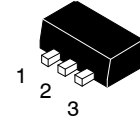


Bipolar Transistor

-20 V, -5 A, Low $V_{CE(sat)}$, PNP Single PCP

2SB1302



SOT-89 / PCP-1
CASE 419AU

Features

- Adoption of FBET, MBIT Processes
- Large Current Capacity
- Ultrasmall Size Making it Easy to Provide High-Density Small-Sized Hybrid IC's
- Low Collector to Emitter Saturation Voltage
- Fast Switching Speed
- These Devices are Pb-Free and are RoHS Compliant

Applications

- DC-DC Converters, Motor Drivers, Relay Drivers, Lamp Drivers

SPECIFICATIONS

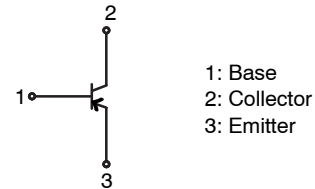
ABSOLUTE MAXIMUM RATINGS at $T_a = 25^\circ\text{C}$

| Parameter | Symbol | Value | Unit |
|--------------------------------|-----------|-------------|------------------|
| Collector to Base Voltage | V_{CBO} | -25 | V |
| Collector to Emitter Voltage | V_{CEO} | -20 | V |
| Emitter to Base Voltage | V_{EBO} | -5 | V |
| Collector Current | I_C | -5 | A |
| Collector Current (Pulse) | I_{CP} | -8 | A |
| Collector Dissipation (Note 1) | P_C | 1.3 | W |
| Junction Temperature | T_J | 150 | $^\circ\text{C}$ |
| Storage Temperature | T_{STG} | -55 to +150 | $^\circ\text{C}$ |

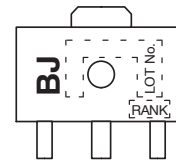
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1. Surface mounted on ceramic substrate ($250\text{ mm}^2 \times 0.8\text{ mm}$).

ELECTRICAL CONNECTION



MARKING DIAGRAM



ORDERING INFORMATION

| Device | Package | Shipping [†] |
|---------------|------------------|-----------------------|
| 2SB1302S-TD-E | PCP (Pb-Free) | 1000 / Tape & Reel |
| 2SB1302T-TD-E | PCP (Pb-Free) | 1000 / Tape & Reel |

[†]For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, [BRD8011/D](#).

2SB1302

ELECTRICAL CHARACTERISTICS at $T_A = 25^\circ\text{C}$

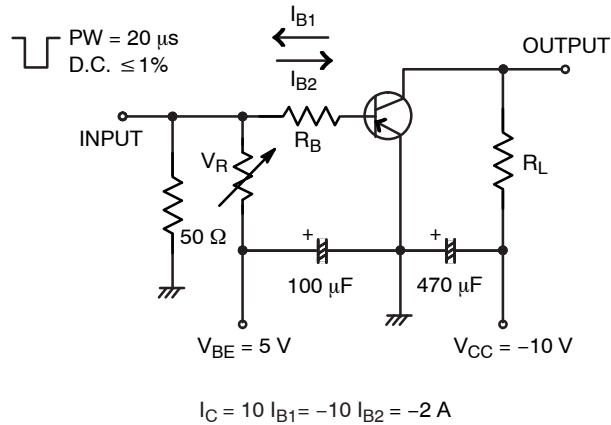
| Parameter | Symbol | Conditions | Ratings | | | Unit |
|---|---------------|--|---------|------|------|------|
| | | | Min | Typ | Max | |
| Collector Cutoff Current | I_{CBO} | $V_{CB} = -20\text{ V}, I_E = 0\text{ A}$ | | | -500 | nA |
| Emitter Cutoff Current | I_{EBO} | $V_{EB} = -4\text{ V}, I_C = 0\text{ A}$ | | | -500 | nA |
| DC Current Gain | h_{FE1} | $V_{CE} = -2\text{ V}, I_C = -500\text{ mA}$ | 140* | | 400* | |
| | h_{FE2} | $V_{CE} = -2\text{ V}, I_C = -4\text{ A}$ | 60 | | | |
| Gain-Bandwidth Product | f_T | $V_{CE} = -5\text{ V}, I_C = -200\text{ mA}$ | | 320 | | MHz |
| Output Capacitance | C_{ob} | $V_{CB} = -10\text{ V}, f = 1\text{ MHz}$ | | 60 | | pF |
| Collector to Emitter Saturation Voltage | $V_{CE(sat)}$ | $I_C = -3\text{ A}, I_B = -60\text{ mA}$ | | -250 | -500 | mV |
| Base to Emitter Saturation Voltage | $V_{BE(sat)}$ | $I_C = -3\text{ A}, I_B = -60\text{ mA}$ | | -1.0 | -1.3 | V |
| Collector to Base Breakdown Voltage | $V_{(BR)CBO}$ | $I_C = -10\text{ }\mu\text{A}, I_E = 0\text{ A}$ | -25 | | | V |
| Collector to Emitter Breakdown Voltage | $V_{(BR)CEO}$ | $I_C = -1\text{ mA}, R_{BE} = \infty$ | -20 | | | V |
| Emitter to Base Breakdown Voltage | $V_{(BR)EBO}$ | $I_E = -10\text{ }\mu\text{A}, I_C = 0\text{ A}$ | -5 | | | V |
| Turn-On Time | t_{on} | See specified Test Circuit | | 40 | | ns |
| Storage Time | t_{stg} | | | 200 | | ns |
| Fall Time | t_f | | | 10 | | ns |

