

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

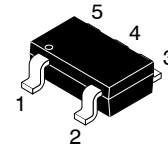
Specifications

(): PNP

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

Parameter	Symbol	Conditions	Ratings	Unit
Collector-to-Base Voltage	V_{CBO}		(–)80	V
Collector-to-Emitter Voltage	V_{CEO}		(–)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 ($600\text{ mm}^2 \times 0.8\text{ mm}$) 1 unit	0.9	W
Total Power Dissipation	P_T	Mounted on a ceramic board ($600\text{ mm}^2 \times 0.8\text{ mm}$)	1.2	W
Junction Temperature	T_j		150	$^\circ\text{C}$
Storage Temperature	T_{stg}		–55 to +150	$^\circ\text{C}$

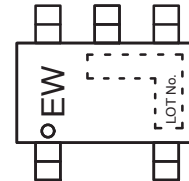
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.



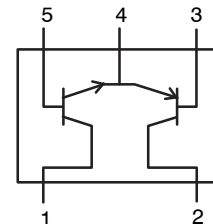
- 1: Collector (NPN TR)
- 2: Collector (PNP TR)
- 3: Base (PNP TR)
- 4: Emitter Common
- 5: Base (NPN TR)

CPH5
CASE 318BC

MARKING DIAGRAM



ELECTRICAL CONNECTION



ORDERING INFORMATION

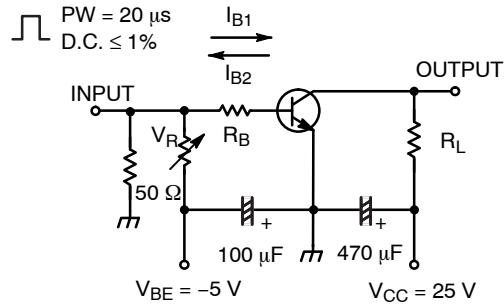
Device	Package	Shipping [†]
CPH5520-TL-E	CPH5 (Pb-Free)	3000 / Tape & Reel

[†]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.

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

Parameter	Symbol	Conditions	Ratings			Unit
			Min	Typ	Max	
Collector Cutoff Current	I_{CBO}	$V_{CB} = (-)40\text{ V}$, $I_E = 0\text{ A}$	–	–	(–)1	μA
Emitter Cutoff Current	I_{EBO}	$V_{EB} = (-)4\text{ V}$, $I_C = 0\text{ A}$	–	–	(–)1	μA
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

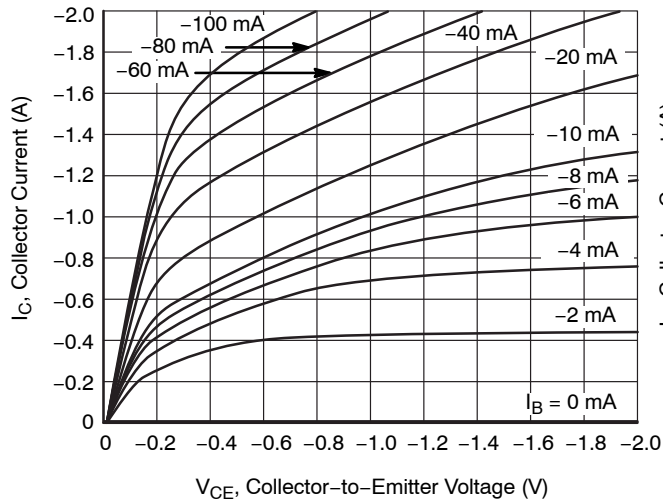


Figure 2. $I_C - V_{CE}$ (PNP)

