Ordering number : EN2112C

2SB1201/2SD1801

Bipolar Transistor
(–)50V, (–)2A, Low V_{CE}(sat), (PNP)NPN Single TP/TP-FA

ON Semiconductor®
http://onsemi.com

Applications

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

Features

- Adoption of FBET, 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 2SB1201/2SD1801-used sets smaller

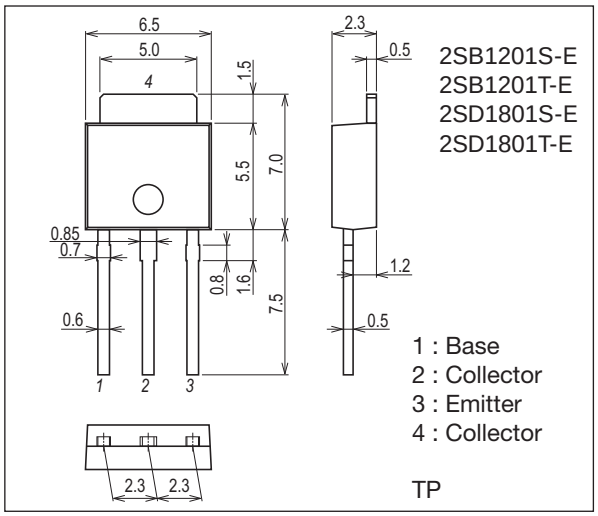
Specifications ( ): 2SB1201

Absolute Maximum Ratings at Ta=25°C

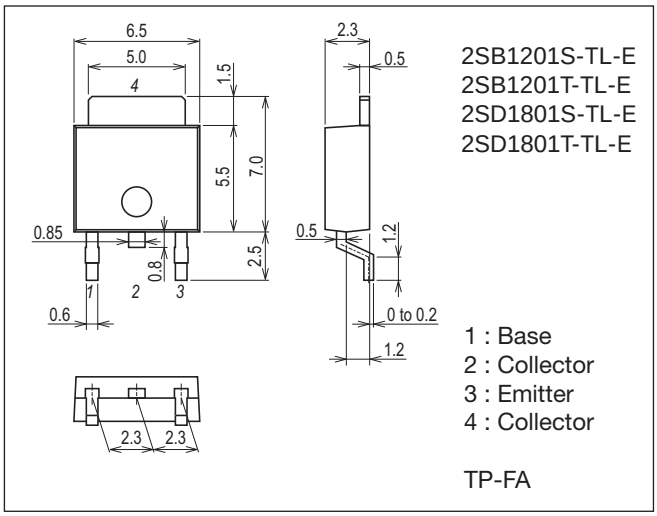
Parameter	Symbol	Conditions	Ratings	Unit
Collector-to-Base Voltage	V_{CBO}		(–)60	V
Collector-to-Emitter Voltage	V_{CEO}		(–)50	V
Emitter-to-Base Voltage	V_{EBO}		(–)6	V
Collector Current	I_C		(–)2	A
Collector Current (Pulse)	I_{CP}		(–)4	A

Continued on next page.

Package Dimensions unit : mm (typ)
7518-003



Package Dimensions unit : mm (typ)
7003-003

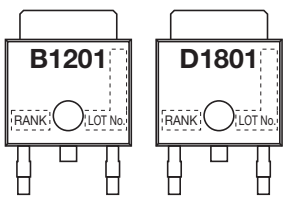


Product & Package Information

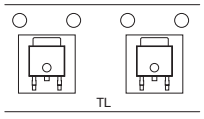
- Package : TP
- JEITA, JEDEC : SC-64, TO-251
- Minimum Packing Quantity : 500 pcs./bag

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

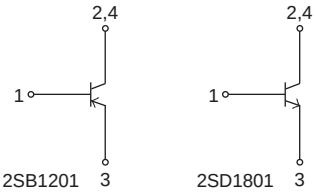
Marking (TP, TP-FA)



Packing Type (TP-FA) : TL



Electrical Connection



Semiconductor Components Industries, LLC, 2013
September, 2013
60612 TKIM TB-00000906, TA-4180/10904TN (KT)/92098HA (KT)/8259MO/4137KI/4076KI, TS No.2112-1/10

Continued from preceding page.

Parameter	Symbol	Conditions	Ratings	Unit
Collector Dissipation	P_C		0.8	W
		Tc=25°C	15	W
Junction Temperature	Tj		150	°C
Storage Temperature	Tstg		−55 to +150	°C

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.

