



# 2SA2040/2SC5707 — 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

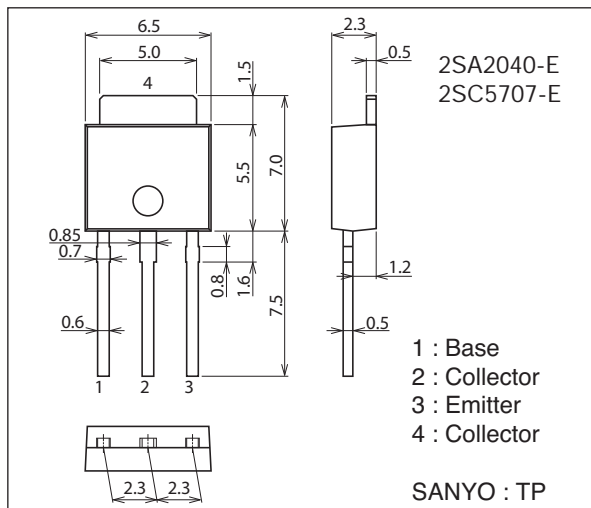
### Specifications ( ) : 2SA2040

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

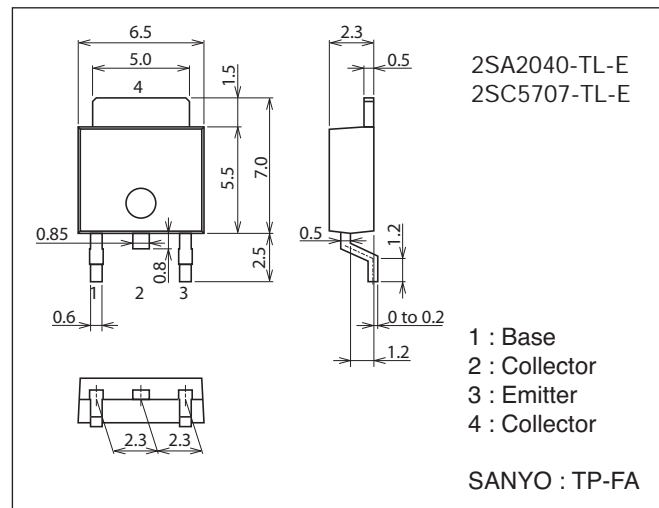
Parameter	Symbol	Conditions	Ratings	Unit
Collector-to-Base Voltage	V <sub>CB0</sub>		(-50)100	V
Collector-to-Emitter Voltage	V <sub>CES</sub>		(-50)100	V
Collector-to-Emitter Voltage	V <sub>CEO</sub>		(-50)	V
Emitter-to-Base Voltage	V <sub>EBO</sub>		(-6)	V
Collector Current	I <sub>C</sub>		(-8)	A
Collector Current (Pulse)	I <sub>CP</sub>		(-11)	A

Continued on next page.

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



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

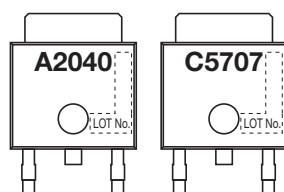


### Product & Package Information

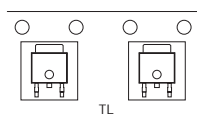
- Package : TP
- JEITA, JEDEC : SC-64, TO-251
- Minimum Packing Quantity : 500 pcs./bag

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

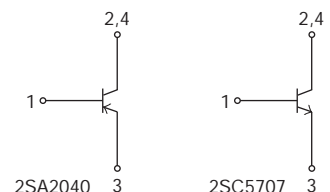
### Marking (TP, TP-FA)



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



### Electrical Connection



## 2SA2040/2SC5707

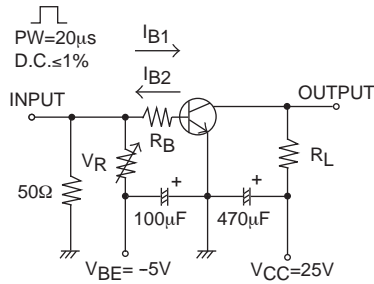
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Parameter	Symbol	Conditions	Ratings	Unit
Base Current	$I_B$		(-)2	A
Collector Dissipation	$P_C$		1.0	W
		$T_C=25^\circ\text{C}$	15	W
Junction Temperature	$T_j$		150	$^\circ\text{C}$
Storage Temperature	$T_{stg}$		-55 to +150	$^\circ\text{C}$

