



SANYO Semiconductors

# DATA SHEET

An ON Semiconductor Company

## 2SC5488A — NPN Epitaxial Planar Silicon Transistor VHF to UHF Wide-Band Low-Noise Amplifier Applications

### Features

- Low-noise : NF=1.0dB typ (f=1GHz)
- High gain :  $|S_{21e}|^2=12\text{dB typ (f=1GHz)}$
- High cut-off frequency :  $f_T=7\text{GHz typ}$
- Ultrasmall, slim flat-lead package (1.4mm×0.8mm×0.6mm)
- Halogen free compliance

### Specifications

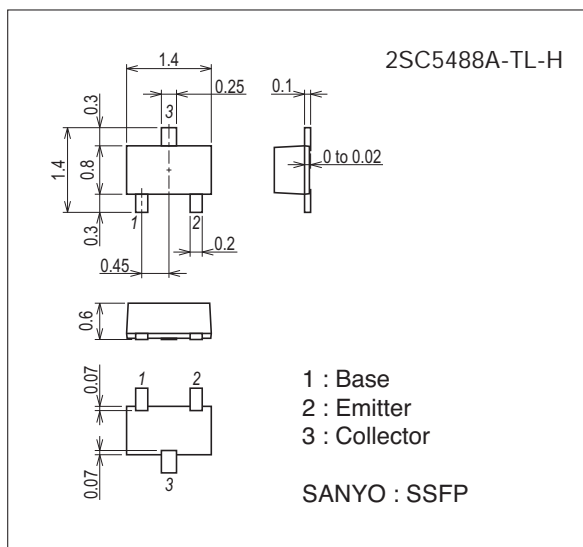
Absolute Maximum Ratings at Ta=25°C

| Parameter                    | Symbol           | Conditions | Ratings     | Unit |
|------------------------------|------------------|------------|-------------|------|
| Collector-to-Base Voltage    | V <sub>CB0</sub> |            | 20          | V    |
| Collector-to-Emitter Voltage | V <sub>CEO</sub> |            | 10          | V    |
| Emitter-to-Base Voltage      | V <sub>EB0</sub> |            | 2           | V    |
| Collector Current            | I <sub>C</sub>   |            | 70          | mA   |
| Collector Dissipation        | P <sub>C</sub>   |            | 100         | mW   |
| Junction Temperature         | T <sub>J</sub>   |            | 150         | °C   |
| Storage Temperature          | T <sub>stg</sub> |            | -55 to +150 | °C   |

### Package Dimensions

unit : mm (typ)

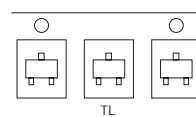
7029A-002



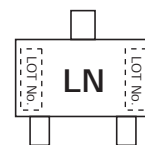
### Product & Package Information

- Package : SSFP
- JEITA, JEDEC : SC-81
- Minimum Packing Quantity : 8,000 pcs./reel

