

# Bipolar Transistor

(-)50 V, (-)5 A, Low  $V_{CE(sat)}$ ,  
Complementary Dual CPH5

## CPH5520

### Features

- Composite Type with a PNP Transistor and an NPN Transistor Contained in One Package, Facilitating High-Density Mounting
- Ultrasmall Package Facilitate Miniaturization in End Products. (0.9 mm Mounting Height)
- This is a Pb-Free Device

### Applications

- Relay Drivers, Lamp Drivers, Motor Drivers, Gate Drivers

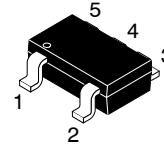
### Specifications

( ): PNP

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

Parameter	Symbol	Conditions	Ratings	Unit
Collector-to-Base Voltage	$V_{CBO}$		(-50)80	V
Collector-to-Emitter Voltage	$V_{CEO}$		(-50)50	V
Emitter-to-Base Voltage	$V_{EBO}$		(-)6	V
Collector Current	$I_C$		(-)2	A
Collector Current (Pulse)	$I_{CP}$		(-)5	A
Base Current	$I_B$		(-)400	mA
Collector Dissipation	$P_C$	Mounted on a ceramic board (600 mm <sup>2</sup> × 0.8 mm) 1unit	0.9	W
Total Power Dissipation	$P_T$	Mounted on a ceramic board (600 mm <sup>2</sup> × 0.8 mm)	1.2	W
Junction Temperature	$T_j$		150	°C
Storage Temperature	$T_{stg}$		-55 to +150	°C

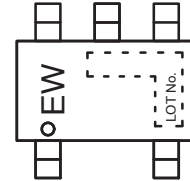
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.



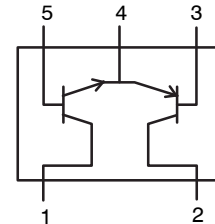
- 1: Collector (NPN TR)
- 2: Collector (PNP TR)
- 3: Base (PNP TR)
- 4: Emitter Common
- 5: Base (NPN TR)

CPH5  
CASE 318BC

### MARKING DIAGRAM



### ELECTRICAL CONNECTION



### ORDERING INFORMATION

Device	Package	Shipping†
CPH5520-TL-E	CPH5 (Pb-Free)	3000 / Tape & Reel

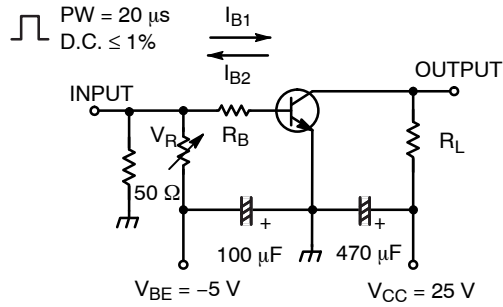
†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, [BRD8011/D](#).

# CPH5520

## ELECTRICAL CHARACTERISTICS (Ta = 25°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	$h_{FE}$	$V_{CE} = (-)2\text{ V}, I_C = (-)100\text{ mA}$	200	-	560	
Gain-Bandwidth Product	$f_T$	$V_{CE} = (-)10\text{ V}, I_C = (-)300\text{ mA}$	-	420	-	MHz
Output Capacitance	$C_{ob}$	$V_{CB} = (-)10\text{ V}, f = 1\text{ MHz}$	-	(16) $8$	-	pF
Collector-to-Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C = (-)1\text{ A}, I_B = (-)50\text{ mA}$	-	(-165) $130$	(-330) $260$	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	$V_{(BR)CBO}$	$I_C = (-)10\text{ }\mu\text{A}, I_E = 0\text{ A}$	(-50) $80$	-	-	V
Collector-to-Emitter Breakdown Voltage	$V_{(BR)CEO}$	$I_C = (-)1\text{ mA}, R_{BE} = \infty$	(-50) $50$	-	-	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	-	(35) $35$	-	ns
Storage Time	$t_{stg}$		-	(200) $330$	-	ns
Fall Time	$t_f$		-	(24) $40$	-	ns

