

Bipolar Transistor

(–)50 V, (–)8 A, Low $V_{CE(sat)}$,
(PNP)NPN Single TP/TP–FA

2SA2040, 2SC5707

Features

- Adoption of FBET and MBIT Processes
- Low Collector–to–emitter Saturation Voltage
- Large Current Capacitance
- High–speed Switching
- High Allowable Power Dissipation
- These are Pb–Free Devices

Applications

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

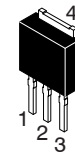
Specifications

(): 2SA2040

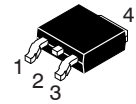
ABSOLUTE MAXIMUM RATINGS ($T_a = 25^\circ\text{C}$)

Parameter	Symbol	Conditions	Ratings	Unit
Collector–to–Base Voltage	V_{CBO}		(–)100	V
Collector–to–Emitter Voltage	V_{CES}		(–)100	V
			(–)50	V
Emitter to Base Voltage	V_{EBO}		(–)6	V
Collector Current	I_C		(–)8	A
Collector Current (Pulse)	I_{CP}		(–)11	A
Base Current	I_B		(–)2	A
Collector Dissipation	P_C		1.0	W
		$T_c = 25^\circ\text{C}$	15	
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.



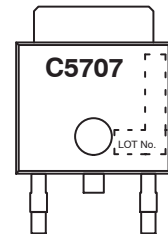
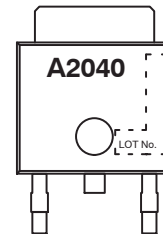
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CASE 369AJ



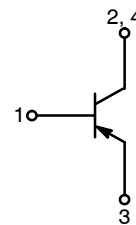
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CASE 369AH

- 1: Base
2: Collector
3: Emitter
4: Collector

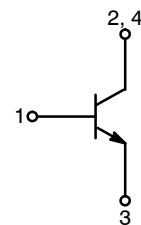
MARKING DIAGRAMS



ELECTRICAL CONNECTION



2SA2040



2SC5707

ORDERING INFORMATION

Device	Package	Shipping [†]
2SA2040–E	IPAK / TP (Pb–Free)	500 Units / Bulk
2SC5707–E	IPAK / TP (Pb–Free)	500 Units / Bulk
2SA2040–TL–E	DPAK / TP–FA (Pb–Free)	700 / Tape & Reel
2SC5707–TL–E	DPAK / TP–FA (Pb–Free)	700 / 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 (Ta = 25°C)

Parameter	Symbol	Conditions	Ratings			Unit
			Min	Typ	Max	
Collector Cutoff Current	I_{CBO}	$V_{CB} = (-)40\text{ V}, I_E = 0\text{ A}$	–	–	(–)0.1	μA
Emitter Cutoff Current	I_{EBO}	$V_{EB} = (-)4\text{ V}, I_C = 0\text{ A}$	–	–	(–)0.1	μA
DC Current Gain	h_{FE}	$V_{CE} = (-)2\text{ V}, I_C = (-)500\text{ mA}$	200	–	560	
Gain–Bandwidth Product	f_T	$V_{CE} = (-)10\text{ V}, I_C = (-)500\text{ mA}$	–	(290)330	–	MHz
Output Capacitance	C_{ob}	$V_{CB} = (-)10\text{ V}, f = 1\text{ MHz}$	–	(50)28	–	pF
Collector–to–Emitter Saturation Voltage	$V_{CE(sat)1}$	$I_C = (-)3.5\text{ A}, I_B = (-)175\text{ mA}$	–	(–230)160	(–390)240	mV
	$V_{CE(sat)2}$	$I_C = (-)2\text{ A}, I_B = (-)40\text{ mA}$	–	(–240)110	(–400)170	mV
Base–to–Emitter Saturation Voltage	$V_{BE(sat)}$	$I_C = (-)2\text{ A}, I_B = (-)40\text{ mA}$		(–)0.83	(–)1.2	V
Collector–to–Base Breakdown Voltage	$V_{(BR)CBO}$	$I_C = (-)10\text{ }\mu\text{A}, I_E = 0\text{ A}$	(–50)100	–	–	V
Collector–to–Emitter Breakdown Voltage	$V_{(BR)CES}$	$I_C = (-)100\text{ }\mu\text{A}, R_{BE} = 0\text{ }\Omega$	(–50)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	–	(40)30	–	ns
Storage Time	t_{stg}		–	(225)420	–	ns
Fall Time	t_f		–	25	–	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.

