



# 2SA2040/2SC5707

## Bipolar Transistor (-50V, (-)8A, Low VCE(sat), (PNP)NPN Single TP/TP-FA

ON Semiconductor®

<http://onsemi.com>

### 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

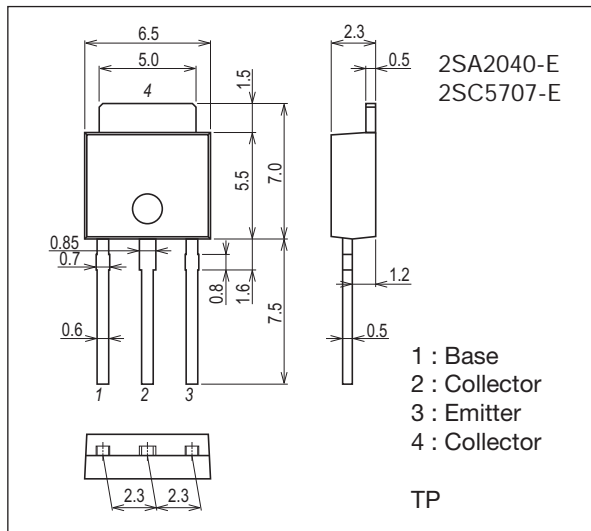
### Specifications ( ) : 2SA2040

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

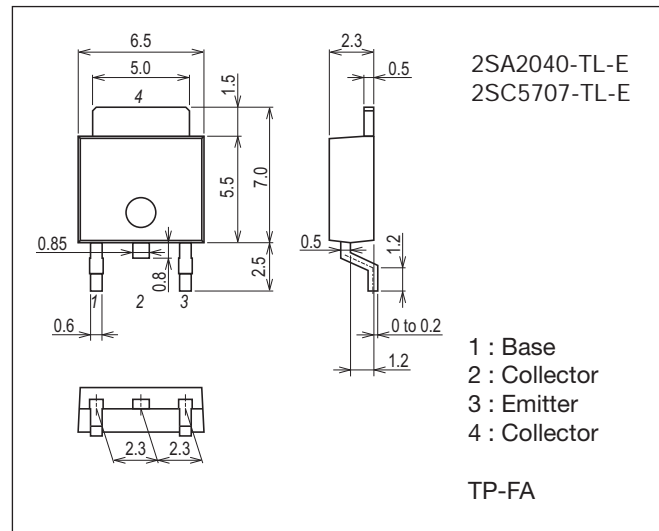
| Parameter                    | Symbol           | Conditions | Ratings  | Unit |
|------------------------------|------------------|------------|----------|------|
| Collector-to-Base Voltage    | V <sub>CB0</sub> |            | (-50)100 | V    |
| Collector-to-Emitter Voltage | V <sub>CES</sub> |            | (-50)100 | V    |
| Collector-to-Emitter Voltage | V <sub>CEO</sub> |            | (-50)    | V    |
| Emitter-to-Base Voltage      | V <sub>EB0</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

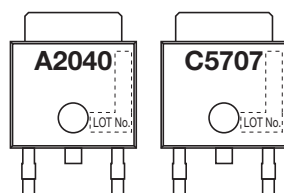


### Product & Package Information

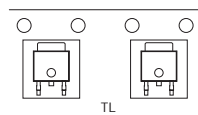
- Package : TP
- JEITA, JEDEC : SC-64, TO-251
- Minimum Packing Quantity : 500 pcs./bag

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

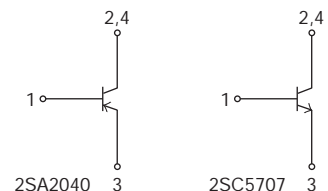
### Marking (TP, TP-FA)



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



### Electrical Connection



## 2SA2040 / 2SC5707

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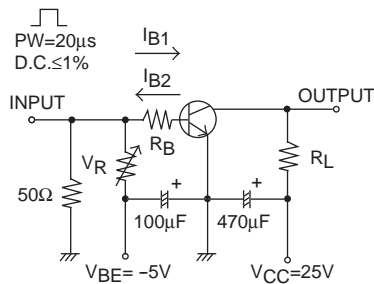
| Parameter             | Symbol    | Conditions             | Ratings     | Unit             |
|-----------------------|-----------|------------------------|-------------|------------------|
| Base Current          | $I_B$     |                        | (-)2        | A                |
| Collector Dissipation | $P_C$     |                        | 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 | $^\circ\text{C}$ |

