Bipolar Transistor

(–)50 V, (–)5 A, Low $V_{CE(sat)}$, (PNP)NPN Single TP/TP–FA

2SB1203/2SD1803

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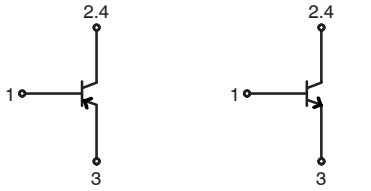
Features

- Low Collector–to–Emitter Saturation Voltage
- Excellent Linearity of h_{FE}
- Small and Slim Package Making It Easy to Make 2SB1203/2SD1803–Applied Sets Smaller
- High Current and High f_T
- Fast Switching Speed

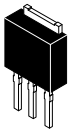
Applications

- Relay Drivers, High–Speed Inverters, Converters, and Other General High–Current Switching Applications

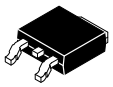
ELETRICAL CONNECTION



2SB1203 2SD1803

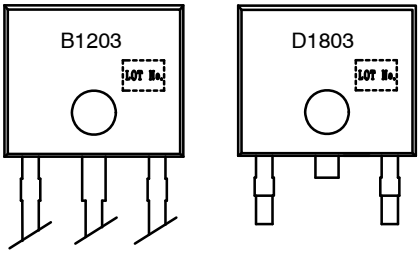


IPAK / TP
CASE 369AJ



DPAK / TP–FA
CASE 369AH

MARKING DIAGRAM



ORDERING INFORMATION

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

ABSOLUTE MAXIMUM RATINGS (at Ta = 25°C)

Symbol	Parameter	Condition	Rating	Unit
V_{CBO}	Collector–to–Base Voltage		(–)60	V
V_{CEO}	Collector–to–Emitter Voltage		(–)50	V
V_{EBO}	Emitter–to–Base Voltage		(–)6	V
I_C	Collector Current		(–)5	A
I_{CP}	Collector Current (Pulse)		(–)8	A
P_C	Collector Dissipation		1	W
		Tc = 25°C	20	W
Tj	Junction Temperature		150	°C
Tstg	Storage Temperature		–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.

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ELECTRICAL CHARACTERISTICS (at T_A = 25°C)

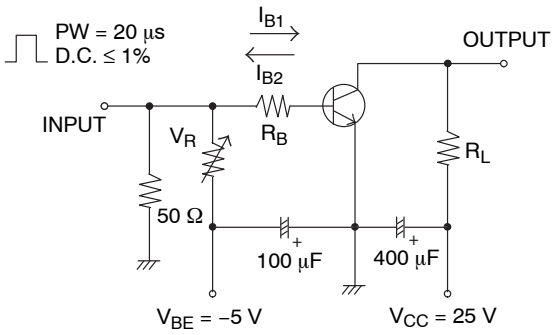
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
I_{CBO}	Collector Cutoff Current	V_{CB} = (−)40 V, I_E = 0 A			(−)1	μA
I_{EBO}	Emitter Cutoff Current	V_{EB} = (−)4 V, I_C = 0 A			(−)1	μA
$h_{FE}1$	DC Current Gain	V_{CE} = (−)2 V, I_C = (−)0.5 A	70 (Note 1)		400 (Note 1)	
$h_{FE}2$		V_{CE} = (−)2 V, I_C = (−)4 A	35			
f_T	Gain−Bandwidth Product	V_{CE} = (−)5 V, I_C = (−)1 A		(130)180		MHz
Cob	Output Capacitance	V_{CB} = (−)10 V, f = 1 MHz		(60)40		pF
$V_{CE(sat)}$	Collector−to−Emitter Saturation Voltage	I_C = (−)3 A, I_B = (−)0.15 A		(−280)220	(−550)400	mV
$V_{BE(sat)}$	Base−to−Emitter Saturation Voltage	I_C = (−)3 A, I_B = (−)0.15 A		(−)0.95	(−)1.3	V
$V_{(BR)CBO}$	Collector−to−Base Breakdown Voltage	I_C = (−)10 μA, I_E = 0 A	(−)60			V
$V_{(BR)CEO}$	Collector−to−Emitter Breakdown Voltage	I_C = (−)1 mA, R_{BE} = ∞	(−)50			V
$V_{(BR)EBO}$	Emitter−to−Base Breakdown Voltage	I_E = (−)10 μA, I_C = 0 A	(−)6			V
t_{on}	Turn−On Time	See Specified Test Circuit		(50)50		ns
t_{stg}	Storage Time			(450)500		ns
t_f	Fall Time			(20)20		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.

