

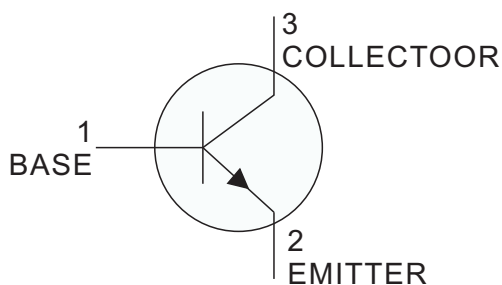
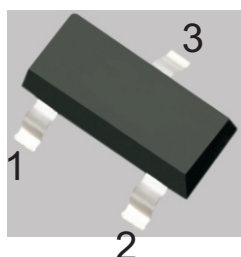
General Purpose Transistor

NPN Silicon

FEATURES

- High Collector Current.
- Complementary to S9012.
- Excellent hFE Linearity.

SOT-23



DEVICE MARKING
S9013 = J3

MAXIMUM RATINGS

| Rating | Symbol | Value | Unit |
|--------------------------------|-----------|-------|------|
| Collector–Emitter Voltage | V_{CEO} | 25 | Vdc |
| Collector–Base Voltage | V_{CBO} | 40 | Vdc |
| Emitter–Base Voltage | V_{EBO} | 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 | $^\circ\text{C}$ |

ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ unless otherwise noted.) OFF CHARACTERISTICS

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

1. FR–5 = $1.0 \times 0.75 \times 0.062 \text{ in.}$

2. Alumina = $0.4 \times 0.3 \times 0.024 \text{ in.}$ 99.5% alumina.

3. Pulse Test: Pulse Width $< 300 \mu\text{s}$, Duty Cycle $< 2.0\%$.

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted) (Continued) ON CHARACTERISTICS (3)

| Characteristic | Symbol | Min | Max | Unit |
|--|----------------------|-----|-----|-----------------|
| DC Current Gain | h _{FE} | | | — |
| (I _C = 50 mAdc, V _{CE} = 1 Vdc) | | 120 | 400 | |
| (I _C = 500 mAdc, V _{CE} = 1 Vdc) | | 40 | — | |
| Collector–Emitter Saturation Voltage | V _{CE(sat)} | | | V _{dc} |
| (I _C = 500 mAdc, I _B = 50 mAdc)(3) | | — | 0.6 | |
| Base–Emitter Saturation Voltage(3) | V _{BE(sat)} | | | V _{dc} |
| (I _C = 500 mAdc, I _B = 50 mAdc) | | — | 1.2 | |
| Base-emitter voltage (V _{CB} =1V, I _C =10mA) | V _{BE} | — | 0.7 | |

SMALL–SIGNAL CHARACTERISTICS

| | | | | |
|--|-----------------|-----|-----|-----|
| Current–Gain — Bandwidth Product (I _C = 20mAdc, V _{CE} = 6.0Vdc, f = 30MHz) | f _T | 150 | — | MHz |
| Collector output capacitance (V _{CB} = 6.0Vdc, I _E = 0, f = 1.0 MHz) | C _{ob} | — | 8.0 | pF |

