

# 2SB1202/2SD1802

## Bipolar Transistor

(-)50 V, (-)3 A, Low  $V_{CE(sat)}$  (PNP)NPN  
Single TP/TP-FA

### Features

- Adoption of FBET and MBIT Processes
- Large Current Capacitance and Wide ASO
- Low Collector to Emitter Saturation Voltage
- Fast Switching Speed
- Small and Slim Package Making it Easy to Make  
2SB1202/2SD1802-used Sets Smaller
- These Devices are Pb-Free and are RoHS Compliant

### Applications

- Voltage Regulators, Relay Drivers, Lamp Drivers, Electrical Equipment

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

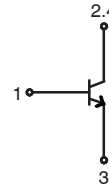
Parameter	Symbol	Conditions	Ratings	Unit
Collector to Base Voltage	$V_{CBO}$		(-)60	V
Collector to Emitter Voltage	$V_{CEO}$		(-)50	V
Emitter to Base Voltage	$V_{EBO}$		(-)6	V
Collector Current	$I_C$		(-)3	A
Collector Current (Pulse)	$I_{CP}$		(-)6	A
Collector Dissipation	$P_C$		1	W
		$T_C = 25^\circ\text{C}$	15	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.

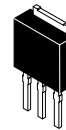


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(For PNP, the polarity is reversed.)

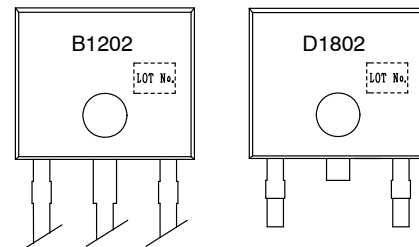


IPAK / TP  
CASE 369AJ



DPAK / TP-FA  
CASE 369AH

### MARKING DIAGRAM



### ORDERING INFORMATION

See detailed ordering and shipping information on page 8 of this data sheet.

## 2SB1202/2SD1802

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

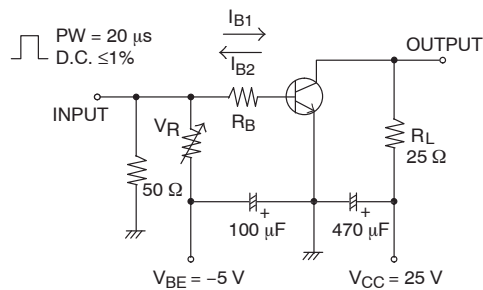
Parameter	Symbol	Conditions	Ratings			Unit
			Min	Typ	Max	
Collector Cutoff Current	$I_{CBO}$	$V_{CB} = (-)40\text{ V}, I_E = 0\text{ A}$			(-)1	$\mu\text{A}$
Emitter Cutoff Current	$I_{EBO}$	$V_{EB} = (-)4\text{ V}, I_C = 0\text{ A}$			(-)1	$\mu\text{A}$
DC Current Gain	$h_{FE1}$	$V_{CE} = (-)2\text{ V}, I_C = (-)100\text{ mA}$	100*		560*	
	$h_{FE2}$	$V_{CE} = (-)2\text{ V}, I_C = (-)3\text{ A}$	35			
Gain-Bandwidth Product	$f_T$	$V_{CE} = (-)10\text{ V}, I_C = (-)50\text{ mA}$		150		MHz
Output Capacitance	$C_{ob}$	$V_{CB} = (-)10\text{ V}, f = 1\text{ MHz}$		(39)25		pF
Collector to Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C = (-)2\text{ A}, I_B = (-)100\text{ mA}$		(-0.35)0.19	(-0.7)0.5	V
Base to Emitter Saturation Voltage	$V_{BE(sat)}$	$V_{CE} = (-)2\text{ V}, I_C = (-)100\text{ mA}$		(-)0.94	(-)1.2	V
Collector to Base Breakdown Voltage	$V_{(BR)CBO}$	$I_C = (-)10\text{ }\mu\text{A}, I_E = 0\text{ A}$	(-)60			V
Collector to Emitter Breakdown Voltage	$V_{(BR)CEO}$	$I_C = (-)1\text{ mA}, R_{BE} = \Omega$	(-)50			V
Emitter to Base Breakdown Voltage	$V_{(BR)EBO}$	$I_E = (-)10\text{ }\mu\text{A}, I_C = 0\text{ A}$	(-)6			V
Turn-On Time	$t_{on}$	See specified Test Circuit		70		ns
Storage Time	$t_{stg}$			(450)650		ns
Fall Time	$t_f$			35		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.

