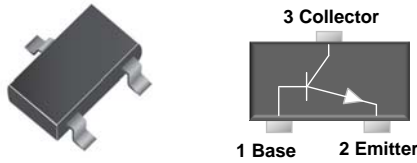


Small Signal Transistor

SOT-23

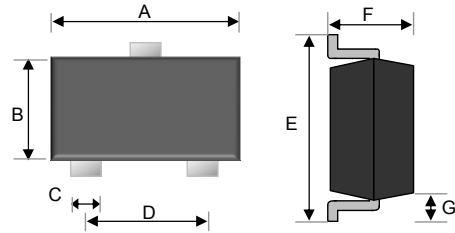


Features

- ✧ Epitaxial planar die construction
- ✧ Surface device type mounting
- ✧ Moisture sensitivity level 1
- ✧ Matte Tin(Sn) lead finish with Nickel(Ni) underplate
- ✧ Pb free version and RoHS compliant
- ✧ Green compound (Halogen free) with suffix "G" on packing code and prefix "G" on date code

Mechanical Data

- ✧ Case : SOT- 23 small outline plastic package
- ✧ Terminal: Matte tin plated, lead free., solderable per MIL-STD-202, Method 208 guaranteed
- ✧ High temperature soldering guaranteed: 260°C/10s
- ✧ Weight : 0.008gram (approximately)
- ✧ Marking Code : 1P

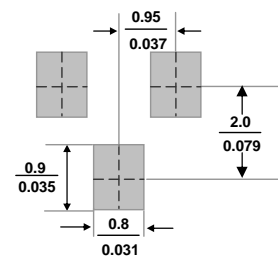


| Dimensions | Unit (mm) | | Unit (inch) | |
|------------|-----------|------|-------------|-------|
| | Min | Max | Min | Max |
| A | 2.80 | 3.00 | 0.110 | 0.118 |
| B | 1.20 | 1.40 | 0.047 | 0.055 |
| C | 0.30 | 0.50 | 0.012 | 0.020 |
| D | 1.80 | 2.00 | 0.071 | 0.079 |
| E | 2.25 | 2.55 | 0.089 | 0.100 |
| F | 0.90 | 1.20 | 0.035 | 0.043 |
| G | 0.550 REF | | 0.022 REF | |

Ordering Information

| Package | Part No. | Packing | Marking |
|---------|---------------|--------------|---------|
| SOT-23 | MMBT2222A RF | 3K / 7" Reel | 1P |
| SOT-23 | MMBT2222A RFG | 3K / 7" Reel | 1P |

Suggested PAD Layout



Maximum Ratings and Electrical Characteristics

Rating at 25°C ambient temperature unless otherwise specified.

Maximum Ratings

| Type Number | Symbol | Value | Units |
|---|-----------------|--------------|-------|
| Power Dissipation | P_D | 300 | mW |
| Collector-Base Voltage | V_{CBO} | 75 | V |
| Collector-Emitter Voltage | V_{CEO} | 40 | V |
| Emitter-Base Voltage | V_{EBO} | 6 | V |
| Collector Current | I_C | 600 | mA |
| Thermal Resistance (Junction to Ambient) (Note 1) | $R_{\theta JA}$ | 417 | °C/W |
| Junction and Storage Temperature Range | T_J, T_{STG} | -55 to + 150 | °C |

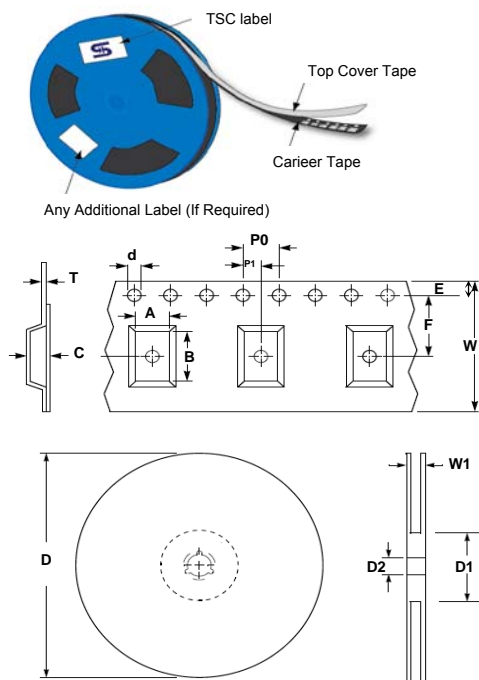
Notes:1. Valid provided that electrodes are kept at ambient temperature

