

# Bipolar Transistor

(-)100 V, (-)1 A, Low  $V_{CE(sat)}$ ,  
(PNP)NPN Single PCP

## 2SA1416, 2SC3646

### 特長

- FBET, MBIT プロセス採用
- スイッチングタイムが速い
- 超小型でハイブリットIC 用として高密度化, 小型化が容易である
- 高耐圧で電流容量が大きい
- These Devices are Pb-Free and are RoHS Compliant

( ) 内は 2SA1416 の場合を示す。  
絶対最大定格 ABSOLUTE MAXIMUM RATINGS at  $T_a = 25^\circ\text{C}$

項目	記号	定格値	Unit
コレクタ・ベース電	$V_{CBO}$	(-) 120	V
コレクタ・エミッタ電	$V_{CEO}$	(-) 100	V
エミッタ・ベース電圧	$V_{EBO}$	(-) 6	V
コレクタ電流	$I_C$	(-) 1	A
コレクタ電流 (パルス)	$I_{CP}$	(-) 2	A
コレクタ損失	$P_C$	500	mW
コレクタ損失 (注1)		1.3	W
接合部温度	$T_J$	150	$^\circ\text{C}$
保存周囲温度	$T_{STG}$	-55 to +150	$^\circ\text{C}$

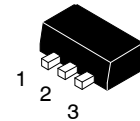
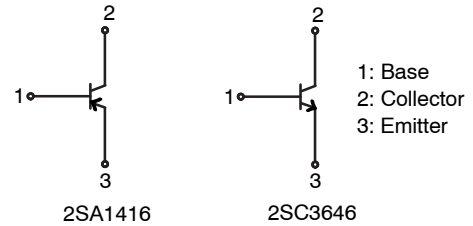
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

(参考訳)

最大定格を超えるストレスは、デバイスにダメージを与える危険性があります。これらの定格値を超えた場合は、デバイスの機能性を損ない、ダメージが生じ、信頼性に影響を及ぼす危険性があります。

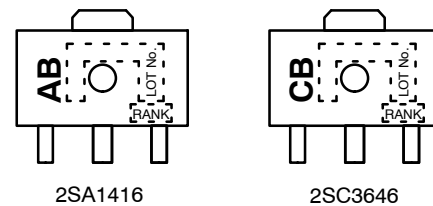
1. セラミック基板 (250mm<sup>2</sup> y 0.8mm) 装着時

### 電氣的接続図



SOT-89 / PCP-1  
CASE 419AU

### MARKING DIAGRAM



### ORDERING INFORMATION

See detailed ordering and shipping information on page 6 of this data sheet.

## 2SA1416, 2SC3646

電気的特性 ELECTRICAL CHARACTERISTICS at  $T_A = 25^\circ\text{C}$

項目	記号	条件	定格値			Unit
			Min	Typ	Max	
コレクタしゃ断電	$I_{CBO}$	$V_{CB} = (-)100\text{ V}$ , $I_E = 0\text{ A}$			(-)100	nA
エミッタしゃ断電流	$I_{EBO}$	$V_{EB} = (-)4\text{ V}$ , $I_C = 0\text{ A}$			(-)100	nA
直流電流増幅率	$h_{FE}$	$V_{CE} = (-)5\text{ V}$ , $I_C = (-)100\text{ mA}$	100*		400*	
利得帯域幅積	$f_T$	$V_{CE} = (-)10\text{ V}$ , $I_C = (-)100\text{ mA}$		120		MHz
出力容量	$C_{ob}$	$V_{CB} = (-)10\text{ V}$ , $f = 1\text{ MHz}$		(13)8.5		pF
コレクタ・エミッタ飽和電圧	$V_{CE(sat)}$	$I_C = (-)400\text{ mA}$ , $I_B = (-)40\text{ mA}$		(-0.2)0.1	(-0.6)0.4	V
ベース・エミッタ飽和電圧	$V_{BE(sat)}$	$I_C = (-)400\text{ mA}$ , $I_B = (-)40\text{ mA}$		(-)0.85	(-)1.2	V
コレクタ・ベース降伏電圧	$V_{(BR)CBO}$	$I_C = (-)10\text{ }\mu\text{A}$ , $I_E = 0\text{ A}$	(-)120			V
コレクタ・エミッタ降伏電圧	$V_{(BR)CEO}$	$I_C = (-)1\text{ mA}$ , $R_{BE} = \infty$	(-)100			V
エミッタ・ベース降伏電圧	$V_{(BR)EBO}$	$I_E = (-)10\text{ }\mu\text{A}$ , $I_C = 0\text{ A}$	(-)6			V
ターンオン時間	$t_{on}$	指定回路において		(80)80		ns
蓄積時間	$t_{stg}$			(700)850		ns
下降時間	$t_f$			(40)50		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.