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 $T_a=25^\circ\text{C}$

| 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

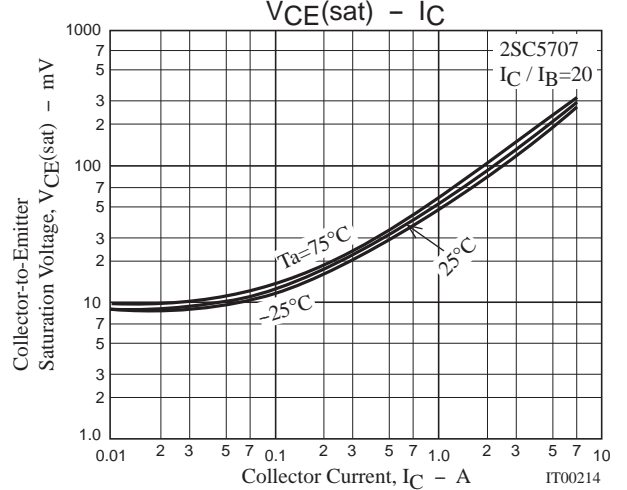
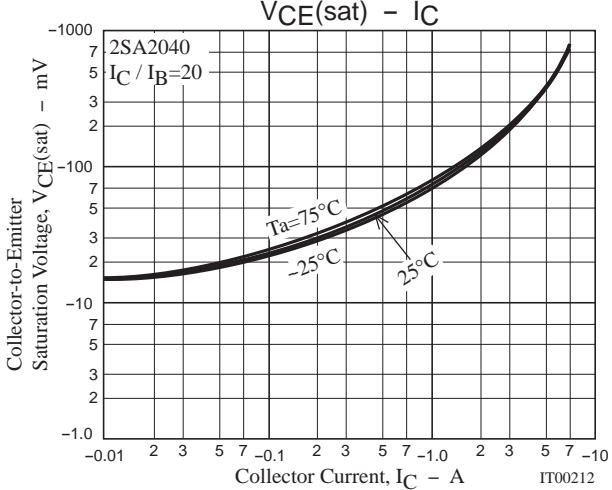
