



SANYO Semiconductors

DATA SHEET

An ON Semiconductor Company

2SD1012 — NPN Epitaxial Planar Silicon Transistor

Low-Voltage Large-Current Amplifier Applications

Specifications

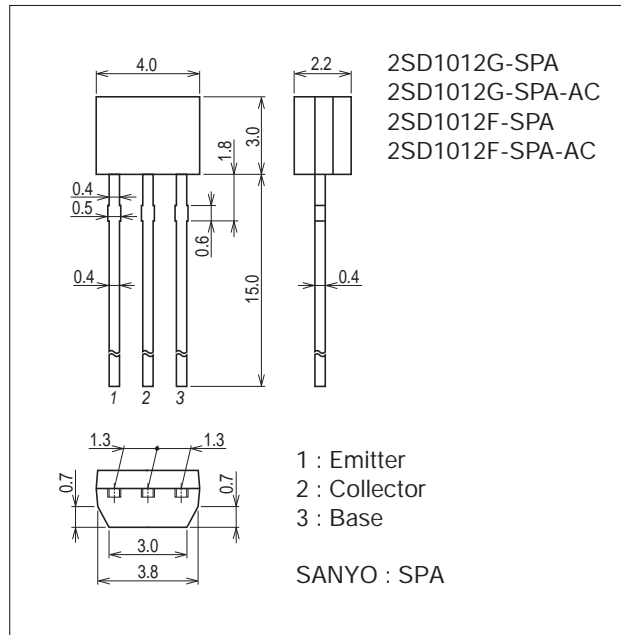
Absolute Maximum Ratings at $T_a=25^\circ\text{C}$

| Parameter | Symbol | Conditions | Ratings | Unit |
|------------------------------|-----------|------------|-------------|------------------|
| Collector-to-Base Voltage | V_{CB0} | | 20 | V |
| Collector-to-Emitter Voltage | V_{CE0} | | 15 | V |
| Emitter-to-Base Voltage | V_{EB0} | | 5 | V |
| Collector Current | I_C | | 0.7 | A |
| Collector Current (Pulse) | I_{CP} | | 1.5 | A |
| Collector Dissipation | P_C | | 250 | mW |
| Junction Temperature | T_j | | 125 | $^\circ\text{C}$ |
| Storage Temperature | T_{stg} | | -55 to +125 | $^\circ\text{C}$ |

Package Dimensions

unit : mm (typ)

7524-004



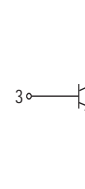
Product & Package Information

- Package : SPA
- JEITA, JEDEC : SC-72
- Minimum Packing Quantity : 2,500 pcs./box, 500pcs./bag

