



# 2SA1770/2SC4614

## Bipolar Transistor

(-)160V, (-)1.5A, Low  $V_{CE(sat)}$ , (PNP)NPN Single NMP

ON Semiconductor®

<http://onsemi.com>

### Features

- Adoption of MBIT process
- High breakdown voltage and large current capacity

( )2SA1770

### Specifications

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

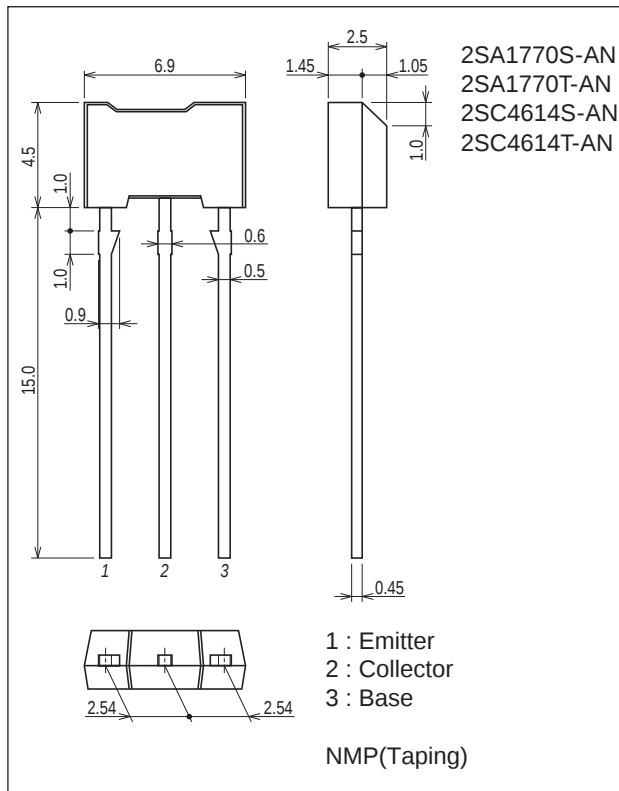
| Parameter                    | Symbol    | Conditions | Ratings     | Unit               |
|------------------------------|-----------|------------|-------------|--------------------|
| Collector-to-Base Voltage    | $V_{CBO}$ |            | (-)180      | V                  |
| Collector-to-Emitter Voltage | $V_{CEO}$ |            | (-)160      | V                  |
| Emitter-to-Base Voltage      | $V_{EBO}$ |            | (-)6        | V                  |
| Collector Current            | $I_C$     |            | (-)1.5      | A                  |
| Collector Current (Pulse)    | $I_{CP}$  |            | (-)2.5      | A                  |
| Collector Dissipation        | $P_C$     |            | 1           | W                  |
| 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)

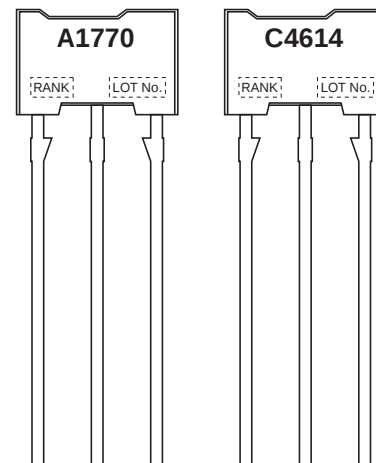
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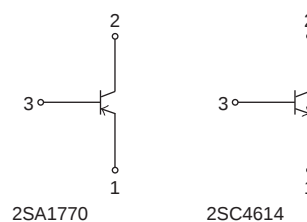
### Product & Package Information

- Package : NMP(Taping)
- JEITA, JEDEC : SC-71
- Minimum Packing Quantity : 2,500 pcs./box