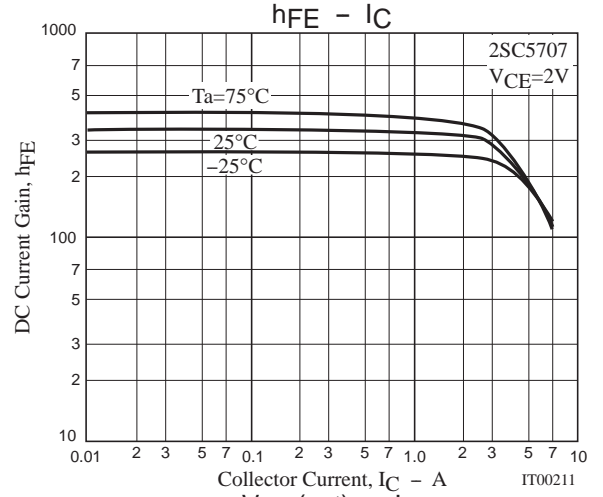
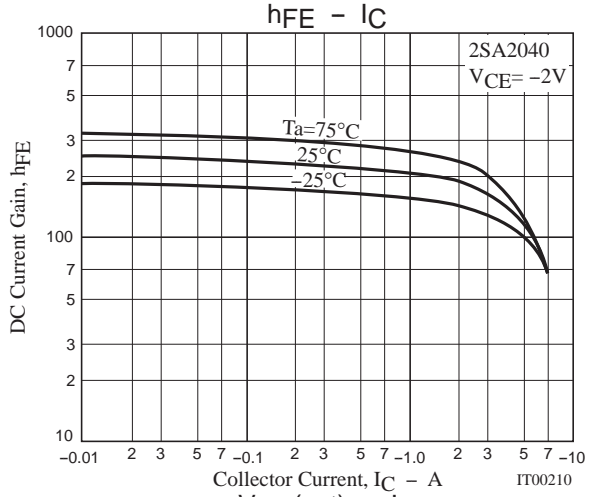
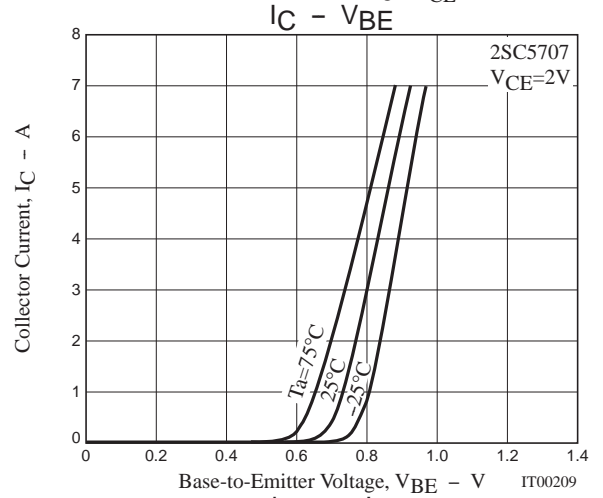
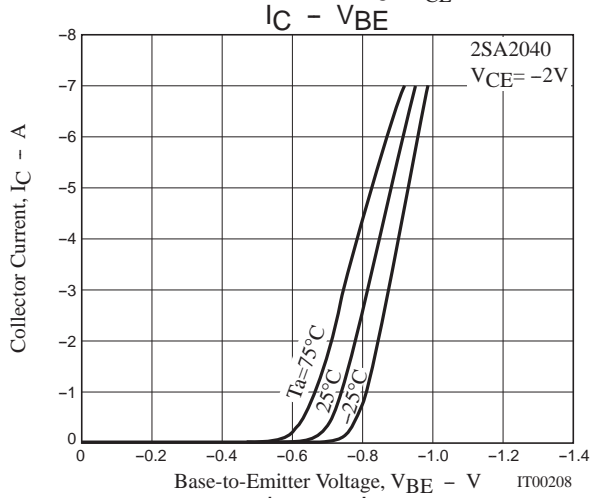
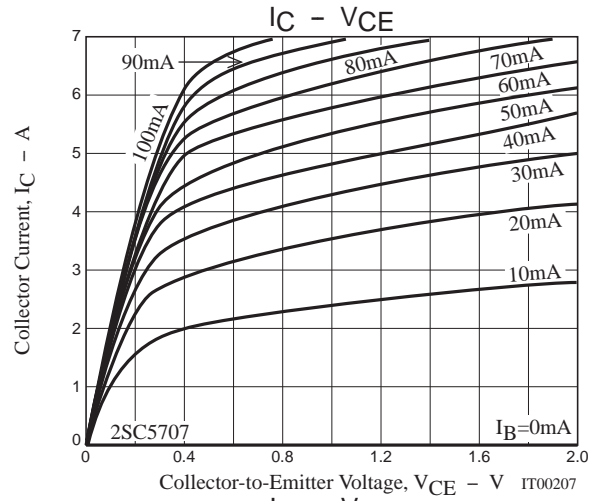
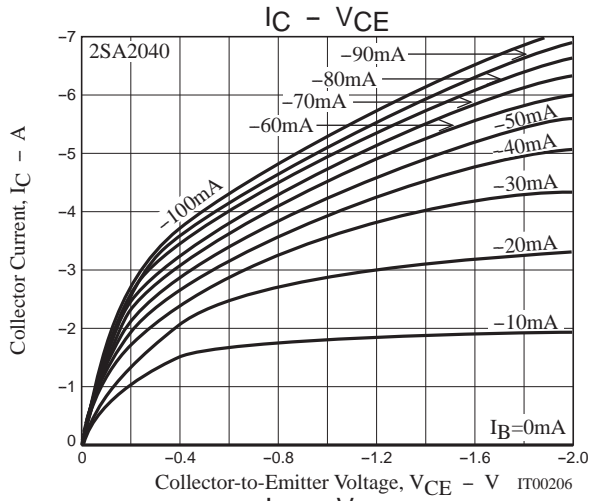