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

*2SB1302 is classified by 500 mA h_{FE} as follows :

| Rank | S | T |
|----------|------------|------------|
| h_{FE} | 140 to 280 | 200 to 400 |

Switching Time Test Circuit



TYPICAL CHARACTERISTICS

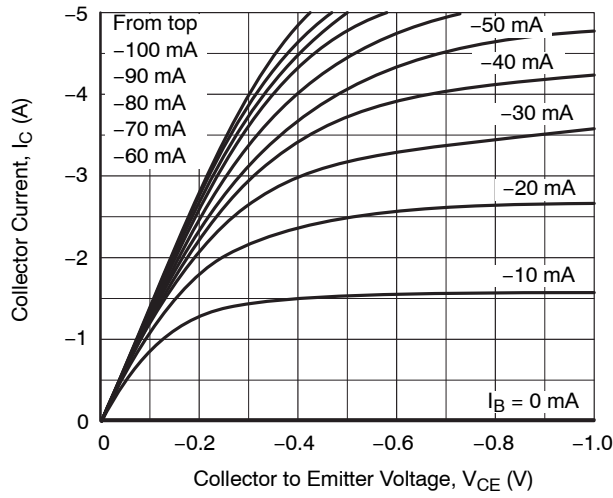


Figure 1. $I_C - V_{CE}$

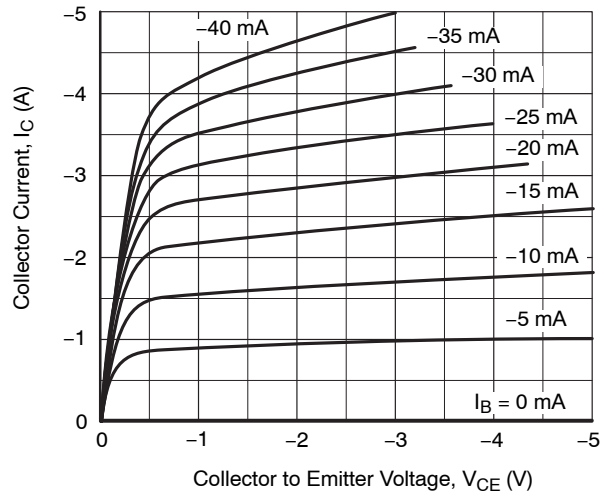