### Marking(NMP(Taping))



### Electrical Connection



2SA1770 / 2SC4614

Electrical Characteristics at Ta=25°C

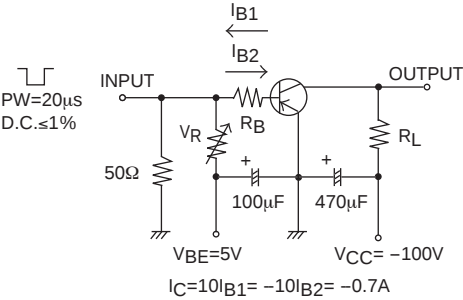
| Parameter                               | Symbol               | Conditions                                        | Ratings |           |           | Unit |
|-----------------------------------------|----------------------|---------------------------------------------------|---------|-----------|-----------|------|
|                                         |                      |                                                   | min     | typ       | max       |      |
| Collector Cutoff Current                | ICBO                 | V <sub>CB</sub> =(-)120V, I <sub>E</sub> =0A      |         |           | (-)1      | μA   |
| Emitter Cutoff Current                  | IEBO                 | V <sub>EB</sub> =(-)4V, I <sub>C</sub> =0A        |         |           | (-)1      | μA   |
| DC Current Gain                         | h <sub>FE1</sub>     | V <sub>CE</sub> =(-)5V, I <sub>C</sub> =(-)100mA  | 140*    |           | 400*      |      |
|                                         | h <sub>FE2</sub>     | V <sub>CE</sub> =(-)5V, I <sub>C</sub> =(-)10mA   | 80      |           |           |      |
| Gain-Bandwidth Product                  | f <sub>T</sub>       | V <sub>CE</sub> =(-)10V, I <sub>C</sub> =(-)50mA  |         | 120       |           | MHz  |
| Output Capacitance                      | Cob                  | V <sub>CB</sub> =(-)10V, f=1MHz                   |         | (22)14    |           | pF   |
| Collector-to-Emitter Saturation Voltage | V <sub>CE(sat)</sub> | I <sub>C</sub> =(-)500mA, I <sub>B</sub> =(-)50mA |         | (-200)130 | (-500)450 | mV   |
| Base-to-Emitter Saturation Voltage      | V <sub>BE(sat)</sub> |                                                   |         | (-)0.85   | (-)1.2    | V    |
| Collector-to-Base Breakdown Voltage     | V <sub>(BR)CBO</sub> | I <sub>C</sub> =(-)10μA, I <sub>E</sub> =0A       | (-)180  |           |           | V    |
| Collector-to-Emitter Breakdown Voltage  | V <sub>(BR)CEO</sub> | I <sub>C</sub> =(-)1mA, R <sub>BE</sub> =∞        | (-)160  |           |           | V    |
| Emitter-to-Base Breakdown Voltage       | V <sub>(BR)EBO</sub> | I <sub>E</sub> =(-)10μA, I <sub>C</sub> =0A       | (-)6    |           |           | V    |
| Turn-On Time                            | t <sub>on</sub>      | See specified Test Circuit.                       |         | 40(40)    |           | ns   |
| Storage Time                            | t <sub>stg</sub>     |                                                   |         | (0.7)1.2  |           | μs   |
| Fall Time                               | t <sub>f</sub>       |                                                   |         | (40)80    |           | ns   |

\* : The 2SA1770/2SC4614 are classified by 100mA h<sub>FE</sub> as follows :

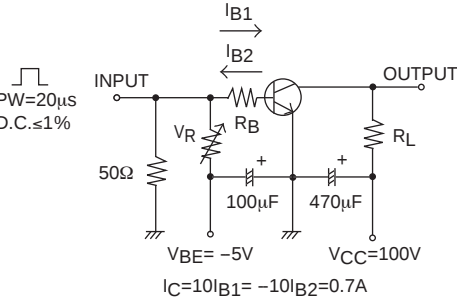
| Rank            | S          | T          |
|-----------------|------------|------------|
| h <sub>FE</sub> | 140 to 280 | 200 to 400 |

