



55GN01CA

RF Transistor 10V, 70mA, $f_T=5.5\text{GHz}$, NPN Single CP

ON Semiconductor®

<http://onsemi.com>

Features

- High cutoff frequency : $f_T=5.5\text{GHz}$ typ
- High gain : $|S_{21e}|^2=9.5\text{dB}$ typ ($f=1\text{GHz}$)

Specifications

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

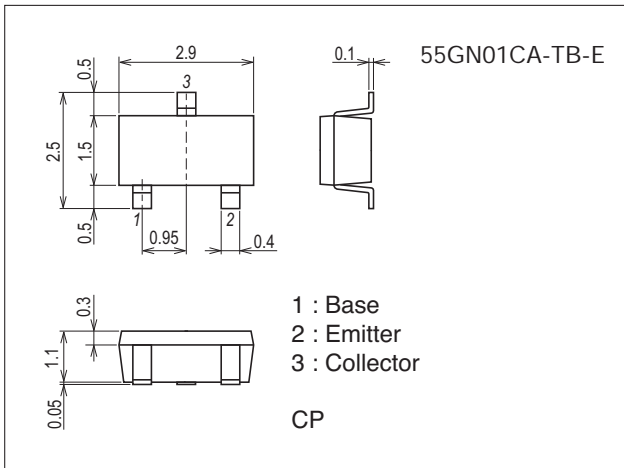
| Parameter | Symbol | Conditions | Ratings | Unit |
|------------------------------|-----------|------------|-------------|------------------|
| Collector-to-Base Voltage | V_{CBO} | | 20 | V |
| Collector-to-Emitter Voltage | V_{CEO} | | 10 | V |
| Emitter-to-Base Voltage | V_{EBO} | | 3 | V |
| Collector 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)

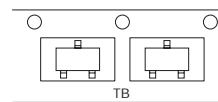
7013A-009



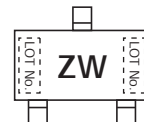
Product & Package Information

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

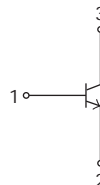
Packing Type: TB



Marking



Electrical Connection



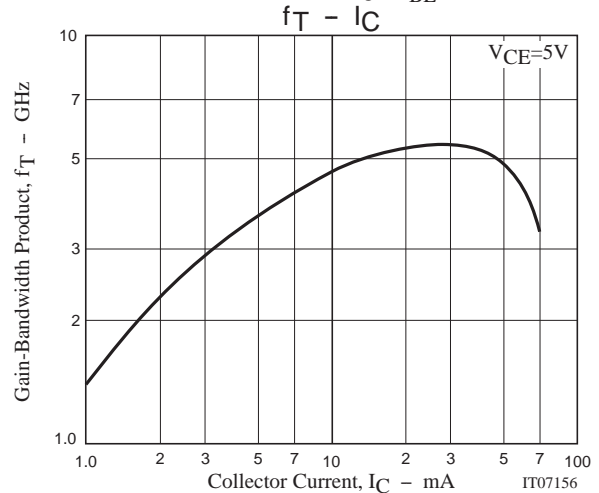
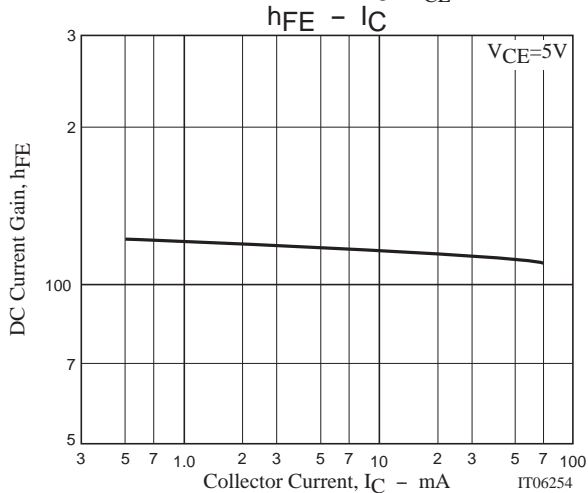
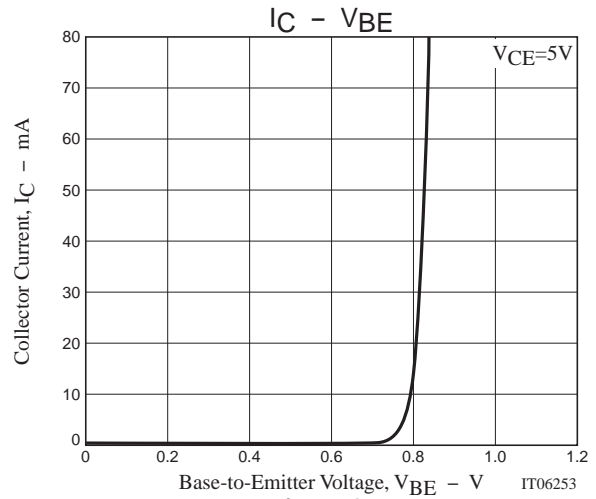
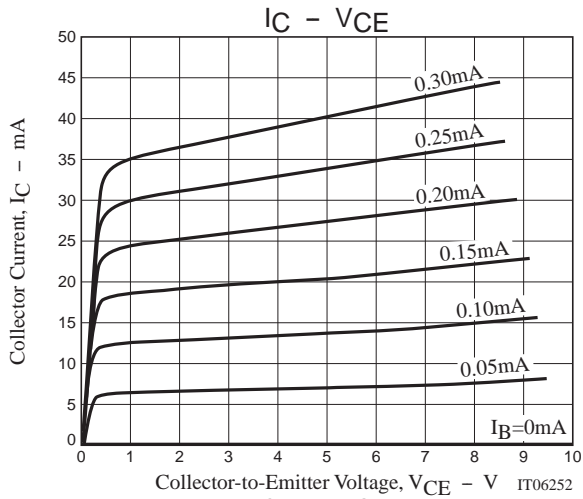
55GN01CA

