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SANYO Semiconductors

# DATA SHEET

An ON Semiconductor Company

## 2SB1204 — PNP Epitaxial Planar Silicon Transistor High-Current Switching Applications

### Applications

- Relay drivers, high-speed inverters, converters, and other general high-current switching applications

### Features

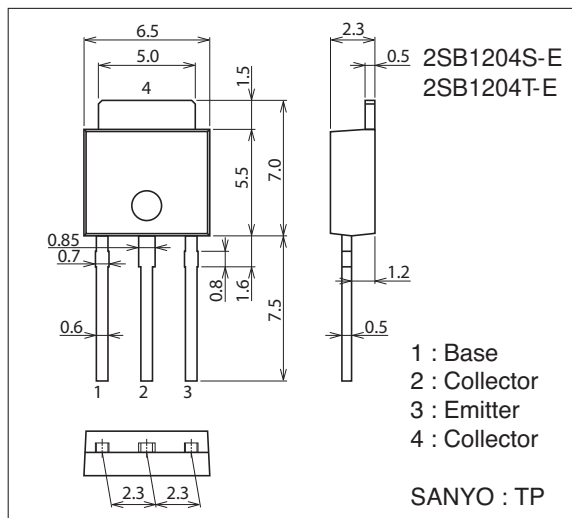
- Low collector-to-emitter saturation voltage
- High current and high  $f_T$
- Excellent linearity of  $h_{FE}$
- Fast switching speed
- Small and slim package making it easy to make 2SB1204-applied sets smaller

### Specifications

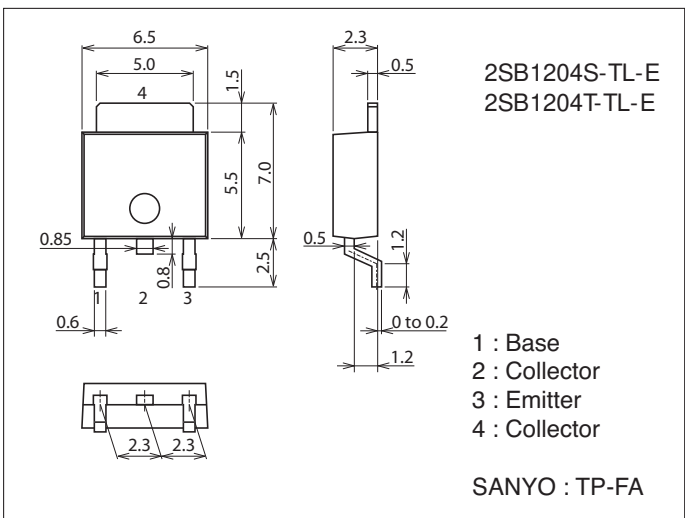
**Absolute Maximum Ratings** at  $T_a=25^\circ\text{C}$

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	$I_C$		-8	A
Collector Current (Pulse)	$I_{CP}$		-12	A
Collector Dissipation	PC	$T_c=25^\circ\text{C}$	1	W
			20	W
Junction Temperature	$T_j$		150	$^\circ\text{C}$
Storage Temperature	$T_{stg}$		-55 to +150	$^\circ\text{C}$

**Package Dimensions** unit : mm (typ)  
7518-003



**Package Dimensions** unit : mm (typ)  
7003-003

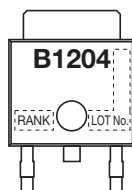


### Product & Package Information

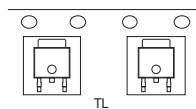
- Package : TP
- JEITA, JEDEC : SC-64, TO-251
- Minimum Packing Quantity : 500 pcs./bag

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

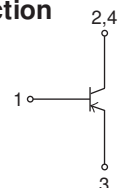
### Marking (TP, TP-FA)



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



### Electrical Connection



SANYO Semiconductor Co., Ltd.

