Ordering number : EN2540B

2SB1216/2SD1816

Bipolar Transistor
(–)100V, (–)4A, Low V_{CE}(sat), (PNP)NPN Single TP/TP-FA

ON Semiconductor®
http://onsemi.com

Applications

- Suitable for relay drivers, high-speed inverters, converters, and other general high-current switching applications

Features

- Low collector-to-emitter saturation voltage
- Small and slim package facilitating compactness of sets
- High f_T
- Good linearity of h_{FE}
- Fast switching time

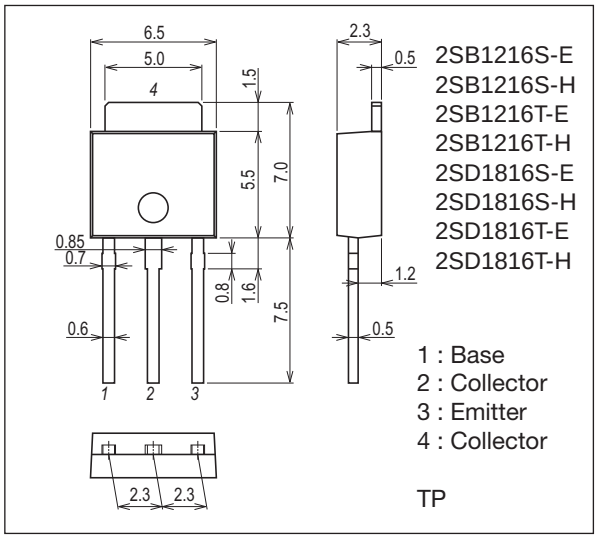
Specifications ( ): 2SB1216

Absolute Maximum Ratings at Ta=25°C

Parameter	Symbol	Conditions	Ratings	Unit
Collector-to-Base Voltage	V_{CBO}		(–)120	V
Collector-to-Emitter Voltage	V_{CEO}		(–)100	V
Emitter-to-Base Voltage	V_{EBO}		(–)6	V
Collector Current	I_C		(–)4	A
Collector Current (Pulse)	I_{CP}		(–)8	A

Continued on next page.

Package Dimensions unit : mm (typ)
7518-003

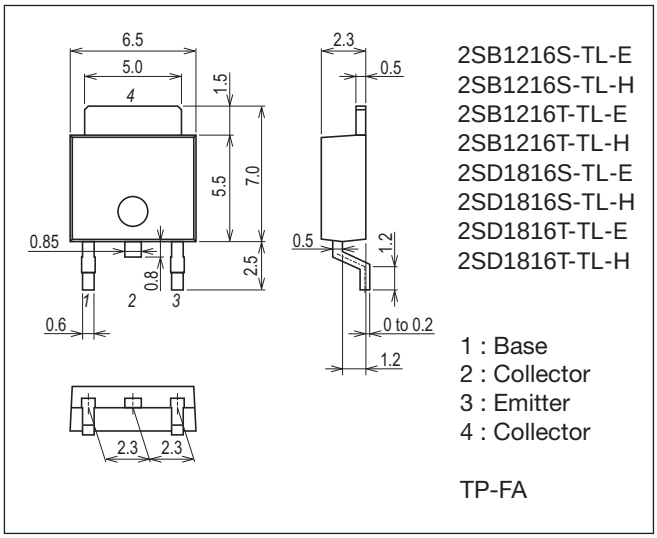


2SB1216S-E
2SB1216S-H
2SB1216T-E
2SB1216T-H
2SD1816S-E
2SD1816S-H
2SD1816T-E
2SD1816T-H

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

TP

Package Dimensions unit : mm (typ)
7003-003



2SB1216S-TL-E
2SB1216S-TL-H
2SB1216T-TL-E
2SB1216T-TL-H
2SD1816S-TL-E
2SD1816S-TL-H
2SD1816T-TL-E
2SD1816T-TL-H

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

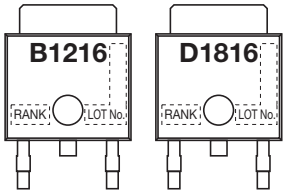
TP-FA

Product & Package Information

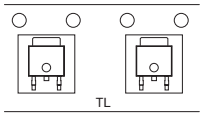
- Package : TP
- JEITA, JEDEC : SC-64, TO-251
- Minimum Packing Quantity : 500 pcs./bag

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

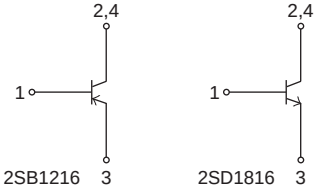
Marking (TP, TP-FA)



Packing Type (TP-FA) : TL



Electrical Connection



Semiconductor Components Industries, LLC, 2013
September, 2013
60612 TKIM TA-4145, TA-4275, TA-3737/N2503TN (KT)/92098HA (KT)/8229MO/4087TA, TS No.2540-1/9

Continued from preceding page.

Parameter	Symbol	Conditions	Ratings	Unit
Collector Dissipation	P_C		1	W
		Tc=25°C	20	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.

