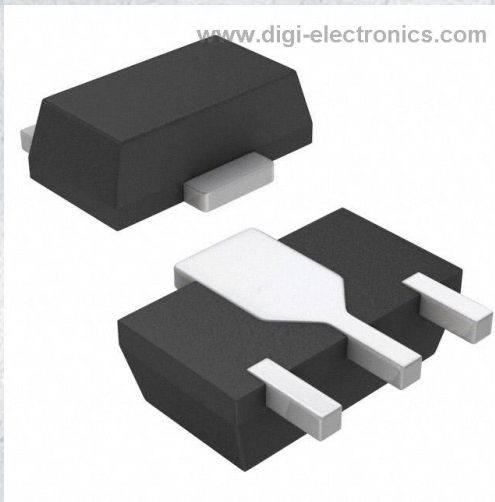


# 2SC5994-TD-E Datasheet



<https://www.DiGi-Electronics.com>

|                              |  |
|------------------------------|--|
| DiGi Electronics Part Number | 2SC5994-TD-E-DG  |
| Manufacturer                 | <a href="#">onsemi</a>   |
| Manufacturer Product Number  | 2SC5994-TD-E   |
| Description                  | TRANS NPN 50V 2A PCP   |
| Detailed Description         | Bipolar (BJT) Transistor NPN 50 V 2 A 420MHz 1.3 W Surface Mount PCP |



Tel: +00 852-30501935

RFQ Email: [Info@DiGi-Electronics.com](mailto:Info@DiGi-Electronics.com)

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## Purchase and inquiry

Manufacturer Product Number:

2SC5994-TD-E

Series:

-

Transistor Type:

NPN

Voltage - Collector Emitter Breakdown (Max):

50 V

Current - Collector Cutoff (Max):

1 $\mu$ A (ICBO)

Power - Max:

1.3 W

Operating Temperature:

150°C (TJ)

Package / Case:

TO-243AA

Base Product Number:

2SC5994

Manufacturer:

onsemi

Product Status:

Active

Current - Collector (Ic) (Max):

2 A

Vce Saturation (Max) @ Ib, Ic:

300mV @ 50mA, 1A

DC Current Gain (hFE) (Min) @ Ic, Vce:

200 @ 100mA, 2V

Frequency - Transition:

420MHz

Mounting Type:

Surface Mount

Supplier Device Package:

PCP

## Environmental & Export classification

RoHS Status:

ROHS3 Compliant

REACH Status:

REACH Unaffected

HTSUS:

8541.29.0075

Moisture Sensitivity Level (MSL):

1 (Unlimited)

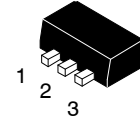
ECCN:

EAR99

# Bipolar Transistor

50 V, 2 A, Low  $V_{CE(sat)}$ , NPN Single

## 2SC5994



SOT-89 / PCP-1  
CASE 419AU

### Features

- Adoption of MBIT Process
- Low Collector to Emitter Saturation Voltage
- Large Current Capacity
- High Speed Switching

### Applications

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

### SPECIFICATIONS

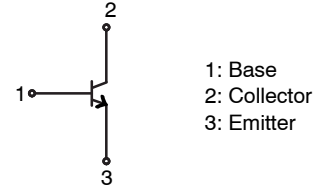
**ABSOLUTE MAXIMUM RATINGS** at  $T_a = 25^\circ\text{C}$

| Parameter   | Symbol    | Value       | Unit             |
|---|-----------|-------------|------------------|
| Collector to Base Voltage                                     | $V_{CBO}$ | 100         | V                |
| Collector to Emitter Voltage                                  | $V_{CES}$ | 100         | V                |
|   | $V_{CEO}$ | 50          | V                |
| Emitter to Base Voltage                                       | $V_{EBO}$ | 6           | V                |
| Collector Current   | $I_C$     | 2           | A                |
| Collector Current (Pulse)                                     | $I_{CP}$  | 4           | A                |
| Base Current  | $I_B$     | 400         | mA               |
| Collector Dissipation<br>(Note 1)<br>$T_C = 25^\circ\text{C}$ | $P_C$     | 1.3         | W                |
|   |           | 3.5         |                  |
| Junction Temperature  | $T_J$     | 150         | $^\circ\text{C}$ |
| Storage Temperature   | $T_{STG}$ | -55 to +150 | $^\circ\text{C}$ |

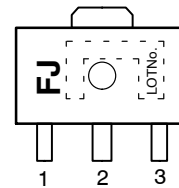
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1. Surface mounted on ceramic substrate (450 mm<sup>2</sup> x 0.8 mm).