Marking



Electrical Connection



2SD1012

Electrical Characteristics at Ta=25°C

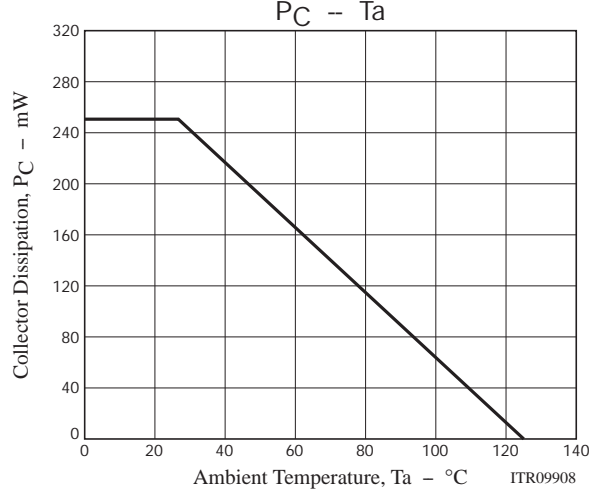
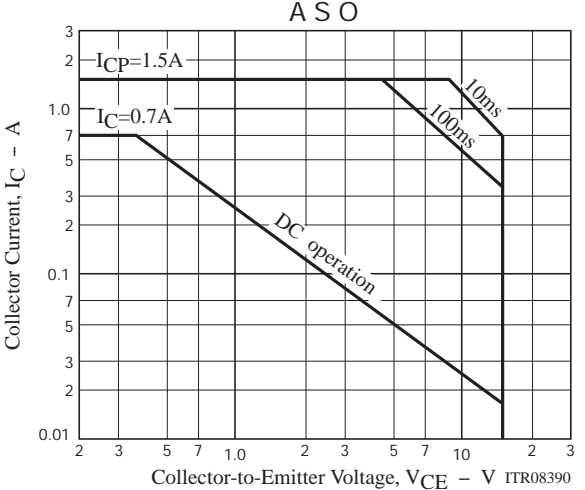
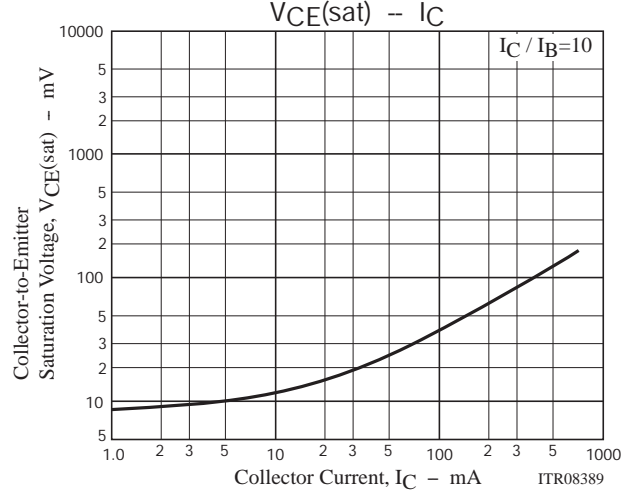
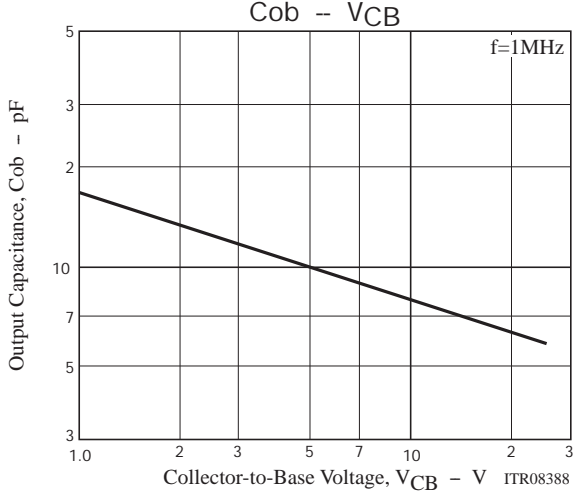
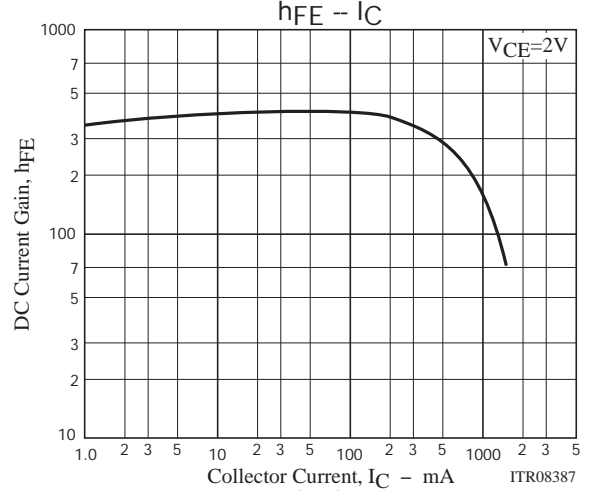
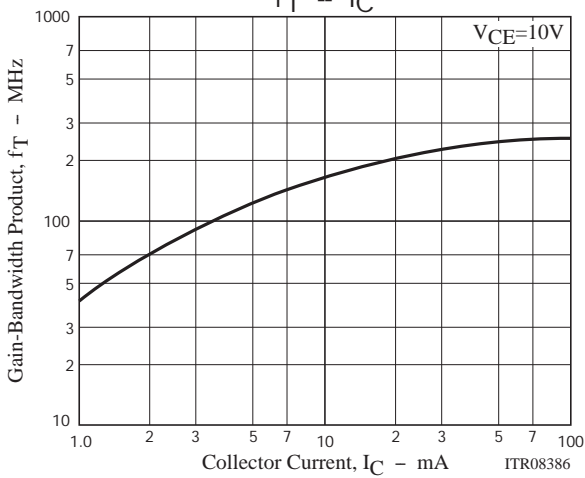
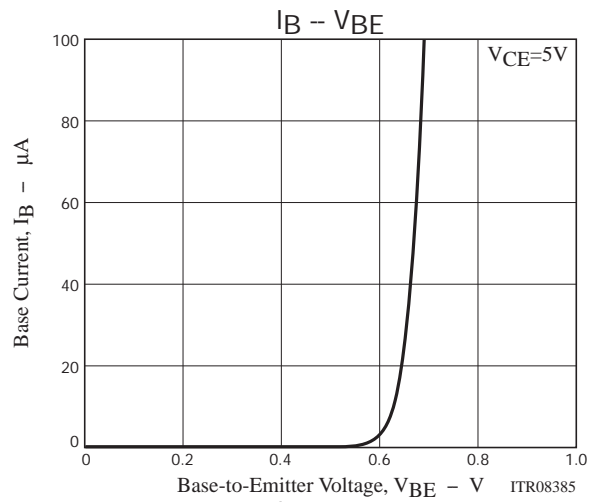
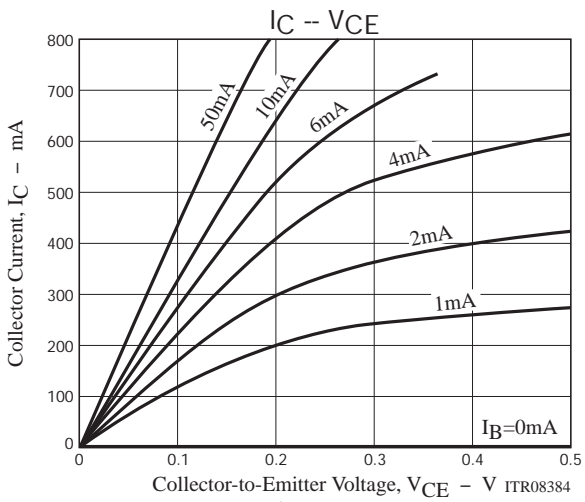
| Parameter | Symbol | Conditions | Ratings | | | Unit |
|---|-----------------------|--|---------|-----|------|------|
| | | | min | typ | max | |
| Collector Cutoff Current | ICBO | V _{CB} =15V, I _E =0A | | | 1.0 | μA |
| Emitter Cutoff Current | IEBO | V _{EB} =4V, I _C =0A | | | 1.0 | μA |
| DC Current Gain | h _{FE1} | V _{CE} =2V, I _C =50mA | 160* | | 960* | |
| | h _{FE2} | V _{CE} =2V, I _C =500mA Pulse | 80 | | | |
| Gain-Bandwidth Product | f _T | V _{CE} =10V, I _C =50mA | | 250 | | MHz |
| Common Base Output Capacitance | Cob | V _{CB} =10V, f=1MHz | | 8 | | pF |
| Collector-to-Emitter Saturation Voltage | V _{CE(sat)1} | I _C =5mA, I _B =0.5mA | | 10 | 25 | mV |
| | V _{CE(sat)2} | I _C =100mA, I _B =10mA | | 30 | 80 | mV |
| Base-to-Emitter Saturation Voltage | V _{BE(sat)} | I _C =100mA, I _B =10mA | | 0.8 | 1.2 | V |
| Collector-to-Base Breakdown Voltage | V(BR)CBO | I _C =10μA, I _E =0A | 20 | | | V |
| Collector-to-Emitter Breakdown Voltage | V(BR)CEO | I _C =1mA, R _{BE} =∞ | 15 | | | V |
| Emitter-to-Base Breakdown Voltage | V(BR)EBO | I _E =10μA, I _C =0A | 5 | | | V |