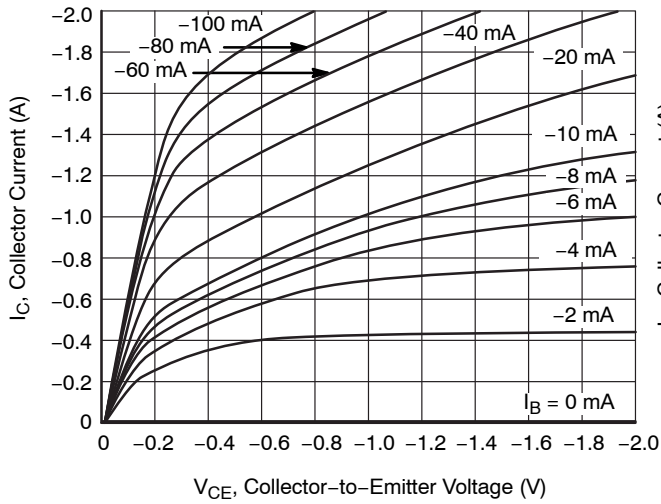
Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.



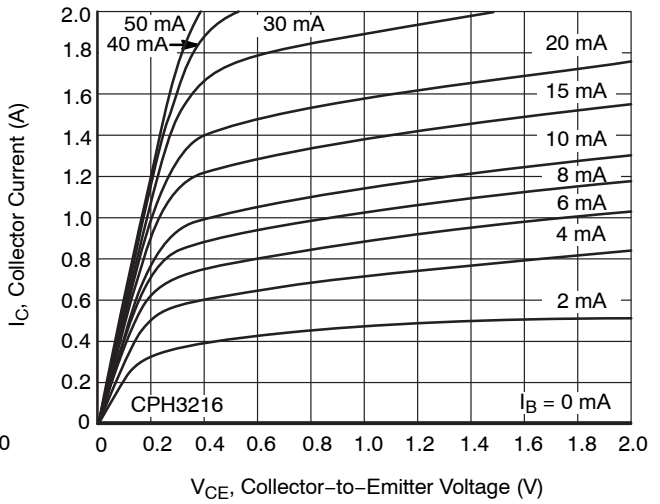
$I_C = 10I_{B1} = -10I_{B2} = 0.7\text{ A}$   
For PNP, the polarity is reversed.

