



SANYO Semiconductors

# DATA SHEET

An ON Semiconductor Company

## 2SB1216/2SD1816 — PNP/NPN Epitaxial Planar Silicon Transistor

### High-Current Switching Applications

#### 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

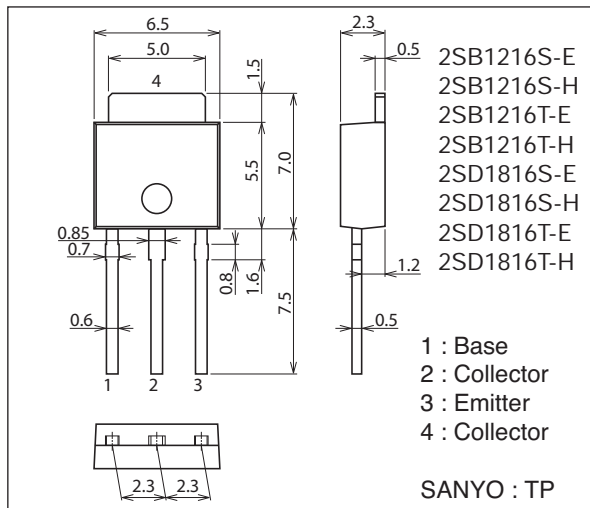
Absolute Maximum Ratings at  $T_a=25^\circ\text{C}$

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

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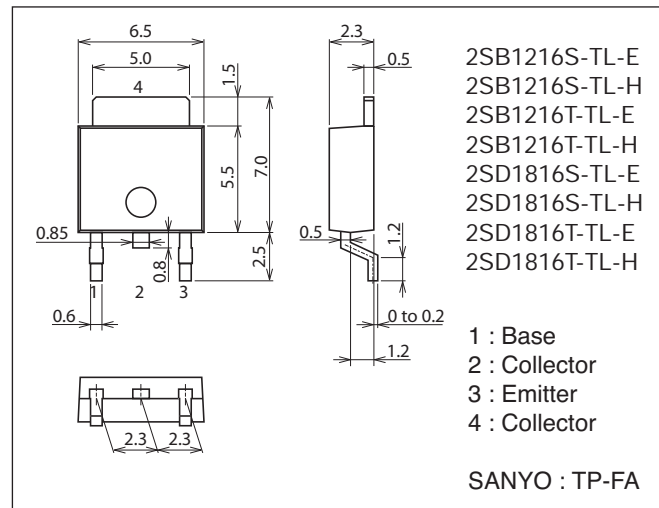
#### Package Dimensions unit : mm (typ)

7518-003



#### Package Dimensions unit : mm (typ)

7003-003

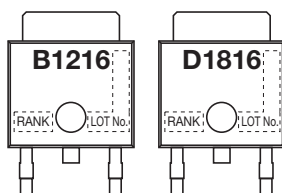


#### Product & Package Information

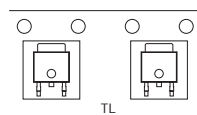
- Package : TP
- JEITA, JEDEC : SC-64, TO-251
- Minimum Packing Quantity : 500 pcs./bag

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

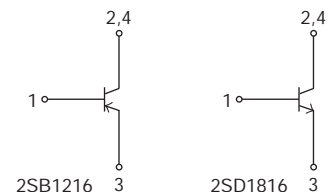
#### Marking (TP, TP-FA)



#### Packing Type (TP-FA) : TL



#### Electrical Connection



SANYO Semiconductor Co., Ltd.

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## 2SB1216/2SD1816

Continued from preceding page.

Parameter	Symbol	Conditions	Ratings	Unit
Collector Dissipation	PC		1	W
		T <sub>c</sub> =25°C	20	W
Junction Temperature	T <sub>j</sub>		150	°C
Storage Temperature	T <sub>stg</sub>		-55 to +150	°C

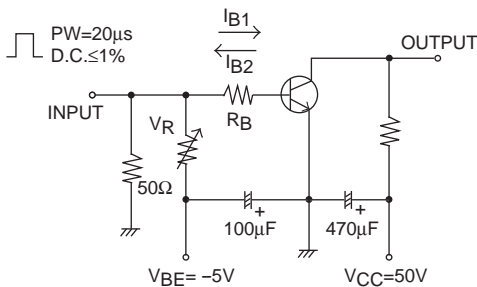
### Electrical Characteristics at T<sub>a</sub>=25°C

