



SANYO Semiconductors

## DATA SHEET

An ON Semiconductor Company

# 2SC5347A — NPN Epitaxial Planar Silicon Transistor

## High-Frequency Semi-Power Output Stage, Low-Noise Medium Output Amplifier Applications

## Features

- High-frequency medium output amplification ( $V_{CE}=5V$ ,  $I_C=50mA$ )
  - $f_T=4.7GHz$  typ ( $f=1GHz$ )
  - $|S_{21e}|^2=8dB$  typ ( $f=1GHz$ )
  - $NF=1.8dB$  typ ( $f=1GHz$ )

## Specifications

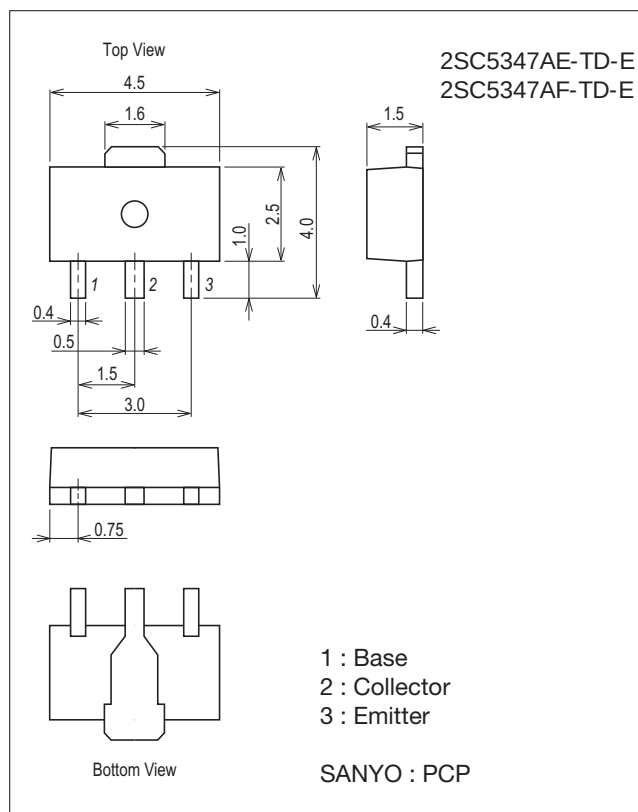
Absolute Maximum Ratings at  $T_a=25^\circ C$ 

| Parameter                    | Symbol    | Conditions                                                    | Ratings     | Unit |
|------------------------------|-----------|---------------------------------------------------------------|-------------|------|
| Collector-to-Base Voltage    | $V_{CBO}$ |                                                               | 20          | V    |
| Collector-to-Emitter Voltage | $V_{CEO}$ |                                                               | 12          | V    |
| Emitter-to-Base Voltage      | $V_{EBO}$ |                                                               | 2           | V    |
| Collector Current            | $I_C$     |                                                               | 150         | mA   |
| Collector Dissipation        | $P_C$     | When mounted on ceramic substrate (900mm <sup>2</sup> ×0.8mm) | 1.3         | W    |
| Junction Temperature         | $T_J$     |                                                               | 150         | °C   |
| Storage Temperature          | $T_{stg}$ |                                                               | -55 to +150 | °C   |

## Package Dimensions

unit : mm (typ)

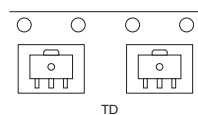
7007B-004



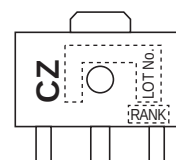
## Product &amp; Package Information

- Package : PCP
- JEITA, JEDEC : SC-62, SOT-89, TO-243
- Minimum Packing Quantity : 1,000 pcs./reel

