Ordering number : ENA1098A

SANYO Semiconductors

# DATA SHEET

An ON Semiconductor Company

NPN Epitaxial Planar Silicon Transistor

# 15GN01CA — VHF to UHF Band High-Frequency Switching, High-Frequency General-Purpose Amplifier Applications

## Features

- Small ON-resistance [Ron=2Ω ($I_B$=3mA)]
- Small output capacitance [Cob=1.2pF ($V_{CB}$=10V)]

## Specifications

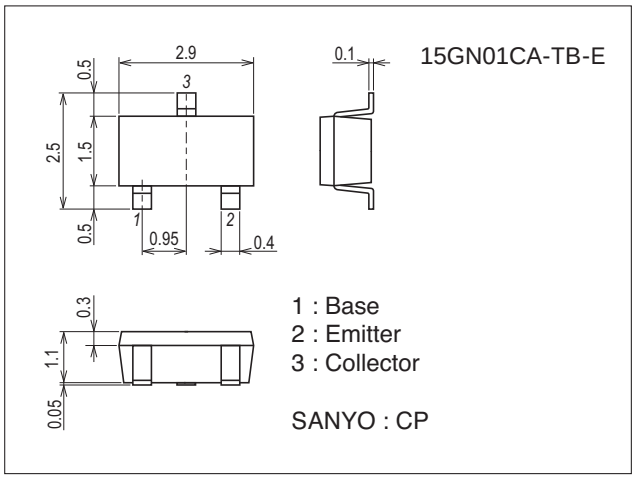
### Absolute Maximum Ratings at Ta=25°C

| Parameter | Symbol | Conditions | Ratings | Unit |
|---|---|---|---|---|
| Collector-to-Base Voltage | $V_{CBO}$ | | 15 | V |
| Collector-to-Emitter Voltage | $V_{CEO}$ | | 8 | V |
| Emitter-to-Base Voltage | $V_{EBO}$ | | 3 | V |
| Collector Current | $I_C$ | | 50 | mA |
| Collector Dissipation | $P_C$ | | 200 | mW |
| Junction Temperature | Tj | | 150 | °C |
| Storage Temperature | Tstg | | −55 to +150 | °C |

### Package Dimensions

unit : mm (typ)

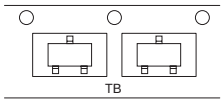
7013A-009



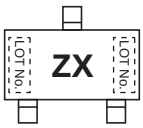

### Product & Package Information

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

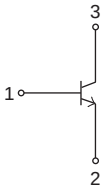
### Packing Type: TB




### Marking




### Electrical Connection

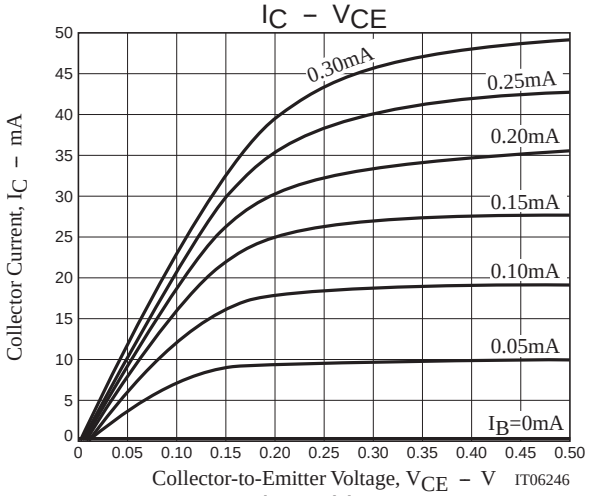


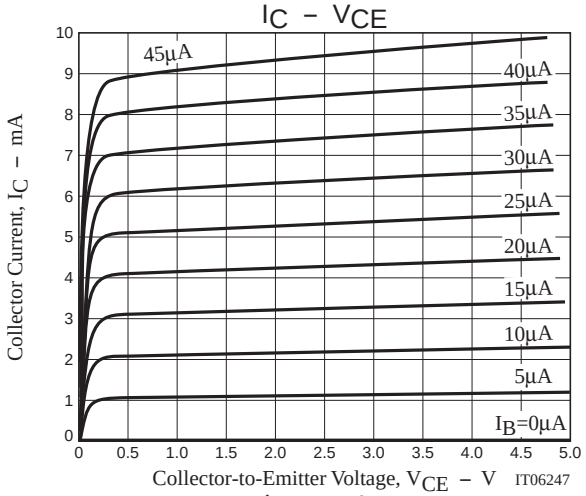
## Electrical Characteristics at Ta=25°C