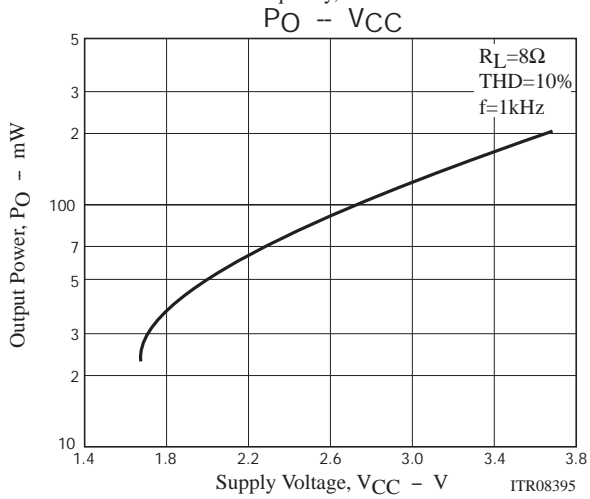
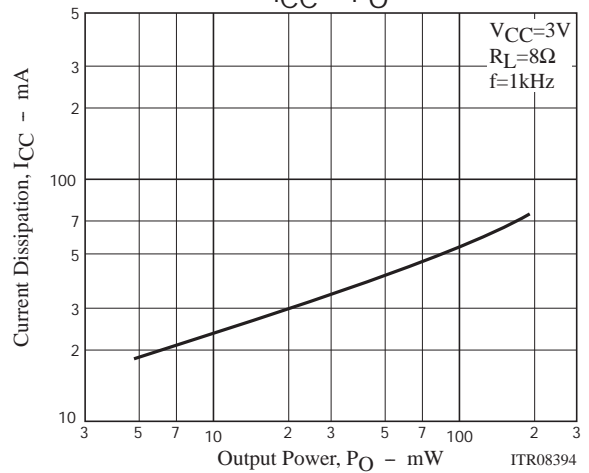
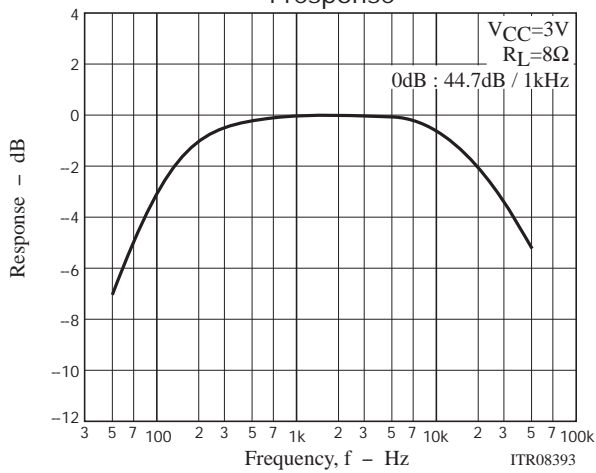
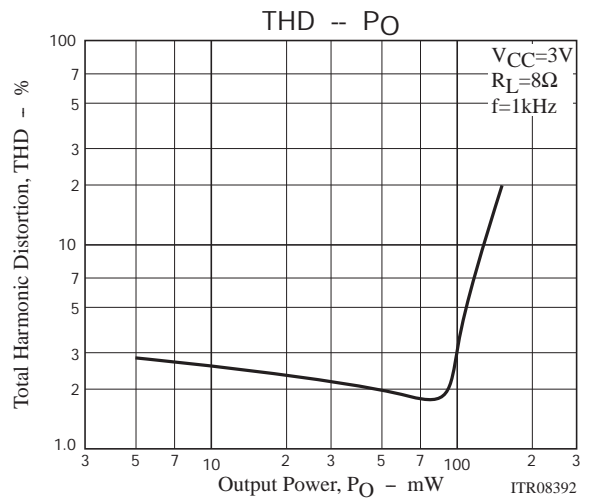
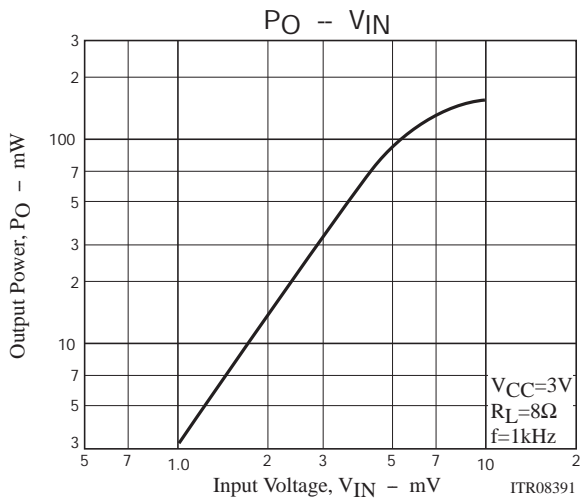
* : The 2SD1012 is classified by 50mA h_{FE} as follows :

