Ordering number : EN2113E

2SB1202/2SD1802

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

ON Semiconductor®
http://onsemi.com

Applicaitons

・ Voltage regulators, relay drivers, lamp drivers, electrical equipment

Features

・ Adoption of FBET and MBIT processes
・ Low collector to emitter saturation voltage
・ Large current capacitance and wide ASO
・ Fast switching speed
・ Small and slim package making it easy to make 2SB1202/2SD1802-used sets smaller

Specifications ( ): 2SB1202

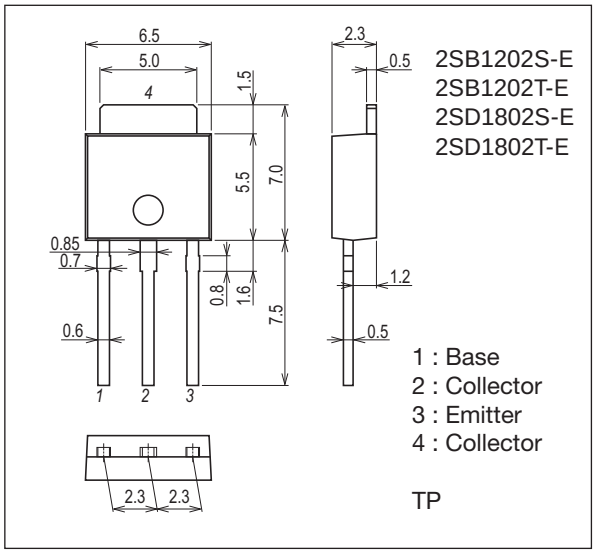
Absolute Maximum Ratings at Ta=25°C

Parameter	Symbol	Conditions	Ratings	Unit
Collector to Base Voltage	V_{CBO}		(–)60	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

Continued on next page.

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

Package Dimensions unit : mm (typ)
7518-003

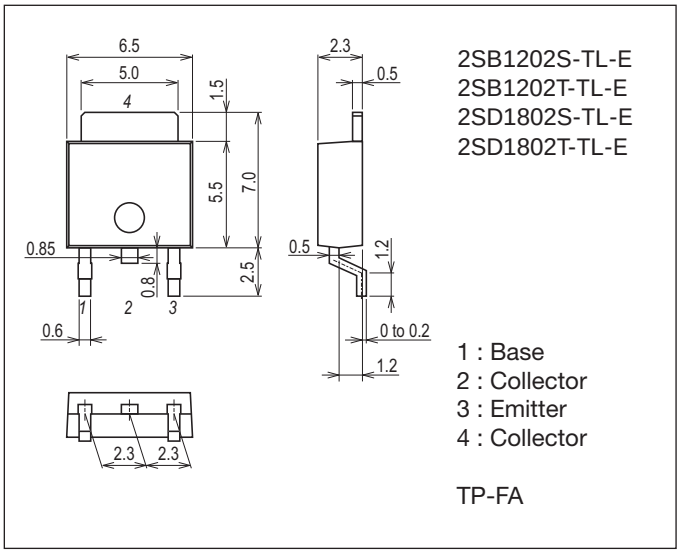


2SB1202S-E
2SB1202T-E
2SD1802S-E
2SD1802T-E

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

TP

Package Dimensions unit : mm (typ)
7003-003



2SB1202S-TL-E
2SB1202T-TL-E
2SD1802S-TL-E
2SD1802T-TL-E

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

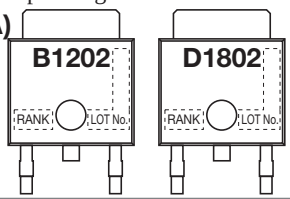
TP-FA

Product & Package Information

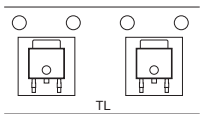
- Package : TP
- JEITA, JEDEC : SC-64, TO-251, SOT-553, DPAK
- Minimum Packing Quantity : 500 pcs./bag

- Package : TP-FA
- JEITA, JEDEC : SC-63, TO-252, SOT-428, DPAK
- Minimum Packing Quantity : 700 pcs./reel

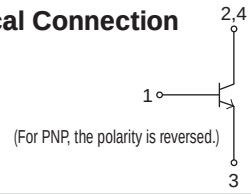
Marking(TP, TP-FA)



Packing Type (TP-FA) : TL



Electrical Connection



(For PNP, the polarity is reversed.)

Continued from preceding page.