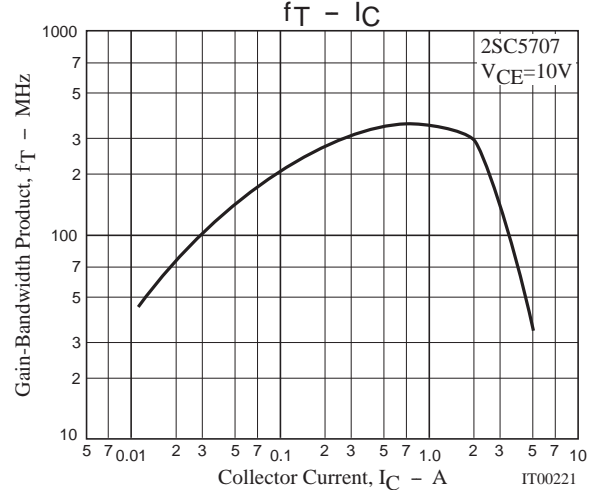
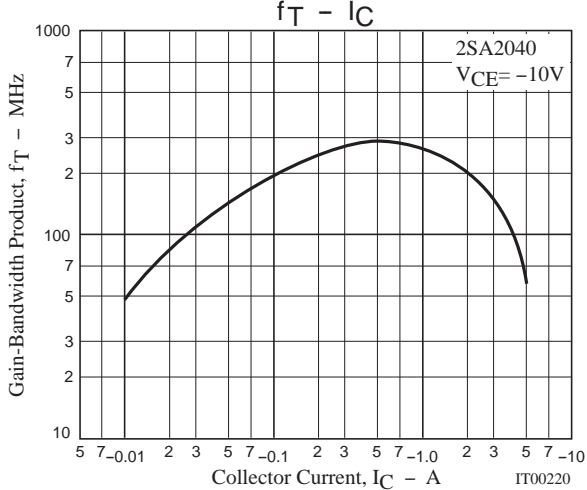
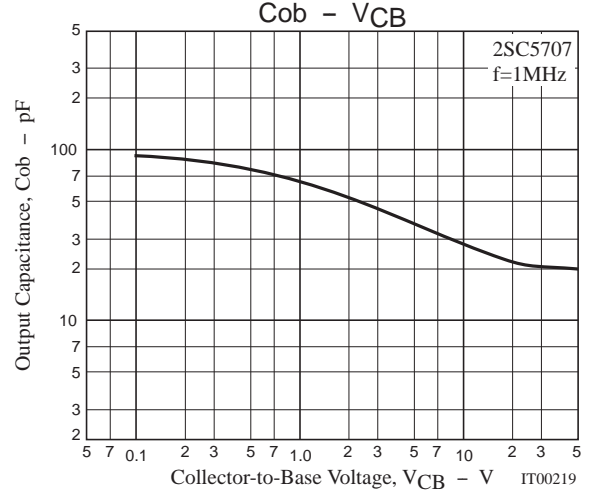
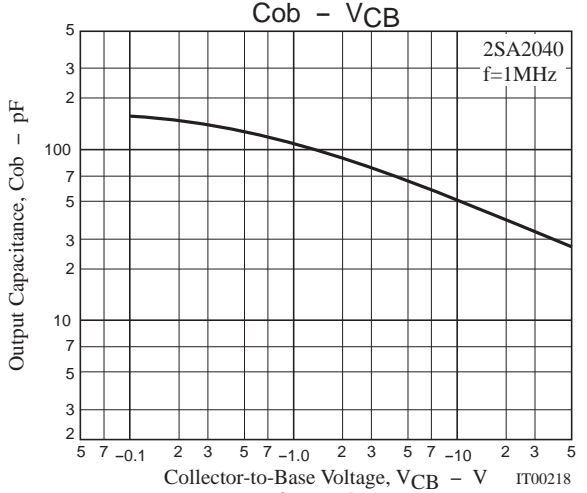
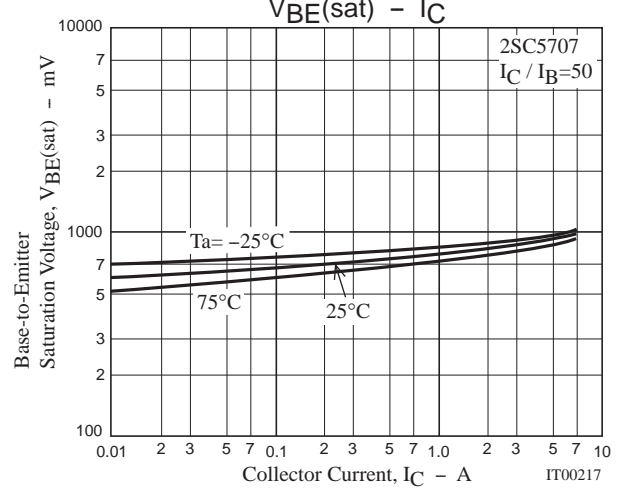
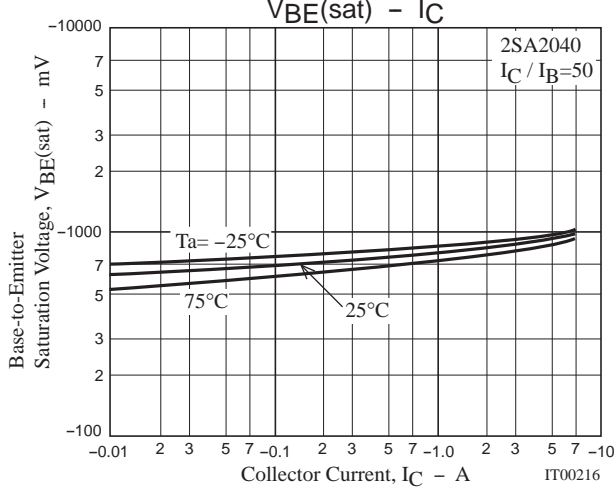
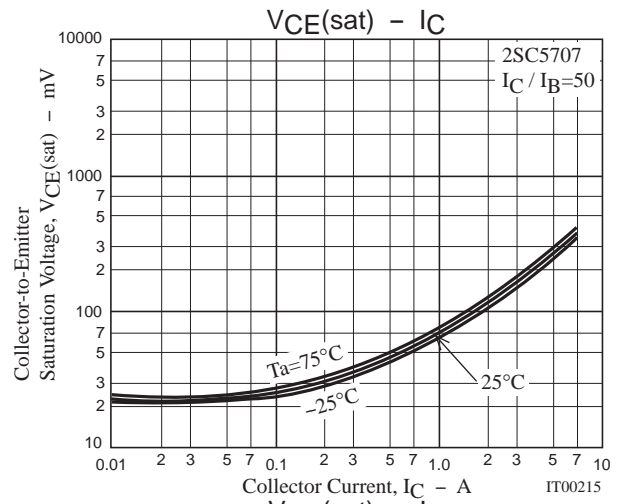
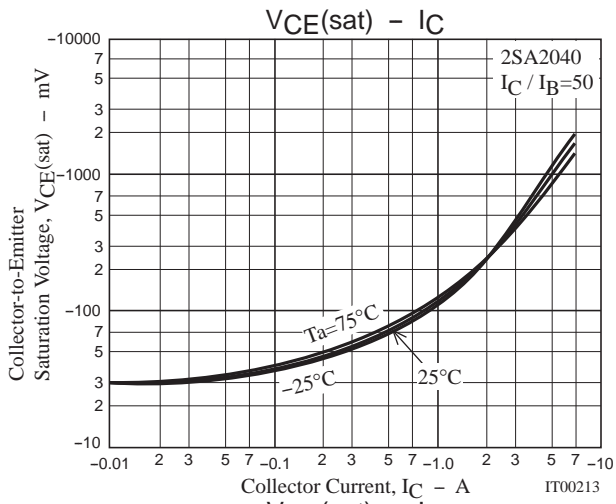
$$20I_{B1} = -20I_{B2} = I_C = 2.5\text{A}$$

