

Bipolar Transistor (–)50 V, (–)3 A, Low $V_{CE(sat)}$, (PNP)NPN Single

NSVS50030SB3, NSVS50031SB3

This device is bipolar junction transistor featuring high current, low saturation voltage, and high speed switching.

Suitable for motor driver, relay driver, DC–DC converter of automotive applications. AEC–Q101qualified and PPAP capable.

Features

- Large Current Capacitance
- Low Collector to Emitter Saturation Voltage
- High–Speed Switching
- High Allowable Power Dissipation
- AEC–Q101Qualified and PPAP Capable
- Pb–Free, Halogen Free and RoHS Compliance
- Ultra Small Package Facilitates Miniaturization in End Products (Mounting Height: 0.9 mm)

Typical Applications

- DC / DC Converter
- Relay Drivers, Lamp Drivers, Motor Drivers
- Camera Flash

Specifications

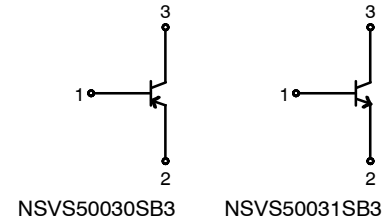
ABSOLUTE MAXIMUM RATINGS at $T_A = 25^\circ\text{C}$

Parameter	Symbol	Value	Unit
Collector to Base Voltage	V_{CBO}	(–50) 100	V
Collector to Emitter Voltage	V_{CES}	(–50) 100	V
Collector to Emitter Voltage	V_{CEO}	(–)50	V
Emitter to Base Voltage	V_{EBO}	(–)6	V
Collector Current	I_C	(–)3	A
Collector Current (Pulse)	I_{CP}	(–)6	A
Base Current	I_B	(–)600	mA
Collector Dissipation (Note 1)	P_C	1.1	W
Junction Temperature	T_j	175	$^\circ\text{C}$
Storage Temperature	T_{stg}	–55 to +175	$^\circ\text{C}$

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.

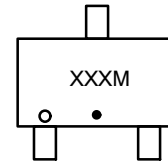
1. Surface mounted on ceramic substrate. (600 mm² x 0.8 mm)

ELECTRICAL CONNECTION



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MARKING DIAGRAMS



XXX = HAE: NSVS50030SB3
= HCE: NSVS50031SB3
M = Single Digit Date Code

ORDERING INFORMATION

See detailed ordering and shipping information on page 2 of this data sheet.

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ORDERING INFORMATION

Device	Marking	Package	Shipping (Qty / Packing) †
NSVS50030SB3T1G	HAE	CPH3 (Pb-Free / Halogen Free)	3,000/ Tape & Reel
NSVS50031SB3T1G	HCE		

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specification Brochure, BRD8011/D.

ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

Parameter	Symbol	Conditions	Value			Unit
			Min	Typ	Max	
Collector Cutoff Current	I _{CBO}	V _{CB} = (-)40 V, I _E = 0 A			(-)1	μA
Emitter Cutoff Current	I _{EBO}	V _{EB} = (-)4 V, I _C = 0 A			(-)1	μA
DC Current Gain	h _{FE}	V _{CE} = (-)2 V, I _C = (-)100 mA	200		560	
Gain-Bandwidth Product	f _T	V _{CE} = (-)10 V, I _C = (-)500 mA		(360) 380		MHz
Output Capacitance	C _{ob}	V _{CB} = (-)10 V, f = 1 MHz		(24) 13		pF
Collector to Emitter Saturation Voltage	V _{CE(sat)}	I _C = (-)1 A, I _B = (-)50 mA		(-100) 80	(-200) 120	mV
		I _C = (-)2 A, I _B = (-)100 mA		(-185) 140	(-500) 210	mV
Base to Emitter Saturation Voltage	V _{BE(sat)}	I _C = (-)2 A, I _B = (-)100 mA		(-)0.88	(-)1.2	V
Collector to Base Breakdown Voltage	V _{(BR)CBO}	I _C = (-)10 μA, I _E = 0 A	(-50) 100			V
Collector to Emitter Breakdown Voltage	V _{(BR)CES}	I _C = (-)100 μA, R _{BE} = 0 Ω	(-50) 100			V
Collector to Emitter Breakdown Voltage	V _{(BR)CEO}	I _C = (-)1 mA, R _{BE} = ∞	(-)50			V
Emitter to Base Breakdown Voltage	V _{(BR)EBO}	I _E = (-)10 μA, I _C = 0 A	(-)6			V
Turn-On Time	t _{on}	See Fig.1		(30) 35		ns
Storage Time	t _{stg}			(230) 300		ns
Fall Time	t _f			(15) 22		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.