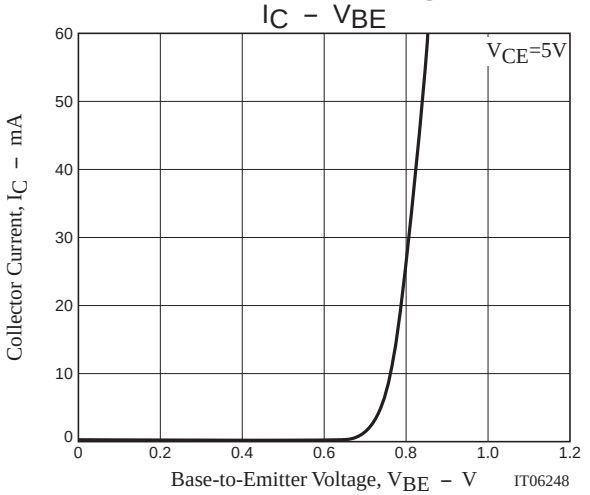
| Parameter | Symbol | Conditions | Ratings | | | Unit |
|---|---|---|---|---|---|---|
| | | | min | typ | max | |
| Collector Cutoff Current | $I_{CBO}$ | $V_{CB}$=10V, $I_E$=0A | | | 0.5 | μA |
| Emitter Cutoff Current | $I_{EBO}$ | $V_{EB}$=2V, $I_C$=0A | | | 0.5 | μA |
| DC Current Gain | $h_{FE}$ | $V_{CE}$=5V, $I_C$=10mA | 200 | | 400 | |
| Gain-Bandwidth Product | $f_T$ | $V_{CE}$=5V, $I_C$=10mA | 1.0 | 1.5 | | GHz |
| Output Capacitance | Cob | $V_{CB}$=10V, f=1MHz | | 1.2 | 1.6 | pF |
| Collector-to-Emitter Saturation Voltage | $V_{CE}$(sat) | $I_C$=20mA, $I_B$=2mA | | 0.06 | 0.12 | V |
| Output ON resistance | Ron | $I_B$=3mA, f=10kHz | | 2.0 | | Ω |

