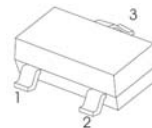


## FEATURES

- Complementary to S9014

### SOT-23



1.BASE  
2.EMITTER  
3.COLLECTOR

### Marking

| Type number | Marking code |
|-------------|--------------|
| S9015       | M6           |

## MAXIMUM RATINGS AND ELECTRICAL CHARACTERISTICS

### MAXIMUM RATINGS

| Rating                         | Symbol    | Value | Unit |
|--------------------------------|-----------|-------|------|
| Collector–Emitter Voltage      | $V_{CEO}$ | -45   | Vdc  |
| Collector–Base Voltage         | $V_{CBO}$ | -50   | Vdc  |
| Emitter–Base Voltage           | $V_{EBO}$ | -5.0  | Vdc  |
| Collector Current — Continuous | $I_c$     | -100  | mAdc |

### THERMAL CHARACTERISTICS

| Characteristic                                                          | Symbol         | Max          | Unit               |
|-------------------------------------------------------------------------|----------------|--------------|--------------------|
| Total Device Dissipation FR– 5 Board, (1)<br>$T_A = 25^{\circ}\text{C}$ | $P_D$          | 200          | mW                 |
| Junction and Storage Temperature                                        | $T_J, T_{stg}$ | - 55 to +150 | $^{\circ}\text{C}$ |

### CLASSIFICATION OF $h_{FE}$

| Rank  | L       | H        |
|-------|---------|----------|
| Range | 200-450 | 400-1000 |

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

OFF CHARACTERISTICS

| Characteristic                                                                  | Symbol               | Min  | Max  | Unit             |
|---------------------------------------------------------------------------------|----------------------|------|------|------------------|
| Collector–Emitter Breakdown Voltage(3)<br>(IC = -0.1 mA <sub>dc</sub> , IB = 0) | V <sub>(BR)CEO</sub> | -45  | —    | V <sub>dc</sub>  |
| Collector–Base Breakdown Voltage<br>(IC = -100 μA <sub>dc</sub> , IE = 0)       | V <sub>(BR)CBO</sub> | -50  | —    | V <sub>dc</sub>  |
| Emitter–Base Breakdown Voltage<br>(IE = -100 μA <sub>dc</sub> , IC = 0)         | V <sub>(BR)EBO</sub> | -5.0 | —    | V <sub>dc</sub>  |
| Collector cut-off current<br>(VCB = -50 V <sub>dc</sub> , IE = 0)               | ICBO                 | —    | -0.1 | uA <sub>dc</sub> |
| Emitter cut-off current<br>(VEB = -5V <sub>dc</sub> , IC = 0)                   | IEBO                 | —    | -0.1 | uA <sub>dc</sub> |