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Collector Cutoff Current	I <sub>CBO</sub>	V <sub>CB</sub> =(-)100V, I <sub>E</sub> =0A			(-)1	μA
Emitter Cutoff Current	I <sub>EBO</sub>	V <sub>EB</sub> =(-)4V, I <sub>C</sub> =0A			(-)1	μA
DC Current Gain	h <sub>FE1</sub>	V <sub>CE</sub> =(-)5V, I <sub>C</sub> =(-)0.5A	70*		400*	
	h <sub>FE2</sub>	V <sub>CE</sub> =(-)5V, I <sub>C</sub> =(-)3A	40			
Gain-Bandwidth Product	f <sub>T</sub>	V <sub>CE</sub> =(-)10V, I <sub>C</sub> =(-)0.5A		(130)180		MHz
Output Capacitance	C <sub>ob</sub>	V <sub>CB</sub> =(-)10V, f=1MHz		(65)40		pF
Collector-to-Emitter Saturation Voltage	V <sub>CE(sat)</sub>	I <sub>C</sub> =(-)2A, I <sub>B</sub> =(-)0.2A		(-200)150	(-500)400	mV
Base-to-Emitter Saturation Voltage	V <sub>BE(sat)</sub>	V <sub>CE</sub> =(-)2A, I <sub>C</sub> =(-)0.2A		(-)0.9	(-)1.2	V
Collector-to-Base Breakdown Voltage	V(BR)CBO	I <sub>C</sub> =(-)10μA, I <sub>E</sub> =0A	(-)120			V
Collector-to-Emitter Breakdown Voltage	V(BR)CEO	I <sub>C</sub> =(-)1mA, R <sub>BE</sub> =∞	(-)100			V
Emitter-to-Base Breakdown Voltage	V(BR)EBO	I <sub>E</sub> =(-)10μA, I <sub>C</sub> =0A	(-)6			V
Turn-On Time	t <sub>on</sub>	See specified Test Circuit.		100		ns
Storage Time	t <sub>stg</sub>			(800)900		ns
Fall Time	t <sub>f</sub>			50		ns

\* : The 2SB1216/2SD1816 are classified by 0.5A h<sub>FE</sub> as follows :

