

Bipolar Transistor

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

2SB1203/2SD1803

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

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

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
		$T_c = 25^\circ\text{C}$	20	W
T_J	Junction Temperature		150	$^\circ\text{C}$
T_{stg}	Storage Temperature		-55 to +150	$^\circ\text{C}$

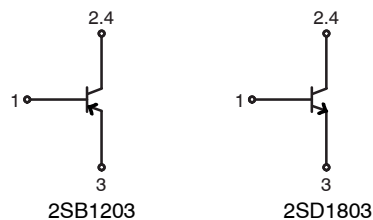
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.



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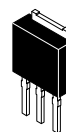
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ELECTRICAL CONNECTION

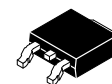


2SB1203

2SD1803

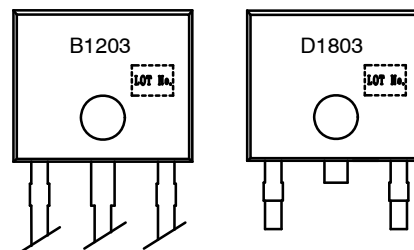


IPAK / TP
CASE 369AJ



DPAK / TP-FA
CASE 369AH

MARKING DIAGRAM



ORDERING INFORMATION

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

2SB1203/2SD1803

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

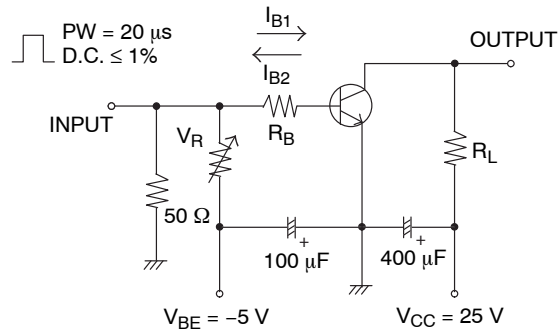
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
I_{CBO}	Collector Cutoff Current	$V_{CB} = (-)40\text{ V}, I_E = 0\text{ A}$			(-1)	μA
I_{EBO}	Emitter Cutoff Current	$V_{EB} = (-)4\text{ V}, I_C = 0\text{ A}$			(-1)	μA
h_{FE1}	DC Current Gain	$V_{CE} = (-)2\text{ V}, I_C = (-)0.5\text{ A}$	70 (Note 1)		400 (Note 1)	
h_{FE2}		$V_{CE} = (-)2\text{ V}, I_C = (-)4\text{ A}$	35			
f_T	Gain-Bandwidth Product	$V_{CE} = (-)5\text{ V}, I_C = (-)1\text{ A}$		(130)180		MHz
C_{ob}	Output Capacitance	$V_{CB} = (-)10\text{ V}, f = 1\text{ MHz}$		(60)40		pF
$V_{CE(sat)}$	Collector-to-Emitter Saturation Voltage	$I_C = (-)3\text{ A}, I_B = (-)0.15\text{ A}$		(-280)220	(-550)400	mV
$V_{BE(sat)}$	Base-to-Emitter Saturation Voltage	$I_C = (-)3\text{ A}, I_B = (-)0.15\text{ A}$		(-)0.95	(-)1.3	V
$V_{(BR)CBO}$	Collector-to-Base Breakdown Voltage	$I_C = (-)10\text{ }\mu\text{A}, I_E = 0\text{ A}$	(-)60			V
$V_{(BR)CEO}$	Collector-to-Emitter Breakdown Voltage	$I_C = (-)1\text{ mA}, R_{BE} = \infty$	(-)50			V
$V_{(BR)EBO}$	Emitter-to-Base Breakdown Voltage	$I_E = (-)10\text{ }\mu\text{A}, I_C = 0\text{ A}$	(-)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



$I_C = 10\text{ A}, I_{B1} = -10\text{ A}, I_{B2} = 2\text{ A}$
For PNP, the polarity is reversed.