**Figure 1. Switching Time Test Circuit**

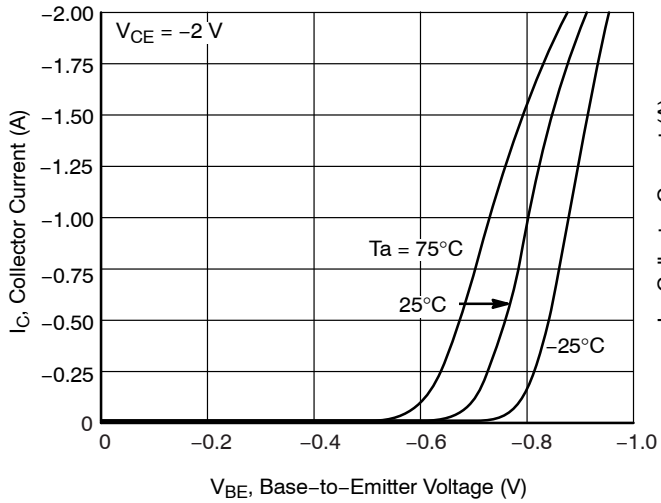
# CPH5520



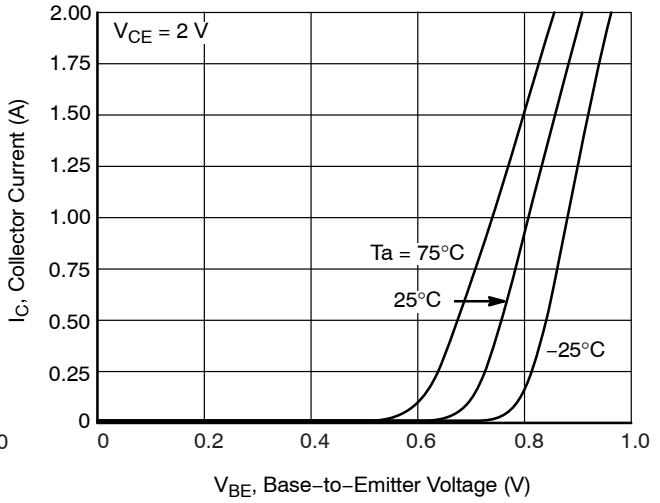
**Figure 2.  $I_C - V_{CE}$  (PNP)**



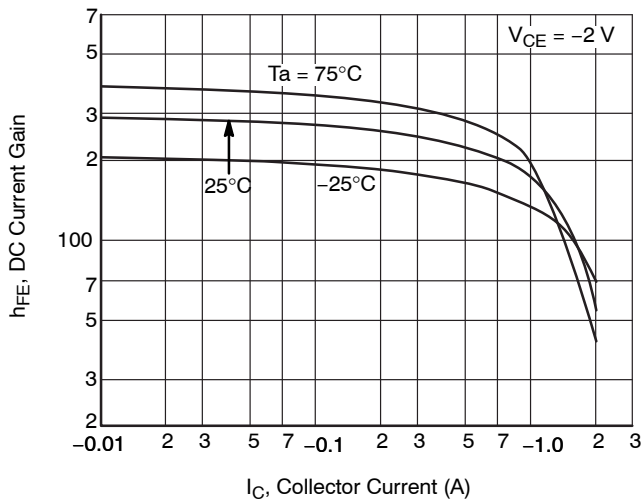
**Figure 3.  $I_C - V_{CE}$  (NPN)**



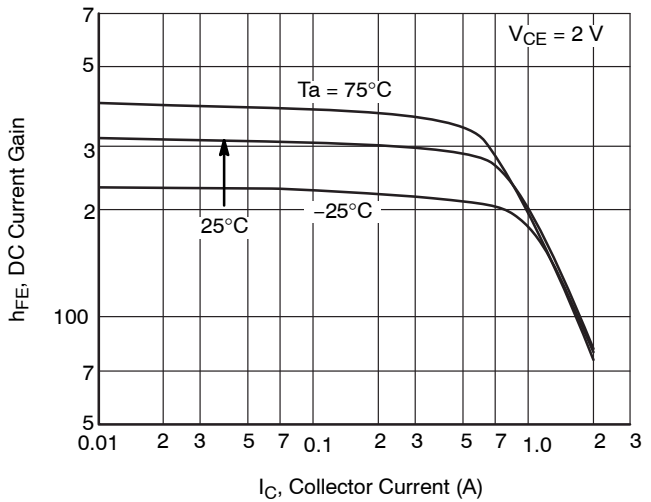
**Figure 4.  $I_C - V_{BE}$  (PNP)**



**Figure 5.  $I_C - V_{BE}$  (NPN)**



**Figure 6.  $h_{FE} - I_C$  (PNP)**



**Figure 7.  $h_{FE} - I_C$  (NPN)**

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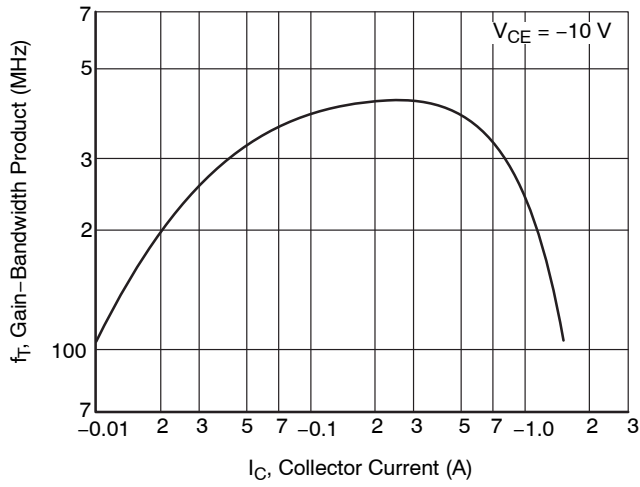


Figure 8.  $f_T - I_C$  (PNP)