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

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Collector Cutoff Current	$I_{CBO}$	$V_{CB}=(-)40\text{V}, I_E=0\text{A}$			(-)0.1	$\mu\text{A}$
Emitter Cutoff Current	$I_{EBO}$	$V_{EB}=(-)4\text{V}, I_C=0\text{A}$			(-)0.1	$\mu\text{A}$
DC Current Gain	$h_{FE}$	$V_{CE}=(-)2\text{V}, I_C=(-)500\text{mA}$	200		560	
Gain-Bandwidth Product	$f_T$	$V_{CE}=(-)10\text{V}, I_C=(-)500\text{mA}$		(290)330		MHz
Output Capacitance	$C_{ob}$	$V_{CB}=(-)10\text{V}, f=1\text{MHz}$		(50)28		pF
Collector-to-Emitter Saturation Voltage	$V_{CE(sat)1}$	$I_C=(-)3.5\text{A}, I_B=(-)175\text{mA}$		(-230)160	(-390)240	mV
	$V_{CE(sat)2}$	$I_C=(-)2\text{A}, I_B=(-)40\text{mA}$		(-240)110	(-400)170	mV
Base-to-Emitter Saturation Voltage	$V_{BE(sat)}$	$I_C=(-)2\text{A}, I_B=(-)40\text{mA}$		(-)0.83	(-)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	$t_{on}$			(40)30		ns
Storage Time	$t_{stg}$	See specified Test Circuit.		(225)420		ns
Fall Time	$t_f$			25		ns