2SB1203/2SD1803

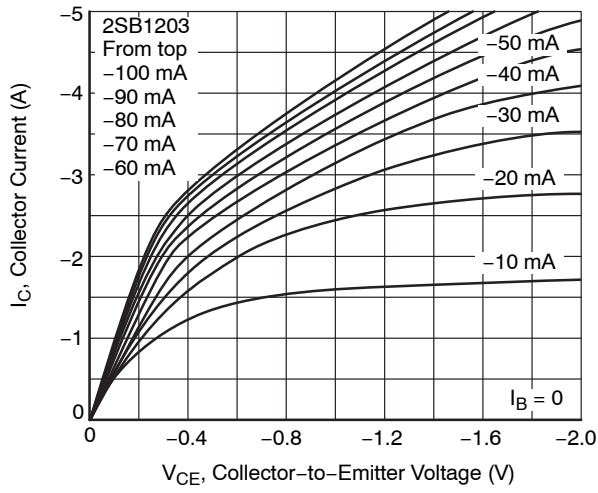


Figure 1. $I_C - V_{CE}$

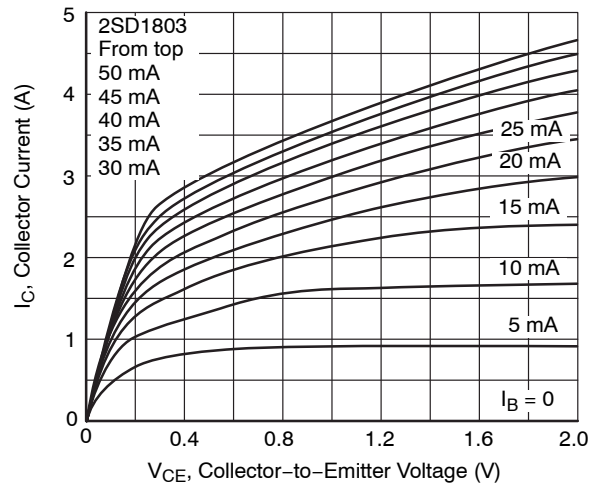


Figure 2. $I_C - V_{CE}$

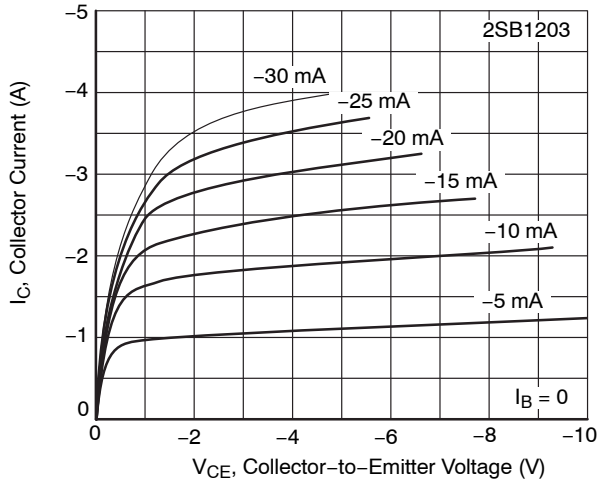


Figure 3. $I_C - V_{CE}$

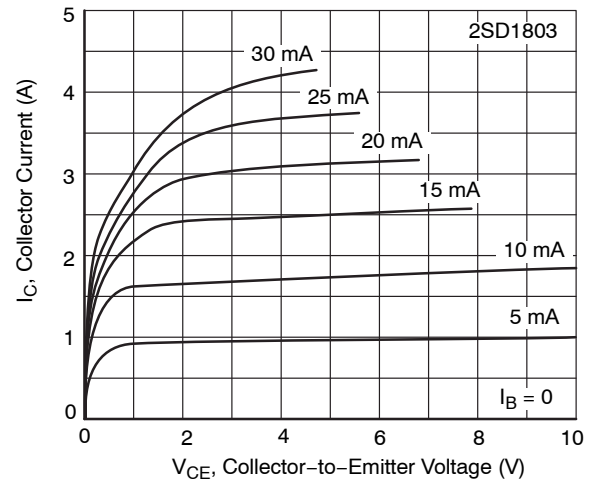