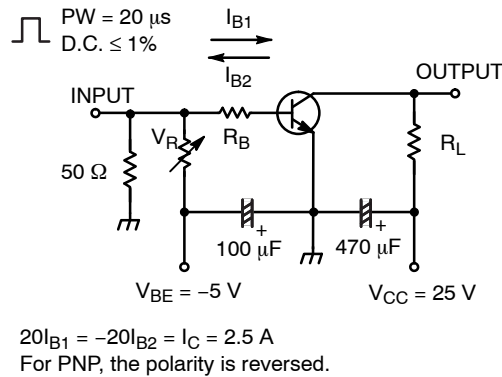


Figure 1. Switching Time Test Circuit

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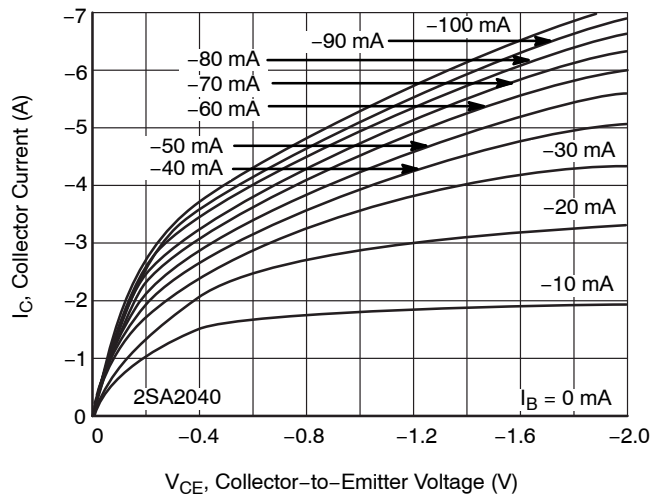