Small Signal Transistor

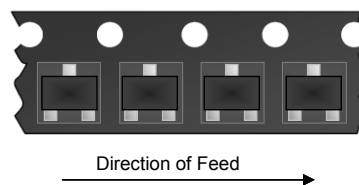
Electrical Characteristics

| Type Number | | Symbol | Min | Max | Units |
|--------------------------------------|--|---------------|-----|------|---------|
| Collector-Base Breakdown Voltage | $I_C = 10\mu A$ $I_E = 0$ | $V_{(BR)CBO}$ | 75 | - | V |
| Collector-Emitter Breakdown Voltage | $I_C = 10mA$ $I_B = 0$ | $V_{(BR)CEO}$ | 40 | - | V |
| Emitter-Base Breakdown Voltage | $I_E = 10\mu A$ $I_C = 0$ | $V_{(BR)EBO}$ | 6 | - | V |
| Collector Cut-off Current | $V_{CB} = 60V$ $I_E = 0$ | I_{CBO} | - | 0.01 | μA |
| Collector Cut-off Current | $V_{CE} = 60V$ $V_{BE(off)} = 3.0V$ | I_{CEX} | - | 0.01 | μA |
| Emitter Cut-off Current | $V_{EB} = 3.0V$ $I_C = 0$ | I_{EBO} | - | 0.01 | μA |
| DC current gain | $V_{CE} = 10V$ $I_C = 500mA$ | h_{FE} | 40 | - | |
| | $V_{CE} = 10V$ $I_C = 150mA$ | | 100 | 300 | |
| | $V_{CE} = 10V$ $I_C = 10mA$ | | 75 | - | |
| | $V_{CE} = 10V$ $I_C = 1mA$ | | 50 | - | |
| | $V_{CE} = 10V$ $I_C = 0.1mA$ | | 35 | - | |
| Collector-Emitter saturation voltage | $I_C = 500mA$ $I_B = 50mA$ | $V_{CE(sat)}$ | - | 1.0 | V |
| Base-Emitter saturation voltage | $I_C = 500mA$ $I_B = 50mA$ | $V_{BE(sat)}$ | - | 2.0 | V |
| Transition frequency | $V_{CE} = 20V$ $I_C = 20mA$ $f = 100MHz$ | f_T | 300 | - | MHz |
| Output capacitance | $V_{CB} = 10V$ $I_E = 0$ $f = 1.0MHz$ | C_{obo} | 8 | | pF |
| Input capacitance | $V_{EB} = 0.5V$ $I_C = 0$ $f = 1.0MHz$ | C_{ibo} | 25 | | pF |
| Delay time | $V_{CC} = 30V$ $V_{BE(off)} = -0.5V$ $I_C = 150mA$ $I_{B1} = 15mA$ | t_d | - | 10 | nS |
| Rise time | $V_{CC} = 30V$ $V_{BE(off)} = -0.5V$ $I_C = 150mA$ $I_{B1} = 15mA$ | t_r | - | 25 | nS |
| Storage time | $V_{CC} = 30V$ $I_C = 150mA$ $I_{B1} = -I_{B2} = 15mA$ | t_s | - | 225 | nS |
| Fall time | $V_{CC} = 30V$ $I_C = 150mA$ $I_{B1} = -I_{B2} = 15mA$ | t_f | - | 60 | nS |