1. The 2SB1203/2SD1803 are classified by 0.5 A h_{FE} as follows:

Rank	Q	R	S	T
h_{FE}	70 to 140	100 to 200	140 to 280	200 to 400

Switching Time Test Circuit



I_C = 10 I_{B1} = −10 I_{B2} = 2 A
For PNP, the polarity is reversed.

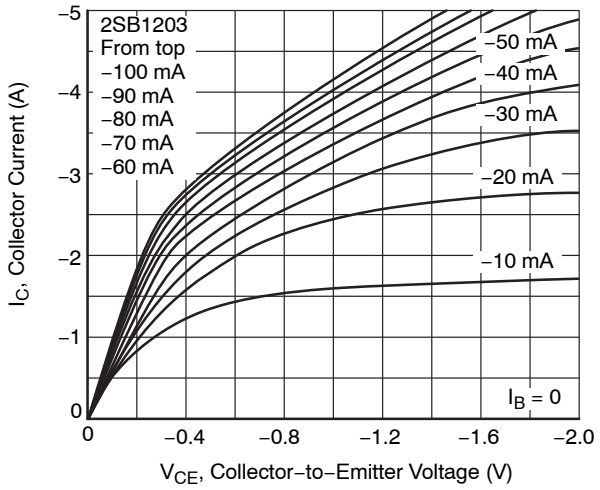


Figure 1. $I_C - V_{CE}$

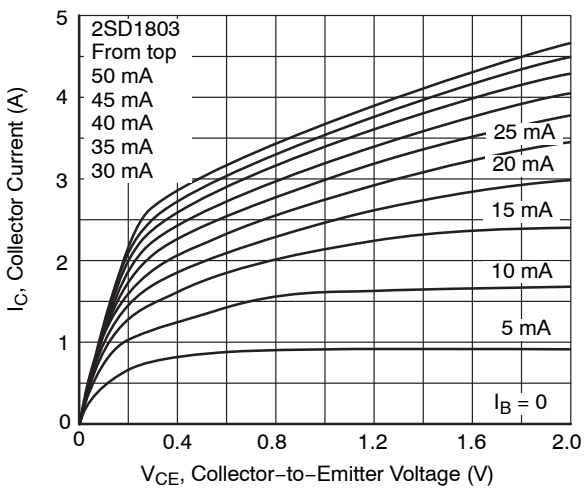


Figure 2. $I_C - V_{CE}$

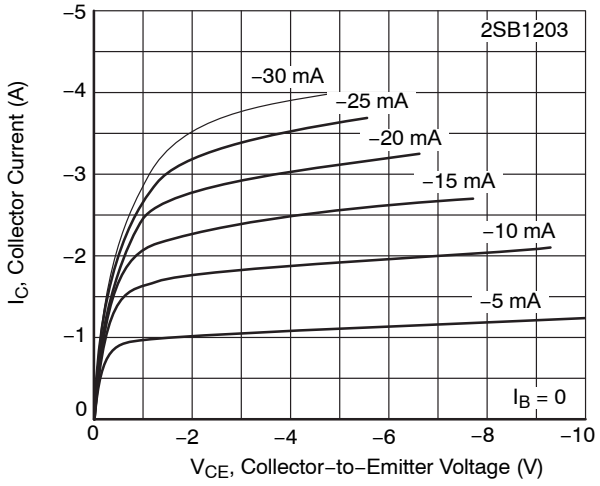