Figure 2. $I_C - V_{CE}$

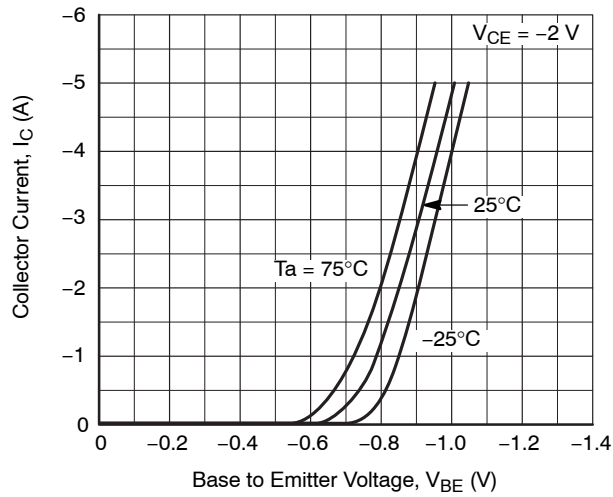


Figure 3. $I_C - V_{BE}$

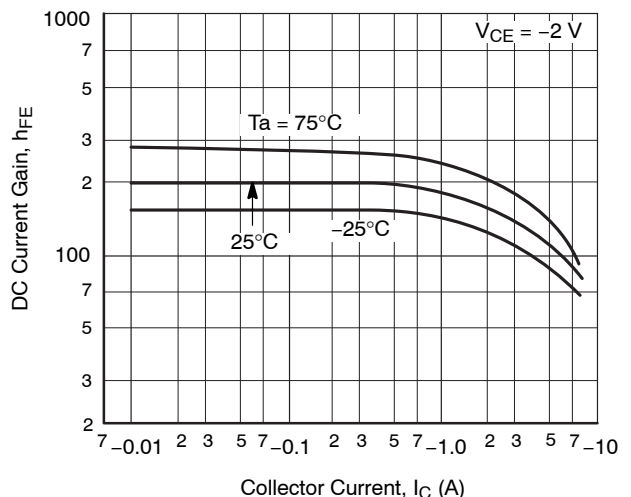


Figure 4. $h_{FE} - I_C$

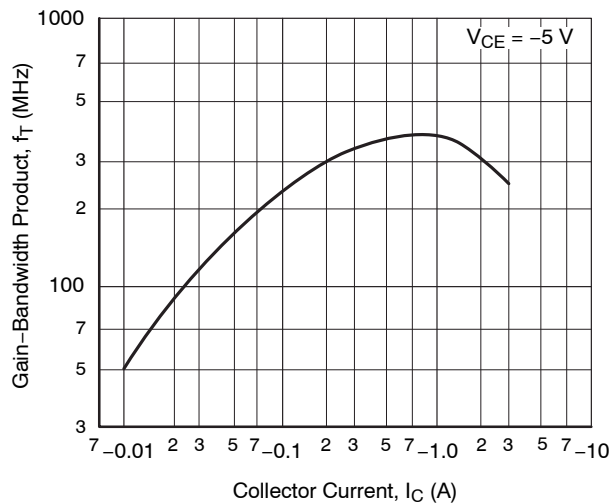


Figure 5. $f_T - I_C$

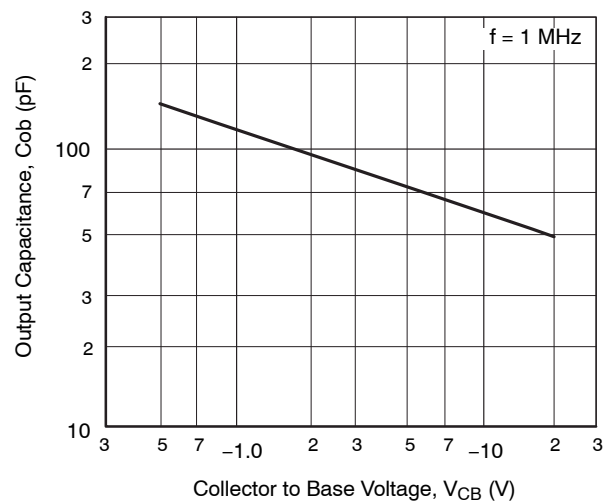


Figure 6. $C_{ob} - V_{CB}$

TYPICAL CHARACTERISTICS (continued)

