



2SC5227A

RF Transistor 10V, 70mA, $f_T=7\text{GHz}$, NPN Single CP

ON Semiconductor®

<http://onsemi.com>

Features

- Low-noise : $NF=1.0\text{dB typ (}f=1\text{GHz)}$
- High gain : $|S_{21e}|^2=12\text{dB typ (}f=1\text{GHz)}$
- High cut-off frequency : $f_T=7\text{GHz typ}$

Specifications

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

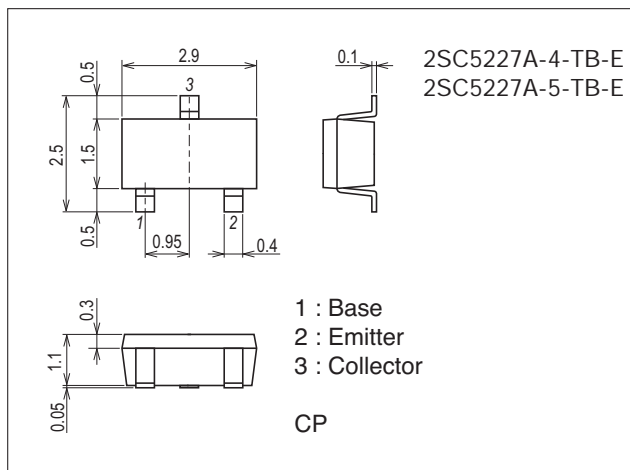
| Parameter | Symbol | Conditions | Ratings | Unit |
|------------------------------|-----------|------------|-------------|------------------|
| Collector-to-Base Voltage | V_{CBO} | | 20 | V |
| Collector-to-Emitter Voltage | V_{CEO} | | 10 | V |
| Emitter-to-Base Voltage | V_{EBO} | | 2 | V |
| Collector Current | I_C | | 70 | mA |
| Collector Dissipation | P_C | | 200 | mW |
| 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.

Package Dimensions

unit : mm (typ)

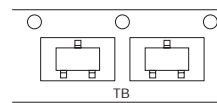
7013A-009



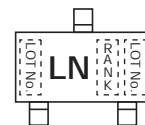
Product & Package Information

- Package : CP
- JEITA, JEDEC : SC-59, TO-236, SOT-23, TO-236AB
- Minimum Packing Quantity : 3,000 pcs./reel

