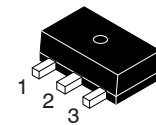


# Bipolar Transistor

(-)160 V, (-)1.5 A, Low  $V_{CE(sat)}$ ,  
(PNP) NPN Single PCP

## 2SA1419, 2SC3649



1. Base
2. Collector
3. Emitter

SOT-89 / PCP-1  
CASE 419AU

### Features

- Adoption of FBET, MBIT Processes
- High Breakdown Voltage and Large Current Capacity
- Ultrasmall Size Making it Easy to Provide High-density, Small-sized Hybrid IC's

### Specifications

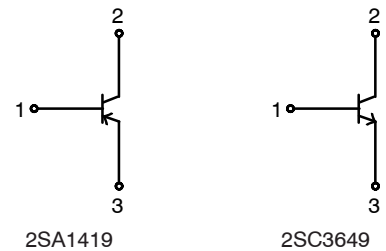
( ): 2SA1419

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

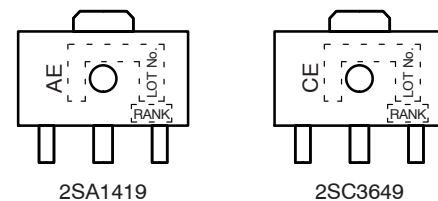
Symbol	Parameter	Conditions	Ratings	Unit
$V_{CBO}$	Collector-to-Base Voltage	-	(-)180	V
$V_{CEO}$	Collector-to-Emitter Voltage	-	(-)160	V
$V_{EBO}$	Emitter-to-Base Voltage	-	(-)6	V
$I_C$	Collector Current	-	(-)1.5	A
$I_{CP}$	Collector Current (Pulse)	-	(-)2.5	A
$P_C$	Collector Dissipation	-	500	mW
		When mounted on ceramic substrate (250 mm <sup>2</sup> x 0.8 mm)	1.5	W
$T_j$	Junction Temperature	-	150	°C
$T_{stg}$	Storage Temperature	-	-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.

### ELECTRICAL CONNECTIONS



### MARKING DIAGRAMS



AE/CE = Specific Device Code

### ORDERING INFORMATION

See detailed ordering and shipping information on page 5 of this data sheet.

## 2SA1419, 2SC3649

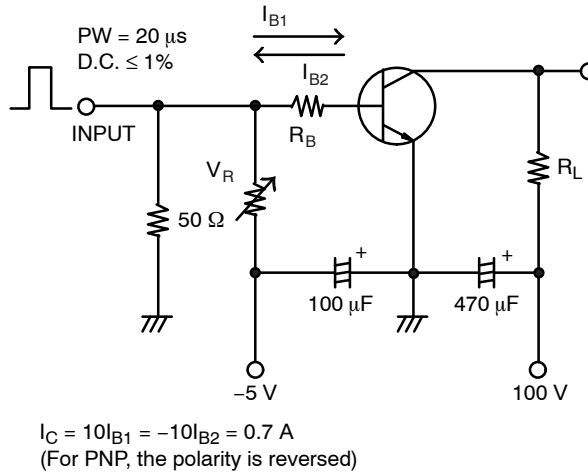
### ELECTRICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ )

Symbol	Parameter	Conditions	Ratings			Unit
			Min	Typ	Max	
$I_{CBO}$	Collector Cutoff Current	$V_{CB} = (-)120\text{ V}, I_E = 0\text{ A}$	-	-	(-) $1$	$\mu\text{A}$
$I_{EBO}$	Emitter Cutoff Current	$V_{EB} = (-)4\text{ V}, I_C = 0\text{ A}$	-	-	(-) $1$	$\mu\text{A}$
$h_{FE1}$	DC Current Gain	$V_{CE} = (-)5\text{ V}, I_C = (-)100\text{ mA}$	100*	-	400*	
$h_{FE2}$		$V_{CE} = (-)5\text{ V}, I_C = (-)10\text{ mA}$	80	-	-	
$f_T$	Gain-Bandwidth Product	$V_{CE} = (-)10\text{ V}, I_C = (-)50\text{ mA}$	-	120	-	MHz
$C_{ob}$	Output Capacitance	$V_{CB} = (-)10\text{ V}, f = 1\text{ MHz}$	-	(22)14	-	pF
$V_{CE(sat)}$	Collector-to-Emitter Saturation Voltage	$I_C = (-)500\text{ mA}, I_B = (-)50\text{ mA}$	-	(-200)130	(-500)450	mV
$V_{BE(sat)}$	Base-to-Emitter Saturation Voltage	$I_C = (-)500\text{ mA}, I_B = (-)50\text{ mA}$	-	(-) $0.85$	(-) $1.2$	V
$V_{(BR)CBO}$	Collector-to-Base Breakdown Voltage	$I_C = (-)10\text{ }\mu\text{A}, I_E = 0\text{ A}$	(-) $180$	-	-	V
$V_{(BR)CEO}$	Collector-to-Emitter Breakdown Voltage	$I_C = (-)1\text{ mA}, R_{BE} = \infty$	(-) $160$	-	-	V
$V_{(BR)EBO}$	Emitter-to-Base Breakdown Voltage	$I_E = (-)10\text{ }\mu\text{A}, I_C = 0\text{ A}$	(-) $6$	-	-	V
$t_{on}$	Turn-ON Time	See specified Test Circuit	-	(40)40	-	ns
$t_{stg}$	Storage Time		-	(0.7)1.2	-	$\mu\text{s}$
$t_f$	Fall Time		-	(40)80	-	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 2SA1419 / 2SC3649 are classified by 100 mA  $h_{FE}$  as follows:

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



**Figure 1. Switching Time Test Circuit**

TYPICAL CHARACTERISTICS

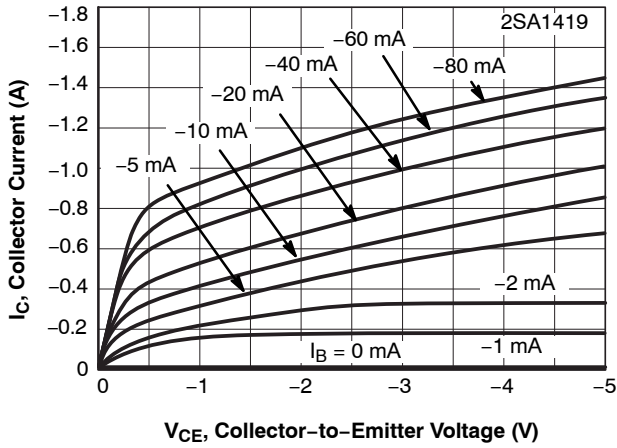


Figure 2.  $I_C - V_{CE}$

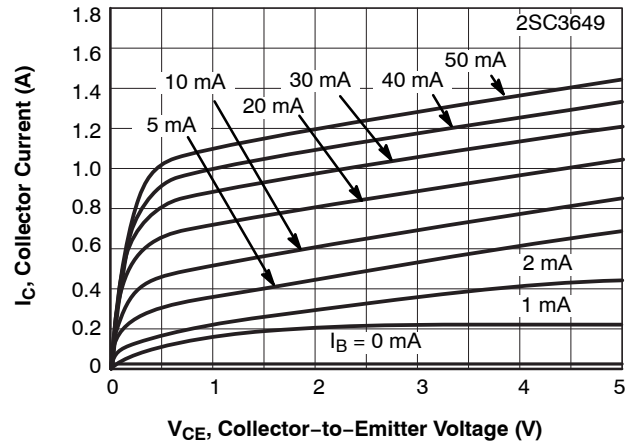


Figure 3.  $I_C - V_{CE}$

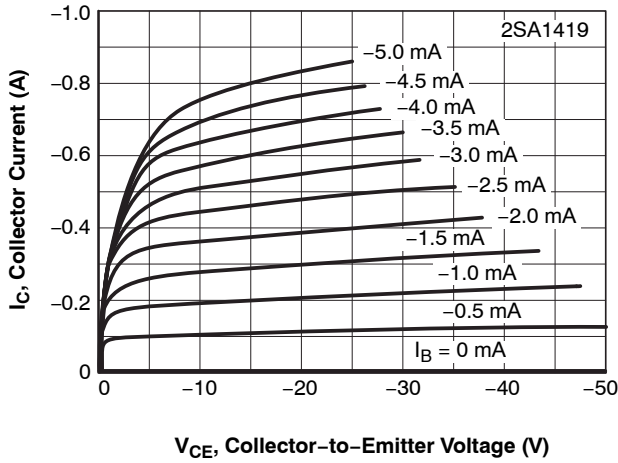


Figure 4.  $I_C - V_{CE}$

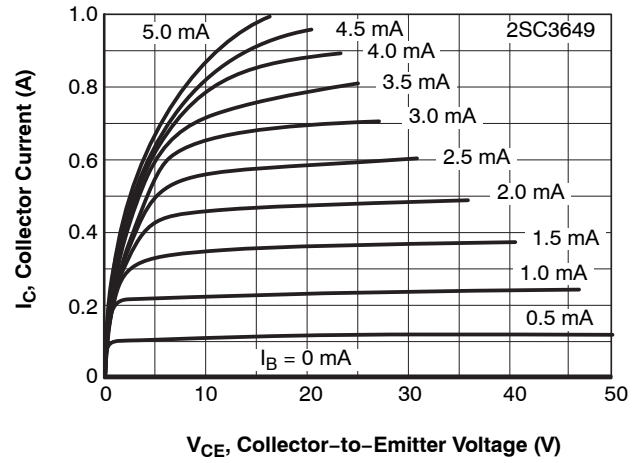


Figure 5.  $I_C - V_{CE}$

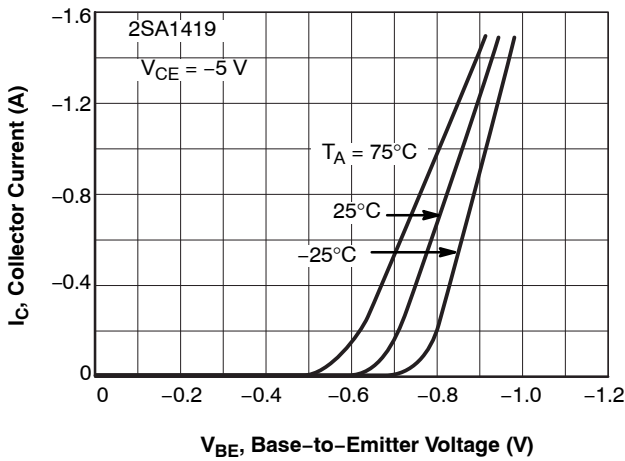


Figure 6.  $I_C - V_{BE}$