Figure 3. $I_C - V_{CE}$

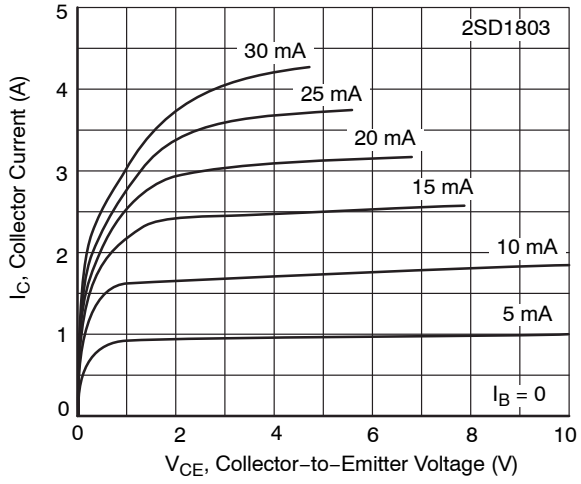


Figure 4. $I_C - V_{CE}$

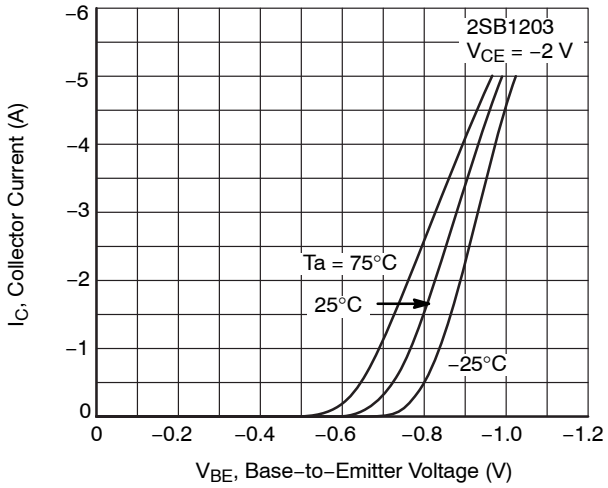


Figure 5. $I_C - V_{BE}$

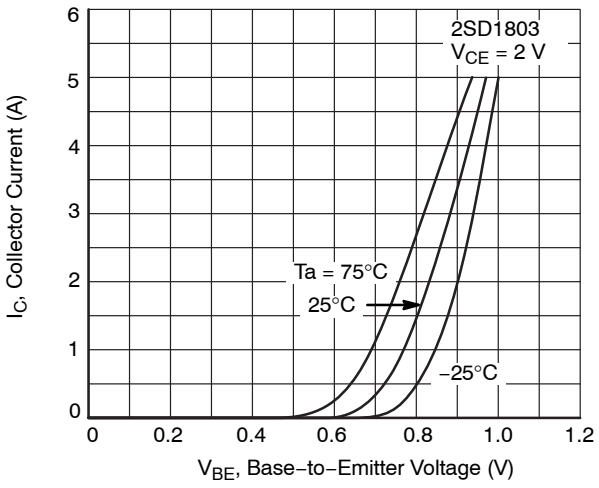


Figure 6. $I_C - V_{BE}$

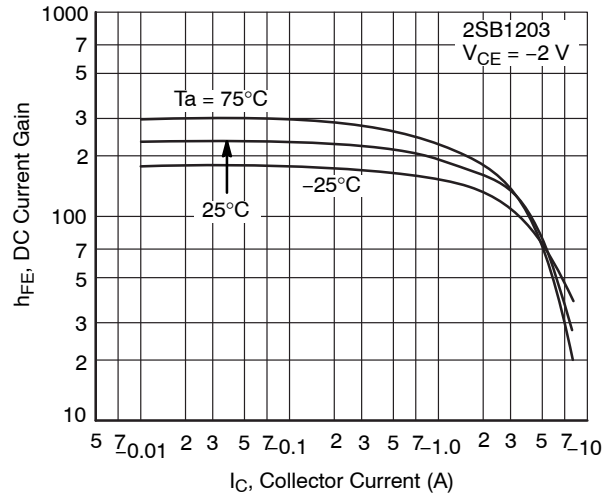


Figure 7. h_{FE} — I_C

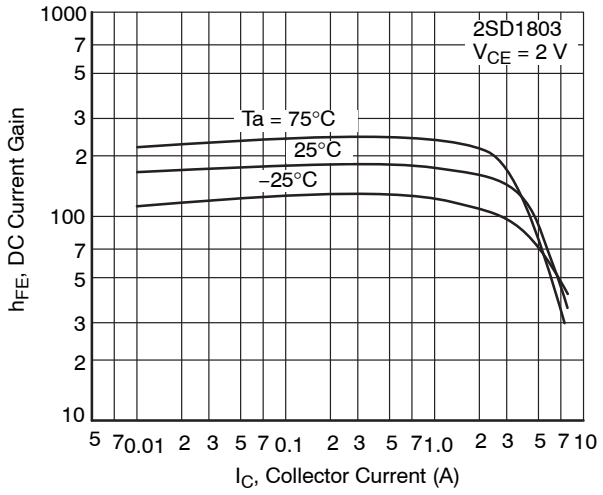


Figure 8. h_{FE} — I_C