### Switching Time Test Circuit

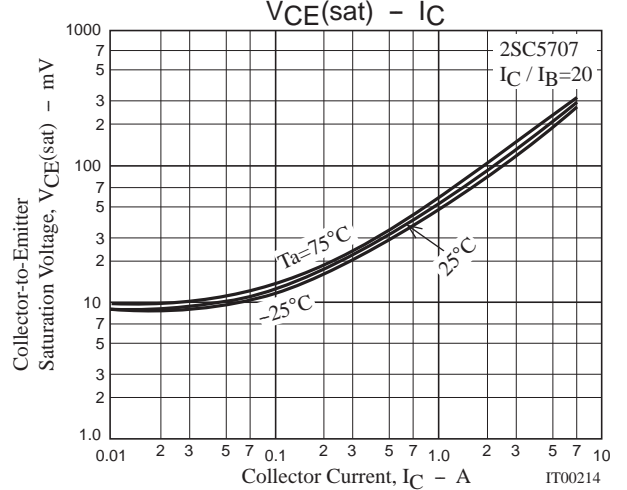
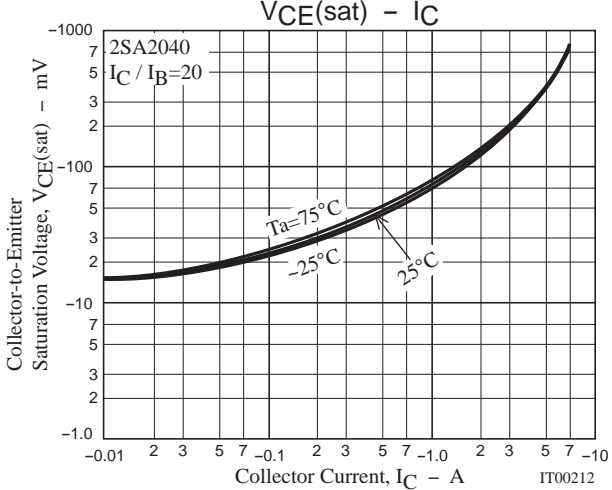
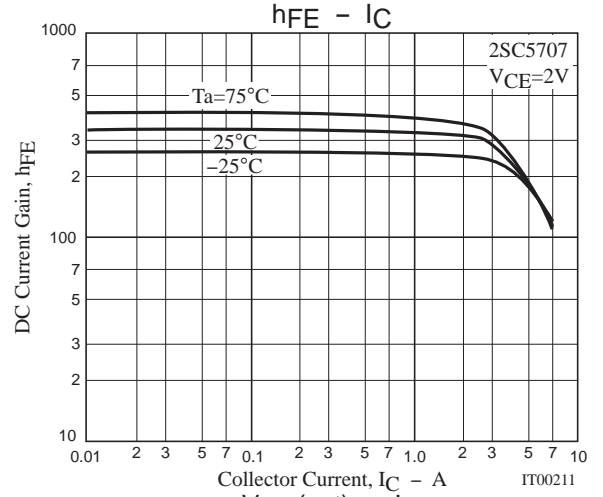
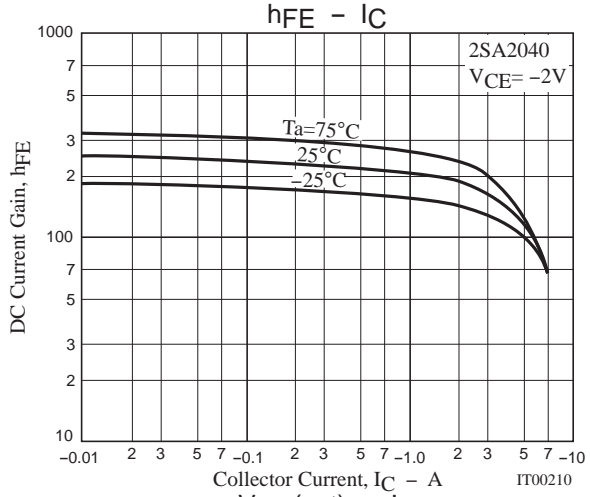
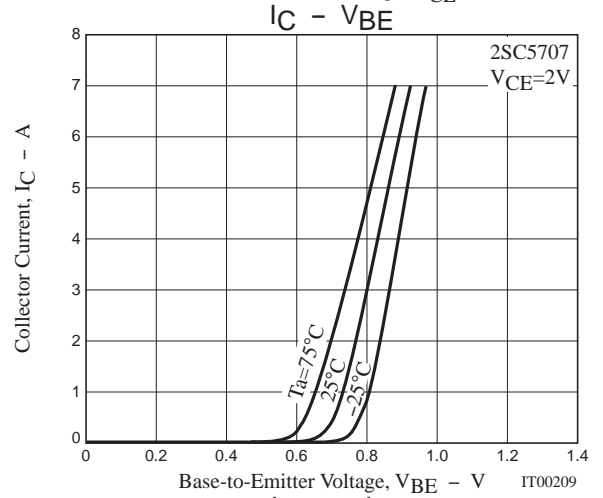
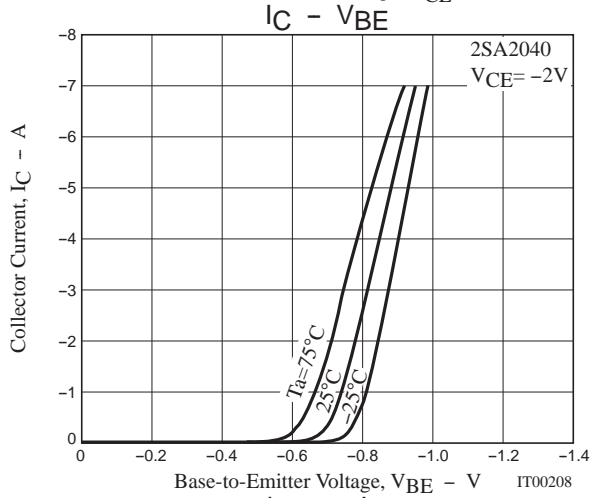
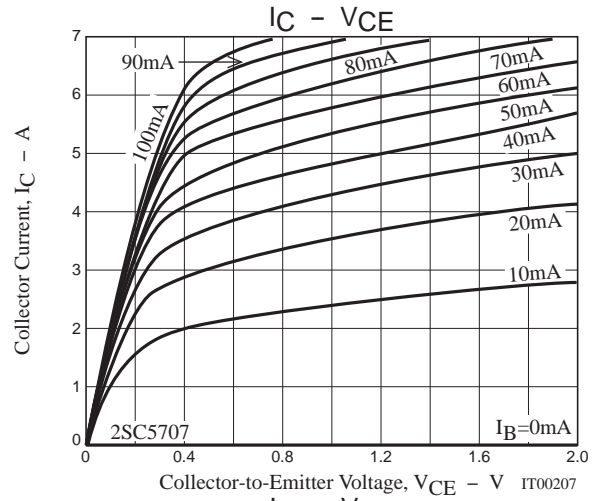
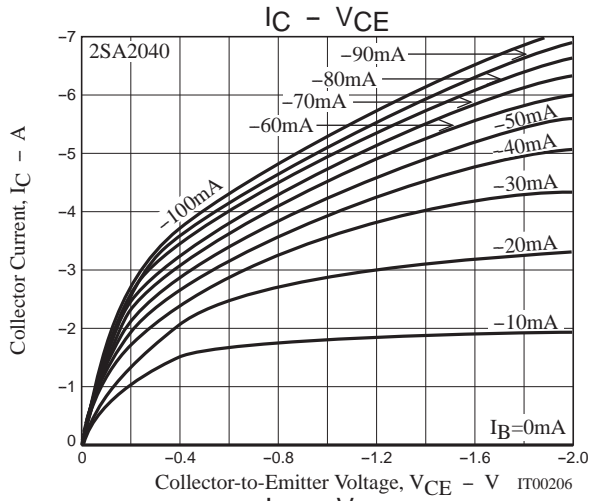


