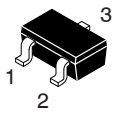
# Bipolar Transistor

## (–)15 V, (–)0.7 A, Low $V_{CE}$(sat), (PNP)NPN Single CP

# 2SB815, 2SD1048




1: Source
2: Drain
3: Gate

**SC–59 / CP3**
**CASE 318BJ**

### Features

- Ultrasmall Package Allows Miniaturization in End Products
- Large Current Capacity ($I_C$=0.7 A) and Low–Saturation Voltage
- These are Pb–Free Devices

### Specifications

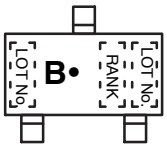
( ): 2SB815

### ABSOLUTE MAXIMUM RATINGS ( $T_A$ = 25°C)

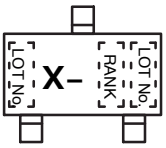
| Parameter | Symbol | Conditions | Ratings | Unit |
|---|---|---|---|---|
| Collector to Base Voltage | $V_{CBO}$ | | (–)20 | V |
| Collector to Emitter Voltage | $V_{CEO}$ | | (–)15 | V |
| Emitter to Base Voltage | $V_{EBO}$ | | (–)5 | V |
| Collector Current | $I_C$ | | (–)0.7 | A |
| Collector Current (Pulse) | $I_{CP}$ | | (–)1.5 | A |
| Collector Dissipation | $P_C$ | | 200 | mW |
| Junction Temperature | Tj | | 125 | °C |
| Storage Temperature | Tstg | | –55 to +125 | °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.

### MARKING DIAGRAMS

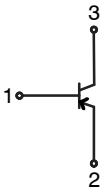



2SB815

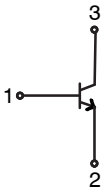



2SD1048

### ELECTRICAL CONNECTION




2SB815




2SD1048

### ORDERING INFORMATION

| Device | Package | Shipping† |
|---|---|---|
| 2SB815–6–TB–E | SC–59 / CP3 (Pb–Free) | 3000 / Tape & Reel |
| 2SB815–7–TB–E | SC–59 / CP3 (Pb–Free) | 3000 / Tape & Reel |
| 2SD1048–6–TB–E | SC–59 / CP3 (Pb–Free) | 3000 / Tape & Reel |
| 2SD1048–7–TB–E | SC–59 / CP3 (Pb–Free) | 3000 / 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.

**ELECTRICAL CHARACTERISTICS** ($T_A$ = 25°C)

| Parameter | Symbol | Conditions | Ratings | | | Unit |
|---|---|---|---|---|---|---|
| | | | Min | Typ | Max | |
| Collector Cutoff Current | $I_{CBO}$ | $V_{CB}$ = (−)15 V, $I_E$ = 0 A | − | − | (−)0.1 | μA |
| Emitter Cutoff Current | $I_{EBO}$ | $V_{EB}$ = (−)4 V, $I_C$ = 0 A | − | − | (−)0.1 | μA |
| DC Current Gain | $h_{FE}1$ | $V_{CE}$ = (−)2 V, $I_C$ = (−)50 mA | 200* | − | 600* | |
| | $h_{FE}2$ | $V_{CE}$ = (−)2 V, $I_C$ = (−)500 mA | 80 | − | − | |
| Gain−Bandwidth Product | $f_T$ | $V_{CE}$ = (−)10 V, $I_C$ = (−)50 mA | − | 250 | − | MHz |
| Output Capacitance | Cob | $V_{CB}$ = (−)10 V, f = 1 MHz | − | (13)8 | − | pF |
| Collector to Emitter Saturation Voltage | $V_{CE}$(sat)1 | $I_C$ = (−)5 mA, $I_B$ = (−)0.5 mA | − | (−15)10 | (−35)25 | mV |
| | $V_{CE}$(sat)2 | $I_C$ = (−)100 mA, $I_B$ = (−)10 mA | − | (−60)30 | (−120)80 | mV |

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.