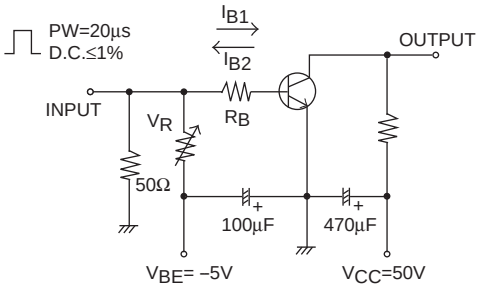
Electrical Characteristics at Ta=25°C

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Collector Cutoff Current	I_{CBO}	V_{CB}=(−)100V, 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}=(−)5V, I_C=(−)0.5A	70*		400*	
	$h_{FE}2$	V_{CE}=(−)5V, I_C=(−)3A	40			
Gain-Bandwidth Product	f_T	V_{CE}=(−)10V, I_C=(−)0.5A		(130)180		MHz
Output Capacitance	Cob	V_{CB}=(−)10V, f=1MHz		(65)40		pF
Collector-to-Emitter Saturation Voltage	V_{CE}(sat)	I_C=(−)2A, I_B=(−)0.2A		(−200)150	(−500)400	mV
Base-to-Emitter Saturation Voltage	V_{BE}(sat)	V_{CE}=(−)2A, I_C=(−)0.2A		(−)0.9	(−)1.2	V
Collector-to-Base Breakdown Voltage	$V_{(BR)CBO}$	I_C=(−)10μA, I_E=0A	(−)120			V
Collector-to-Emitter Breakdown Voltage	$V_{(BR)CEO}$	I_C=(−)1mA, R_{BE}=∞	(−)100			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.		100		ns
Storage Time	t_{stg}			(800)900		ns
Fall Time	t_f			50		ns

* : The 2SB1216/2SD1816 are classified by 0.5A h_{FE} as follows :

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

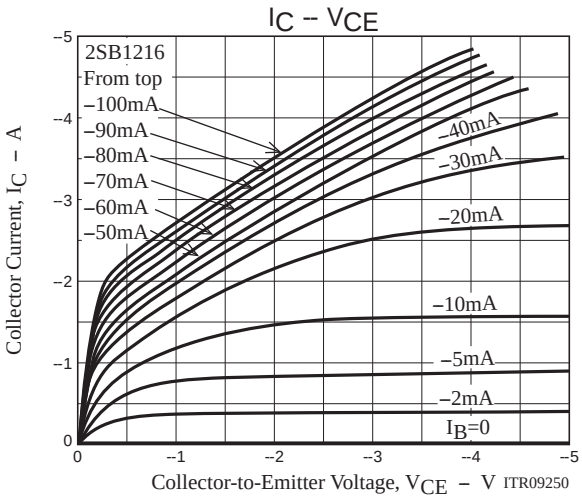
Switching Time Test Circuit

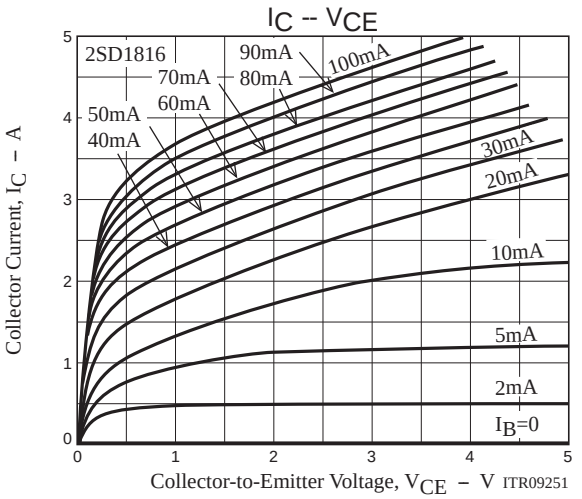


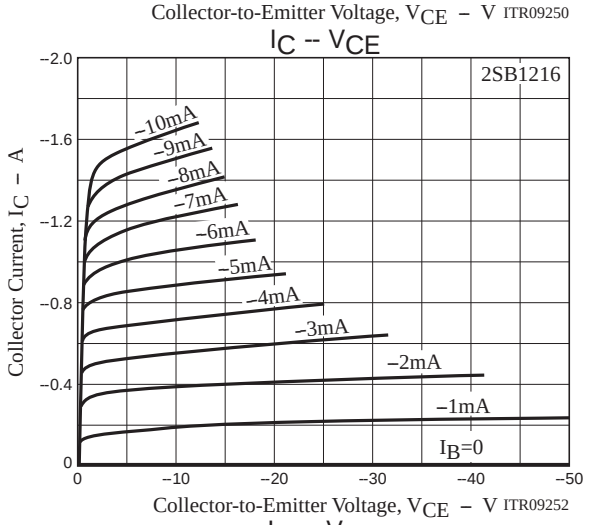
I_C=10I_{B1}= −10I_{B2}=2A
For PNP, the polarity is reversed.