$$20I_{B1} = -20I_{B2} = I_C = 2.5\text{A}$$

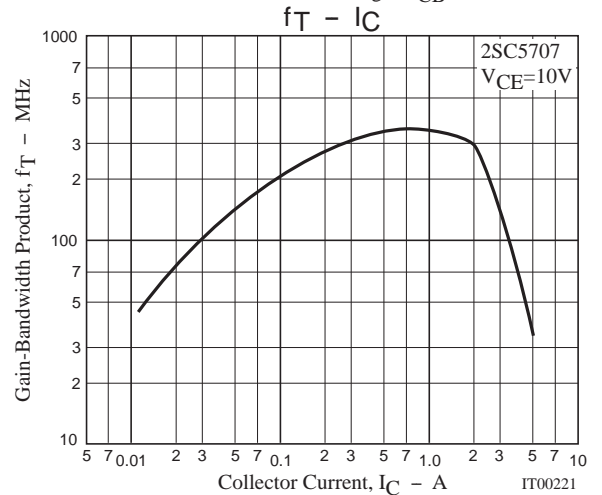
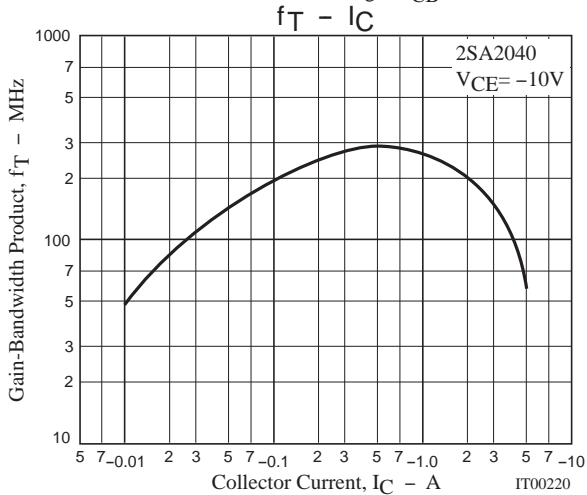
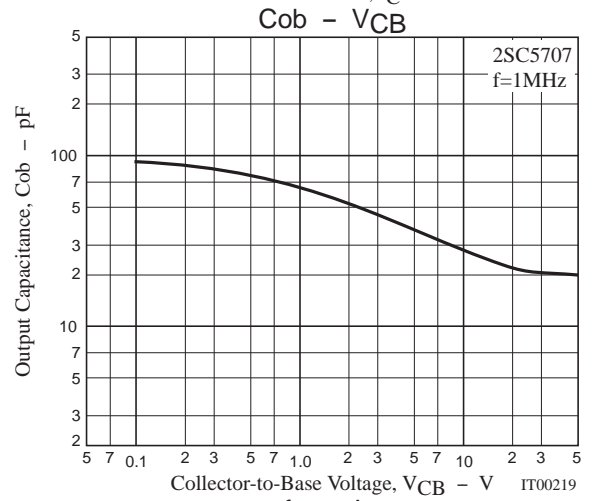
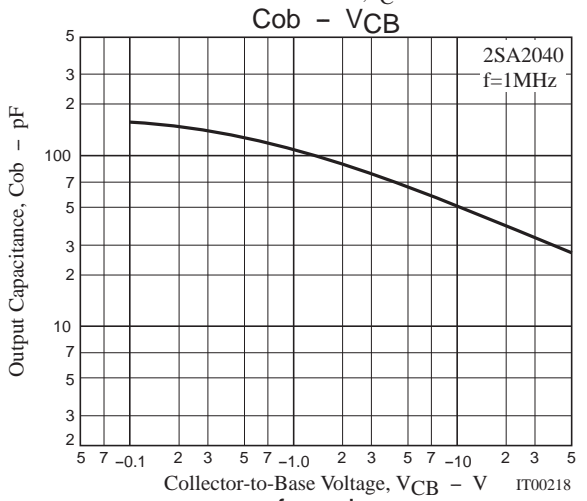