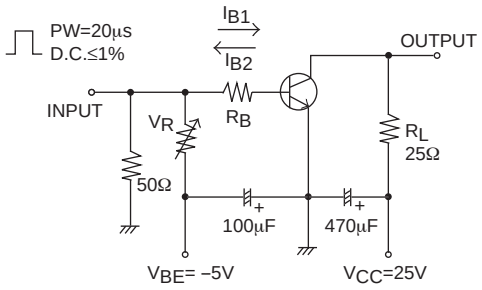
Electrical Characteristics at Ta=25°C

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Collector Cutoff Current	I_{CBO}	V_{CB}=(−)50V, I_E=0A			(−)100	nA
Emitter Cutoff Current	I_{EBO}	V_{EB}=(−)4V, I_C=0A			(−)100	nA
DC Current Gain	$h_{FE}1$	V_{CE}=(−)2V, I_C=(−)100mA	100*		560*	
	$h_{FE}2$	V_{CE}=(−)2V, I_C=(−)1.5A	40			
Gain-Bandwidth Product	f_T	V_{CE}=(−)10V, I_C=(−)50mA		150		MHz
Output Capacitance	Cob	V_{CB}=(−)10V, f=1MHz		(22)12		pF
Collector-to-Emitter Saturation Voltage	V_{CE}(sat)	I_C=(−)1A, I_B=(−)50mA		(−0.3)0.15	(−0.7)0.4	V
Base-to-Emitter Saturation Voltage	V_{BE}(sat)	V_{CE}=(−)1A, I_C=(−)50mA		(−)0.9	(−)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.		60		ns
Storage Time	t_{stg}			(450)550		ns
Fall Time	t_f			30		ns

* : The 2SB1201/2SD1801 are classified by 100mA h_{FE} as follows :

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

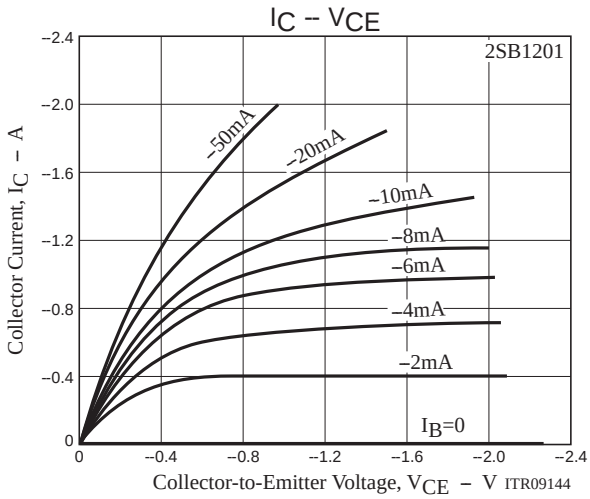
Switching Time Test Circuit

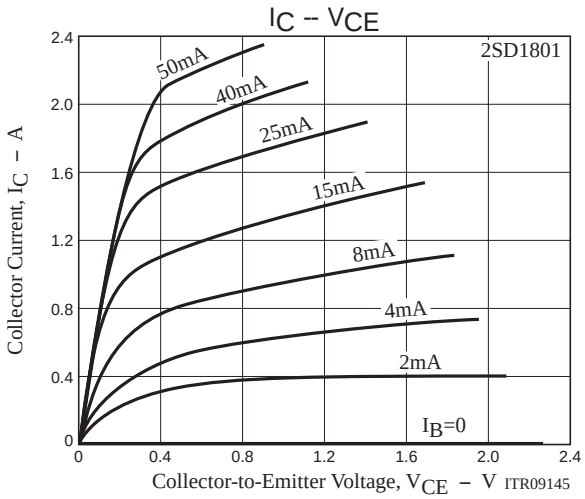


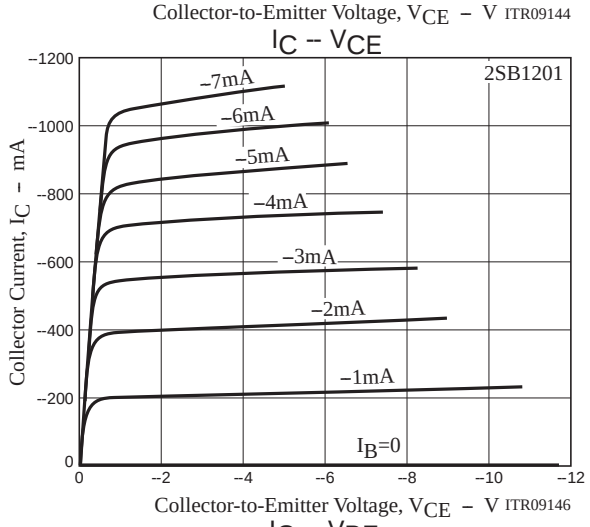
I_C=10I_{B1}= −10I_{B2}=500mA, V_{CC}=25V
For PNP, the polarity is reversed.