Rank	Q	R	S	T
h <sub>FE</sub>	70 to 140	100 to 200	140 to 280	200 to 400

### Switching Time Test Circuit



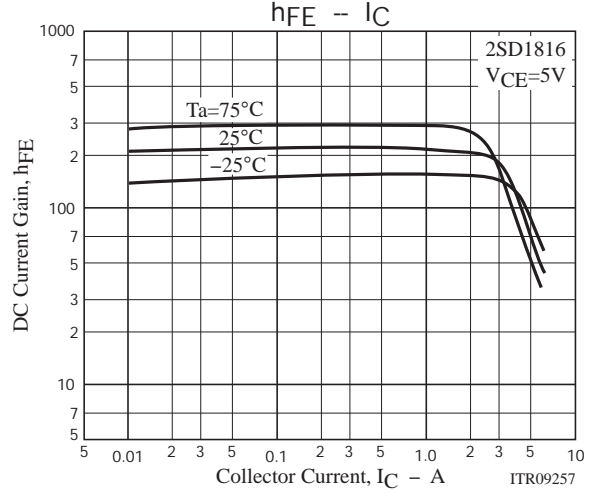
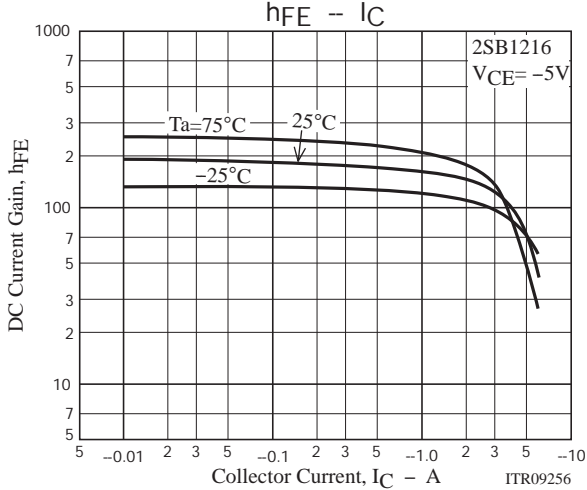
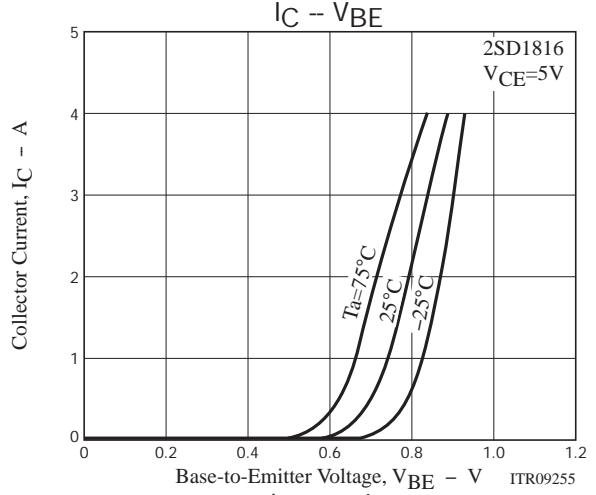
