



SANYO Semiconductors

# DATA SHEET

An ON Semiconductor Company

## 2SA2039/2SC5706 — PNP/NPN Epitaxial Planar Silicon Transistor

### High-Current Switching Applications

#### Applications

- DC / DC converter, relay drivers, lamp drivers, motor drivers, flash

#### Features

- Adoption of FBET and MBIT processes
- Large current capacitance
- Low collector-to-emitter saturation voltage
- High-speed switching
- High allowable power dissipation

#### Specifications ( ) : 2SA2039

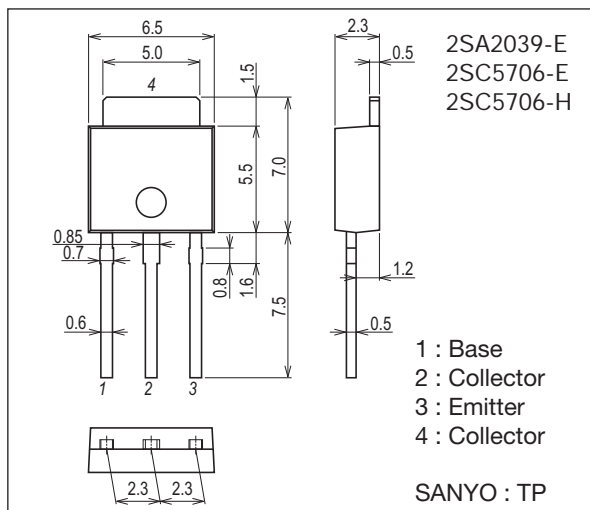
#### Absolute Maximum Ratings at Ta=25°C

Parameter	Symbol	Conditions	Ratings	Unit
Collector-to-Base Voltage	V <sub>CB0</sub>		(-50)100	V
Collector-to-Emitter Voltage	V <sub>CES</sub>		(-50)100	V
Collector-to-Emitter Voltage	V <sub>CEO</sub>		(-50)	V
Emitter-to-Base Voltage	V <sub>EBO</sub>		(-6)	V
Collector Current	I <sub>C</sub>		(-5)	A
Collector Current (Pulse)	I <sub>CP</sub>		(-7.5)	A

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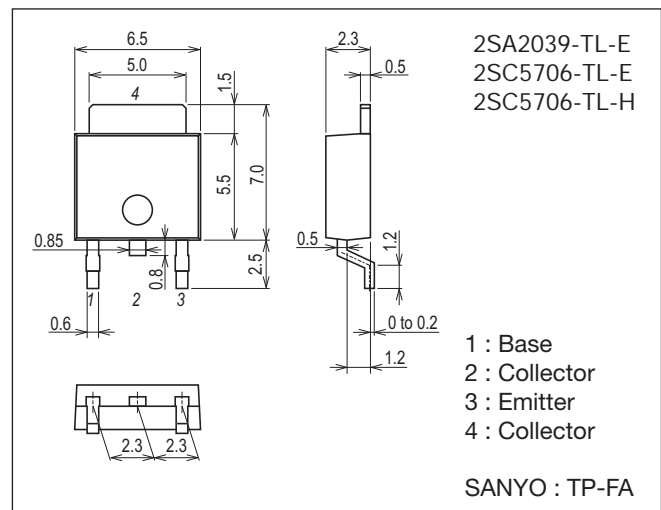
#### Package Dimensions unit : mm (typ)

7518-003



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

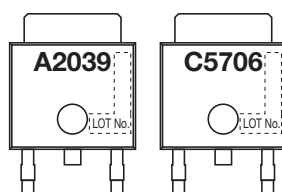
7003-003



#### Product & Package Information

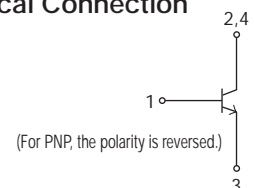
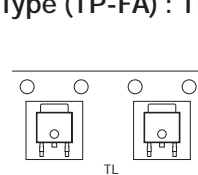
- Package : TP
- JEITA, JEDEC : SC-64, TO-251
- Minimum Packing Quantity : 500 pcs./bag

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



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

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



SANYO Semiconductor Co., Ltd.