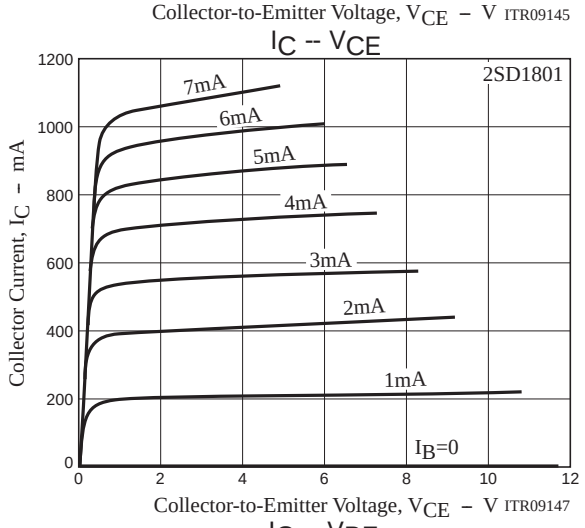
Ordering Information

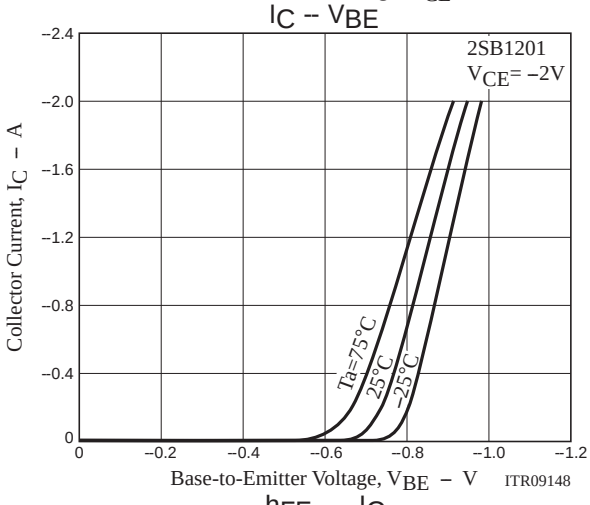
Device	Package	Shipping	memo
2SB1201S-E	TP	500pcs./bag	Pb Free
2SB1201T-E	TP	500pcs./bag	
2SD1801S-E	TP	500pcs./bag	
2SD1801T-E	TP	500pcs./bag	
2SB1201S-TL-E	TP-FA	700pcs./reel	
2SB1201T-TL-E	TP-FA	700pcs./reel	
2SD1801S-TL-E	TP-FA	700pcs./reel	
2SD1801T-TL-E	TP-FA	700pcs./reel	

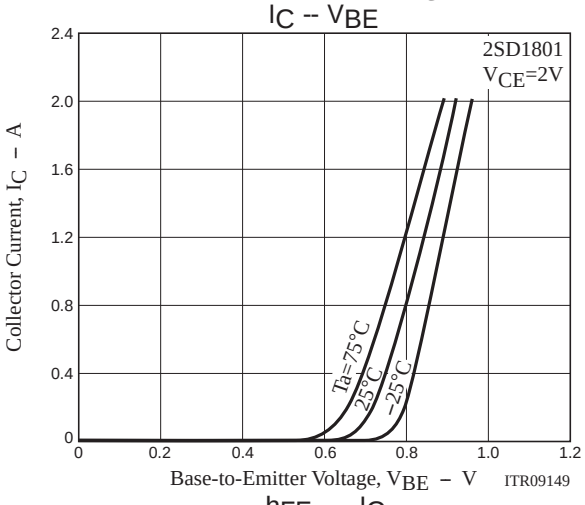

IC – VCE
2SB1201
Collector Current, IC – A
–50mA
–20mA
–10mA
–8mA
–6mA
–4mA
–2mA
IB=0
Collector-to-Emitter Voltage, VCE – V
ITR09144

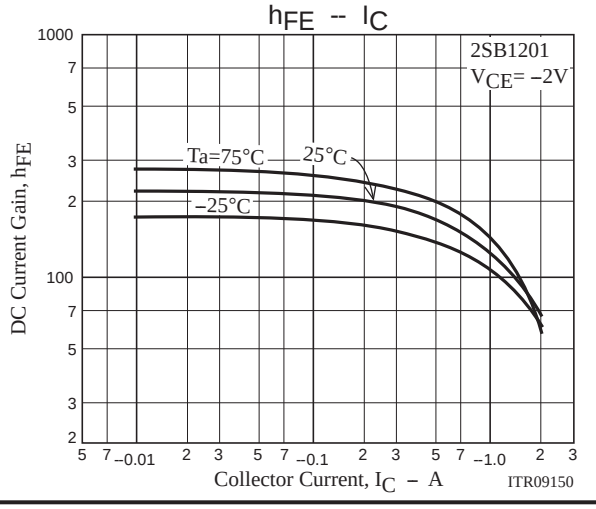

IC – VCE
2SD1801
Collector Current, IC – A
50mA
40mA
25mA
15mA
8mA
4mA
2mA
IB=0
Collector-to-Emitter Voltage, VCE – V
ITR09145

