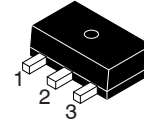


# Bipolar Transistor

(-)50 V, (-)2 A, Low VCE(sat),  
(PNP)NPN Single PCP

## 2SB1123/2SD1623



1: Base  
2: Collector  
3: Emitter

SOT-89 / PCP-1  
CASE 419AU

### Features

- Adoption of FBET, MBIT Processes
- Large Current Capacity and Wide ASO
- The Ultraminiature Package Facilitates Higher-density Mounting, Thus Allows the Applied Hybrid IC's Further Miniaturization
- Low Collector-to-Emitter Saturation Voltage
- Fast Switching Speed
- These are Pb-Free Devices

### Applications

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

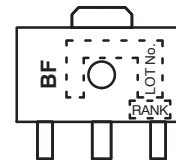
### ABSOLUTE MAXIMUM RATINGS (at Ta = 25°C)

Parameter	Symbol	Conditions	Ratings	Unit
Collector-to-Base Voltage	V <sub>CBO</sub>		(-)60	V
Collector-to-Emitter Voltage	V <sub>CEO</sub>		(-)50	V
Emitter-to-Base Voltage	V <sub>EBO</sub>		(-)6	V
Collector Current	I <sub>C</sub>		(-)2	A
Collector Current (Pulse)	I <sub>CP</sub>		(-)4	A
Collector Dissipation	P <sub>C</sub>		0.5	W
		When mounted on ceramic substrate (250 mm <sup>2</sup> x 0.8 mm)	1.3	W
Junction Temperature	T <sub>j</sub>		150	°C
Storage Temperature	T <sub>stg</sub>		-55 to +150	°C

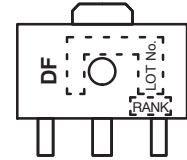
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

NOTE: Specifications ( ): 2SB1123

### MARKING DIAGRAMS

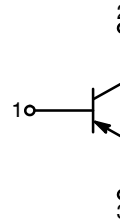


2SB1123

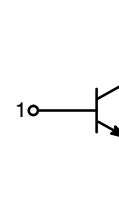


2SD1623

### ELECTRICAL CONNECTION



2SB1123



2SD1623

### ORDERING INFORMATION

Device	Package	Shipping†
2SB1123S-TD-E	PCP (Pb-Free)	1,000 / Tape & Reel
2SB1123T-TD-E	PCP (Pb-Free)	1,000 / Tape & Reel
2SD1623S-TD-E	PCP (Pb-Free)	1,000 / Tape & Reel
2SD1623T-TD-E	PCP (Pb-Free)	1,000 / 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](#).

## 2SB1123/2SD1623

### ELECTRICAL CHARACTERISTICS (at Ta = 25°C)

Parameter	Symbol	Conditions	Ratings			Unit
			Min	Typ	Max	
Collector Cutoff Current	$I_{CBO}$	$V_{CB} = (-)50\text{ V}, I_E = 0\text{ A}$	-	-	(-)100	nA
Emitter Cutoff Current	$I_{EBO}$	$V_{EB} = (-)4\text{ V}, I_C = 0\text{ A}$	-	-	(-)100	nA
DC Current Gain	$h_{FE1}$	$V_{CE} = (-)2\text{ V}, I_C = (-)100\text{ mA}$	100*	-	560*	-
	$h_{FE2}$	$V_{CE} = (-)2\text{ V}, I_C = (-)1.5\text{ A}$	40	-	-	-
Gain-Bandwidth Product	$f_T$	$V_{CE} = (-)10\text{ V}, I_C = (-)50\text{ mA}$	-	150	-	MHz
Output Capacitance	$C_{ob}$	$V_{CB} = (-)10\text{ V}, f = 1\text{ MHz}$	-	(22)12	-	pF
Collector-to-Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C = (-)1\text{ A}, I_B = (-)50\text{ mA}$	-	(-0.3)0.15	(-0.7)0.4	V
Base-to-Emitter Saturation Voltage	$V_{BE(sat)}$	$I_C = (-)1\text{ A}, I_B = (-)50\text{ mA}$	-	(-)0.9	(-)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	$V_{(BR)CEO}$	$I_C = (-)1\text{ mA}, R_{BE} = \infty$	(-)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.	-	(60)60	-	ns
Storage Time	$t_{stg}$		-	(450)550	-	ns
Fall Time	$t_f$		-	(30)30	-	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.