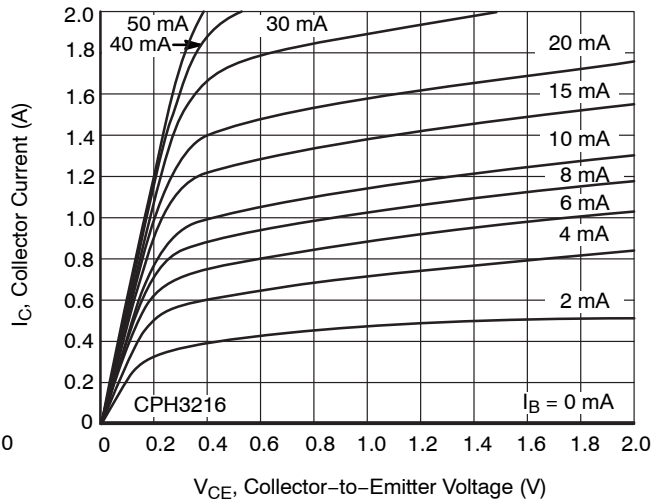


Figure 3. $I_C - V_{CE}$ (NPN)

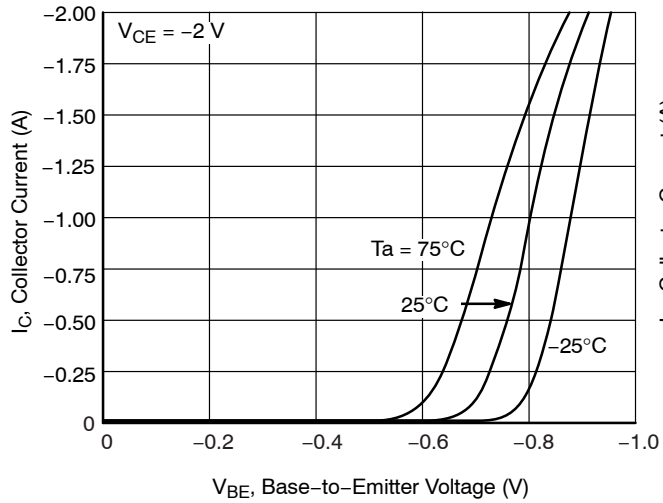


Figure 4. $I_C - V_{BE}$ (PNP)

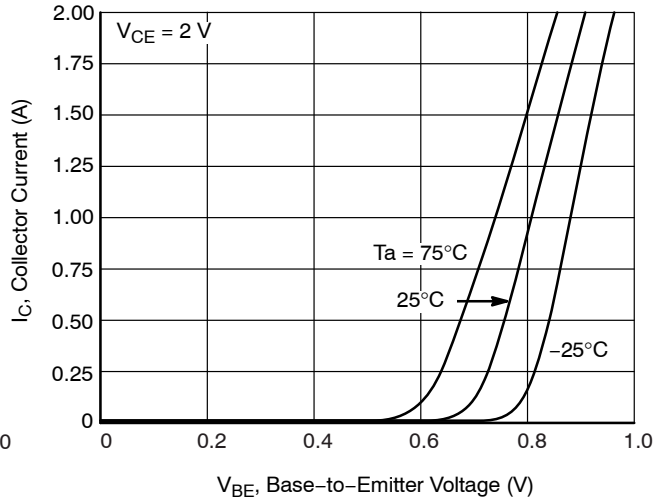


Figure 5. $I_C - V_{BE}$ (NPN)

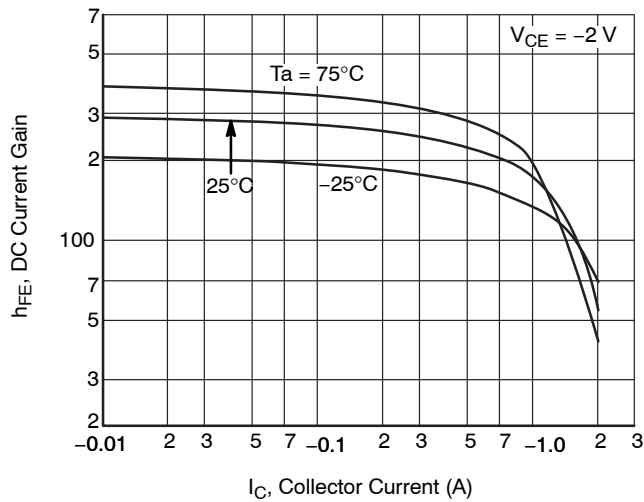


Figure 6. $h_{FE} - I_C$ (PNP)