<http://semicon.sanyo.com/en/network>

## 2SB1204

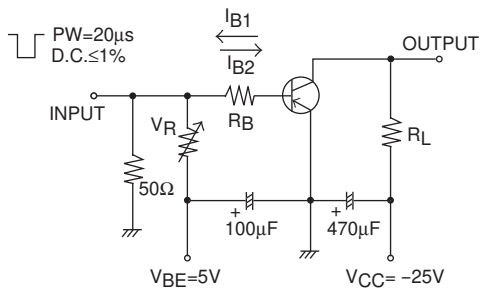
### Electrical Characteristics at Ta=25°C

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Collector Cutoff Current	ICBO	V <sub>CB</sub> = -40V, I <sub>E</sub> = 0A			-1	μA
Emitter Cutoff Current	IEBO	V <sub>EB</sub> = -4V, I <sub>C</sub> = 0A			-1	μA
DC Current Gain	h <sub>FE1</sub>	V <sub>CE</sub> = -2V, I <sub>C</sub> = -0.5A	70*		400*	
	h <sub>FE2</sub>	V <sub>CE</sub> = -2V, I <sub>C</sub> = -6A	35			
Gain-Bandwidth Product	f <sub>T</sub>	V <sub>CE</sub> = -5V, I <sub>C</sub> = -1A		130		MHz
Output Capacitance	C <sub>ob</sub>	V <sub>CB</sub> = -10V, f = 1MHz		95		pF
Collector-to-Emitter Saturation Voltage	V <sub>CE(sat)</sub>	I <sub>C</sub> = -4A, I <sub>B</sub> = -0.2A		-250	-500	mV
Base-to-Emitter Saturation Voltage	V <sub>BE(sat)</sub>	I <sub>C</sub> = -4A, I <sub>B</sub> = -0.2A		-0.95	-1.3	V
Collector-to-Base Breakdown Voltage	V <sub>(BR)CBO</sub>	I <sub>C</sub> = -10μA, I <sub>E</sub> = 0A	-60			V
Collector-to-Emitter Breakdown Voltage	V <sub>(BR)CEO</sub>	I <sub>C</sub> = -1mA, R <sub>BE</sub> = ∞	-50			V
Emitter-to-Base Breakdown Voltage	V <sub>(BR)EBO</sub>	I <sub>E</sub> = -10μA, I <sub>C</sub> = 0A	-6			V
Turn-On Time	t <sub>on</sub>	See specified Test Circuit		50		ns
Storage Time	t <sub>stg</sub>			450		ns
Fall Time	t <sub>f</sub>			20		ns