*The 2SB815/2SD1048 are classified by 50 mA $h_{FE}$ as follows:

| Rank | 6 | 7 |
|---|---|---|
| $h_{FE}$ | 200 to 400 | 300 to 600 |

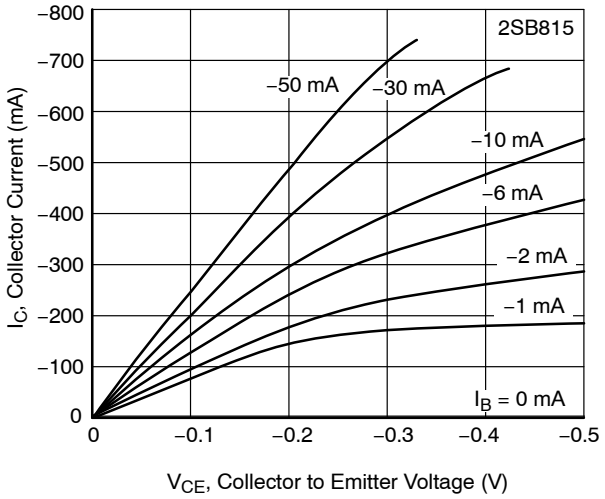



**Figure 1. $I_C$ – $V_{CE}$**

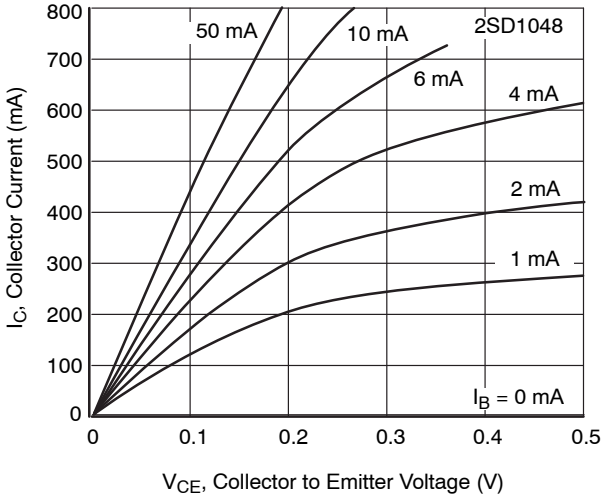



**Figure 2. $I_C$ – $V_{CE}$**

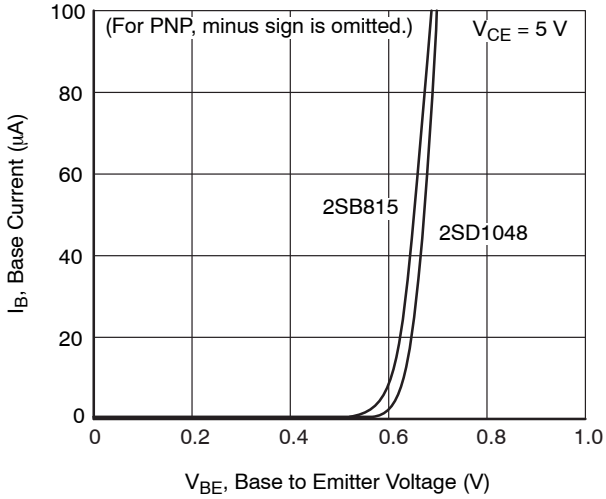



**Figure 3. $I_B$ – $V_{BE}$**

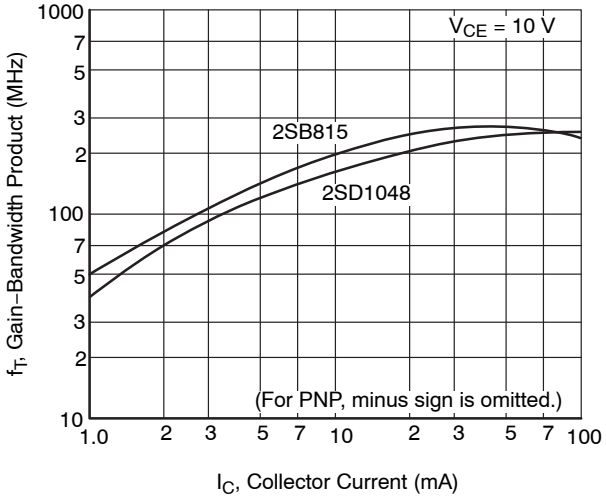



**Figure 4. $f_T$ – $I_C$**

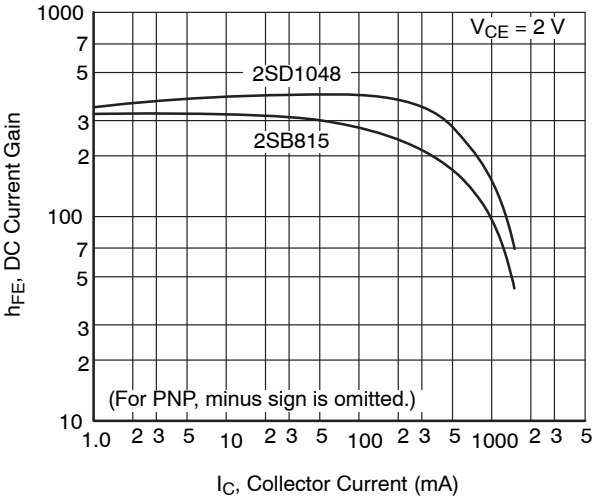



**Figure 5. $h_{FE}$ – $I_C$**

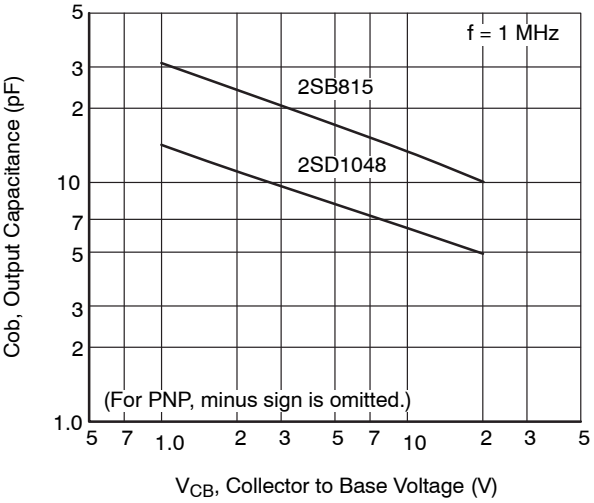



**Figure 6. Cob – $V_{CB}$**

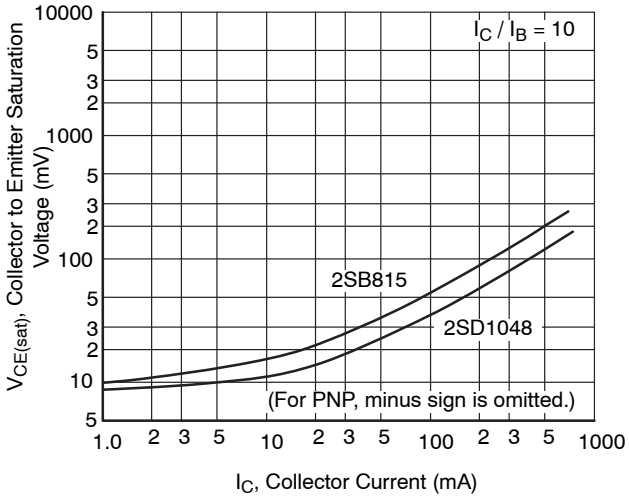



**Figure 7. $V_{CE(sat)}$ – $I_C$**

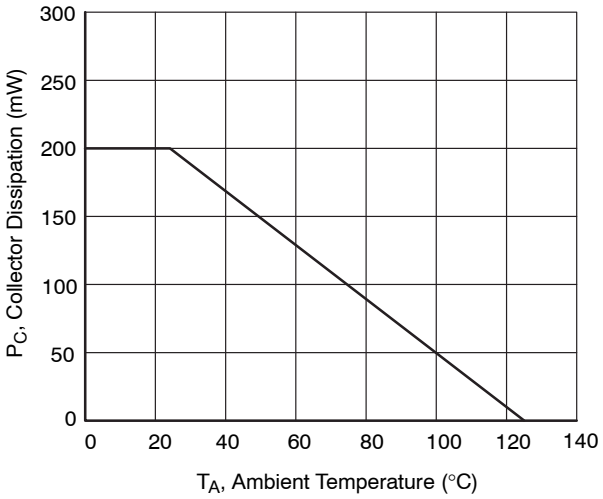
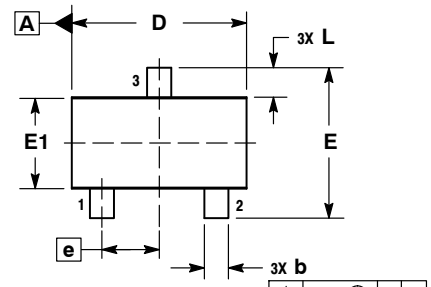



**Figure 8. $P_C$ – $T_A$**

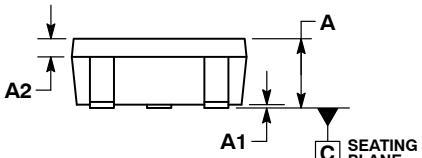