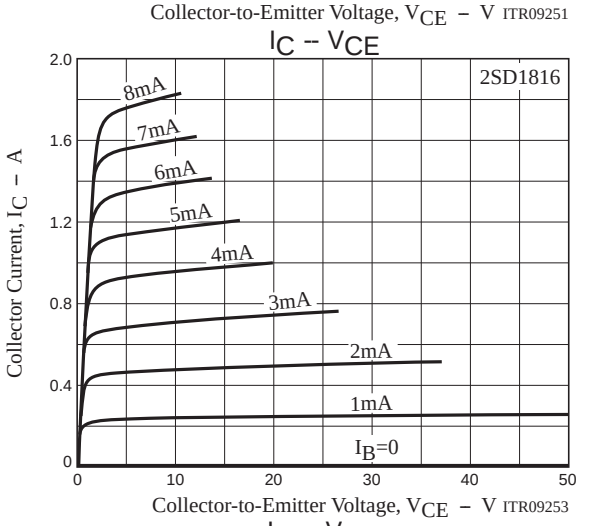
Ordering Information

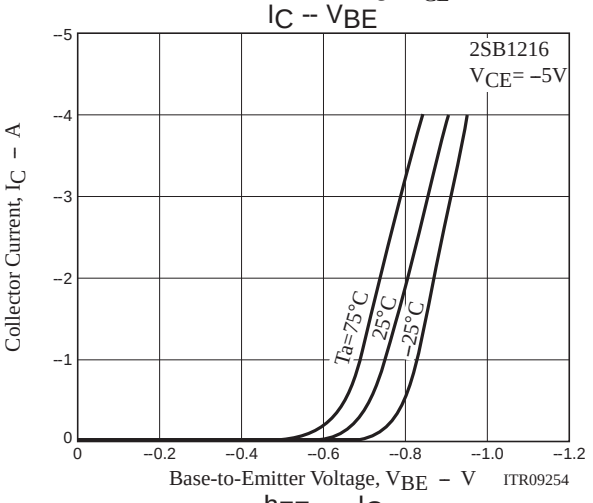
Device	Package	Shipping	memo
2SB1216S-E	TP	500pcs./bag	Pb Free
2SB1216S-H	TP	500pcs./bag	Pb Free and Halogen Free
2SB1216T-E	TP	500pcs./bag	Pb Free
2SB1216T-H	TP	500pcs./bag	Pb Free and Halogen Free
2SD1816S-E	TP	500pcs./bag	Pb Free
2SD1816S-H	TP	500pcs./bag	Pb Free and Halogen Free
2SD1816T-E	TP	500pcs./bag	Pb Free
2SD1816T-H	TP	500pcs./bag	Pb Free and Halogen Free
2SB1216S-TL-E	TP-FA	700pcs./reel	Pb Free
2SB1216S-TL-H	TP-FA	700pcs./reel	Pb Free and Halogen Free
2SB1216T-TL-E	TP-FA	700pcs./reel	Pb Free
2SB1216T-TL-H	TP-FA	700pcs./reel	Pb Free and Halogen Free
2SD1816S-TL-E	TP-FA	700pcs./reel	Pb Free
2SD1816S-TL-H	TP-FA	700pcs./reel	Pb Free and Halogen Free
2SD1816T-TL-E	TP-FA	700pcs./reel	Pb Free
2SD1816T-TL-H	TP-FA	700pcs./reel	Pb Free and Halogen Free

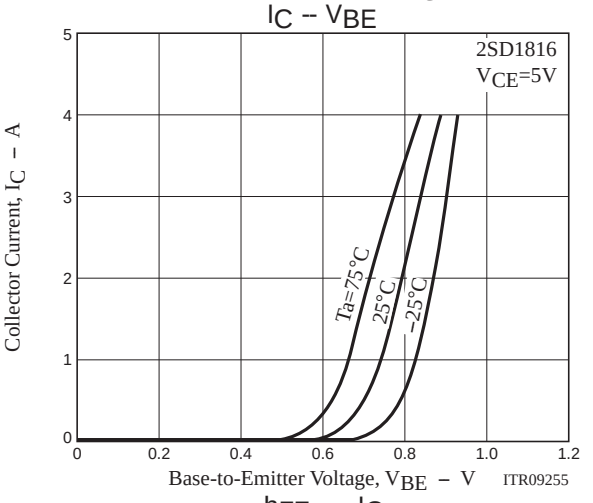

IC -- VCE
2SB1216
From top
–100mA
–90mA
–80mA
–70mA
–60mA
–50mA
–40mA
–30mA
–20mA
–10mA
–5mA
–2mA
IB=0
Collector Current, IC – A
Collector-to-Emitter Voltage, VCE – V
ITR09250