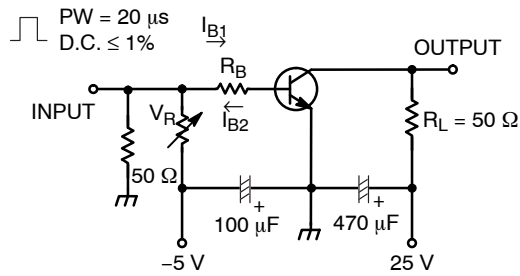
NOTE: Specifications ( ): 2SB1123

\*The 2SB1123/2SD1623 are classified by 100 mA  $h_{FE}$  as follows :

**Table 1.**

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

### Switching Time Test Circuit



$I_C = 10\text{ mA}, I_{B1} = -10\text{ mA}, I_{B2} = 500\text{ }\mu\text{A}$   
(For PNP, the polarity is reversed)

# 2SB1123/2SD1623

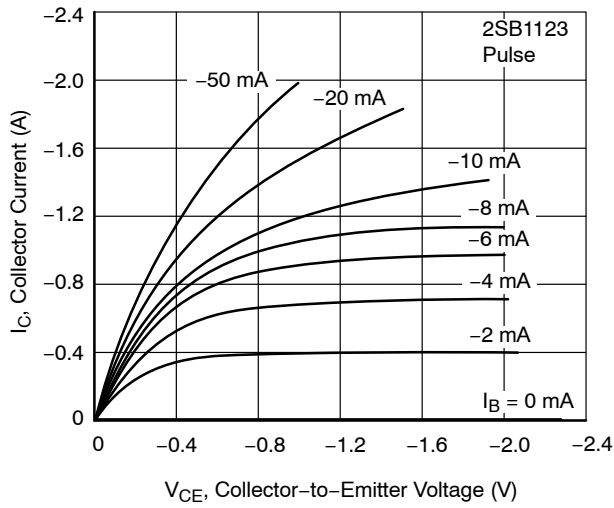