\*The 2SB1202/2SD1802 are classified by 100 mA  $h_{FE}$  as follows :

Rank	R	S	T	U
$h_{FE}$	100 to 200	140 to 280	200 to 400	280 to 560

### Switching Time Test Circuit



$I_C = 10\text{ mA}, I_{B1} = -10\text{ mA}, I_{B2} = 1\text{ mA}$   
For PNP, the polarity is reversed.

# 2SB1202/2SD1802

## TYPICAL CHARACTERISTICS

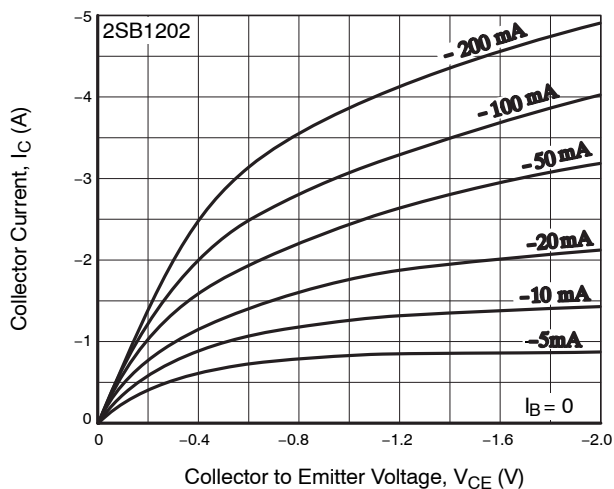


Figure 1.  $I_C - V_{CE}$

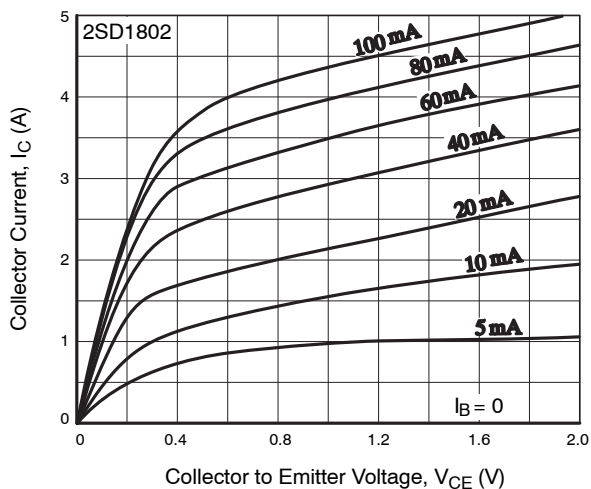