| Rank | F | G | H |
|-----------------|------------|------------|------------|
| h _{FE} | 160 to 320 | 280 to 560 | 480 to 960 |

Ordering Information

| Device | Package | Shipping | memo |
|-----------------|---------|---------------|---------|
| 2SD1012G-SPA | SPA | 500pcs./bag | Pb Free |
| 2SD1012G-SPA-AC | SPA-WA | 2,500pcs./box | |
| 2SD1012F-SPA | SPA | 500pcs./bag | |
| 2SD1012F-SPA-AC | SPA-WA | 2,500pcs./box | |





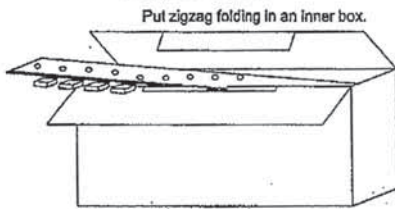
Taping Specification

2SD1012G-SPA-AC, 2SD1012F-SPA-AC

| 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) |
| SPA | A C | C-2 Inner box Dimensions :mm(external) 330×45×145 | 2,500 | 16 inner boxes contained(40,000pcs.) Outer box Dimensions:mm(external) 585×345×200 | 8 inner boxes contained(20,000pcs.) Outer box Dimensions:mm(external) 345×300×200 |
| | A L | C-2 Inner box Dimensions :mm(external) 330×45×145 | 2,400 | 16 inner boxes contained(38,400pcs.) Outer box Dimensions:mm(external) 585×345×200 | 8 inner boxes contained(19,200pcs.) Outer box Dimensions:mm(internal) 345×300×200 |
| | A P | C-4 Inner box Dimensions :mm(external) 330×45×285 | 5,000 | 8 inner boxes contained(40,000pcs.) Outer box Dimensions:mm(external) 585×345×200 | 4 inner boxes contained(20,000pcs.) Outer box Dimensions:mm(internal) 345×300×200 |
| | A S | C-2 Inner box Dimensions :mm(external) 330×45×145 | 1,200 | 16 inner boxes contained(9,200pcs.) Outer box Dimensions:mm(external) 585×345×200 | 8 inner boxes contained(9,600 pcs.) Outer box Dimensions:mm(internal) 345×300×200 |

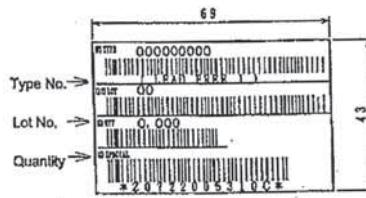
1. Packing format

Packing method



Sample bar code label

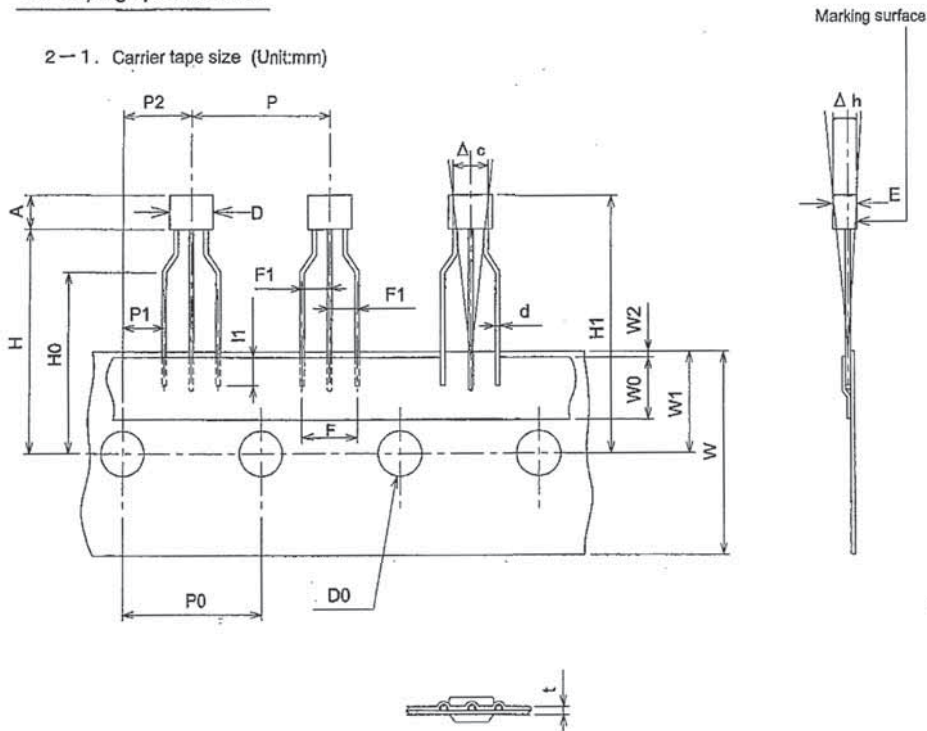
(Unit : mm)