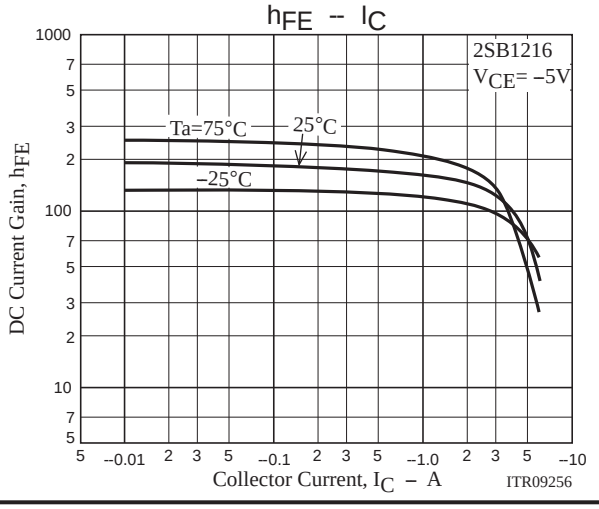

IC -- VCE
2SD1816
90mA
100mA
70mA
80mA
50mA
60mA
40mA
30mA
20mA
10mA
5mA
2mA
IB=0
Collector Current, IC – A
Collector-to-Emitter Voltage, VCE – V
ITR09251

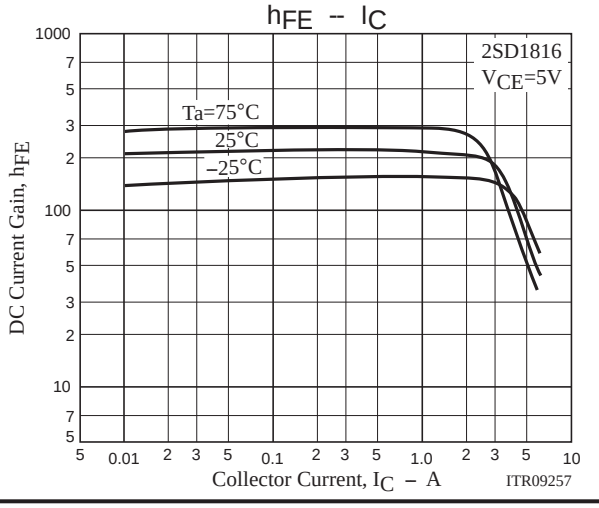

IC -- VCE
2SB1216
–10mA
–9mA
–8mA
–7mA
–6mA
–5mA
–4mA
–3mA
–2mA
–1mA
IB=0
Collector Current, IC – A
Collector-to-Emitter Voltage, VCE – V
ITR09252

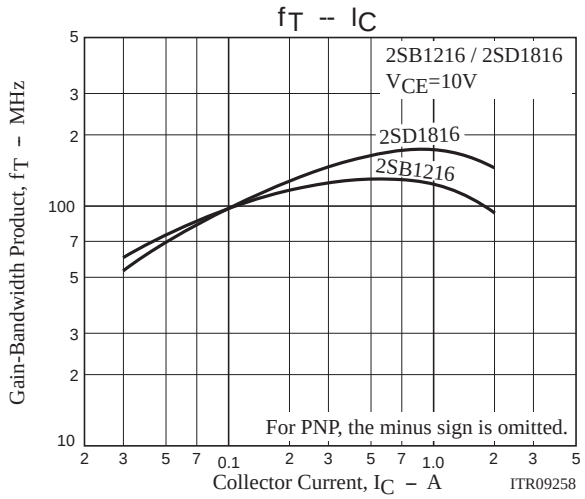

IC -- VCE
2SD1816
8mA
7mA
6mA
5mA
4mA
3mA
2mA
1mA
IB=0
Collector Current, IC – A
Collector-to-Emitter Voltage, VCE – V
ITR09253

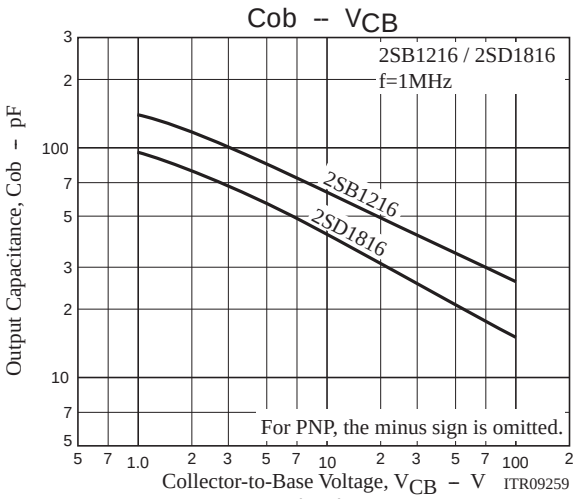

IC -- VBE
2SB1216
VCE= –5V
Ta=75°C
25°C
–25°C
Collector Current, IC – A
Base-to-Emitter Voltage, VBE – V
ITR09254

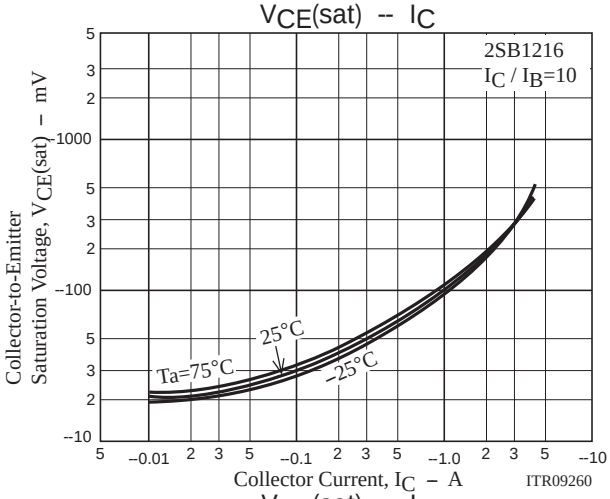

IC -- VBE
2SD1816
VCE=5V
Ta=75°C
25°C
–25°C
Collector Current, IC – A
Base-to-Emitter Voltage, VBE – V
ITR09255