Switching Time Test Circuit

2SA1770

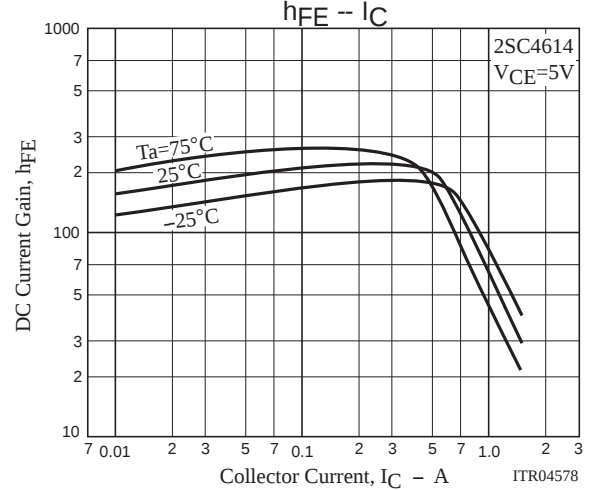
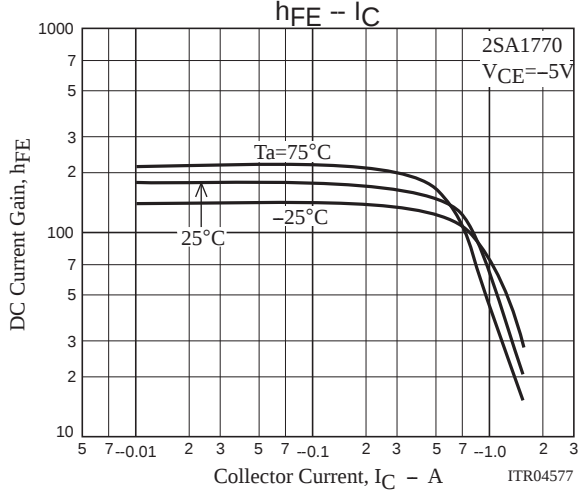
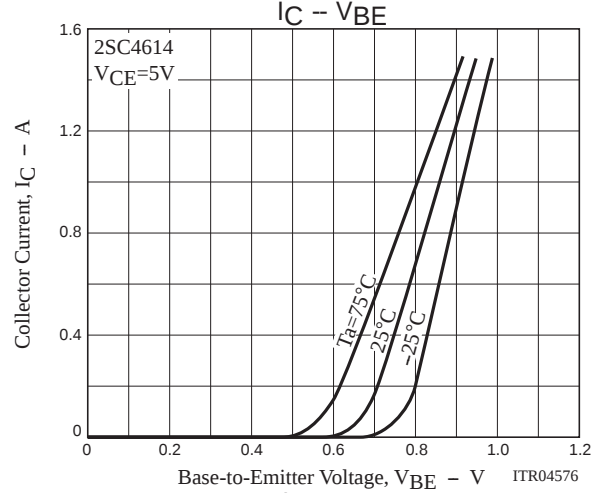
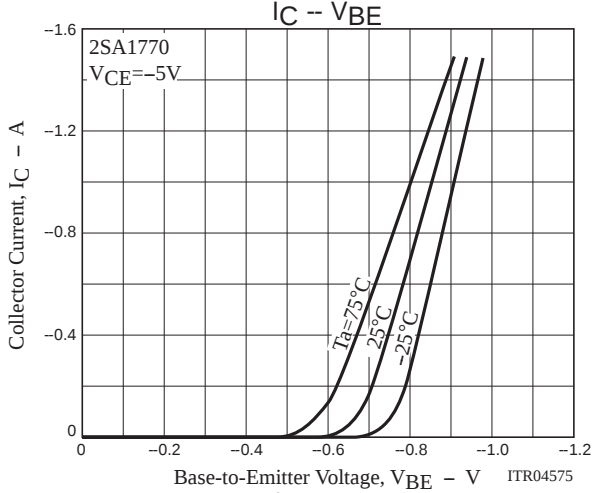