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

ON CHARACTERISTICS

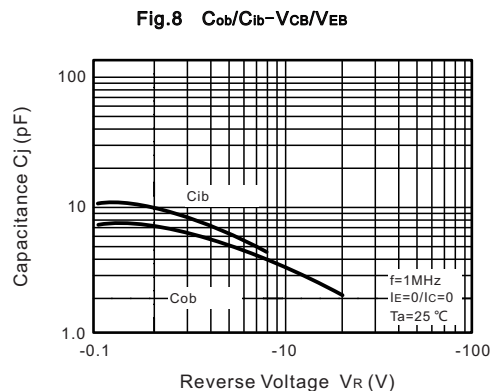
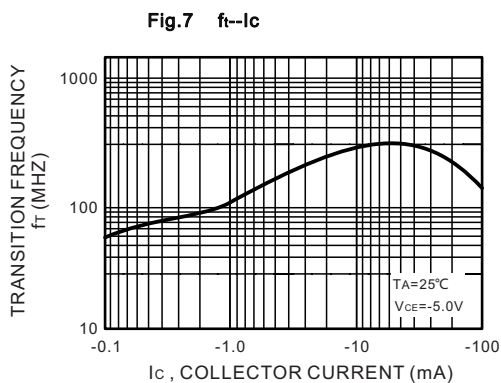
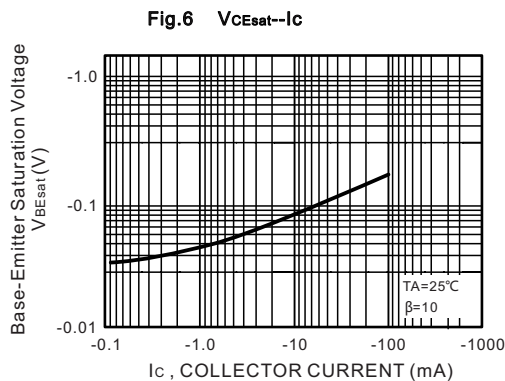
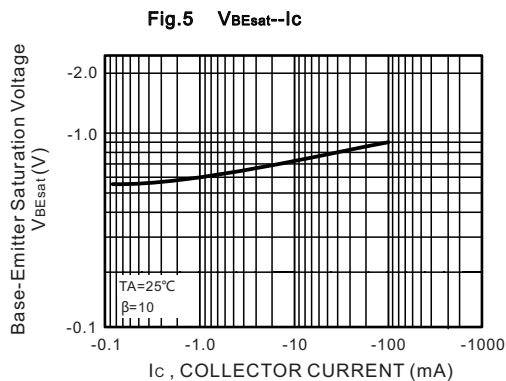
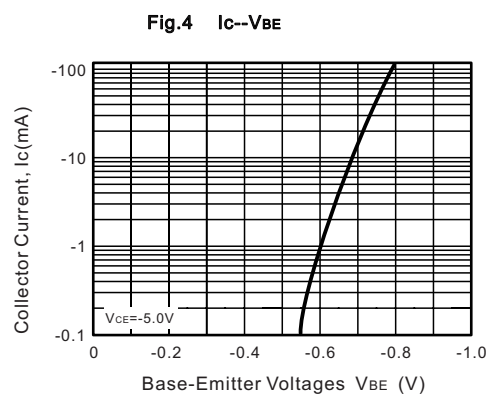
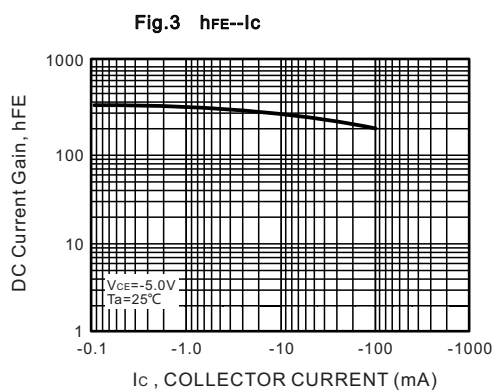
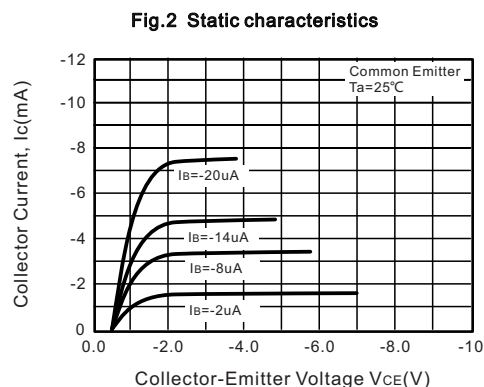
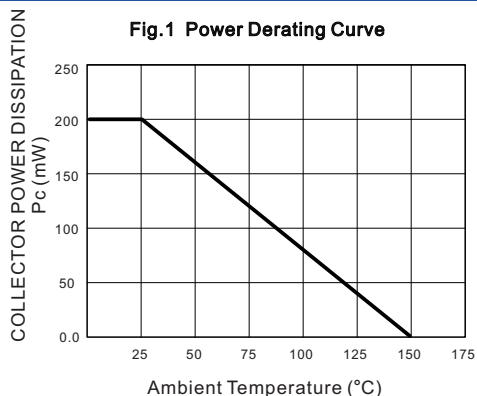
| Characteristic                                               | Symbol          | Min | Max  | Unit            |
|--------------------------------------------------------------|-----------------|-----|------|-----------------|
| DC Current Gain                                              | h <sub>FE</sub> |     |      | —               |
| (IC = -1.0 mA <sub>dc</sub> , VCE = -5 V <sub>dc</sub> )     |                 | 200 | 1000 |                 |
| Collector–Emitter Saturation Voltage                         | VCE(sat)        |     |      | V <sub>dc</sub> |
| (IC = -100 mA <sub>dc</sub> , IB = -10 mA <sub>dc</sub> )(3) |                 | —   | -0.3 |                 |
| Base–Emitter Saturation Voltage(3)                           | VBE(sat)        |     |      | V <sub>dc</sub> |
| (IC = -100 mA <sub>dc</sub> , IB = -10mA <sub>dc</sub> )     |                 | —   | -1.0 |                 |