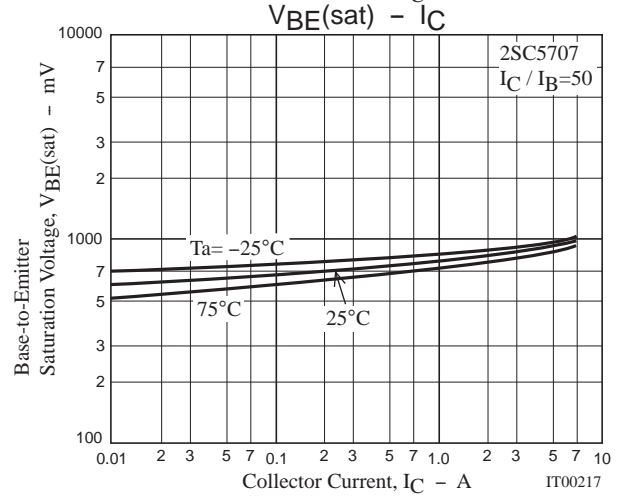
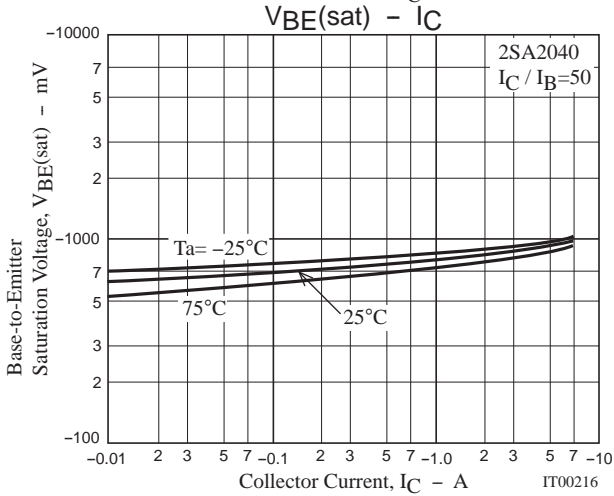
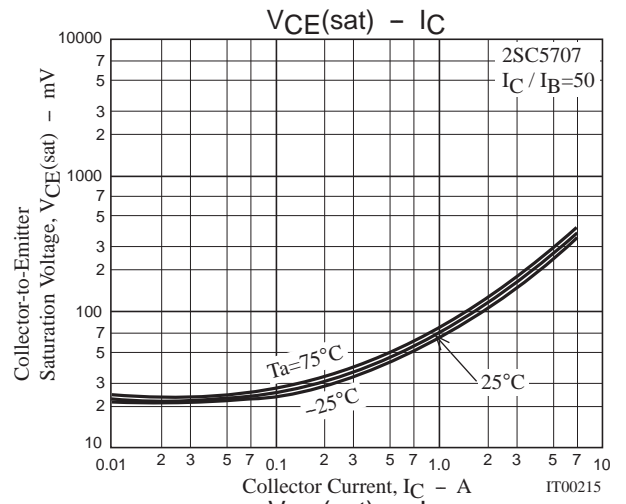
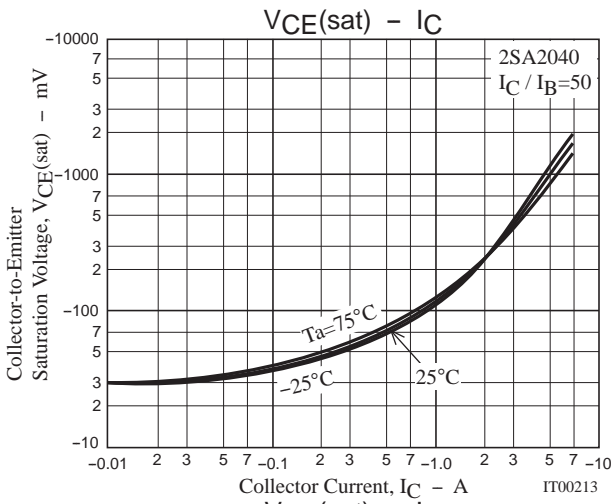
For PNP, the polarity is reversed.