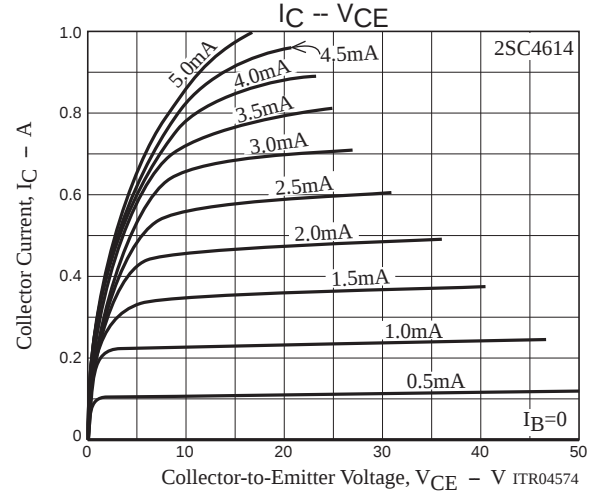
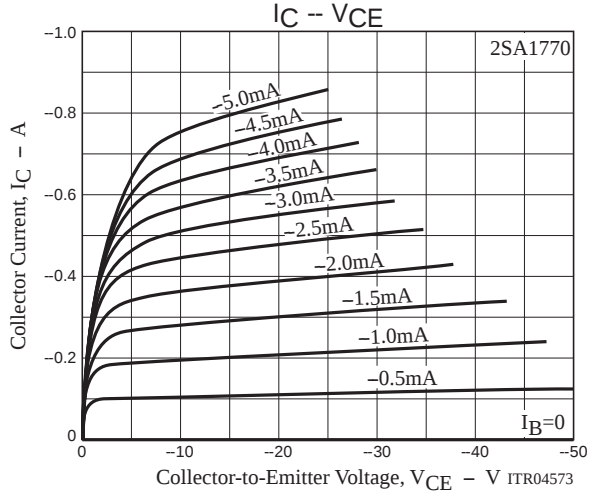
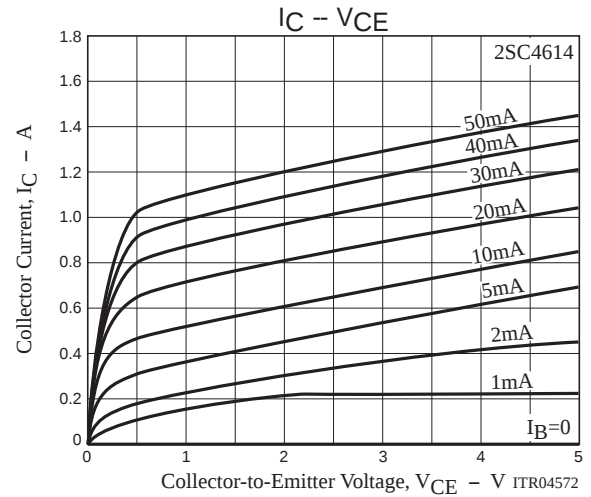
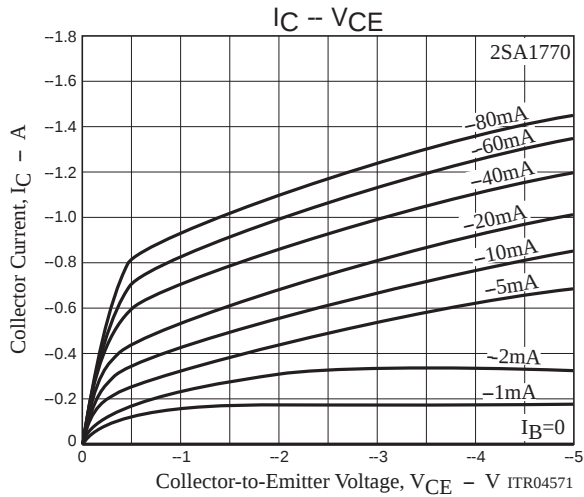