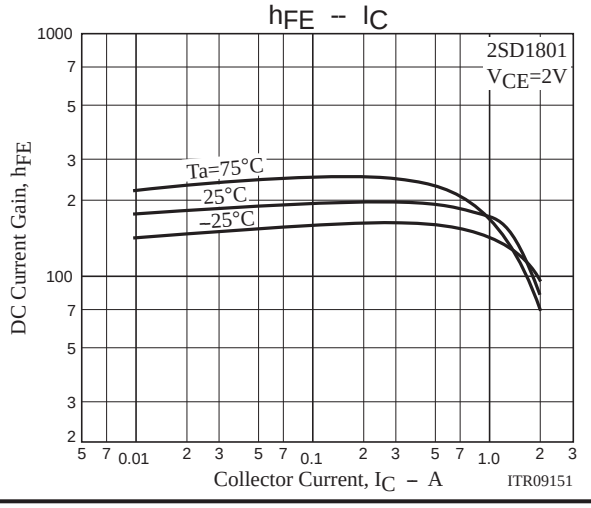

IC – VCE
2SB1201
Collector Current, IC – mA
–7mA
–6mA
–5mA
–4mA
–3mA
–2mA
–1mA
IB=0
Collector-to-Emitter Voltage, VCE – V
ITR09146

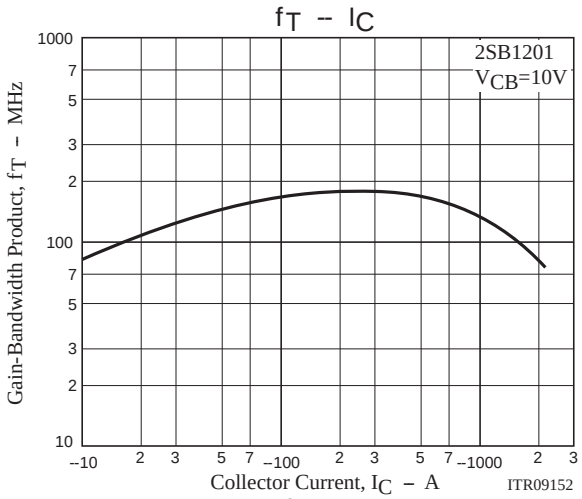

IC – VCE
2SD1801
Collector Current, IC – mA
7mA
6mA
5mA
4mA
3mA
2mA
1mA
IB=0
Collector-to-Emitter Voltage, VCE – V
ITR09147

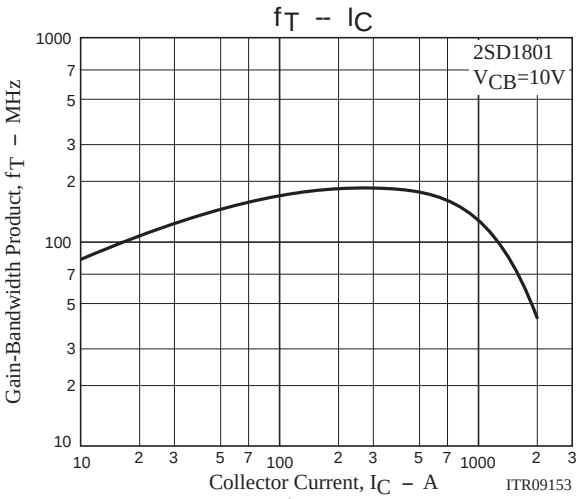

IC – VBE
2SB1201
VCE= –2V
Collector Current, IC – A
Ta=75°C
25°C
–25°C
Base-to-Emitter Voltage, VBE – V
ITR09148

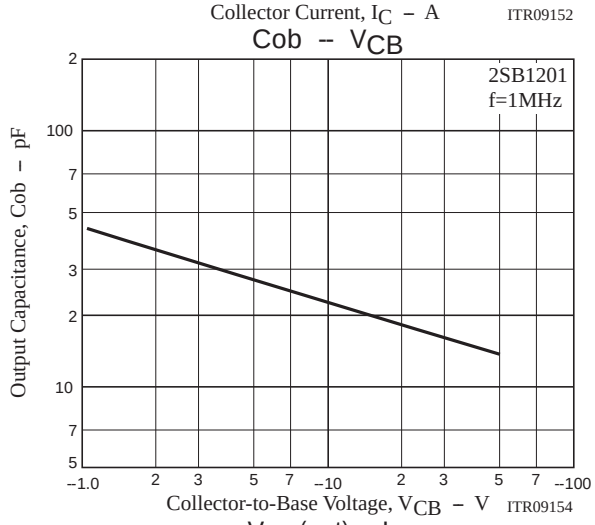

IC – VBE
2SD1801
VCE=2V
Collector Current, IC – A
Ta=75°C
25°C
–25°C
Base-to-Emitter Voltage, VBE – V
ITR09149