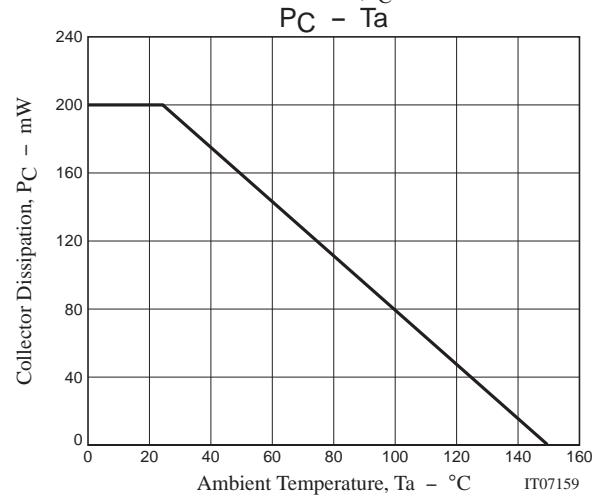
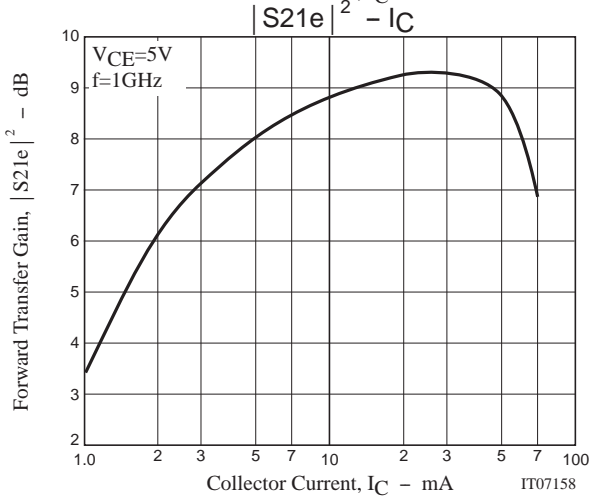
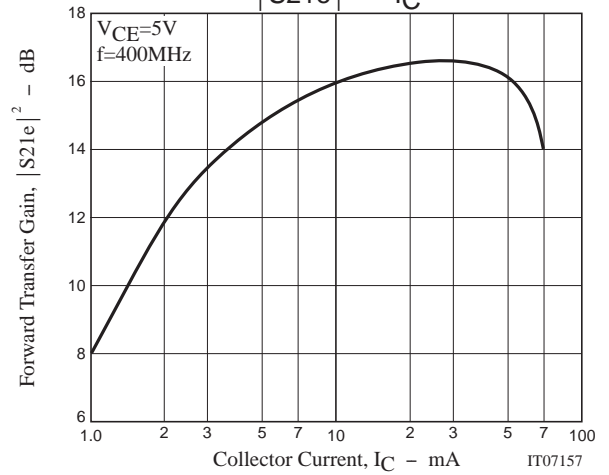
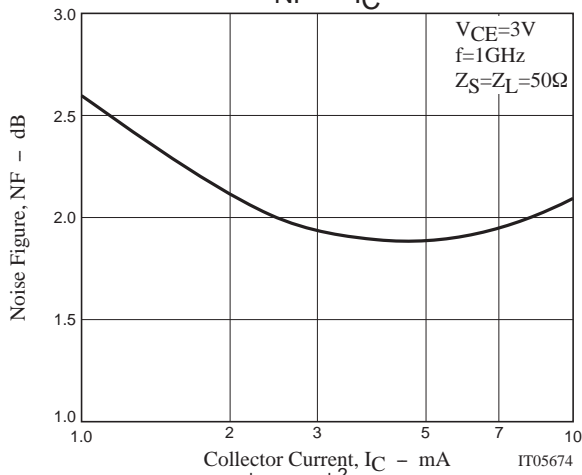
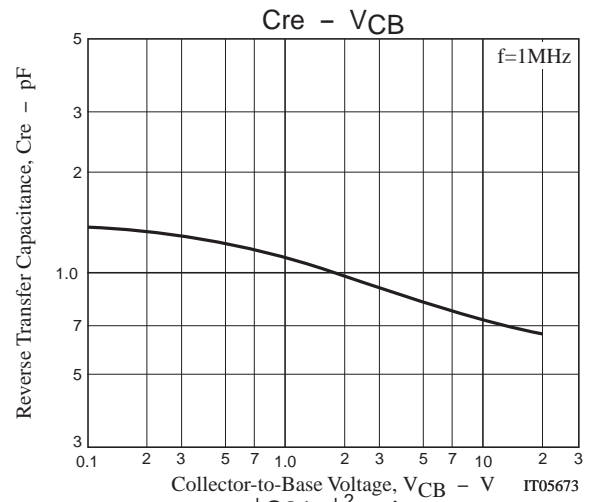
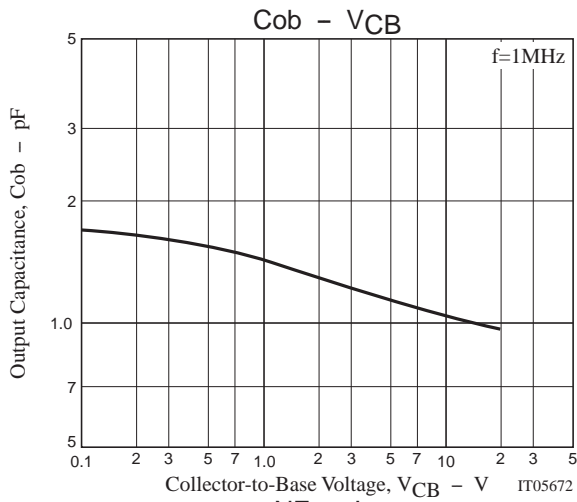
Electrical Characteristics at Ta=25°C