### ELECTRICAL CONNECTION



### MARKING DIAGRAM



FJ = Specific Device Code

### ORDERING INFORMATION

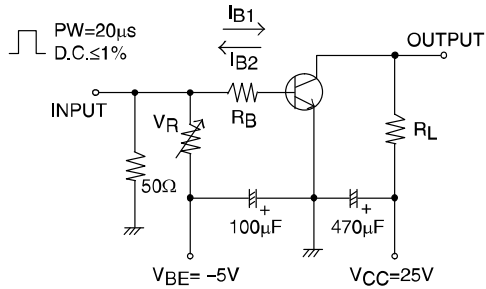
| Device       | Package           | Shipping <sup>†</sup> |
|--------------|-------------------|-----------------------|
| 2SC5994-TD-E | SOT-89 /<br>PCP-1 | 1000 /<br>Tape & Reel |

<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](#).

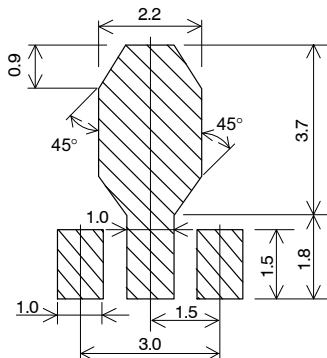
**2SC5994****ELECTRICAL CHARACTERISTICS** at  $T_A = 25^\circ\text{C}$ 

| Parameter                               | Symbol        | Conditions   | Value |     |     | Unit          |
|---|---------------|--|-------|-----|-----|---------------|
|   |               |  | Min   | Typ | Max |               |
| Collector Cutoff Current                | $I_{CBO}$     | $V_{CB} = 50\text{ V}, I_E = 0\text{ A}$                 |       |     | 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                         | $h_{FE1}$     | $V_{CE} = 2\text{ V}, I_C = 100\text{ mA}$               | 200   |     | 560 |               |
|   | $h_{FE2}$     | $V_{CE} = 2\text{ V}, I_C = 1.5\text{ A}$                | 40    |     |     |               |
| Gain-Bandwidth Product                  | $f_T$         | $V_{CE} = 10\text{ V}, I_C = 300\text{ mA}$              |       | 420 |     | MHz           |
| Output Capacitance                      | $C_{ob}$      | $V_{CB} = 10\text{ V}, f = 1\text{ MHz}$                 |       | 9   |     | pF            |
| Collector to Emitter Saturation Voltage | $V_{CE(sat)}$ | $I_C = 1\text{ A}, I_B = 50\text{ mA}$                   |       | 135 | 300 | mV            |
| 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     | $V_{(BR)CBO}$ | $I_C = 10\text{ }\mu\text{A}, I_E = 0\text{ A}$          | 100   |     |     | V             |
| Collector to Emitter Breakdown Voltage  | $V_{(BR)CES}$ | $I_C = 100\text{ }\mu\text{A}, R_{BE} = 0\text{ }\Omega$ | 100   |     |     | V             |
|   | $V_{(BR)CEO}$ | $I_C = 1\text{ mA}, R_{BE} = \infty$                     | 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                               |       | 30  |     | ns            |
| Storage Time                            | $t_{stg}$     |  |       | 330 |     | ns            |
| Fall Time                               | $t_f$         |  |       | 40  |     | 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.