Parameter	Symbol	Conditions	Ratings	Unit
Collector Dissipation	P_C		1	W
		Tc=25°C	15	W
Junction Temperature	Tj		150	°C
Storage Temperature	Tstg		−55 to +150	°C

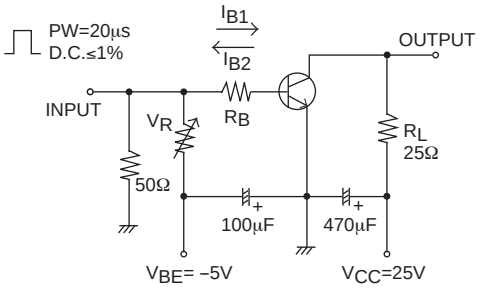
Electrical Characteristics at Ta=25°C

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Collector Cutoff Current	I_{CBO}	V_{CB}=(−)40V, I_E=0A			(−)1	μA
Emitter Cutoff Current	I_{EBO}	V_{EB}=(−)4V, I_C=0A			(−)1	μA
DC Current Gain	$h_{FE}1$	V_{CE}=(−)2V, I_C=(−)100mA	100*		560*	
	$h_{FE}2$	V_{CE}=(−)2V, I_C=(−)3A	35			
Gain-Bandwidth Product	f_T	V_{CE}=(−)10V, I_C=(−)50mA		150		MHz
Output Capacitance	Cob	V_{CB}=(−)10V, f=1MHz		(39)25		pF
Collector to Emitter Saturation Voltage	V_{CE}(sat)	I_C=(−)2A, I_B=(−)100mA		(−0.35)0.19	(−0.7)0.5	mV
Base to Emitter Saturation Voltage	V_{BE}(sat)	V_{CE}=(−)2V, I_C=(−)100mA		(−)0.94	(−)1.2	V
Collector to Base Breakdown Voltage	$V_{(BR)CBO}$	I_C=(−)10μA, I_E=0A	(−)60			V
Collector to Emitter Breakdown Voltage	$V_{(BR)CEO}$	I_C=(−)1mA, R_{BE}=∞	(−)50			V
Emitter to Base Breakdown Voltage	$V_{(BR)EBO}$	I_E=(−)10μA, I_C=0A	(−)6			V
Turn-On Time	t_{on}	See specified Test Circuit.		70		ns
Storage Time	t_{stg}			(450)650		ns
Fall Time	t_f			35		ns

* : The 2SB1202/2SD1802 are classified by 100mA hFE as follows :