Figure 2.  $I_C - V_{CE}$

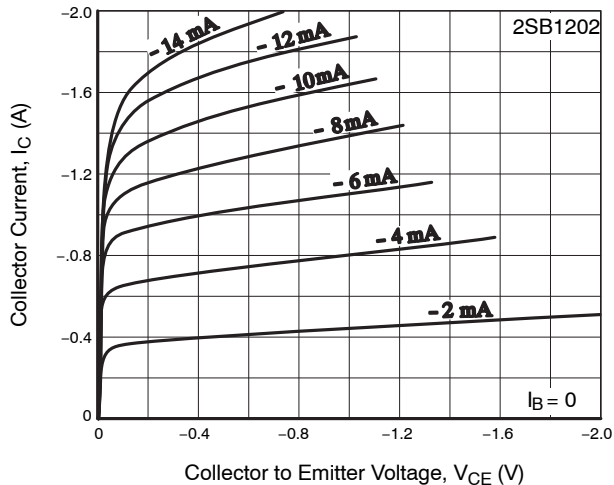


Figure 3.  $I_C - V_{CE}$

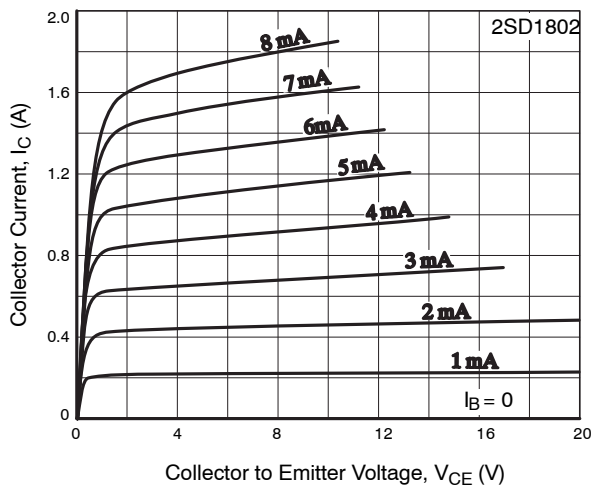


Figure 4.  $I_C - V_{CE}$

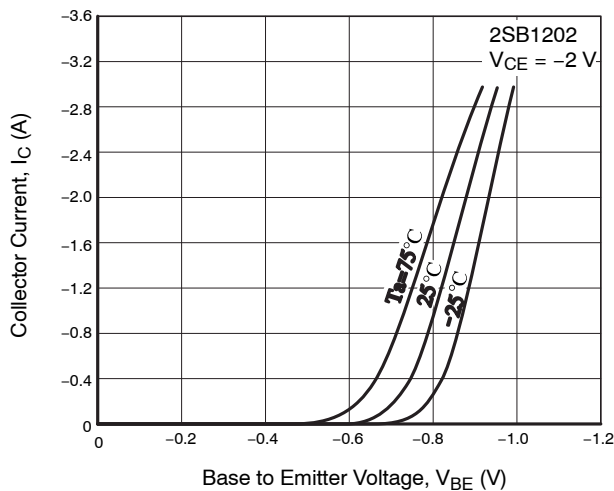


Figure 5.  $I_C - V_{BE}$

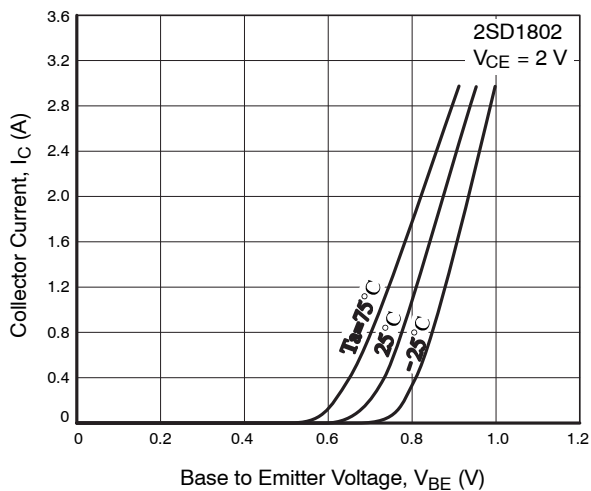


Figure 6.  $I_C - V_{BE}$

# 2SB1202/2SD1802

## TYPICAL CHARACTERISTICS (continued)

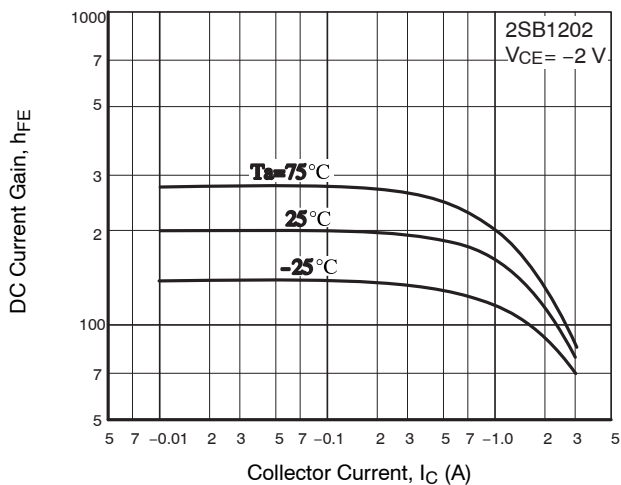