| Parameter | Symbol | Conditions | Ratings | | | Unit |
|------------------------------|---------------|--|---------|-----|-----|---------|
| | | | min | typ | max | |
| Collector Cutoff Current | I_{CBO} | $V_{CB}=10V, I_E=0A$ | | | 0.1 | μA |
| Emitter Cutoff Current | I_{EBO} | $V_{EB}=2V, I_C=0A$ | | | 1 | μA |
| DC Current Gain | h_{FE} | $V_{CE}=5V, I_C=10mA$ | 100 | | 180 | |
| Gain-Bandwidth Product | f_T1 | $V_{CE}=3V, I_C=5mA$ | 3.0 | 4.5 | | GHz |
| | f_T2 | $V_{CE}=5V, I_C=20mA$ | | 5.5 | | GHz |
| Output Capacitance | C_{ob} | $V_{CB}=10V, f=1MHz$ | | 1.1 | 1.3 | pF |
| Reverse Transfer Capacitance | C_{re} | | | 0.7 | | pF |
| Forward Transfer Gain | $ S_{21e} ^2$ | $V_{CE}=5V, I_C=20mA, f=1GHz$ | 6.5 | 9.5 | | dB |
| Noise Figure | NF | $V_{CE}=3V, I_C=5mA, f=1GHz, Z_S=Z_L=50\Omega$ | | 1.9 | | dB |