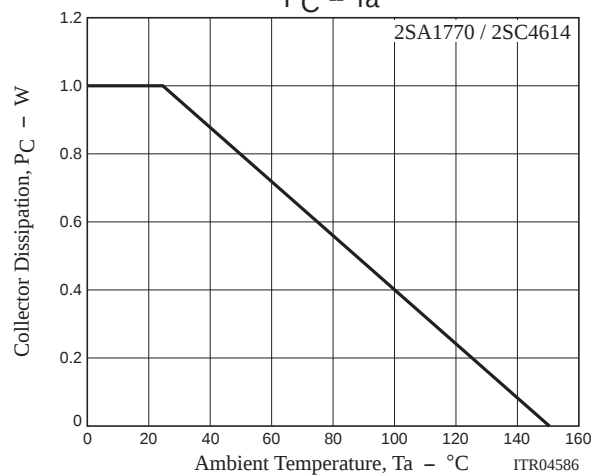
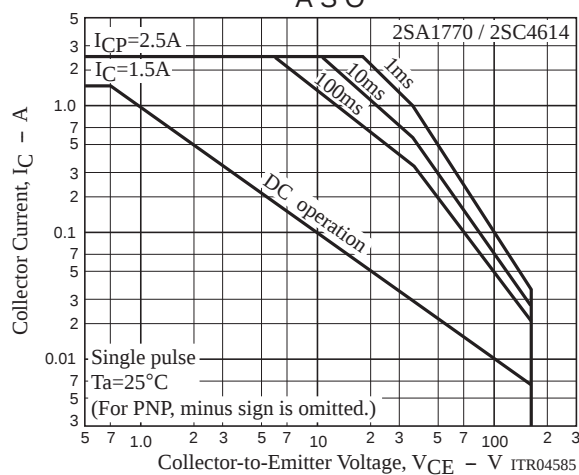
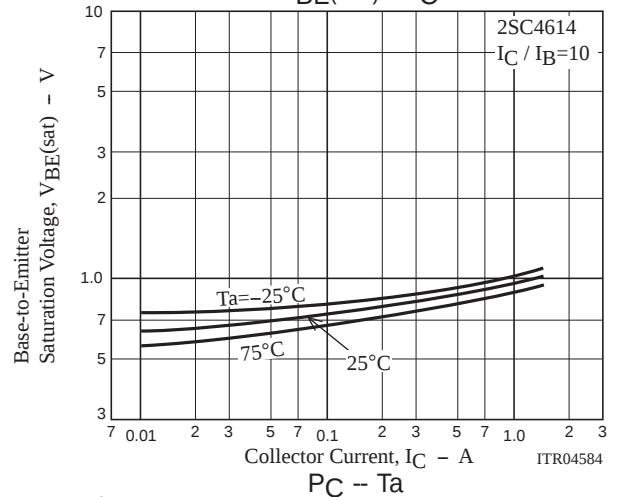
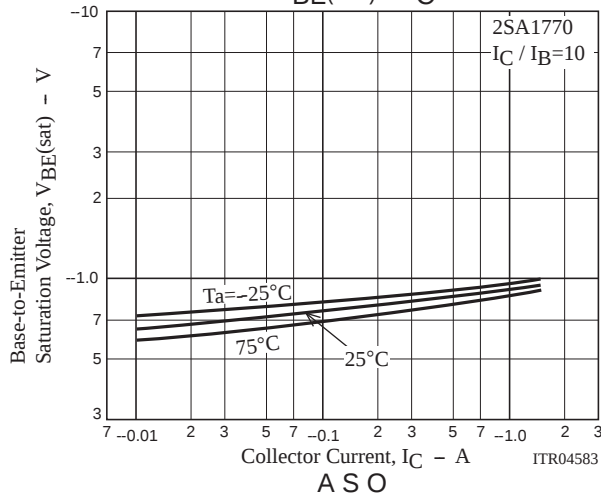
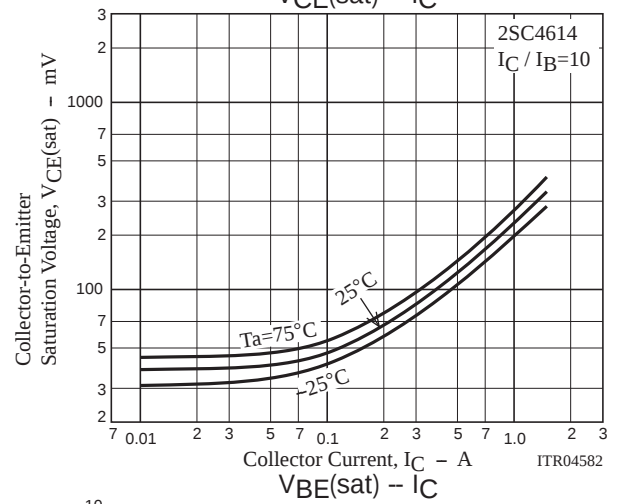
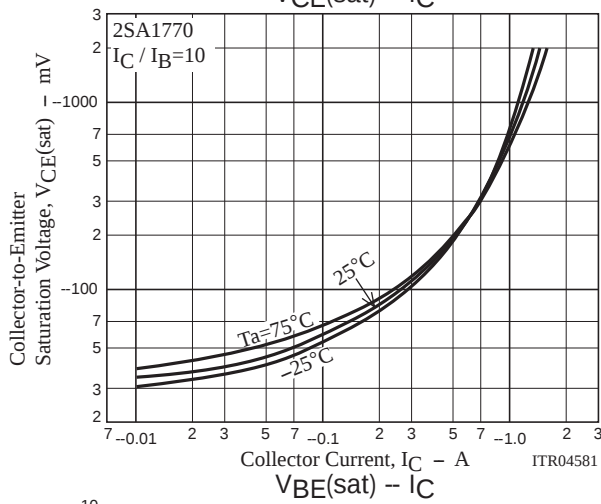
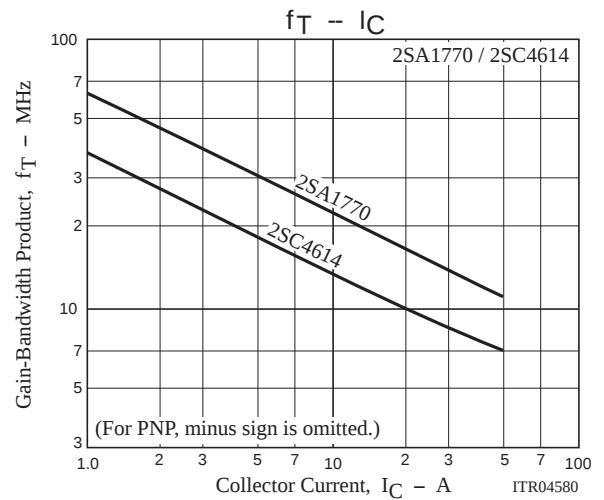
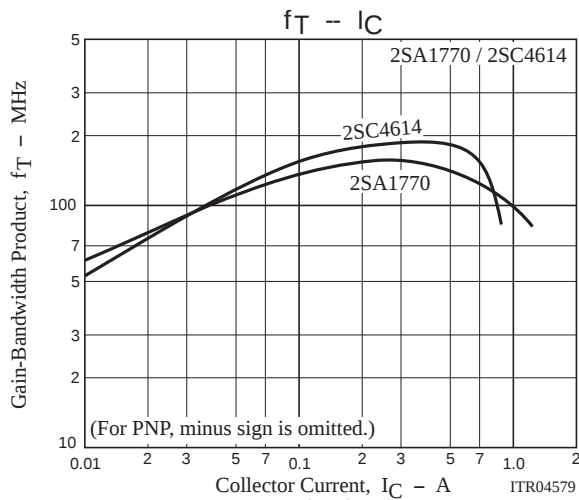
2SC4614