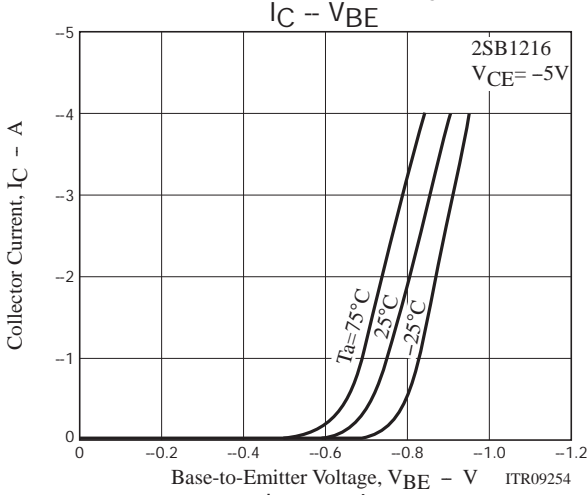
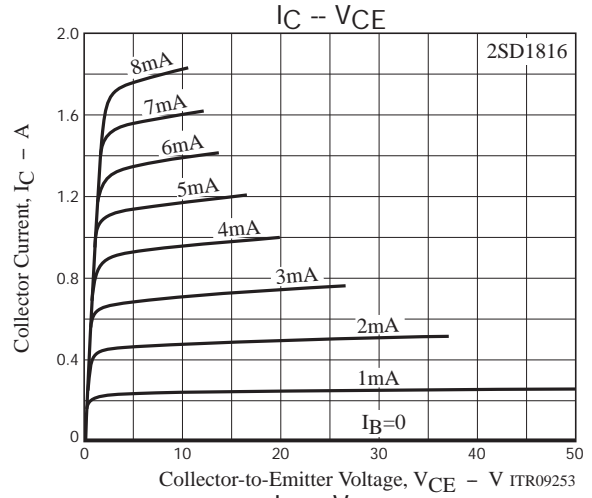
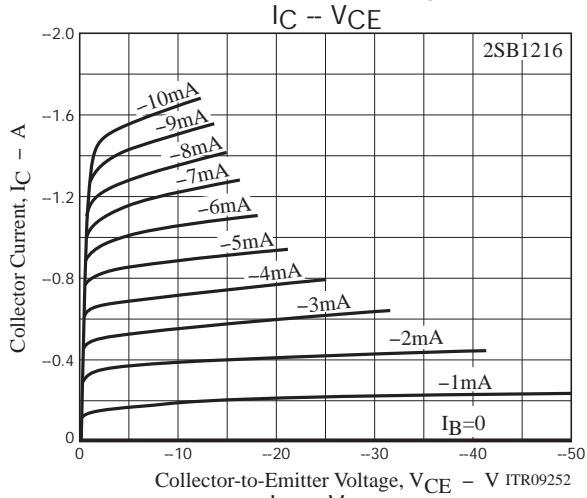
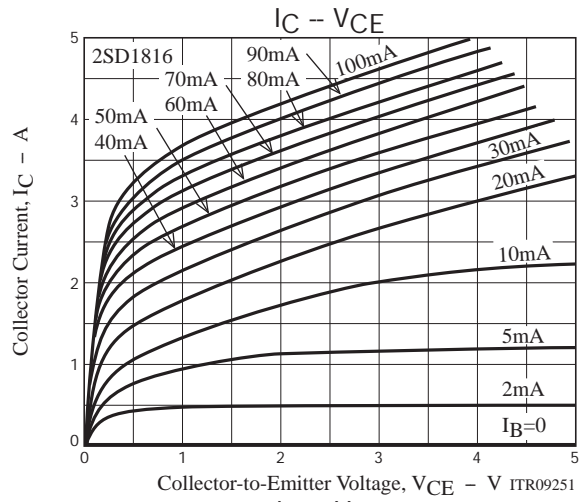
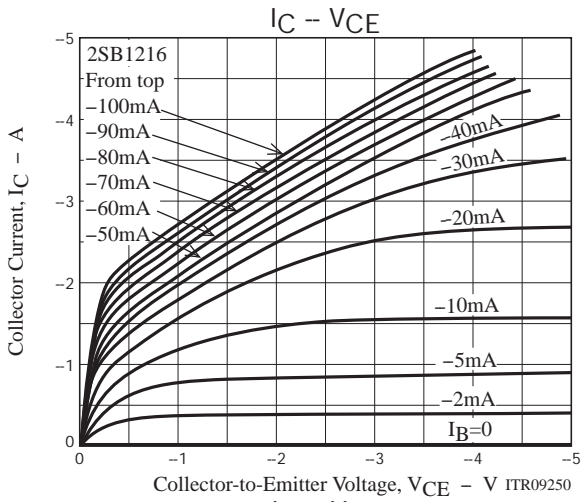
$$I_C = 10I_{B1} = -10I_{B2} = 2A$$