Ordering Information

| Device | Package | Shipping | memo |
|---------------|---------|----------------|---------|
| 55GN01CA-TB-E | CP | 3,000pcs./reel | Pb Free |





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S Parameters (Common emitter)

$V_{CE}=5V, I_C=1mA, Z_O=50\Omega$

| Freq(MHz) | S11 | $\angle S11$ | S21 | $\angle S21$ | S12 | $\angle S12$ | S22 | $\angle S22$ |
|-----------|-------|--------------|-------|--------------|-------|--------------|-------|--------------|
| 100 | 0.949 | -22.44 | 3.333 | 161.77 | 0.051 | 76.83 | 0.974 | -10.27 |
| 200 | 0.896 | -42.53 | 3.106 | 145.66 | 0.096 | 64.91 | 0.926 | -19.70 |
| 400 | 0.771 | -76.67 | 2.521 | 119.93 | 0.149 | 47.18 | 0.801 | -32.90 |
| 600 | 0.679 | -102.20 | 2.043 | 101.07 | 0.167 | 38.13 | 0.714 | -40.64 |
| 800 | 0.622 | -122.03 | 1.712 | 86.82 | 0.169 | 34.45 | 0.661 | -46.50 |
| 1000 | 0.585 | -138.21 | 1.490 | 75.34 | 0.164 | 35.98 | 0.642 | -51.94 |
| 1200 | 0.566 | -152.02 | 1.321 | 65.79 | 0.158 | 41.97 | 0.633 | -56.73 |
| 1400 | 0.555 | -163.57 | 1.192 | 57.95 | 0.167 | 51.00 | 0.636 | -62.43 |
| 1600 | 0.550 | -173.92 | 1.101 | 51.64 | 0.189 | 57.12 | 0.653 | -68.80 |
| 1800 | 0.545 | -176.42 | 1.027 | 45.83 | 0.209 | 64.08 | 0.665 | -74.79 |
| 2000 | 0.543 | -167.94 | 0.963 | 41.62 | 0.262 | 70.03 | 0.683 | -80.37 |

$V_{CE}=5V, I_C=3mA, Z_O=50\Omega$

| Freq(MHz) | S11 | $\angle S11$ | S21 | $\angle S21$ | S12 | $\angle S12$ | S22 | $\angle S22$ |
|-----------|-------|--------------|-------|--------------|-------|--------------|-------|--------------|
| 100 | 0.849 | -36.58 | 8.604 | 151.45 | 0.047 | 69.52 | 0.908 | -19.05 |
| 200 | 0.719 | -65.72 | 7.078 | 130.50 | 0.077 | 58.46 | 0.768 | -32.07 |
| 400 | 0.543 | -104.50 | 4.701 | 105.14 | 0.109 | 49.29 | 0.576 | -42.71 |
| 600 | 0.466 | -128.63 | 3.425 | 90.40 | 0.126 | 50.26 | 0.500 | -47.19 |
| 800 | 0.434 | -145.01 | 2.697 | 79.88 | 0.141 | 53.53 | 0.463 | -51.04 |
| 1000 | 0.417 | -157.80 | 2.265 | 71.34 | 0.162 | 57.40 | 0.455 | -55.89 |
| 1200 | 0.414 | -167.96 | 1.951 | 63.80 | 0.183 | 60.44 | 0.454 | -60.20 |
| 1400 | 0.415 | -176.38 | 1.735 | 57.35 | 0.214 | 63.33 | 0.460 | -65.55 |
| 1600 | 0.418 | -175.97 | 1.591 | 51.56 | 0.245 | 61.95 | 0.473 | -71.92 |
| 1800 | 0.421 | -169.02 | 1.462 | 45.89 | 0.266 | 63.26 | 0.487 | -77.11 |
| 2000 | 0.426 | -163.03 | 1.370 | 41.27 | 0.313 | 65.05 | 0.508 | -81.84 |