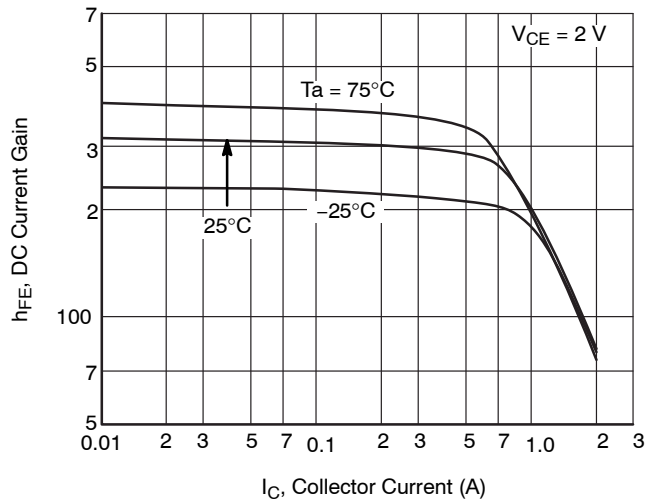


Figure 7. $h_{FE} - I_C$ (NPN)

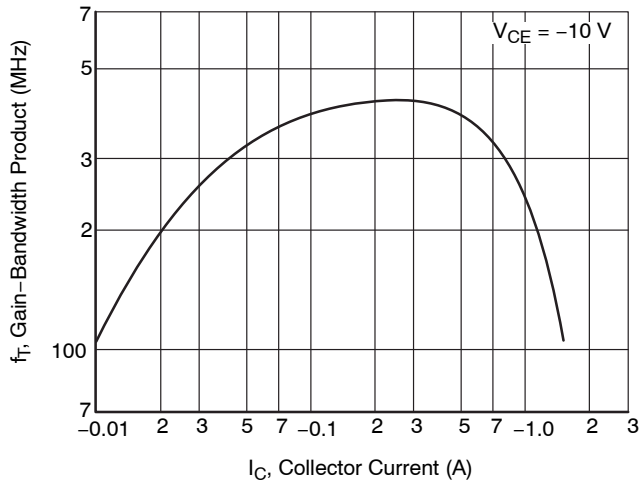


Figure 8. $f_T - I_C$ (PNP)

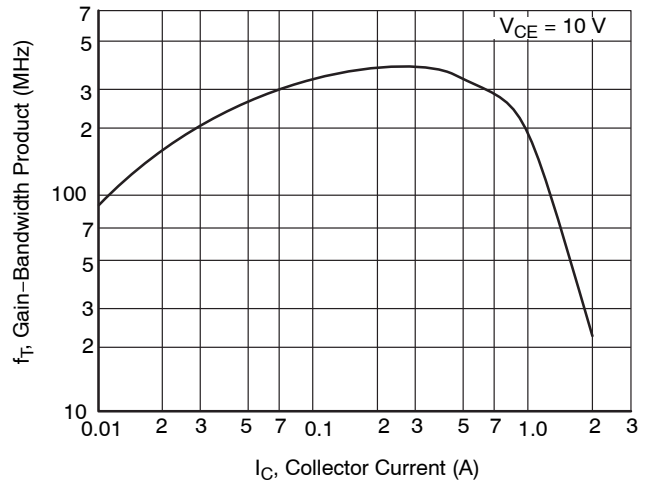


Figure 9. $f_T - I_C$ (NPN)