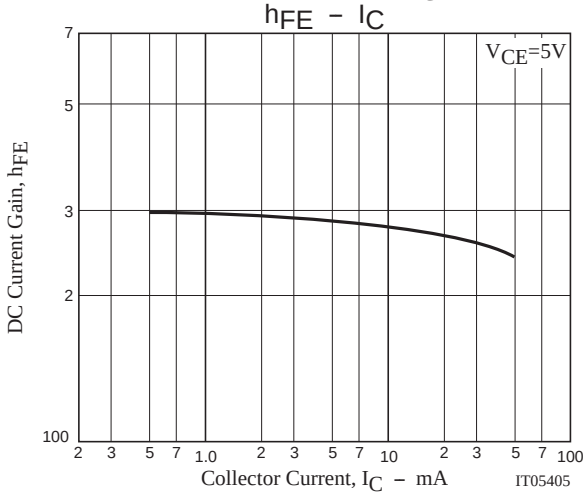
## Ordering Information

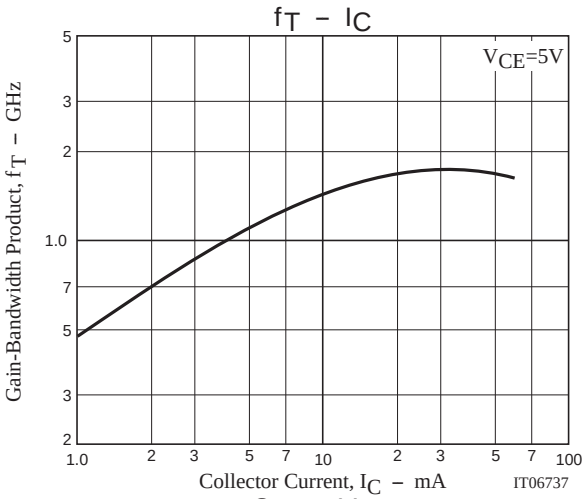
| Device | Package | Shipping | memo |
|---|---|---|---|
| 15GN01CA-TB-E | CP | 3,000pcs./reel | Pb Free |