For PNP, the polarity is reversed.

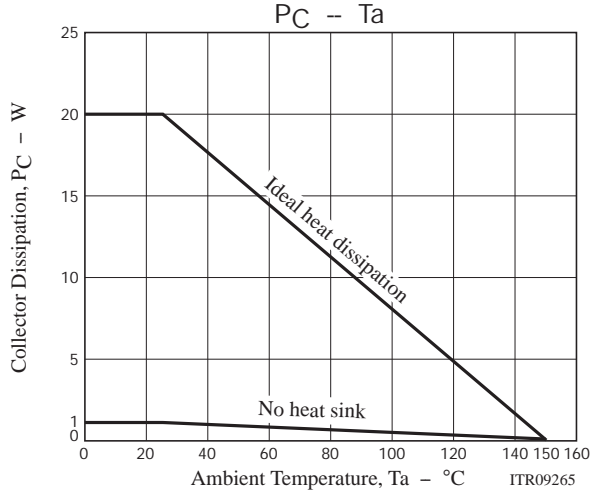
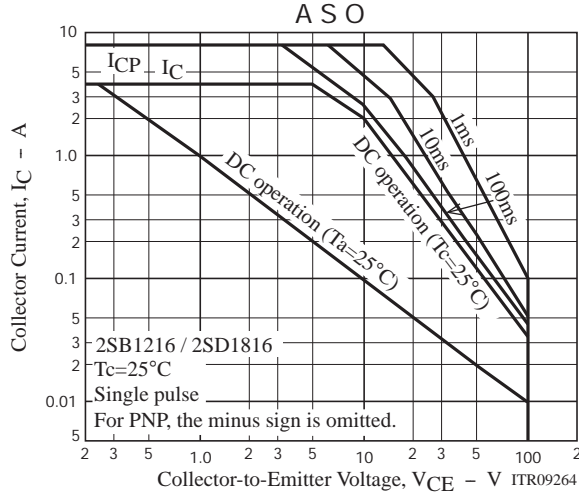
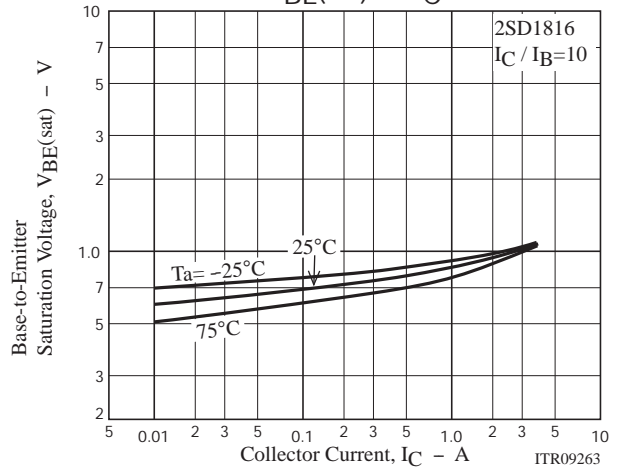
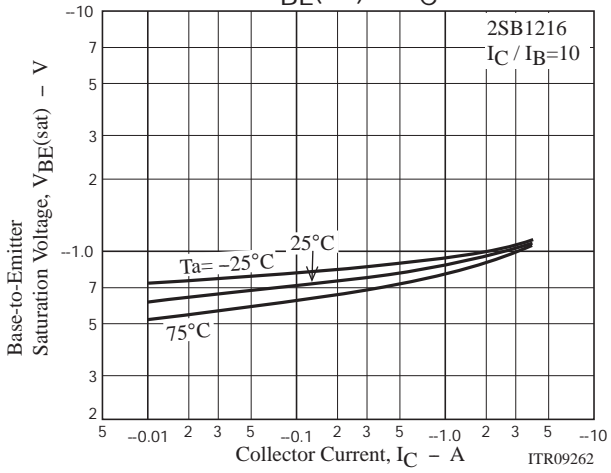
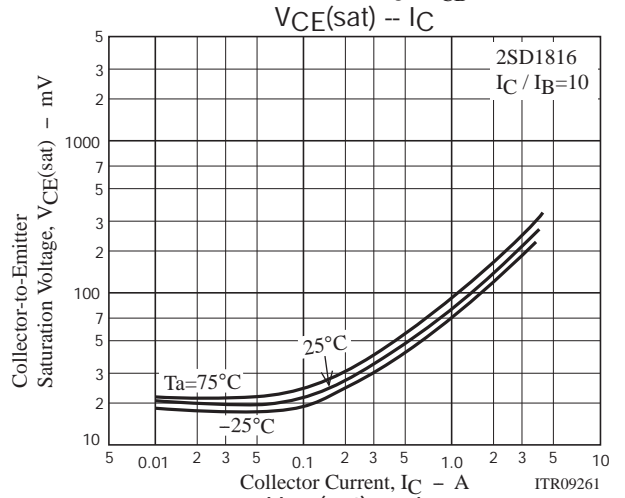
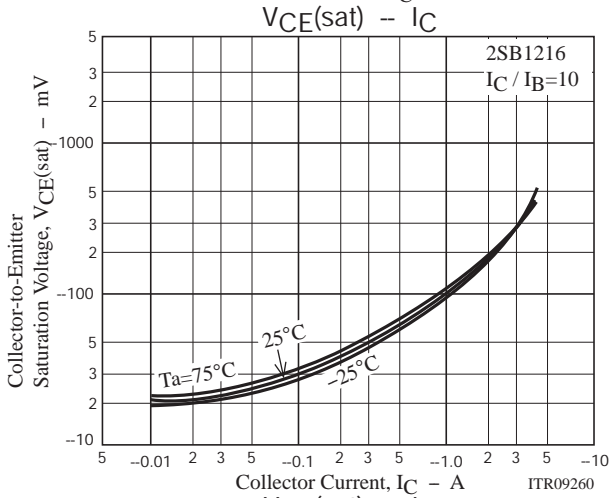
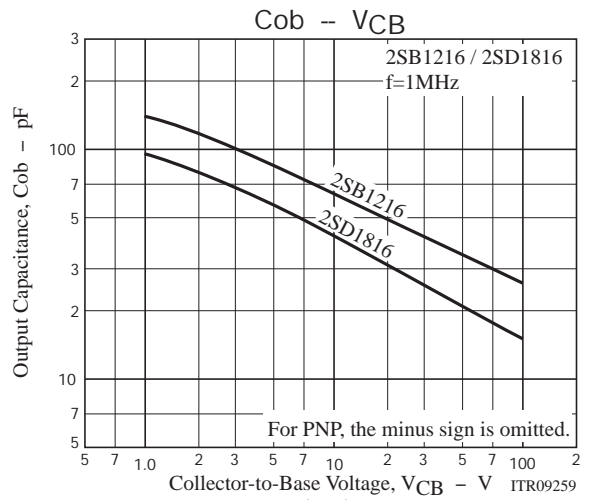
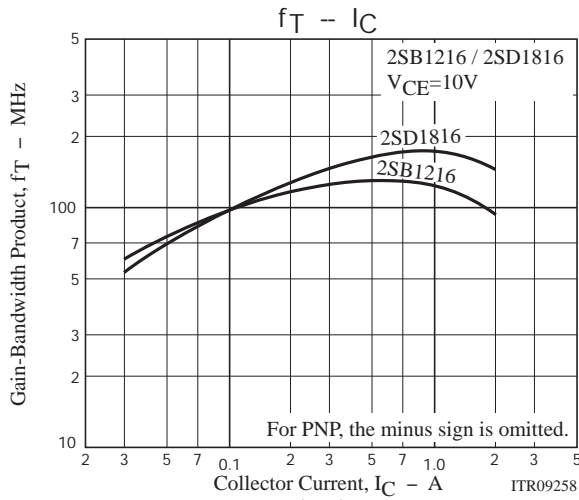
### Ordering Information