Rank	R	S	T	U
h_{FE}	100 to 200	140 to 280	200 to 400	280 to 560

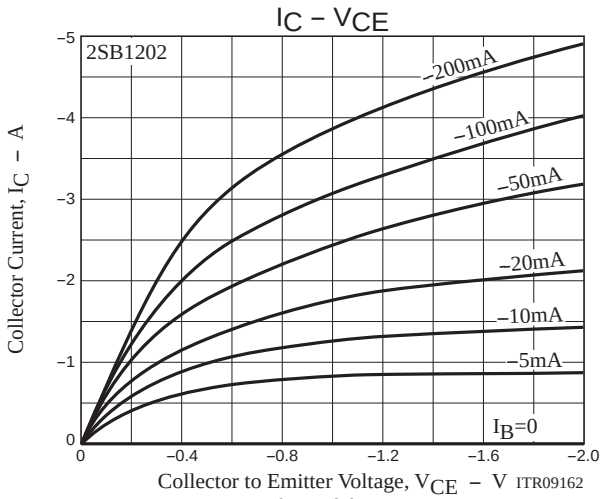
Switching Time Test Circuit

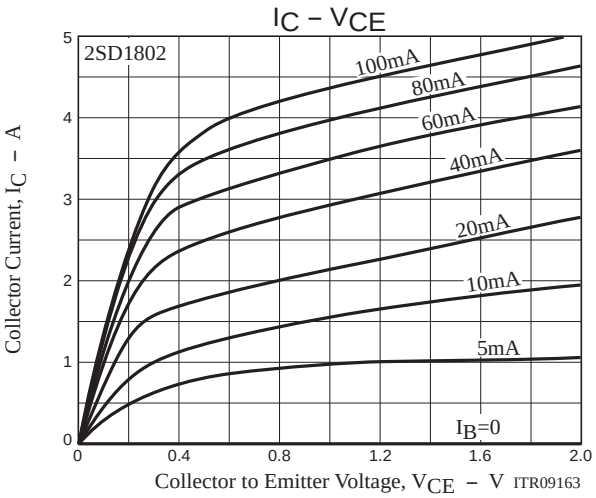


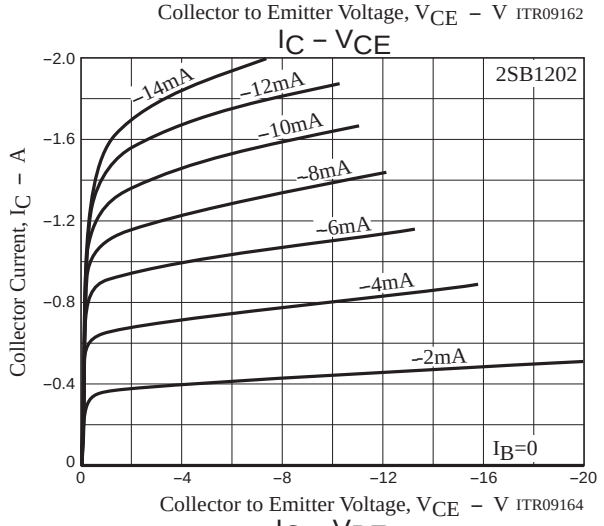
I_C=10I_{B1}= −10I_{B2}=1A
For PNP, the polarity is reversed.

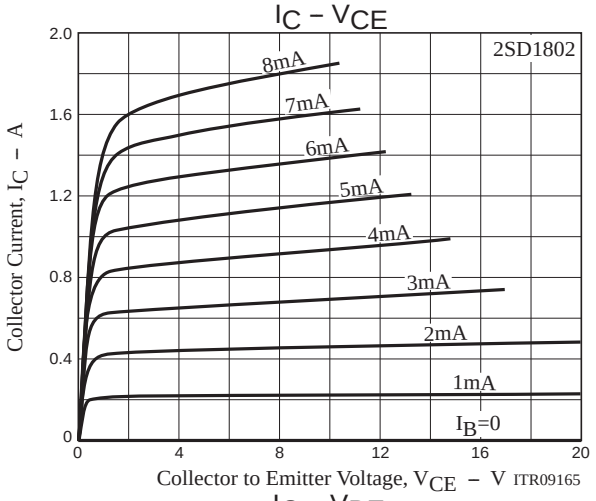
Ordering Information

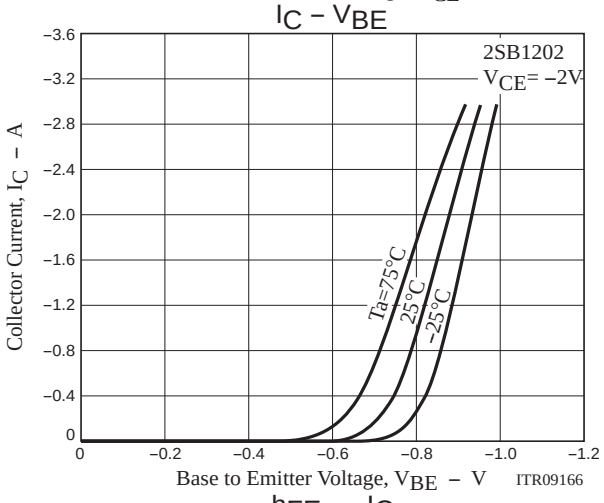
Device	Package	Shipping	memo
2SB1202S-E	TP	500pcs./bag	Pb Free
2SB1202T-E	TP	500pcs./bag	
2SD1802S-E	TP	500pcs./bag	
2SD1802T-E	TP	500pcs./bag	
2SB1202S-TL-E	TP-FA	700pcs./reel	
2SB1202T-TL-E	TP-FA	700pcs./reel	
2SD1802S-TL-E	TP-FA	700pcs./reel	
2SD1802T-TL-E	TP-FA	700pcs./reel	