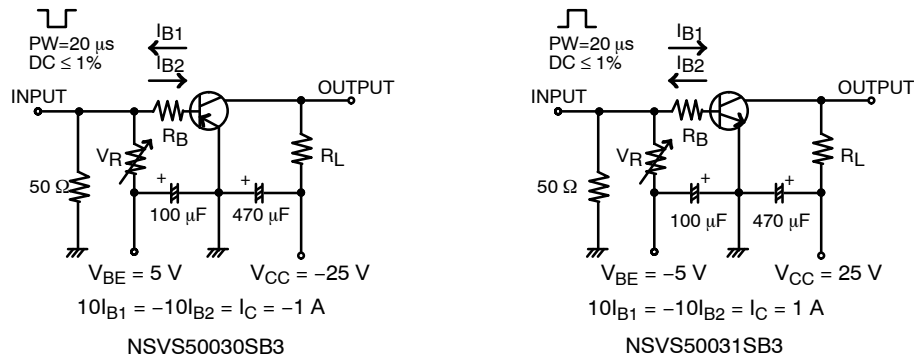


Figure 1. Switching Time Test Circuit

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TYPICAL PERFORMANCE CHARACTERISTICS

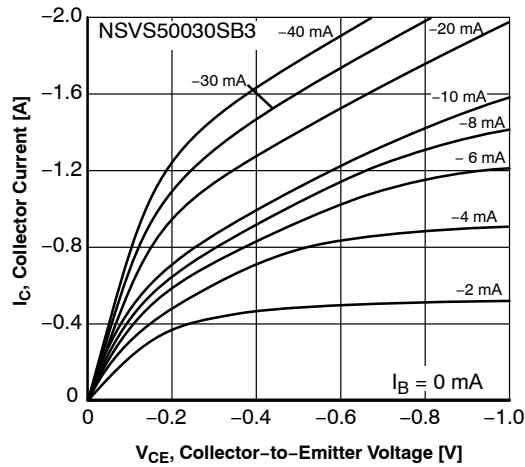


Figure 2. $I_C - V_{CE}$

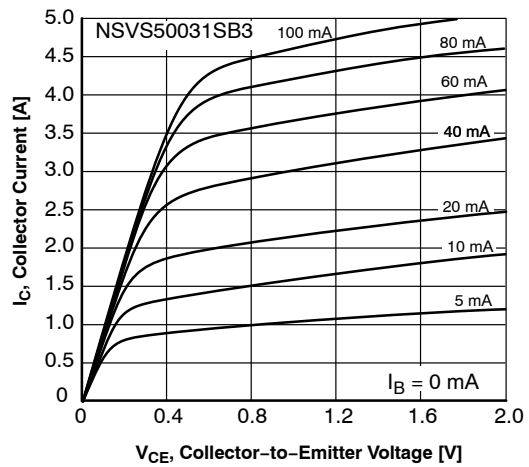


Figure 3. $I_C - V_{CE}$

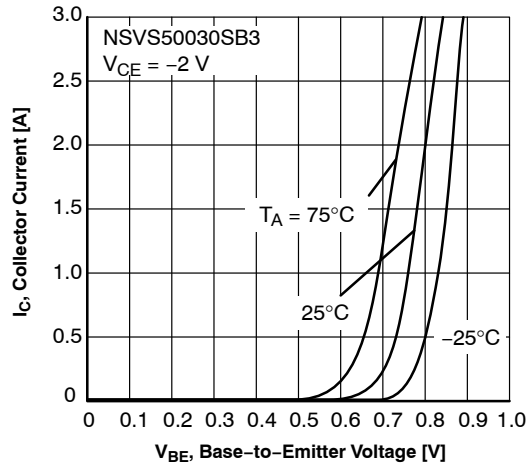