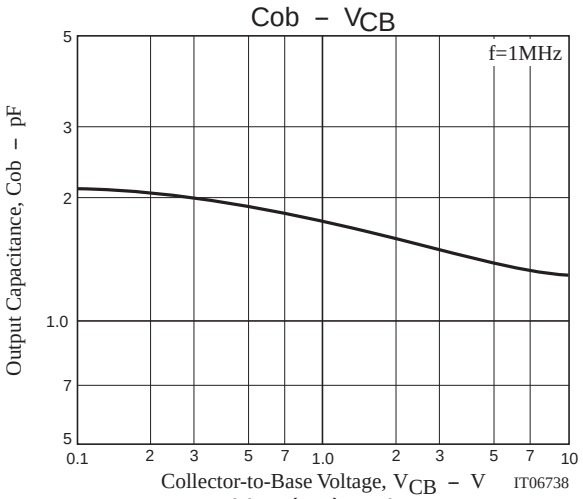


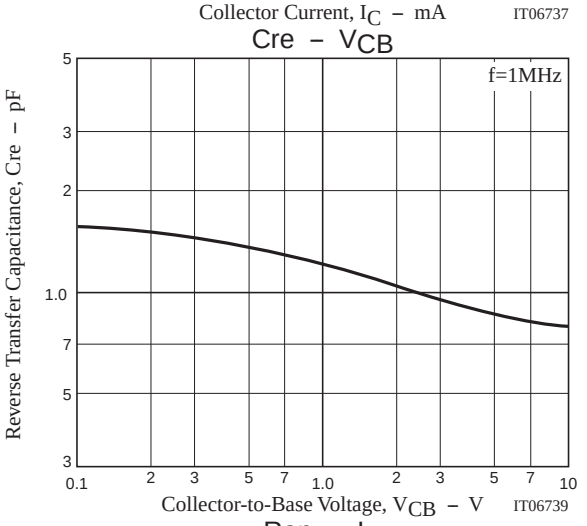



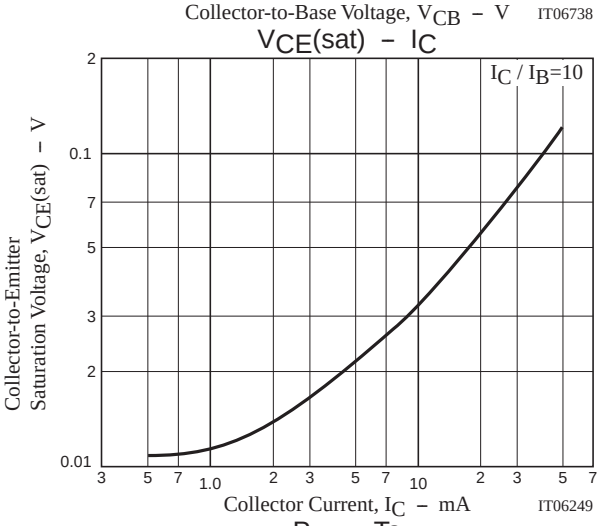



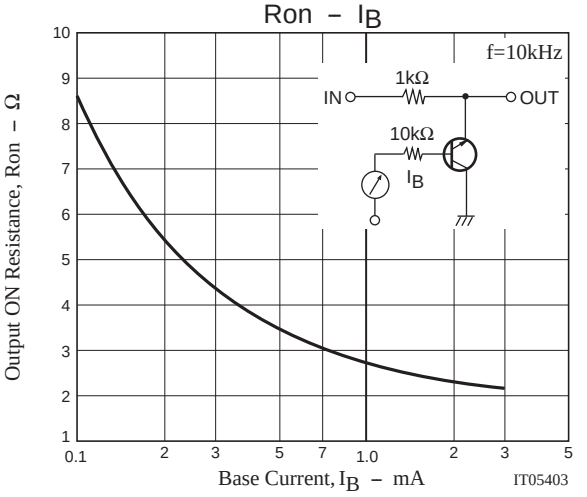



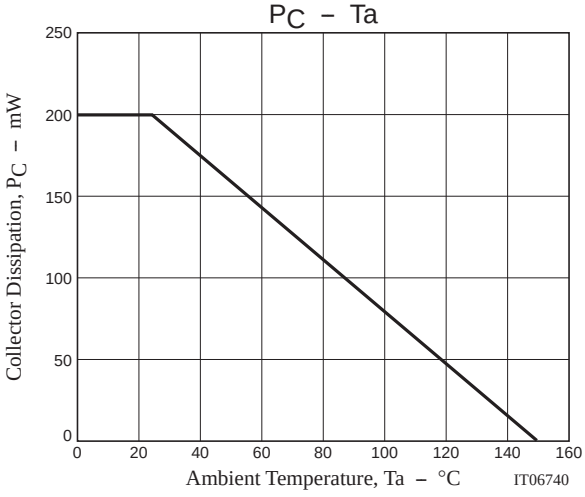

fT – IC
VCE=5V
Gain-Bandwidth Product, fT – GHz
Collector Current, IC – mA
IT06737


Cob – VCB
f=1MHz
Output Capacitance, Cob – pF
Collector-to-Base Voltage, VCB – V
IT06738


Cre – VCB
f=1MHz
Reverse Transfer Capacitance, Cre – pF
Collector-to-Base Voltage, VCB – V
IT06739


VCE(sat) – IC
IC / IB=10
Collector-to-Emitter Saturation Voltage, VCE(sat) – V
Collector Current, IC – mA
IT06249


Ron – IB
f=10kHz
1kΩ
IN
OUT
10kΩ
IB
Output ON Resistance, Ron – Ω
Base Current, IB – mA
IT05403


PC – Ta
Collector Dissipation, PC – mW
Ambient Temperature, Ta – °C
IT06740

**S Parameters (Common emitter)**

$V_{CE}$=5V, $I_C$=5mA, $Z_O$=50Ω

| Freq(MHz) | \|S11\| | ∠S11 | \|S21\| | ∠S21 | \|S12\| | ∠S12 | \|S22\| | ∠S22 |
|---|---|---|---|---|---|---|---|---|
| 100 | 0.650 | -26.84 | 4.392 | 121.74 | 0.029 | 71.26 | 0.776 | -10.73 |
| 200 | 0.554 | -37.39 | 2.798 | 110.97 | 0.050 | 66.90 | 0.737 | -14.52 |
| 300 | 0.494 | -47.15 | 2.148 | 103.12 | 0.070 | 63.30 | 0.720 | -18.26 |
| 400 | 0.444 | -56.64 | 1.787 | 96.10 | 0.087 | 61.98 | 0.708 | -22.11 |
| 500 | 0.406 | -65.32 | 1.537 | 89.48 | 0.101 | 59.57 | 0.697 | -25.85 |
| 600 | 0.377 | -73.55 | 1.369 | 83.71 | 0.113 | 57.85 | 0.691 | -29.52 |
| 700 | 0.348 | -83.03 | 1.245 | 77.82 | 0.126 | 56.52 | 0.687 | -33.29 |
| 800 | 0.325 | -90.95 | 1.137 | 72.30 | 0.137 | 54.57 | 0.684 | -37.14 |
| 900 | 0.306 | -99.25 | 1.058 | 67.12 | 0.148 | 53.75 | 0.682 | -40.75 |
| 1000 | 0.288 | -107.53 | 0.990 | 62.37 | 0.153 | 52.46 | 0.682 | -44.56 |