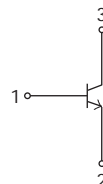
### Packing Type: TL



### Marking



### Electrical Connection



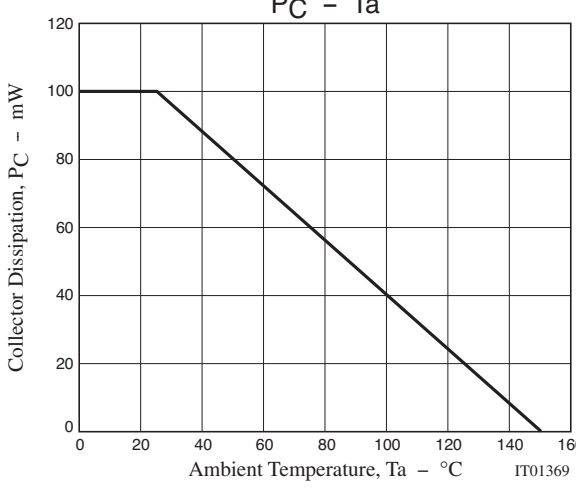
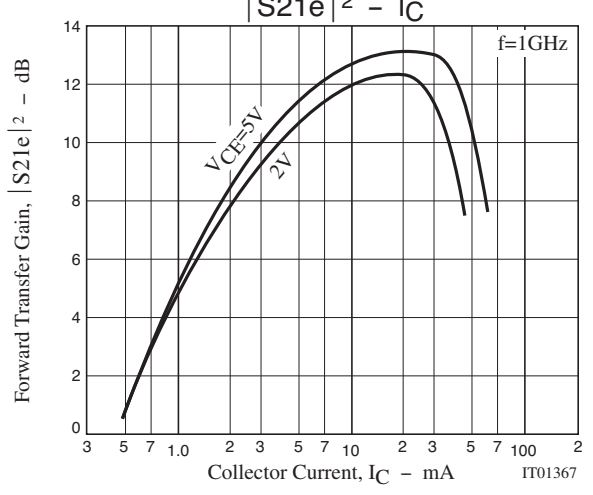
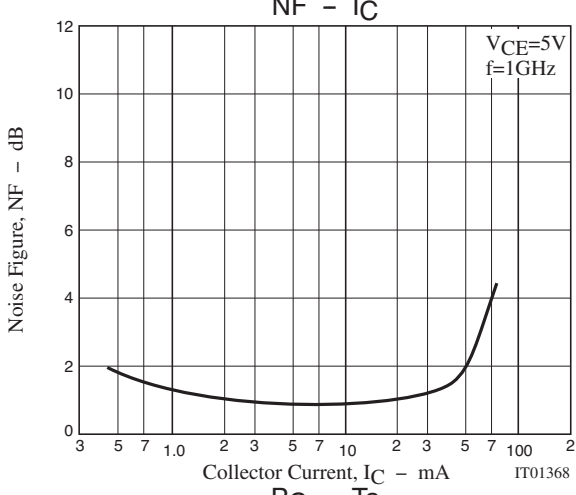
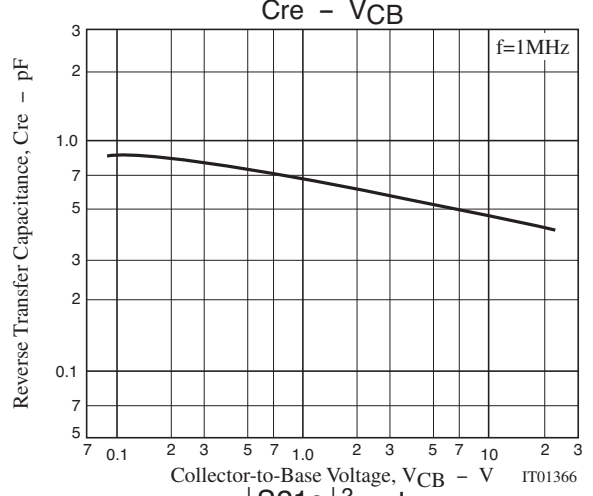
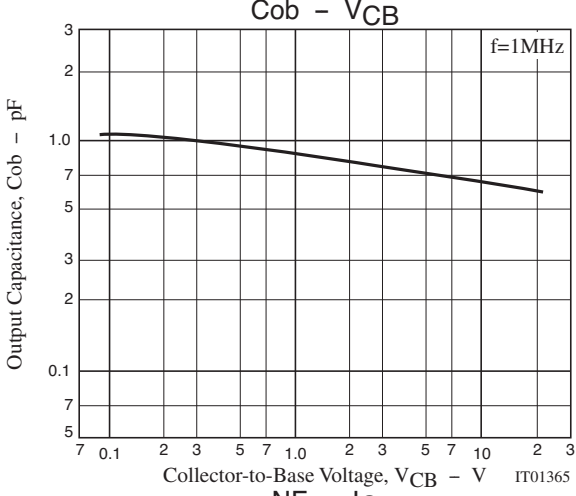
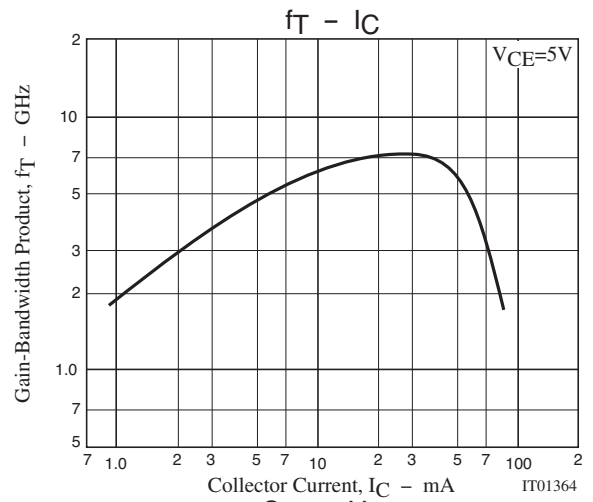
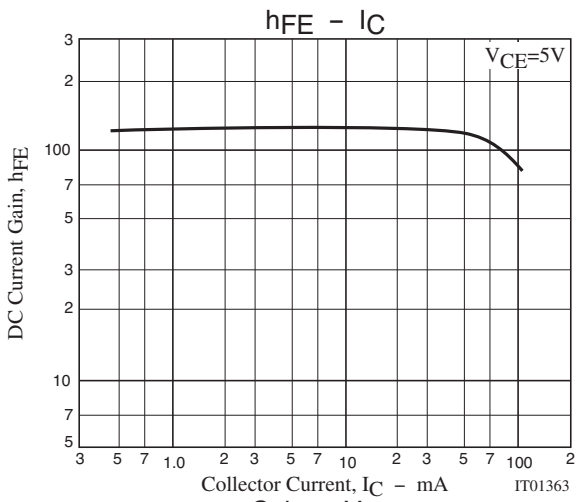
## 2SC5488A