Figure 4. $I_C - V_{BE}$

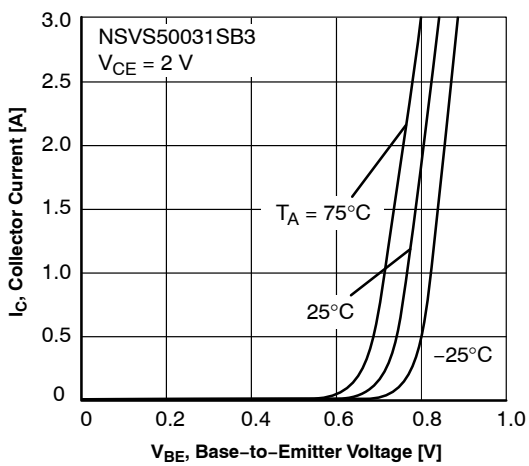


Figure 5. $I_C - V_{BE}$

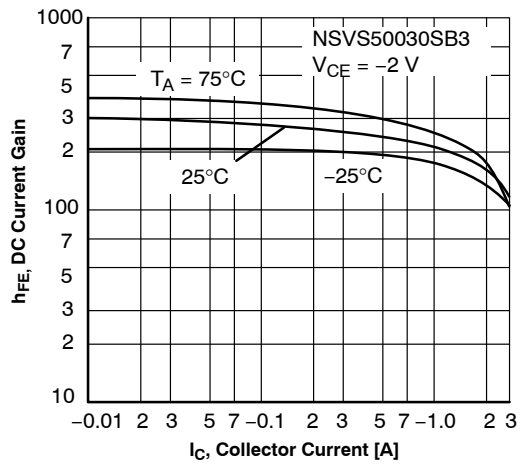


Figure 6. $h_{FE} - I_C$

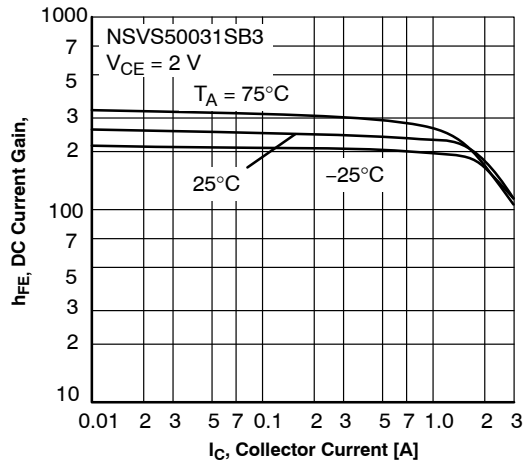


Figure 7. $h_{FE} - I_C$

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TYPICAL PERFORMANCE CHARACTERISTICS (CONTINUED)