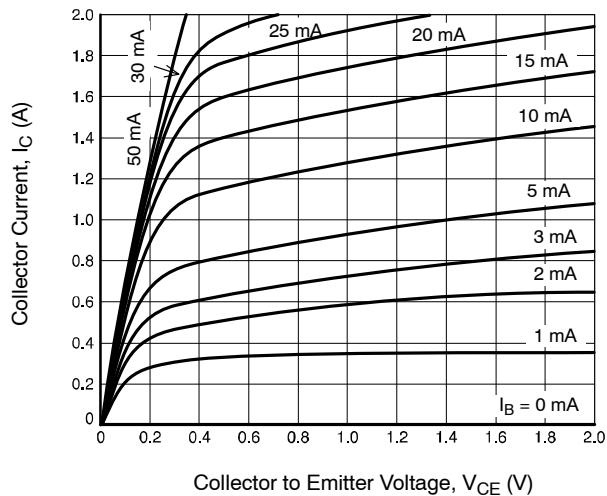
**Switching Time Test Circuit**

$$I_C = 10\text{ mA}, I_{B1} = -10\text{ mA}, I_{B2} = 700\text{ mA}$$

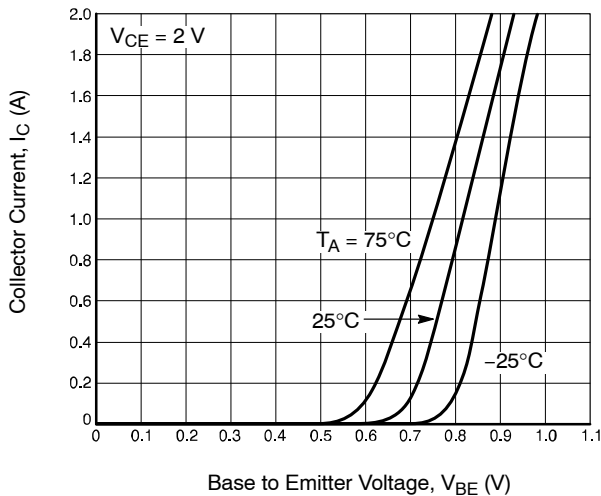
**Recommended Soldering Footprint**

# 2SC5994

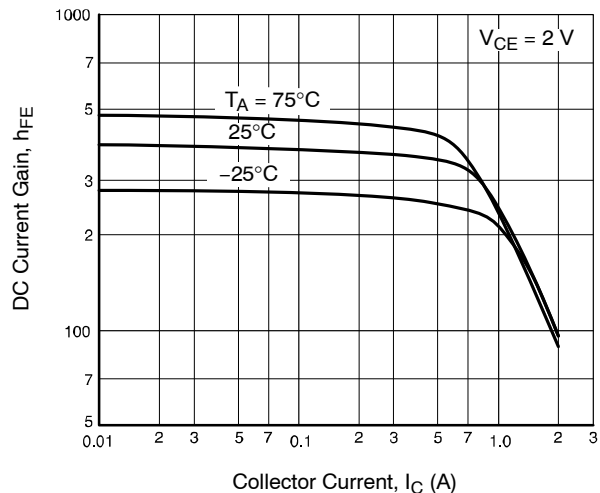
## TYPICAL CHARACTERISTICS



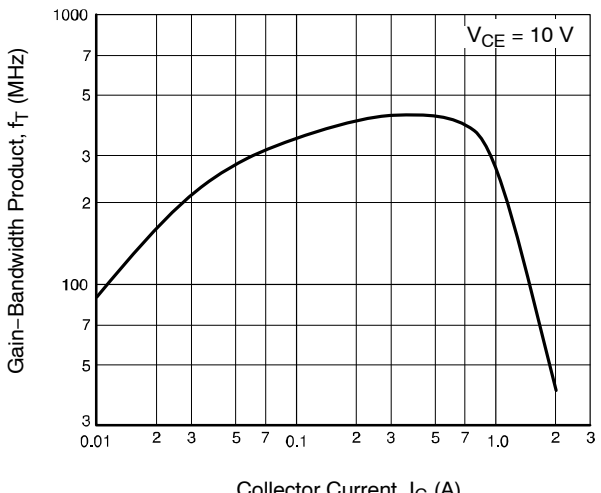
**Figure 1.  $I_C - V_{CE}$**



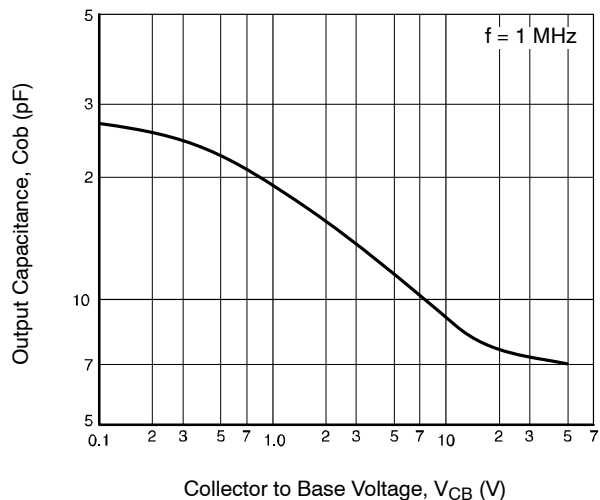
