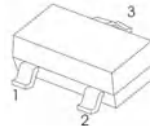




FEATURES

- High Collector Current.
- Complementary to S9013.
- Excellent hFE Linearity.

SOT-23



- 1.BASE
2.EMITTER
3.COLLECTOR

MAXIMUM RATINGS AND ELECTRICAL CHARACTERISTICS

MAXIMUM RATINGS

| Rating | Symbol | Value | Unit |
|--------------------------------|-----------|-------|------|
| Collector–Emitter Voltage | V_{CE0} | 25 | Vdc |
| Collector–Base Voltage | V_{CB0} | 40 | Vdc |
| Emitter–Base Voltage | V_{EB0} | 5.0 | Vdc |
| Collector Current — Continuous | I_c | 500 | mAdc |

THERMAL CHARACTERISTICS

| Characteristic | Symbol | Max | Unit |
|---|----------------|--------------|------------------|
| Total Device Dissipation FR– 5 Board, (1) $T_A = 25^\circ\text{C}$ | P_D | 300 | mW |
| Junction and Storage Temperature | T_J, T_{stg} | - 55 to +150 | $^\circ\text{C}$ |

CLASSIFICATION OF hFE

| Rank | L | H | J |
|-------|---------|---------|---------|
| Range | 120-200 | 200-350 | 300-400 |

ELECTRICAL CHARACTERISTICS (TA = 25°C unless otherwise noted.)

OFF CHARACTERISTICS

| Characteristic | Symbol | Min | Max | Unit |
|--|---------------|-----|-----|---------------|
| Collector–Emitter Breakdown Voltage(3) ($I_C = 1.0 \text{ mA}$, $I_B = 0$) | $V_{(BR)CEO}$ | 25 | – | Vdc |
| Collector–Base Breakdown Voltage ($I_C = 100 \mu\text{A}$, $I_E = 0$) | $V_{(BR)CBO}$ | 40 | – | Vdc |
| Emitter–Base Breakdown Voltage ($I_E = 100 \mu\text{A}$, $I_C = 0$) | $V_{(BR)EBO}$ | 5.0 | – | Vdc |
| Collector cut-off current ($V_{CB} = 40 \text{ Vdc}$, $I_E = 0$) | I_{CBO} | – | 0.1 | μA |
| Collector cut-off current ($V_{CE} = 20 \text{ Vdc}$, $I_B = 0$) | I_{CEO} | – | 0.1 | μA |
| Emitter cut-off current ($V_{EB} = 5 \text{ Vdc}$, $I_C = 0$) | I_{EBO} | – | 0.1 | μA |

- FR–5 = 1.0 x 0.75 x 0.062 in.
- Alumina = 0.4 x 0.3 x 0.024 in. 99.5% alumina.
- Pulse Test: Pulse Width <300 μs , Duty Cycle <2.0%.

ON CHARACTERISTICS

| Characteristic | Symbol | Min | Max | Unit |
|---|---------------|-----|-----|------|
| DC Current Gain | h_{FE} | | | — |
| ($I_C = 50 \text{ mA}$, $V_{CE} = 1 \text{ Vdc}$) | | 120 | 400 | |
| ($I_C = 500 \text{ mA}$, $V_{CE} = 1 \text{ Vdc}$) | | 40 | — | |
| Collector–Emitter Saturation Voltage ($I_C = 500 \text{ mA}$, $I_B = 50 \text{ mA}$)(3) | $V_{CE(sat)}$ | — | 0.6 | Vdc |
| Base–Emitter Saturation Voltage(3) | $V_{BE(sat)}$ | | | Vdc |
| ($I_C = 500 \text{ mA}$, $I_B = 50 \text{ mA}$) | | — | 1.2 | |
| Base-emitter voltage ($V_{CB} = 1\text{V}$, $I_C = 10\text{mA}$) | V_{BE} | — | 0.7 | |

SMALL–SIGNAL CHARACTERISTICS

| | | | | |
|---|----------|-----|-----|-----|
| Current–Gain — Bandwidth Product ($I_C = 20\text{mA}$, $V_{CE} = 6.0\text{Vdc}$, $f = 30\text{MHz}$) | f_T | 150 | – | MHz |
| Collector output capacitance ($V_{CB} = 6.0\text{Vdc}$, $I_E = 0$, $f = 1.0 \text{ MHz}$) | C_{ob} | – | 8.0 | pF |