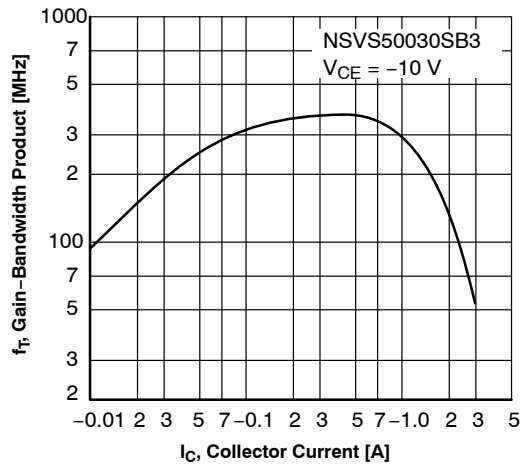


Figure 8. $f_T - I_C$

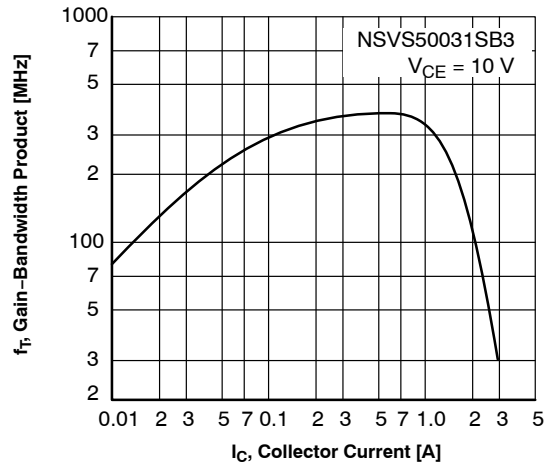


Figure 9. $f_T - I_C$

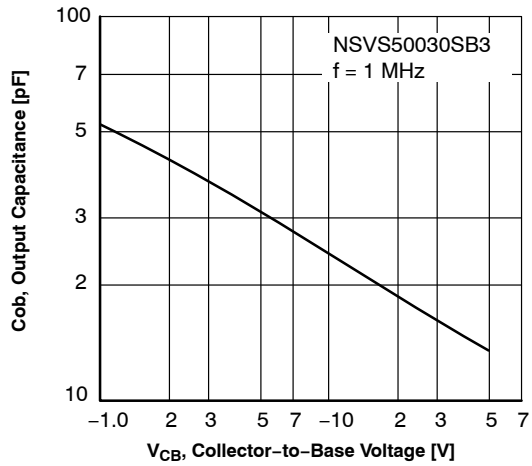


Figure 10. $C_{ob} - V_{CB}$

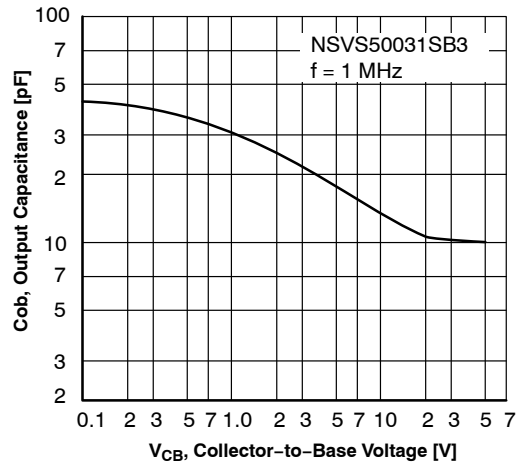


Figure 11. $C_{ob} - V_{CB}$

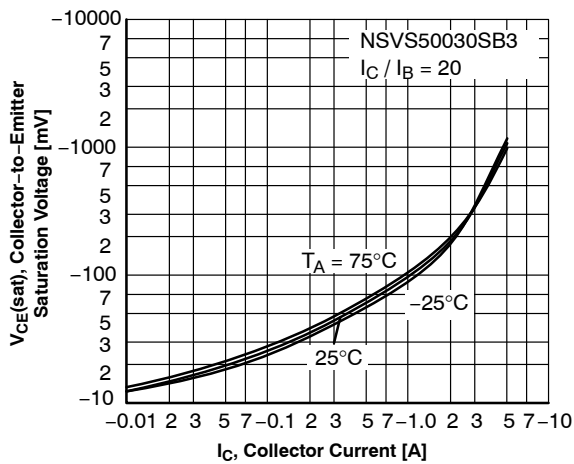


Figure 12. $V_{CE(sat)} - I_C$

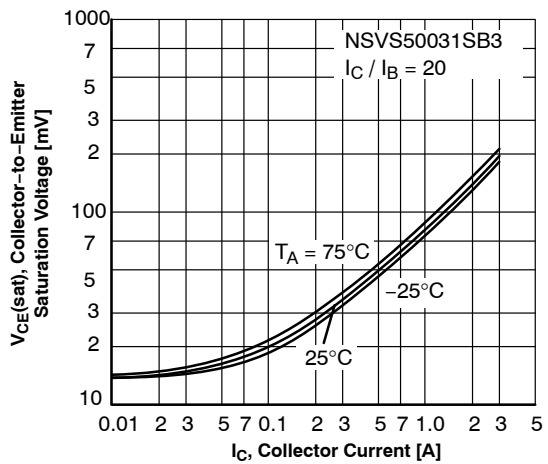


Figure 13. $V_{CE(sat)} - I_C$

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TYPICAL PERFORMANCE CHARACTERISTICS (CONTINUED)