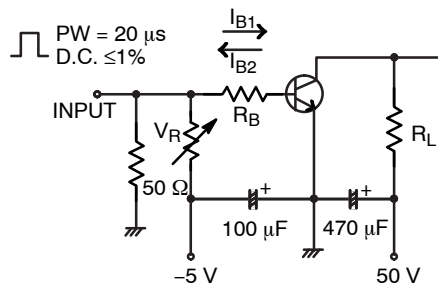
(参考訳)

製品パラメータは、特別な記述が無い限り、記載されたテスト条件に対する電気的特性で示しています。異なる条件下で製品動作を行った時には、電気的特性で示している特性を得られない場合があります。

\*2SA1416 / 2SC3646 は 100 mA  $h_{FE}$  により次のように分類している。

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

### スイッチングタイム測定回路図



$I_C = 10\text{ mA}$   $I_{B1} = -10\text{ mA}$   $I_{B2} = 400\text{ mA}$   
(PNPの場合極性逆)

# 2SA1416, 2SC3646

## TYPICAL CHARACTERISTICS

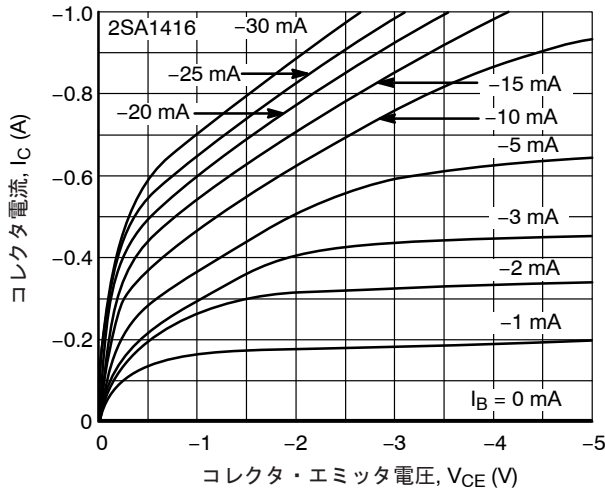


図 1.  $I_C - V_{CE}$

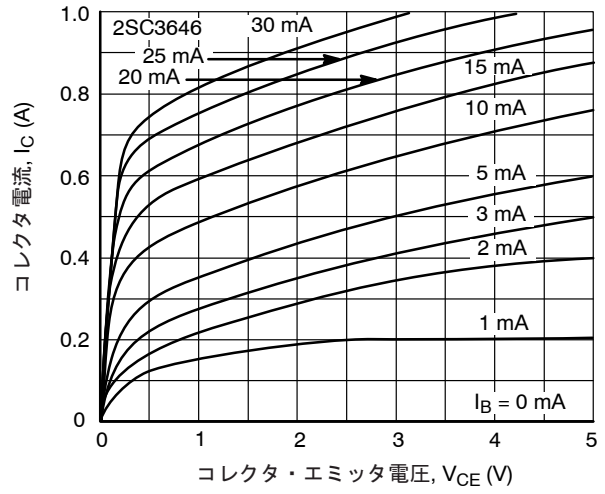


図 2.  $I_C - V_{CE}$

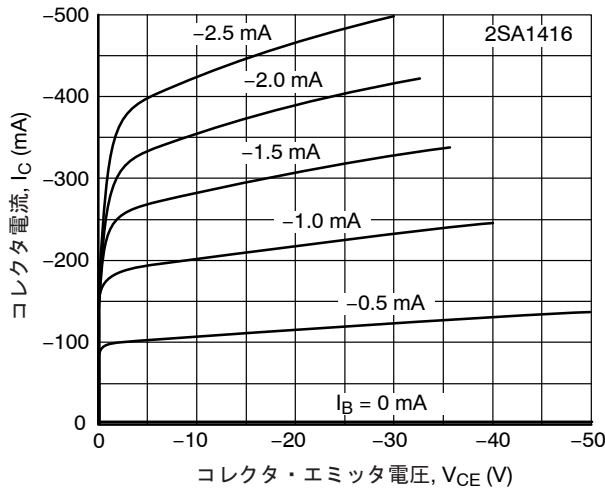


図 3.  $I_C - V_{CE}$

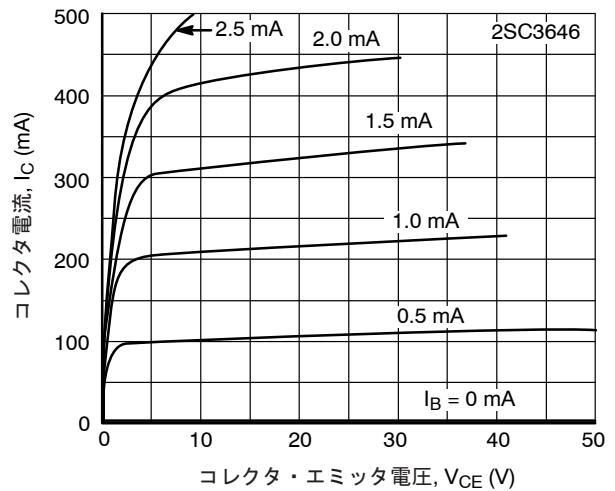


図 4.  $I_C - V_{CE}$