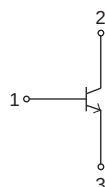
## Packing Type: TD



## Marking



## Electrical Connection



## 2SC5347A

### Electrical Characteristics at Ta=25°C

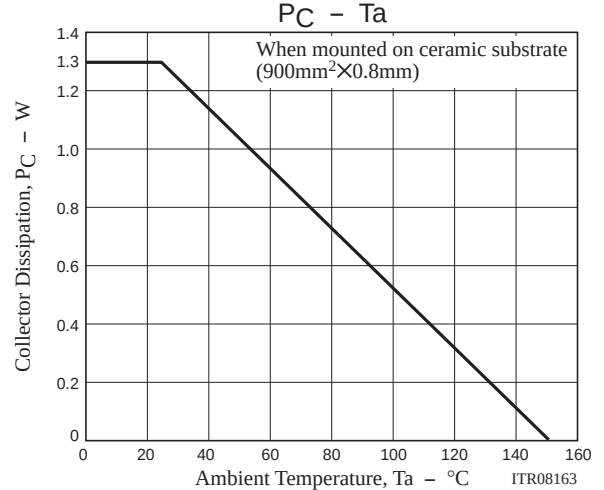
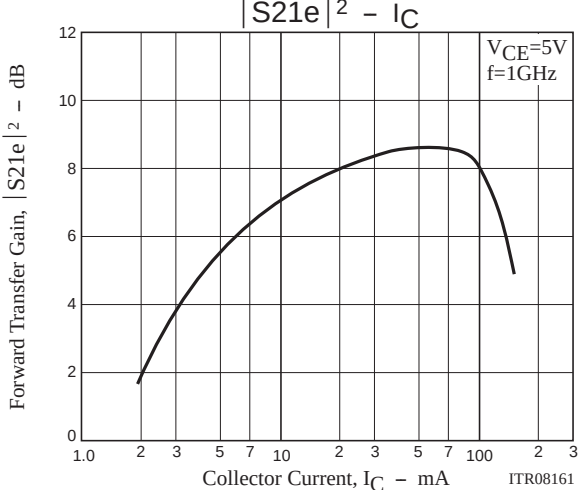
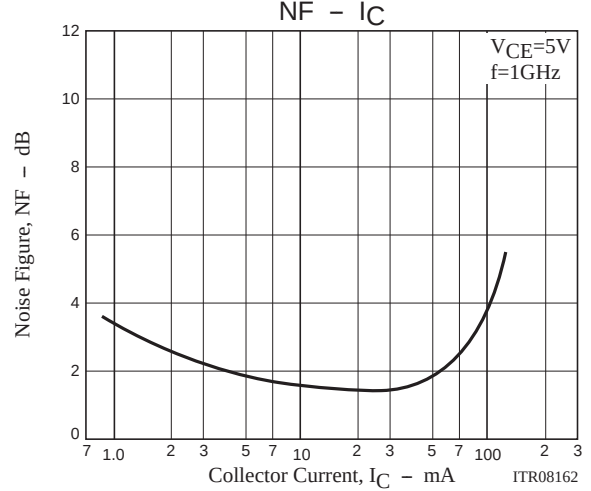
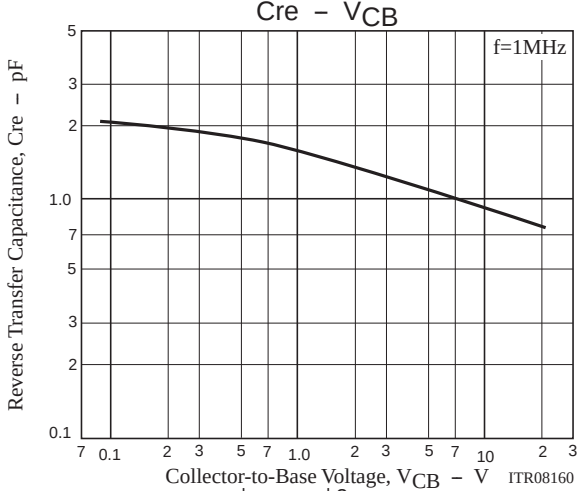
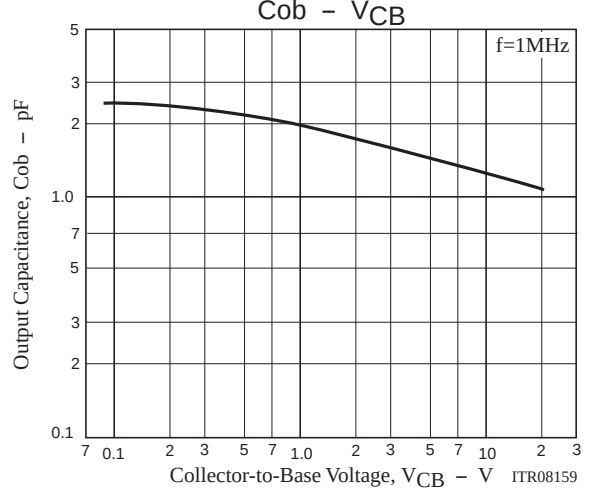
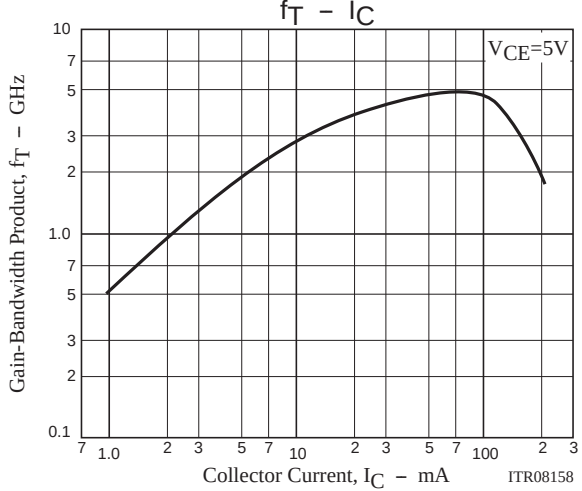
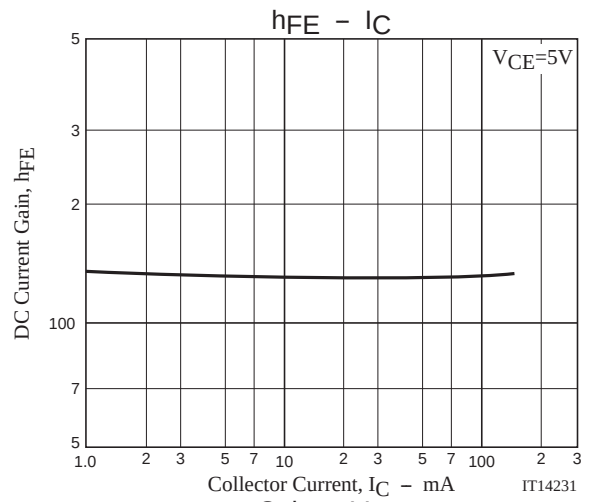
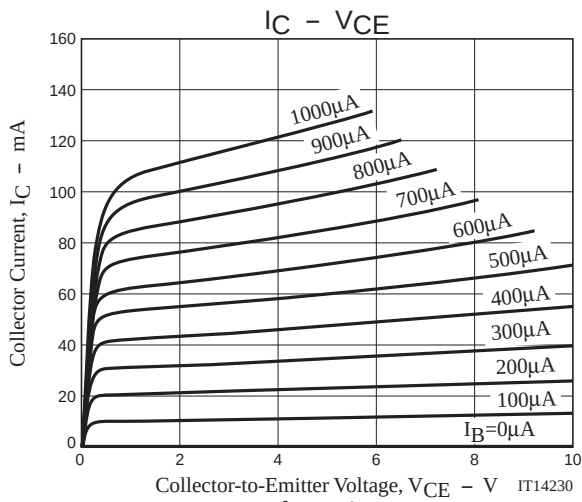
| Parameter                    | Symbol                          | Conditions                                        | Ratings |     |      | Unit |
|------------------------------|---------------------------------|---------------------------------------------------|---------|-----|------|------|
|                              |                                 |                                                   | min     | typ | max  |      |
| Collector Cutoff Current     | ICBO                            | V <sub>CB</sub> =10V, I <sub>E</sub> =0A          |         |     | 1.0  | μA   |
| Emitter Cutoff Current       | IEBO                            | V <sub>EB</sub> =1V, I <sub>C</sub> =0A           |         |     | 10   | μA   |
| DC Current Gain              | h <sub>FE</sub>                 | V <sub>CE</sub> =5V, I <sub>C</sub> =50mA         | 60*     |     | 270* |      |
| Gain-Bandwidth Product       | f <sub>T</sub>                  | V <sub>CE</sub> =5V, I <sub>C</sub> =50mA         | 3       | 4.7 |      | GHz  |
| Output Capacitance           | Cob                             | V <sub>CB</sub> =10V, f=1MHz                      |         | 1.3 | 2.0  | pF   |
| Reverse Transfer Capacitance | Cre                             |                                                   |         | 0.9 |      | pF   |
| Forward Transfer Gain        | S <sub>21e</sub>   <sup>2</sup> | V <sub>CE</sub> =5V, I <sub>C</sub> =50mA, f=1GHz | 6       | 8   |      | dB   |
| Noise Figure                 | NF                              | V <sub>CE</sub> =5V, I <sub>C</sub> =50mA, f=1GHz |         | 1.8 | 3.0  | dB   |