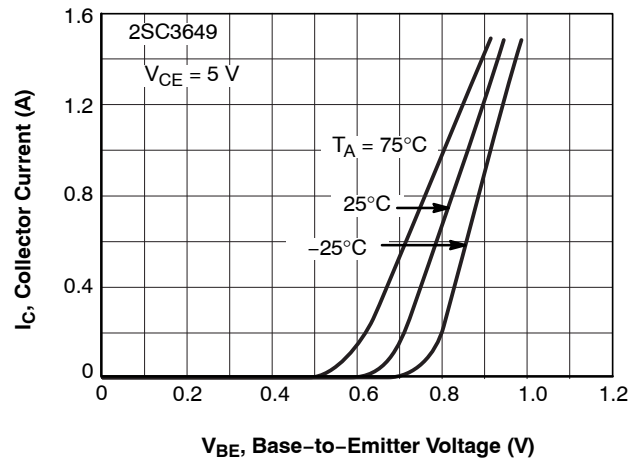


Figure 7.  $I_C - V_{BE}$

# 2SA1419, 2SC3649

## TYPICAL CHARACTERISTICS (continued)

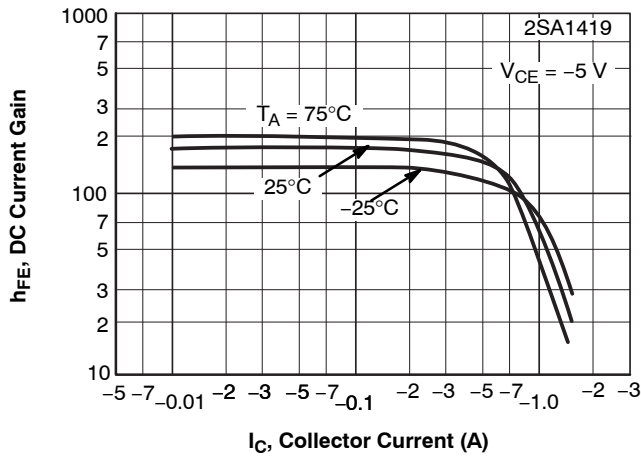


Figure 8.  $h_{FE} - I_C$

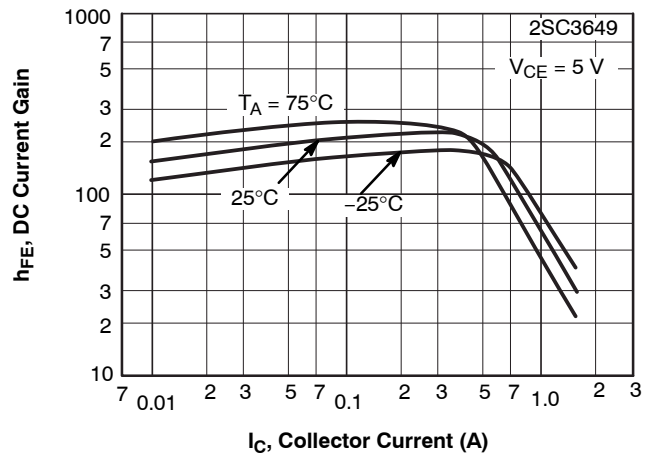


Figure 9.  $h_{FE} - I_C$

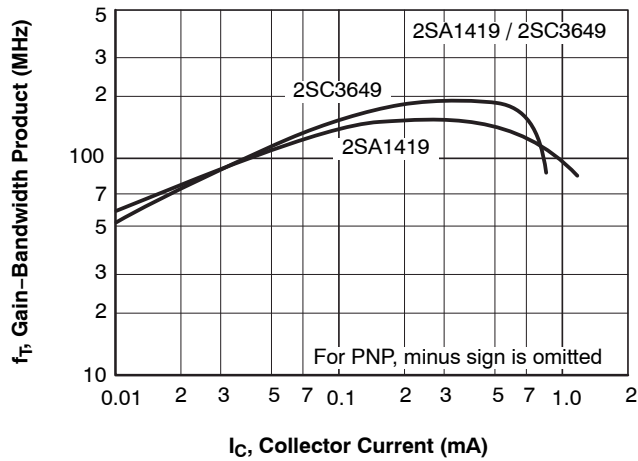


Figure 10.  $f_T - I_C$

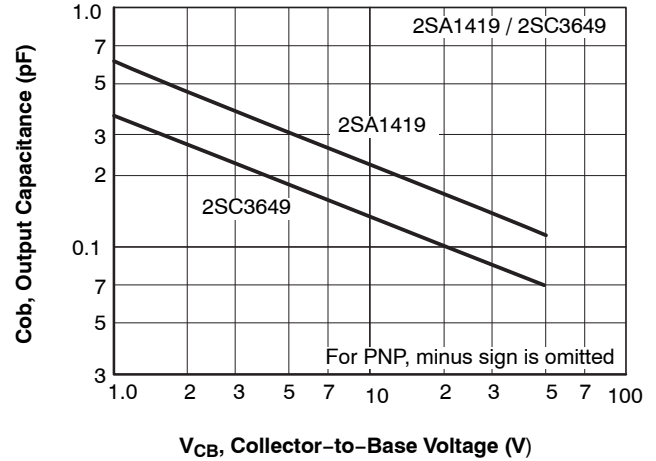


Figure 11.  $C_{ob} - V_{CB}$

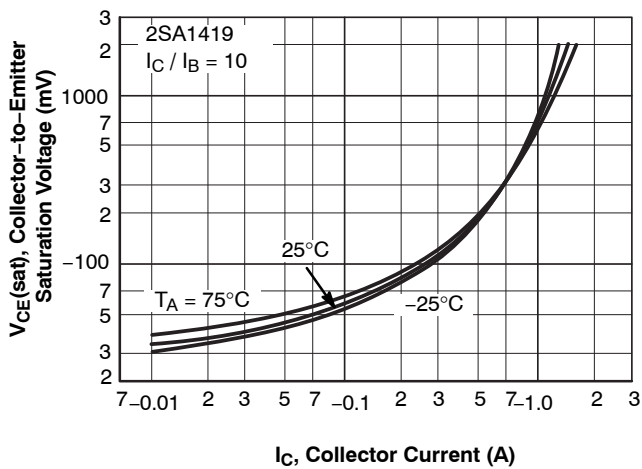


Figure 12.  $V_{CE(sat)} - I_C$