*LEAD FREE 1 :
Lead-free external terminal surface treatment product.

2. Taping specifications

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



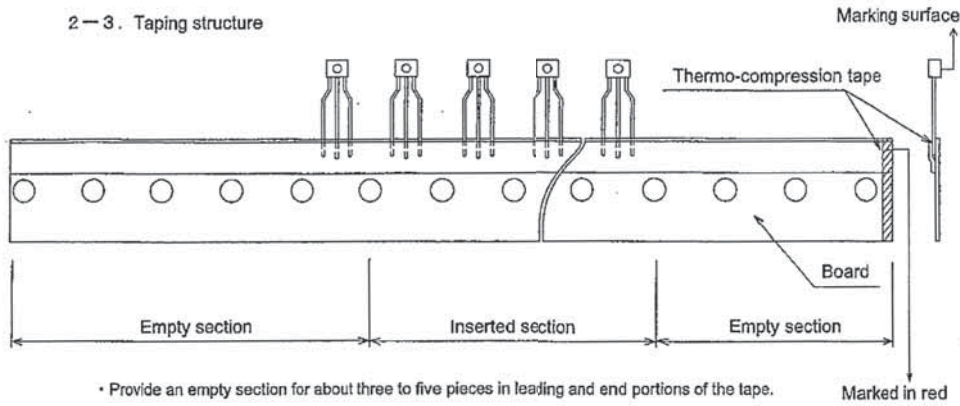
2-2. Taping size standard

Unit:mm

| Item | Symbol | Standard | Tolerance |
|---------------------------------|---------|-------------|---|
| Work piece outside diameter | D | 4.0 | ±0.2 |
| | E | 2.2 | ±0.2 |
| Work piece height | A | 3.0 | ±0.2 |
| Lead wire diameter | d | 0.4 × 0.4 t | ±0.1 |
| Bonded lead wire | l1 | 2.5MIN | |
| Pitch between products | P | 12.7 | ±1.0 |
| 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 -0.2 |
| Lead wire pitch distance | F1 | 2.5 | +0.4 -0.1 |
| Product inclination | Δ h | 0 | ±2.0 |
| Displacement of perforations | P1 | 3.85 | ±0.3 |
| | P2 | 6.35 | ±0.3 |
| Displacement of tape | W2 | 0.5MAX | Not to be displaced to the outside of the board |

| Item | Symbol | Standard | Tolerance |
|------------------------------------|--------|----------|---------------|
| Tape width | W | 18.0 | +1.0 -0.5 |
| Adhesive tape | W0 | 6.0 | ±1.0 |
| Displacement of perforations | W1 | 9.0 | +0.75 -0.5 |
| Work piece bottom surface position | H | 19.8 | +1.0 -0.3 |
| Lead wire clinch height | H0 | 16.0 | ±0.5 |
| Work piece upper limit position | H1 | 22.8 | ±1.5 |
| Perforations diameter | D0 | φ 4.0 | ±0.2 |
| Tape thickness (total thickness) | t | 0.6 | ±0.2 |
| Product inclination | Δ c | 0 | ±1.0 |

2-3. Taping structure



- Provide an empty section for about three to five pieces in leading and end portions of the tape.
- Provide marking in red to the E-side end of the board.