\* : The 2SC5347A is classified by 50mA h<sub>FE</sub> as follows :

| Rank            | D         | E         | F          |
|-----------------|-----------|-----------|------------|
| h <sub>FE</sub> | 60 to 120 | 90 to 180 | 135 to 270 |

### Ordering Information

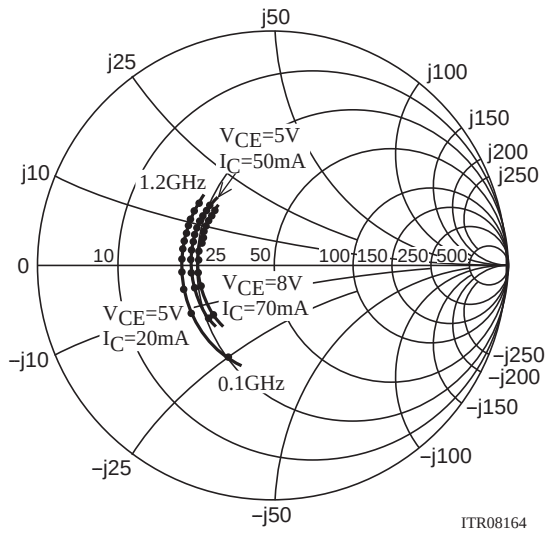
| Device         | Package | Shipping       | memo    |
|----------------|---------|----------------|---------|
| 2SC5347AE-TD-E | PCP     | 1,000pcs./reel | Pb Free |
| 2SC5347AF-TD-E | PCP     | 1,000pcs./reel |         |



S Parameter

S11e

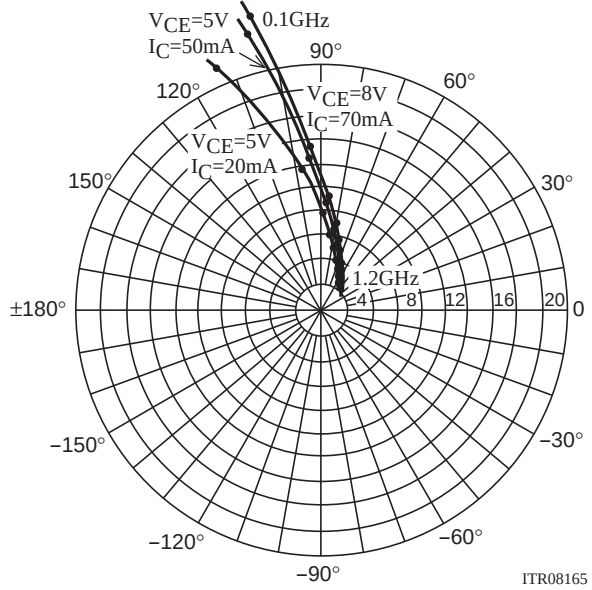
f=100MHz to 1200MHz(100MHz Step)