Figure 7. h<sub>FE</sub> - I<sub>C</sub>

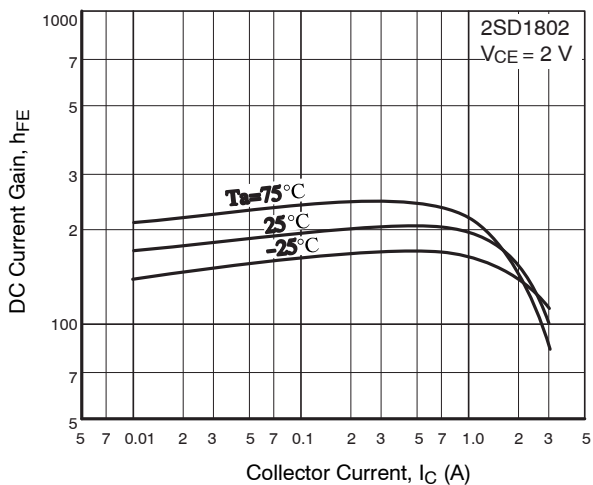


Figure 8. h<sub>FE</sub> - I<sub>C</sub>

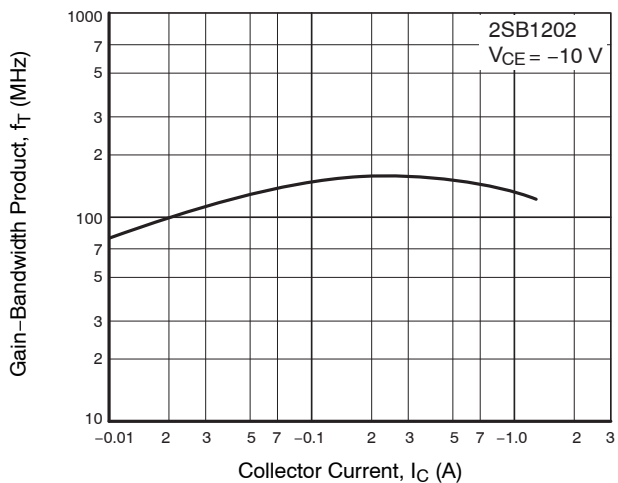


Figure 9. f<sub>T</sub> - I<sub>C</sub>

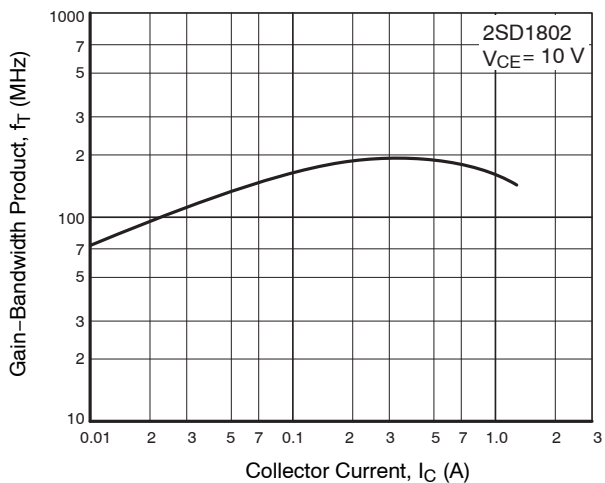


Figure 10. f<sub>T</sub> - I<sub>C</sub>

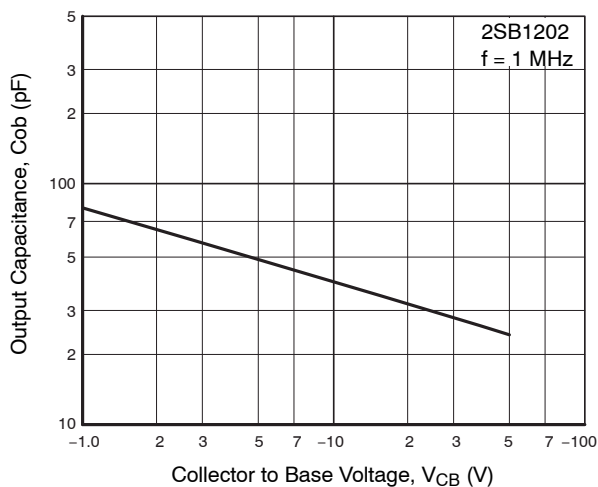


Figure 11. C<sub>ob</sub> - V<sub>CB</sub>

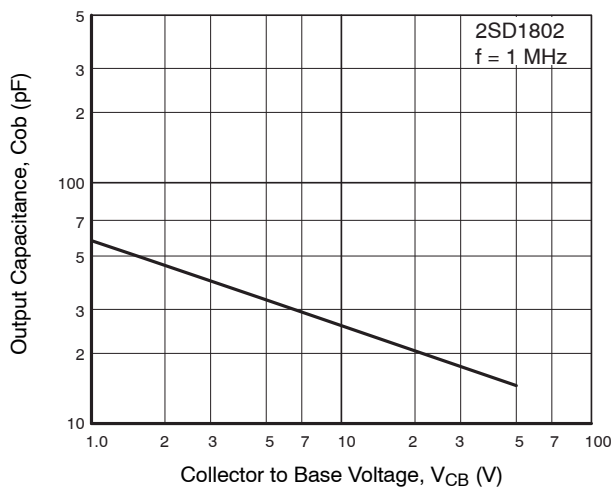