### 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> =20mA         | 90      |     | 200  |      |
| Gain-Bandwidth Product       | f <sub>T</sub>                               | V <sub>CE</sub> =5V, I <sub>C</sub> =20mA         | 5       | 7   |      | GHz  |
| Output Capacitance           | Cob  | V <sub>CB</sub> =10V, f=1MHz                      |         | 0.7 | 1.2  | pF   |
| Reverse Transfer Capacitance | Cre  |   |         |     | 0.45 |      |
| Forward Transfer Gain        | S <sub>21e</sub>   <sup>2</sup> <sub>1</sub> | V <sub>CE</sub> =5V, I <sub>C</sub> =20mA, f=1GHz | 9       | 12  |      | dB   |
|                              | S <sub>21e</sub>   <sup>2</sup> <sub>2</sub> | V <sub>CE</sub> =2V, I <sub>C</sub> =3mA, f=1GHz  |         | 8.5 |      | dB   |
| Noise Figure                 | NF   | V <sub>CE</sub> =5V, I <sub>C</sub> =7mA, f=1GHz  |         | 1.0 | 1.8  | dB   |

### Ordering Information

| Device        | Package | Shipping       | memo                     |
|---------------|---------|----------------|--------------------------|
| 2SC5488A-TL-H | SSFP    | 8,000pcs./reel | Pb Free and Halogen Free |



## 2SC5488A

### S Parameters (Common emitter)

$V_{CE}=5V, I_C=7mA, Z_O=50\Omega$

| Freq(MHz) | S11   | $\angle S11$ | S21    | $\angle S21$ | S12   | $\angle S12$ | S22   | $\angle S22$ |
|-----------|-------|--------------|--------|--------------|-------|--------------|-------|--------------|
| 100       | 0.786 | -40.7        | 17.507 | 151.3        | 0.028 | 70.1         | 0.898 | -20.4        |
| 200       | 0.677 | -72.4        | 13.998 | 131.4        | 0.046 | 58.0         | 0.739 | -33.4        |
| 400       | 0.546 | -112.7       | 9.061  | 108.6        | 0.064 | 49.6         | 0.525 | -43.7        |
| 600       | 0.492 | -135.2       | 6.442  | 96.1         | 0.076 | 49.3         | 0.423 | -46.7        |
| 800       | 0.473 | -150.0       | 5.005  | 87.3         | 0.087 | 50.8         | 0.374 | -44.4        |
| 1000      | 0.465 | -160.0       | 4.073  | 80.4         | 0.099 | 52.6         | 0.346 | -49.7        |
| 1200      | 0.457 | -169.5       | 3.449  | 74.0         | 0.111 | 54.0         | 0.332 | -51.6        |
| 1400      | 0.451 | -176.2       | 2.989  | 68.6         | 0.124 | 55.2         | 0.321 | -54.1        |
| 1600      | 0.449 | -177.8       | 2.658  | 63.8         | 0.138 | 56.6         | 0.319 | -56.2        |
| 1800      | 0.454 | -172.5       | 2.378  | 58.4         | 0.151 | 56.7         | 0.313 | -60.0        |
| 2000      | 0.460 | -167.1       | 2.154  | 54.0         | 0.166 | 56.7         | 0.311 | -63.2        |