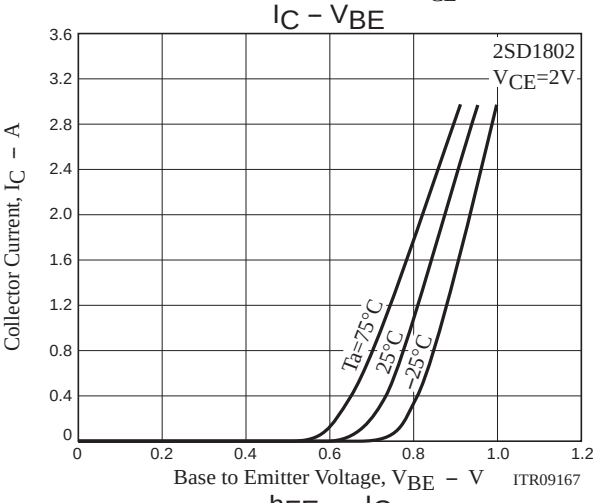

IC – VCE
2SB1202
–200mA
–100mA
–50mA
–20mA
–10mA
–5mA
IB=0
Collector Current, IC – A
Collector to Emitter Voltage, VCE – V
ITR09162

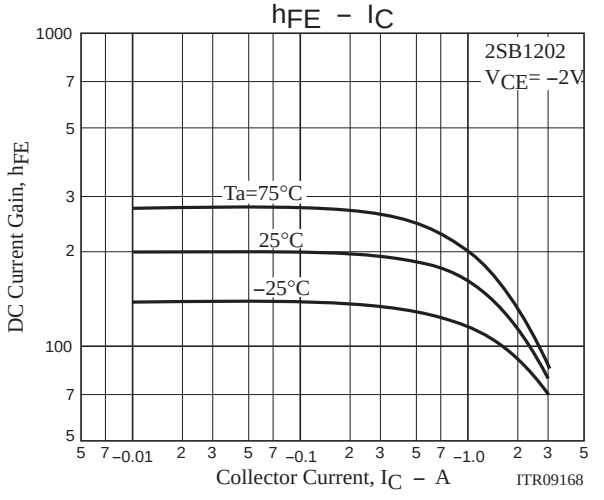

IC – VCE
2SD1802
100mA
80mA
60mA
40mA
20mA
10mA
5mA
IB=0
Collector Current, IC – A
Collector to Emitter Voltage, VCE – V
ITR09163

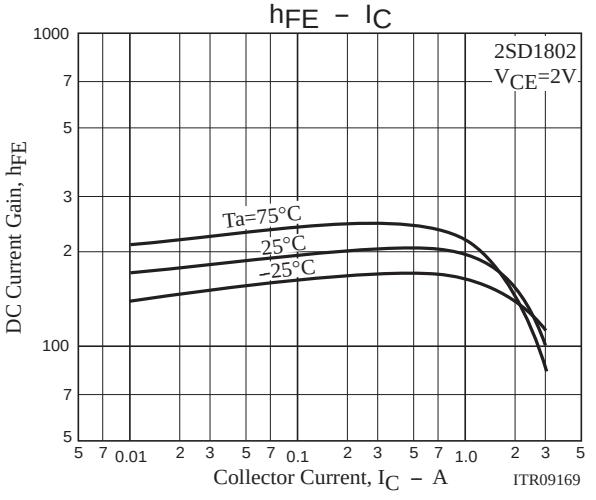

IC – VCE
2SB1202
–14mA
–12mA
–10mA
–8mA
–6mA
–4mA
–2mA
IB=0
Collector Current, IC – A
Collector to Emitter Voltage, VCE – V
ITR09164

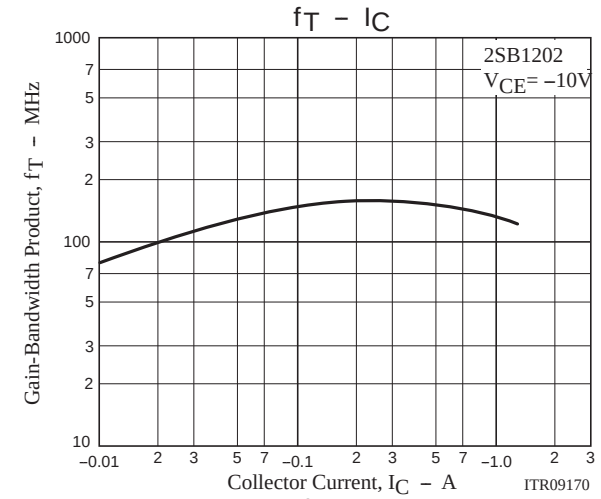

IC – VCE
2SD1802
8mA
7mA
6mA
5mA
4mA
3mA
2mA
1mA
IB=0
Collector Current, IC – A
Collector to Emitter Voltage, VCE – V
ITR09165