CLASSIFICATION OF h_{FE}

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

3. Pulse Test: Pulse Width <300 μs, Duty Cycle <2.0%.

TYPICAL CHARACTERISTICS

Fig.1 Power Derating Curve

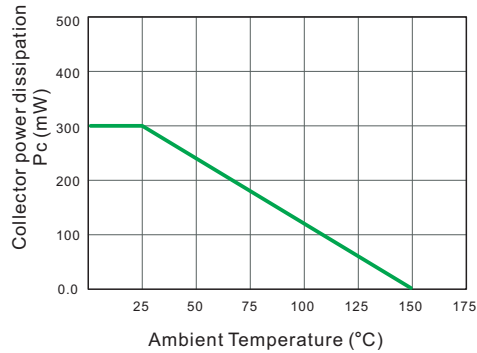


Fig.2 Static characteristics

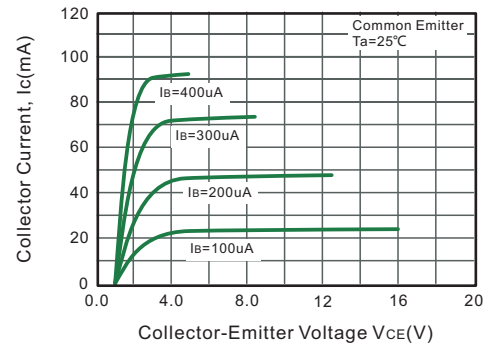


Fig.3 hFE--Ic

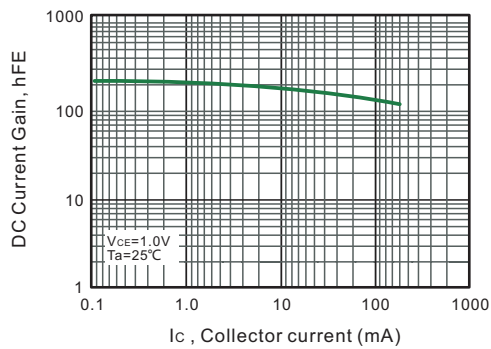


Fig.4 Ic--VBE

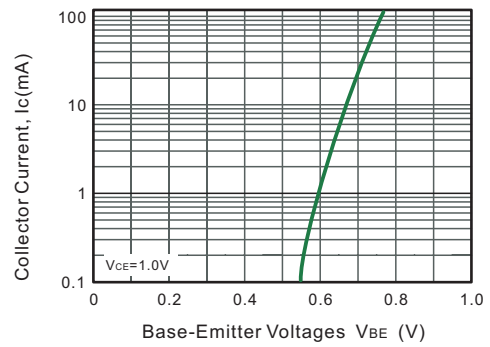


Fig.5 VBEsat--Ic

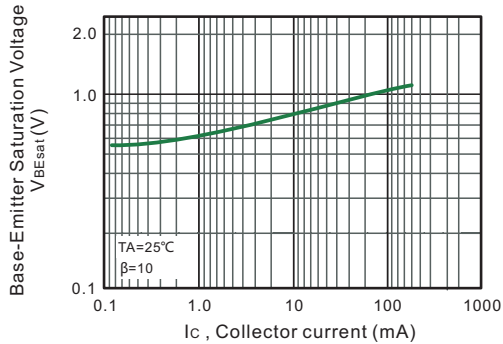


Fig.6 VCEsat--Ic