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## 2SA2039/2SC5706

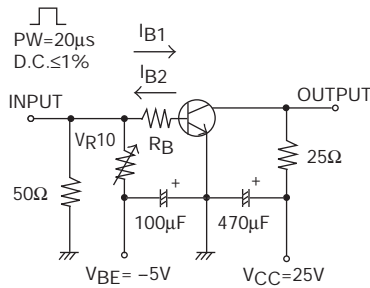
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Parameter	Symbol	Conditions	Ratings	Unit
Base Current	$I_B$		(-)-1.2	A
Collector Dissipation	$P_C$		0.8	W
		$T_C=25^\circ\text{C}$	15	W
Junction Temperature	$T_j$		150	$^\circ\text{C}$
Storage Temperature	$T_{stg}$		-55 to +150	$^\circ\text{C}$

### Electrical Characteristics at $T_a=25^\circ\text{C}$

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Collector Cutoff Current	$I_{CBO}$	$V_{CB}=(-)40\text{V}, I_E=0\text{A}$			(-)-1	$\mu\text{A}$
Emitter Cutoff Current	$I_{EBO}$	$V_{EB}=(-)4\text{V}, I_C=0\text{A}$			(-)-1	$\mu\text{A}$
DC Current Gain	$h_{FE}$	$V_{CE}=(-)2\text{V}, I_C=(-)500\text{mA}$	200		560	
Gain-Bandwidth Product	$f_T$	$V_{CE}=(-)10\text{V}, I_C=(-)500\text{mA}$		(360)400		MHz
Output Capacitance	$C_{ob}$	$V_{CB}=(-)10\text{V}, f=1\text{MHz}$		(24)15		pF
Collector-to-Emitter Saturation Voltage	$V_{CE(sat)1}$	$I_C=(-)1\text{A}, I_B=(-)50\text{mA}$		(-)-115)90	(-)-195)135	mV
	$V_{CE(sat)2}$	$I_C=(-)2\text{A}, I_B=(-)100\text{mA}$		(-)-255)160	(-)-430)240	mV
Base-to-Emitter Saturation Voltage	$V_{BE(sat)}$	$V_{CE}=(-)2\text{V}, I_B=(-)100\text{mA}$		(-)-0.89	(-)-1.2	V
Collector-to-Base Breakdown Voltage	$V_{(BR)CBO}$	$I_C=(-)10\mu\text{A}, I_E=0\text{A}$	(-)-50)100			V
Collector-to-Emitter Breakdown Voltage	$V_{(BR)CES}$	$I_C=(-)100\mu\text{A}, R_{BE}=0\Omega$	(-)-50)100			V
Collector-to-Emitter Breakdown Voltage	$V_{(BR)CEO}$	$I_C=(-)1\text{mA}, R_{BE}=\infty$	(-)-50			V
Emitter-to-Base Breakdown Voltage	$V_{(BR)EBO}$	$I_E=(-)10\mu\text{A}, I_C=0\text{A}$	(-)-6			V
Turn-On Time	$t_{on}$			(30)35		ns
Storage Time	$t_{stg}$	See specified Test Circuit.		(230)300		ns
Fall Time	$t_f$			(15)20		ns