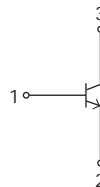
Packing Type: TB



Marking



Electrical Connection



2SC5227A

Electrical Characteristics at Ta=25°C

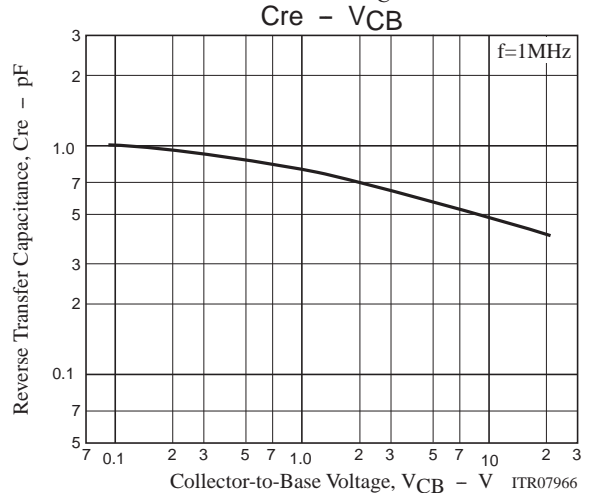
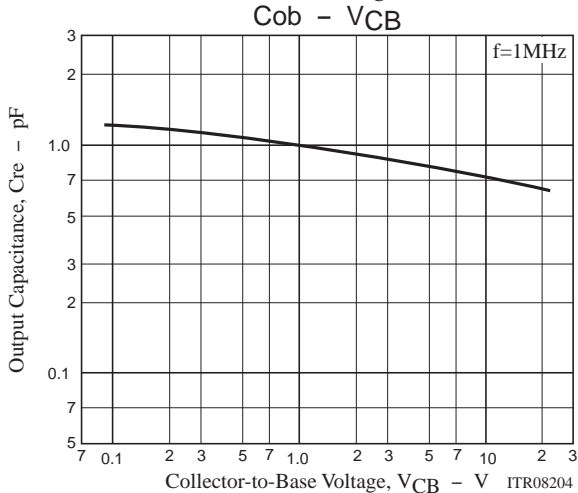
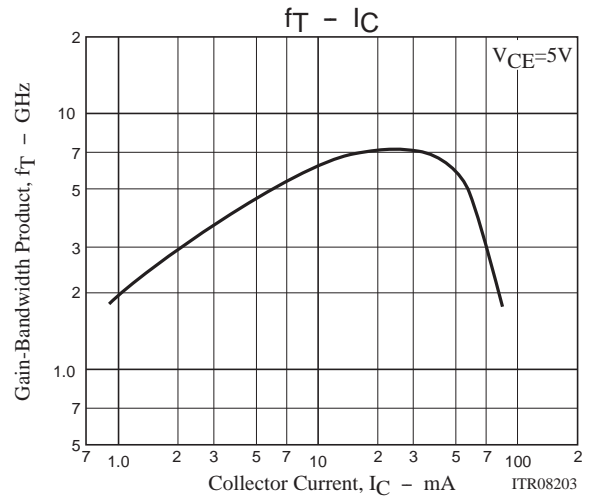
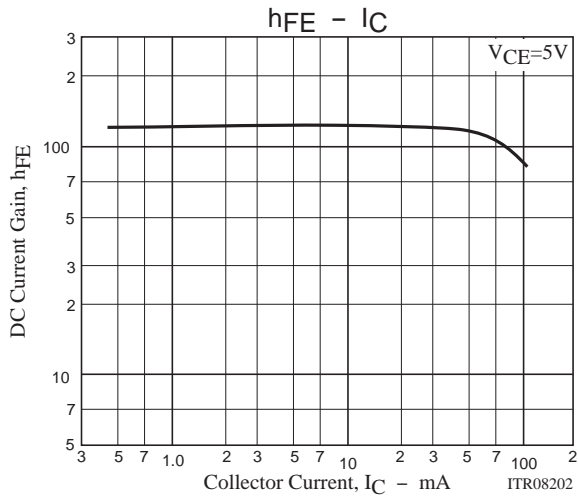
| Parameter | Symbol | Conditions | Ratings | | | Unit |
|------------------------------|-----------------|-------------------------------|---------|------|------|---------|
| | | | min | typ | max | |
| Collector Cutoff Current | I_{CBO} | $V_{CB}=10V, I_E=0A$ | | | 1.0 | μA |
| Emitter Cutoff Current | I_{EBO} | $V_{EB}=1V, I_C=0A$ | | | 10 | μA |
| DC Current Gain | h_{FE} | $V_{CE}=5V, I_C=20mA$ | 60* | | 270* | |
| Gain-Bandwidth Product | f_T | $V_{CE}=5V, I_C=20mA$ | 5 | 7 | | GHz |
| Output Capacitance | C_{ob} | $V_{CB}=10V, f=1MHz$ | | 0.75 | 1.2 | pF |
| Reverse Transfer Capacitance | C_{re} | $V_{CB}=10V, f=1MHz$ | | 0.5 | | pF |
| Forward Transfer Gain | $ S_{21e} ^2_1$ | $V_{CE}=5V, I_C=20mA, f=1GHz$ | 9 | 12 | | dB |
| | $ S_{21e} ^2_2$ | $V_{CE}=2V, I_C=3mA, f=1GHz$ | | 8 | | dB |
| Noise Figure | NF | $V_{CE}=5V, I_C=7mA, f=1GHz$ | | 1.0 | 1.8 | dB |