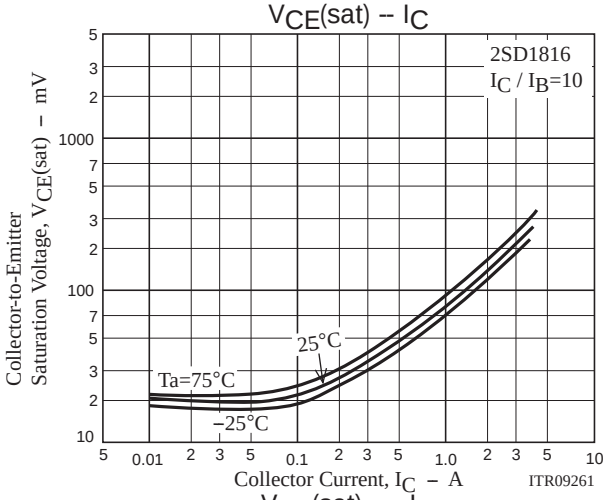

hFE -- IC
2SB1216
VCE= –5V
Ta=75°C
25°C
–25°C
DC Current Gain, hFE
Collector Current, IC – A
ITR09256

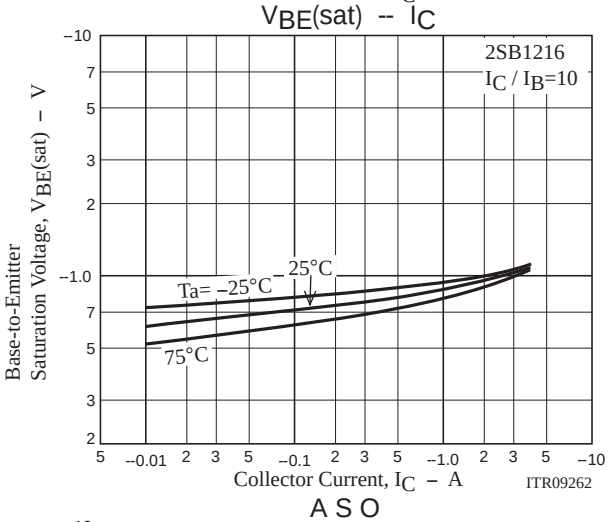

hFE -- IC
2SD1816
VCE=5V
Ta=75°C
25°C
–25°C
DC Current Gain, hFE
Collector Current, IC – A
ITR09257

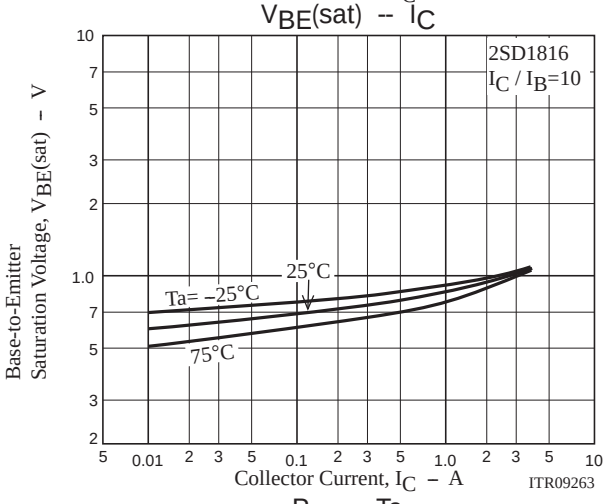

fT -- IC
2SB1216 / 2SD1816
VCE=10V
2SD1816
2SB1216
For PNP, the minus sign is omitted.
Gain-Bandwidth Product, fT – MHz
Collector Current, IC – A
ITR09258

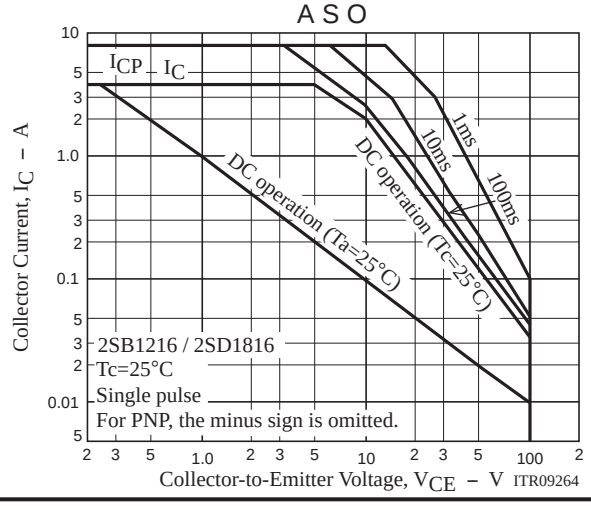

Cob -- VCB
2SB1216 / 2SD1816
f=1MHz
2SB1216
2SD1816
For PNP, the minus sign is omitted.
Output Capacitance, Cob – pF
Collector-to-Base Voltage, VCB – V
ITR09259