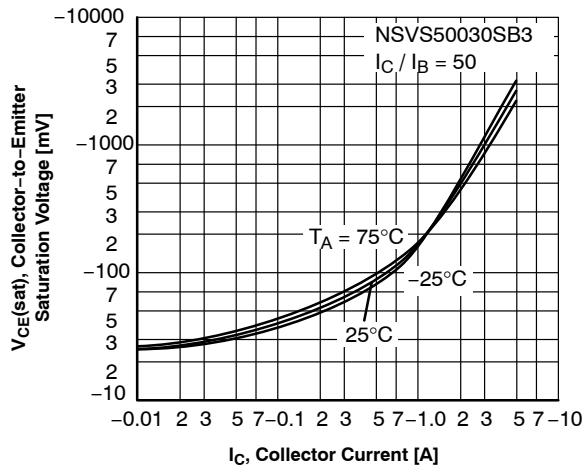


Figure 14. $V_{CE(sat)} - I_C$

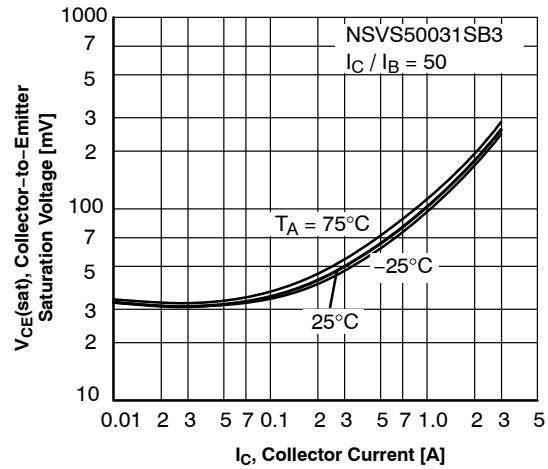


Figure 15. $V_{CE(sat)} - I_C$

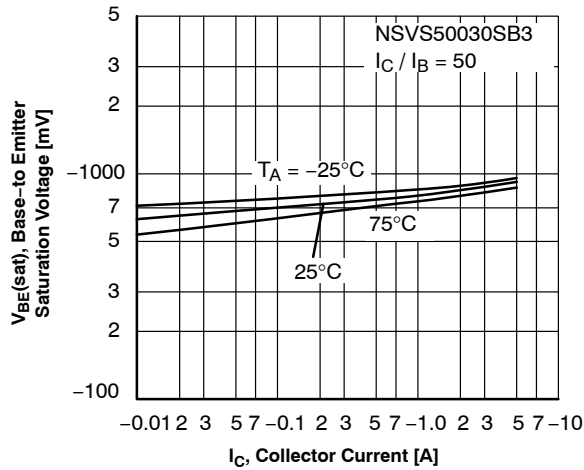


Figure 16. $V_{BE(sat)} - I_C$

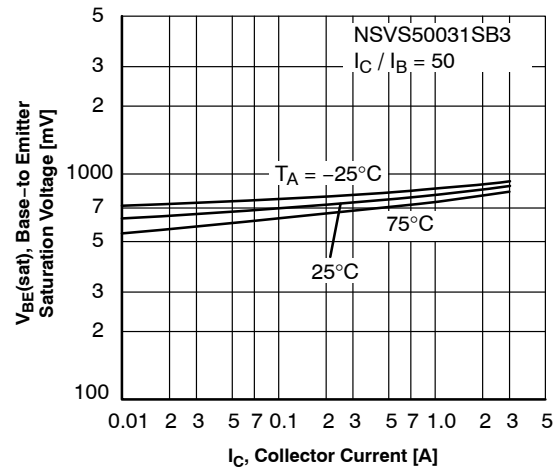


Figure 17. $V_{BE(sat)} - I_C$