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

| Freq(MHz) | S11   | $\angle S11$ | S21    | $\angle S21$ | S12   | $\angle S12$ | S22   | $\angle S22$ |
|-----------|-------|--------------|--------|--------------|-------|--------------|-------|--------------|
| 100       | 0.601 | -65.8        | 28.967 | 137.1        | 0.023 | 64.1         | 0.757 | -32.9        |
| 200       | 0.497 | -103.7       | 19.309 | 116.6        | 0.035 | 57.0         | 0.534 | -50.3        |
| 400       | 0.435 | -139.6       | 10.891 | 98.6         | 0.050 | 58.7         | 0.345 | -50.3        |
| 600       | 0.419 | -156.6       | 7.461  | 89.3         | 0.065 | 61.3         | 0.280 | -50.7        |
| 800       | 0.414 | -166.6       | 5.695  | 82.5         | 0.081 | 63.1         | 0.251 | -51.3        |
| 1000      | 0.413 | -174.0       | 4.613  | 77.0         | 0.098 | 63.8         | 0.235 | -52.9        |
| 1200      | 0.413 | -178.6       | 3.870  | 71.8         | 0.114 | 63.9         | 0.226 | -55.1        |
| 1400      | 0.411 | -173.8       | 3.345  | 66.9         | 0.131 | 63.6         | 0.221 | -57.7        |
| 1600      | 0.413 | -169.6       | 2.960  | 62.7         | 0.148 | 63.2         | 0.220 | -60.2        |
| 1800      | 0.416 | -165.1       | 2.655  | 58.0         | 0.165 | 61.8         | 0.219 | -64.8        |
| 2000      | 0.422 | -160.3       | 2.406  | 54.0         | 0.182 | 60.6         | 0.218 | -68.3        |

$V_{CE}=2V, I_C=3mA, Z_O=50\Omega$

| Freq(MHz) | S11   | $\angle S11$ | S21   | $\angle S21$ | S12   | $\angle S12$ | S22   | $\angle S22$ |
|-----------|-------|--------------|-------|--------------|-------|--------------|-------|--------------|
| 100       | 0.888 | -30.2        | 9.280 | 158.6        | 0.038 | 73.6         | 0.949 | -15.1        |
| 200       | 0.815 | -56.4        | 8.218 | 141.3        | 0.067 | 60.5         | 0.849 | -26.9        |
| 400       | 0.690 | -96.0        | 6.074 | 116.7        | 0.098 | 45.1         | 0.657 | -41.1        |
| 600       | 0.616 | -120.7       | 4.517 | 101.4        | 0.112 | 38.4         | 0.539 | -47.6        |
| 800       | 0.584 | -138.0       | 3.610 | 90.4         | 0.120 | 35.8         | 0.475 | -51.2        |
| 1000      | 0.566 | -150.7       | 2.995 | 81.9         | 0.125 | 35.7         | 0.434 | -54.5        |
| 1200      | 0.555 | -161.2       | 2.540 | 74.2         | 0.131 | 36.5         | 0.410 | -57.5        |
| 1400      | 0.546 | -169.3       | 2.213 | 67.5         | 0.137 | 38.4         | 0.393 | -60.7        |
| 1600      | 0.541 | -176.4       | 1.982 | 62.0         | 0.143 | 40.7         | 0.391 | -64.0        |
| 1800      | 0.545 | -177.1       | 1.774 | 55.9         | 0.152 | 42.5         | 0.382 | -67.8        |
| 2000      | 0.547 | -170.9       | 1.614 | 50.9         | 0.163 | 44.7         | 0.381 | -72.1        |