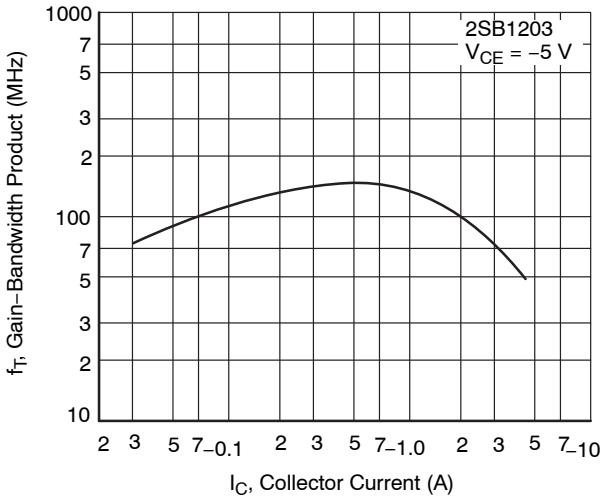


Figure 9. f_T – I_C

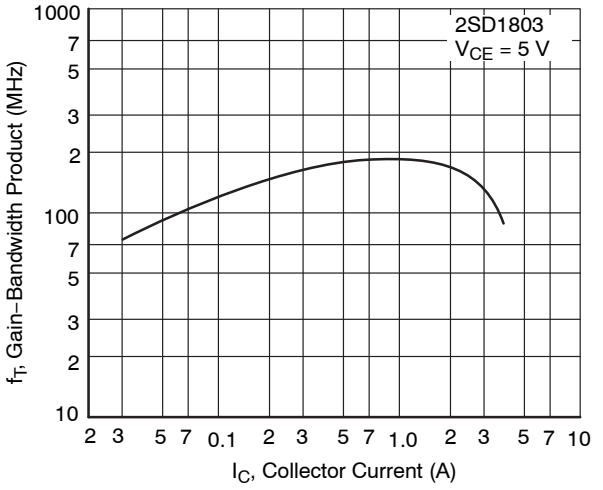


Figure 10. f_T – I_C

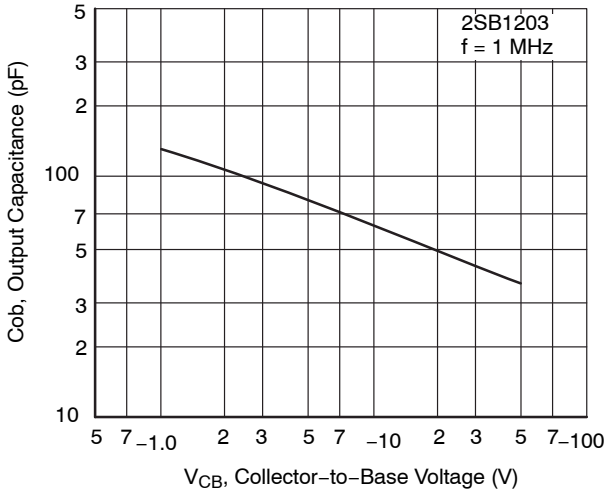


Figure 11. Cob – V_{CB}

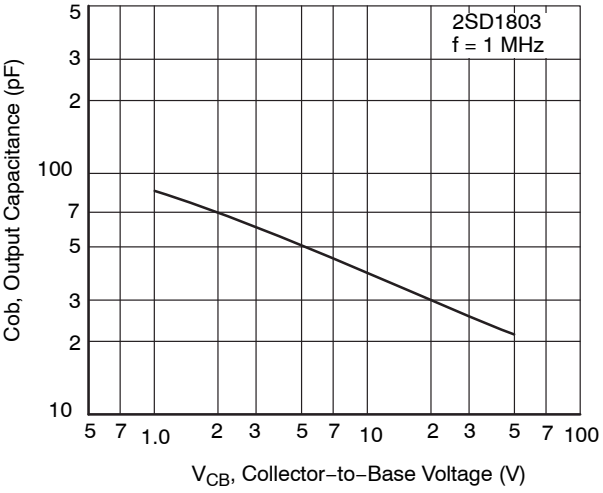


Figure 12. Cob – V_{CB}

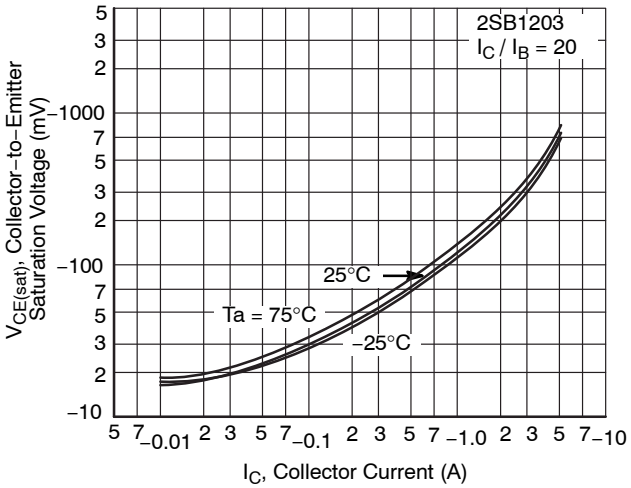


Figure 13. $V_{CE(sat)}$ — I_C

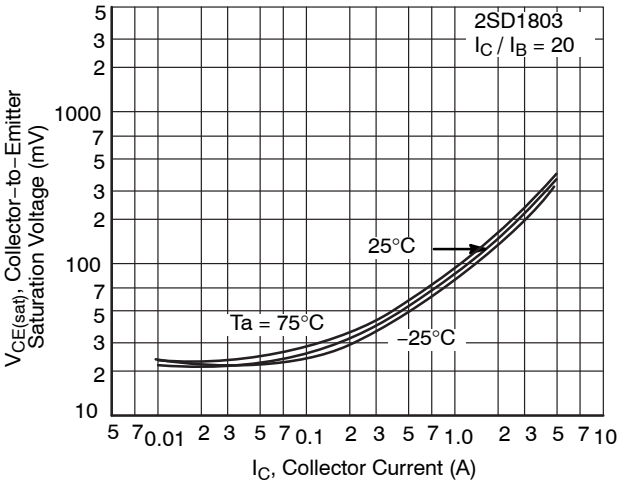


Figure 14. $V_{CE(sat)}$ — I_C