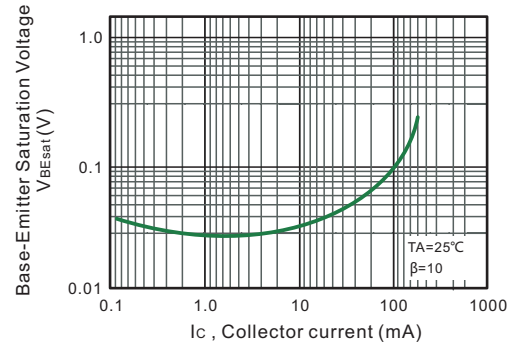


Fig.7 ft--Ic

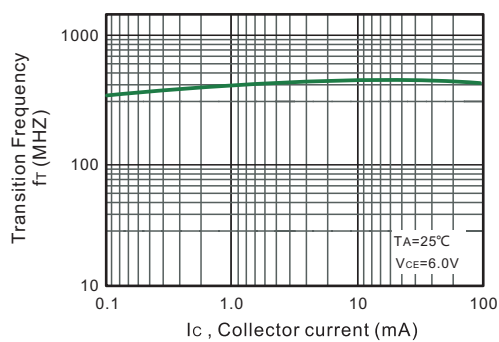
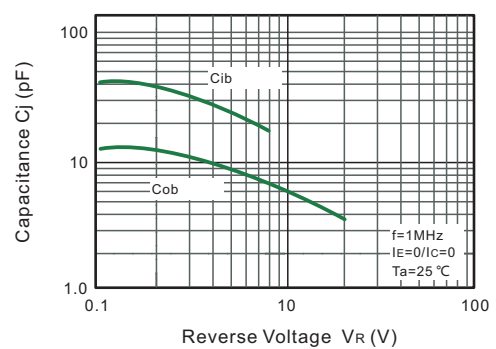
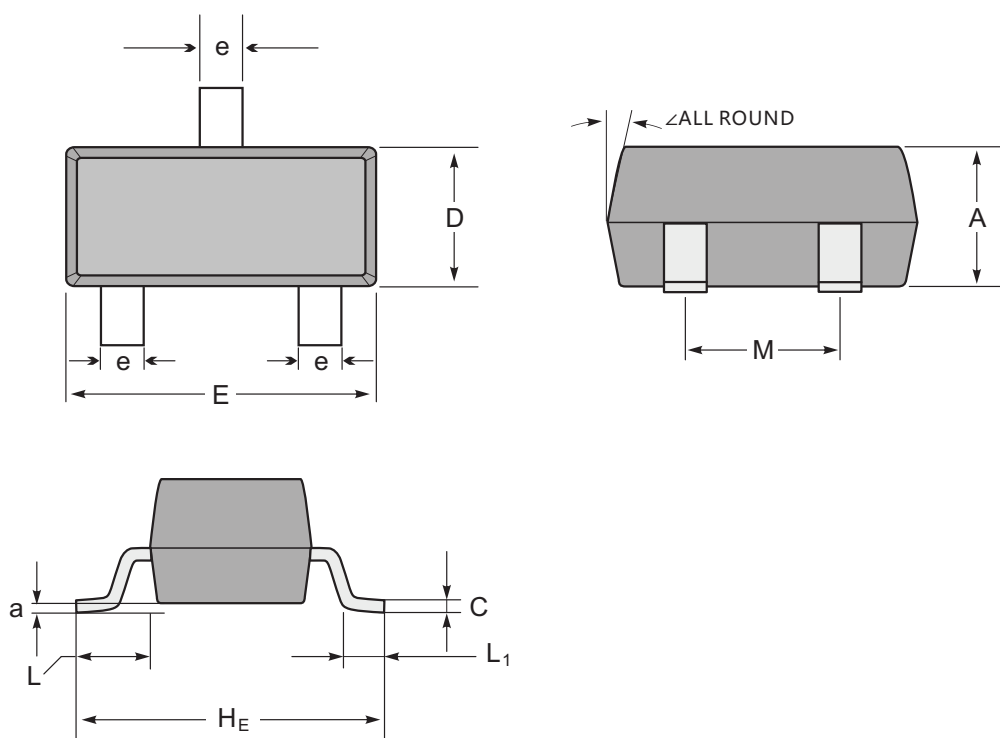


Fig.8 Cob/Cib--Vcb/VEB



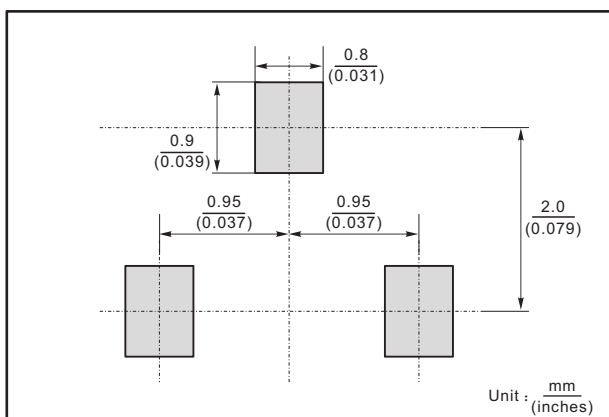
SOT-23 Package Outline Dimensions



SOT-23 mechanical data

| UNIT | | A | C | D | E | H _E | e | M | L | L ₁ | 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 | 12° |
| | 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 | |