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

2SB1216/2SD1816



# 2SB1216/2SD1816



# 2SB1216/2SD1816

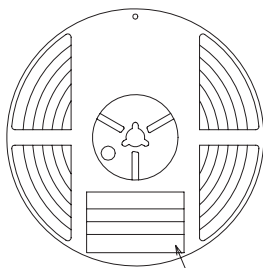
## Taping Specification

2SB1216S-TL-E, 2SB1216S-TL-H, 2SB1216T-TL-E, 2SB1216T-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



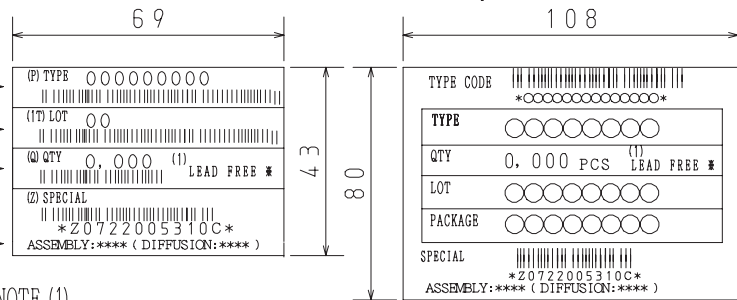
Reel label

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.



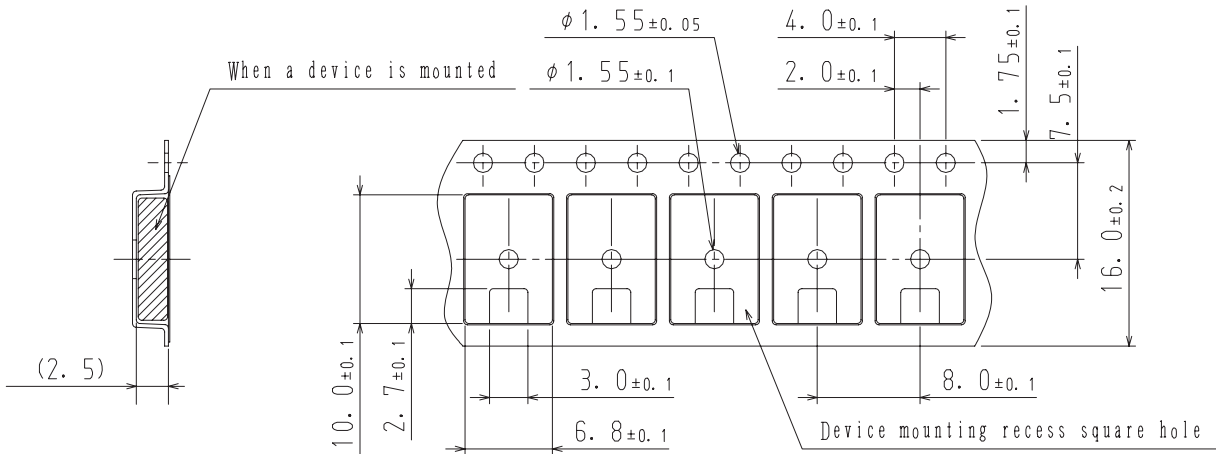
NOTE (1)

The LEAD FREE \* description shows that the surface treatment of the terminal is lead free.