Figure 2. $I_C - V_{CE}$

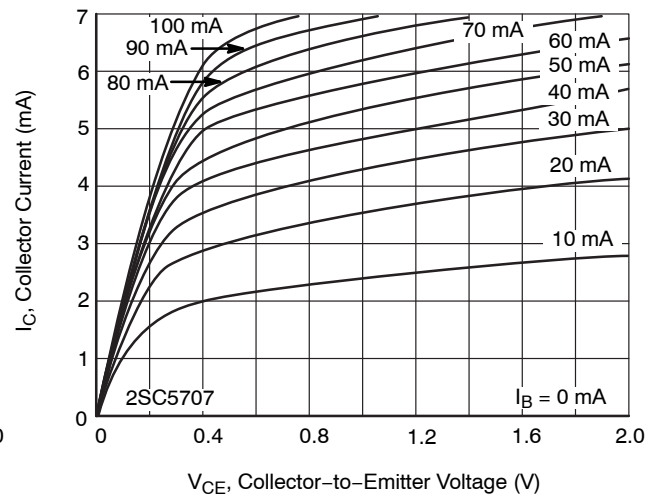


Figure 3. $I_C - V_{CE}$

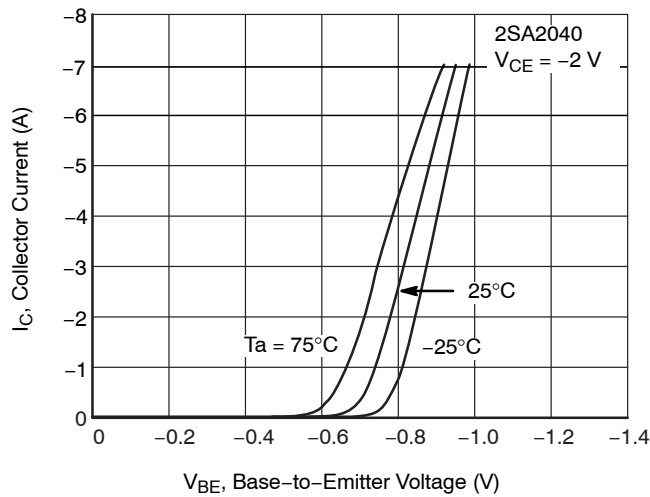


Figure 4. $I_C - V_{BE}$

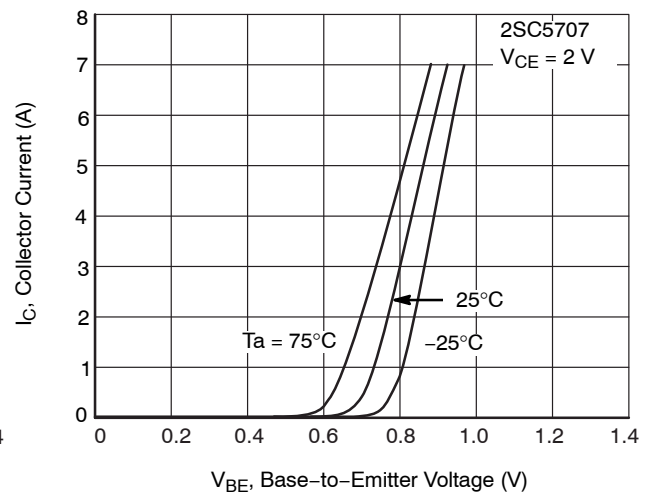


Figure 5. $I_C - V_{BE}$

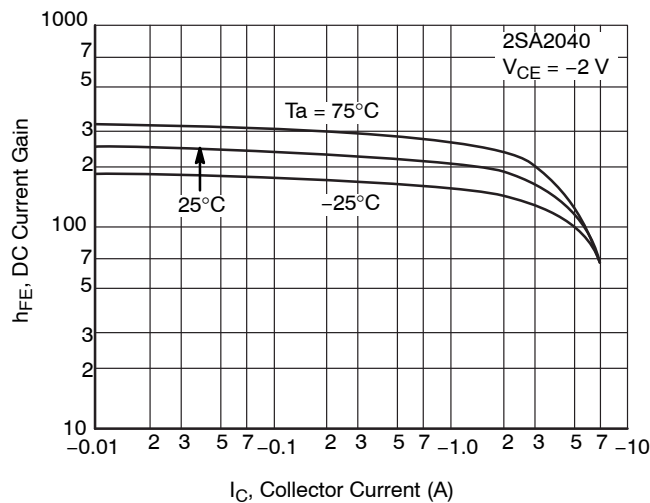


Figure 6. $h_{FE} - I_C$

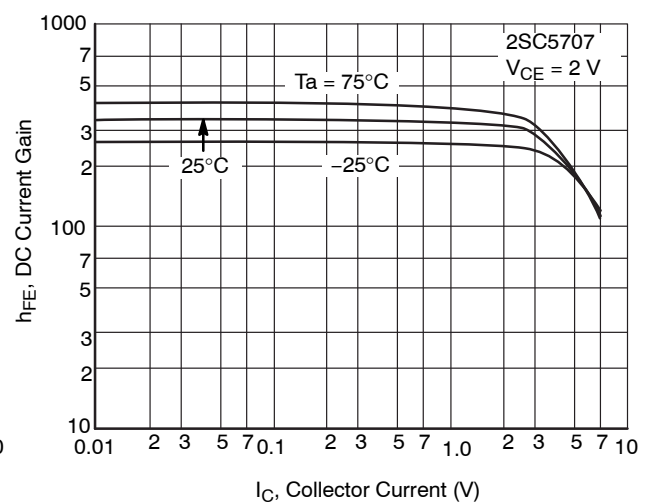


Figure 7. $h_{FE} - I_C$

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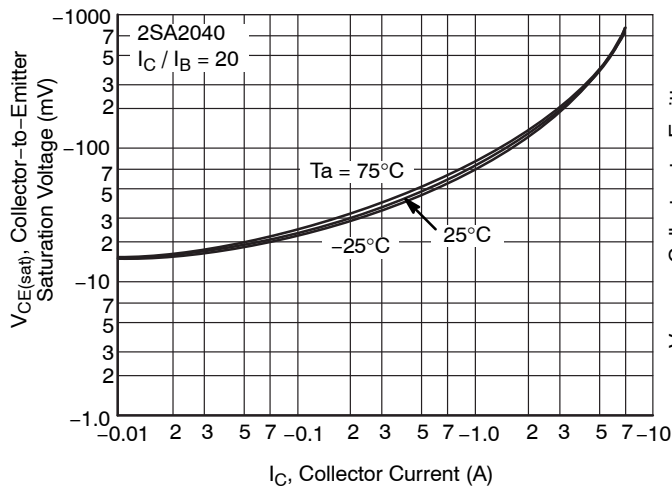