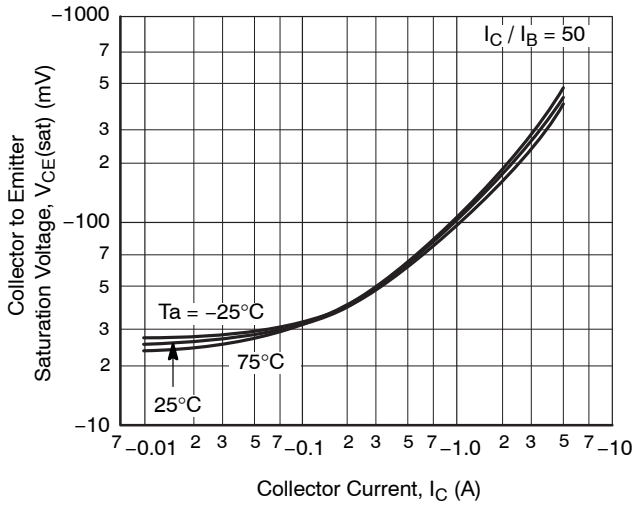


Figure 7. $V_{CE(sat)} - I_C$

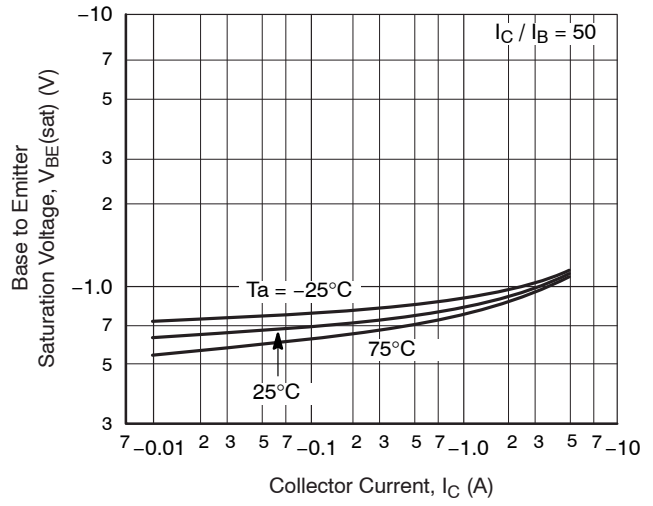


Figure 8. $V_{BE(sat)} - I_C$

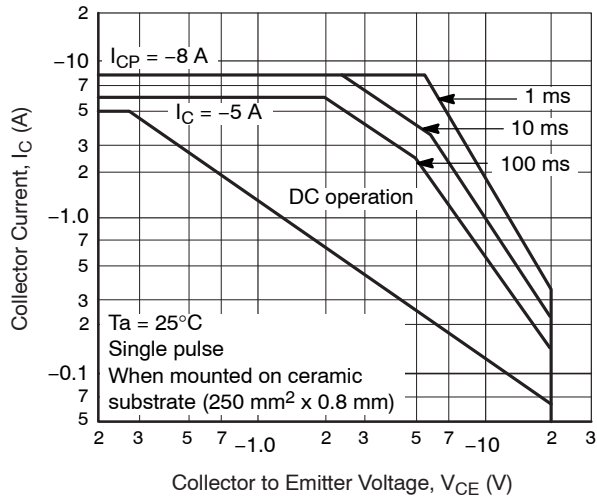


Figure 9. SOA