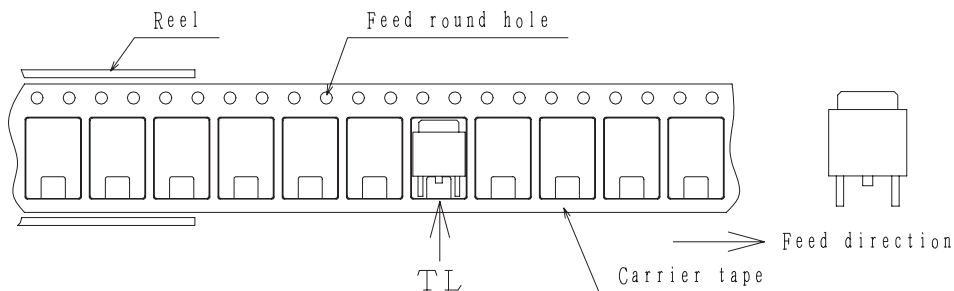
Label	JEITA Phase
LEAD FREE 3	JEITA Phase 3A
LEAD FREE 4	JEITA Phase 3

## Taping configuration

### 1. Carrier tape size (unit:mm)



### 2. Device placement direction

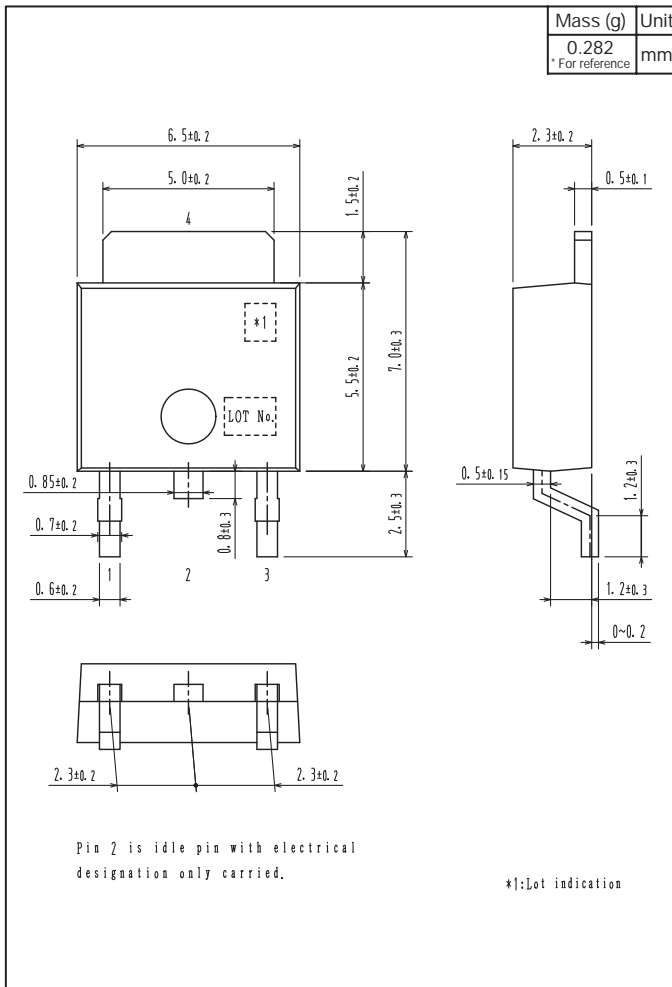


Those with one electrode terminal on the feed hole side.....TL

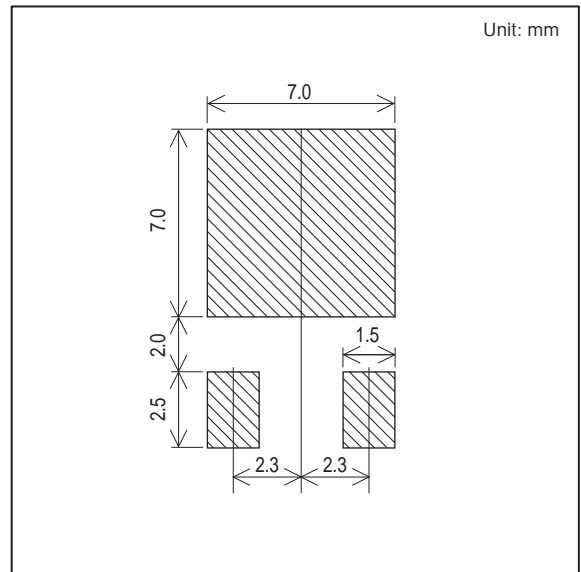
# 2SB1216/2SD1816

## Outline Drawing

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



## Land Pattern Example



# 2SB1216/2SD1816

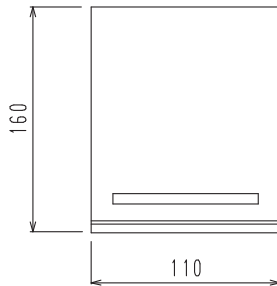
## Bag Packing Specification

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