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

| Freq(MHz) | S11 | $\angle S11$ | S21 | $\angle S21$ | S12 | $\angle S12$ | S22 | $\angle S22$ |
|-----------|-------|--------------|--------|--------------|-------|--------------|-------|--------------|
| 100 | 0.765 | -46.98 | 12.335 | 143.95 | 0.044 | 67.33 | 0.845 | -24.79 |
| 200 | 0.598 | -80.18 | 9.191 | 121.62 | 0.066 | 56.98 | 0.662 | -37.77 |
| 400 | 0.442 | -118.84 | 5.505 | 99.01 | 0.093 | 54.34 | 0.476 | -45.43 |
| 600 | 0.392 | -140.14 | 3.887 | 86.64 | 0.118 | 58.30 | 0.418 | -48.57 |
| 800 | 0.374 | -154.61 | 3.029 | 77.50 | 0.143 | 61.09 | 0.392 | -52.48 |
| 1000 | 0.367 | -165.56 | 2.520 | 70.15 | 0.169 | 63.39 | 0.389 | -57.19 |
| 1200 | 0.367 | -174.16 | 2.162 | 63.07 | 0.197 | 64.83 | 0.391 | -61.75 |
| 1400 | 0.373 | -179.13 | 1.916 | 57.27 | 0.232 | 65.23 | 0.398 | -67.63 |
| 1600 | 0.378 | -172.36 | 1.749 | 51.58 | 0.263 | 62.63 | 0.412 | -74.04 |
| 1800 | 0.384 | -166.49 | 1.606 | 46.28 | 0.284 | 62.94 | 0.424 | -79.34 |
| 2000 | 0.391 | -161.65 | 1.501 | 41.77 | 0.331 | 63.69 | 0.445 | -83.92 |

$V_{CE}=5V, I_C=10mA, Z_O=50\Omega$

| Freq(MHz) | S11 | $\angle S11$ | S21 | $\angle S21$ | S12 | $\angle S12$ | S22 | $\angle S22$ |
|-----------|-------|--------------|--------|--------------|-------|--------------|-------|--------------|
| 100 | 0.604 | -65.10 | 17.802 | 131.98 | 0.037 | 62.29 | 0.725 | -33.04 |
| 200 | 0.444 | -100.60 | 11.395 | 111.07 | 0.056 | 60.51 | 0.514 | -43.72 |
| 400 | 0.347 | -135.89 | 6.264 | 92.91 | 0.085 | 63.77 | 0.367 | -46.89 |
| 600 | 0.325 | -153.23 | 4.335 | 82.90 | 0.117 | 66.77 | 0.332 | -49.51 |
| 800 | 0.319 | -164.36 | 3.342 | 75.17 | 0.148 | 67.58 | 0.321 | -54.09 |
| 1000 | 0.321 | -173.02 | 2.760 | 68.51 | 0.181 | 67.37 | 0.321 | -59.12 |
| 1200 | 0.326 | -179.73 | 2.364 | 62.39 | 0.211 | 67.45 | 0.327 | -64.26 |
| 1400 | 0.336 | -174.71 | 2.089 | 57.19 | 0.249 | 66.65 | 0.337 | -70.42 |
| 1600 | 0.343 | -169.12 | 1.904 | 51.75 | 0.280 | 62.79 | 0.350 | -77.67 |
| 1800 | 0.349 | -164.16 | 1.741 | 46.76 | 0.300 | 62.41 | 0.361 | -82.73 |
| 2000 | 0.358 | -160.18 | 1.629 | 42.30 | 0.347 | 62.24 | 0.382 | -87.25 |

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S Parameters (Common emitter)

$V_{CE}=5V, I_C=15mA, Z_O=50\Omega$

| Freq(MHz) | S11 | $\angle S11$ | S21 | $\angle S21$ | S12 | $\angle S12$ | S22 | $\angle S22$ |
|-----------|-------|--------------|--------|--------------|-------|--------------|-------|--------------|
| 100 | 0.511 | -75.82 | 20.333 | 125.66 | 0.034 | 62.58 | 0.649 | -37.05 |
| 200 | 0.379 | -111.32 | 12.202 | 106.68 | 0.051 | 63.43 | 0.445 | -45.58 |
| 400 | 0.315 | -144.06 | 6.538 | 90.52 | 0.084 | 68.22 | 0.326 | -47.13 |
| 600 | 0.302 | -158.98 | 4.489 | 81.46 | 0.118 | 69.82 | 0.299 | -49.32 |
| 800 | 0.301 | -168.64 | 3.455 | 74.33 | 0.153 | 69.70 | 0.290 | -54.83 |
| 1000 | 0.307 | -176.32 | 2.857 | 67.93 | 0.186 | 68.77 | 0.296 | -60.27 |
| 1200 | 0.314 | 177.94 | 2.433 | 62.00 | 0.217 | 68.37 | 0.302 | -65.94 |
| 1400 | 0.322 | 172.88 | 2.153 | 57.01 | 0.256 | 66.71 | 0.311 | -71.94 |
| 1600 | 0.329 | 167.84 | 1.961 | 51.67 | 0.286 | 62.74 | 0.325 | -79.69 |
| 1800 | 0.337 | 163.07 | 1.792 | 46.79 | 0.308 | 61.86 | 0.337 | -84.37 |
| 2000 | 0.348 | 159.32 | 1.676 | 42.28 | 0.355 | 61.87 | 0.359 | -88.78 |