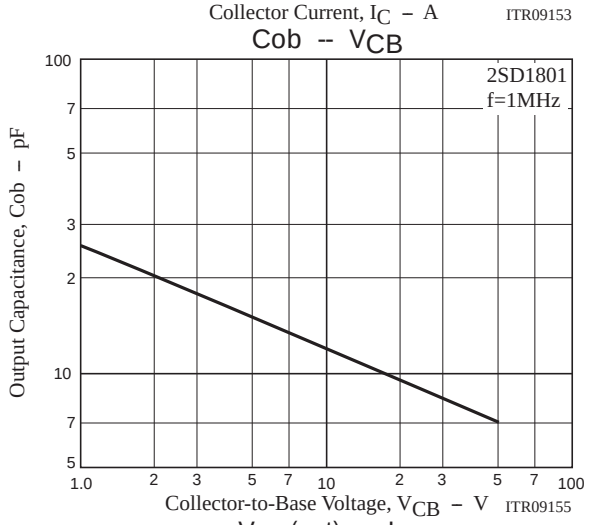

hFE – IC
2SB1201
VCE= –2V
DC Current Gain, hFE
Ta=75°C
25°C
–25°C
Collector Current, IC – A
ITR09150

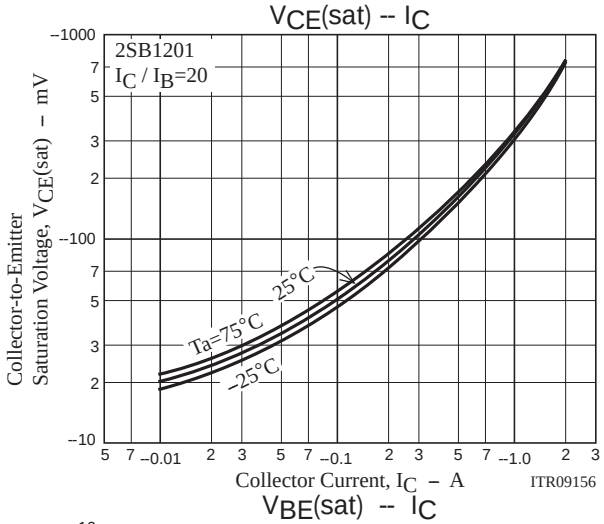

hFE – IC
2SD1801
VCE=2V
DC Current Gain, hFE
Ta=75°C
25°C
–25°C
Collector Current, IC – A
ITR09151

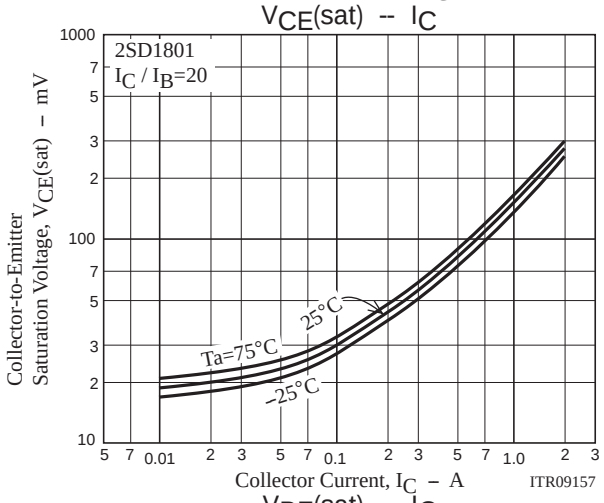

fT – IC
2SB1201
VCB=10V
Gain-Bandwidth Product, fT – MHz
Collector Current, IC – A
ITR09152

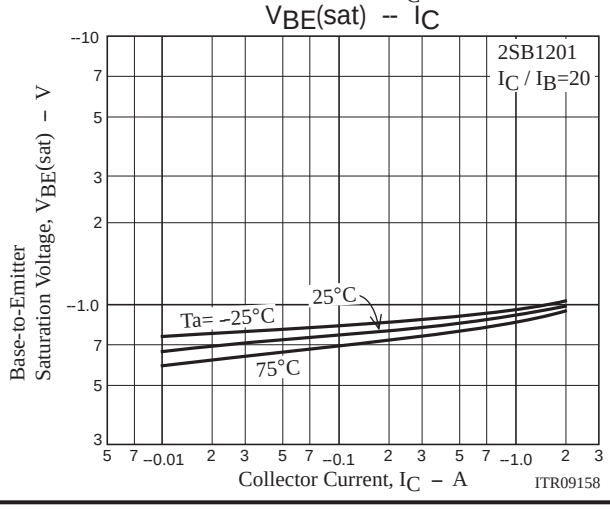

fT – IC
2SD1801
VCB=10V
Gain-Bandwidth Product, fT – MHz
Collector Current, IC – A
ITR09153