Ordering Information

| Device      | Package     | Shipping      | memo    |
|-------------|-------------|---------------|---------|
| 2SA1770S-AN | NMP(Taping) | 2,500pcs./box | Pb Free |
| 2SA1770T-AN | NMP(Taping) | 2,500pcs./box |         |
| 2SC4614S-AN | NMP(Taping) | 2,500pcs./box |         |
| 2SC4614T-AN | NMP(Taping) | 2,500pcs./box |         |





Bag Packing Specification

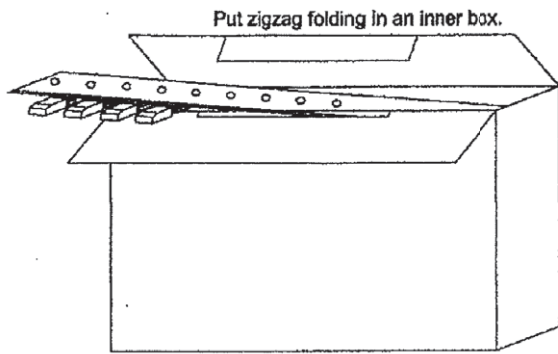
2SA1770S-AN, 2SA1770T-AN, 2SC4614S-AN, 2SC4614T-AN

NMP (Zigzag folding)

| Storage package Outline name | Package type | Maximum Number of devices contained (pcs.)              |                  | Packing format                                                                          |                                                                                         |
|------------------------------|--------------|---------------------------------------------------------|------------------|-----------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
|                              |              | Inner box No.                                           | Storage quantity | Outer box (C—6)                                                                         | Outer box (C—8)                                                                         |
| NMP                          | AN/AZ        | C—3<br>Inner box Dimensions :mm(external)<br>330×45×125 | 2,500            | 8 inner boxes contained(20,000pcs.)<br>Outer box Dimensions:mm(external)<br>585×345×195 | 4 inner boxes contained(10,000pcs.)<br>Outer box Dimensions:mm(external)<br>345×300×195 |