Figure 1.  $I_C - V_{CE}$

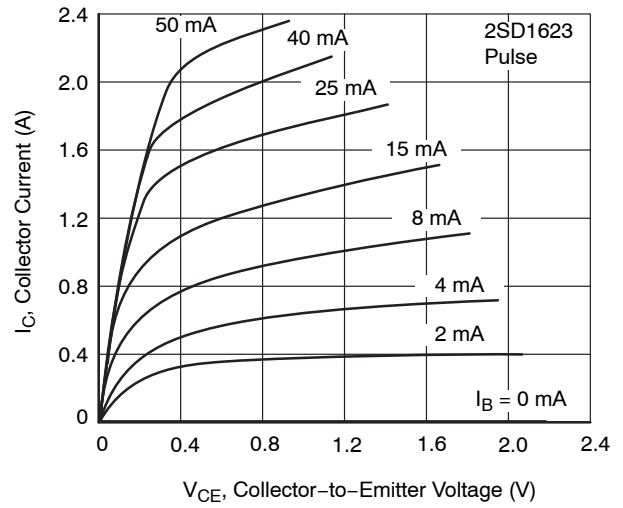


Figure 2.  $I_C - V_{CE}$

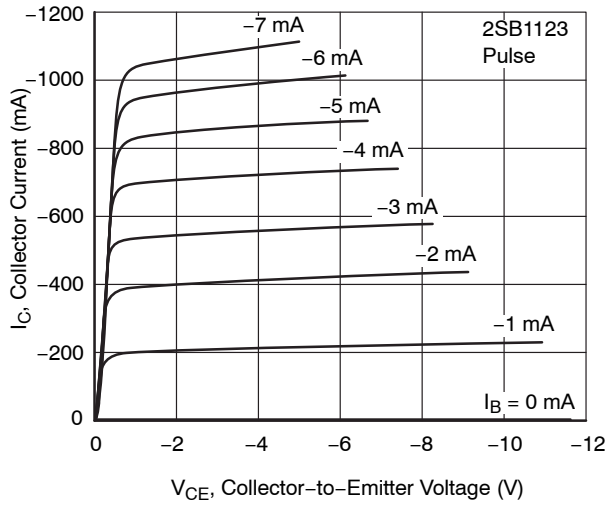


Figure 3.  $I_C - V_{CE}$

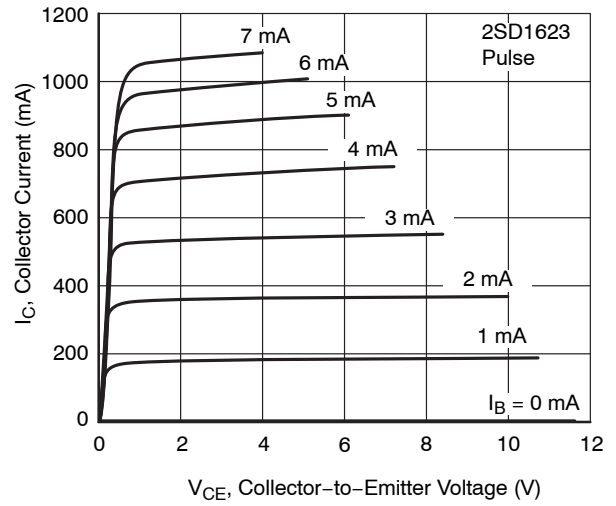


Figure 4.  $I_C - V_{CE}$

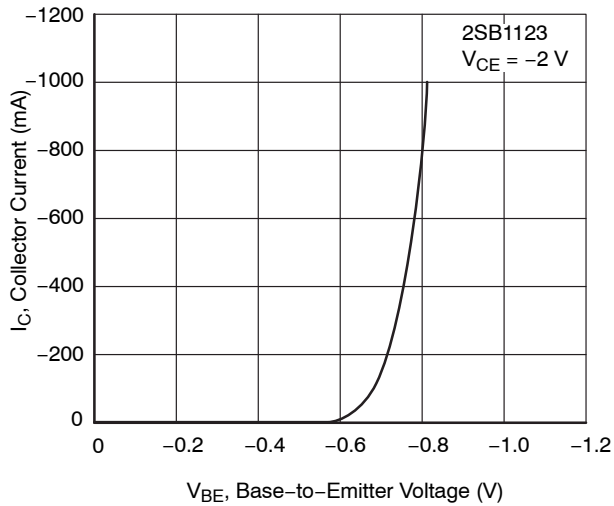


Figure 5.  $I_C - V_{BE}$

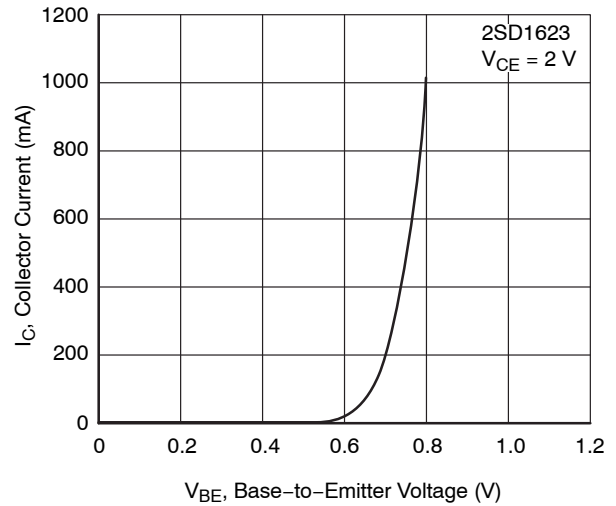
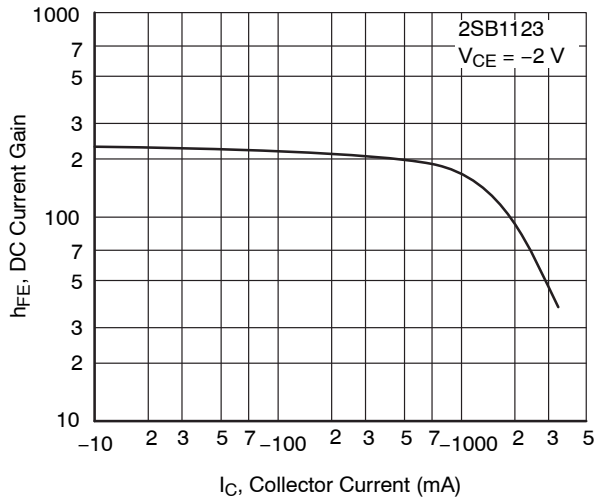
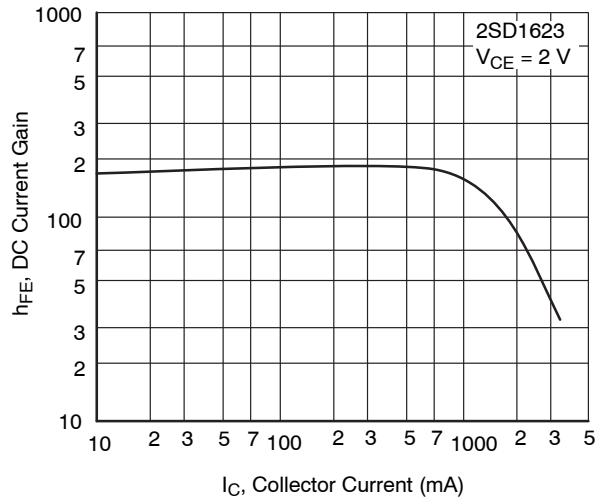