Figure 4. $I_C - V_{CE}$

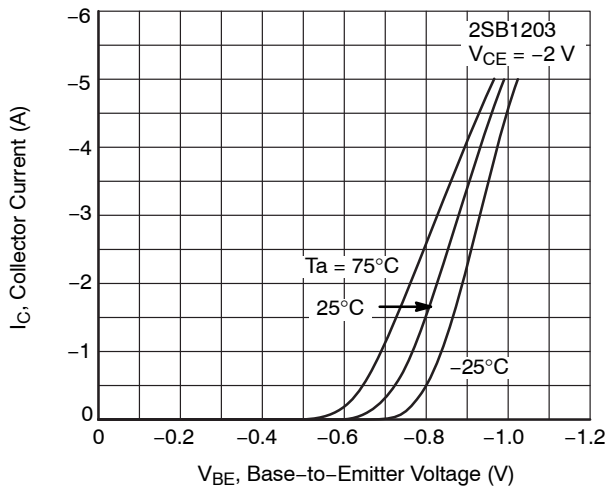


Figure 5. $I_C - V_{BE}$

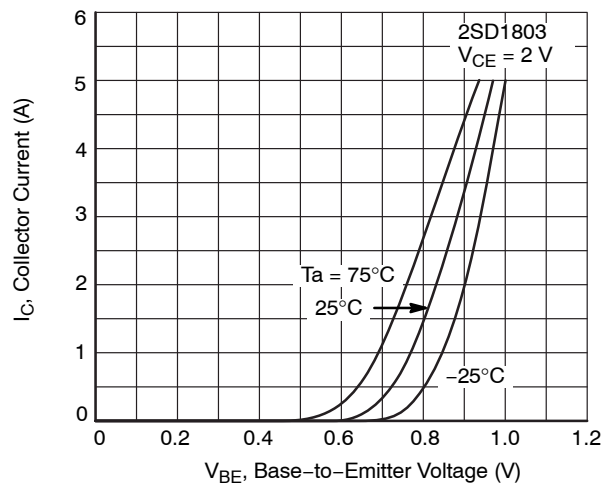


Figure 6. $I_C - V_{BE}$

2SB1203/2SD1803

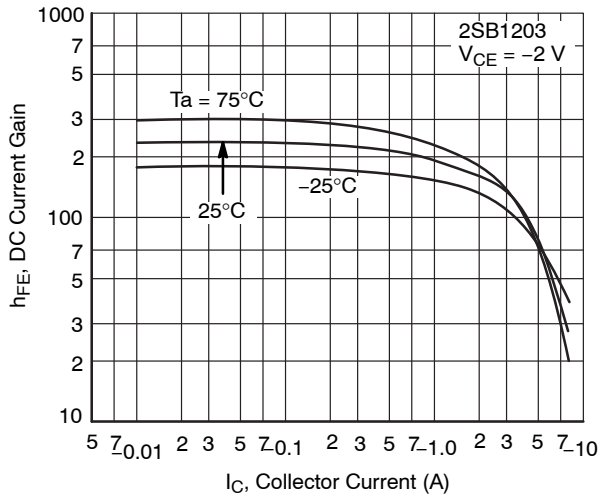


Figure 7. h_{FE} – I_C