**Figure 2.  $I_C - V_{BE}$**



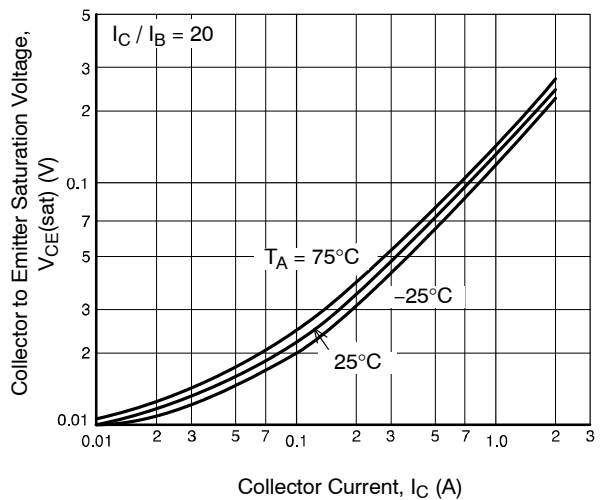
**Figure 3.  $h_{FE} - I_C$**



**Figure 4.  $f_T - I_C$**



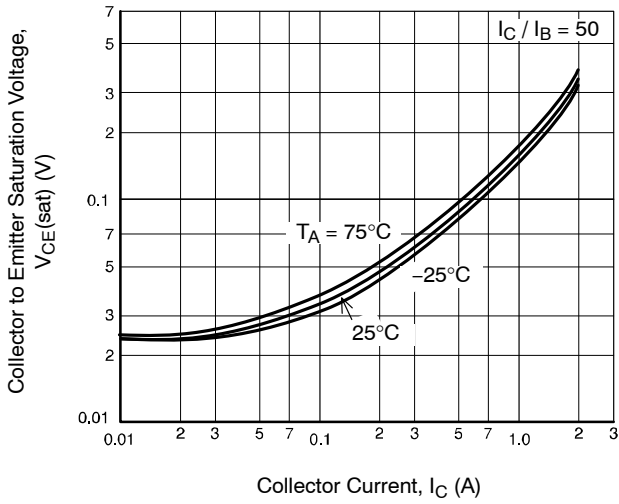
**Figure 5.  $C_{ob} - V_{CB}$**



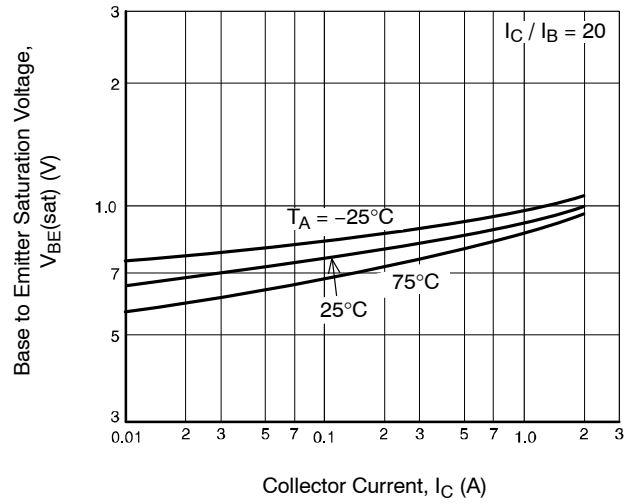
**Figure 6.  $V_{CE(sat)} - I_C$**

## 2SC5994

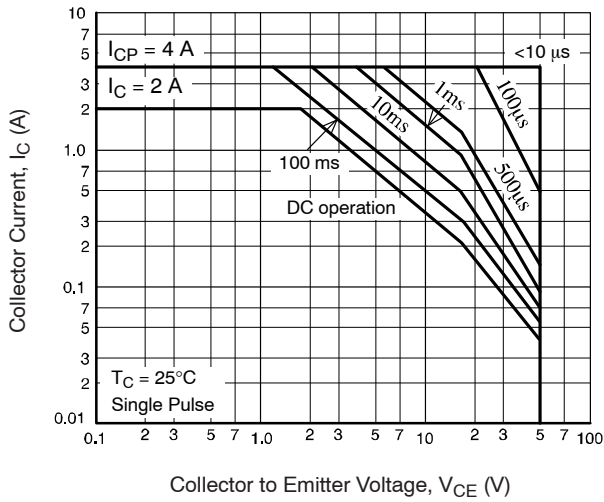
### TYPICAL CHARACTERISTICS (continued)