Figure 6.  $I_C - V_{BE}$

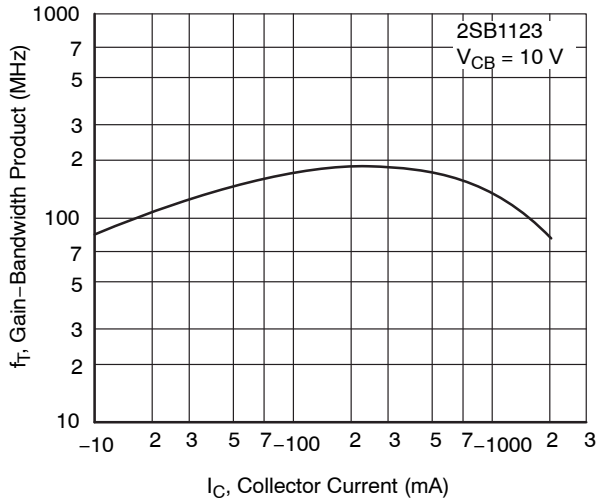
## 2SB1123/2SD1623



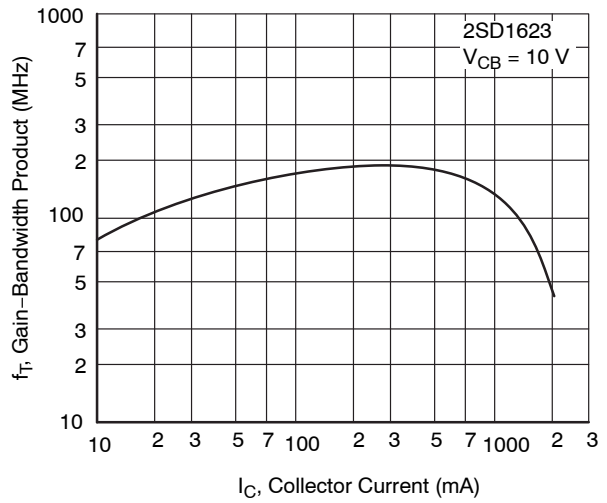
**Figure 7.  $h_{FE} - I_C$**



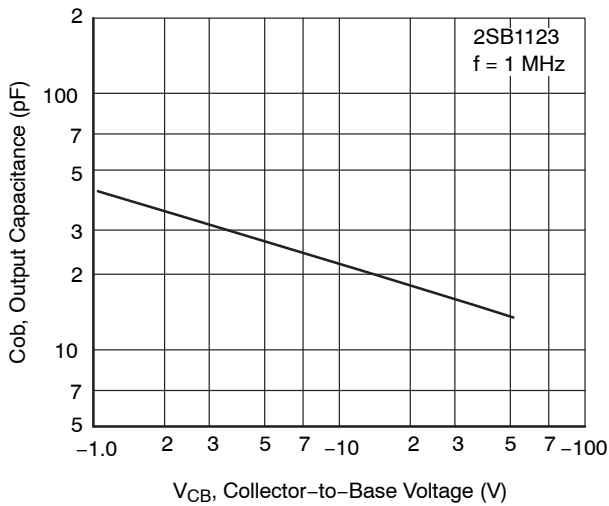
**Figure 8.  $h_{FE} - I_C$**



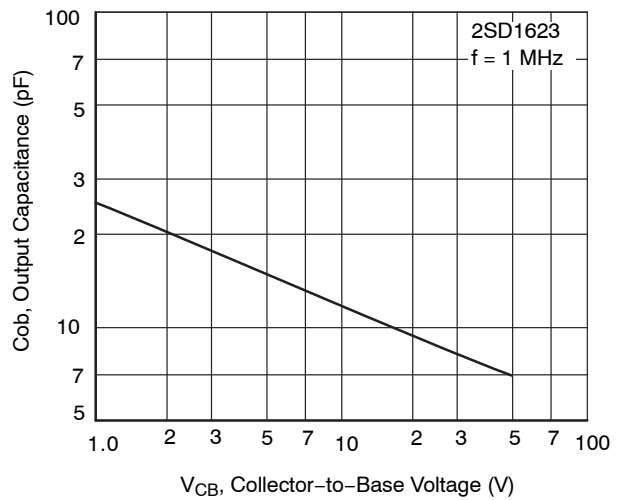