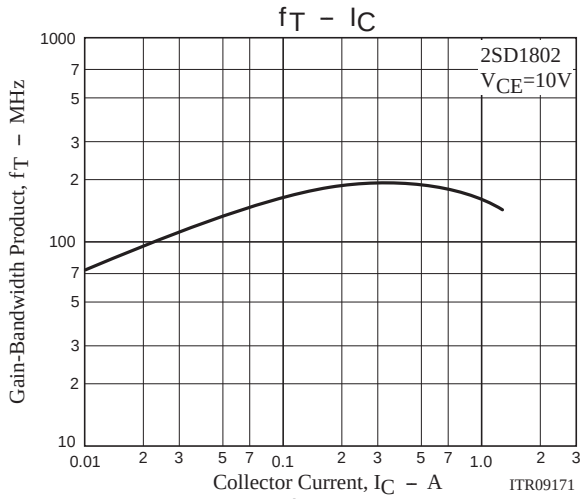

IC – VBE
2SB1202
VCE= –2V
Ta=75°C
25°C
–25°C
Collector Current, IC – A
Base to Emitter Voltage, VBE – V
ITR09166

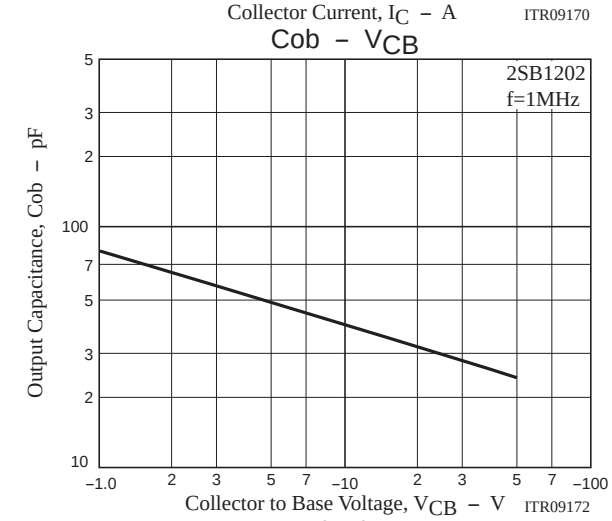

IC – VBE
2SD1802
VCE=2V
Ta=75°C
25°C
–25°C
Collector Current, IC – A
Base to Emitter Voltage, VBE – V
ITR09167

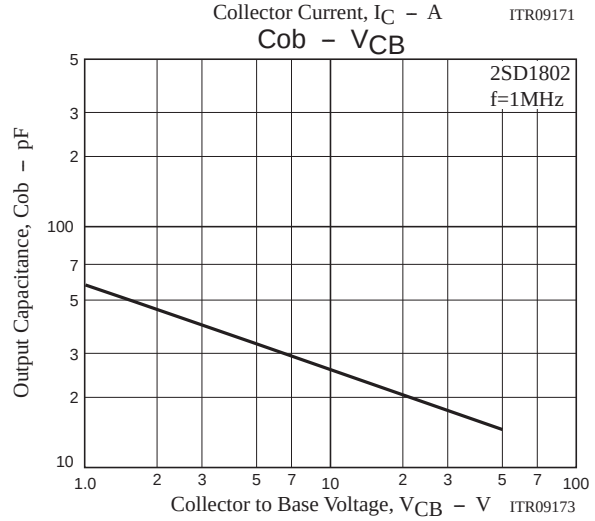

hFE – IC
2SB1202
VCE= –2V
Ta=75°C
25°C
–25°C
DC Current Gain, hFE
Collector Current, IC – A
ITR09168

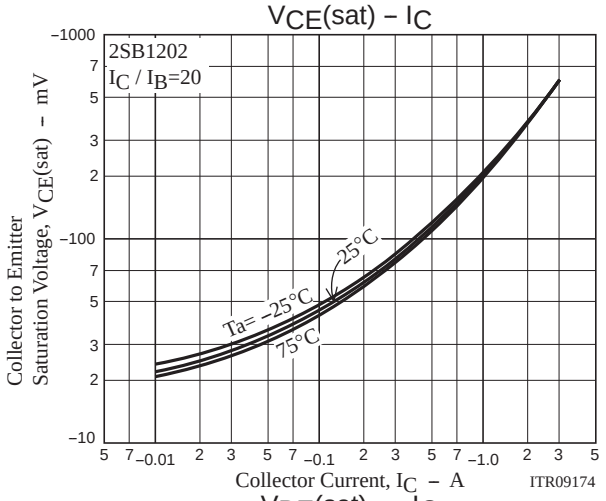

hFE – IC
2SD1802
VCE=2V
Ta=75°C
25°C
–25°C
DC Current Gain, hFE
Collector Current, IC – A
ITR09169