Figure 12. C<sub>ob</sub> - V<sub>CB</sub>

# 2SB1202/2SD1802

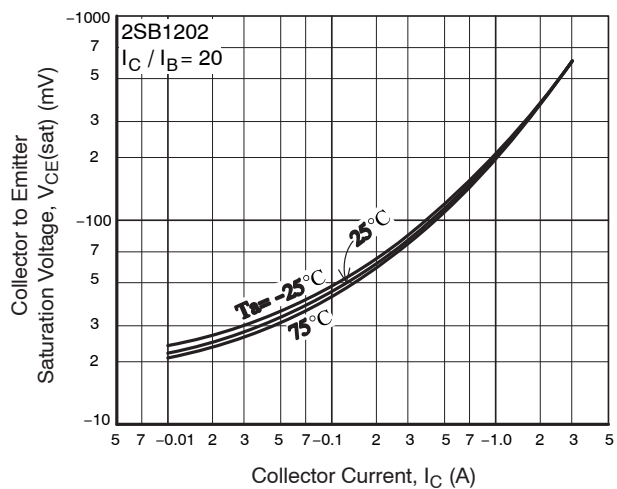


Figure 13.  $V_{CE}(sat) - I_C$

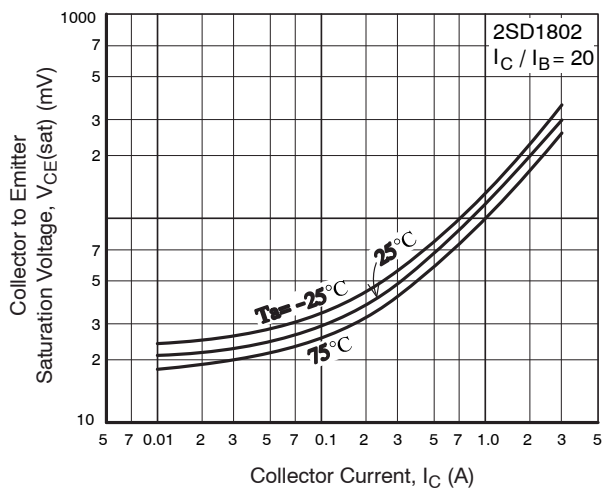


Figure 14.  $V_{CE}(sat) - I_C$

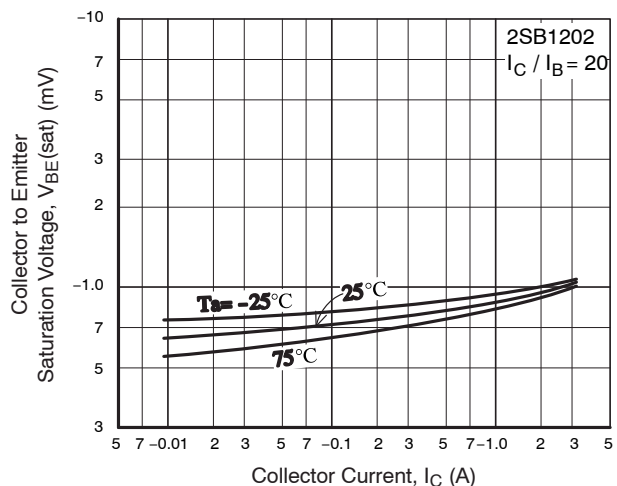


Figure 15.  $V_{BE}(sat) - I_C$

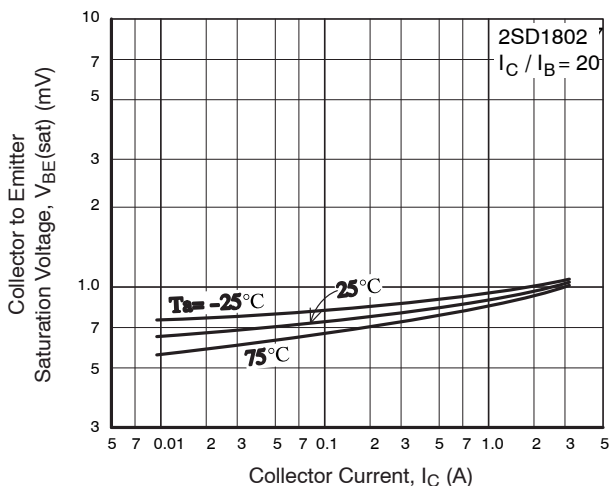


Figure 16.  $V_{BE}(sat) - I_C$

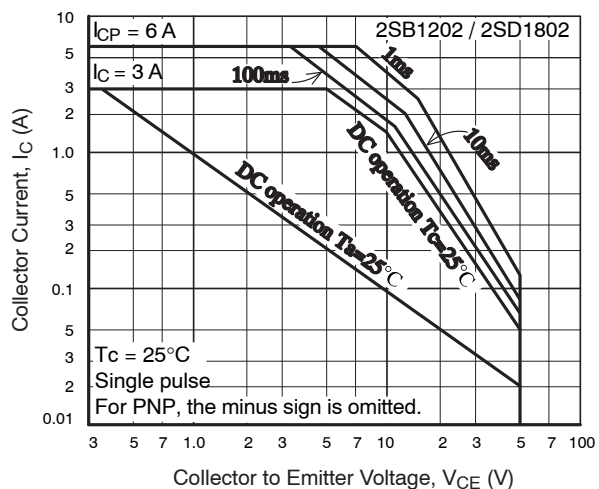