Figure 8. $V_{CE(sat)} - I_C$

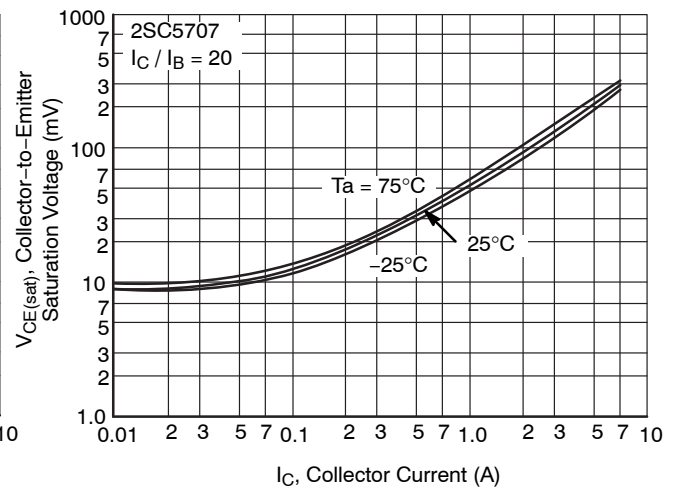


Figure 9. $V_{CE(sat)} - I_C$

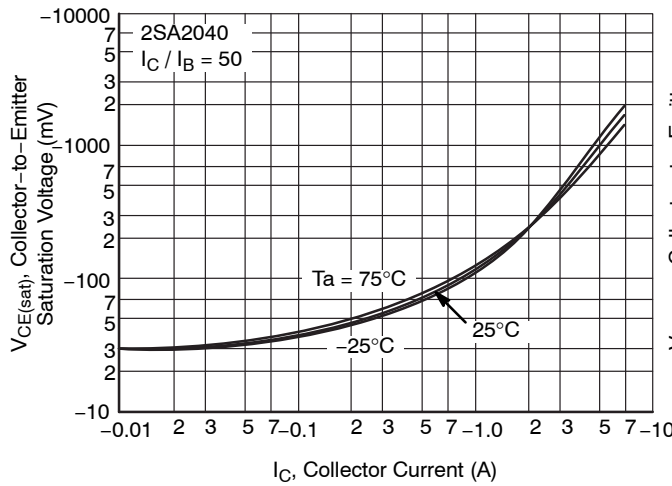


Figure 10. $V_{CE(sat)} - I_C$

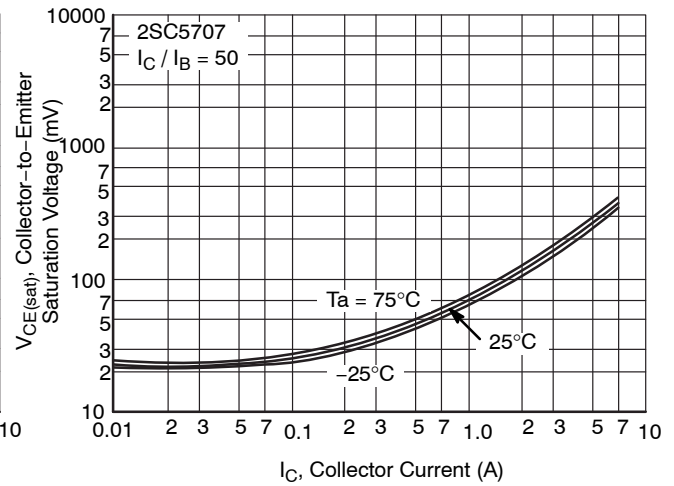


Figure 11. $V_{CE(sat)} - I_C$