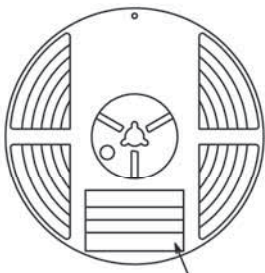
Embossed Taping Specification

2SC5488A-TL-H

1. Packing Format

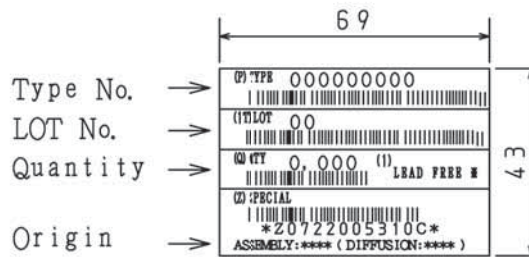
| Package Name | Carrier Tape Type | Maximum Number of devices contained (pcs) |           |           | Packing format  |  |
|--------------|-------------------|---|-----------|-----------|---|--|
|              |                   | Reel                                      | Inner box | Outer box | Inner BOX (C-1)   | Outer BOX (A-7)  |
| SSFP         | SSFP              | 8,000                                     | 40,000    | 240,000   | 5 reels contained<br>Dimensions:mm (external)<br>183×72×185 | 6 inner boxes contained<br>Dimension::mm (external)<br>440×195×210 |

Packing method

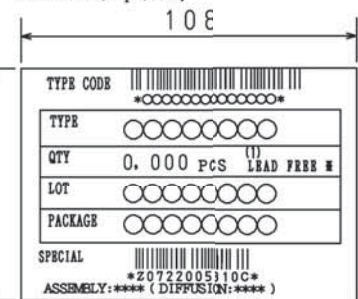


Reel label

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.



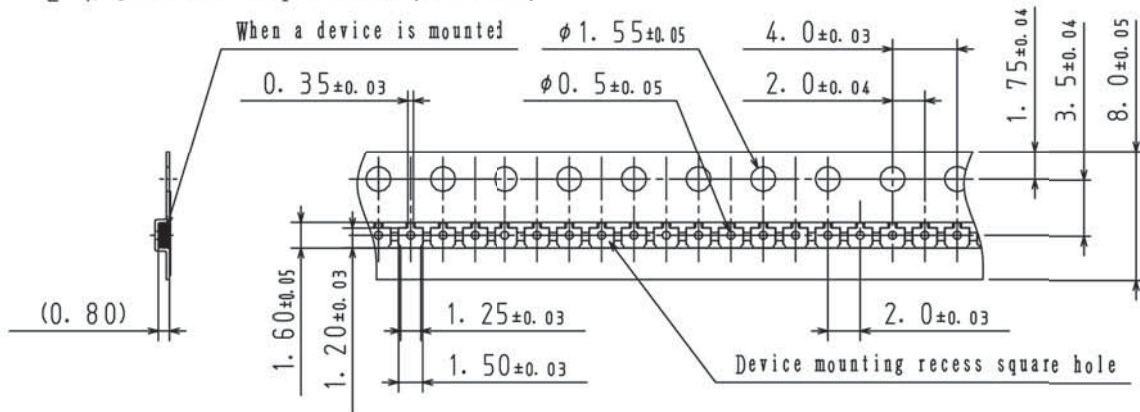
NOTE (1)

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

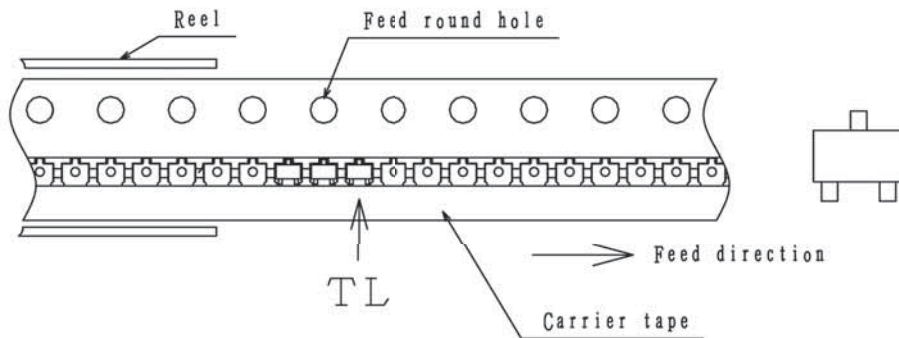
| Label       | JEITA Phase    |
|-------------|----------------|
| LEAD FREE 3 | JEITA Phase 3A |
| LEAD FREE 4 | JEITA Phase 3  |