ITR08164

S21e

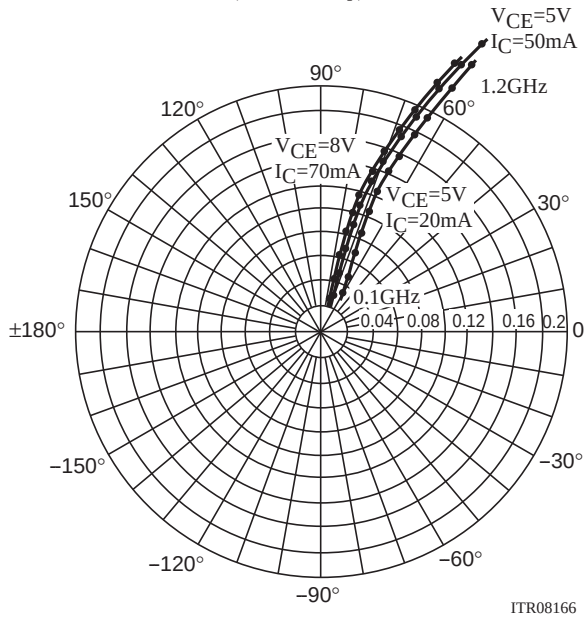
f=100MHz to 1200MHz(100MHz Step)



ITR08165

S12e

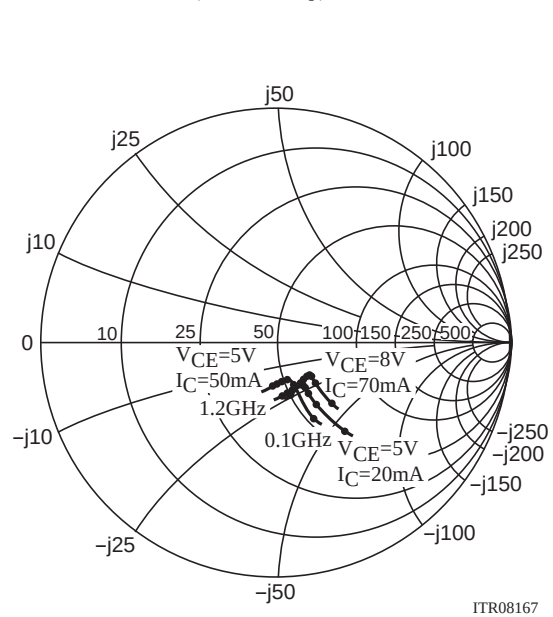
f=100MHz to 1200MHz(100MHz Step)



ITR08166

S22e

f=100MHz to 1200MHz(100MHz Step)



ITR08167

## 2SC5347A

### S Parameters (Common emitter)

$V_{CE}=5V$ ,  $I_C=50mA$ ,  $Z_O=50\Omega$

| Freq(MHz) | S11   | $\angle S11$ | S21    | $\angle S21$ | S12   | $\angle S12$ | S22   | $\angle S22$ |
|-----------|-------|--------------|--------|--------------|-------|--------------|-------|--------------|
| 100       | 0.358 | -141.0       | 24.005 | 105.9        | 0.027 | 68.4         | 0.342 | -63.0        |
| 200       | 0.354 | -165.7       | 12.593 | 93.3         | 0.047 | 72.7         | 0.205 | -68.4        |
| 300       | 0.355 | -176.8       | 8.532  | 86.8         | 0.068 | 74.1         | 0.166 | -69.7        |
| 400       | 0.359 | 174.9        | 6.428  | 81.9         | 0.089 | 73.7         | 0.149 | -72.3        |
| 500       | 0.359 | 169.3        | 5.293  | 77.6         | 0.110 | 72.8         | 0.145 | -75.3        |
| 600       | 0.362 | 163.9        | 4.360  | 73.5         | 0.130 | 71.7         | 0.143 | -78.6        |
| 700       | 0.366 | 158.5        | 3.774  | 69.9         | 0.151 | 70.2         | 0.147 | -82.1        |
| 800       | 0.364 | 153.5        | 3.334  | 66.4         | 0.171 | 68.6         | 0.151 | -85.6        |
| 900       | 0.368 | 149.8        | 2.995  | 62.9         | 0.191 | 66.7         | 0.158 | -90.1        |
| 1000      | 0.370 | 145.3        | 2.725  | 59.4         | 0.210 | 65.1         | 0.166 | -92.3        |
| 1100      | 0.373 | 141.5        | 2.494  | 56.5         | 0.230 | 63.0         | 0.170 | -95.1        |
| 1200      | 0.377 | 137.6        | 2.307  | 53.0         | 0.248 | 61.4         | 0.177 | -97.8        |