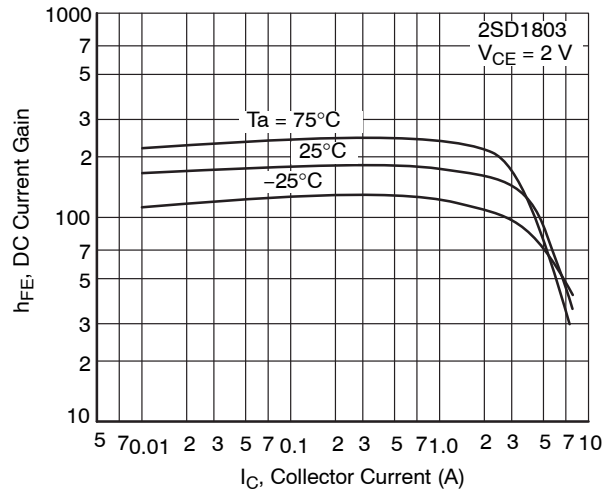


Figure 8. h_{FE} – I_C

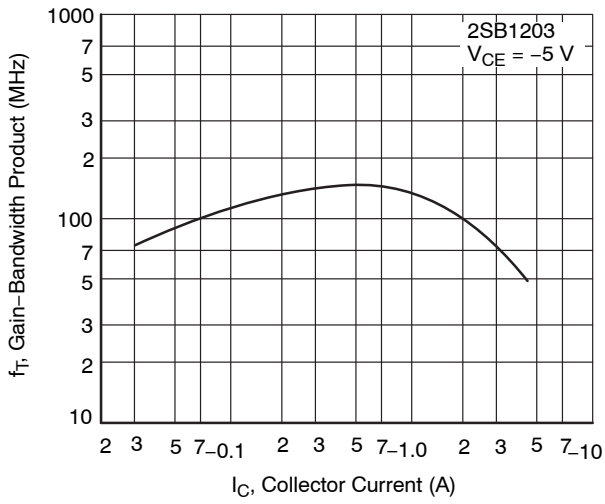


Figure 9. f_T – I_C

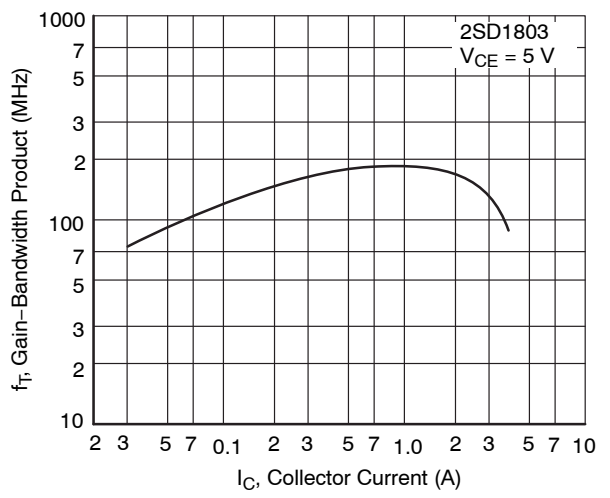


Figure 10. f_T – I_C

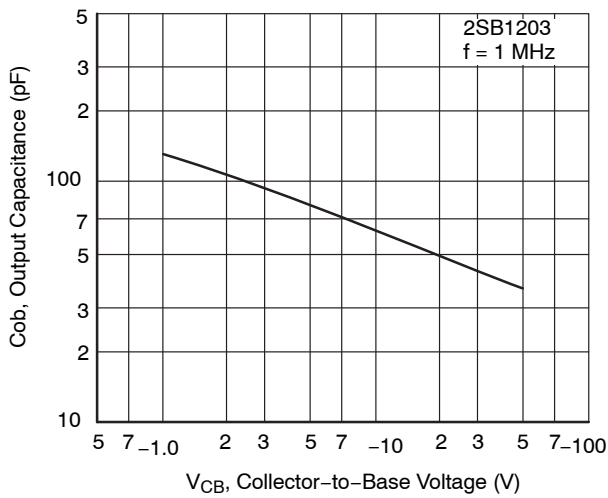


Figure 11. C_{ob} – V_{CB}