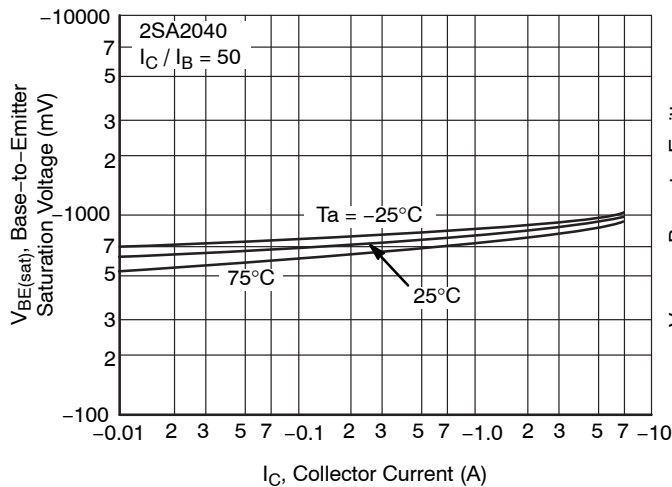


Figure 12. $V_{BE(sat)} - I_C$

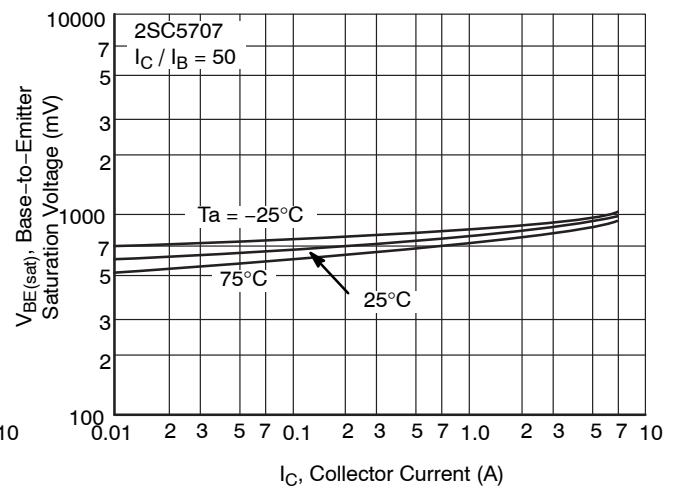


Figure 13. $V_{BE(sat)} - I_C$

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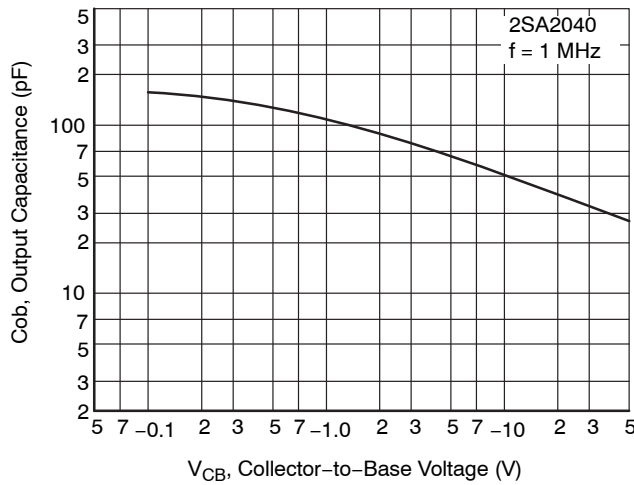