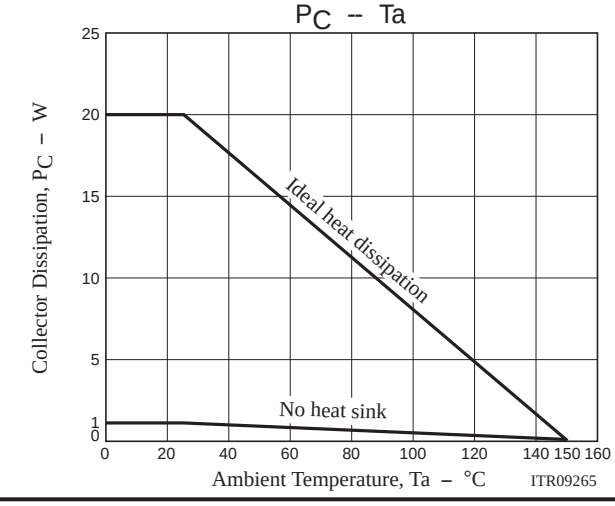

VCE(sat) -- IC
2SB1216
IC / IB=10
Ta=75°C
25°C
–25°C
Collector-to-Emitter Saturation Voltage, VCE(sat) – mV
Collector Current, IC – A
ITR09260


VCE(sat) -- IC
2SD1816
IC / IB=10
Ta=75°C
25°C
–25°C
Collector-to-Emitter Saturation Voltage, VCE(sat) – mV
Collector Current, IC – A
ITR09261


VBE(sat) -- IC
2SB1216
IC / IB=10
Ta= –25°C
25°C
75°C
Base-to-Emitter Saturation Voltage, VBE(sat) – V
Collector Current, IC – A
ITR09262


VBE(sat) -- IC
2SD1816
IC / IB=10
Ta= –25°C
25°C
75°C
Base-to-Emitter Saturation Voltage, VBE(sat) – V
Collector Current, IC – A
ITR09263


A S O
ICP
IC
1ms
10ms
100ms
DC operation (Ta=25°C)
DC operation (Tc=25°C)
2SB1216 / 2SD1816
Tc=25°C
Single pulse
For PNP, the minus sign is omitted.
Collector Current, IC – A
Collector-to-Emitter Voltage, VCE – V
ITR09264


PC -- Ta
Ideal heat dissipation
No heat sink
Collector Dissipation, PC – W
Ambient Temperature, Ta – °C
ITR09265

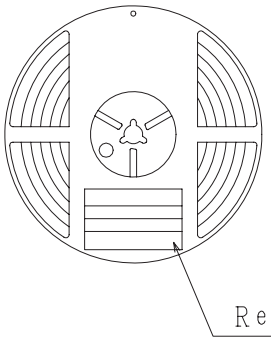
Taping Specification

2SB1216S-TL-E, 2SB1216S-TL-H, 2SB1216T-TL-E2SB1216T-TL-H, 2SD1816S-TL-E, 2SD1816S-TL-H, 2SD1816T-TL-E, 2SD1816T-TL-H

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

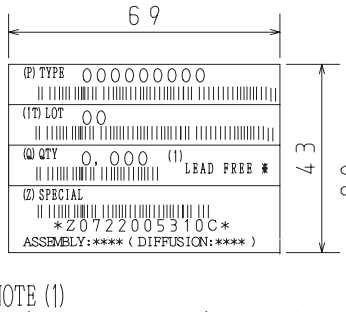


Reel label

Type No.
LOT No.
Quantity
Origin

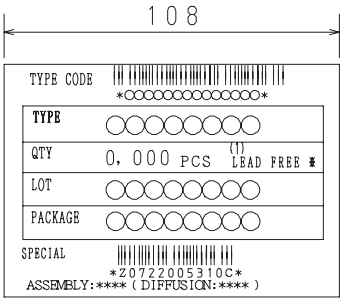
Reel label, Inner box label

(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.