2. Taping configuration

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



2-2. Device placement direction

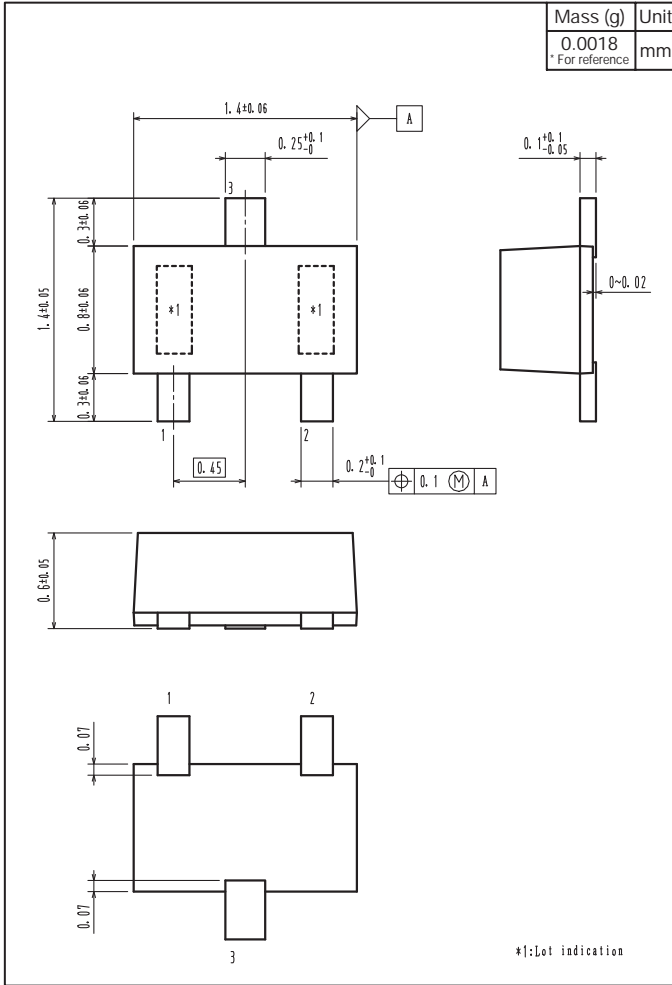


Those with pin 1 index on the feed hole side.....TL

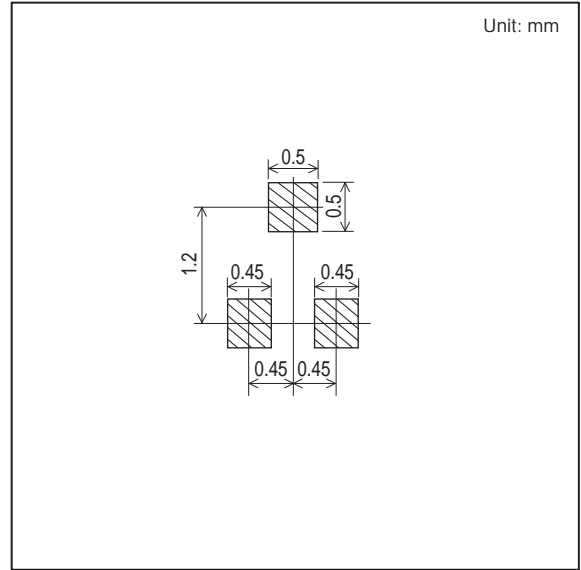
# 2SC5488A

## Outline Drawing

2SC5488A-TL-H



## Land Pattern Example



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