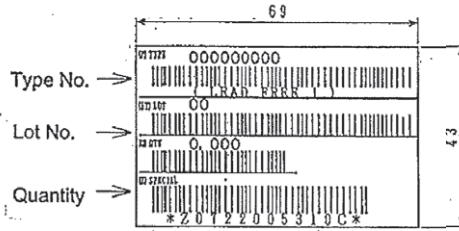
1. Packing format

Packing method



2. Bar code label

(Unit : mm)

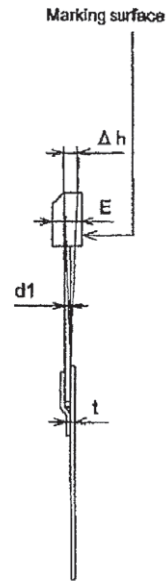
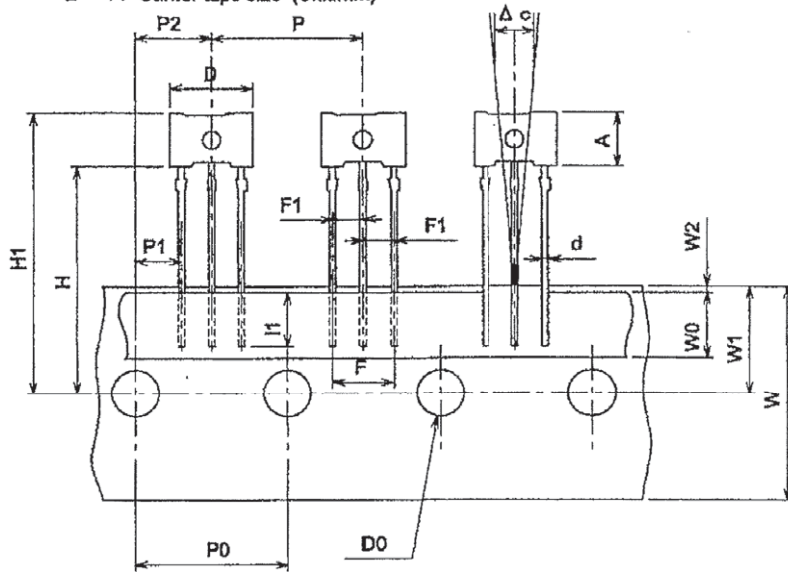


\*LEAD FREE 1:

Lead-free External terminal surface treatment product.

2. Taping specifications

2—1. Carrier tape size (Unit:mm)