Figure 14. Cob - V_{CB}

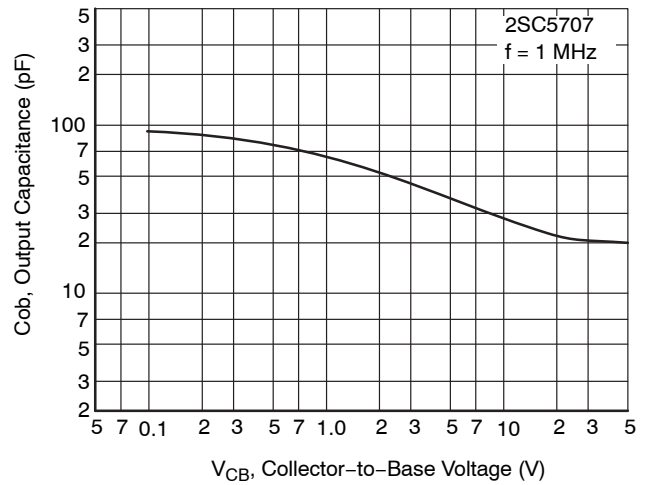


Figure 15. Cob - V_{CB}

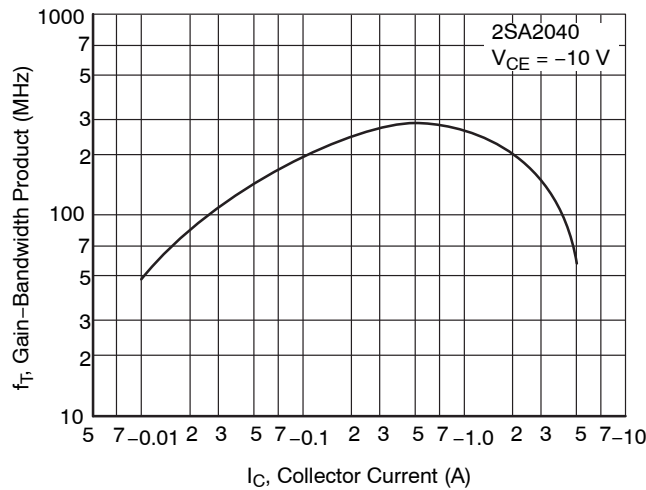


Figure 16. f_T - I_C

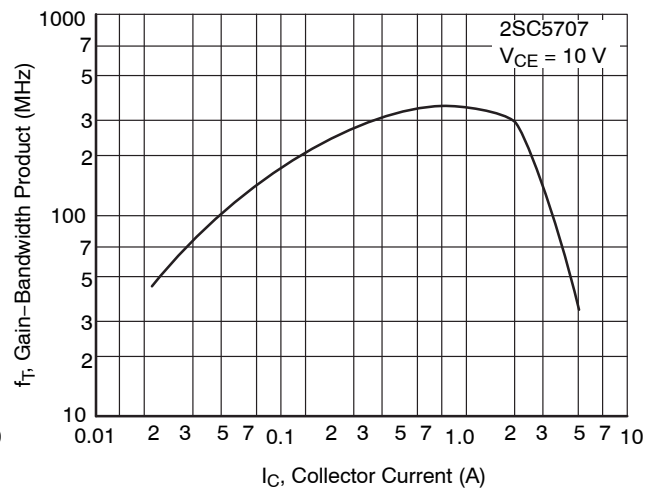


Figure 17. f_T - I_C

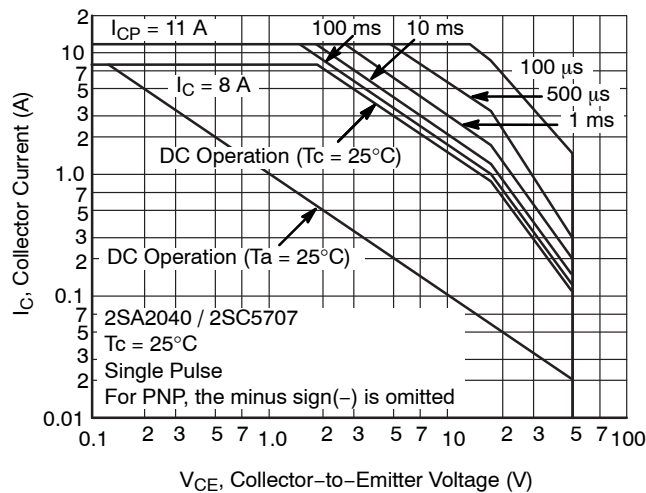


Figure 18. ASO

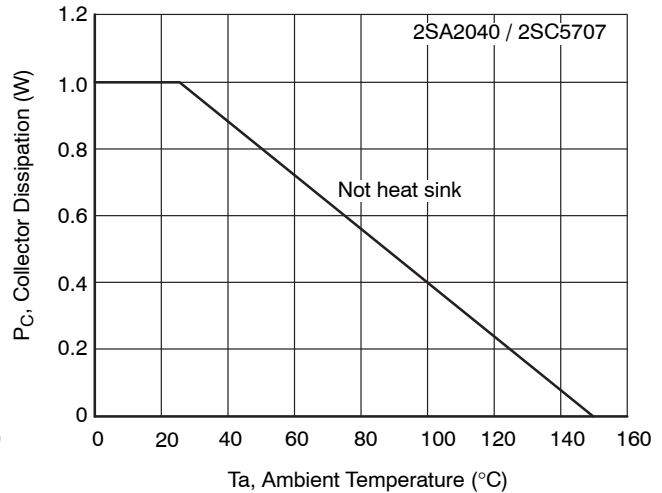