$V_{CE}$=5V, $I_C$=10mA, $Z_O$=50Ω

| Freq(MHz) | \|S11\| | ∠S11 | \|S21\| | ∠S21 | \|S12\| | ∠S12 | \|S22\| | ∠S22 |
|---|---|---|---|---|---|---|---|---|
| 100 | 0.583 | -32.15 | 6.240 | 118.82 | 0.026 | 70.44 | 0.703 | -12.56 |
| 200 | 0.482 | -45.75 | 3.926 | 108.10 | 0.046 | 66.49 | 0.659 | -15.99 |
| 300 | 0.419 | -57.88 | 2.944 | 99.96 | 0.063 | 65.05 | 0.637 | -19.29 |
| 400 | 0.368 | -69.02 | 2.390 | 92.67 | 0.078 | 62.34 | 0.624 | -22.85 |
| 500 | 0.336 | -79.50 | 2.027 | 86.17 | 0.092 | 61.46 | 0.615 | -26.37 |
| 600 | 0.310 | -89.29 | 1.769 | 80.51 | 0.103 | 60.64 | 0.610 | -29.81 |
| 700 | 0.291 | -99.92 | 1.586 | 74.79 | 0.114 | 59.47 | 0.606 | -33.39 |
| 800 | 0.274 | -108.75 | 1.441 | 69.42 | 0.125 | 58.90 | 0.605 | -37.06 |
| 900 | 0.262 | -118.49 | 1.317 | 64.61 | 0.135 | 57.84 | 0.605 | -40.43 |
| 1000 | 0.251 | -127.56 | 1.217 | 59.88 | 0.144 | 57.55 | 0.606 | -44.25 |

$V_{CE}$=5V, $I_C$=20mA, $Z_O$=50Ω

| Freq(MHz) | \|S11\| | ∠S11 | \|S21\| | ∠S21 | \|S12\| | ∠S12 | \|S22\| | ∠S22 |
|---|---|---|---|---|---|---|---|---|
| 100 | 0.513 | -40.12 | 8.263 | 115.87 | 0.025 | 68.95 | 0.625 | -14.43 |
| 200 | 0.407 | -57.84 | 5.054 | 104.00 | 0.043 | 68.30 | 0.576 | -17.14 |
| 300 | 0.347 | -73.04 | 3.701 | 95.34 | 0.056 | 66.04 | 0.557 | -19.89 |
| 400 | 0.303 | -87.02 | 2.936 | 87.98 | 0.071 | 64.63 | 0.545 | -22.91 |
| 500 | 0.281 | -98.99 | 2.433 | 81.63 | 0.083 | 64.43 | 0.538 | -26.26 |
| 600 | 0.266 | -110.32 | 2.091 | 76.17 | 0.095 | 63.54 | 0.537 | -29.36 |
| 700 | 0.257 | -122.12 | 1.853 | 70.61 | 0.106 | 63.34 | 0.536 | -33.02 |
| 800 | 0.248 | -131.81 | 1.662 | 65.60 | 0.117 | 62.91 | 0.538 | -36.53 |
| 900 | 0.244 | -141.38 | 1.504 | 60.76 | 0.128 | 62.37 | 0.538 | -39.95 |
| 1000 | 0.245 | -150.77 | 1.376 | 56.40 | 0.137 | 62.62 | 0.540 | -43.80 |