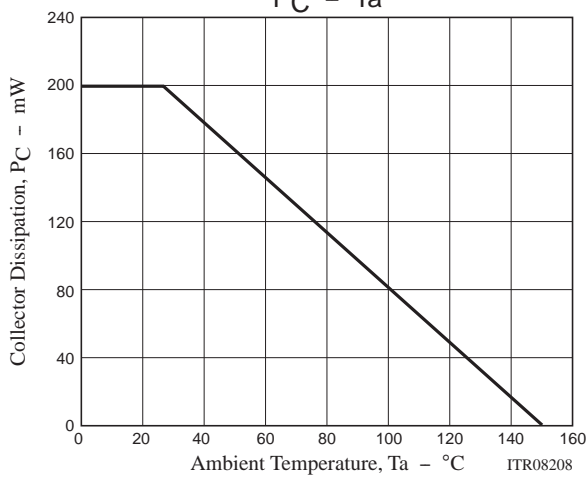
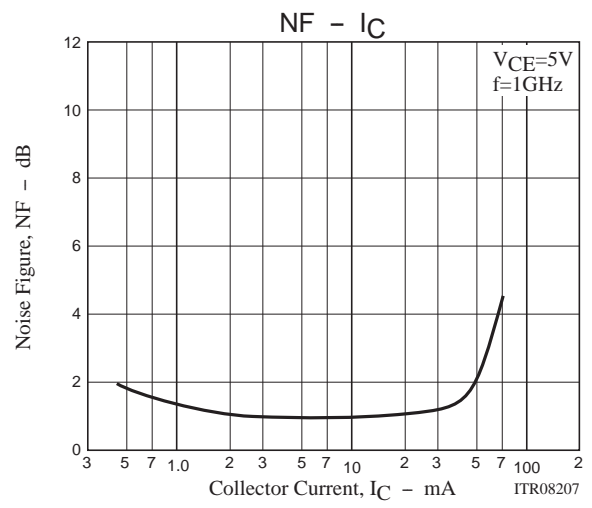
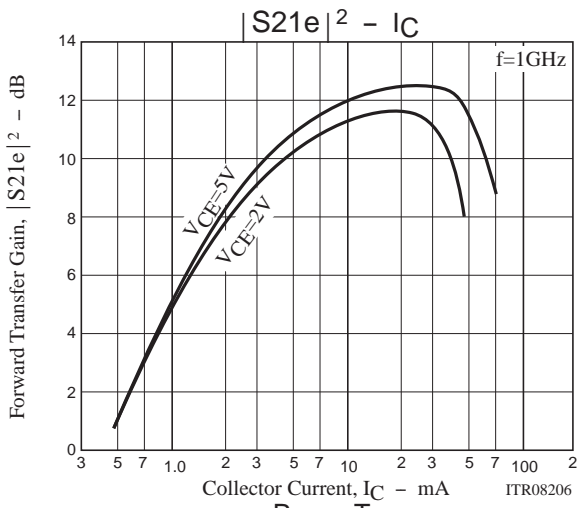
* : The 2SC5227A is classified by 20mA h_{FE} as follows :

| Rank | 3 | 4 | 5 |
|----------|-----------|-----------|------------|
| h_{FE} | 60 to 120 | 90 to 180 | 135 to 270 |

Ordering Information

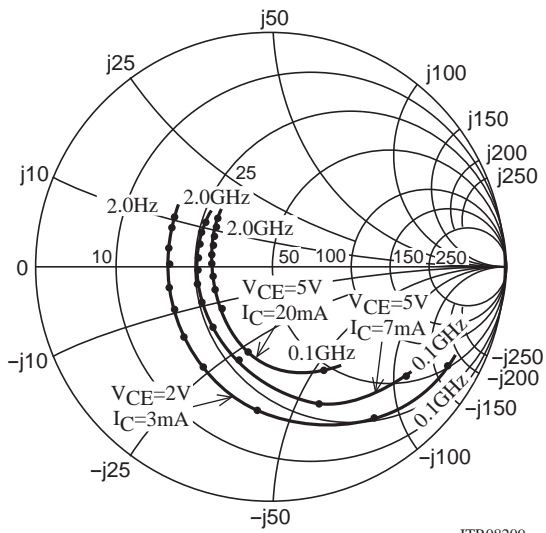
| Device | Package | Shipping | memo |
|-----------------|---------|----------------|---------|
| 2SC5227A-4-TB-E | CP | 3,000pcs./reel | Pb Free |
| 2SC5227A-5-TB-E | CP | 3,000pcs./reel | |