Figure 19. P_C - T_a

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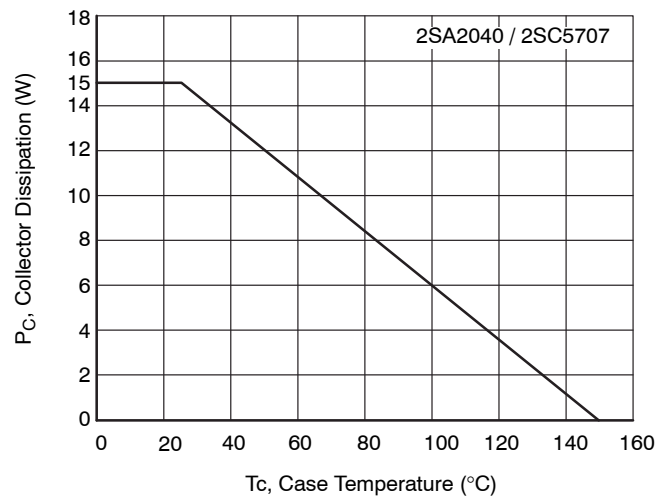
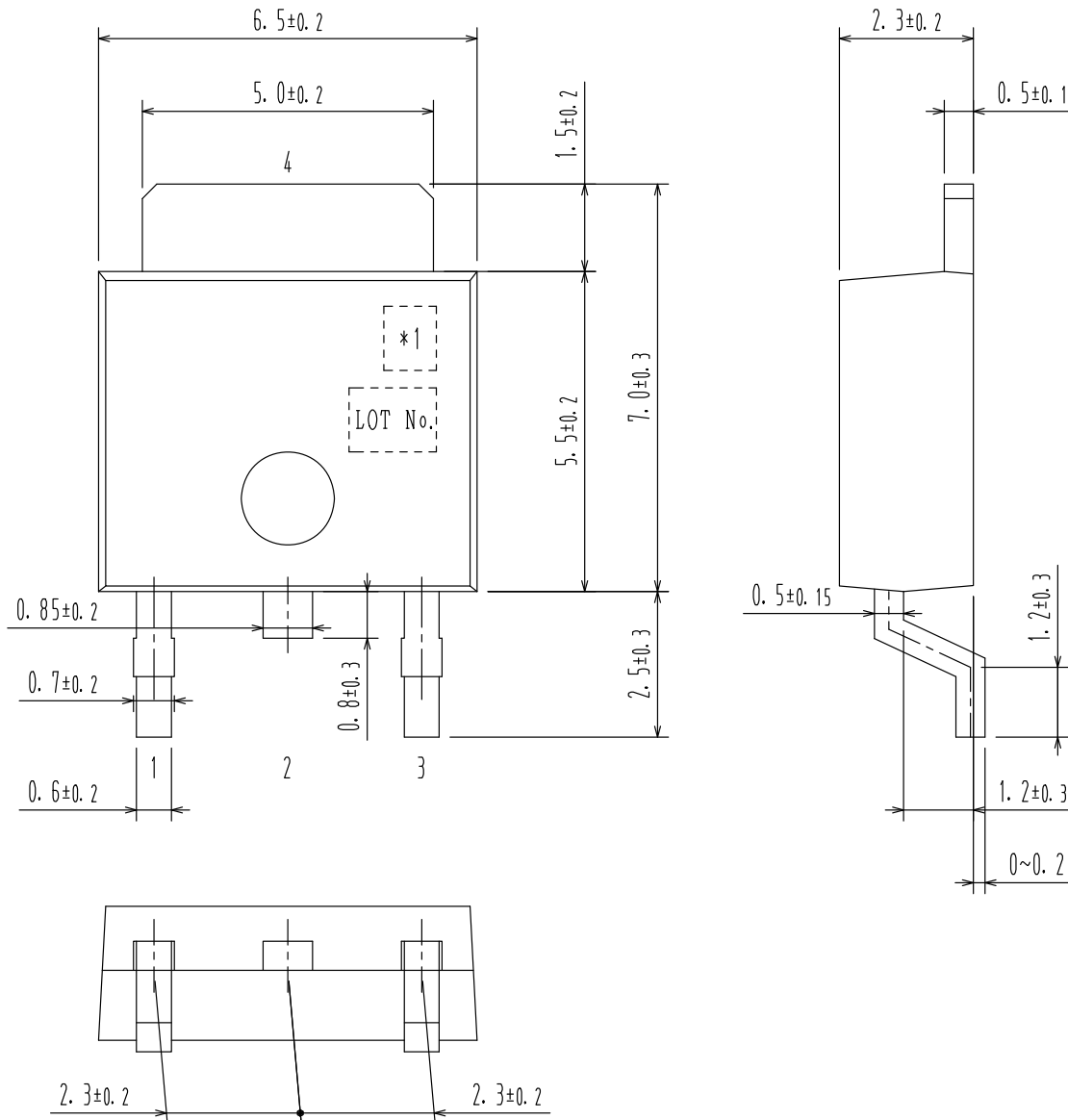


Figure 20. $P_C - T_C$



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Pin 2 is idle pin with electrical designation only carried.