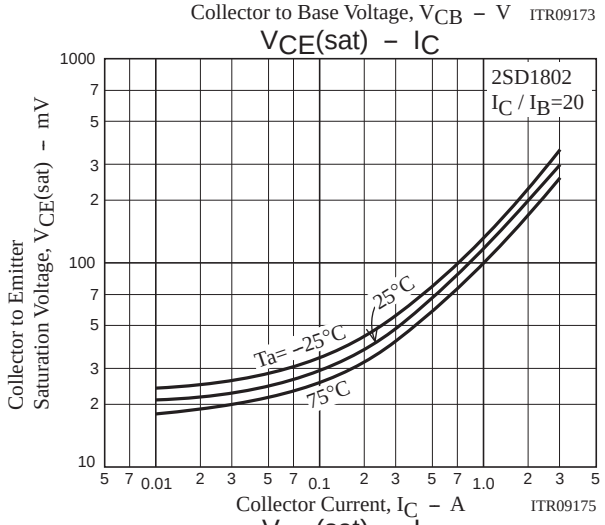

fT – IC
2SB1202
VCE= –10V
Gain-Bandwidth Product, fT – MHz
Collector Current, IC – A
ITR09170

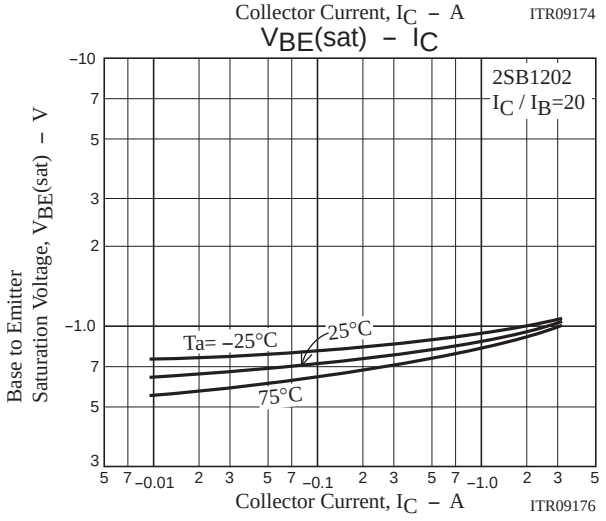

fT – IC
2SD1802
VCE=10V
Gain-Bandwidth Product, fT – MHz
Collector Current, IC – A
ITR09171

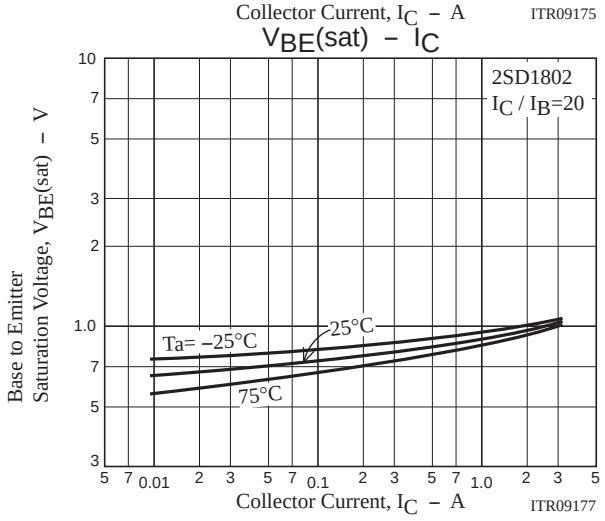

Cob – VCB
2SB1202
f=1MHz
Output Capacitance, Cob – pF
Collector to Base Voltage, VCB – V
ITR09172

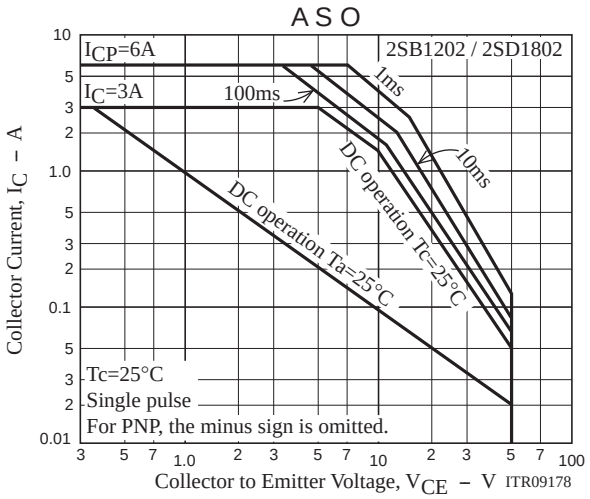

Cob – VCB
2SD1802
f=1MHz
Output Capacitance, Cob – pF
Collector to Base Voltage, VCB – V
ITR09173