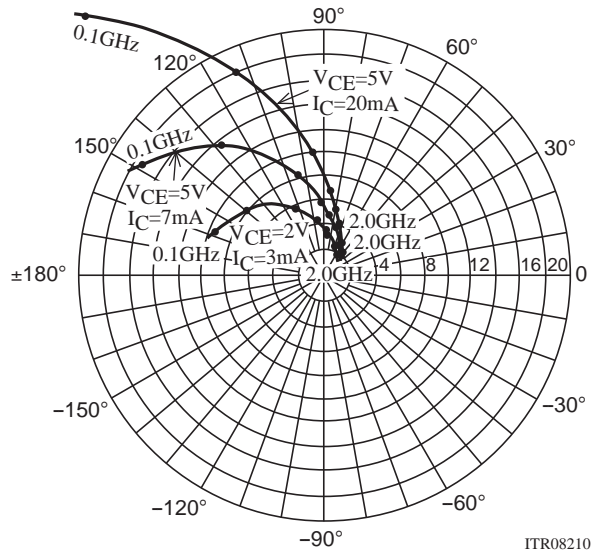


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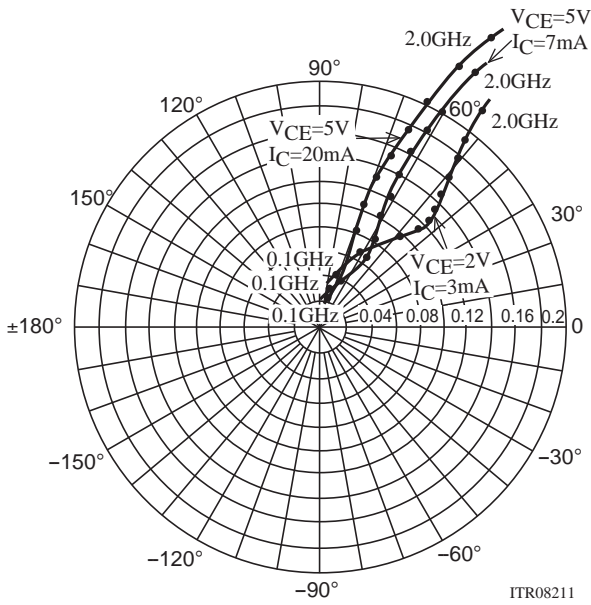
f=100MHz, 200MHz to 2000MHz(200MHz Step)



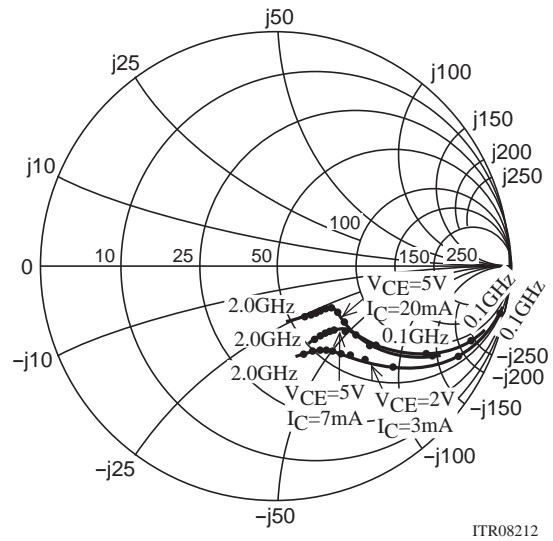
f=100MHz, 200MHz to 2000MHz(200MHz Step)



f=100MHz, 200MHz to 2000MHz(200MHz Step)



f=100MHz, 200MHz to 2000MHz(200MHz Step)