$V_{CE}$=5V, $I_C$=30mA, $Z_O$=50Ω

| Freq(MHz) | \|S11\| | ∠S11 | \|S21\| | ∠S21 | \|S12\| | ∠S12 | \|S22\| | ∠S22 |
|---|---|---|---|---|---|---|---|---|
| 100 | 0.471 | -46.44 | 9.316 | 113.49 | 0.025 | 70.19 | 0.582 | -15.62 |
| 200 | 0.368 | -67.17 | 5.557 | 100.99 | 0.040 | 68.06 | 0.532 | -17.38 |
| 300 | 0.313 | -84.43 | 3.987 | 92.10 | 0.053 | 66.90 | 0.516 | -19.75 |
| 400 | 0.280 | -100.24 | 3.124 | 84.66 | 0.067 | 65.61 | 0.506 | -22.58 |
| 500 | 0.265 | -112.71 | 2.570 | 78.56 | 0.080 | 66.29 | 0.504 | -25.96 |
| 600 | 0.256 | -124.16 | 2.191 | 73.18 | 0.092 | 65.10 | 0.502 | -29.15 |
| 700 | 0.255 | -135.95 | 1.921 | 67.77 | 0.103 | 66.41 | 0.502 | -32.85 |
| 800 | 0.252 | -145.81 | 1.714 | 62.74 | 0.113 | 65.20 | 0.506 | -36.31 |
| 900 | 0.254 | -154.35 | 1.544 | 58.35 | 0.125 | 65.56 | 0.508 | -39.87 |
| 1000 | 0.255 | -163.19 | 1.411 | 53.83 | 0.137 | 64.48 | 0.513 | -43.71 |

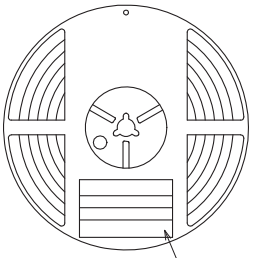
**Embossed Taping Specification**

15GN01CA-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<br>Dimensions:mm (external)<br>183×72×185 | 6 inner boxes contained<br>Dimensions:mm (external)<br>440×195×210 |

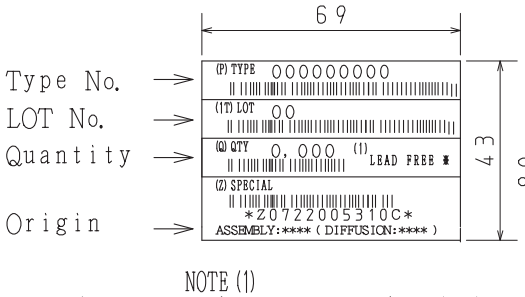
Packing method



Reel label

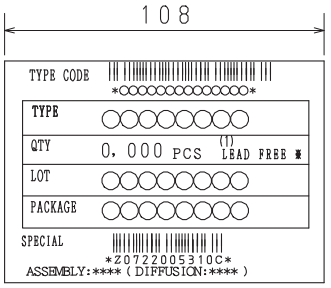
Reel label, Inner box label

(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.

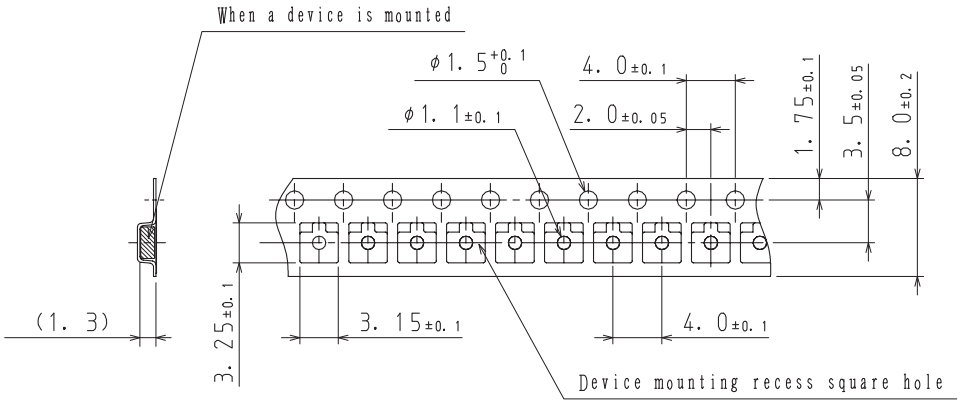



NOTE (1)
The LEAD FREE ※ description shows that the surface treatment of the terminal is lead free.