RATING AND CHARACTERISTIC CURVES

Fig.1 Power Derating Curve

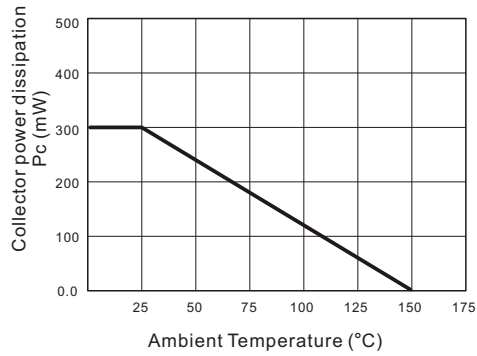


Fig.2 Static characteristics

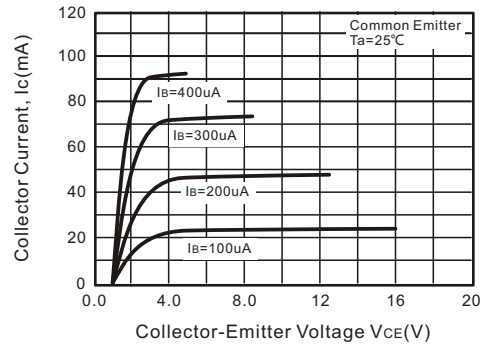


Fig.3 hFE--Ic

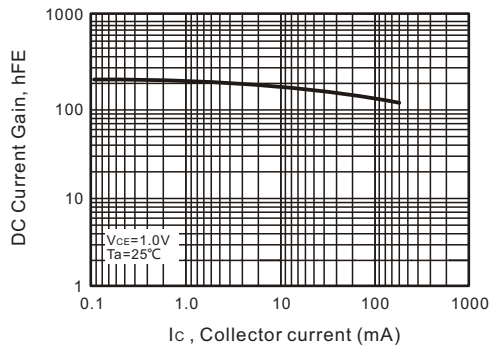


Fig.4 Ic--VBE

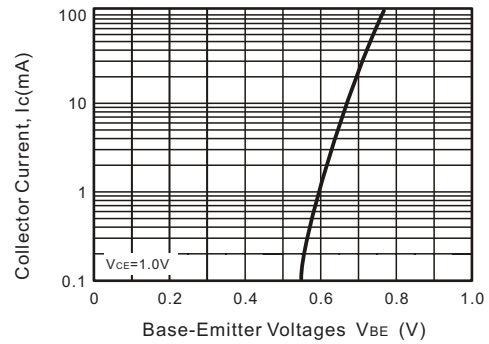


Fig.5 VBEsat--Ic

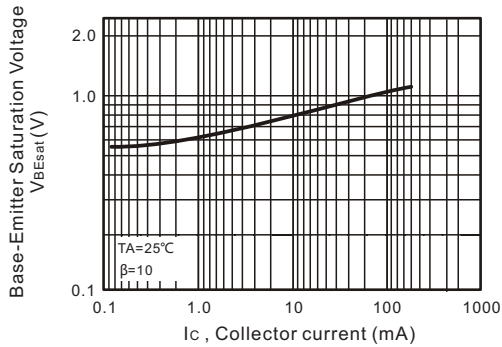


Fig.6 VCEsat--Ic

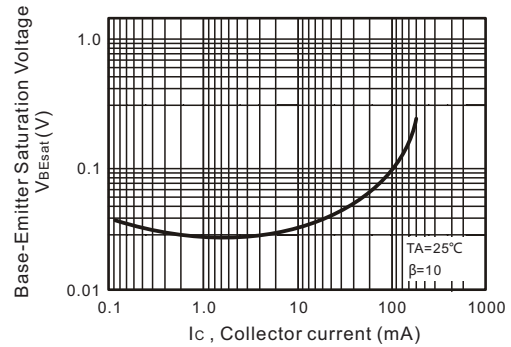


Fig.7 ft--Ic

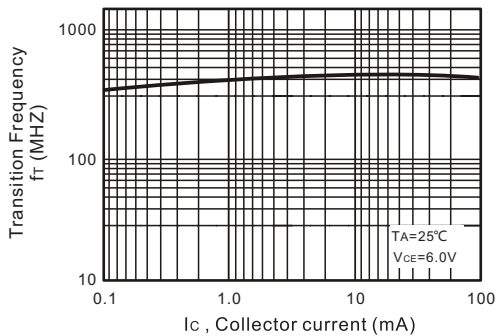
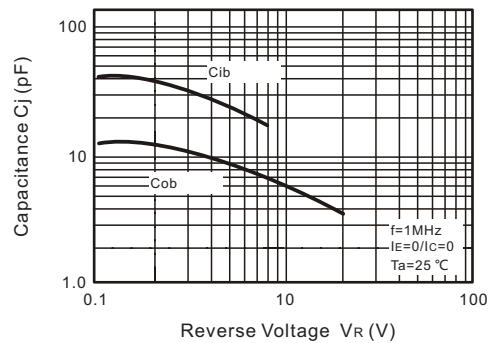