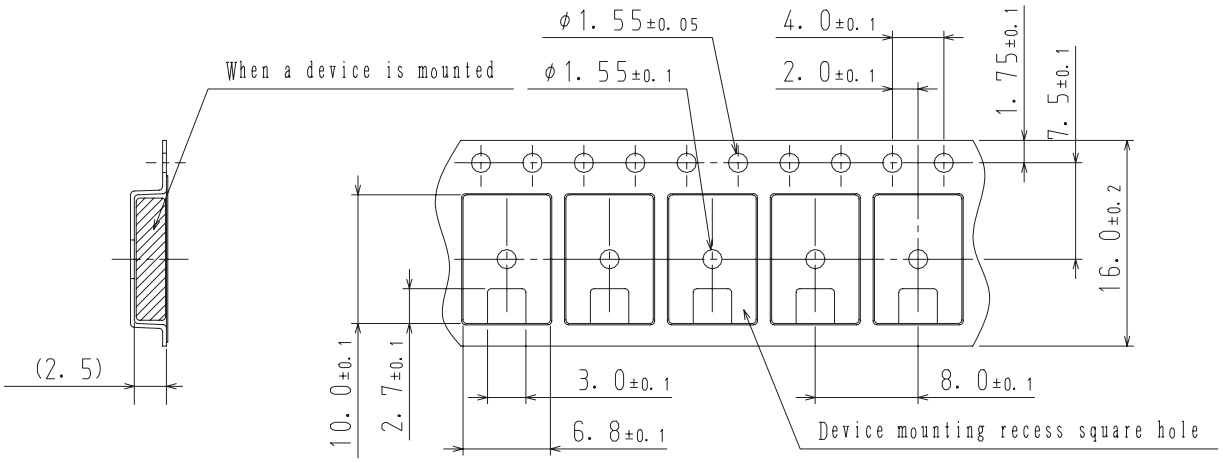


NOTE (1)
The LEAD FREE ※ description shows that the surface treatment of the terminal is lead free.

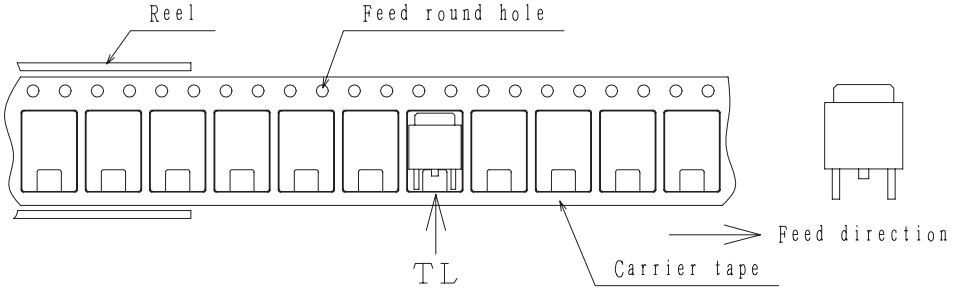
Label	JEITA Phase
LEAD FREE 3	JEITA Phase 3A
LEAD FREE 4	JEITA Phase 3

Taping configuration

1. Carrier tape size (unit:mm)



2. Device placement direction

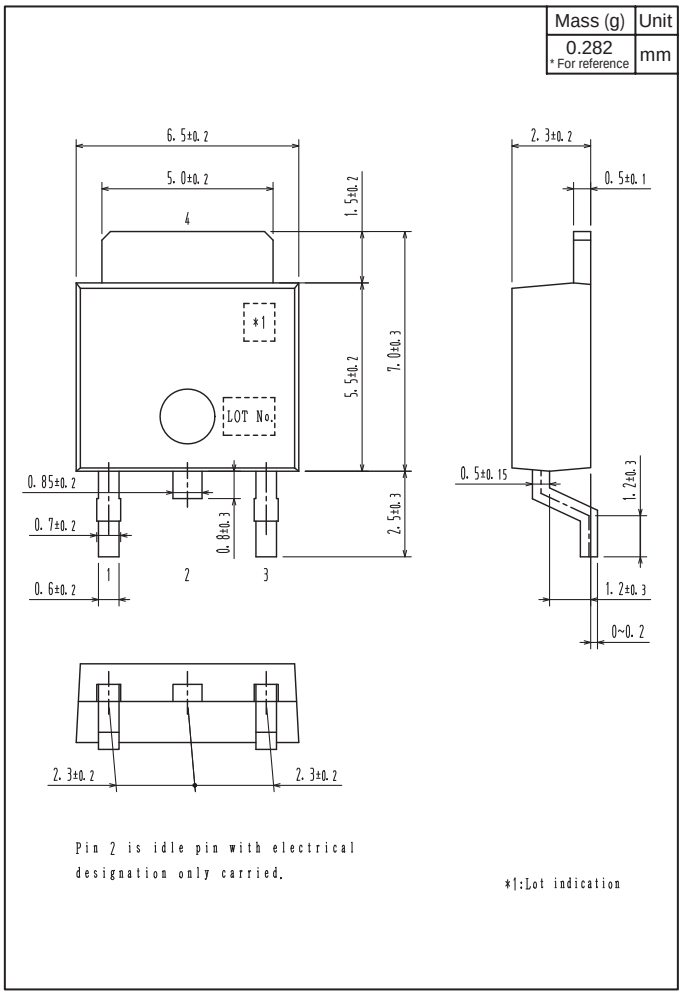


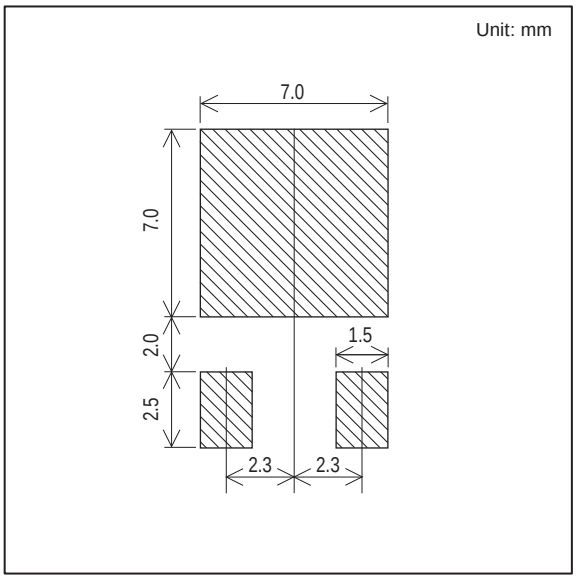
Those with one electrode terminal on the feed hole side·····TL