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

| Freq(MHz) | S11 | $\angle S11$ | S21 | $\angle S21$ | S12 | $\angle S12$ | S22 | $\angle S22$ |
|-----------|-------|--------------|--------|--------------|-------|--------------|-------|--------------|
| 100 | 0.461 | -82.96 | 21.657 | 121.91 | 0.031 | 64.47 | 0.600 | -39.22 |
| 200 | 0.346 | -118.63 | 12.582 | 104.09 | 0.049 | 64.74 | 0.406 | -46.06 |
| 400 | 0.299 | -149.09 | 6.669 | 89.15 | 0.084 | 70.72 | 0.302 | -46.24 |
| 600 | 0.293 | -162.67 | 4.554 | 80.67 | 0.118 | 71.64 | 0.283 | -49.39 |
| 800 | 0.295 | -171.32 | 3.503 | 73.57 | 0.153 | 70.77 | 0.275 | -54.70 |
| 1000 | 0.299 | -178.25 | 2.900 | 67.59 | 0.187 | 69.56 | 0.282 | -60.94 |
| 1200 | 0.307 | 176.25 | 2.468 | 61.65 | 0.221 | 68.70 | 0.290 | -66.45 |
| 1400 | 0.316 | 172.08 | 2.178 | 56.76 | 0.260 | 66.77 | 0.300 | -72.89 |
| 1600 | 0.325 | 166.77 | 1.988 | 51.53 | 0.290 | 62.70 | 0.316 | -80.43 |
| 1800 | 0.333 | 162.69 | 1.813 | 46.81 | 0.310 | 62.12 | 0.325 | -85.59 |
| 2000 | 0.343 | 158.91 | 1.692 | 42.30 | 0.357 | 61.46 | 0.347 | -89.65 |

$V_{CE}=5V, I_C=30mA, Z_O=50\Omega$

| Freq(MHz) | S11 | $\angle S11$ | S21 | $\angle S21$ | S12 | $\angle S12$ | S22 | $\angle S22$ |
|-----------|-------|--------------|--------|--------------|-------|--------------|-------|--------------|
| 100 | 0.399 | -93.89 | 22.859 | 117.43 | 0.029 | 65.09 | 0.537 | -40.85 |
| 200 | 0.317 | -127.93 | 12.830 | 101.25 | 0.045 | 68.93 | 0.364 | -45.35 |
| 400 | 0.289 | -154.90 | 6.712 | 87.64 | 0.082 | 71.95 | 0.281 | -44.97 |
| 600 | 0.288 | -166.40 | 4.587 | 79.56 | 0.119 | 72.93 | 0.266 | -48.17 |
| 800 | 0.293 | -174.03 | 3.524 | 72.71 | 0.155 | 72.01 | 0.262 | -54.35 |
| 1000 | 0.298 | 179.55 | 2.904 | 66.80 | 0.190 | 70.26 | 0.269 | -60.45 |
| 1200 | 0.306 | 174.88 | 2.478 | 61.04 | 0.223 | 69.29 | 0.279 | -66.19 |
| 1400 | 0.318 | 170.70 | 2.188 | 56.20 | 0.261 | 66.98 | 0.289 | -73.12 |
| 1600 | 0.327 | 165.85 | 1.992 | 50.94 | 0.292 | 63.01 | 0.305 | -80.46 |
| 1800 | 0.336 | 161.66 | 1.815 | 46.08 | 0.313 | 62.10 | 0.318 | -85.63 |
| 2000 | 0.347 | 158.15 | 1.699 | 41.95 | 0.358 | 61.22 | 0.337 | -90.00 |