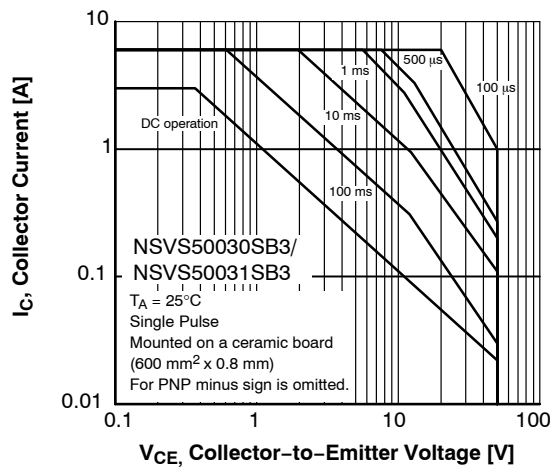


Figure 18. ASO

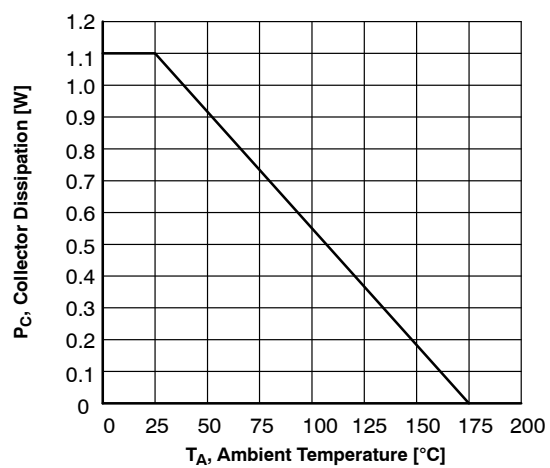
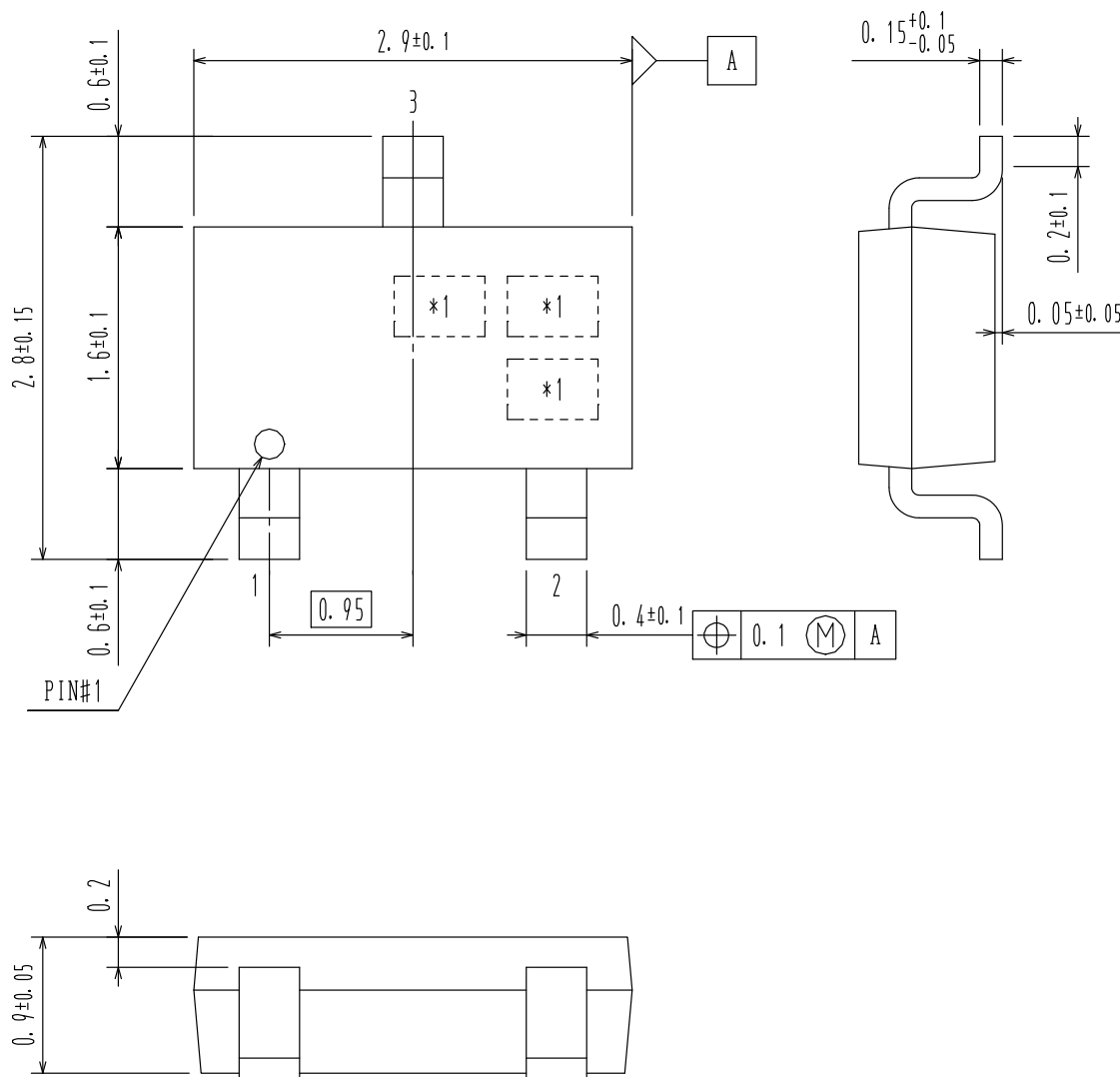


Figure 19. $P_C - T_A$

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DATE 30 NOV 2011



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