### Ordering Information

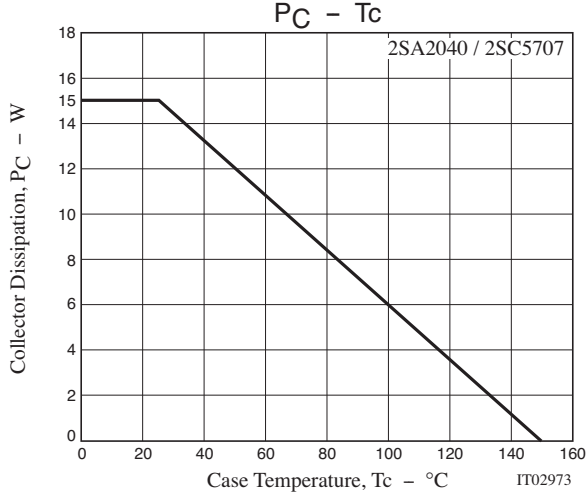
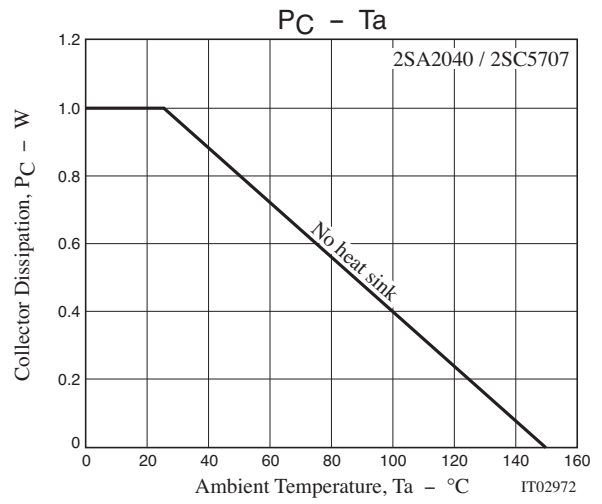
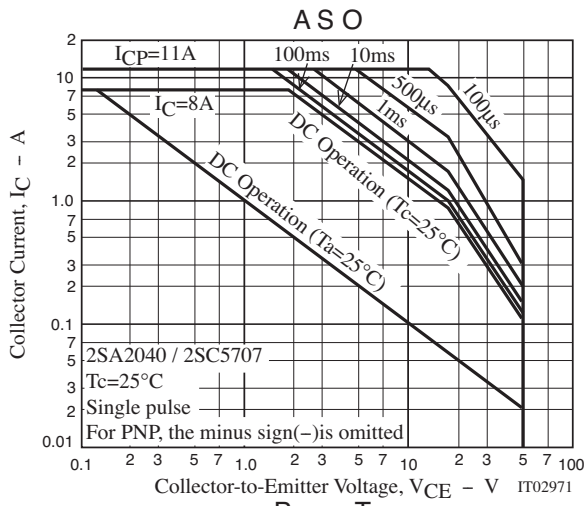
Device	Package	Shipping	memo
2SA2040-E	TP	500pcs./bag	Pb Free
2SC5707-E	TP	500pcs./bag	
2SA2040-TL-E	TP-FA	700pcs./reel	
2SC5707-TL-E	TP-FA	700pcs./reel	