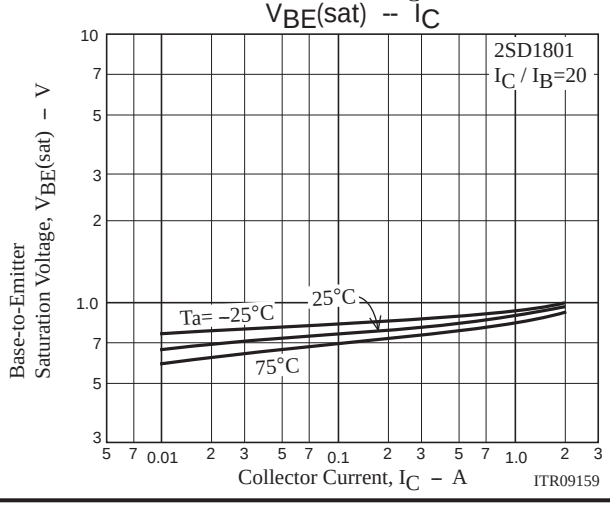

Cob – VCB
2SB1201
f=1MHz
Output Capacitance, Cob – pF
Collector-to-Base Voltage, VCB – V
ITR09154

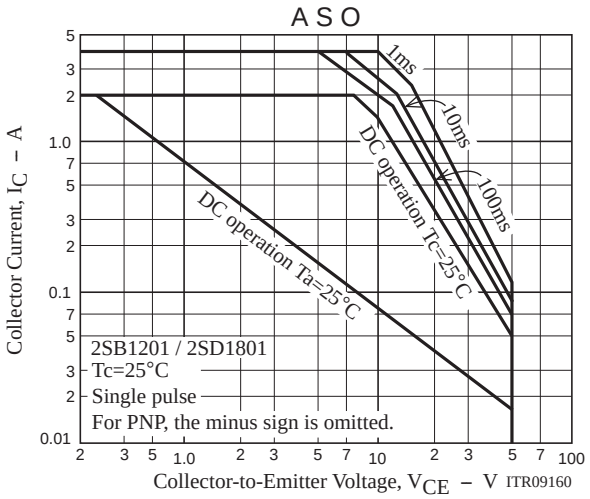

Cob – VCB
2SD1801
f=1MHz
Output Capacitance, Cob – pF
Collector-to-Base Voltage, VCB – V
ITR09155

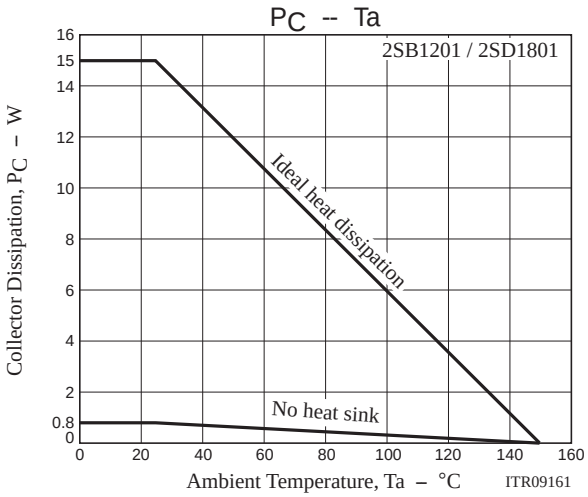

VCE(sat) – IC
2SB1201
IC / IB=20
Ta=75°C
25°C
–25°C
Collector-to-Emitter Saturation Voltage, VCE(sat) – mV
Collector Current, IC – A
ITR09156


VCE(sat) – IC
2SD1801
IC / IB=20
Ta=75°C
25°C
–25°C
Collector-to-Emitter Saturation Voltage, VCE(sat) – mV
Collector Current, IC – A
ITR09157


VBE(sat) – IC
2SB1201
IC / IB=20
Ta= –25°C
25°C
75°C
Base-to-Emitter Saturation Voltage, VBE(sat) – V
Collector Current, IC – A
ITR09158


VBE(sat) – IC
2SD1801
IC / IB=20
Ta= –25°C
25°C
75°C
Base-to-Emitter Saturation Voltage, VBE(sat) – V
Collector Current, IC – A
ITR09159


A S O
Collector Current, I_C – A
Collector-to-Emitter Voltage, V_{CE} – V
1ms
10ms
100ms
DC operation Tc=25°C
DC operation Ta=25°C
2SB1201 / 2SD1801
Tc=25°C
Single pulse
For PNP, the minus sign is omitted.
ITR09160


P_C -- Ta
Collector Dissipation, P_C – W
Ambient Temperature, Ta – °C
2SB1201 / 2SD1801
Ideal heat dissipation
No heat sink
ITR09161

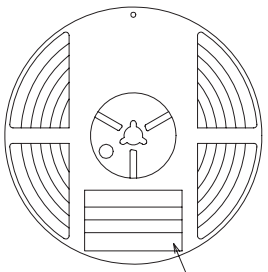
Taping Specification

2SB1201S-TL-E, 2SB1201T-TL-E, 2SD1801S-TL-E, 2SD1801T-TL-E

Packing Format

Package Name	Carrier Tape Type	Maximum Number of devices contained (pcs)			Packing format	
		Reel	Inner box	Outer box	Inner BOX (C-1)	Outer BOX (A-7)
TP-FA	TP	700	2,100	12,600	3 reels contained Dimensions:mm (external) 183×72×185	6 inner boxes contained Dimensions:mm (external) 440×195×210