$V_{CE}=5V$ ,  $I_C=20mA$ ,  $Z_O=50\Omega$

| Freq(MHz) | S11   | $\angle S11$ | S21    | $\angle S21$ | S12   | $\angle S12$ | S22   | $\angle S22$ |
|-----------|-------|--------------|--------|--------------|-------|--------------|-------|--------------|
| 100       | 0.445 | -115.4       | 21.095 | 113.8        | 0.032 | 59.7         | 0.479 | -52.4        |
| 200       | 0.400 | -149.6       | 11.567 | 97.4         | 0.049 | 63.4         | 0.300 | -58.0        |
| 300       | 0.394 | -165.7       | 7.917  | 89.3         | 0.066 | 67.0         | 0.242 | -58.8        |
| 400       | 0.391 | -176.5       | 5.974  | 82.5         | 0.085 | 68.5         | 0.214 | -60.0        |
| 500       | 0.391 | 176.7        | 4.845  | 78.4         | 0.103 | 68.8         | 0.203 | -62.2        |
| 600       | 0.392 | 169.4        | 4.065  | 73.9         | 0.122 | 68.6         | 0.199 | -64.7        |
| 700       | 0.393 | 163.8        | 3.522  | 70.0         | 0.141 | 67.8         | 0.198 | -67.9        |
| 800       | 0.394 | 158.4        | 3.114  | 66.4         | 0.159 | 67.1         | 0.201 | -71.2        |
| 900       | 0.396 | 154.1        | 2.798  | 62.5         | 0.178 | 65.7         | 0.204 | -74.7        |
| 1000      | 0.399 | 149.3        | 2.548  | 58.9         | 0.196 | 64.5         | 0.212 | -78.1        |
| 1100      | 0.403 | 144.9        | 2.333  | 55.5         | 0.215 | 62.9         | 0.218 | -81.4        |
| 1200      | 0.408 | 141.0        | 2.158  | 51.8         | 0.233 | 61.8         | 0.224 | -84.1        |

$V_{CE}=8V$ ,  $I_C=70mA$ ,  $Z_O=50\Omega$

| Freq(MHz) | S11   | $\angle S11$ | S21    | $\angle S21$ | S12   | $\angle S12$ | S22   | $\angle S22$ |
|-----------|-------|--------------|--------|--------------|-------|--------------|-------|--------------|
| 100       | 0.328 | -141.2       | 25.505 | 105.1        | 0.024 | 70.5         | 0.348 | -50.8        |
| 200       | 0.323 | -165.7       | 13.334 | 93.0         | 0.043 | 75.0         | 0.233 | -48.9        |
| 300       | 0.323 | -176.6       | 9.025  | 86.7         | 0.062 | 75.8         | 0.204 | -47.0        |
| 400       | 0.326 | 175.1        | 6.819  | 81.8         | 0.081 | 75.5         | 0.191 | -48.0        |
| 500       | 0.325 | 169.5        | 5.481  | 77.8         | 0.100 | 74.5         | 0.187 | -50.5        |
| 600       | 0.328 | 163.6        | 4.612  | 73.7         | 0.119 | 73.4         | 0.185 | -53.6        |
| 700       | 0.330 | 158.4        | 3.980  | 70.2         | 0.139 | 71.8         | 0.188 | -57.3        |
| 800       | 0.333 | 153.5        | 3.524  | 66.7         | 0.157 | 70.4         | 0.191 | -60.9        |
| 900       | 0.335 | 150.0        | 3.148  | 63.3         | 0.177 | 68.5         | 0.198 | -65.1        |
| 1000      | 0.341 | 144.7        | 2.866  | 60.0         | 0.194 | 67.1         | 0.204 | -69.0        |
| 1100      | 0.345 | 141.2        | 2.629  | 57.0         | 0.213 | 65.1         | 0.208 | -72.1        |
| 1200      | 0.348 | 138.0        | 2.424  | 53.4         | 0.230 | 62.6         | 0.215 | -75.3        |