\* : The 2SB1204 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

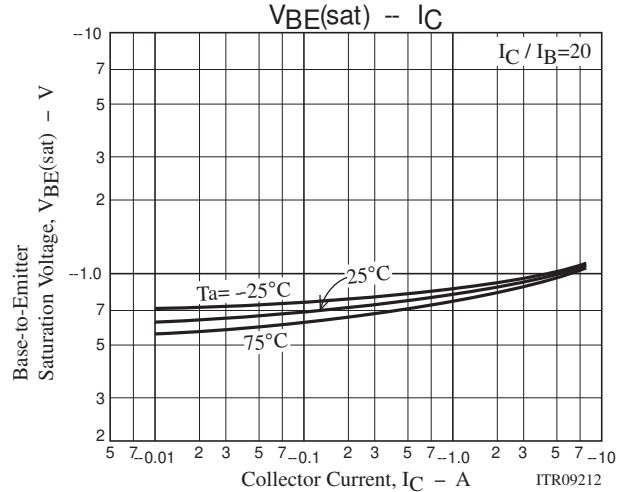
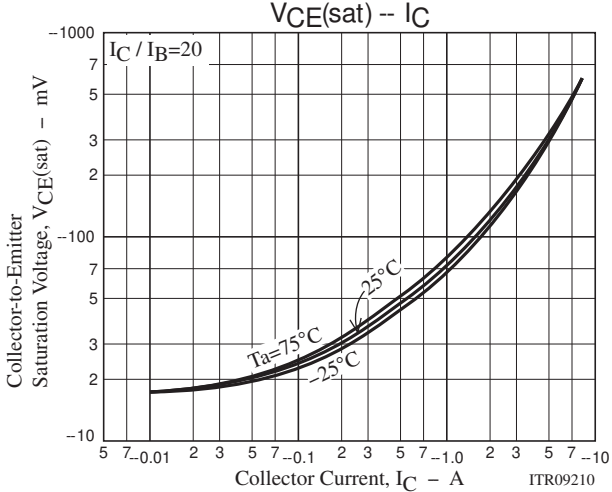
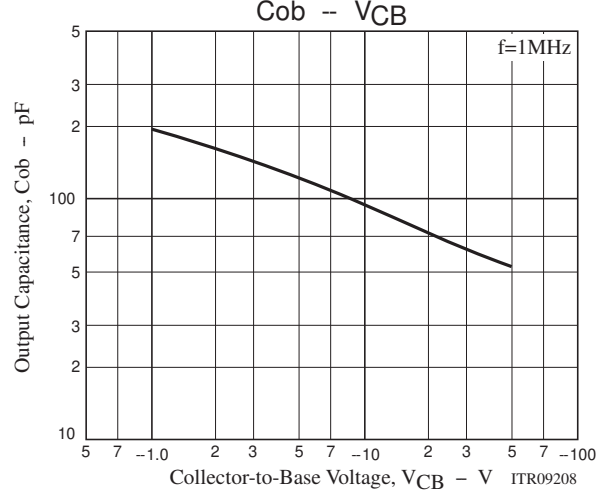
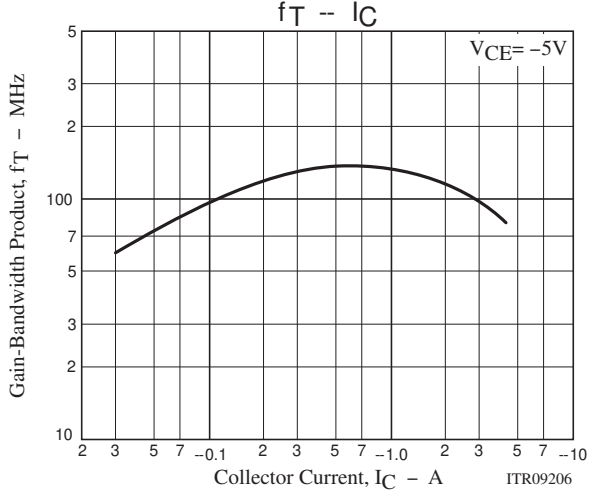
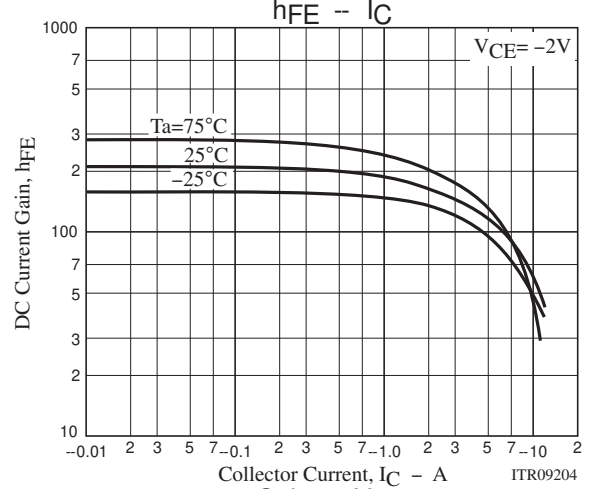
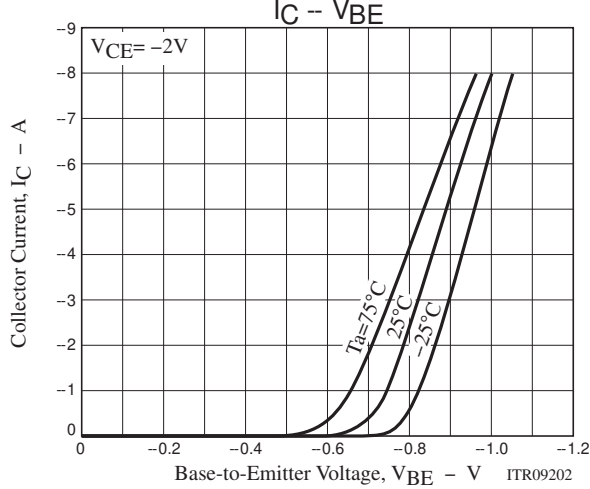
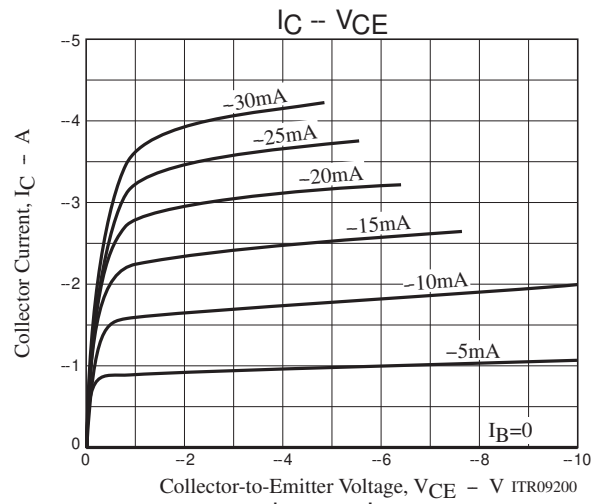
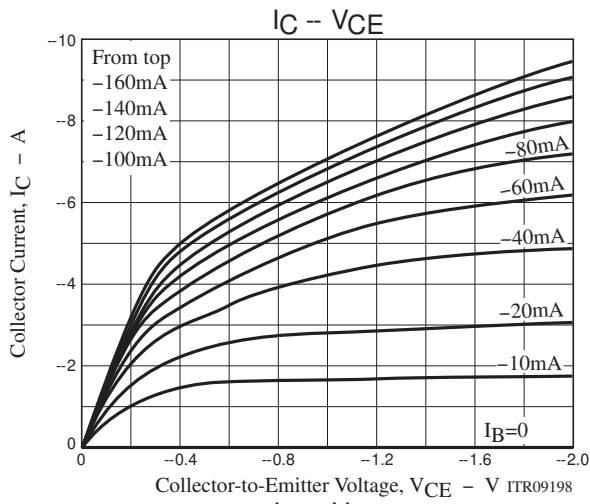
### Switching Time Test Circuit