**Figure 9.  $f_T - I_C$**



**Figure 10.  $f_T - I_C$**

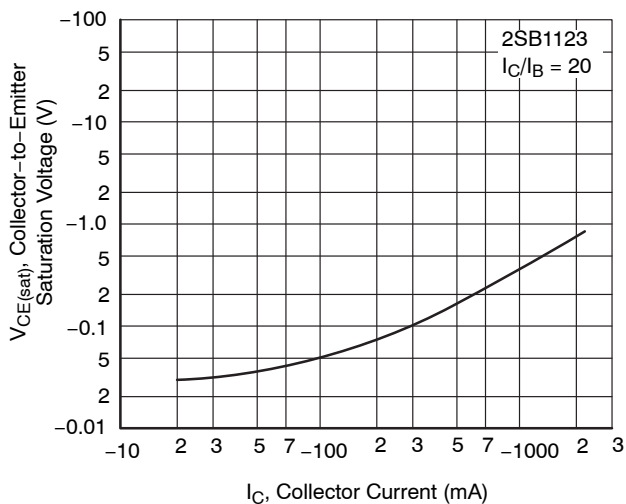


**Figure 11. Cob -  $V_{CB}$**

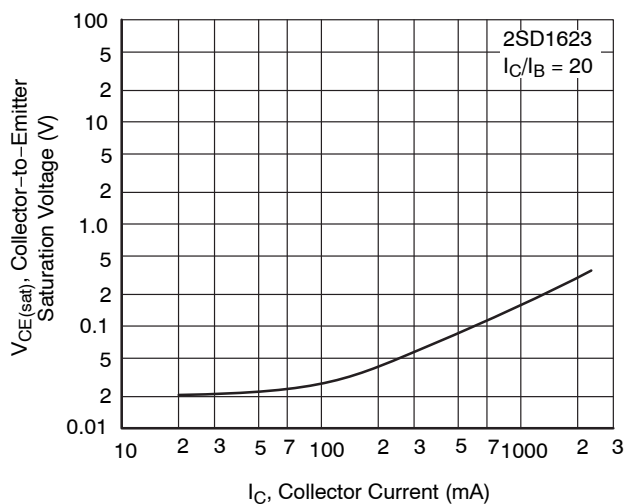


**Figure 12. Cob -  $V_{CB}$**

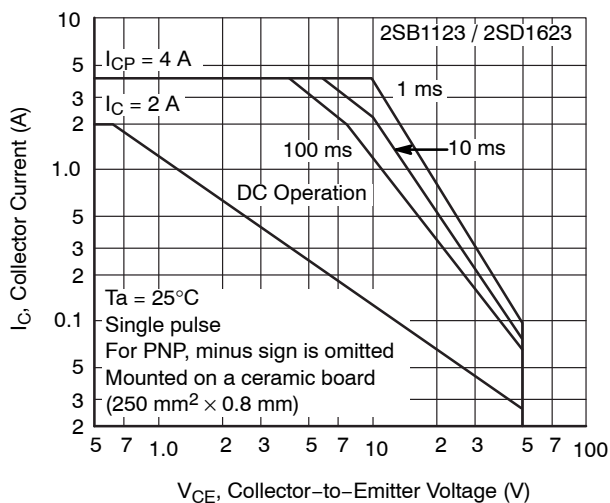