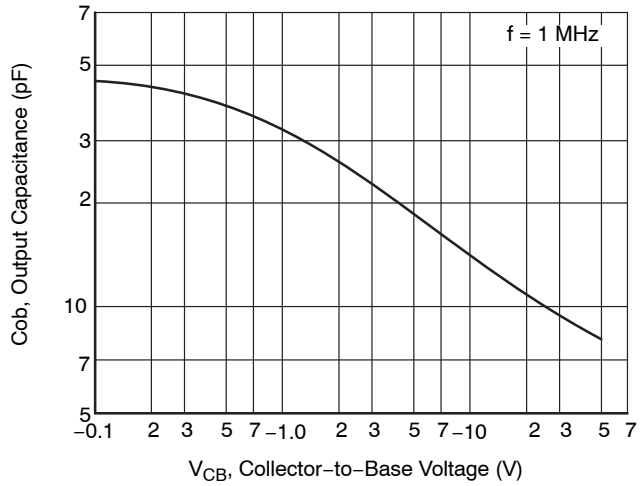


Figure 10. $C_{ob} - V_{CB}$ (PNP)

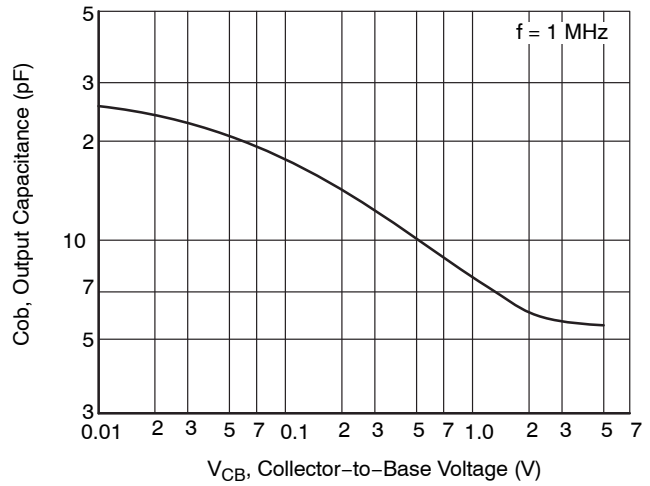


Figure 11. $C_{ob} - V_{CB}$ (NPN)

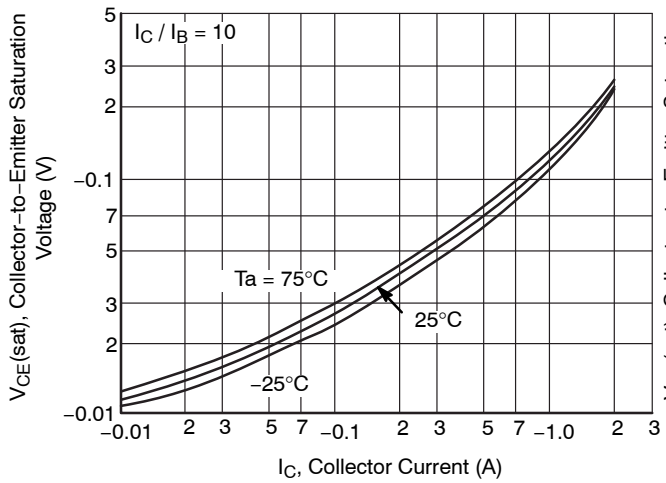


Figure 12. $V_{CE(sat)} - I_C$ (PNP)