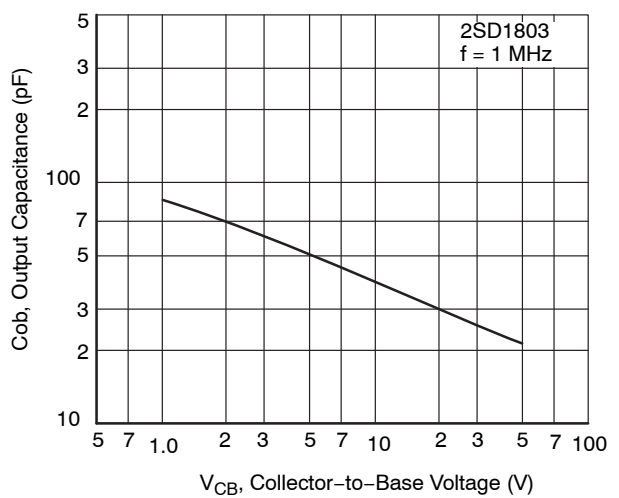


Figure 12. C_{ob} – V_{CB}

2SB1203/2SD1803

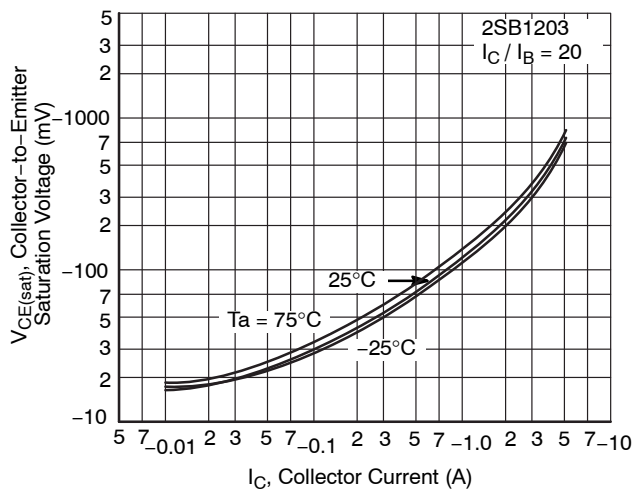


Figure 13. $V_{CE(sat)} - I_C$

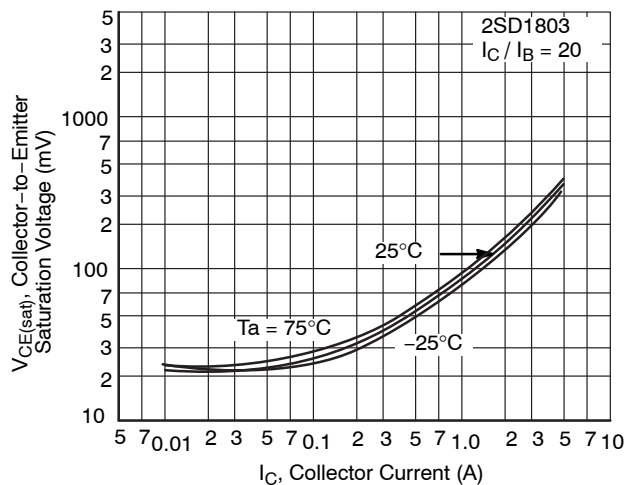


Figure 14. $V_{CE(sat)} - I_C$

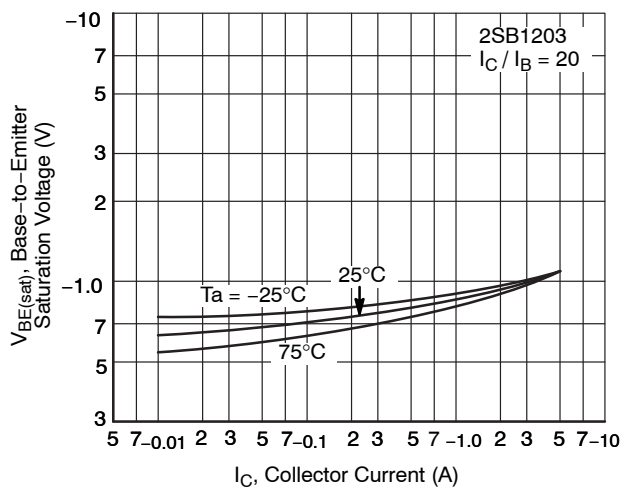