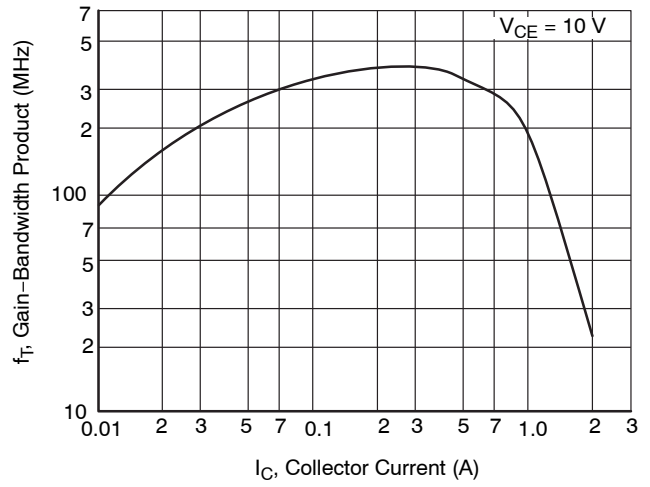


Figure 9.  $f_T - I_C$  (NPN)

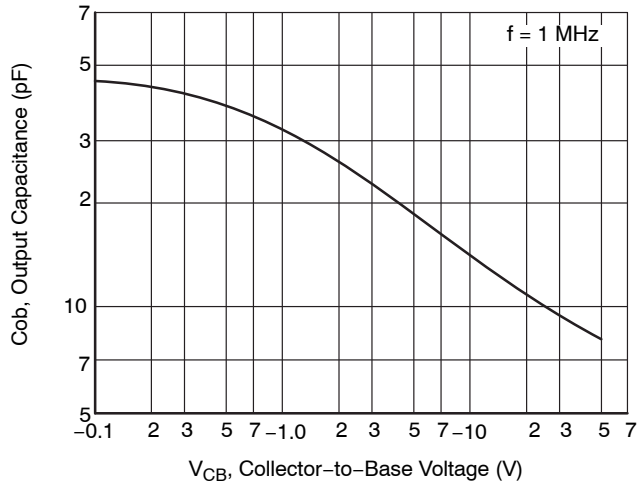


Figure 10.  $C_{ob} - V_{CB}$  (PNP)

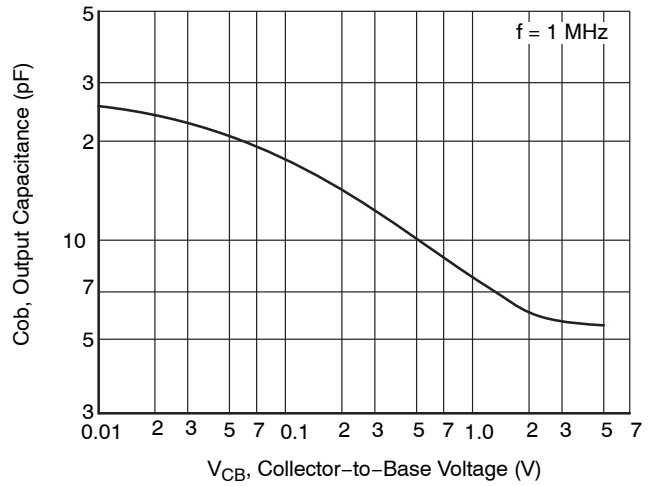


Figure 11.  $C_{ob} - V_{CB}$  (NPN)

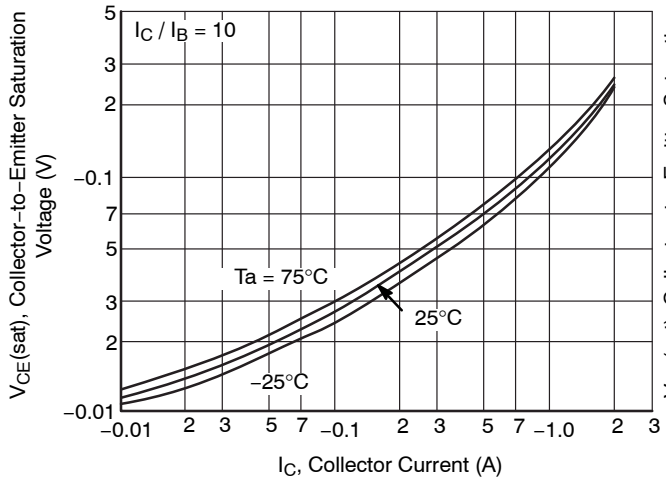


Figure 12.  $V_{CE(sat)} - I_C$  (PNP)