### Switching Time Test Circuit

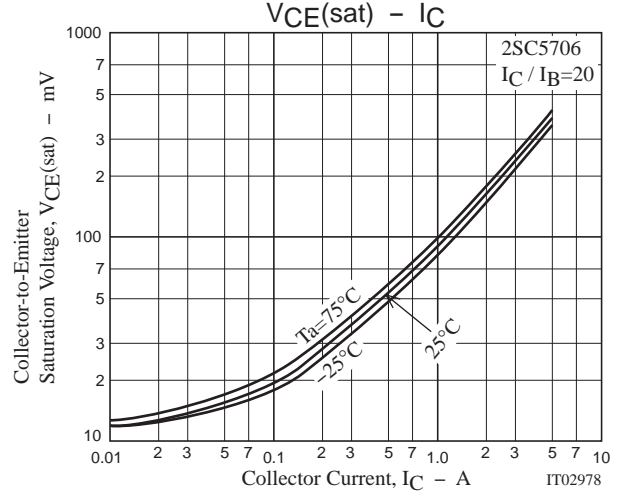
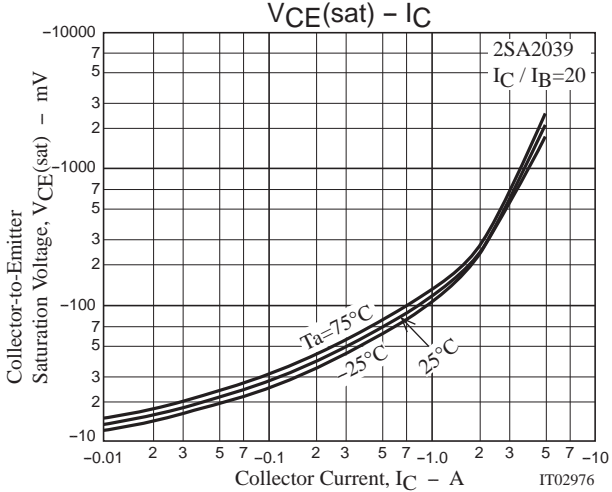
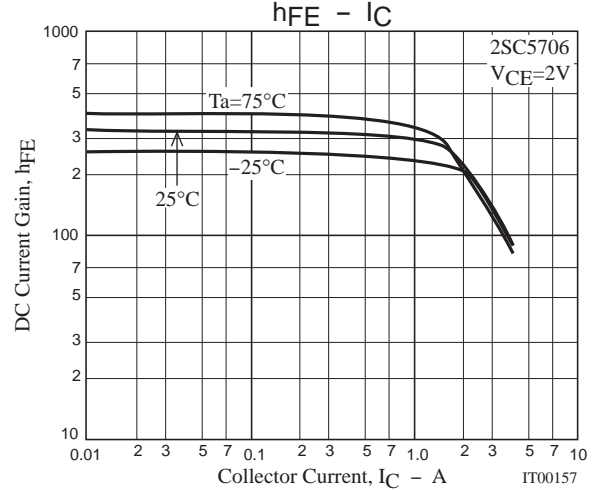
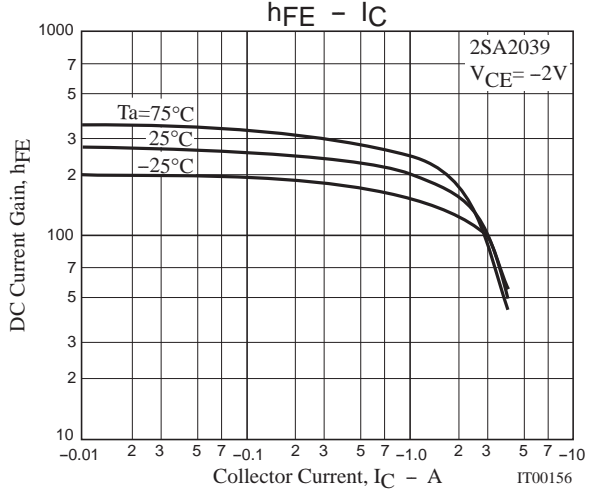
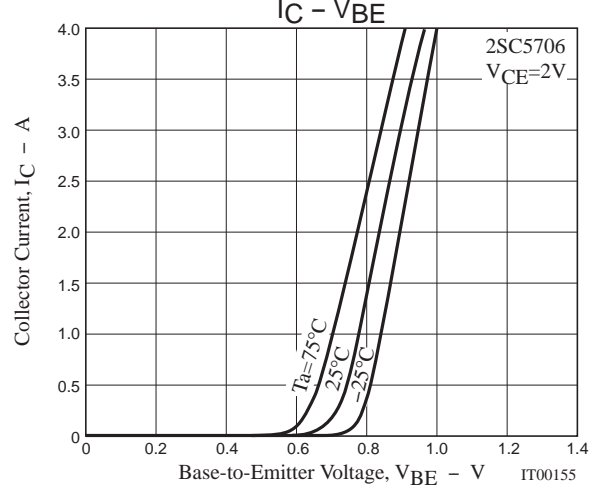
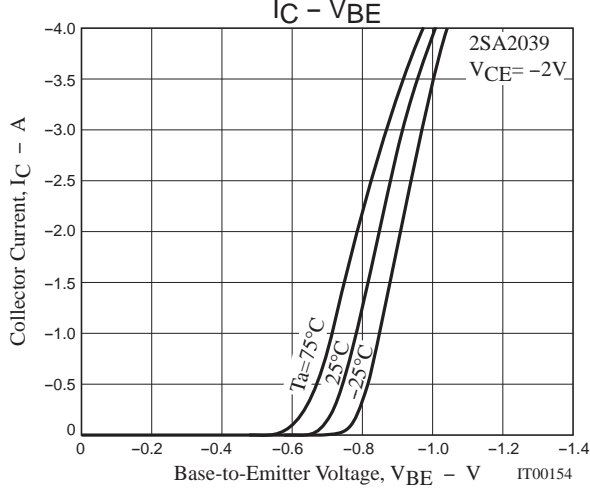
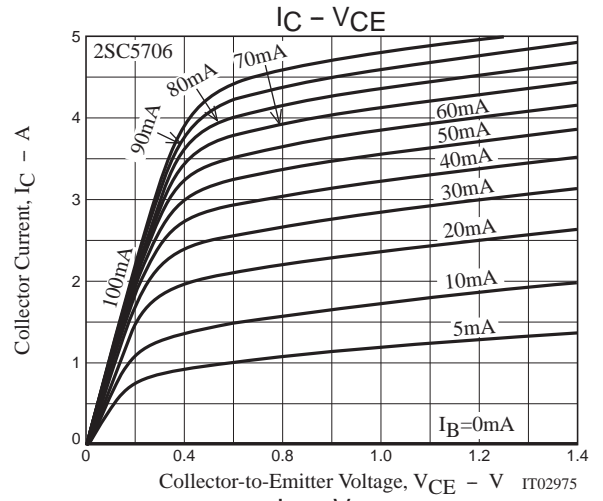
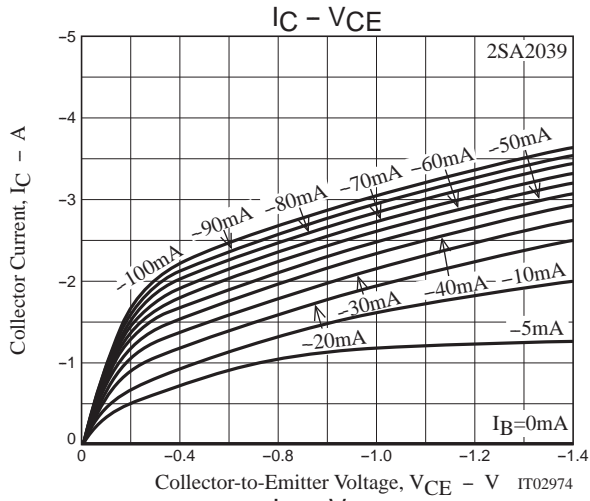


