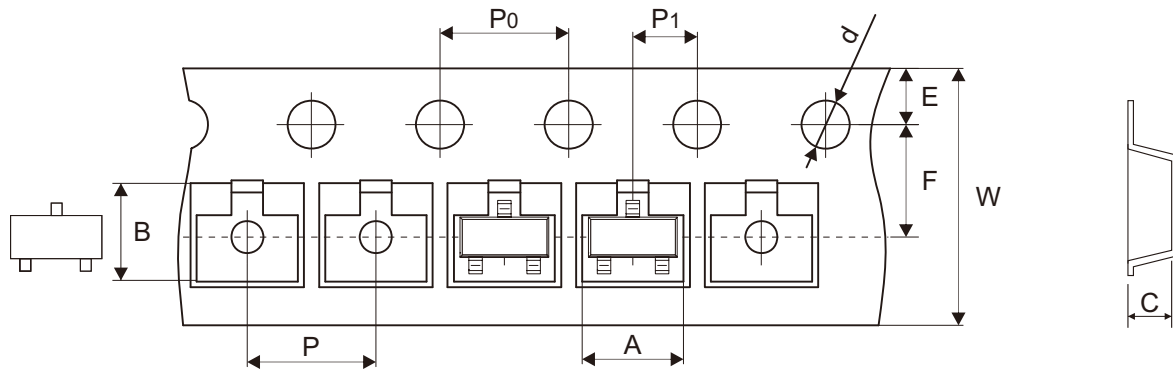


Fig.8 - P_c — T_a



Reel Taping Specification



| SOT-23 | SYMBOL | A | B | C | d | D | D1 | D2 |
|--------|--------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| | (mm) | 3.15 ± 0.10 | 2.77 ± 0.10 | 1.22 ± 0.10 | 1.50 ± 0.10 | 178.00 ± 2.00 | 54.40 ± 1.00 | 13.00 ± 1.00 |
| | (inch) | 0.124 ± 0.004 | 0.109 ± 0.004 | 0.048 ± 0.004 | 0.059 ± 0.004 | 7.008 ± 0.079 | 2.142 ± 0.039 | 0.512 ± 0.039 |

| SOT-23 | SYMBOL | E | F | P | P0 | P1 | W | W1 |
|--------|--------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| | (mm) | 1.75 ± 0.10 | 3.50 ± 0.10 | 4.00 ± 0.10 | 4.00 ± 0.10 | 2.00 ± 0.10 | 8.00 ± 0.10 | 12.30 ± 1.00 |
| | (inch) | 0.069 ± 0.004 | 0.138 ± 0.004 | 0.157 ± 0.004 | 0.157 ± 0.004 | 0.079 ± 0.004 | 0.315 ± 0.004 | 0.484 ± 0.039 |