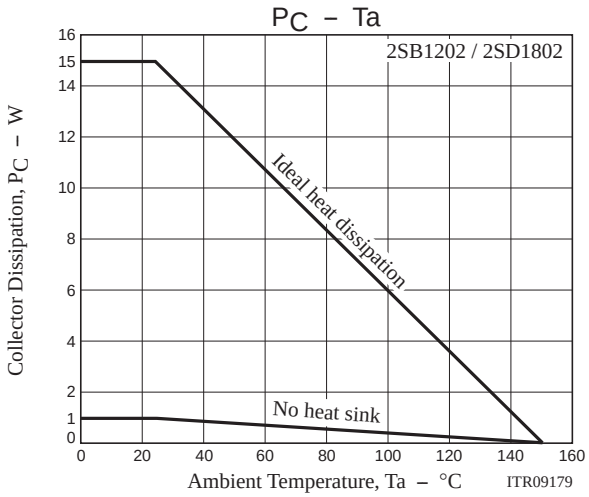

VCE(sat) – IC
2SB1202
IC / IB=20
Ta= –25°C
25°C
75°C
Collector to Emitter Saturation Voltage, VCE(sat) – mV
Collector Current, IC – A
ITR09174


VCE(sat) – IC
2SD1802
IC / IB=20
Ta= –25°C
25°C
75°C
Collector to Emitter Saturation Voltage, VCE(sat) – mV
Collector Current, IC – A
ITR09175


VBE(sat) – IC
2SB1202
IC / IB=20
Ta= –25°C
25°C
75°C
Base to Emitter Saturation Voltage, VBE(sat) – V
Collector Current, IC – A
ITR09176

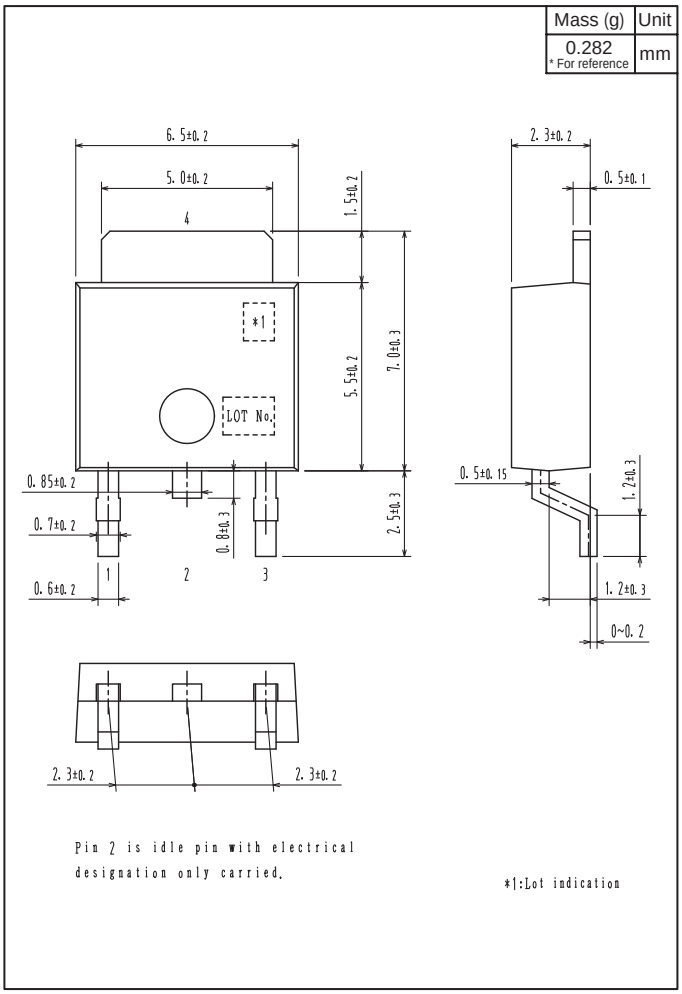

VBE(sat) – IC
2SD1802
IC / IB=20
Ta= –25°C
25°C
75°C
Base to Emitter Saturation Voltage, VBE(sat) – V
Collector Current, IC – A
ITR09177