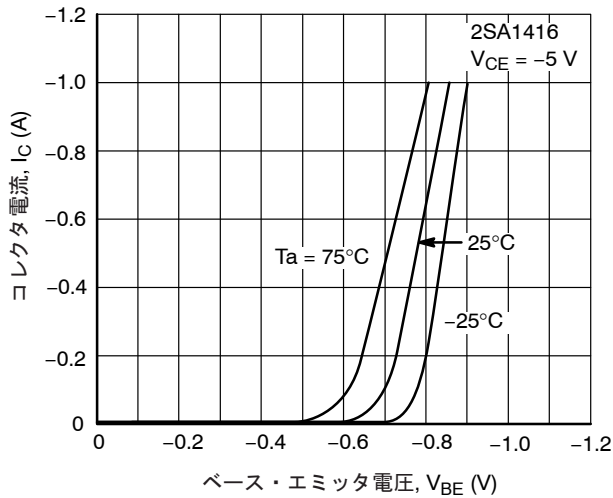


図 5.  $I_C - V_{BE}$

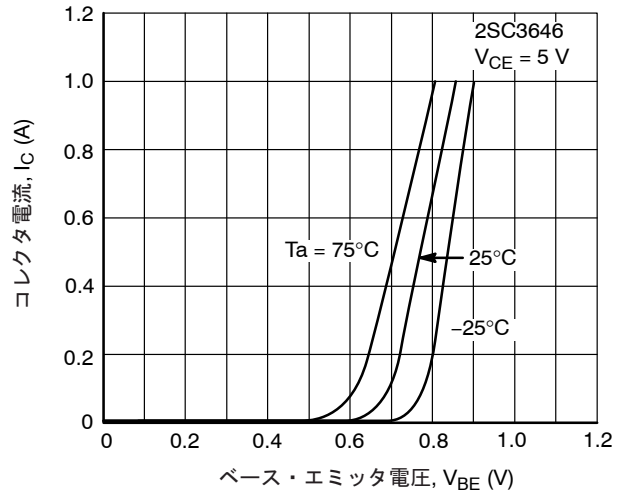


図 6.  $I_C - V_{BE}$

# 2SA1416, 2SC3646

## TYPICAL CHARACTERISTICS (continued)

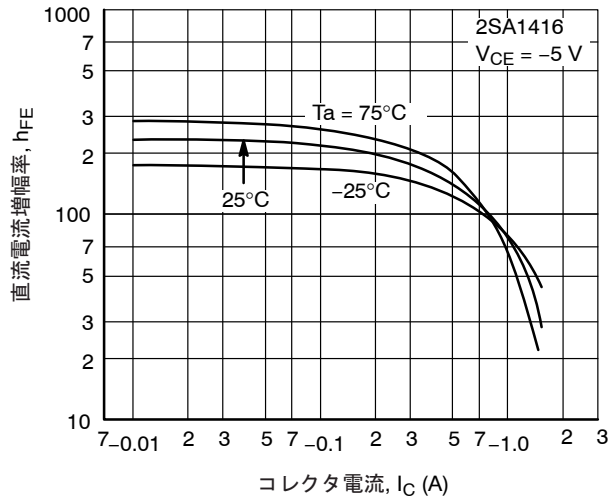


図 7.  $h_{FE} - I_C$

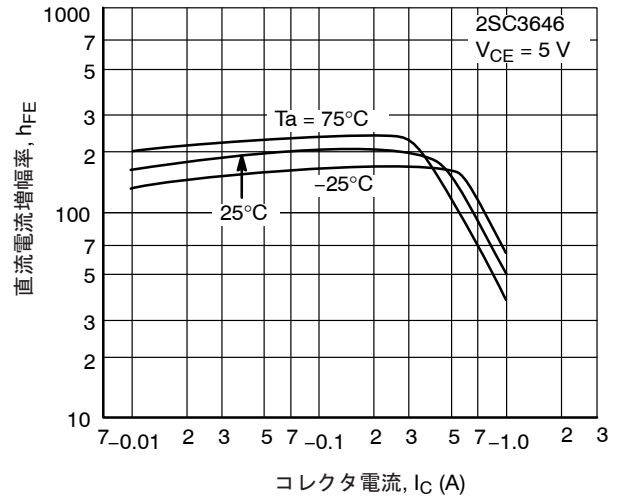


図 8.  $h_{FE} - I_C$