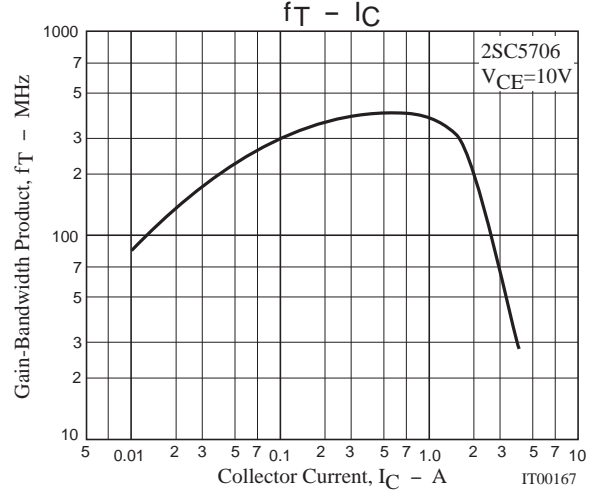
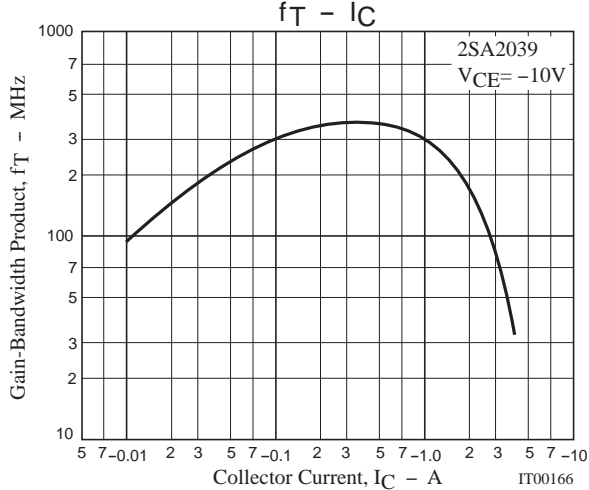
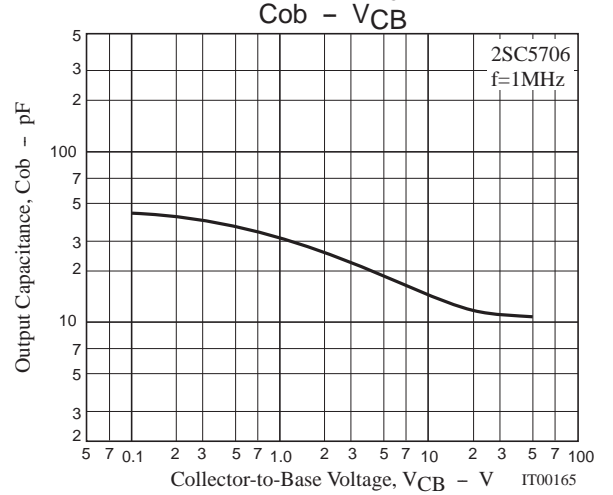
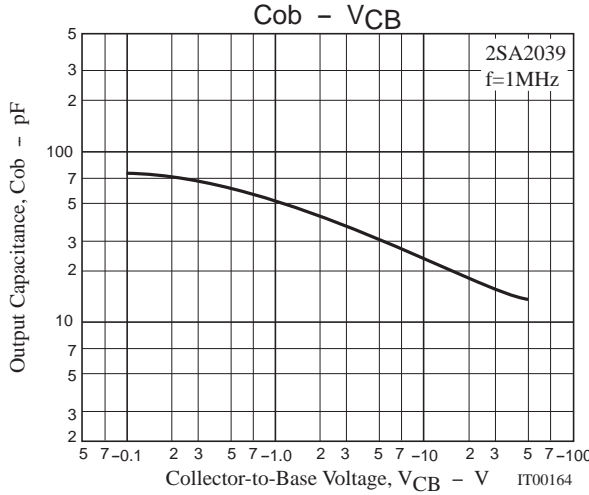
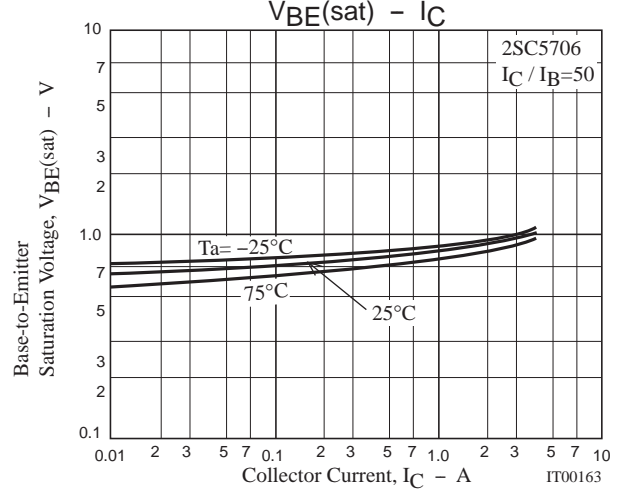