Tape & Reel specification



| Item | Symbol | Dimension(mm) |
|------------------------|--------|---------------|
| Carrier width | A | 3.15 ±0.10 |
| Carrier length | B | 2.77 ±0.10 |
| Carrier depth | C | 1.22 ±0.10 |
| Sprocket hole | d | 1.50 ± 0.10 |
| Reel outside diameter | D | 178 ± 1 |
| Reel inner diameter | D1 | 55 Min |
| Feed hole width | D2 | 13.0 ± 0.20 |
| Sprocket hole position | E | 1.75 ±0.10 |
| Punch hole position | F | 3.50 ±0.05 |
| Sprocket hole pitch | P0 | 4.00 ±0.10 |
| Embossment center | P1 | 2.00 ±0.05 |
| Overall tape thickness | T | 0.229 ±0.013 |
| Tape width | W | 8.10 ±0.20 |
| Reel width | W1 | 12.30 ±0.20 |



Rating and Characteristic Curves

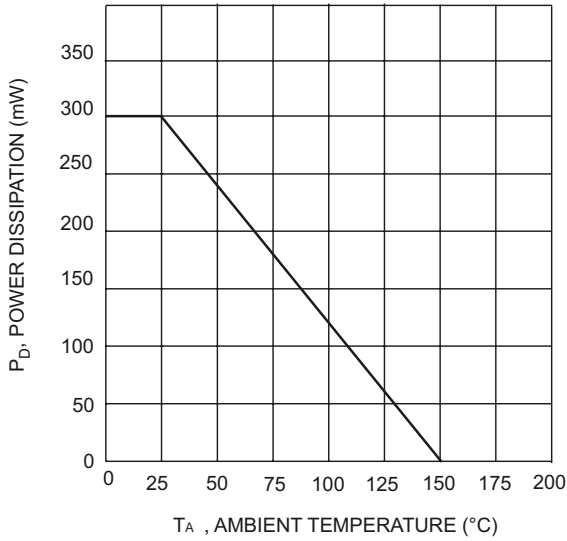


Fig. 1 Max Power Dissipation vs Ambient Temperature

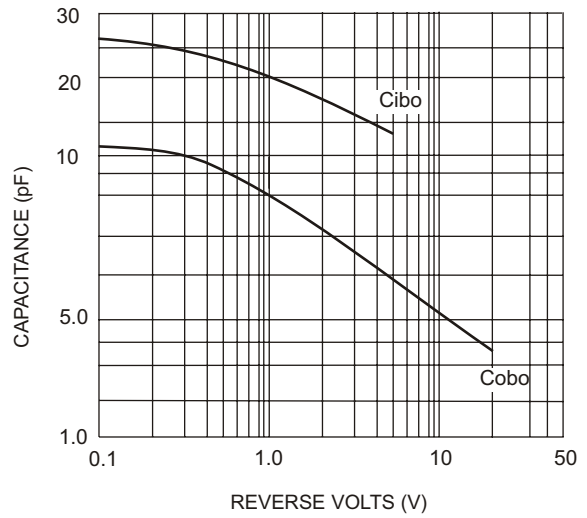


Fig. 2 Typical Capacitance

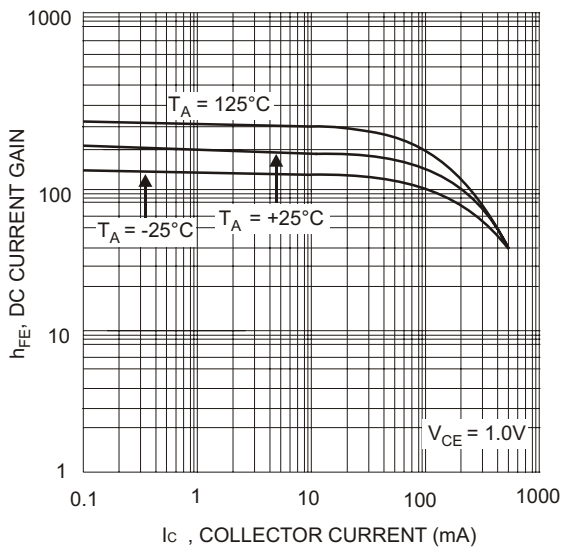


Fig.3 Typical DC Current Gain vs Collector Current

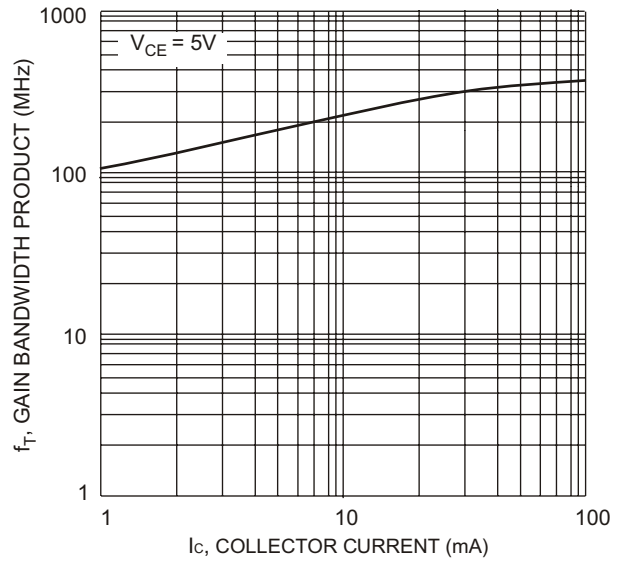


Fig. 4 Gain Bandwidth Product vs. Collector Current

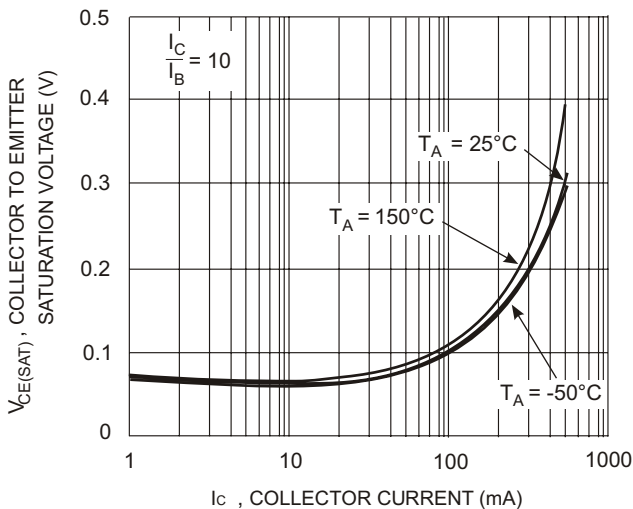


Fig. 5 Collector Emitter Saturation Voltage vs. Collector Current

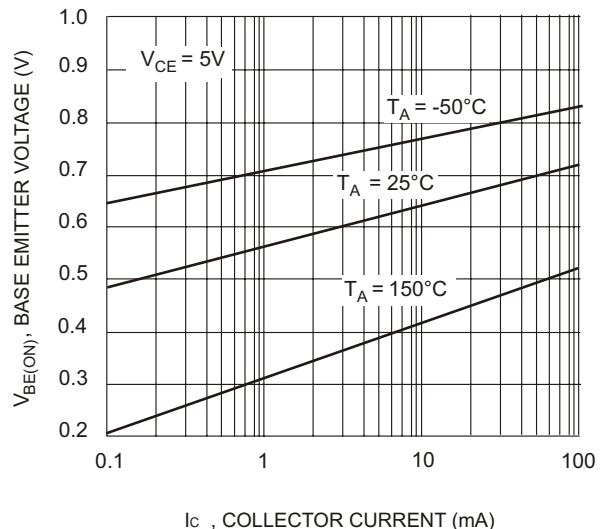


Fig. 6 Base Emitter Voltage vs. Collector Current