Figure 17. ASO

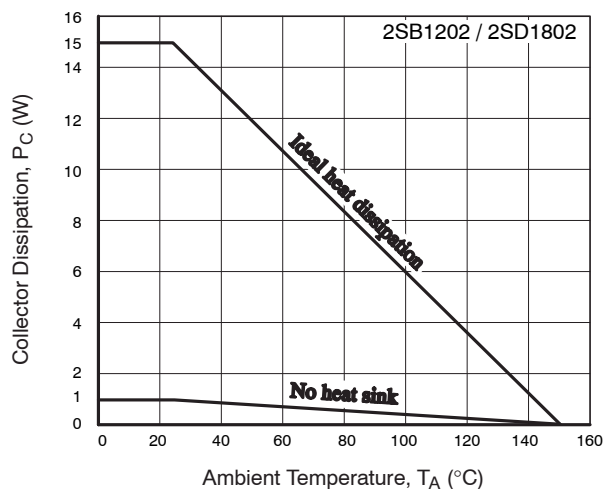


Figure 18.  $P_C - T_A$

## 2SB1202/2SD1802

### ORDERING INFORMATION

Device	Package	Shipping†	memo
2SB1202S-E	TP	500pcs./bag	Pb-Free
2SB1202T-E	TP	500pcs./bag	
2SD1802S-E	TP	500pcs./bag	
2SD1802T-E	TP	500pcs./bag	
2SB1202S-TL-E	TP-FA	700pcs./reel	
2SB1202T-TL-E	TP-FA	700pcs./reel	
2SD1802S-TL-E	TP-FA	700pcs./reel	
2SD1802T-TL-E	TP-FA	700pcs./reel	