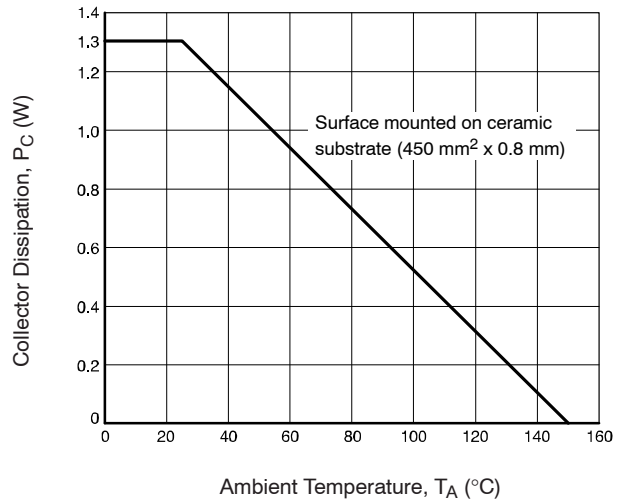
**Figure 7.  $V_{CE(sat)} - I_C$**



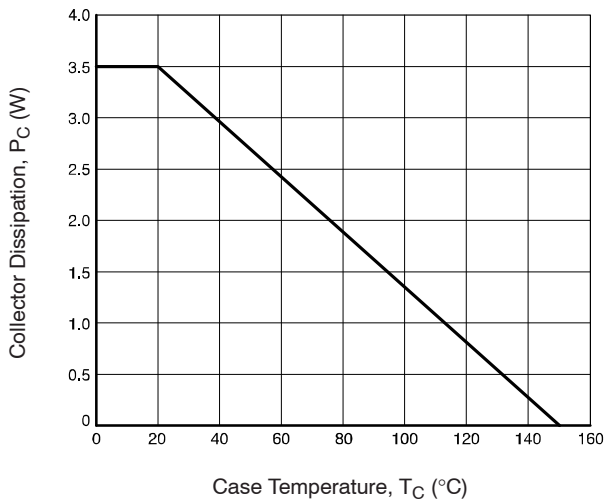
**Figure 8.  $V_{BE(sat)} - I_C$**



**Figure 9. ASO**



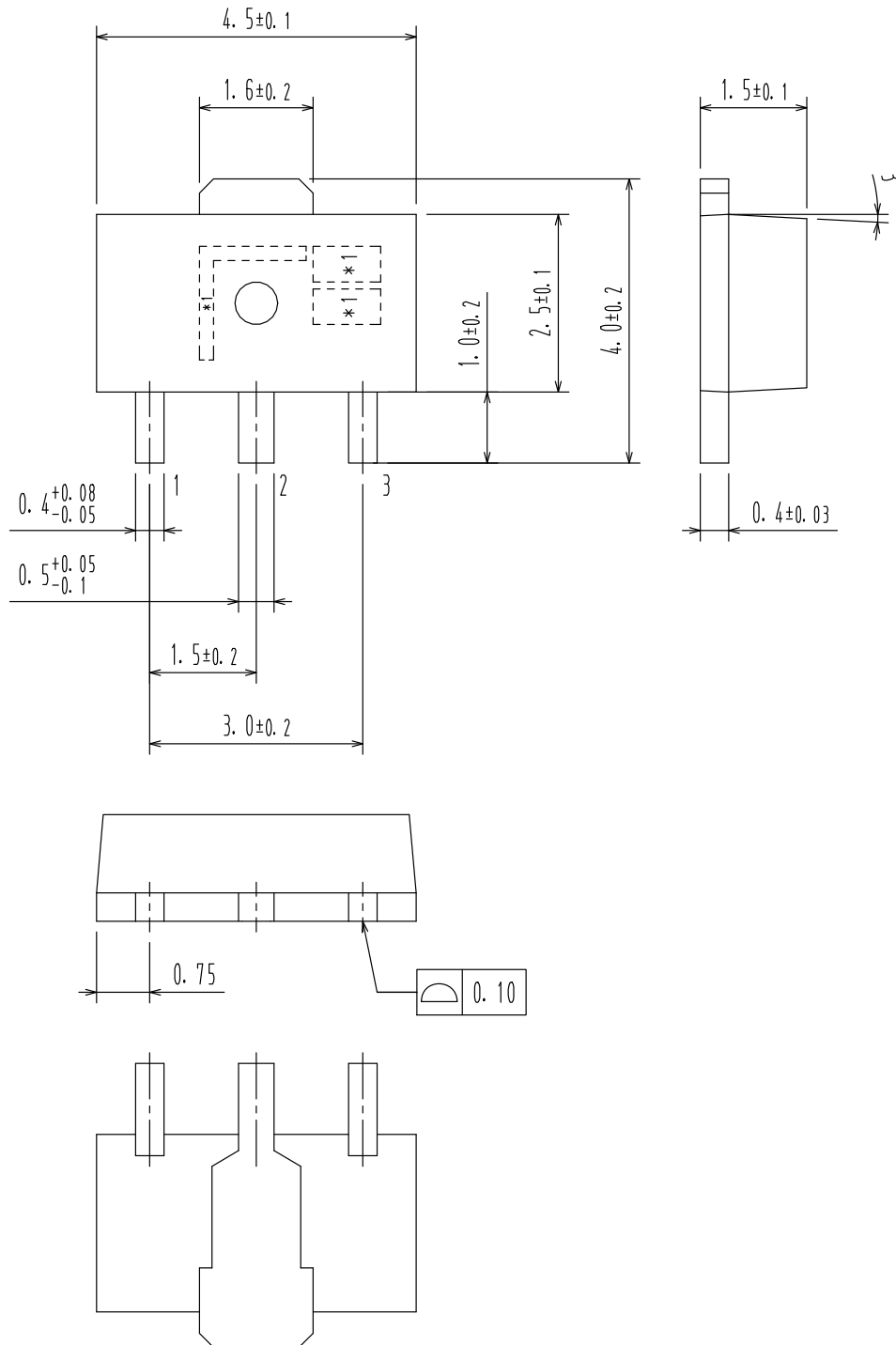
**Figure 10.  $P_C - T_A$**



**Figure 11.  $P_C - T_C$**

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

DATE 30 APR 2012



|                         |                       |   |
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