## 2SB1123/2SD1623



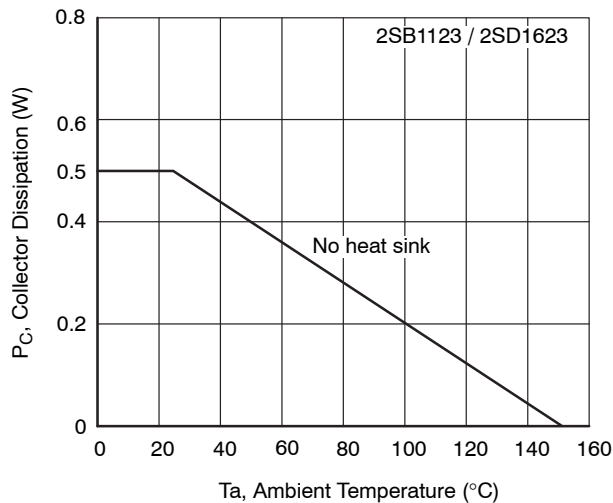
**Figure 13.  $V_{CE(sat)} - I_C$**



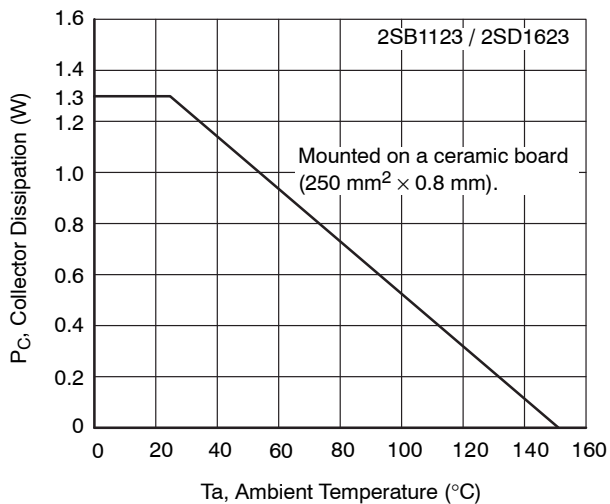
**Figure 14.  $V_{CE(sat)} - I_C$**



**Figure 15. ASO**



**Figure 16.  $P_C - T_a$**



**Figure 17.  $P_C - T_a$**

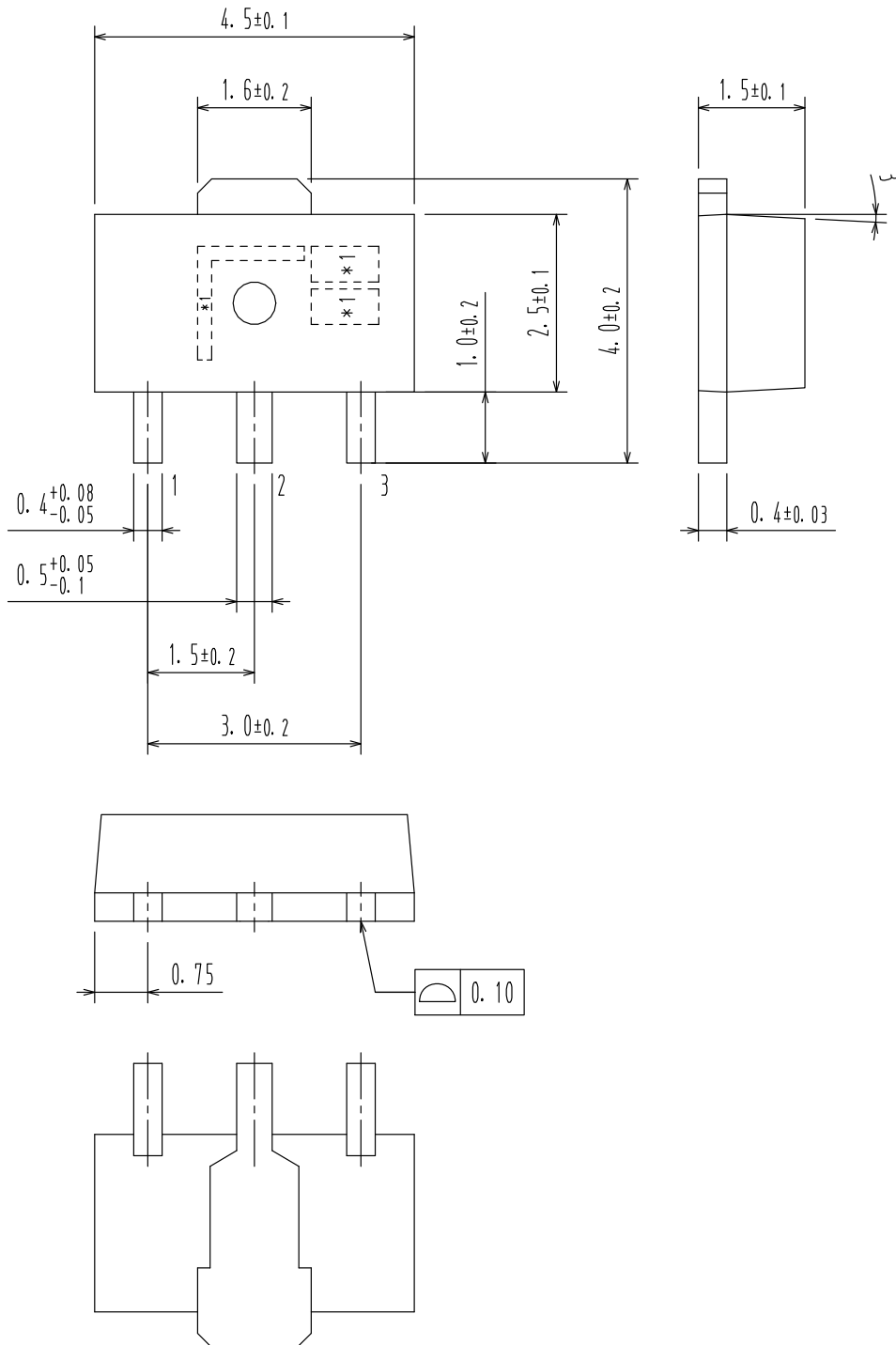
**MECHANICAL CASE OUTLINE**  
**PACKAGE DIMENSIONS**

ON Semiconductor®



**SOT-89 / PCP-1**  
**CASE 419AU**  
**ISSUE 0**

DATE 30 APR 2012



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