Figure 15. $V_{BE(sat)} - I_C$

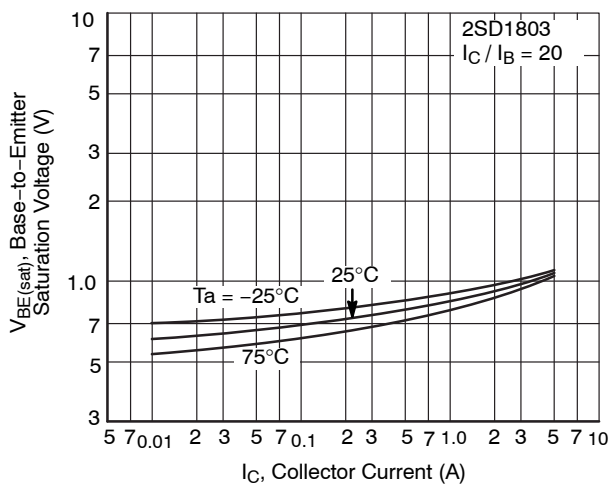


Figure 16. $V_{BE(sat)} - I_C$

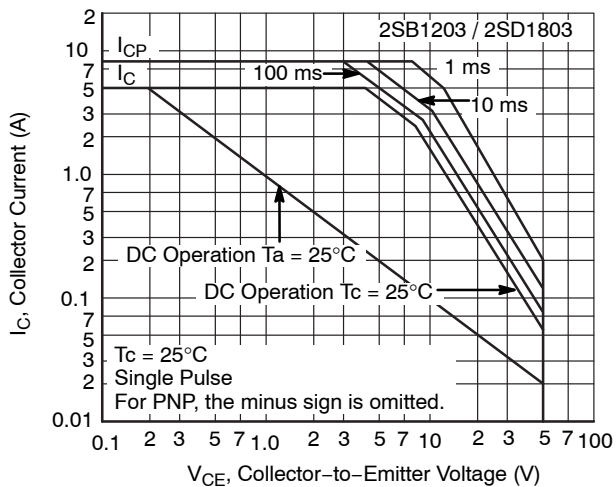


Figure 17. ASO

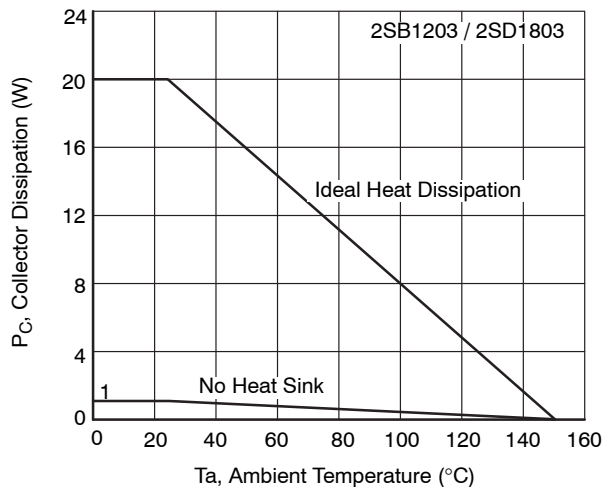


Figure 18. $P_C - T_a$

2SB1203/2SD1803