2SC5227A

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 | 0.722 | -41.6 | 17.352 | 148.7 | 0.029 | 70.9 | 0.883 | -21.3 |
| 200 | 0.587 | -73.2 | 13.419 | 127.6 | 0.046 | 60.8 | 0.710 | -33.1 |
| 400 | 0.426 | -113.0 | 8.371 | 105.1 | 0.067 | 56.9 | 0.507 | -40.7 |
| 600 | 0.369 | -136.6 | 5.914 | 92.7 | 0.084 | 58.4 | 0.423 | -42.5 |
| 800 | 0.344 | -152.9 | 4.593 | 83.9 | 0.102 | 60.3 | 0.382 | -43.9 |
| 1000 | 0.334 | -165.7 | 3.750 | 76.7 | 0.121 | 61.5 | 0.360 | -46.3 |
| 1200 | 0.326 | -177.9 | 3.178 | 70.3 | 0.141 | 62.0 | 0.350 | -49.1 |
| 1400 | 0.324 | 172.3 | 2.784 | 64.9 | 0.162 | 61.8 | 0.341 | -52.2 |
| 1600 | 0.328 | 163.4 | 2.476 | 59.5 | 0.183 | 61.2 | 0.334 | -56.4 |
| 1800 | 0.335 | 154.5 | 2.246 | 54.6 | 0.204 | 60.5 | 0.328 | -60.8 |
| 2000 | 0.346 | 147.5 | 3.073 | 50.0 | 0.226 | 59.6 | 0.328 | -65.4 |

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

| Freq(MHz) | S11 | $\angle S11$ | S21 | $\angle S21$ | S12 | $\angle S12$ | S22 | $\angle S22$ |
|-----------|-------|--------------|--------|--------------|-------|--------------|-------|--------------|
| 100 | 0.477 | -66.8 | 28.090 | 133.6 | 0.022 | 67.7 | 0.726 | -32.7 |
| 200 | 0.358 | -104.1 | 17.995 | 112.9 | 0.035 | 65.3 | 0.506 | -41.6 |
| 400 | 0.288 | -142.2 | 9.903 | 95.9 | 0.057 | 68.3 | 0.350 | -42.4 |
| 600 | 0.273 | -159.8 | 6.777 | 86.7 | 0.081 | 69.9 | 0.299 | -41.8 |
| 800 | 0.270 | -171.7 | 5.181 | 79.9 | 0.104 | 70.2 | 0.278 | -43.2 |
| 1000 | 0.271 | 178.7 | 4.209 | 73.9 | 0.129 | 69.1 | 0.269 | -45.9 |
| 1200 | 0.273 | 169.4 | 3.554 | 68.5 | 0.153 | 67.9 | 0.264 | -49.6 |
| 1400 | 0.275 | 161.1 | 3.085 | 63.6 | 0.177 | 66.2 | 0.258 | -53.3 |
| 1600 | 0.284 | 153.4 | 2.749 | 59.1 | 0.202 | 64.3 | 0.253 | -58.3 |
| 1800 | 0.294 | 145.6 | 2.479 | 54.6 | 0.224 | 62.5 | 0.249 | -63.4 |
| 2000 | 0.302 | 140.8 | 2.295 | 50.6 | 0.248 | 60.4 | 0.248 | -68.7 |

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

| Freq(MHz) | S11 | $\angle S11$ | S21 | $\angle S21$ | S12 | $\angle S12$ | S22 | $\angle S22$ |
|-----------|-------|--------------|-------|--------------|-------|--------------|-------|--------------|
| 100 | 0.858 | -30.5 | 9.283 | 157.3 | 0.039 | 73.6 | 0.944 | -15.6 |
| 200 | 0.769 | -57.4 | 8.036 | 138.7 | 0.068 | 61.4 | 0.834 | -27.5 |
| 400 | 0.607 | -97.1 | 5.756 | 113.9 | 0.099 | 48.4 | 0.641 | -40.5 |
| 600 | 0.528 | -123.2 | 4.302 | 98.1 | 0.114 | 44.4 | 0.525 | -46.5 |
| 800 | 0.486 | -141.6 | 3.414 | 87.0 | 0.125 | 43.9 | 0.465 | -50.2 |
| 1000 | 0.460 | -156.4 | 2.834 | 78.0 | 0.137 | 45.4 | 0.429 | -53.7 |
| 1200 | 0.453 | -169.4 | 2.429 | 70.3 | 0.149 | 47.5 | 0.408 | -57.3 |
| 1400 | 0.440 | 179.8 | 2.143 | 63.6 | 0.163 | 49.2 | 0.395 | -60.9 |
| 1600 | 0.441 | 170.1 | 1.919 | 57.4 | 0.179 | 50.8 | 0.385 | -65.4 |
| 1800 | 0.447 | 160.4 | 1.739 | 51.7 | 0.196 | 52.3 | 0.381 | -70.1 |
| 2000 | 0.454 | 152.5 | 1.621 | 46.4 | 0.215 | 53.3 | 0.379 | -75.2 |