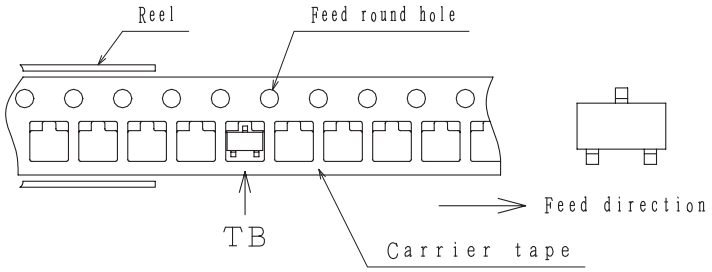
| Label | JEITA Phase |
|---|---|
| LEAD FREE 3 | JEITA Phase 3A |
| LEAD FREE 4 | JEITA Phase 3 |

## 2. Taping configuration

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



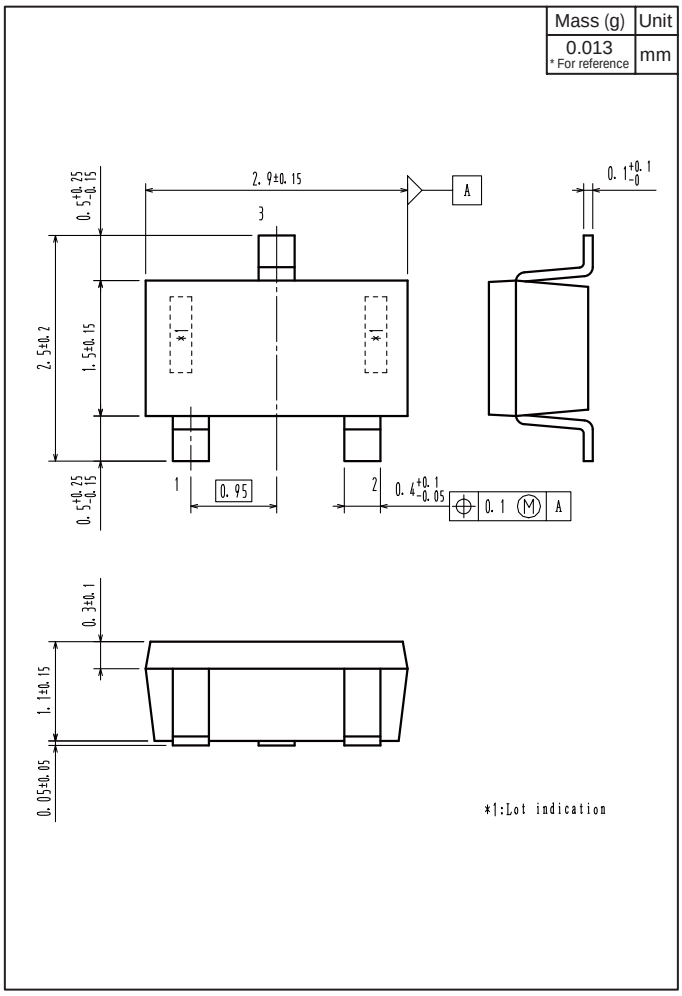

### 2-2. Device placement direction



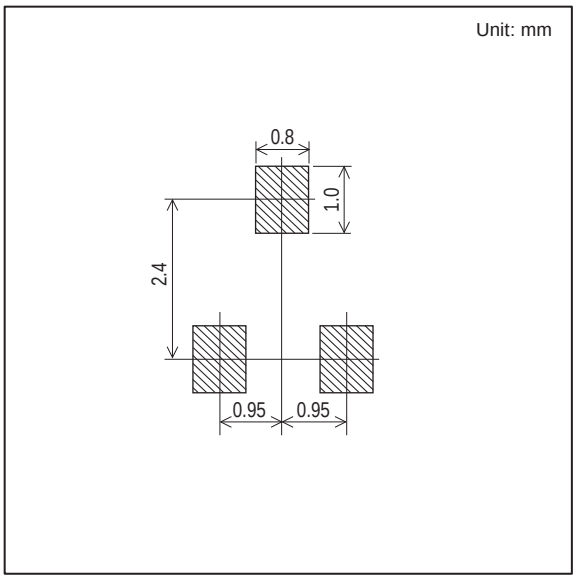

Those with one electrode terminal on the feed hole side……TB

## Outline Drawing

15GN01CA-TB-E




## Land Pattern Example



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