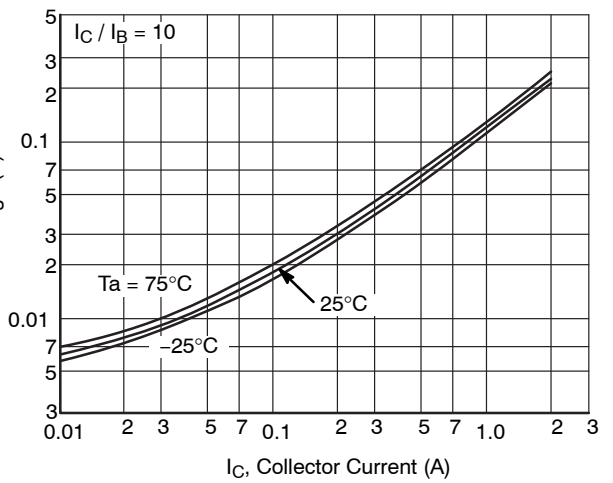


Figure 13. $V_{CE(sat)} - I_C$ (NPN)

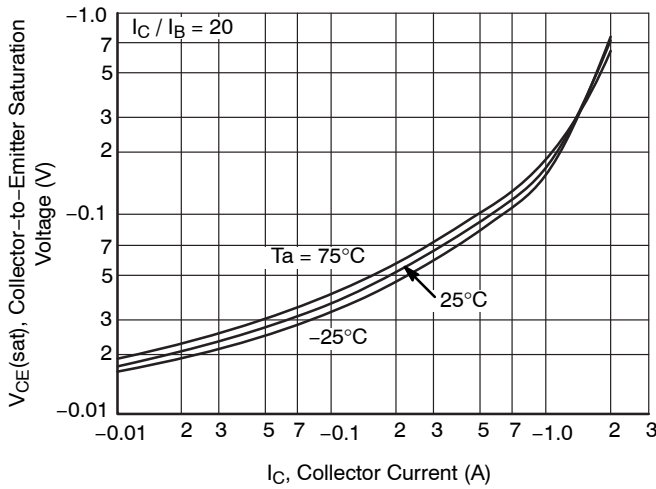


Figure 14. $V_{CE(sat)} - I_C$ (PNP)

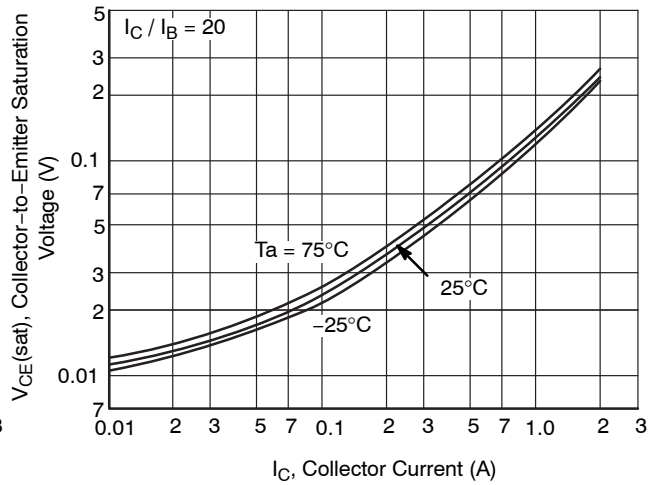


Figure 15. $V_{CE(sat)} - I_C$ (NPN)

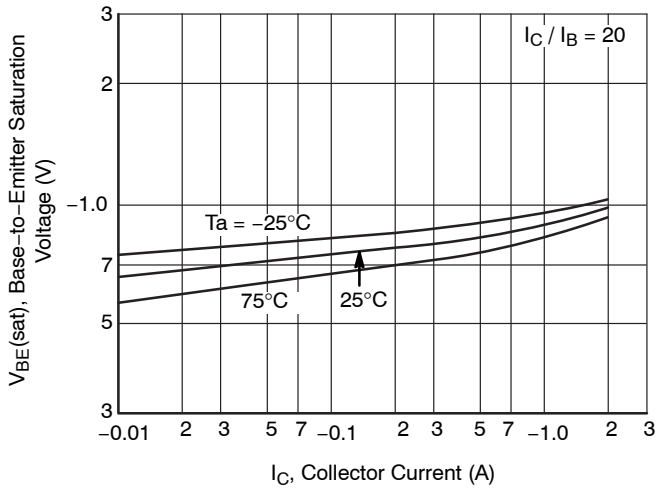


Figure 16. $V_{BE(sat)} - I_C$ (PNP)