Fig.8 Cob/Cib--Vcb/VEB



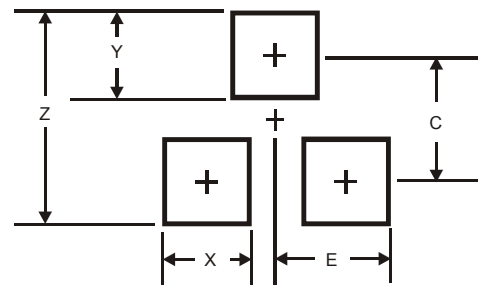
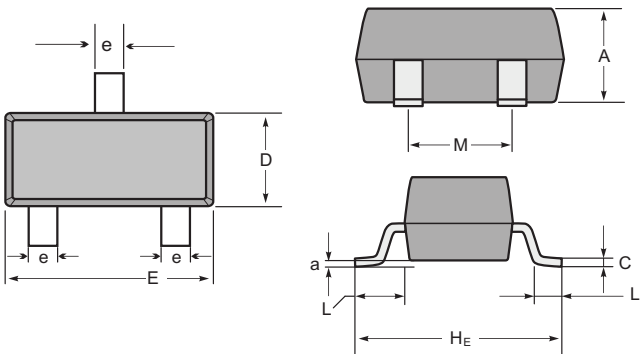
Soldering parameters

| Reflow Condition | | Pb-Free assembly (see as below) |
|---|------------------------------------|------------------------------------|
| Pre Heat | -Temperature Min ($T_{s(min)}$) | +150°C |
| | -Temperature Max ($T_{s(max)}$) | +200°C |
| | -Time (Min to Max) (ts) | 60-180 secs. |
| Average ramp up rate (Liquid us Temp (T_L) to peak) | | 3°C/sec. Max |
| $T_{s(max)}$ to T_L - Ramp-up Rate | | 3°C/sec. Max |
| Reflow | -Temperature (T_L) (Liquid us) | +217°C |
| | -Temperature (t_L) | 60-150 secs. |
| Peak Temp (T_P) | | +260(+0/-5)°C |
| Time within 5°C of actual Peak Temp (t_p) | | 30 secs. Max |
| Ramp-down Rate | | 6°C/sec. Max |
| Time 25°C to Peak Temp (T_P) | | 8 min. Max |
| Do not exceed | | +260°C |



Package Dimensions & Suggested Pad Layout

SOT23



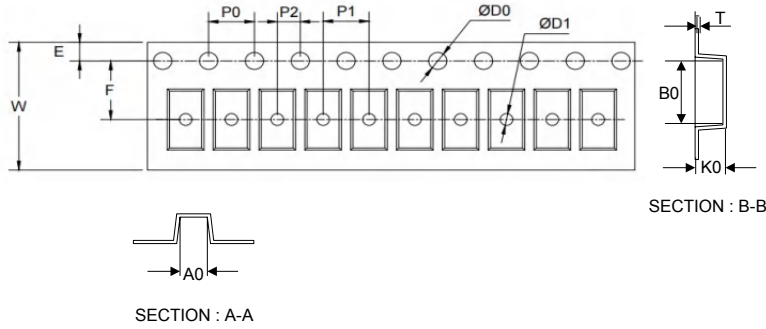
SOT-23 mechanical data

| UNIT | A | C | D | E | He | e | M | L | L1 | a | |
|------|-----|-----|------|-----|-----|-----|-----|------|------------|------------|------|
| mm | max | 1.1 | 0.15 | 1.4 | 3.0 | 2.6 | 0.5 | 1.95 | 0.55 (ref) | 0.36 (ref) | 0.0 |
| | min | 0.9 | 0.08 | 1.2 | 2.8 | 2.2 | 0.3 | 1.7 | | | 0.15 |
| mil | max | 43 | 6 | 55 | 118 | 102 | 20 | 77 | 22 (ref) | 14 (ref) | 0.0 |
| | min | 35 | 3 | 47 | 110 | 87 | 12 | 67 | | | 6 |

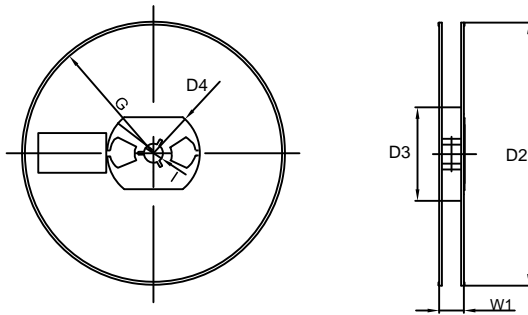
| Dimensions | SOT23 |
|------------|-------|
| Z | 2.9 |
| X | 0.8 |
| Y | 0.9 |
| C | 2.0 |
| E | 1.35 |

Tape & reel specification

Tape



7" Reel



| Symbol | Dimension (mm) |
|--------|----------------|
| P0 | 4.00±0.10 |
| P1 | 4.00±0.10 |
| P2 | 2.00±0.10 |
| D0 | 1.55±0.10 |
| D1 | 1.05±0.10 |
| E | 1.55±0.10 |
| F | 3.60±0.10 |
| W | 8.00±0.10 |
| A0 | 3.80±0.20 |
| B0 | 3.25±0.20 |
| K0 | 1.45±0.10 |
| T | 0.25±0.05 |
| D2 | 178.0±3.0 |
| D3 | 55Min. |
| D4 | R24.0±3.0 |
| G | R82.0±3.0 |
| I | 13.0±2.0 |
| W1 | 11.0±3.0 |

Quantity: 3000PCS