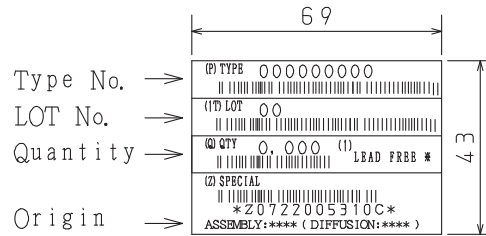
### 1. Packing Format

Package Name	Maximum Number of devices contained (pcs)			
	Bag	Inner box	Outer box	
TP	500	B-1	A-1	A-2
		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)



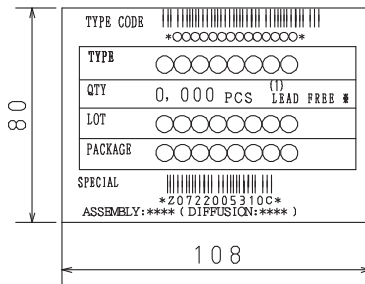
### 4. Outer box label (unit:mm)

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.

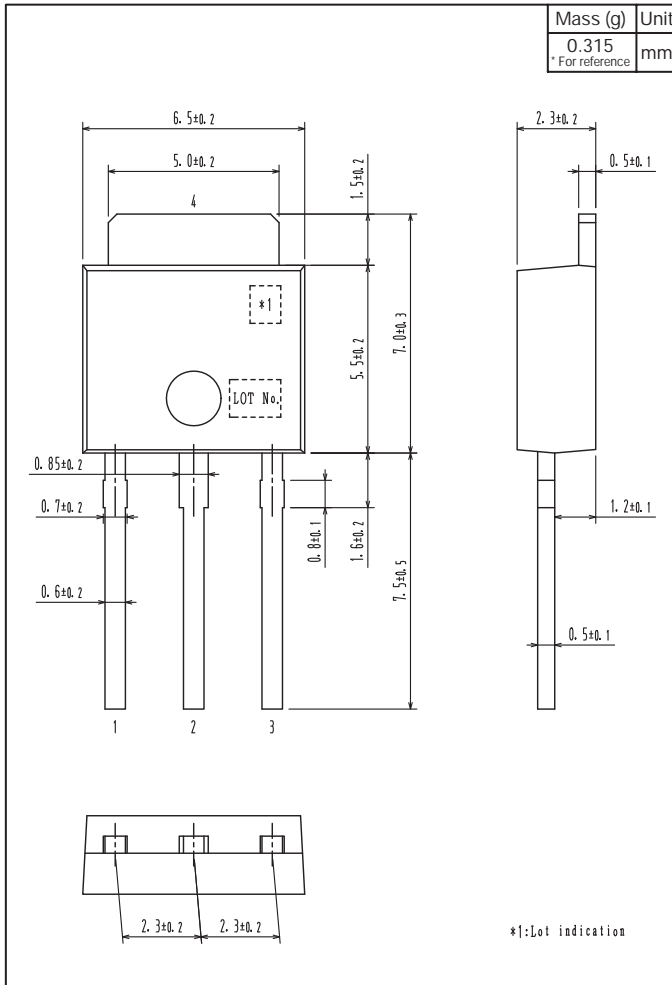
Label	JEITA Phase
LEAD FREE 3	JEITA Phase 3A
LEAD FREE 4	JEITA Phase 3



# 2SB1216/2SD1816

## Outline Drawing

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





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