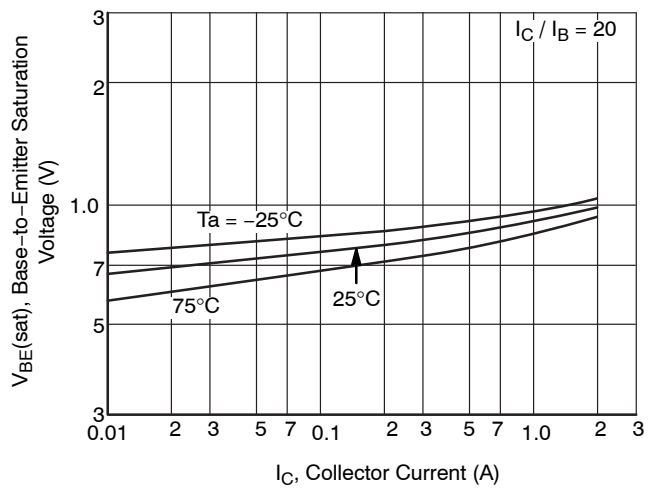


Figure 17. $V_{BE(sat)} - I_C$ (NPN)

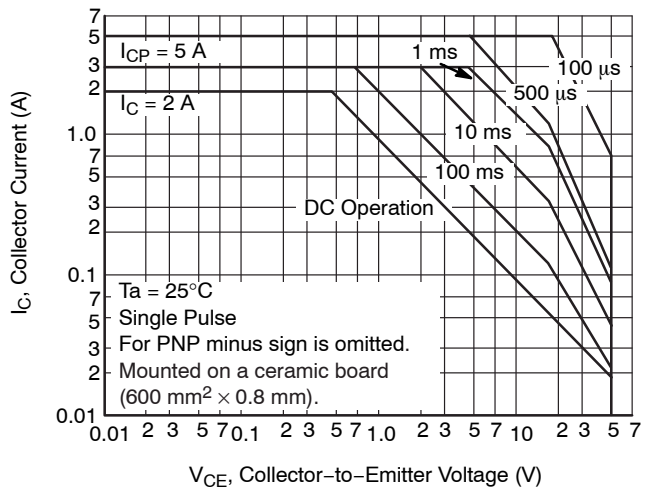


Figure 18. ASO (PNP/NPN)