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

| Freq(MHz) | S11 | $\angle S11$ | S21 | $\angle S21$ | S12 | $\angle S12$ | S22 | $\angle S22$ |
|-----------|-------|--------------|--------|--------------|-------|--------------|-------|--------------|
| 100 | 0.362 | -108.51 | 22.521 | 112.91 | 0.026 | 65.35 | 0.481 | -39.63 |
| 200 | 0.317 | -140.52 | 12.288 | 98.38 | 0.044 | 72.35 | 0.338 | -40.74 |
| 400 | 0.307 | -162.72 | 6.363 | 85.74 | 0.080 | 73.69 | 0.278 | -40.44 |
| 600 | 0.310 | -172.48 | 4.352 | 77.92 | 0.119 | 74.51 | 0.271 | -44.11 |
| 800 | 0.316 | -178.74 | 3.340 | 71.23 | 0.153 | 72.84 | 0.270 | -50.45 |
| 1000 | 0.324 | 175.82 | 2.762 | 65.12 | 0.189 | 71.55 | 0.280 | -57.21 |
| 1200 | 0.333 | 171.21 | 2.353 | 59.35 | 0.220 | 70.16 | 0.289 | -63.53 |
| 1400 | 0.345 | 167.33 | 2.077 | 54.36 | 0.260 | 68.28 | 0.300 | -70.35 |
| 1600 | 0.354 | 162.55 | 1.888 | 49.16 | 0.289 | 63.88 | 0.317 | -78.50 |
| 1800 | 0.363 | 158.67 | 1.725 | 44.33 | 0.313 | 63.21 | 0.330 | -83.35 |
| 2000 | 0.376 | 155.01 | 1.615 | 39.70 | 0.361 | 62.47 | 0.352 | -88.07 |

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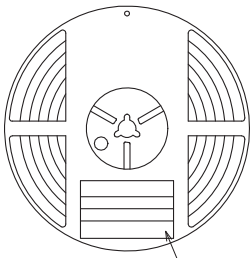
Embossed Taping Specification

55GN01CA-TB-E

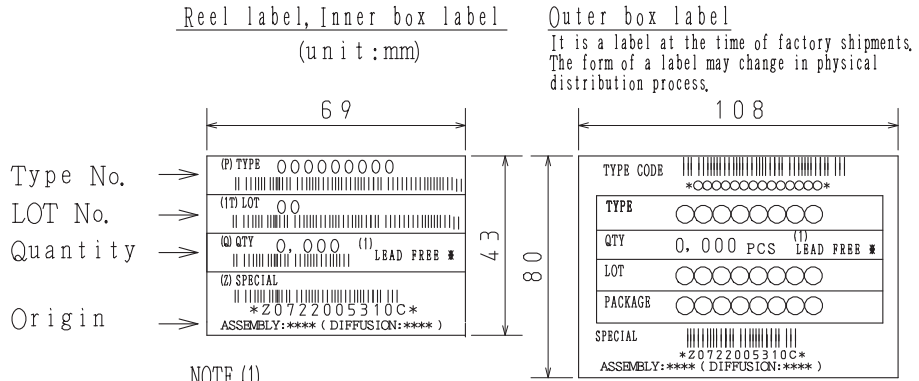
1. Packing Format

| 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



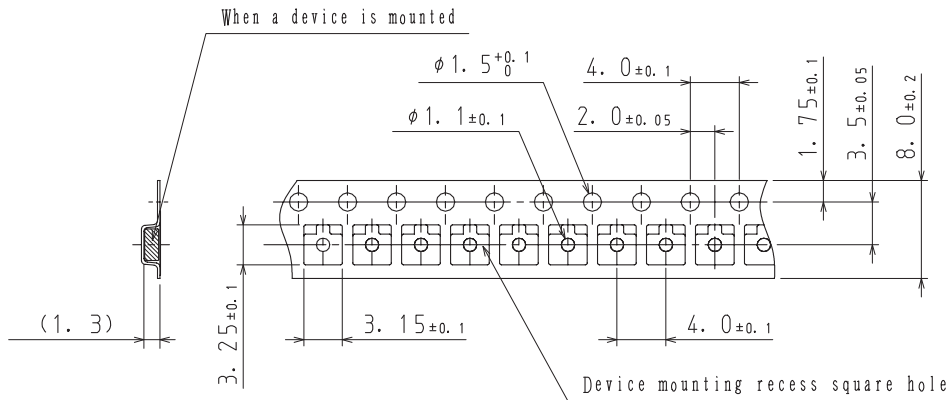
NOTE (1)