For PNP, the polarity is reversed.

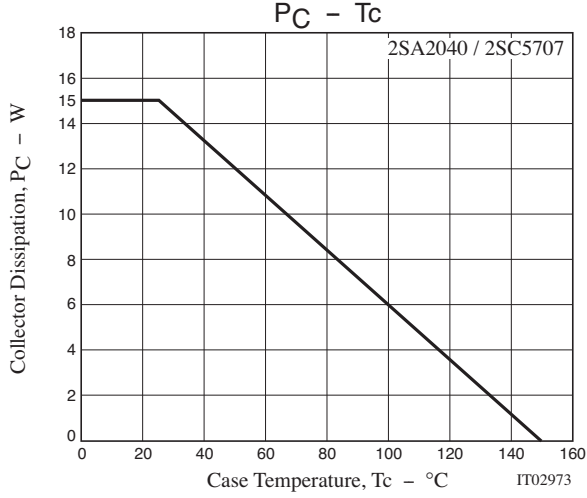
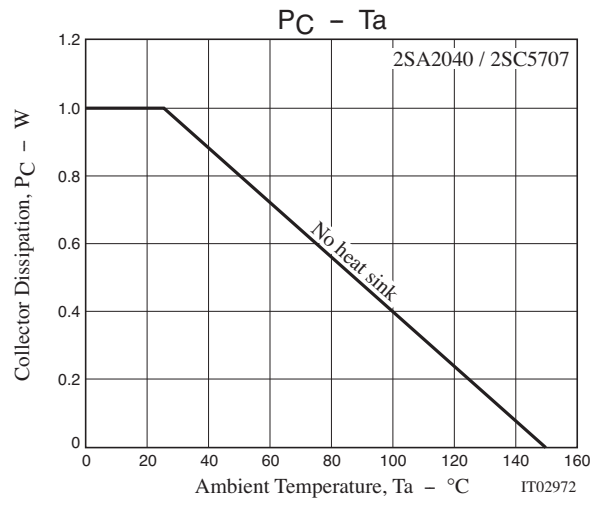
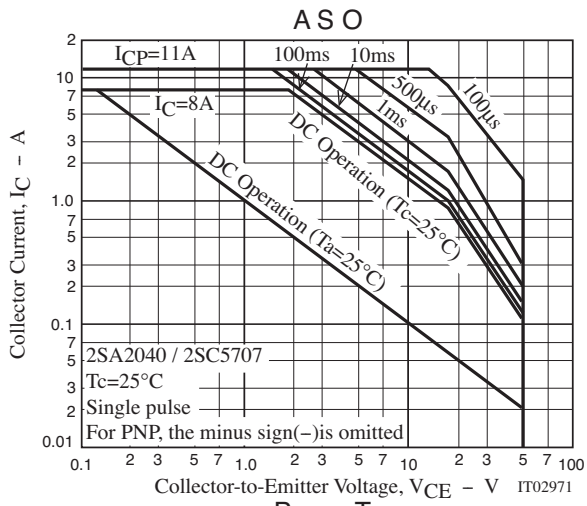
### Ordering Information