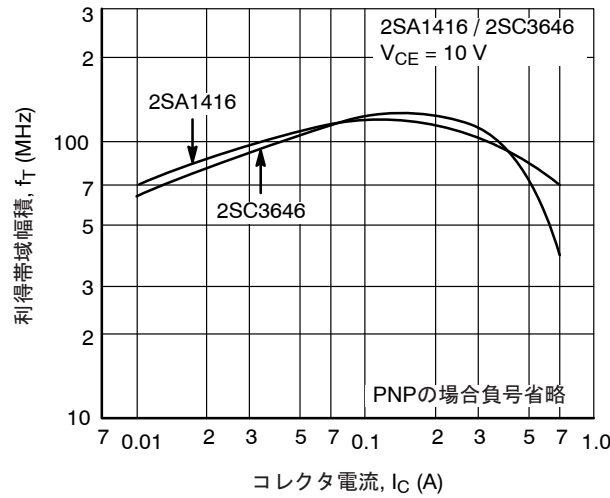


図 9.  $f_T - I_C$

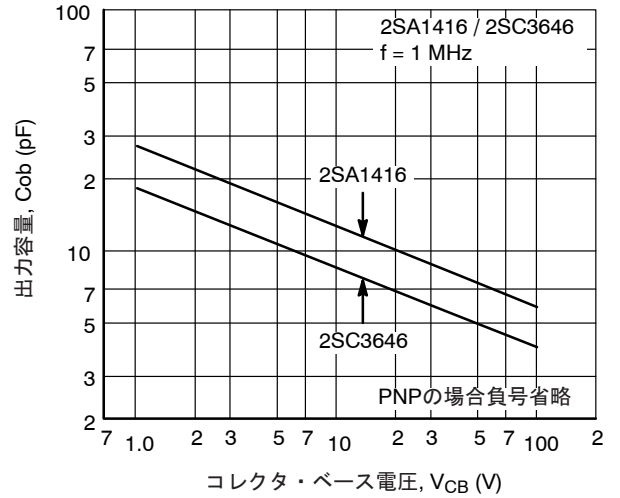


図 10.  $C_{ob} - V_{CB}$

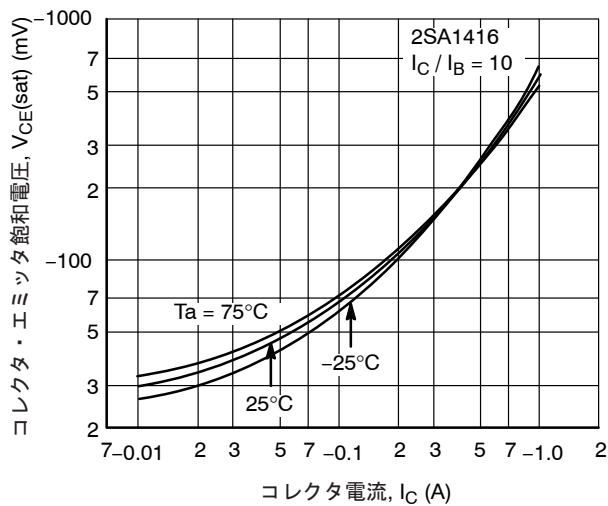


図 11.  $V_{CE(sat)} - I_C$

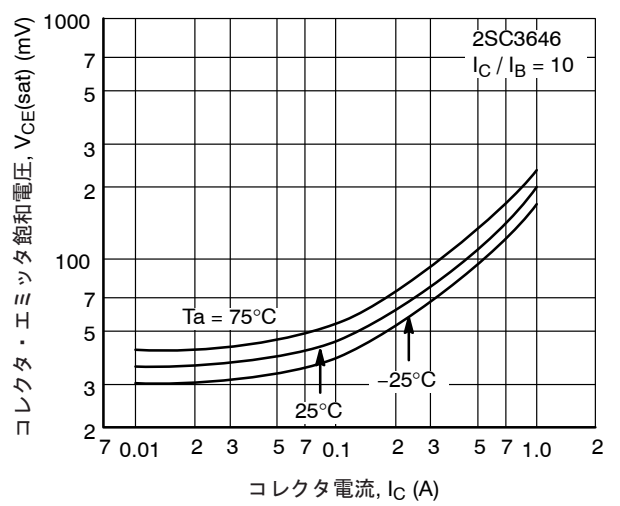


図 12.  $V_{CE(sat)} - I_C$

# 2SA1416, 2SC3646

## TYPICAL CHARACTERISTICS (continued)

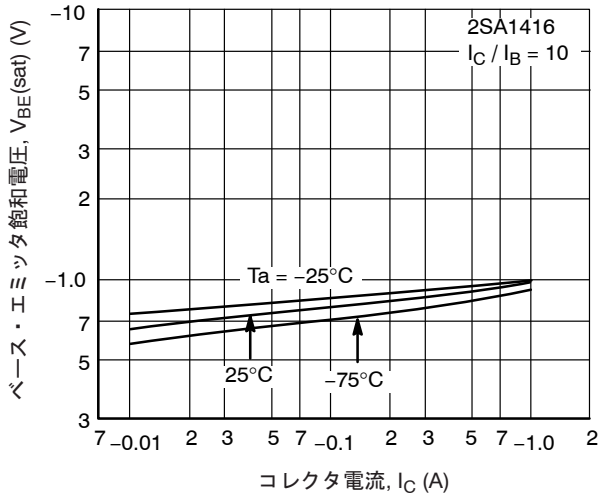