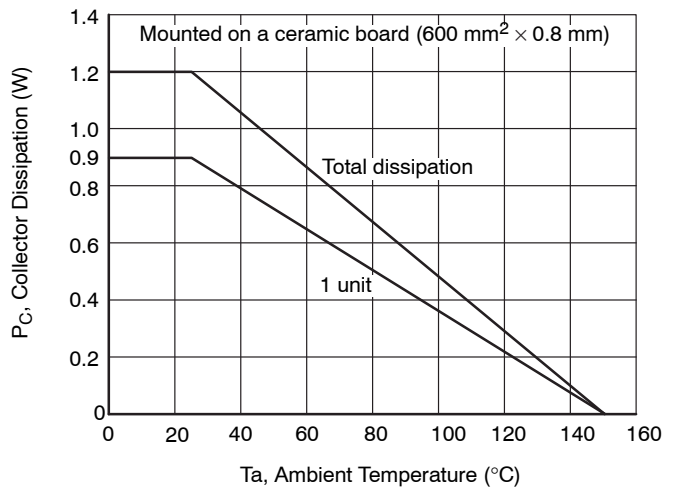
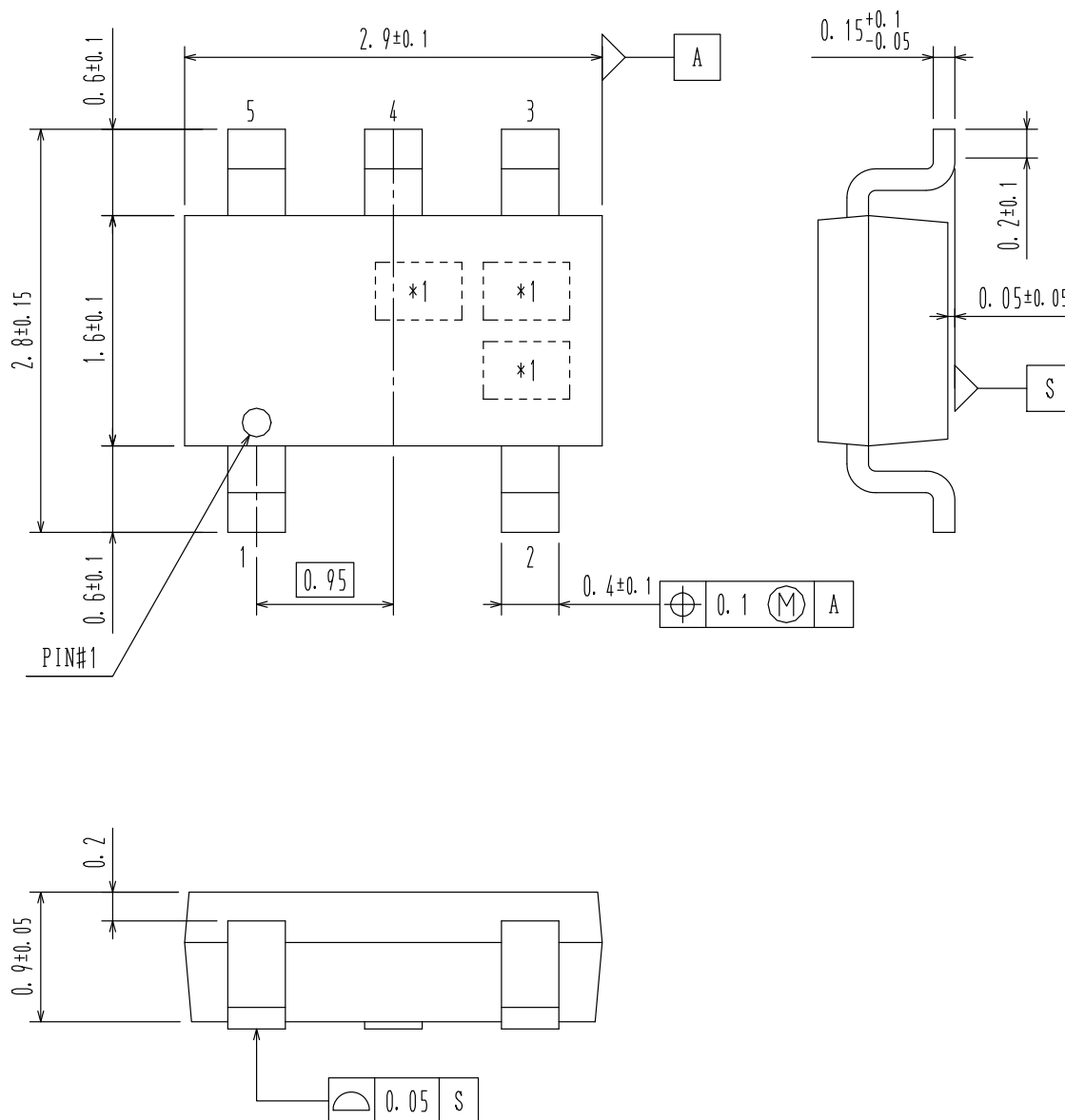


Figure 19. $P_C - T_a$ (PNP/NPN)

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DATE 30 NOV 2011



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