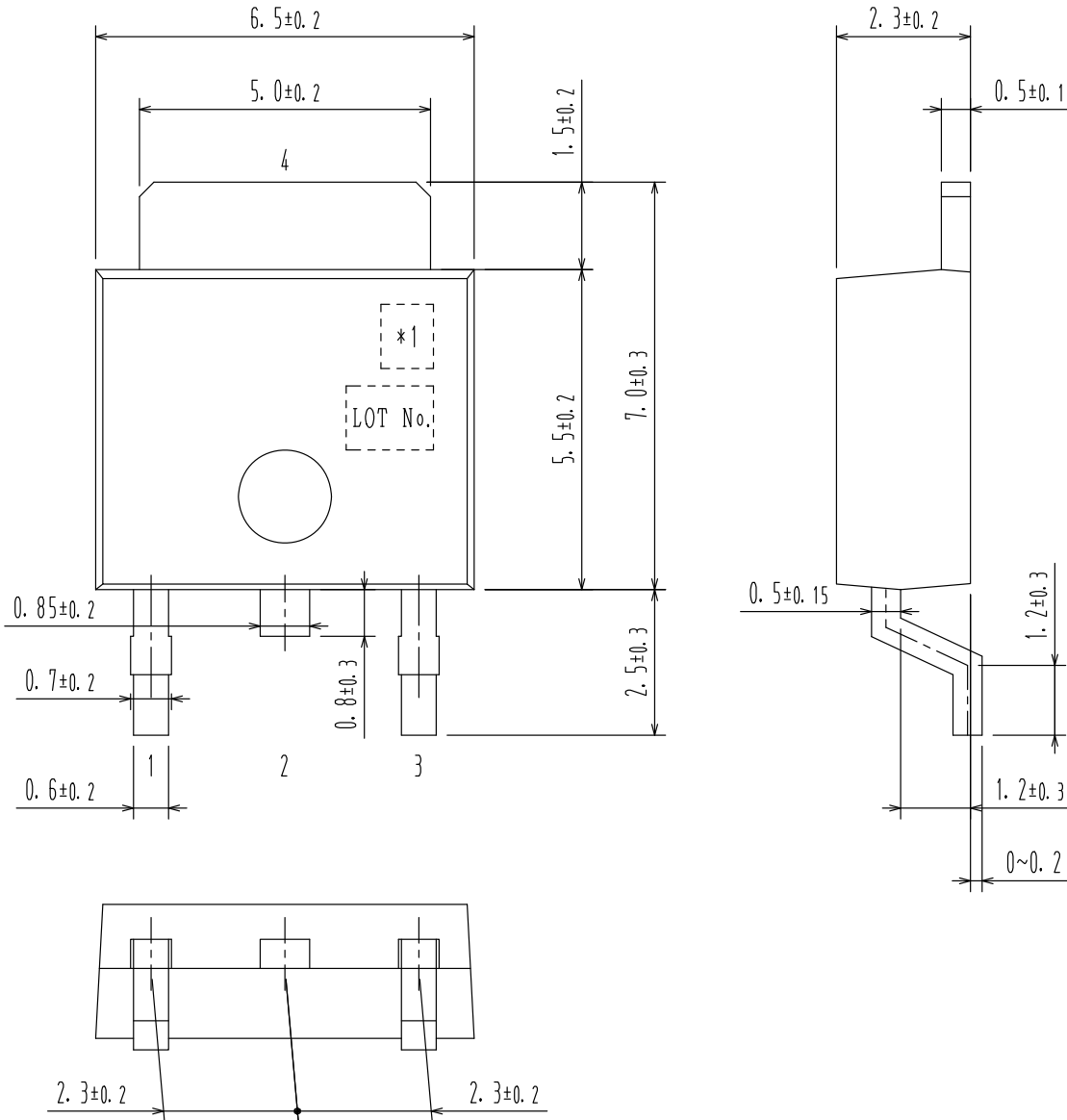
ORDERING INFORMATION

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

MECHANICAL CASE OUTLINE
PACKAGE DIMENSIONS

DPAK / TP-FA
CASE 369AH
ISSUE O

DATE 30 JAN 2012



Pin 2 is idle pin with electrical designation only carried.