Outline Drawing

Land Pattern Example

2SB1216S-TL-E, 2SB1216S-TL-H, 2SB1216T-TL-E2SB1216T-TL-H, 2SD1816S-TL-E, 2SD1816S-TL-H, 2SD1816T-TL-E, 2SD1816T-TL-H





Bag Packing Specification

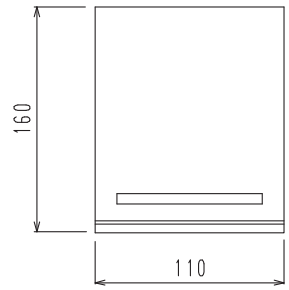
2SB1216S-E, 2SB1216S-H, 2SB1216T-E, 2SB1216T-H, 2SD1816S-E, 2SD1816S-H, 2SD1816T-E, 2SD1816T-H

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

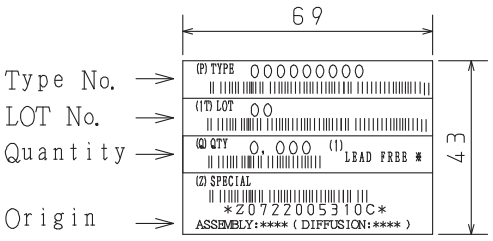
2. Bag dimensions

(unit: mm)



3. Bag label, Inner box label

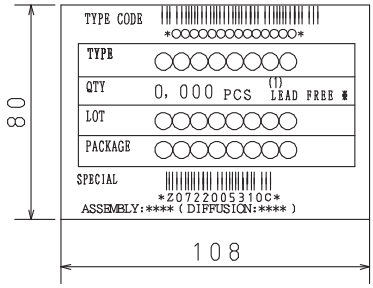
(unit: mm)



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.

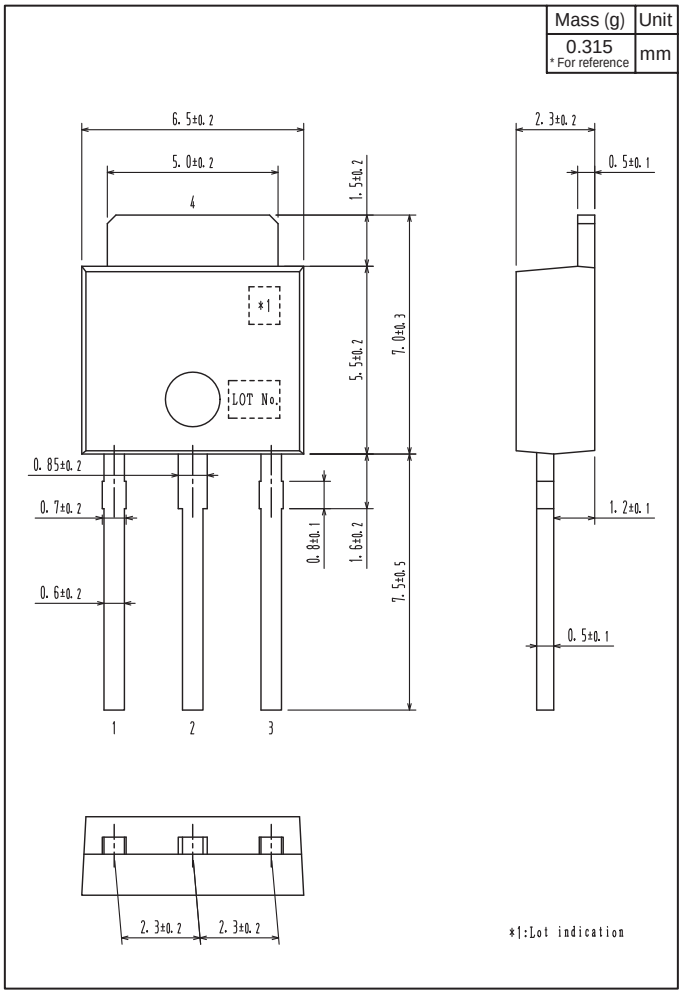


NOTE (1)
The LEAD FREE ※ description shows that the surface treatment of the terminal is lead free.

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

Outline Drawing

2SB1216S-E, 2SB1216S-H, 2SB1216T-E, 2SB1216T-H, 2SD1816S-E, 2SD1816S-H, 2SD1816T-E, 2SD1816T-H



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