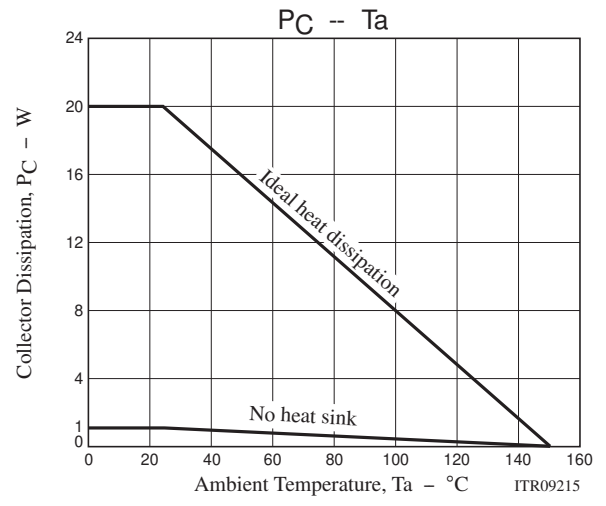
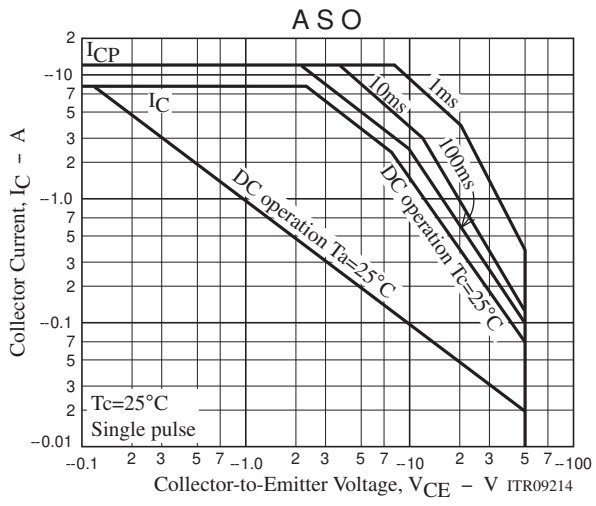
$$I_C = -10I_{B1} = 10I_{B2} = -4A$$