**Embossed Taping Specification**

2SC5347AE-TD-E, 2SC5347AF-TD-E

## 1. Packing Format

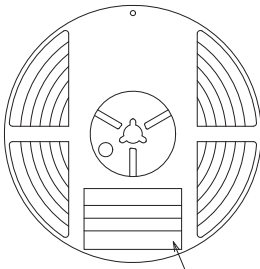
| Package Name | Carrier Tape Type | Maximum Number of devices contained (pcs) |           |           | Packing format                                              |                                                                    |
|--------------|-------------------|-------------------------------------------|-----------|-----------|-------------------------------------------------------------|--------------------------------------------------------------------|
|              |                   | Reel                                      | Inner box | Outer box | Inner BOX (C-1)                                             | Outer BOX (A-7)                                                    |
| PCP          | PCP               | 1,000                                     | 4,000     | 24,000    | 4 reels contained<br>Dimensions:mm (external)<br>183×72×185 | 6 inner boxes contained<br>Dimensions:mm (external)<br>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 →

|                                  |                       |
|----------------------------------|-----------------------|
| (P) TYPE                         | 000000000             |
| (15) LOT                         | 00                    |
| (Q) QTY                          | 0,000 (1) LEAD FREE # |
| (Z) SPECIAL                      | *Z0722005310C*        |
| ASSEMBLY:**** ( DIFFUSION:**** ) |                       |

|                                  |                           |
|----------------------------------|---------------------------|
| TYPE CODE                        |                           |
| *C000000000000*                  |                           |
| TYPE                             | ○○○○○○○○                  |
| QTY                              | 0,000 PCS (1) LEAD FREE # |
| LOT                              | ○○○○○○○○                  |
| PACKAGE                          | ○○○○○○○○                  |
| SPECIAL                          |                           |
| *Z0722005310C*                   |                           |
| ASSEMBLY:**** ( DIFFUSION:**** ) |                           |

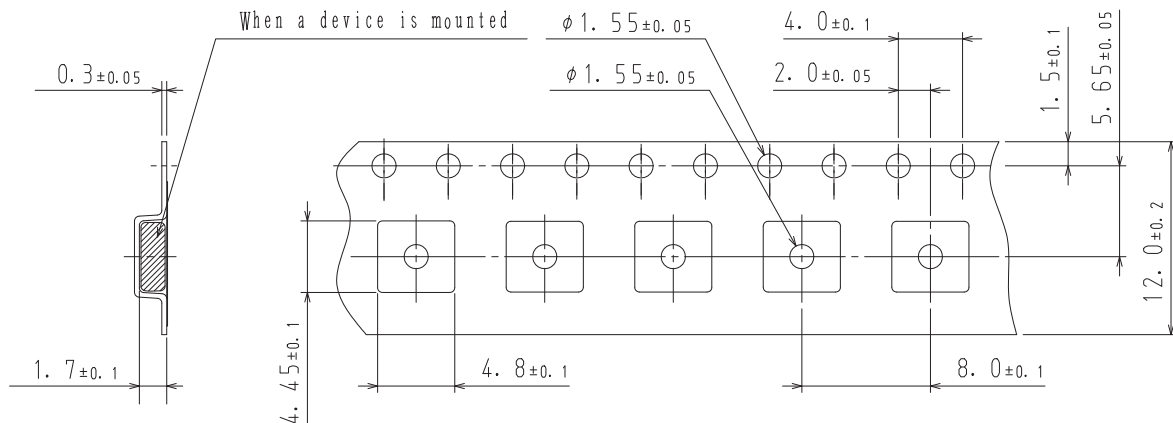
NOTE (1)

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

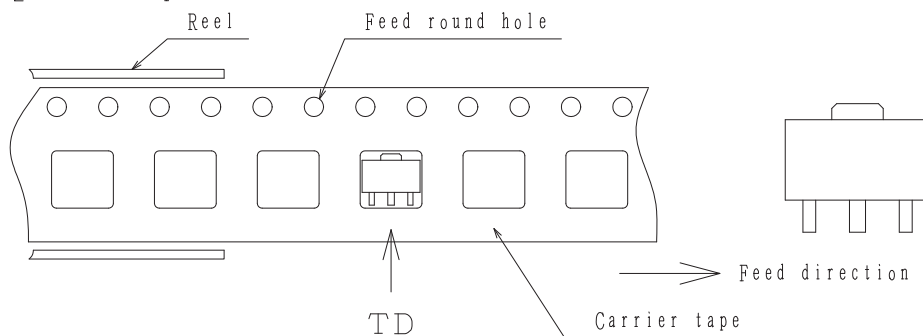
| Label       | JEITA Phase    |
|-------------|----------------|
| LEAD FREE 3 | JEITA Phase 3A |
| LEAD FREE 4 | JEITA Phase 3  |