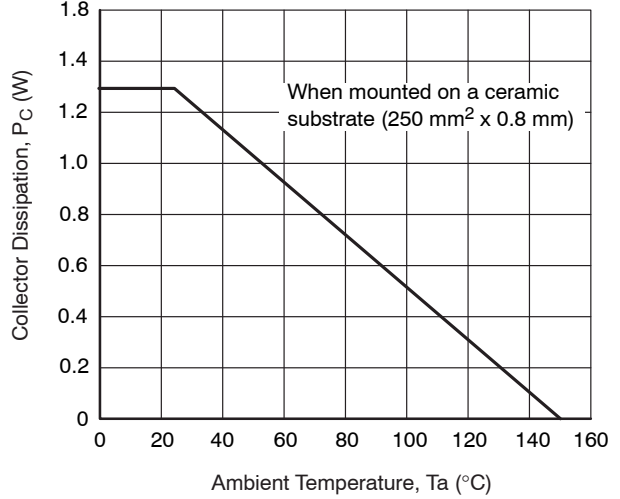


Figure 10. $P_C - T_a$

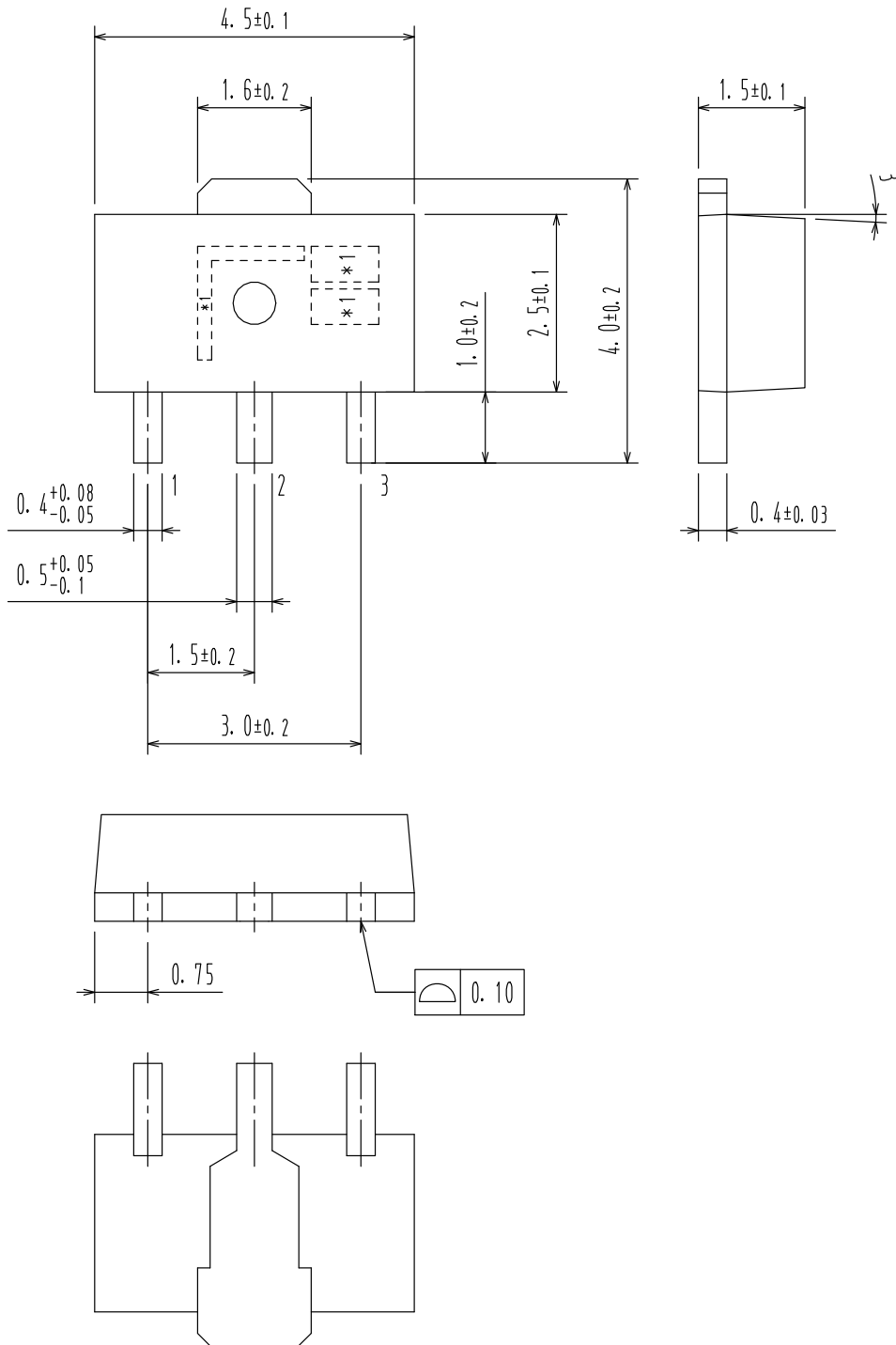
MECHANICAL CASE OUTLINE
PACKAGE DIMENSIONS

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