Embossed Taping Specification

2SC5227A-4-TB-E, 2SC5227A-5-TB-E

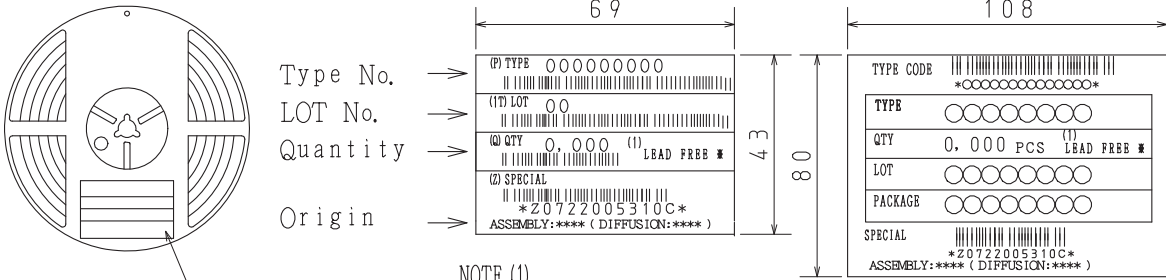
1. Packing Format

| 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) |
| CP | CP | 3,000 | 15,000 | 90,000 | 5 reels contained Dimensions:mm (external) 183×72×185 | 6 inner boxes contained Dimensions:mm (external) 440×195×210 |

Packing method

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.

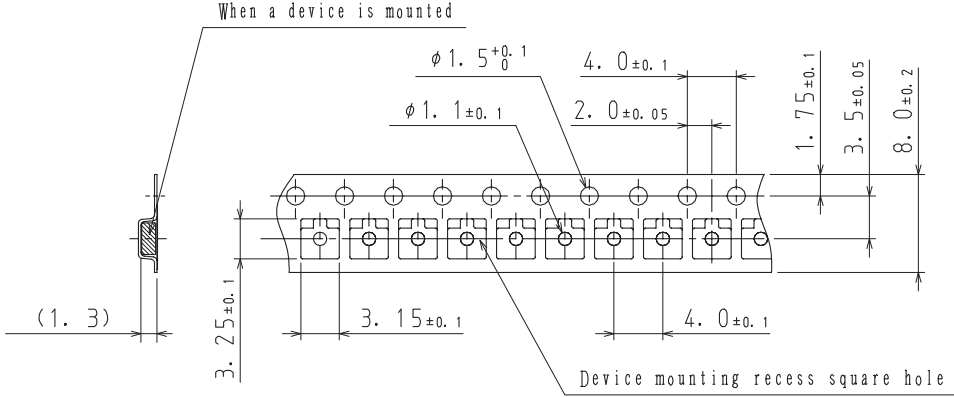


NOTE (1)
The LEAD FREE * description shows that the surface treatment of the terminal is lead free.