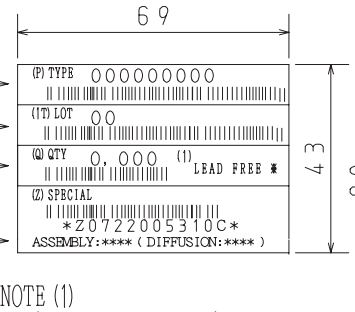
Packing method



Reel label

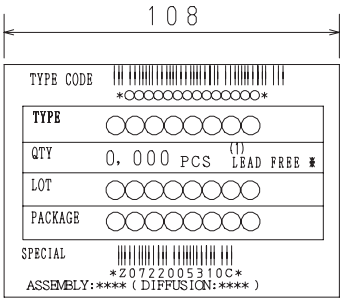
Reel label, Inner box label

(unit:mm)



Outer box label

It is a label at the time of factory shipments. The form of a label may change in physical distribution process.

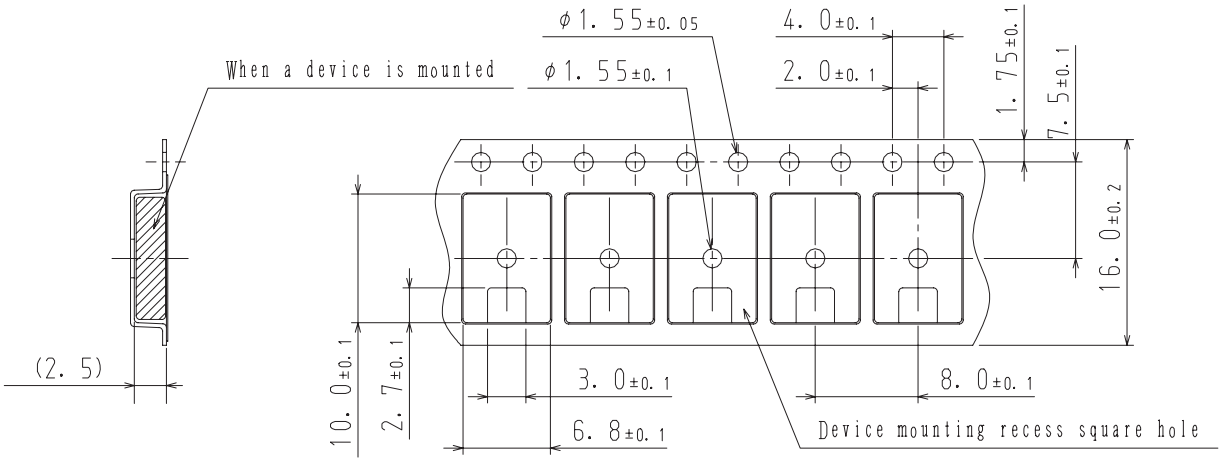


NOTE (1)
The LEAD FREE ※ description shows that the surface treatment of the terminal is lead free.

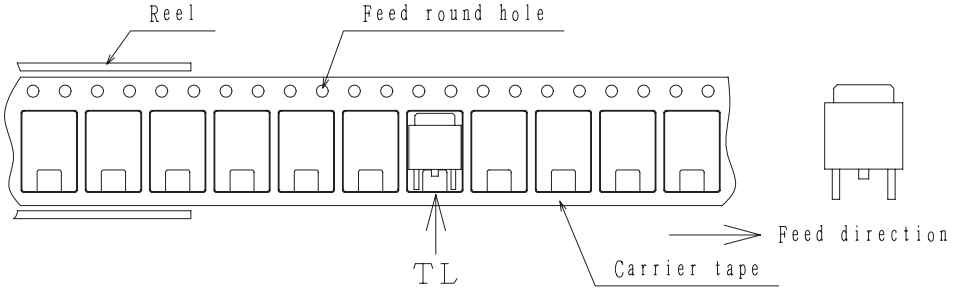
Label	JEITA Phase
LEAD FREE 3	JEITA Phase 3A
LEAD FREE 4	JEITA Phase 3