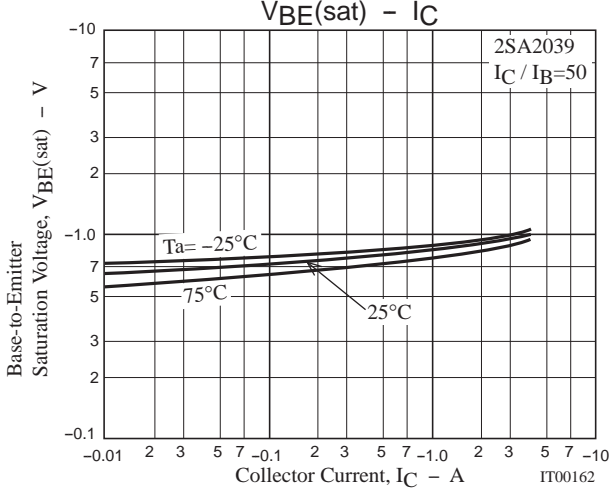
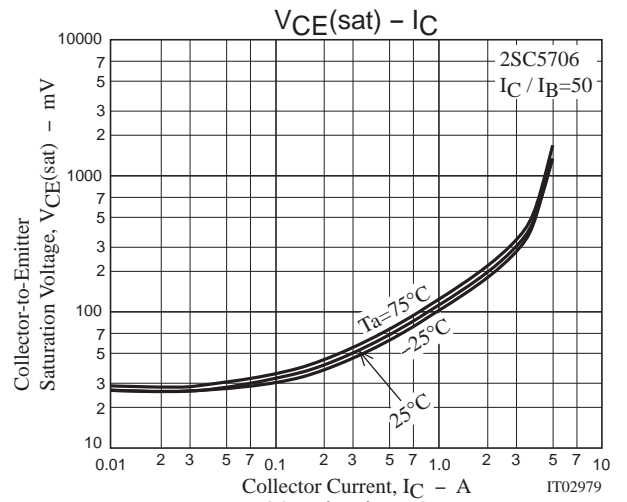
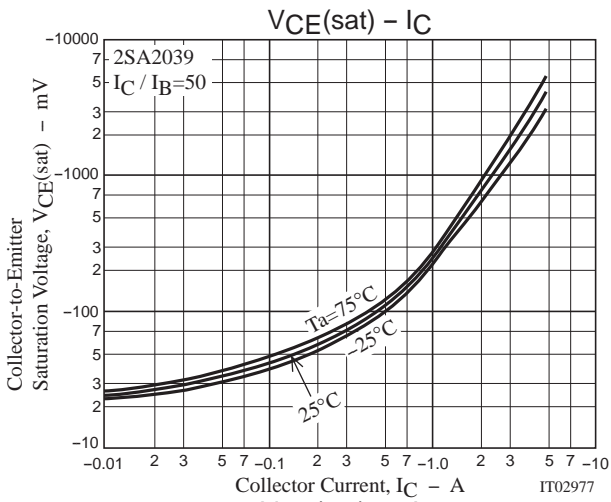
$$I_C = 10I_{B1} = -10I_{B2} = 1\text{A}$$