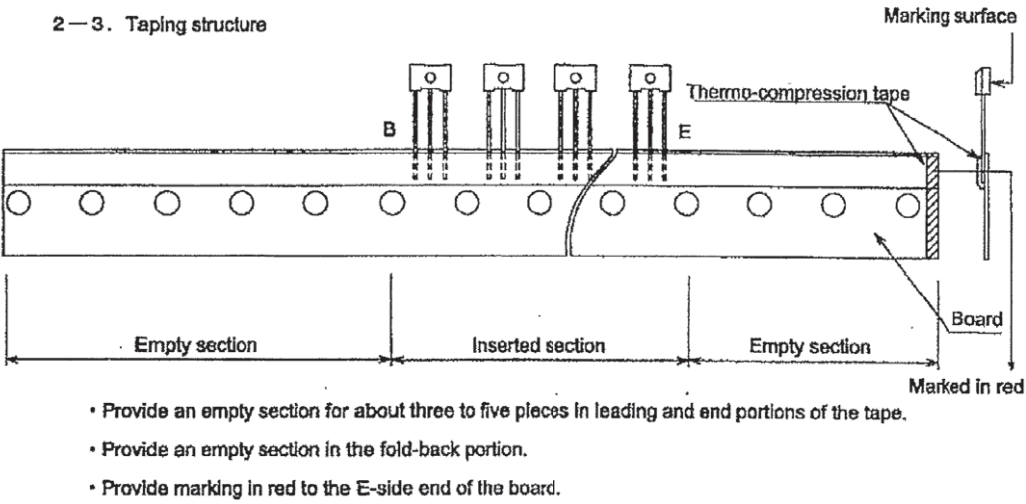


2—2. Taping size standard

| Item                            | Symbol | Standard | Tolerance    |
|---------------------------------|--------|----------|--------------|
| Work piece outside diameter     | D      | 6.9      | ±0.2         |
|                                 | E      | 2.5      | ±0.2         |
| Work piece height               | A      | 4.5      | ±0.2         |
| Lead wire diameter              | d      | 0.5      | ±0.1         |
| Lead wire thickness             | d1     | 0.45     | ±0.1         |
| Bonded lead wire                | I1     | 3.0MIN   |              |
| Pitch between products          | P      | 12.7     | ±0.5         |
| Pitch between perforations      | P0     | 12.7     | ±0.2         |
| Total pitch for 21 perforations | P0×20  | 254.0    | ±1.0         |
| Distance between lead wire      | F      | 5.0      | +0.8<br>-0.2 |
| Lead wire pitch distance        | F1     | 2.54     | +0.4<br>-0.1 |
| Displacement of perforations    | P1     | 3.81     | ±0.3         |
|                                 | P2     | 6.35     | ±0.3         |
| Displacement of tape            | W2     | 0~0.5    |              |

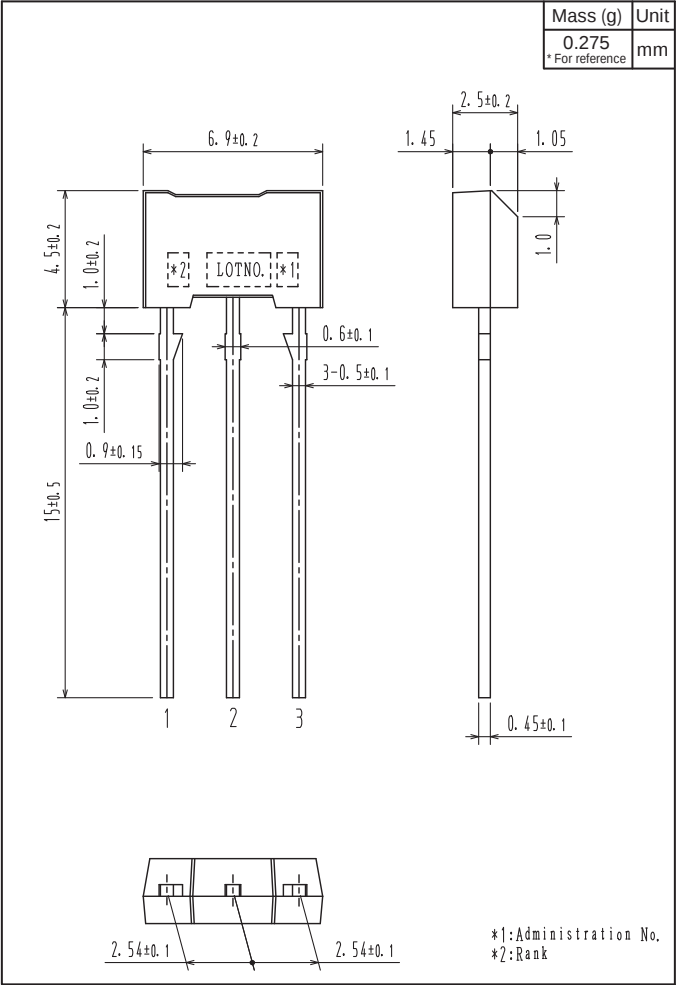
Unit:mm

| Item                               | Symbol | Standard | Tolerance    |
|------------------------------------|--------|----------|--------------|
| Tape width                         | W      | 18.0     | ±0.5         |
| Adhesive tape                      | W0     | 6.0      | ±0.5         |
| Displacement of perforations       | W1     | 9.0      | ±0.5         |
| Work piece bottom surface position | H      | 19.0     | +1.0<br>-0.5 |
| Work piece upper limit position    | H1     | 23.5     | ±1.0         |
| Perforations diameter              | D0     | φ4.0     | ±0.2         |
| Tape thickness (total thickness)   | t      | 0.6      | ±0.2         |
| Product inclination                | Δc     | 0        | ±0.7         |
| Product inclination                | Δh     | 0        | ±1.0         |



Outline Drawing

2SA1770S-AN, 2SA1770T-AN, 2SC4614S-AN, 2SC4614T-AN



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