A S O
2SB1202 / 2SD1802
ICP=6A
IC=3A
100ms
1ms
10ms
DC operation Tc=25°C
DC operation Ta=25°C
Tc=25°C
Single pulse
For PNP, the minus sign is omitted.
Collector Current, IC – A
Collector to Emitter Voltage, VCE – V
ITR09178

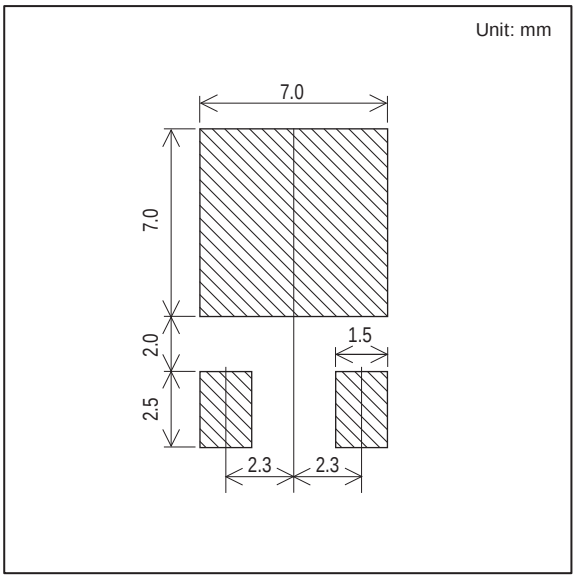

PC – Ta
2SB1202 / 2SD1802
Ideal heat dissipation
No heat sink
Collector Dissipation, PC – W
Ambient Temperature, Ta – °C
ITR09179

Outline Drawing

2SB1202S-TL-E, 2SB1202T-TL-E, 2SD1802S-TL-E, 2SD1802T-TL-E

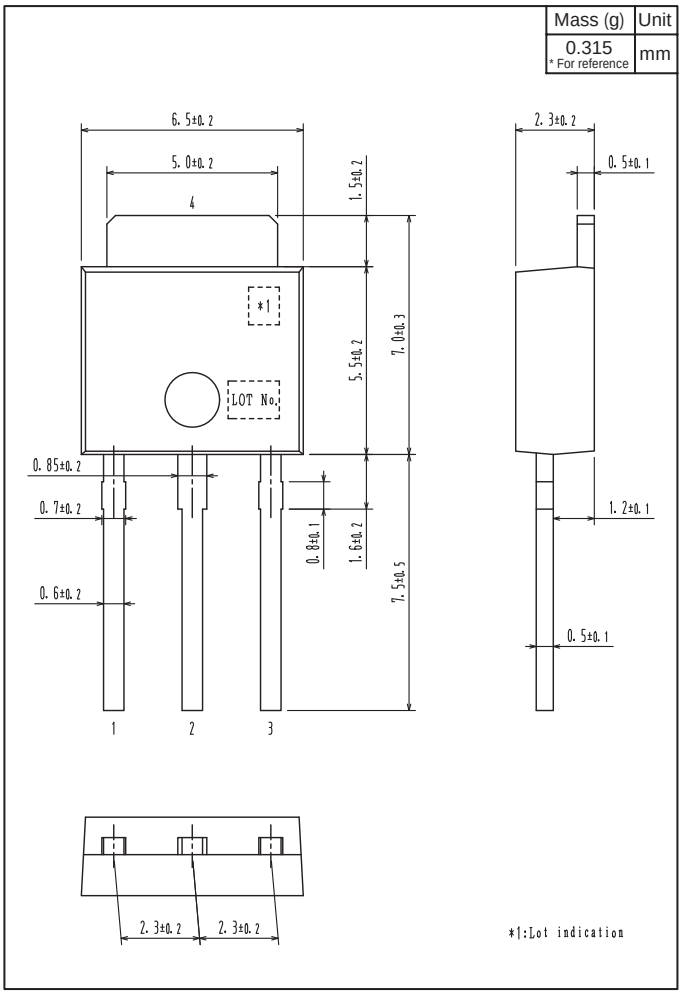


Land Pattern Example



Outline Drawing

2SB1202S-E, 2SB1202T-E, 2SD1802S-E, 2SD1802T-E



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- Shortage Management
- Alternative Solution
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