| 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



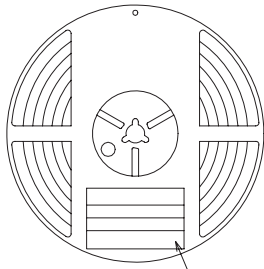
Taping Specification

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<br>Dimensions:mm (external)<br>183×72×185 | 6 inner boxes contained<br>Dimensions:mm (external)<br>440×195×210 |

Packing method



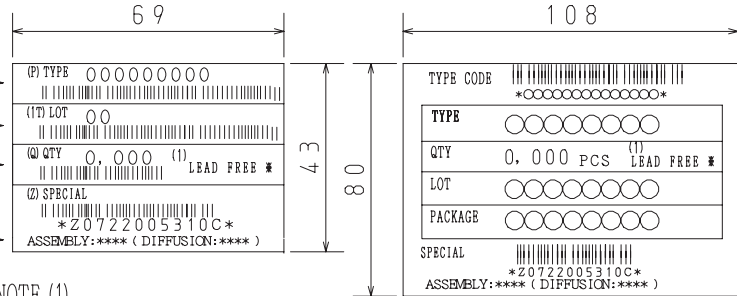
Type No.  
LOT No.  
Quantity  
Origin

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.



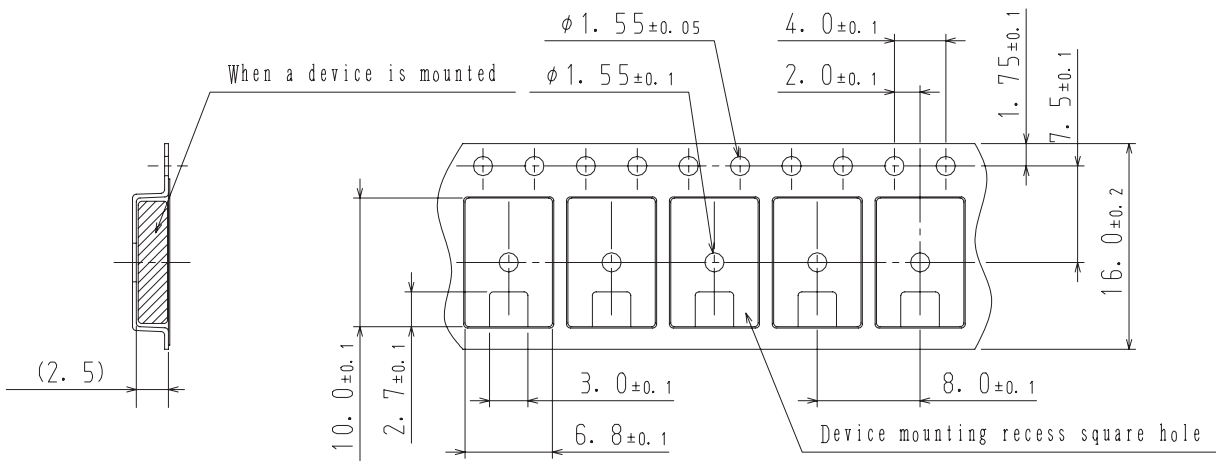
NOTE (1)