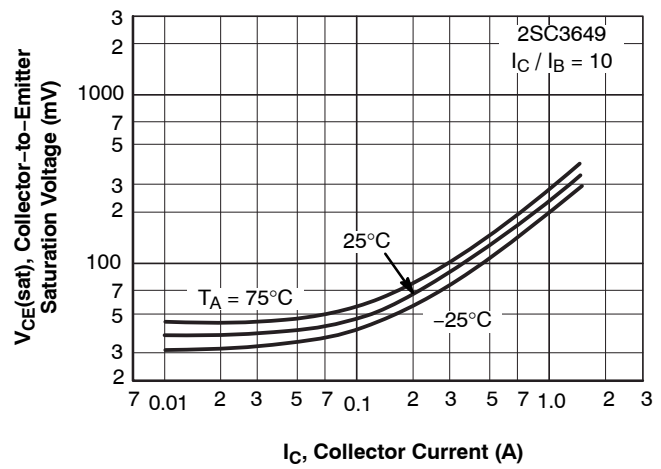


Figure 13.  $V_{CE(sat)} - I_C$

# 2SA1419, 2SC3649

## TYPICAL CHARACTERISTICS (continued)

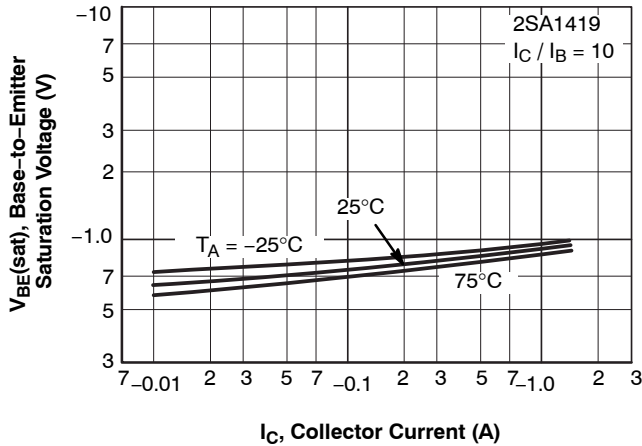


Figure 14.  $V_{BE(sat)} - I_C$

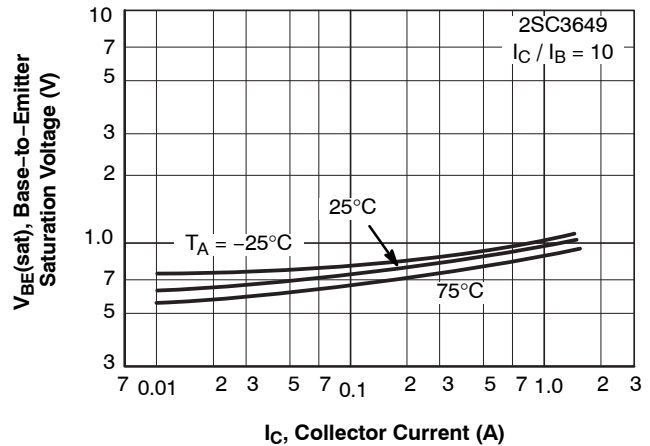


Figure 15.  $V_{BE(sat)} - I_C$

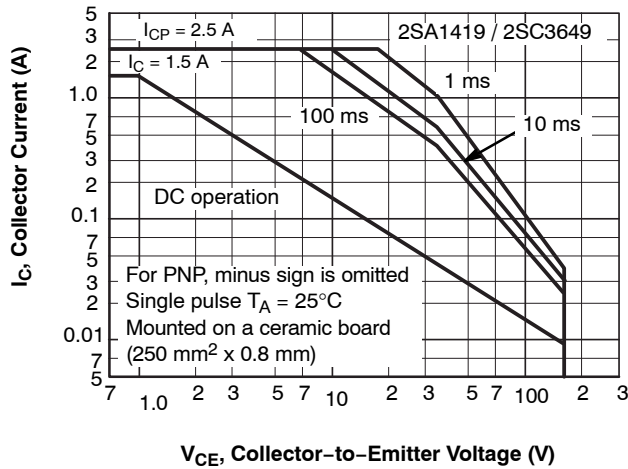


Figure 16. ASO

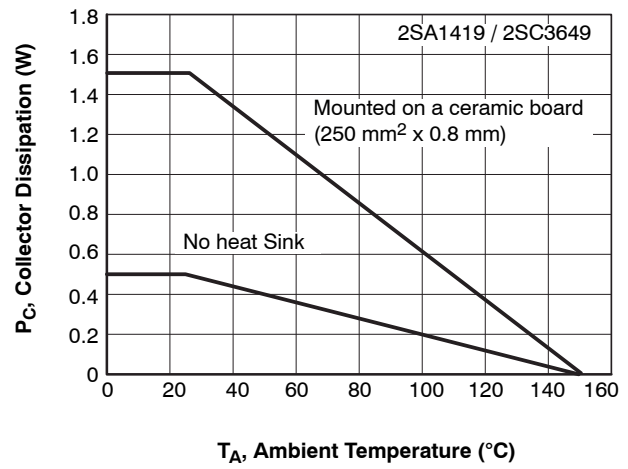


Figure 17.  $P_C - T_A$

### ORDERING INFORMATION

Device	Package	Shipping <sup>†</sup>
2SA1419S-TD-E	SOT-89 / PCP-1 (Pb-Free)	1000 / Tape & Reel
2SA1419T-TD-E	SOT-89 / PCP-1 (Pb-Free)	1000 / Tape & Reel
2SA1419T-TD-H	SOT-89 / PCP-1 (Pb-Free, Halide Free)	1000 / Tape & Reel
2SC3649S-TD-E	SOT-89 / PCP-1 (Pb-Free)	1000 / Tape & Reel
2SC3649S-TD-H	SOT-89 / PCP-1 (Pb-Free & Halogen Free)	1000 / Tape & Reel
2SC3649T-TD-E	SOT-89 / PCP-1 (Pb-Free)	1000 / Tape & Reel
2SC3649T-TD-H	SOT-89 / PCP-1 (Pb-Free & Halogen Free)	1000 / 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](#).