For PNP, the polarity is reversed.

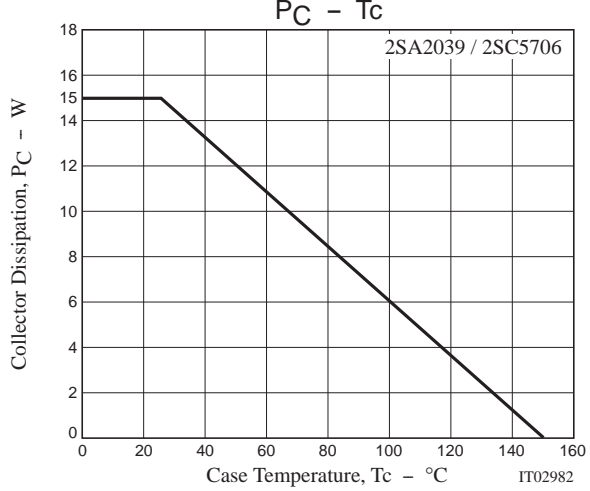
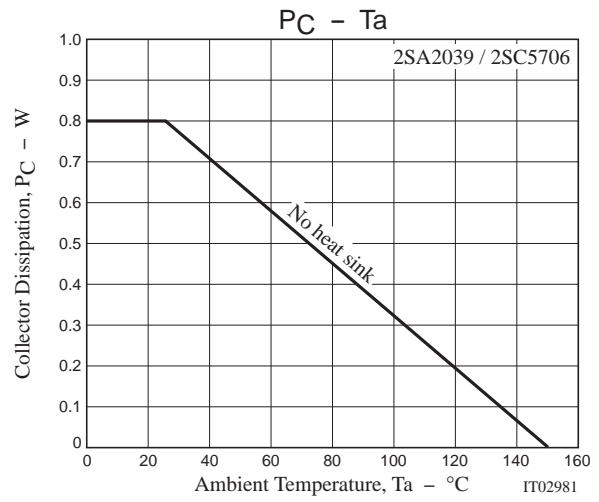
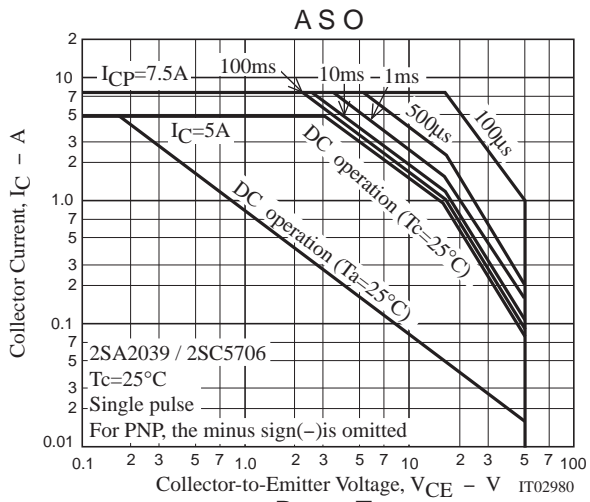
### Ordering Information

Device	Package	Shipping	memo
2SA2039-E	TP	500pcs./bag	Pb Free
2SC5706-E	TP	500pcs./bag	
2SC5706-H	TP	500pcs./bag	Pb Free & Halogen Free
2SA2039-TL-E	TP-FA	700pcs./reel	Pb Free
2SC5706-TL-E	TP-FA	700pcs./reel	
2SC5706-TL-H	TP-FA	700pcs./reel	Pb Free & Halogen Free





# 2SA2039/2SC5706



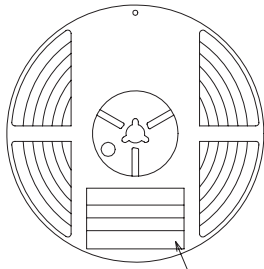
Taping Specification

2SA2039-TL-E, 2SC5706-TL-E, 2SC5706-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



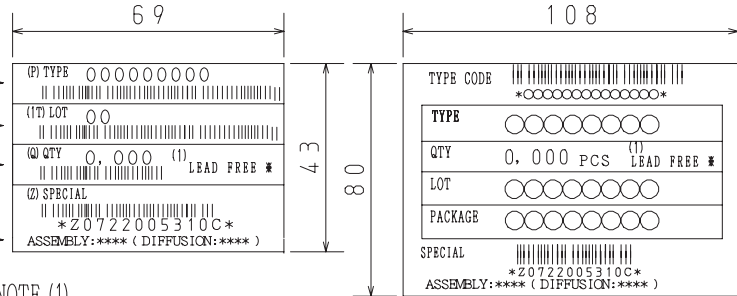
Type No.  
LOT No.  
Quantity  
Origin

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.