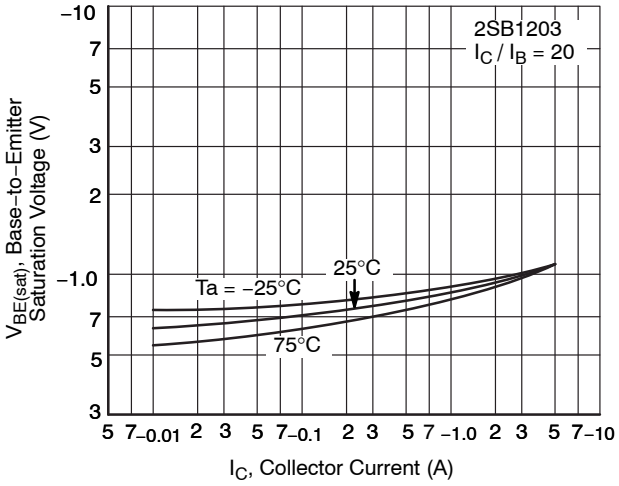


Figure 15. $V_{BE(sat)}$ − I_C

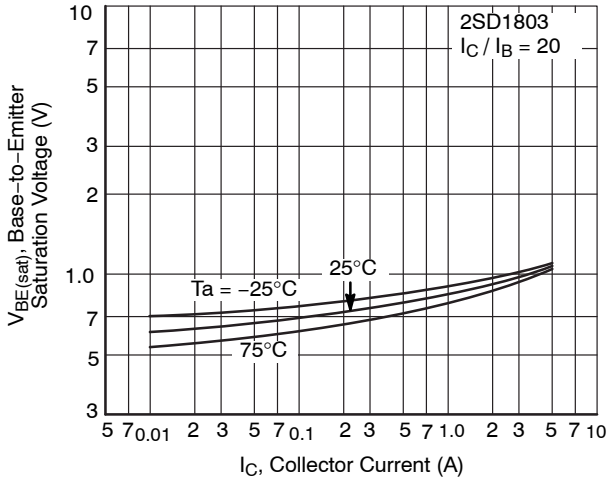


Figure 16. $V_{BE(sat)}$ − I_C

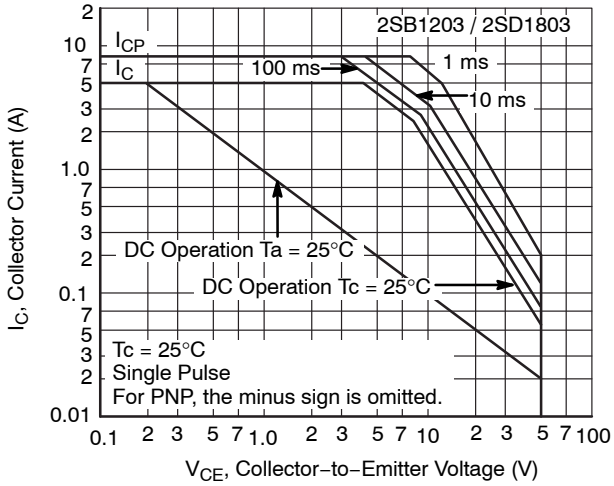


Figure 17. ASO

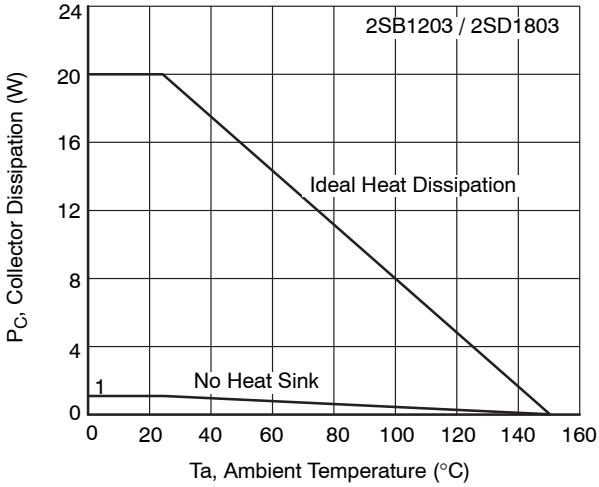


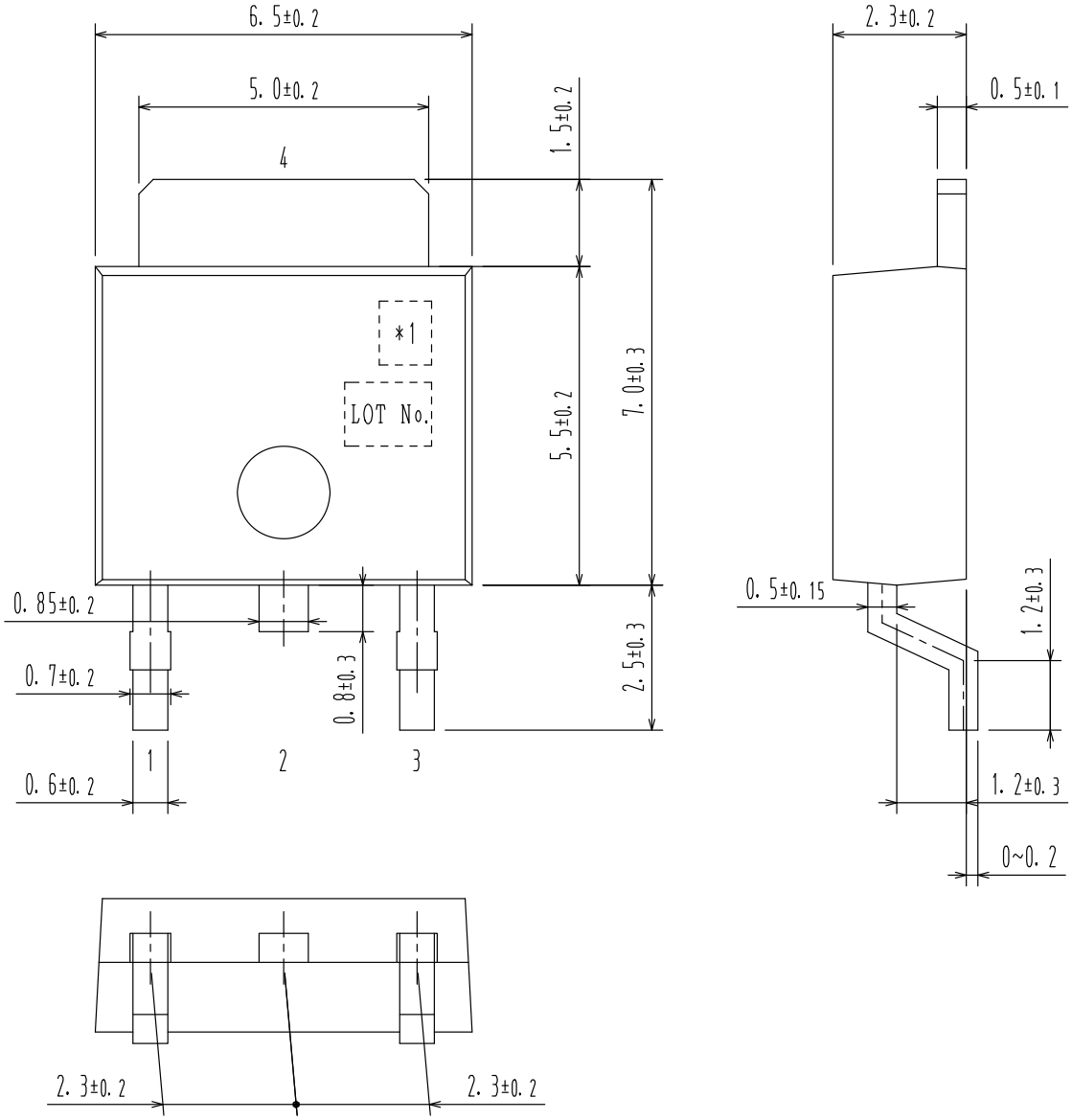
Figure 18. P_C − T_a

ORDERING INFORMATION

Device	Package	Shipping	memo
2SB1203S−E	TP	500pcs./bag	Pb Free
2SB1203S−H	TP	500pcs./bag	Pb Free and Halogen Free
2SB1203T−H	TP	500pcs./bag	Pb Free and Halogen Free
2SD1803S−E	TP	500pcs./bag	Pb Free
2SD1803S−H	TP	500pcs./bag	Pb Free and Halogen Free
2SD1803T−E	TP	500pcs./bag	Pb Free
2SD1803T−H	TP	500pcs./bag	Pb Free and Halogen Free
2SB1203S−TL−E	TP−FA	700pcs./bag	Pb Free
2SB1203S−TL−H	TP−FA	700pcs./bag	Pb Free and Halogen Free
2SB1203T−TL−E	TP−FA	700pcs./bag	Pb Free
2SB1203T−TL−H	TP−FA	700pcs./bag	Pb Free and Halogen Free
2SD1803S−TL−E	TP−FA	700pcs./bag	Pb Free
2SD1803S−TL−H	TP−FA	700pcs./bag	Pb Free and Halogen Free
2SD1803T−TL−E	TP−FA	700pcs./bag	Pb Free
2SD1803T−TL−H	TP−FA	700pcs./bag	Pb Free and Halogen Free

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DATE 30 JAN 2012



Pin 2 is idle pin with electrical designation only carried.