### Ordering Information

Device	Package	Shipping	memo
2SB1204S-E	TP	500pcs./bag	Pb Free
2SB1204T-E	TP	500pcs./bag	
2SB1204S-TL-E	TP-FA	700pcs./reel	
2SB1204T-TL-E	TP-FA	700pcs./reel	



# 2SB1204



Taping Specification

2SB1204S-TL-E, 2SB1204T-TL-E

Packing Format

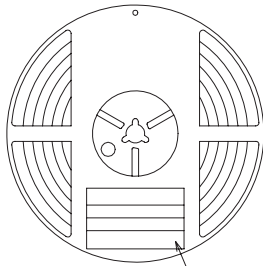
Package Name	Carrier Tape Type	Maximum Number of devices contained (pcs)			Packing format	
		Reel	Inner box	Outer box	Inner BOX (C-1)	Outer BOX (A-7)
TP-FA	TP	700	2,100	12,600	3 reels contained Dimensions:mm (external) 183×72×185	6 inner boxes contained Dimensions:mm (external) 440×195×210

Reel label, Inner box label  
(unit:mm)

Outer box label

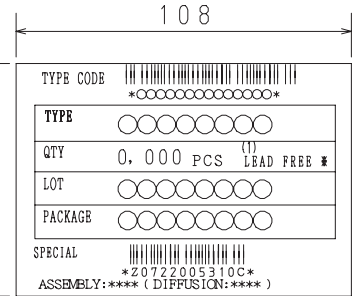
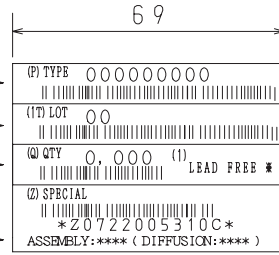
It is a label at the time of factory shipments.  
The form of a label may change in physical distribution process.

Packing method



Reel label

Type No.  
LOT No.  
Quantity  
Origin



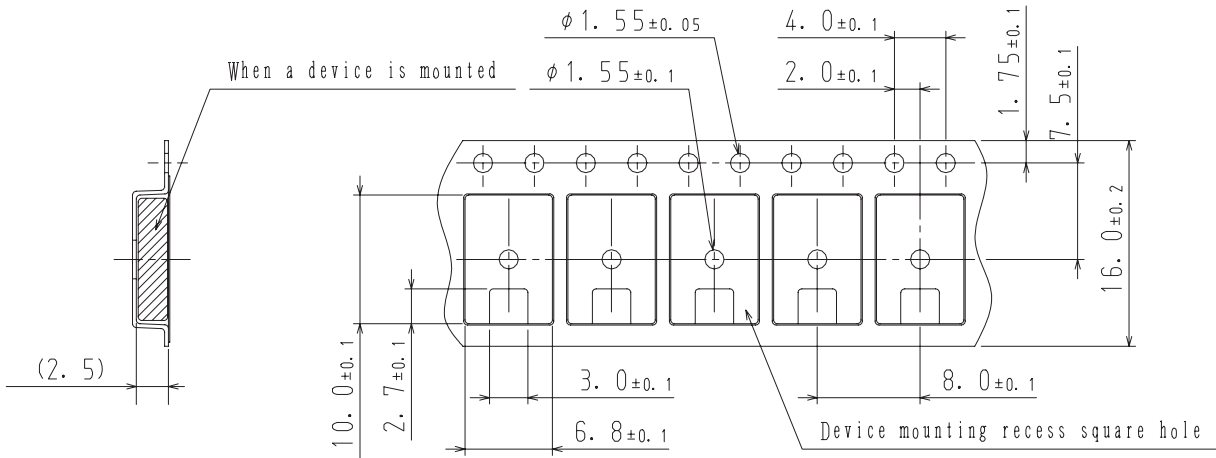
NOTE (1)