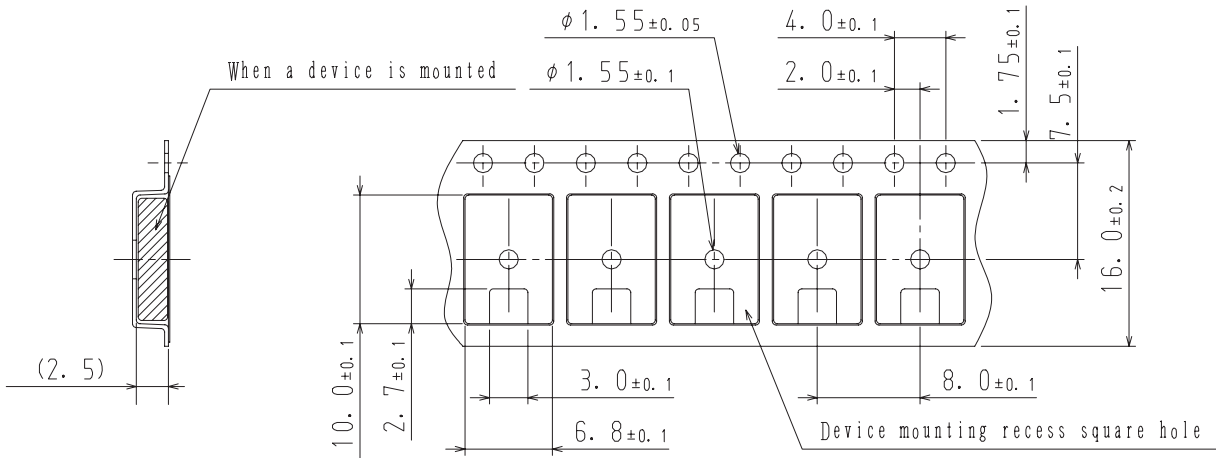
NOTE (1)

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

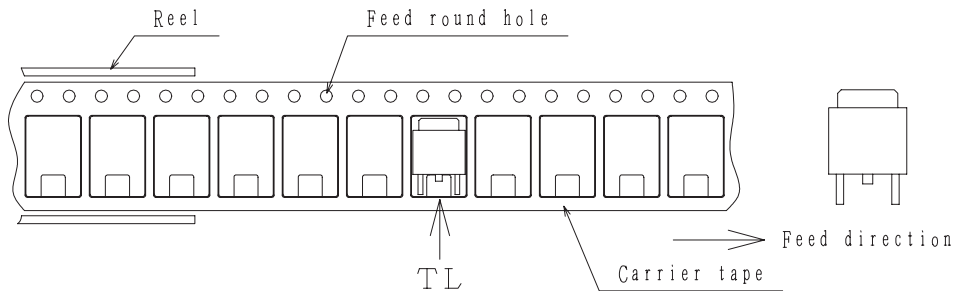
Label	JEITA Phase
LEAD FREE 3	JEITA Phase 3A
LEAD FREE 4	JEITA Phase 3