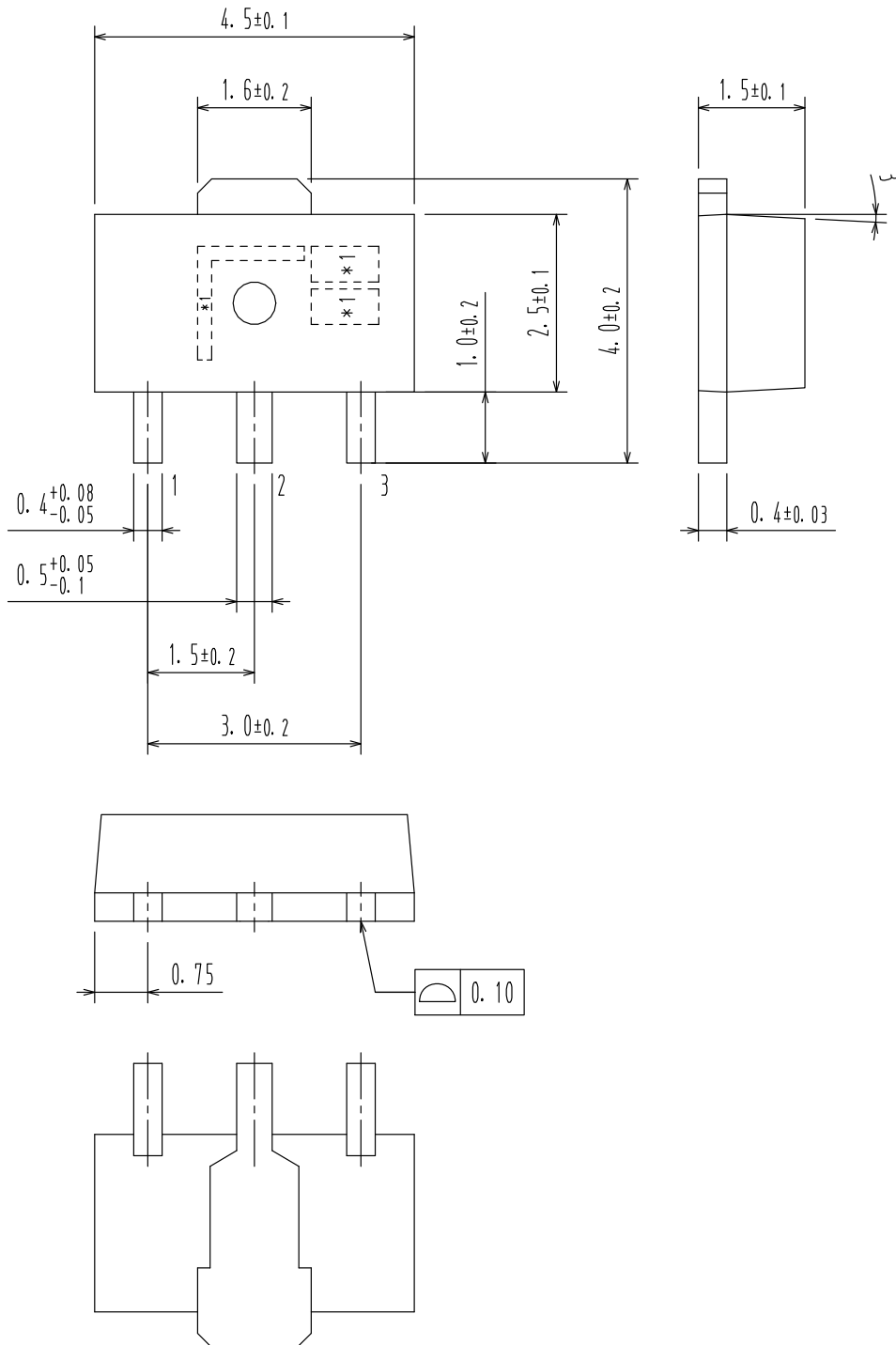
**MECHANICAL CASE OUTLINE**  
**PACKAGE DIMENSIONS**

ON Semiconductor®



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

DATE 30 APR 2012



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