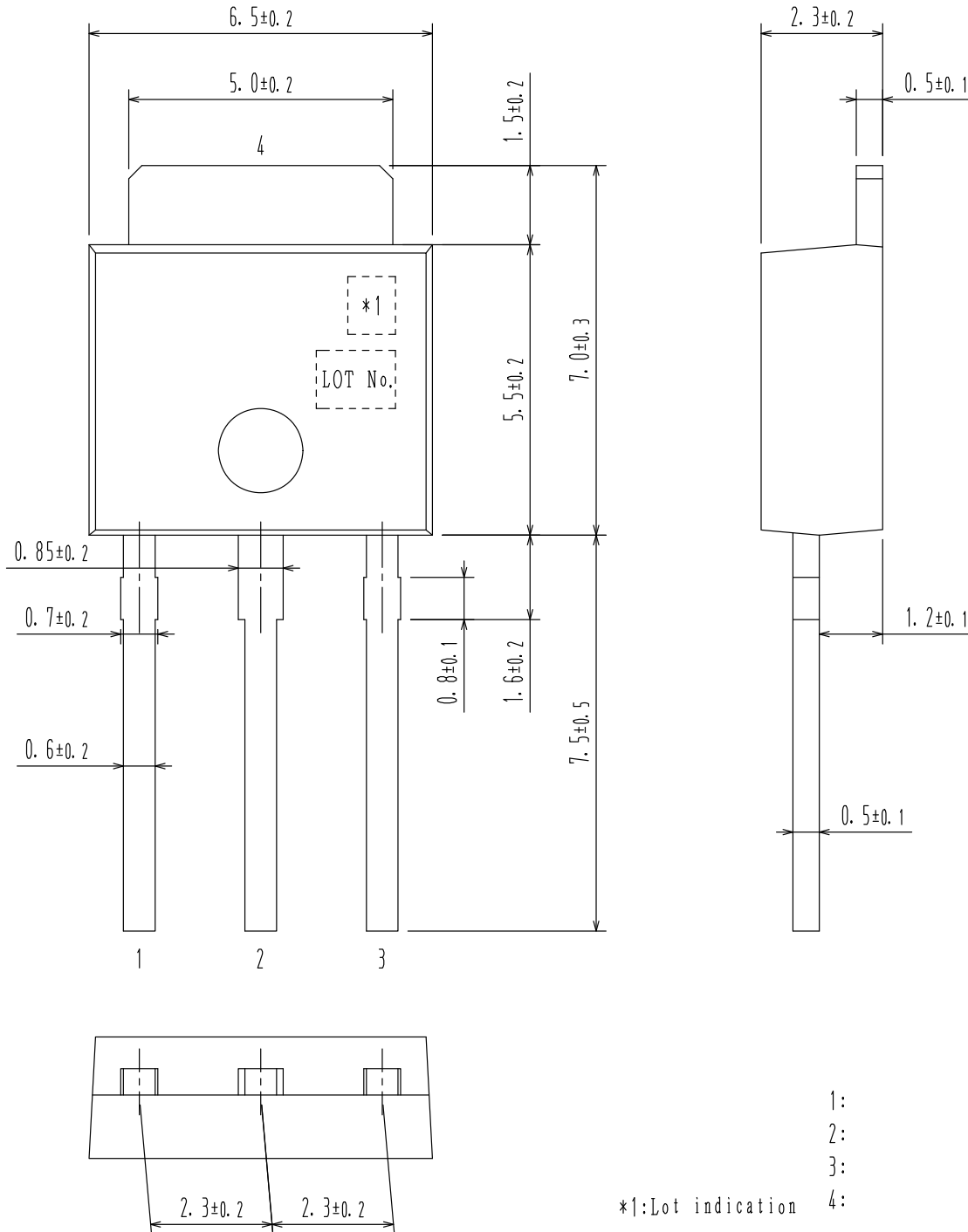
	1:
	2:
	3:
*1:Lot indication	4:

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