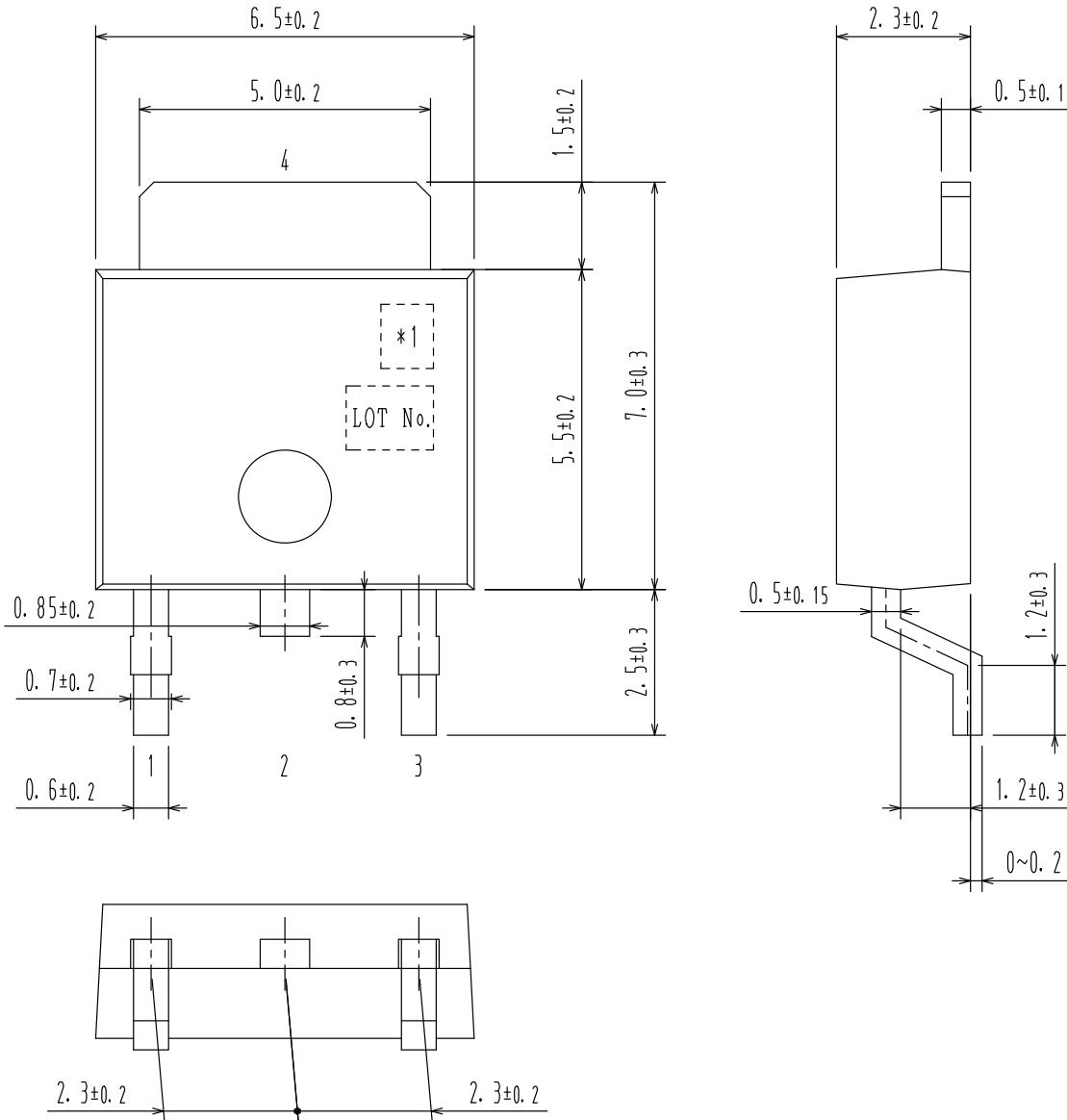
†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

**MECHANICAL CASE OUTLINE**  
**PACKAGE DIMENSIONS**



**DPAK / TP-FA**  
**CASE 369AH**  
**ISSUE O**

DATE 30 JAN 2012



Pin 2 is idle pin with electrical designation only carried.