Taping configuration

1. Carrier tape size (unit:mm)



2. Device placement direction

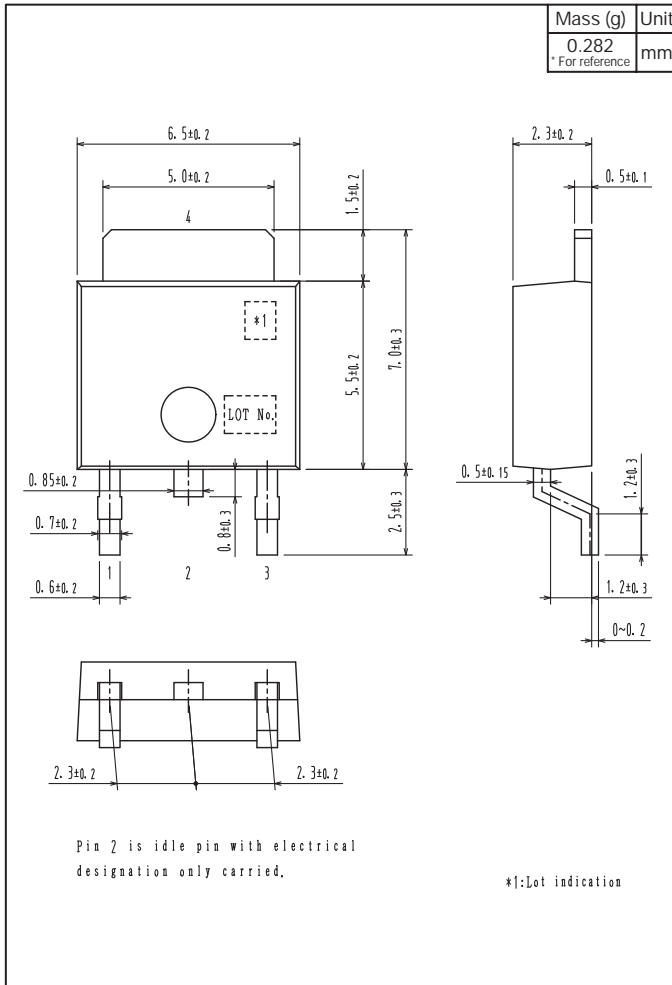


Those with one electrode terminal on the feed hole side.....TL

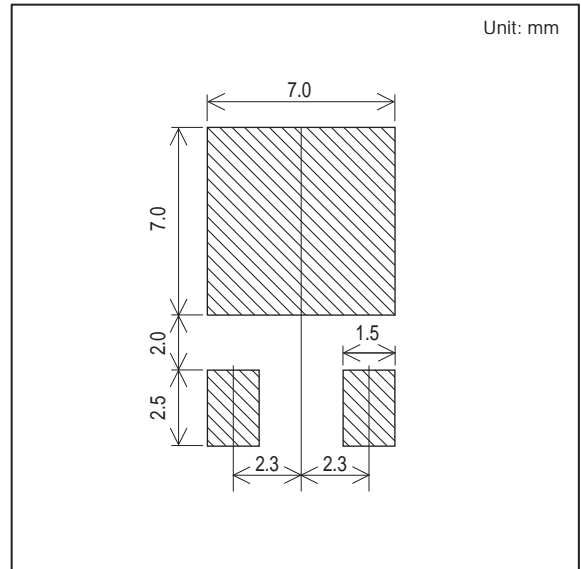
# 2SA2039/2SC5706

## Outline Drawing

2SA2039-TL-E, 2SC5706-TL-E, 2SC5706-TL-H



## Land Pattern Example



Bag Packing Specification

2SA2039-E, 2SC5706-E, 2SC5706-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)



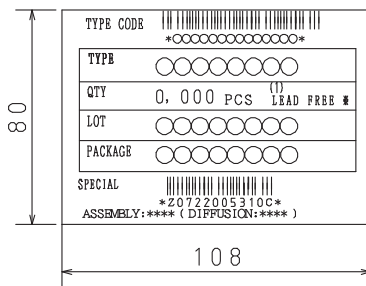
4. Outer box label  
(unit:mm)

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.

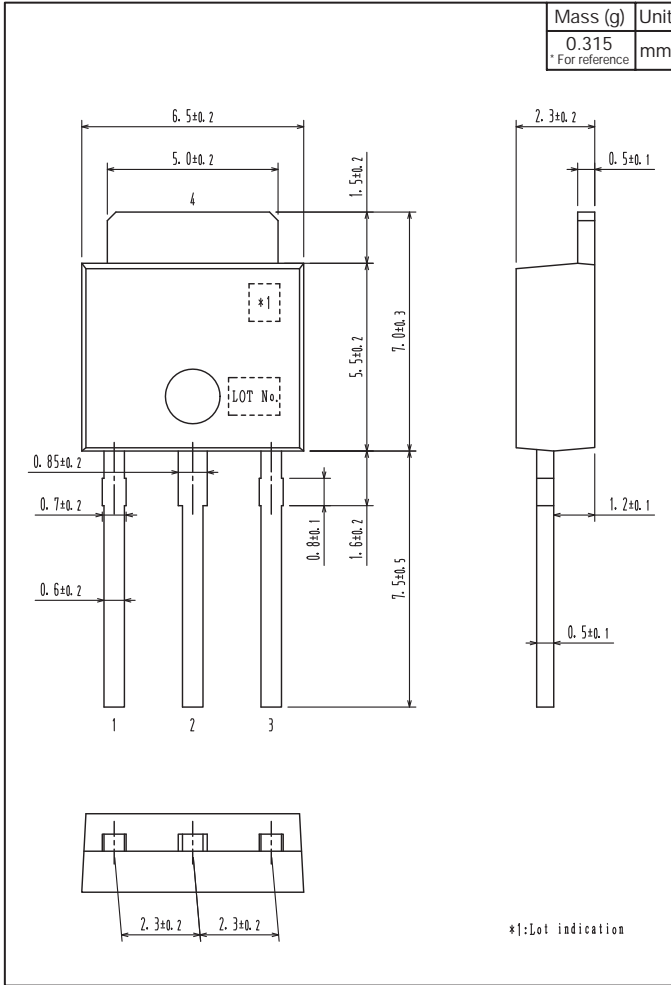
Label	JEITA Phase
LEAD FREE 3	JEITA Phase 3A
LEAD FREE 4	JEITA Phase 3





Outline Drawing

2SA2039-E, 2SC5706-E, 2SC5706-H



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