SMALL–SIGNAL CHARACTERISTICS

|                                                                                                        |                |     |   |     |
|--------------------------------------------------------------------------------------------------------|----------------|-----|---|-----|
| Current–Gain — Bandwidth Product<br>(IC = -10mA <sub>dc</sub> , VCE = -5.0V <sub>dc</sub> , f = 30MHz) | f <sub>T</sub> | 150 | — | MHz |
|--------------------------------------------------------------------------------------------------------|----------------|-----|---|-----|

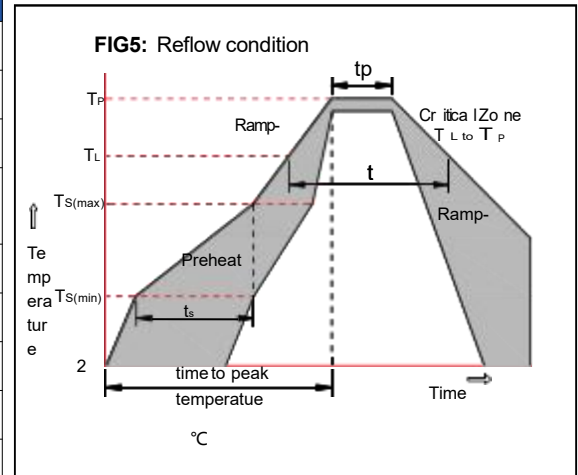


RATING AND CHARACTERISTIC CURVES



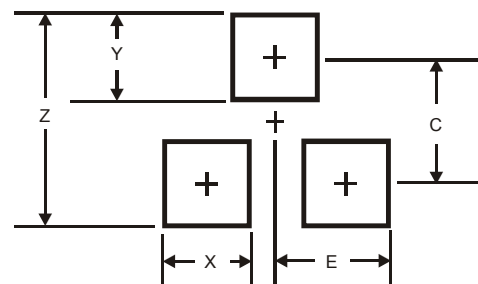
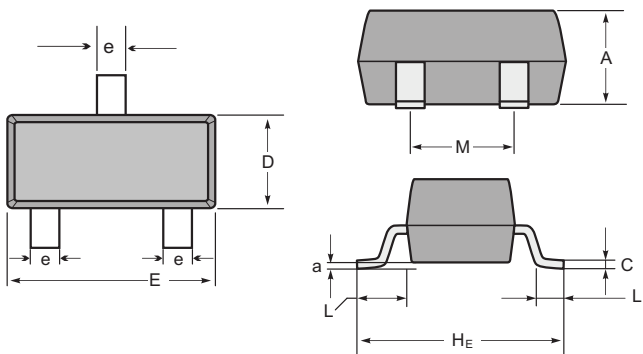
## Soldering parameters

| Reflow Condition                                        |                                   | Pb-Free assembly<br>(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



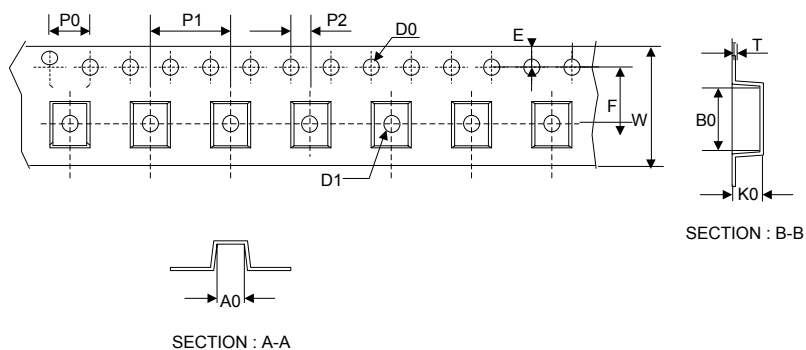
### SOT-23 mechanical data

| UNIT | A   | C   | D    | E   | H <sub>E</sub> | e   | M   | L    | L <sub>1</sub> | a          |
|------|-----|-----|------|-----|----------------|-----|-----|------|----------------|------------|
| mm   | max | 1.1 | 0.15 | 1.4 | 3.0            | 2.6 | 0.5 | 1.95 | 0.55 (ref)     | 0.36 (ref) |
|      | 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)   |
|      | 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



| 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 |                |

7" Reel