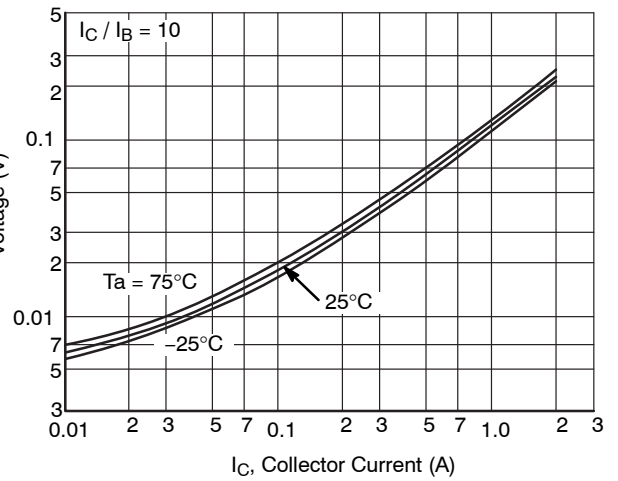


Figure 13.  $V_{CE(sat)} - I_C$  (NPN)

# CPH5520

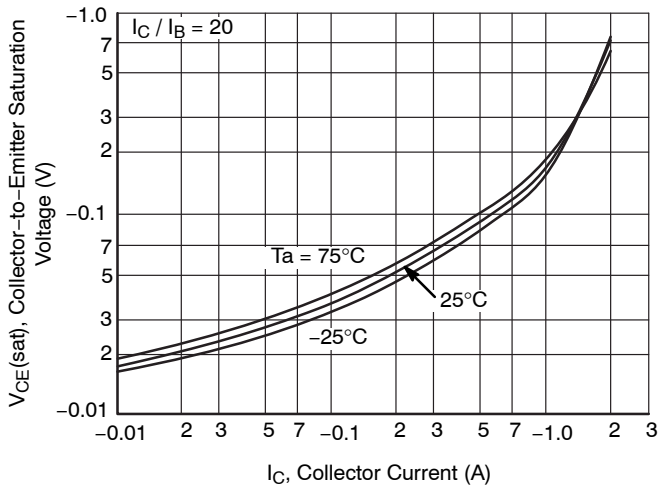


Figure 14.  $V_{CE(sat)} - I_C$  (PNP)

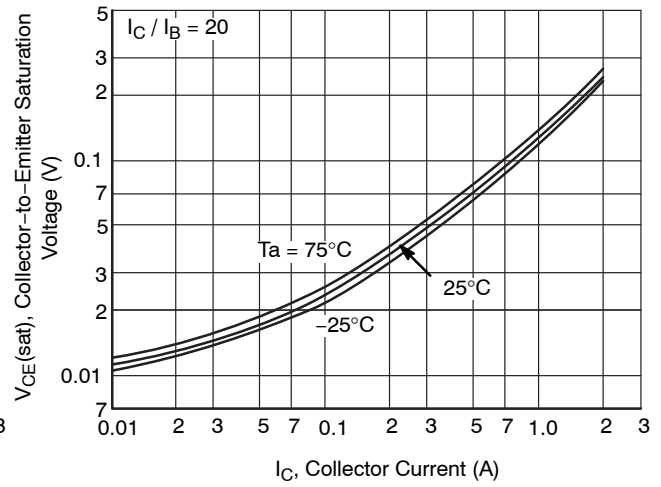


Figure 15.  $V_{CE(sat)} - I_C$  (NPN)