The recommended mounting pad size

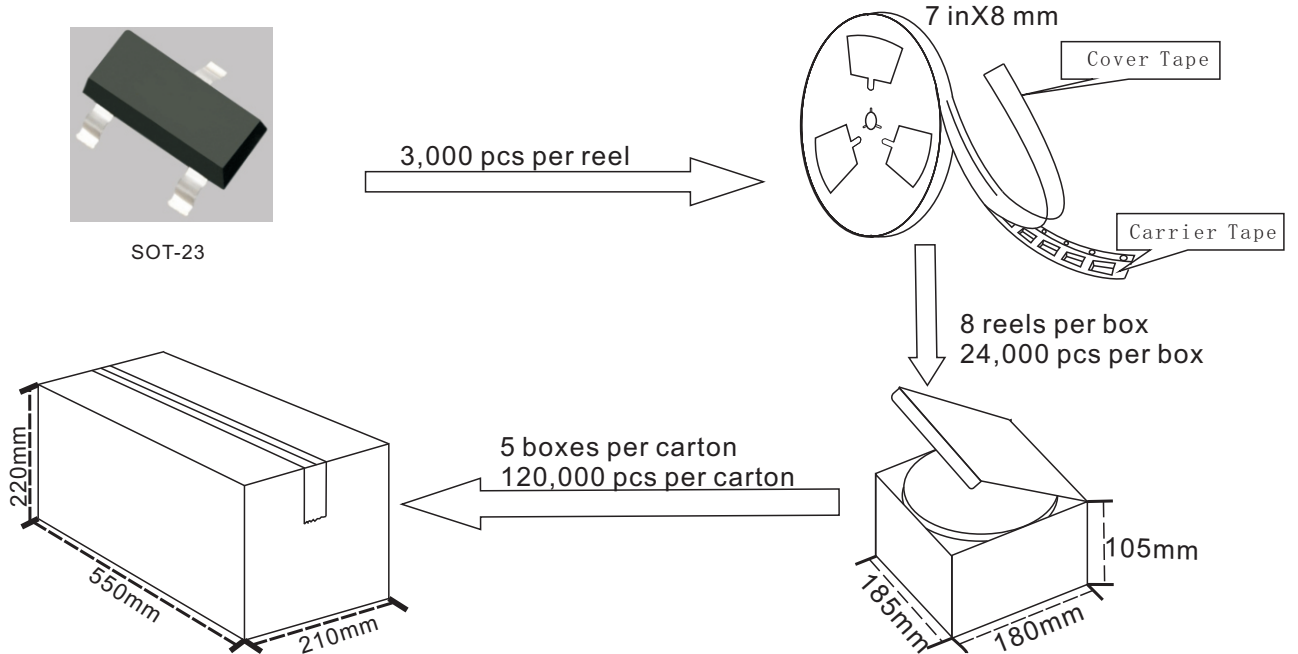


Marking

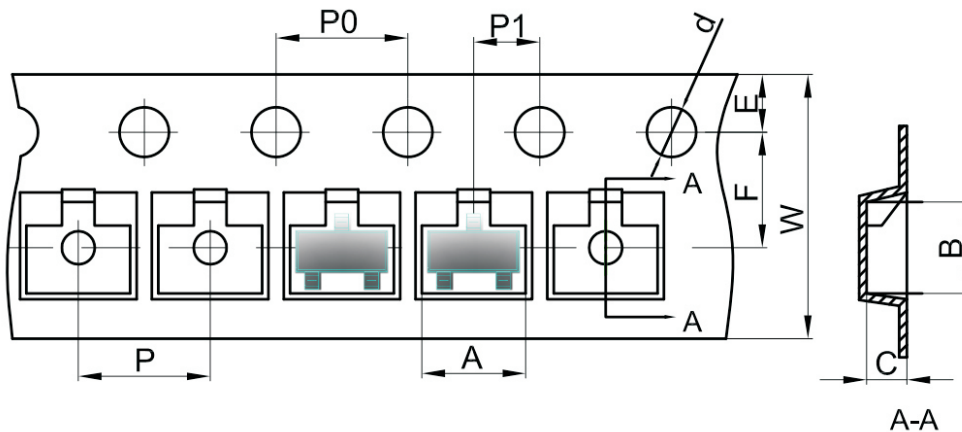
| Type number | Marking code |
|-------------|--------------|
| S9013 | J3 |

SOT-23 Packing

1. The method of packaging and dimension are shown as below figure. (Dimension in mm)



SOT-23 Embossed Carrier Tape



| Dimensions are in millimeter | | | | | | | | | | |
|------------------------------|------|------|------|-------|------|------|------|------|------|------|
| Pkg type | A | B | C | d | E | F | P0 | P | P1 | W |
| SOT-23 | 3.15 | 2.77 | 1.22 | Ø1.50 | 1.75 | 3.50 | 4.00 | 4.00 | 2.00 | 8.00 |

SOT-23 Tape Leader and Trailer