2SA2040/2SC5707



# 2SA2040/2SC5707



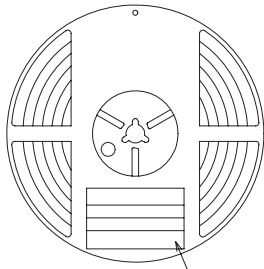
Taping Specification

2SA2040-TL-E, 2SC5707-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

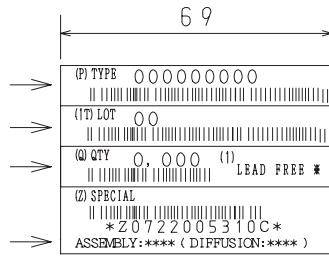
Packing method



Type No.  
LOT No.  
Quantity  
Origin

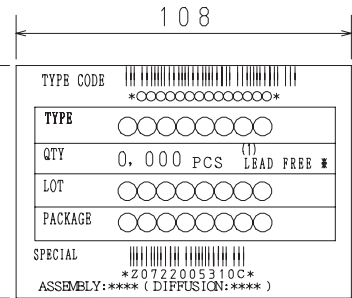
Reel label

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.



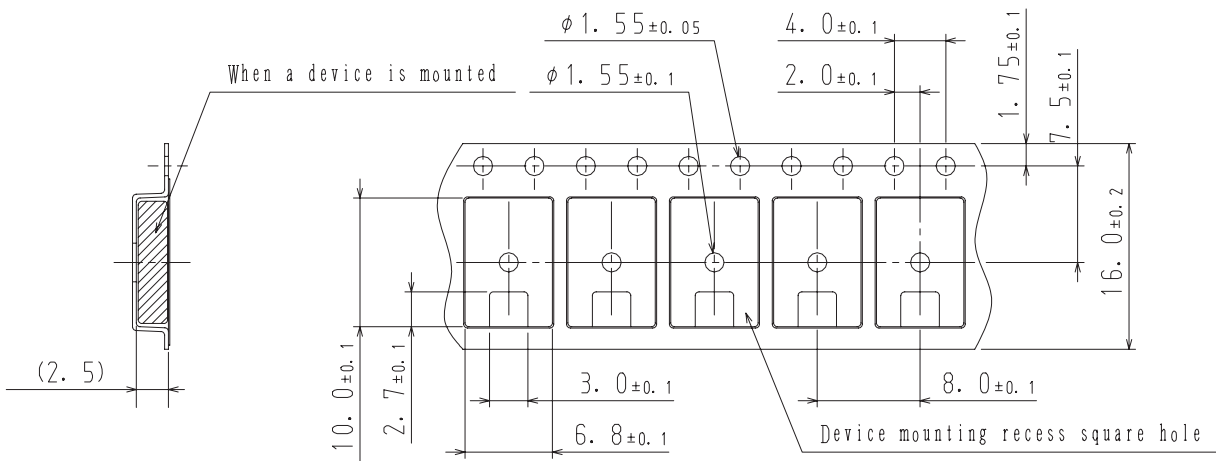
NOTE (1)