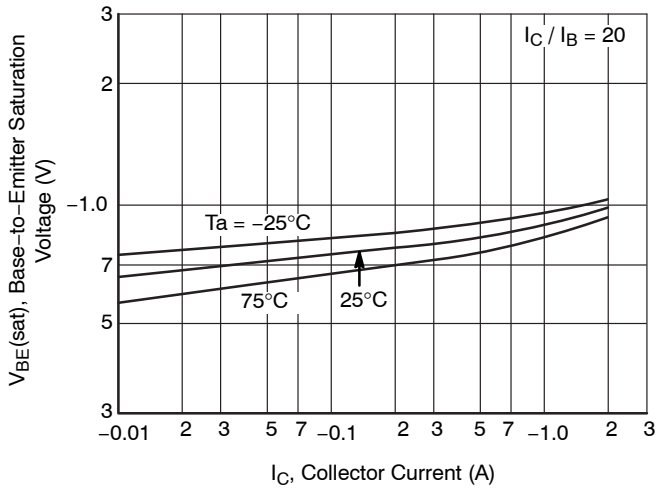


Figure 16.  $V_{BE(sat)} - I_C$  (PNP)

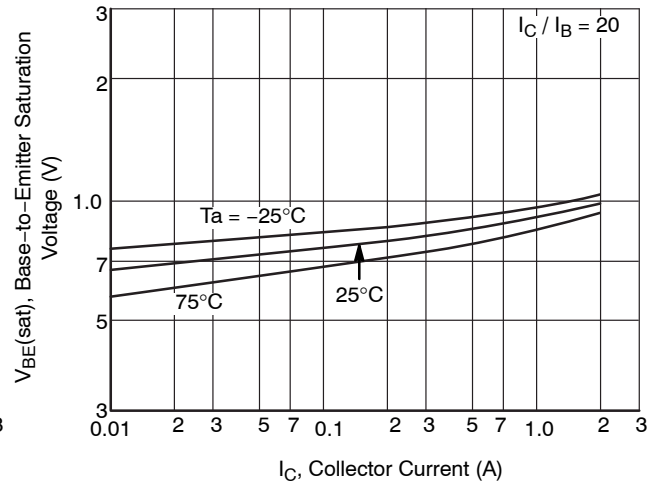


Figure 17.  $V_{BE(sat)} - I_C$  (NPN)

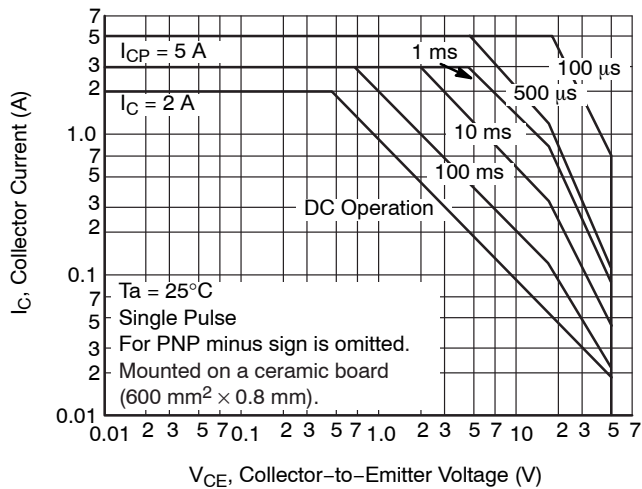


Figure 18. ASO (PNP/NPN)