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

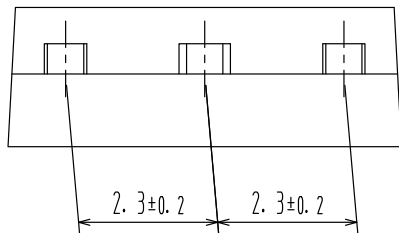
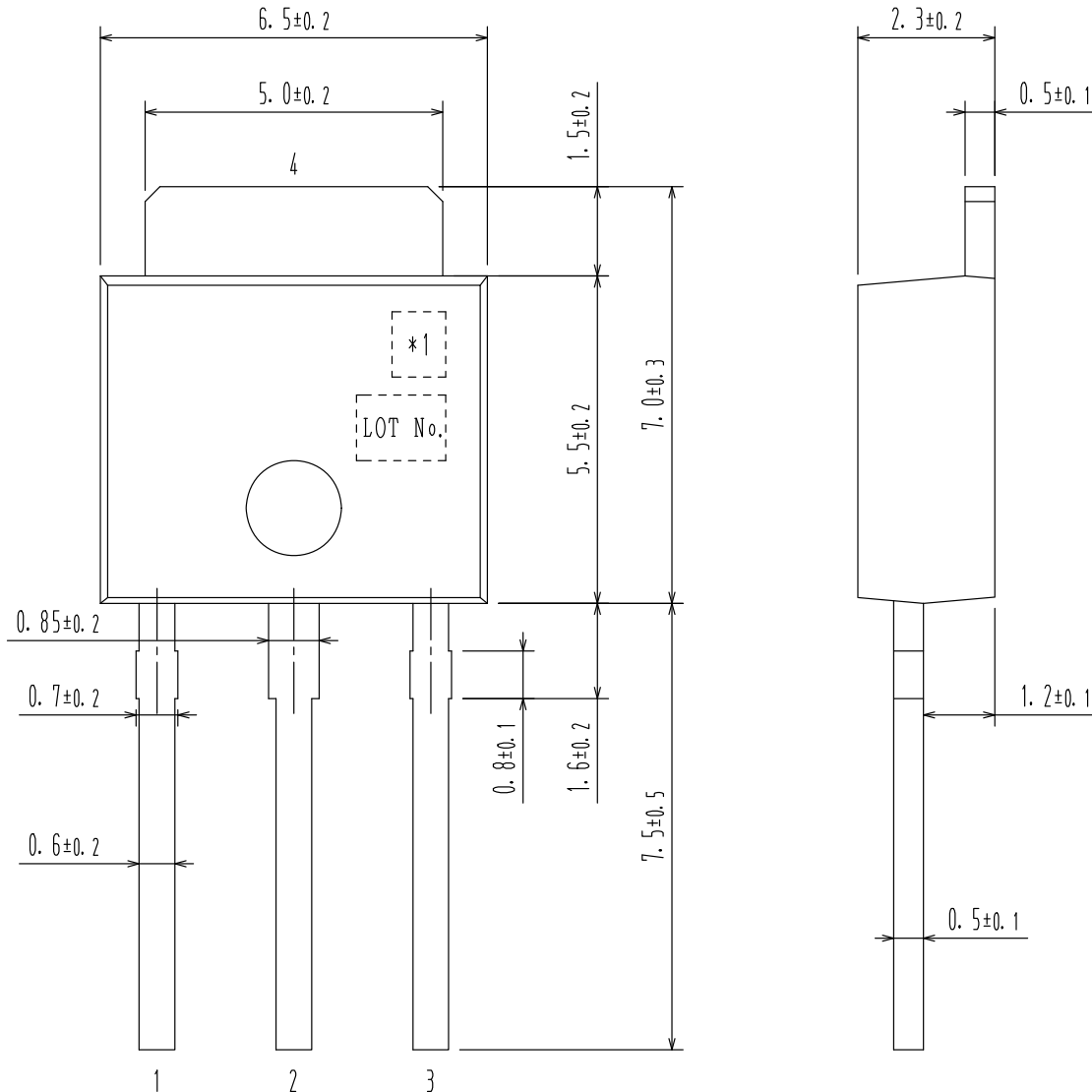
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MECHANICAL CASE OUTLINE
PACKAGE DIMENSIONS

IPAK / TP
CASE 369AJ
ISSUE O

DATE 30 JAN 2012



- 1:
- 2:
- 3:
- 4:

*1: Lot indication

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