SCALE 2:1

**SC−59 / CP3**
CASE 318BJ
ISSUE O

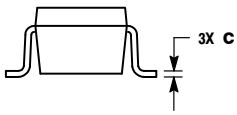
DATE 09 JAN 2015




TOP VIEW




SIDE VIEW

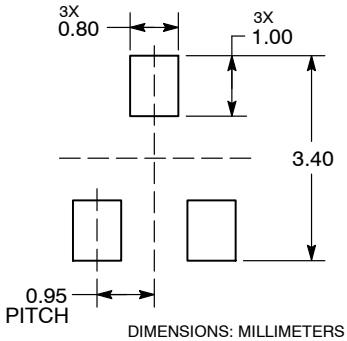



END VIEW

NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. DIMENSIONS D AND E1 DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS. MOLD FLASH, PROTRUSIONS, OR GATE BURRS SHALL NOT EXCEED 0.20 PER SIDE.
4. DIMENSIONS D AND E1 ARE MEASURED AT THE OUTERMOST EXTREME OF THE PLASTIC BODY.
5. DIMENSIONS b AND c APPLY TO THE FLAT SECTION OF THE LEAD BETWEEN 0.10 AND 0.20 FROM THE TIP.

| | MILLIMETERS | |
|---|---|---|
| DIM | MIN | MAX |
| A | 0.95 | 1.35 |
| A1 | 0.00 | 0.10 |
| A2 | 0.20 | 0.40 |
| b | 0.35 | 0.50 |
| c | 0.10 | 0.20 |
| D | 2.75 | 3.05 |
| E | 2.30 | 2.70 |
| E1 | 1.35 | 1.65 |
| e | 0.95 BSC | |
| L | 0.35 | 0.75 |

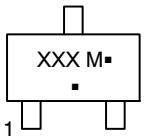
## RECOMMENDED SOLDERING FOOTPRINT*




DIMENSIONS: MILLIMETERS

*For additional information on our Pb−Free strategy and soldering details, please download the **onsemi** Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

## GENERIC MARKING DIAGRAM




XXX = Specific Device Code
M = Date Code
▪ = Pb−Free Package

(Note: Microdot may be in either location)

*This information is generic. Please refer to device data sheet for actual part marking. Pb−Free indicator, “G” or microdot “ ▪”, may or may not be present.

| | | | |
|---|---|---|---|
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| **DESCRIPTION:** | **SC−59 / CP3** | | **PAGE 1 OF 1** |

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