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

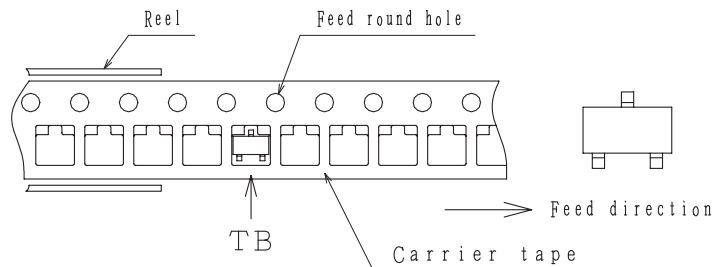
| Label | JEITA Phase |
|-------------|----------------|
| LEAD FREE 3 | JEITA Phase 3A |
| LEAD FREE 4 | JEITA Phase 3 |

2. Taping configuration

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



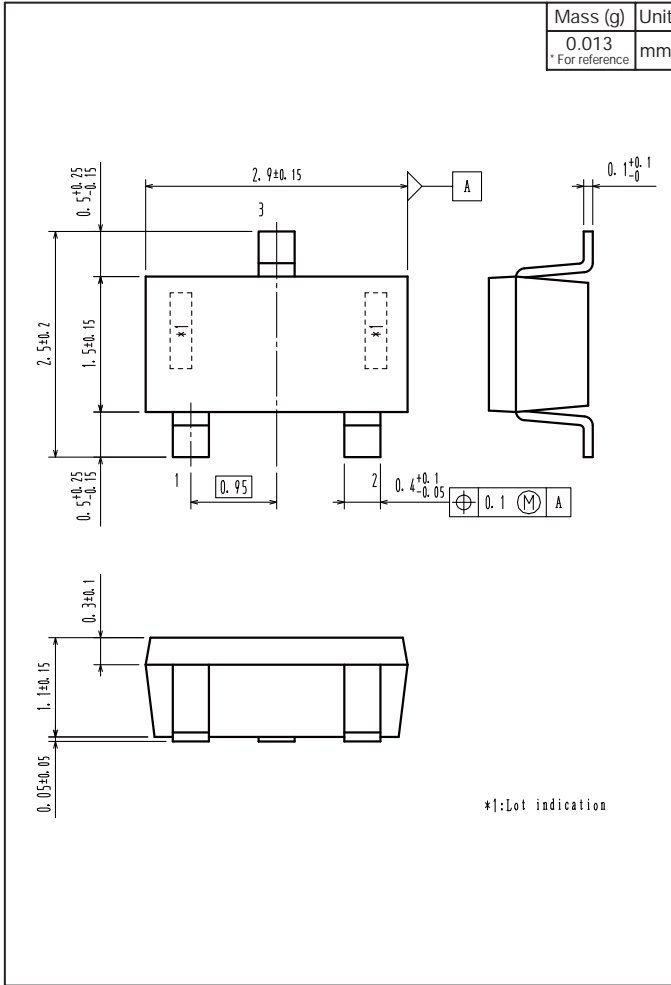
2-2. Device placement direction



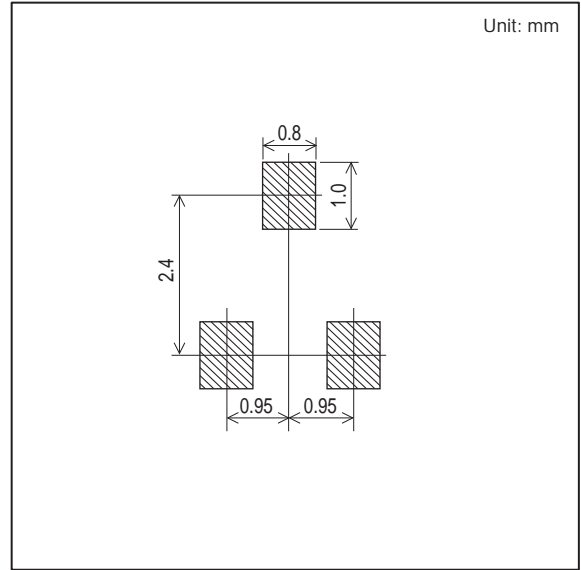
Those with one electrode terminal on the feed hole side.....TB

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Outline Drawing 55GN01CA-TB-E



Land Pattern Example



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