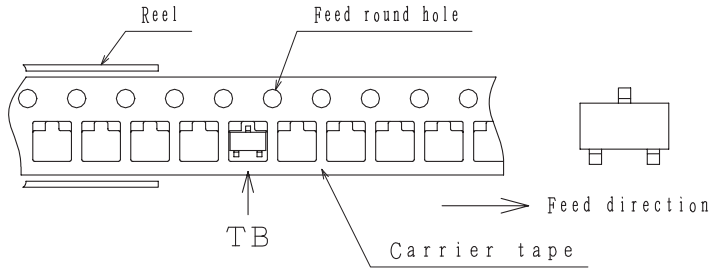
| Label | JEITA Phase |
|-------------|----------------|
| LEAD FREE 3 | JEITA Phase 3A |
| LEAD FREE 4 | JEITA Phase 3 |

2. Taping configuration

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



2-2. Device placement direction

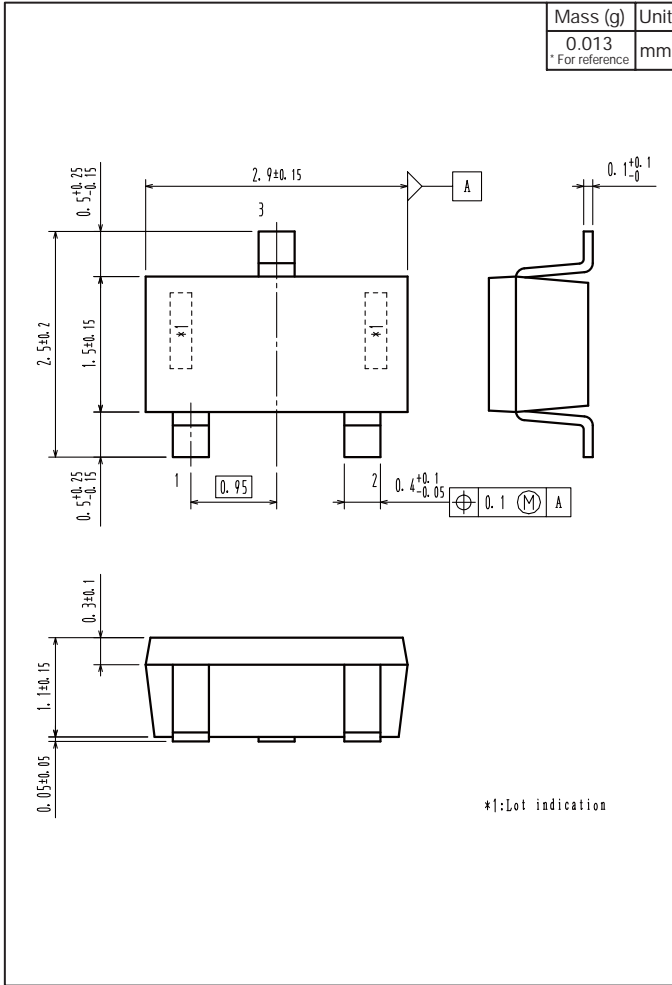


Those with one electrode terminal on the feed hole side.....TB

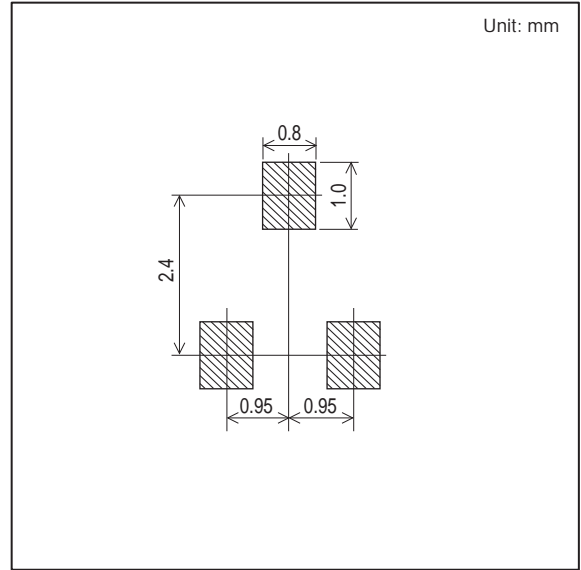
2SC5227A

Outline Drawing

2SC5227A-4-TB-E, 2SC5227A-5-TB-E





Land Pattern Example



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