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

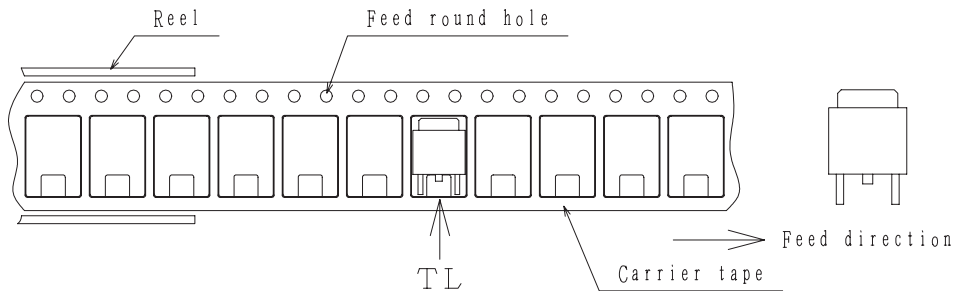
| Label       | JEITA Phase    |
|-------------|----------------|
| LEAD FREE 3 | JEITA Phase 3A |
| LEAD FREE 4 | JEITA Phase 3  |

Taping configuration

1. Carrier tape size (unit:mm)



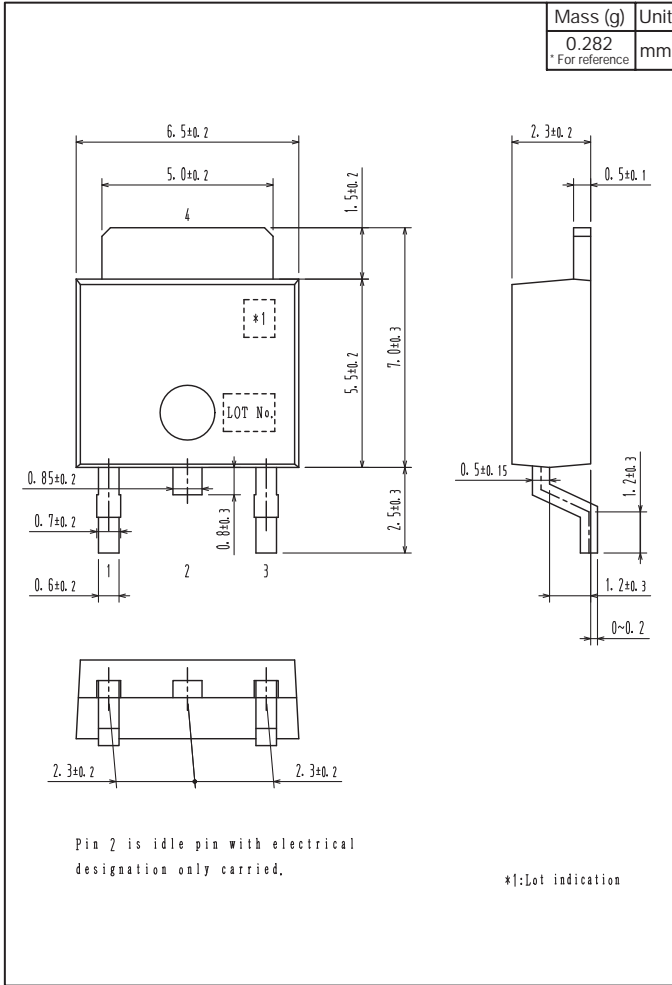
2. Device placement direction



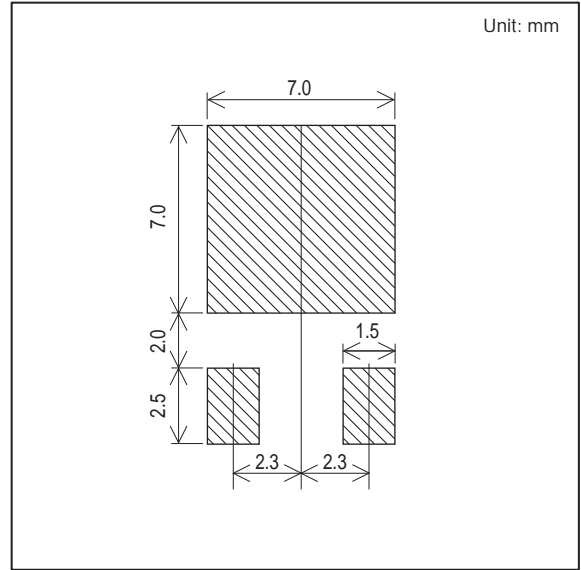
Those with one electrode terminal on the feed hole side.....TL

Outline Drawing

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



Land Pattern Example



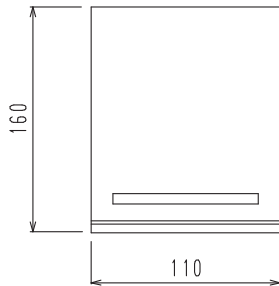