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

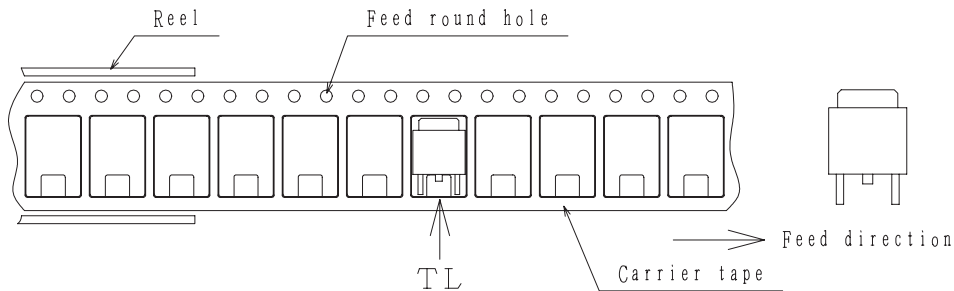
Label	JEITA Phase
LEAD FREE 3	JEITA Phase 3A
LEAD FREE 4	JEITA Phase 3

Taping configuration

1. Carrier tape size (unit:mm)



2. Device placement direction

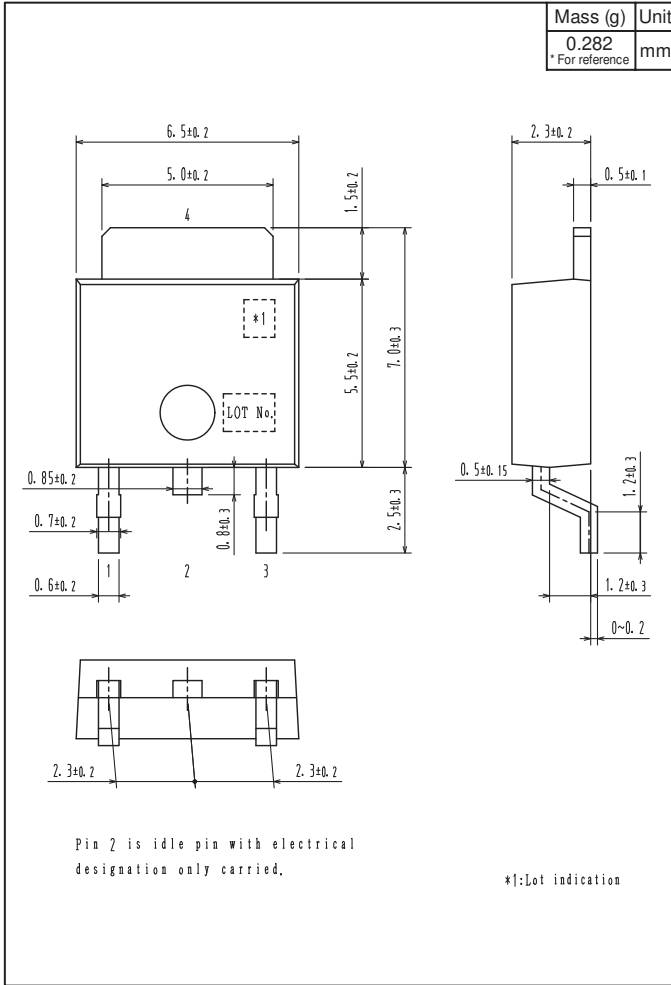


Those with one electrode terminal on the feed hole side.....TL

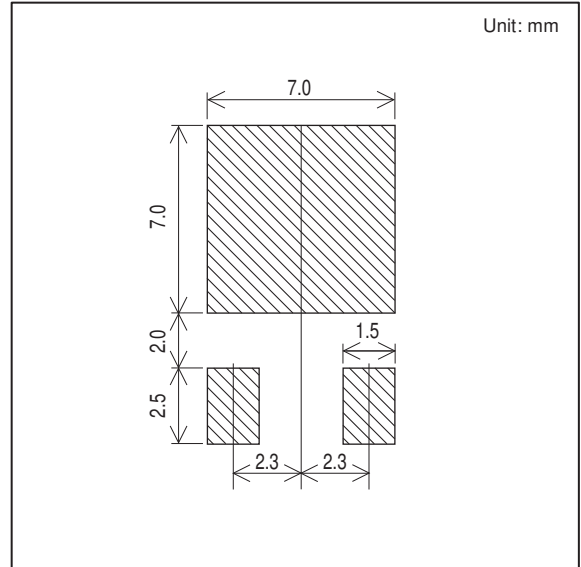
# 2SB1204

## Outline Drawing

2SB1204S-TL-E, 2SB1204T-TL-E