- 1:
- 2:
- 3:
- \*1: Lot indication 4:

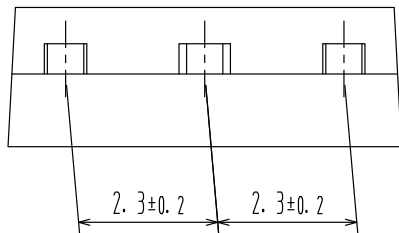
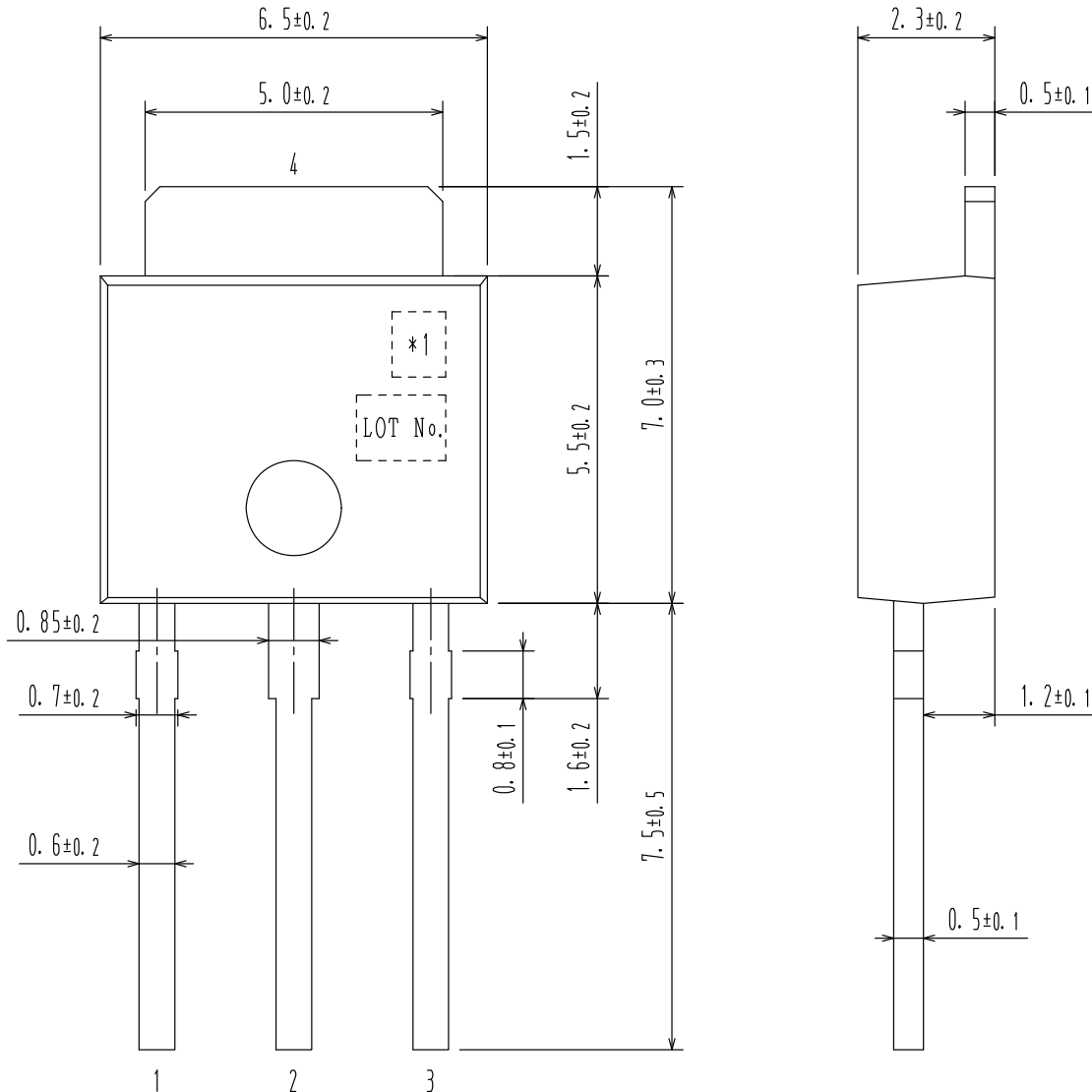
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**MECHANICAL CASE OUTLINE**  
**PACKAGE DIMENSIONS**

**IPAK / TP**  
**CASE 369AJ**  
**ISSUE O**

DATE 30 JAN 2012



- 1:
- 2:
- 3:
- 4:

\*1: Lot indication

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