Bag Packing Specification

2SA2040-E, 2SC5707-E

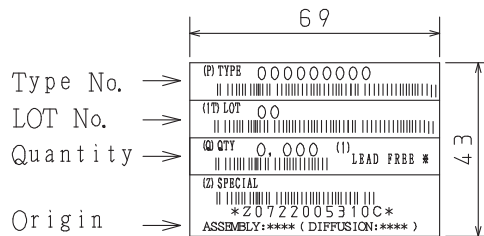
1. Packing Format

| 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)



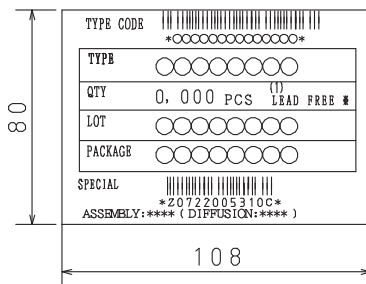
4. Outer box label  
(unit:mm)

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.

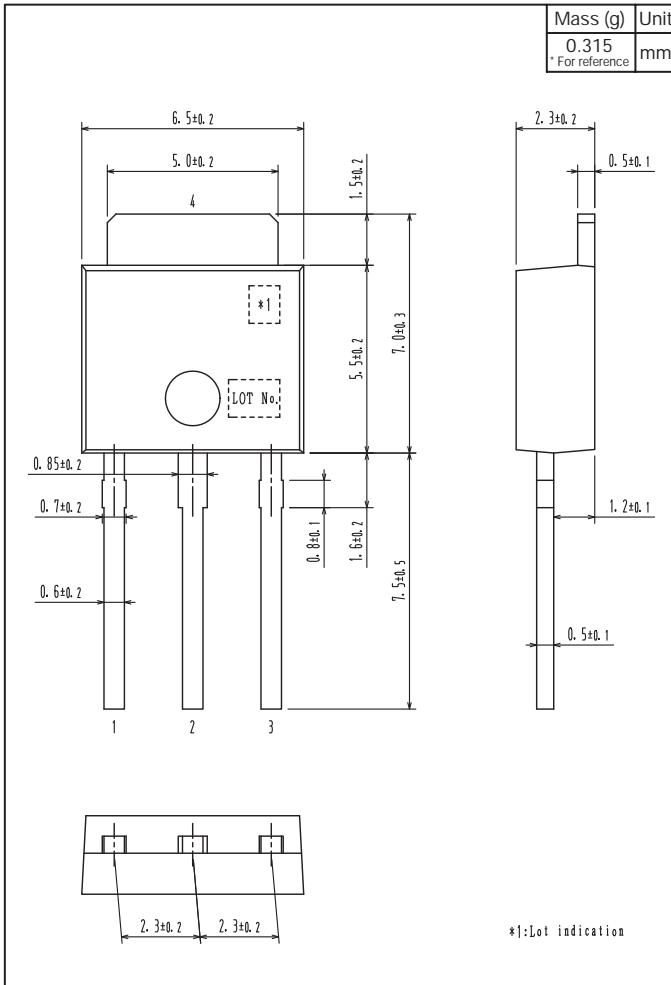
| Label       | JEITA Phase    |
|-------------|----------------|
| LEAD FREE 3 | JEITA Phase 3A |
| LEAD FREE 4 | JEITA Phase 3  |





Outline Drawing

2SA2040-E, 2SC5707-E



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