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

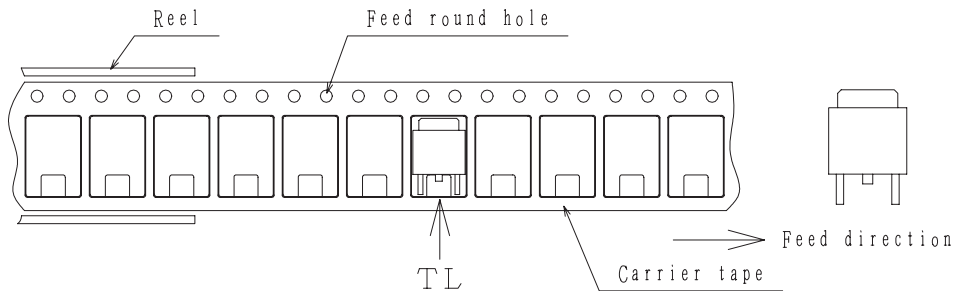
Label	JEITA Phase
LEAD FREE 3	JEITA Phase 3A
LEAD FREE 4	JEITA Phase 3

Taping configuration

1. Carrier tape size (unit:mm)



2. Device placement direction

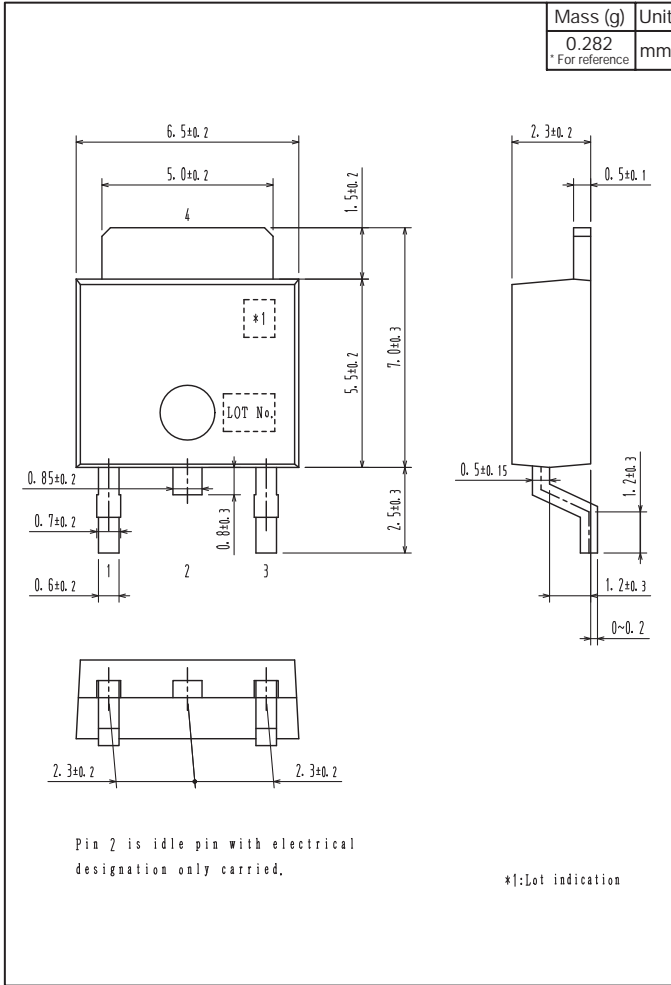


Those with one electrode terminal on the feed hole side.....TL

# 2SA2040/2SC5707

## Outline Drawing

2SA2040-TL-E, 2SC5707-TL-E



## Land Pattern Example



Bag Packing Specification

2SA2040-E, 2SC5707-E

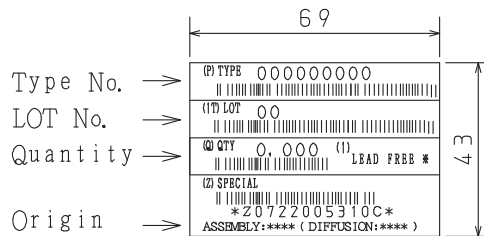
1. Packing Format

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)



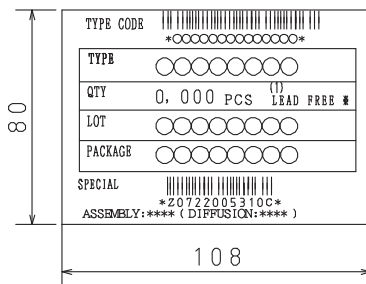
4. Outer box label  
(unit:mm)

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





Outline Drawing

2SA2040-E, 2SC5707-E



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