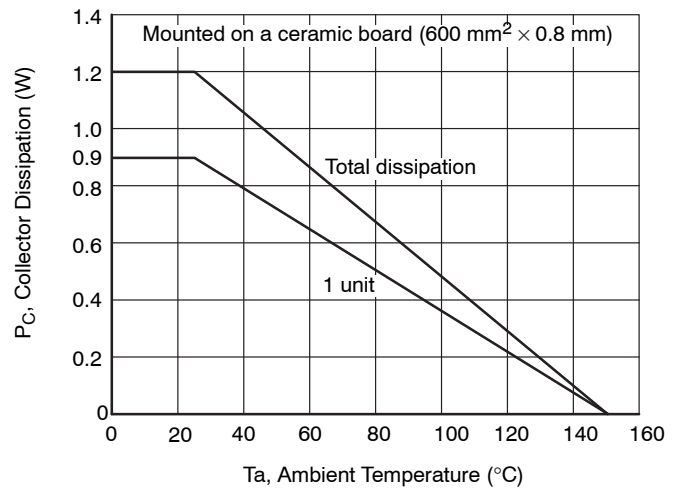
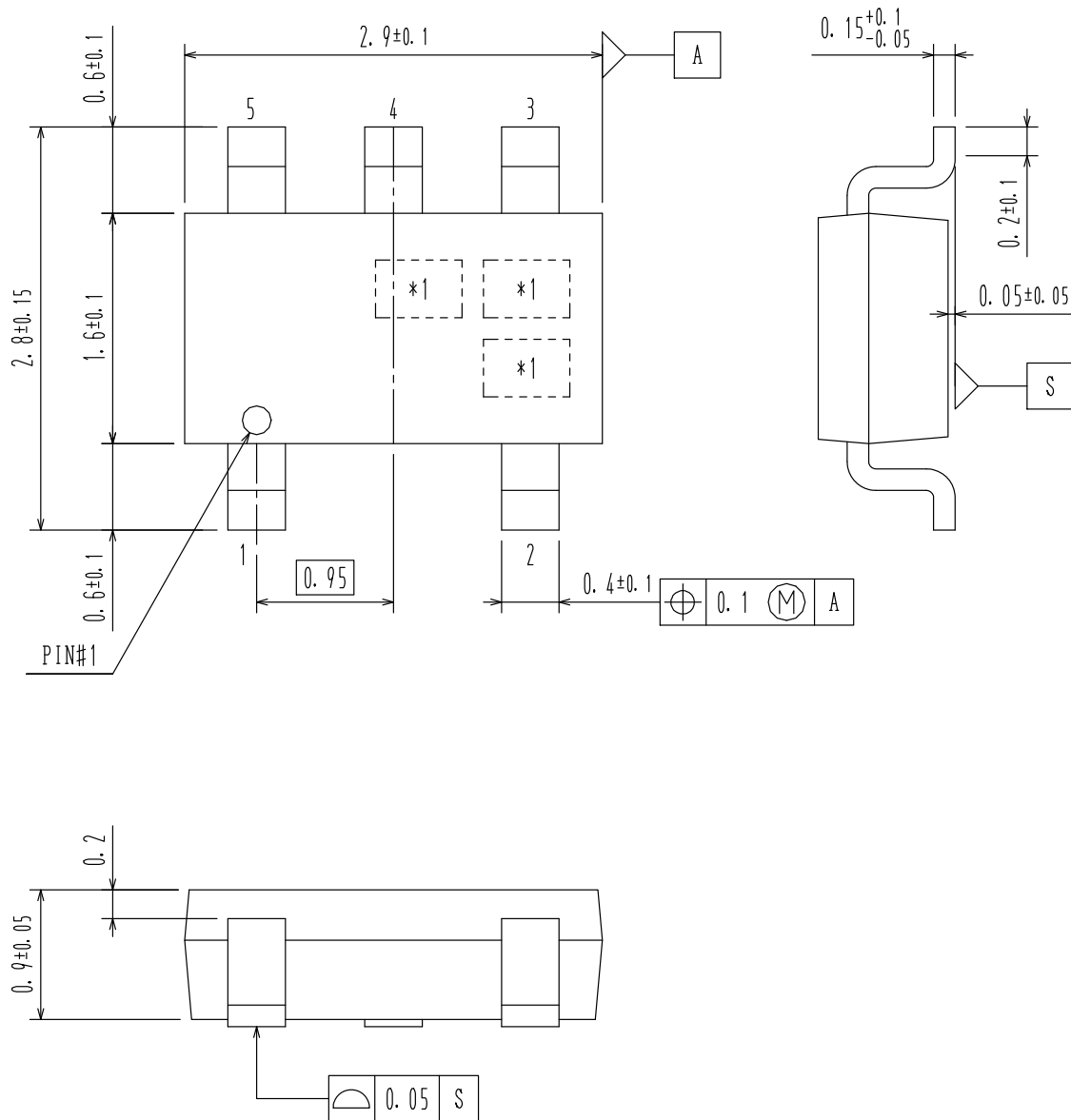


Figure 19.  $P_C - T_a$  (PNP/NPN)

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

**CPH5**  
**CASE 318BC**  
**ISSUE O**

DATE 30 NOV 2011



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