図 13.  $V_{BE(sat)} - I_C$

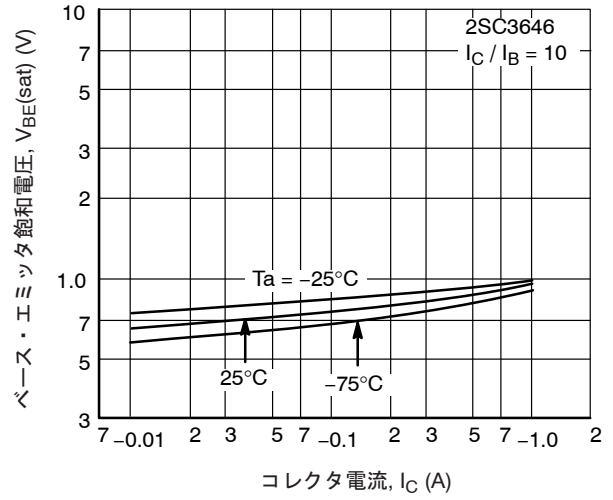


図 14.  $V_{BE(sat)} - I_C$

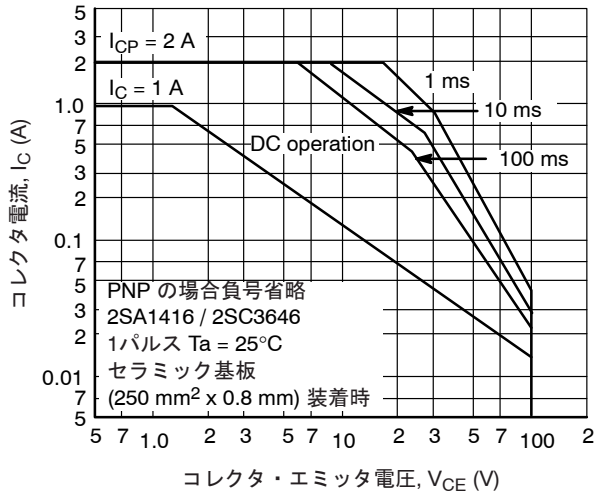


図 15. ASO

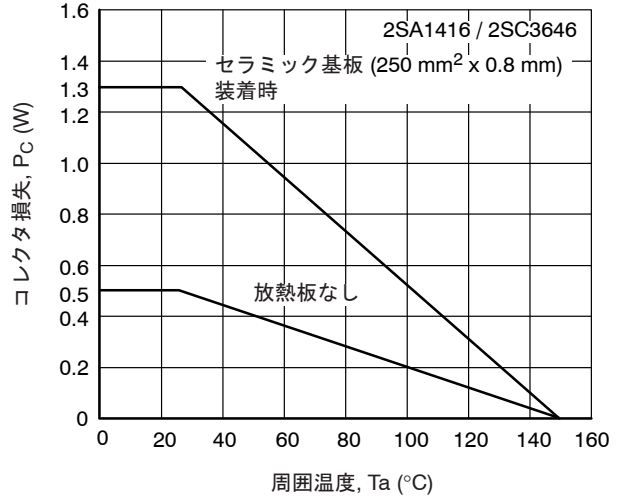


図 16.  $P_C - T_a$

## 2SA1416, 2SC3646

### ORDERING INFORMATION

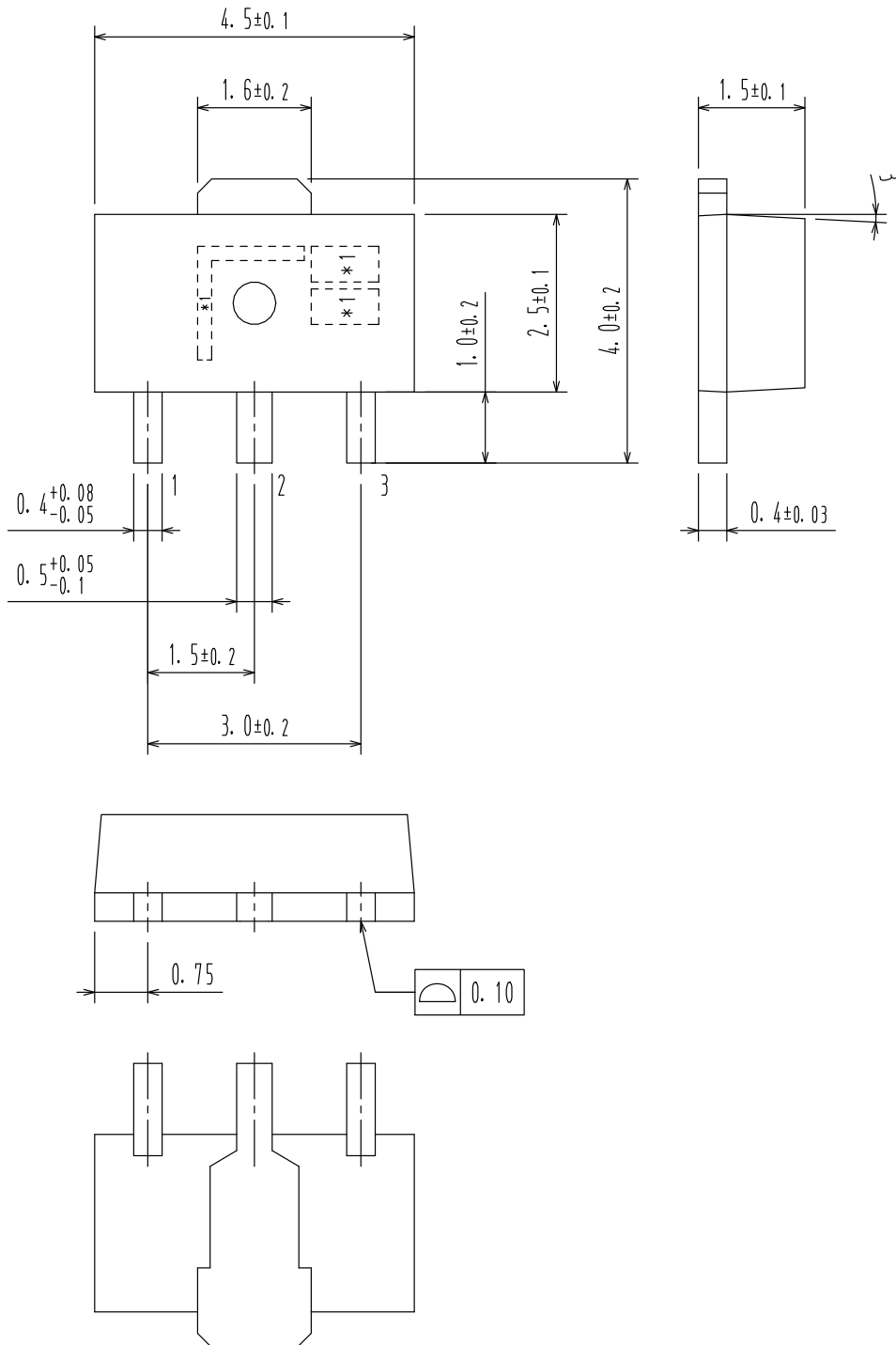
Device	Marking	パッケージ名	Shipping <sup>†</sup>
2SA1416S-TD-E	AB	SOT-89 / PCP-1 (Pb-Free)	1000 / Tape & Reel
2SA1416T-TD-E			
2SC3646S-TD-E	CB		
2SC3646T-TD-E			

<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**

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

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