## Land Pattern Example



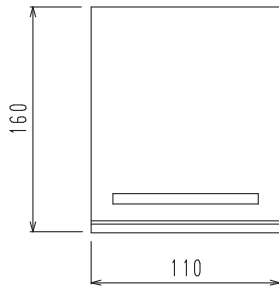
**Bag Packing Specification**

2SB1204S-E, 2SB1204T-E

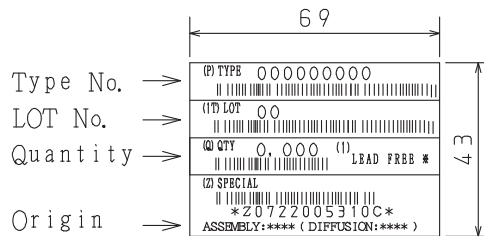
1. Packing Format

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)



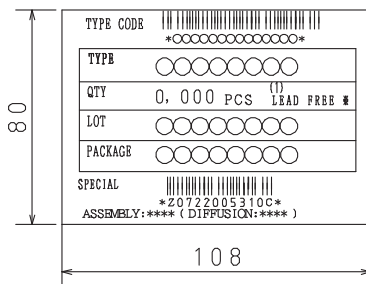
4. Outer box label  
(unit:mm)

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

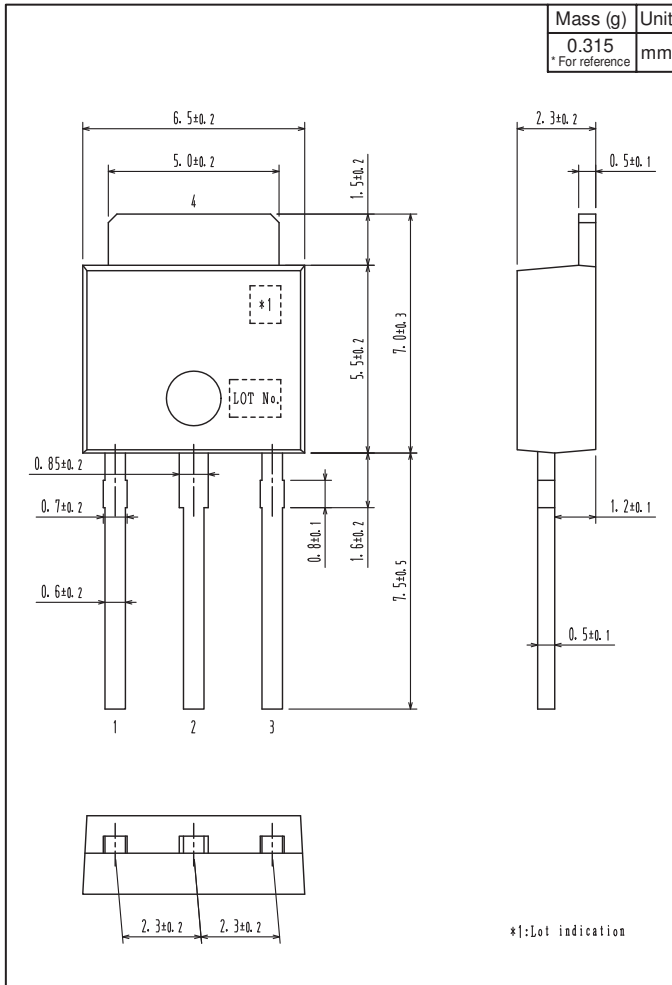




# 2SB1204

## Outline Drawing

2SB1204S-E, 2SB1204T-E



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