

# Bipolar Transistor

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

## 2SB815, 2SD1048

### 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

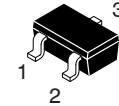
### Specifications

( ): 2SB815

### ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ )

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	$T_j$		125	$^\circ\text{C}$
Storage Temperature	$T_{stg}$		-55 to +125	$^\circ\text{C}$

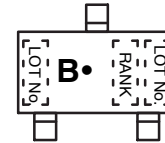
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.



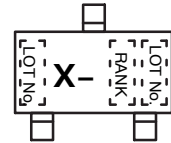
1: Source  
2: Drain  
3: Gate

SC-59 / CP3  
CASE 318BJ

### MARKING DIAGRAMS

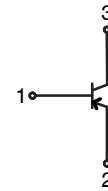


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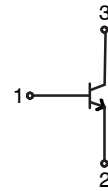


2SD1048

### ELECTRICAL CONNECTION



2SB815



2SD1048

### ORDERING INFORMATION

Device	Package	Shipping <sup>†</sup>
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

<sup>†</sup>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](#).

## 2SB815, 2SD1048

### ELECTRICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ )

Parameter	Symbol	Conditions	Ratings			Unit
			Min	Typ	Max	
Collector Cutoff Current	$I_{CBO}$	$V_{CB} = (-)15\text{ V}, I_E = 0\text{ A}$	–	–	$(-)0.1$	$\mu\text{A}$
Emitter Cutoff Current	$I_{EBO}$	$V_{EB} = (-)4\text{ V}, I_C = 0\text{ A}$	–	–	$(-)0.1$	$\mu\text{A}$
DC Current Gain	$h_{FE1}$	$V_{CE} = (-)2\text{ V}, I_C = (-)50\text{ mA}$	200*	–	600*	
	$h_{FE2}$	$V_{CE} = (-)2\text{ V}, I_C = (-)500\text{ mA}$	80	–	–	
Gain–Bandwidth Product	$f_T$	$V_{CE} = (-)10\text{ V}, I_C = (-)50\text{ mA}$	–	250	–	MHz
Output Capacitance	$C_{ob}$	$V_{CB} = (-)10\text{ V}, f = 1\text{ MHz}$	–	(13)8	–	pF
Collector to Emitter Saturation Voltage	$V_{CE(sat)1}$	$I_C = (-)5\text{ mA}, I_B = (-)0.5\text{ mA}$	–	(–15)10	(–35)25	mV
	$V_{CE(sat)2}$	$I_C = (-)100\text{ mA}, I_B = (-)10\text{ mA}$	–	(–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