Taping configuration

1. Carrier tape size (unit:mm)



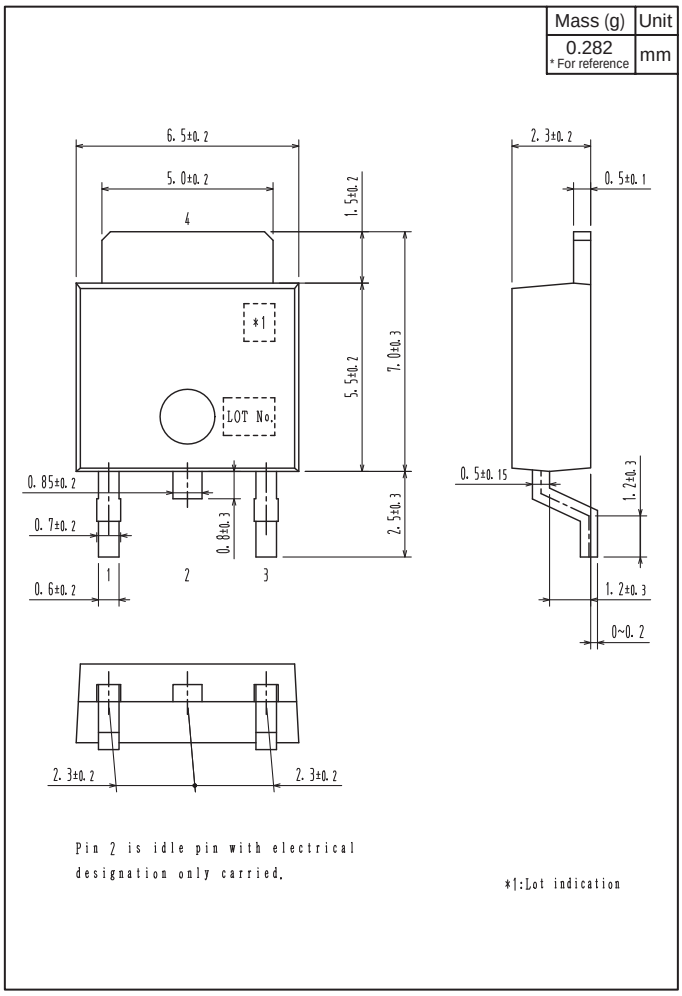
2. Device placement direction



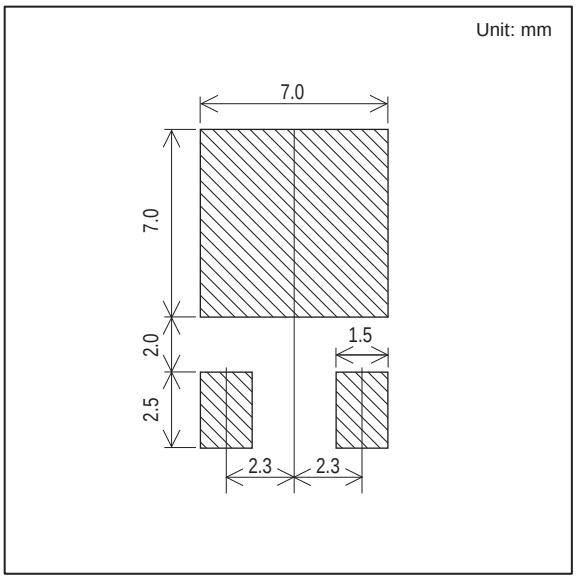
Those with one electrode terminal on the feed hole side·····TL

Outline Drawing

2SB1201S-TL-E, 2SB1201T-TL-E, 2SD1801S-TL-E, 2SD1801T-TL-E



Land Pattern Example



Bag Packing Specification

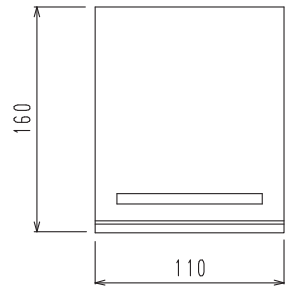
2SB1201S-E, 2SB1201T-E, 2SD1801S-E, 2SD1801T-E

1. Packing Format

Package Name	Maximum Number of devices contained (pcs)			
	Bag	Inner box	Outer box	
TP		B-1	A-1	A-2
	500	10,000	50,000	30,000
	Packing format (Dimensions: mm (external))			
	Inner box		Outer box	
	B-1		A-1	A-2
	445×225×55		470×250×300	470×250×190

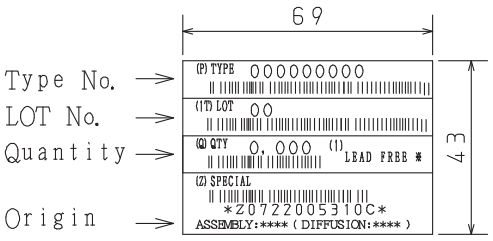
2. Bag dimensions

(unit: mm)



3. Bag label, Inner box label

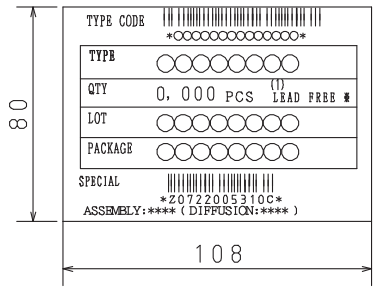
(unit: mm)



4. Outer box label

(unit: mm)

It is a label at the time of factory shipments.
The form of a label may change in physical distribution process.



NOTE (1)
The LEAD FREE ※ description shows that the surface treatment of the terminal is lead free.

Label	JEITA Phase
LEAD FREE 3	JEITA Phase 3A
LEAD FREE 4	JEITA Phase 3

Outline Drawing

2SB1201S-E, 2SB1201T-E, 2SD1801S-E, 2SD1801T-E