*1:Lot indication

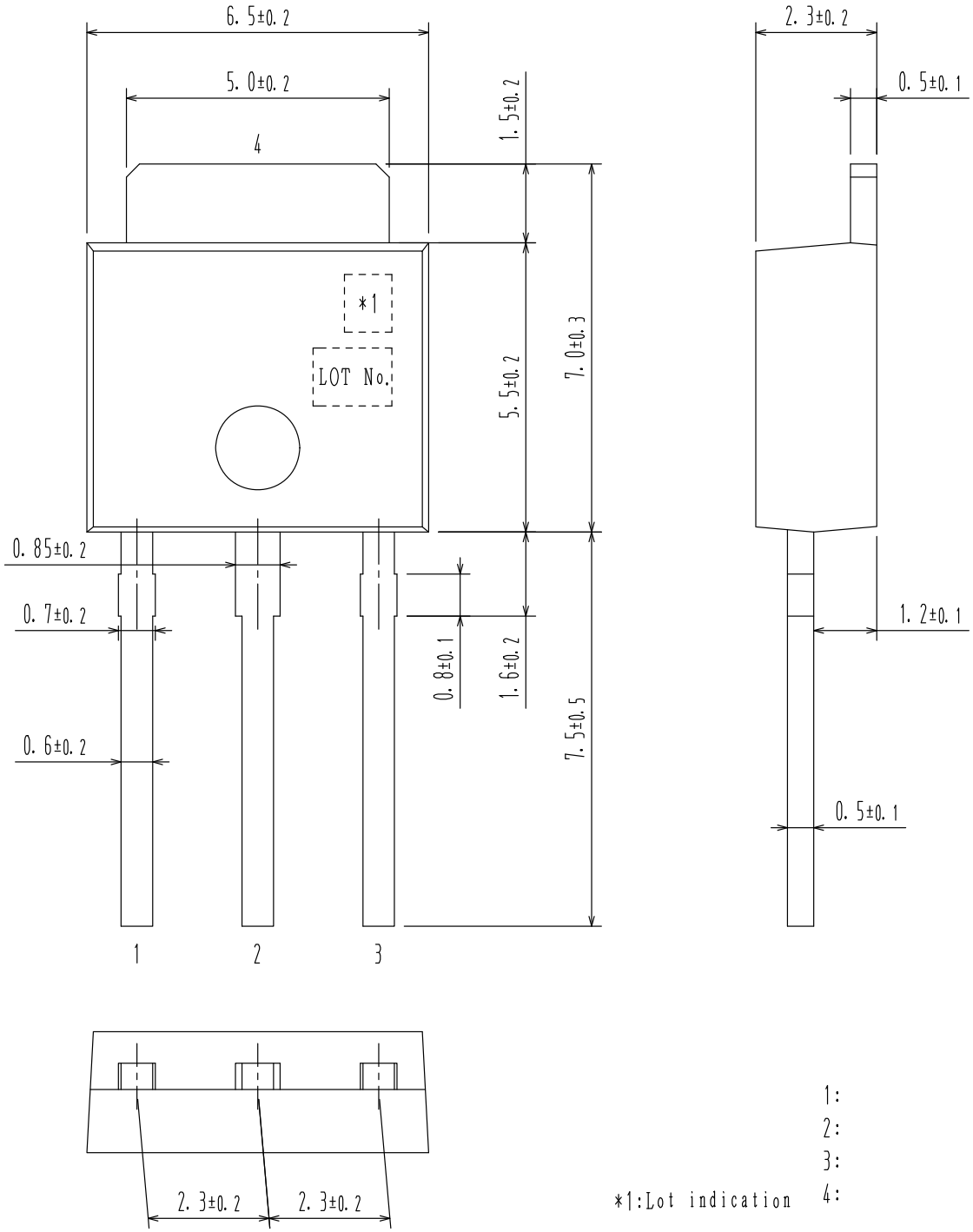
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