## 2SB815, 2SD1048

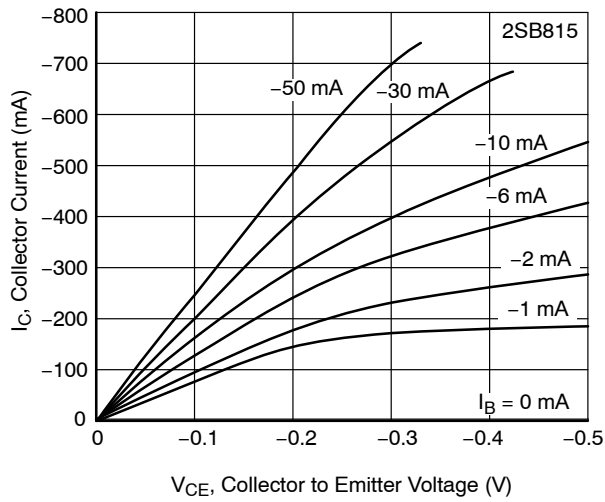


Figure 1.  $I_C - V_{CE}$

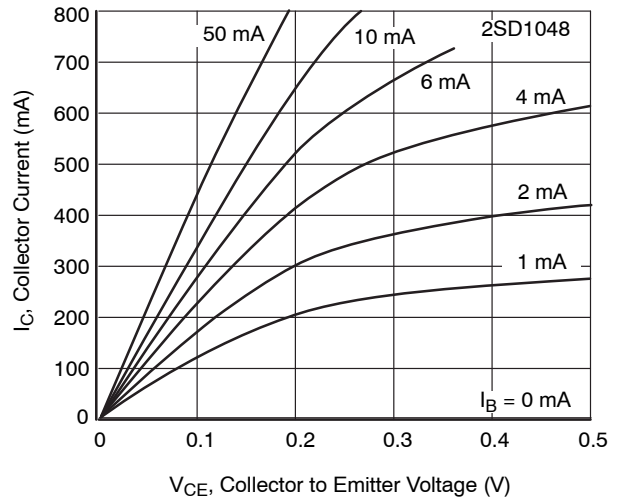


Figure 2.  $I_C - V_{CE}$

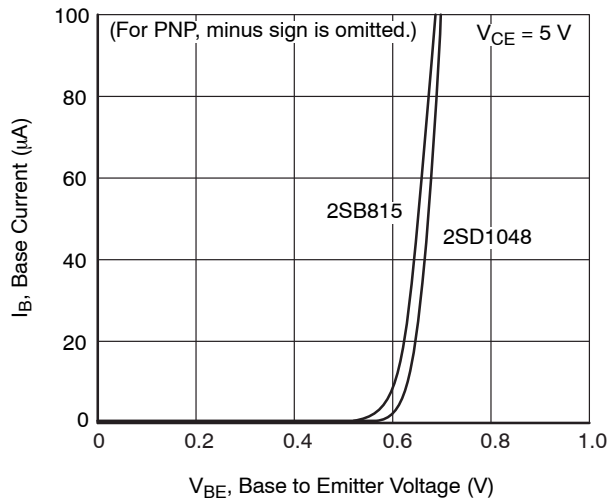


Figure 3.  $I_B - V_{BE}$

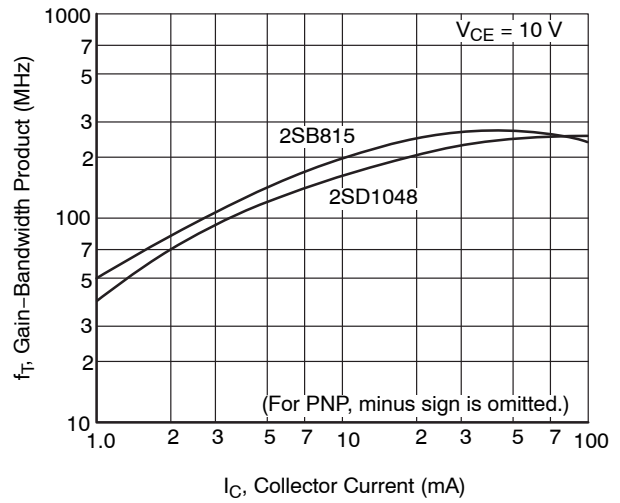


Figure 4.  $f_T - I_C$

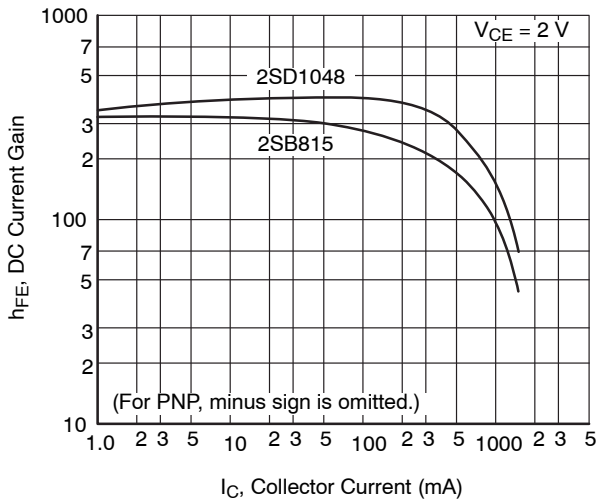


Figure 5.  $h_{FE} - I_C$

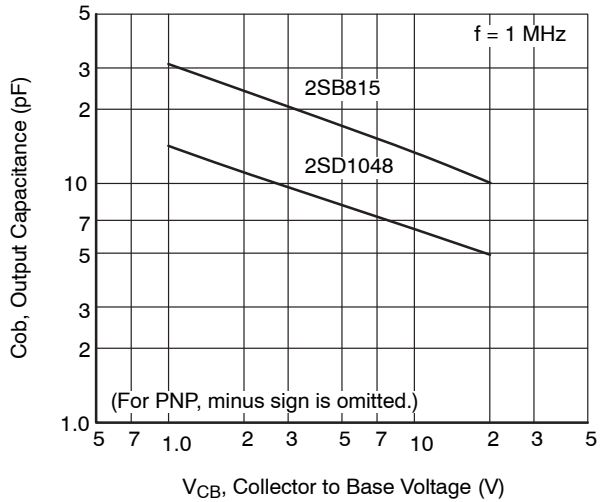


Figure 6.  $C_{ob} - V_{CB}$

## 2SB815, 2SD1048

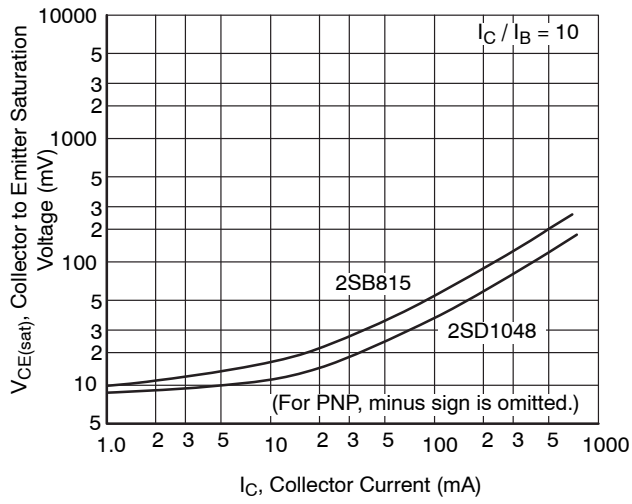


Figure 7.  $V_{CE(sat)} - I_C$

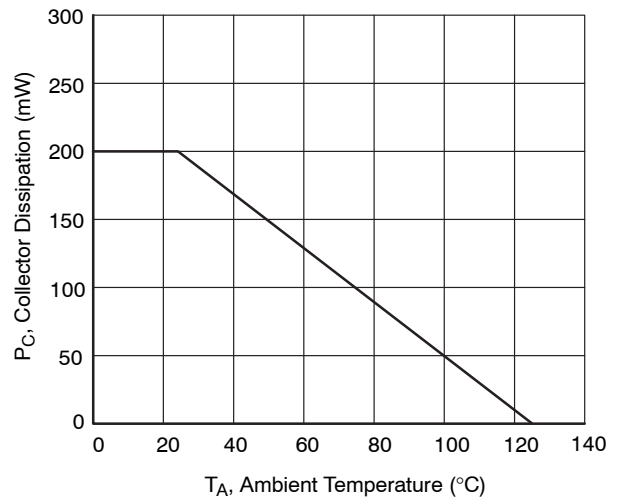


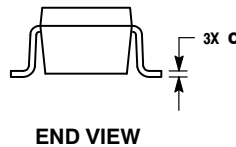
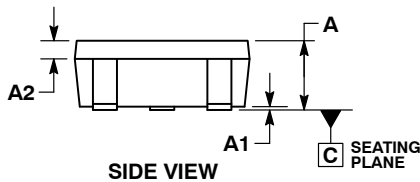
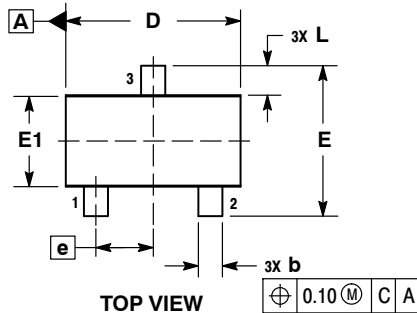
Figure 8.  $P_C - T_A$



SCALE 2:1

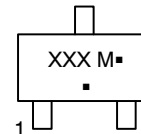
**SC-59 / CP3**  
**CASE 318BJ**  
**ISSUE O**

DATE 09 JAN 2015


**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.

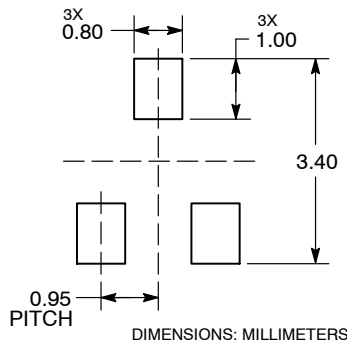
DIM	MILLIMETERS	
	MIN	MAX
A	0.95	1.35
A1	0.00	0.10
A2	0.20	0.40
b	0.35	0.50
c	0.10	0.20
D	2.75	3.05
E	2.30	2.70
E1	1.35	1.65
e	0.95 BSC	
L	0.35	0.75

**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.

**RECOMMENDED SOLDERING FOOTPRINT\***


\*For additional information on our Pb-Free strategy and soldering details, please download the **onsemi** Soldering and Mounting Techniques Reference Manual, [SOLDERRM/D](#).

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