## 2. Taping configuration

## 2-1. Carrier tape size (unit:mm)

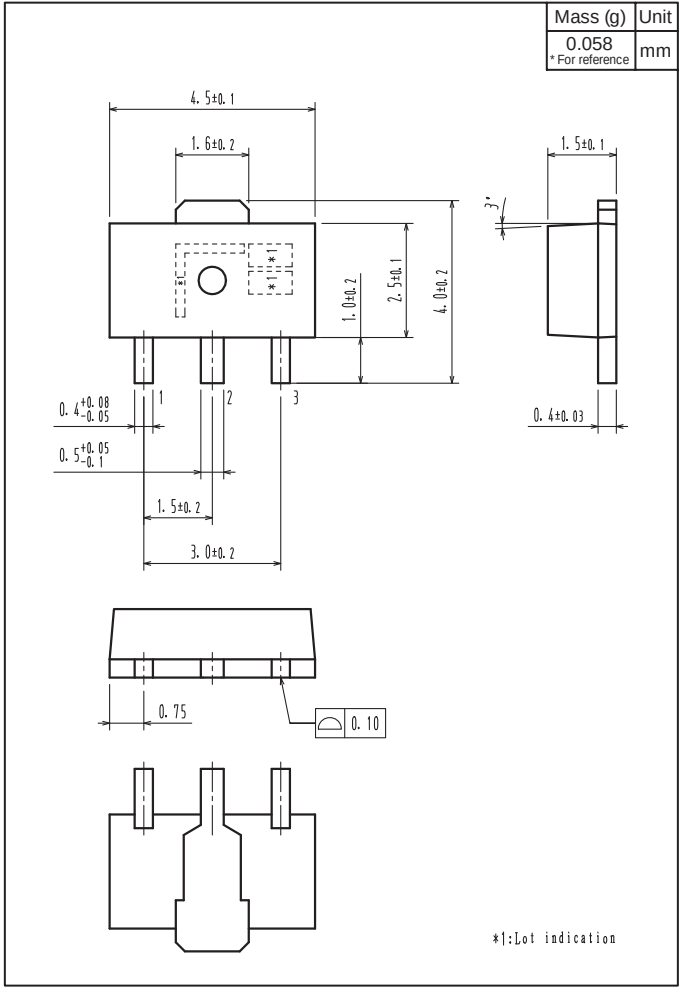


## 2-2. Device placement direction

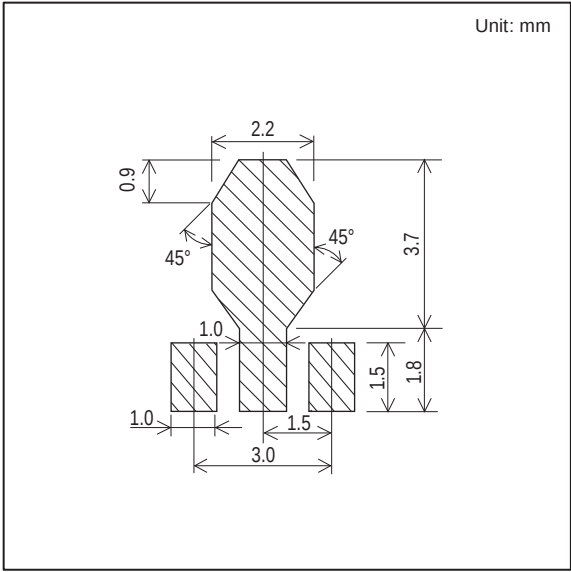


Outline Drawing

2SC5347AE-TD-E, 2SC5347AF-TD-E



Land Pattern Example



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