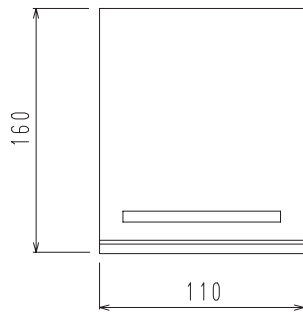
Bag Packing Specification

2SD1012G-SPA, 2SD1012F-SPA

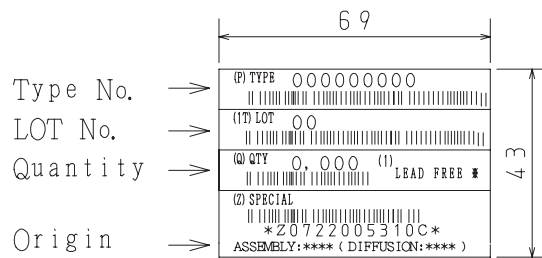
1. Packing Format

| Package Name | Maximum Number of devices contained (pcs) | | | | |
|---|---|------------|------------|-------------|-------------|
| | Bag | Inner BOX | | Outer BOX | |
| SPA | 500 | B-1 | B-1/2 | A-1 | A-2 |
| | | 20,000 | 10,000 | 100,000 | 60,000 |
| Packing format (Dimensions:mm (external)) | | | | | |
| | | Inner BOX | | Outer BOX | |
| | | B-1 | B-1/2 | A-1 | A-2 |
| | | 445×225×55 | 445×225×55 | 470×250×300 | 470×250×190 |

2. Bag dimensions
(unit:mm)

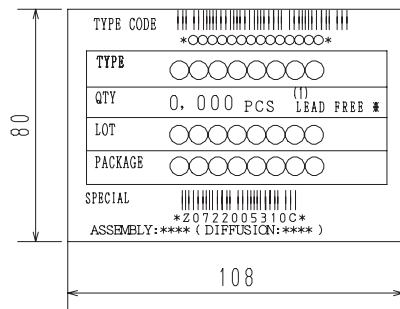


3. Bag label, Inner box label
(unit:mm)



4. Outer box label
(unit:mm)

It is a label at the time of factory shipments. The form of a label may change in physical distribution process.



NOTE (1)

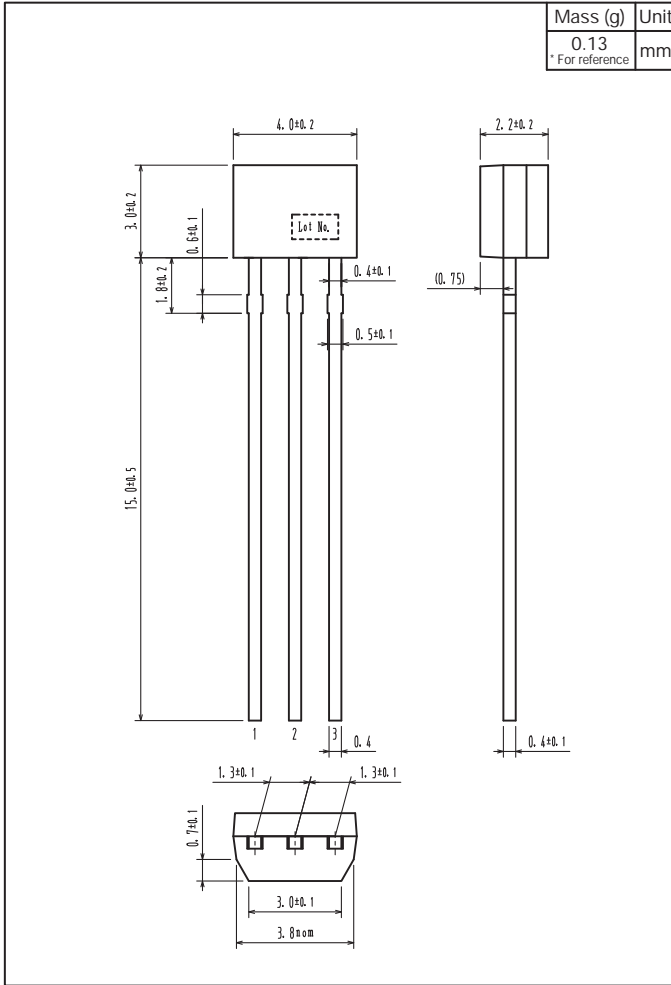
The LEAD FREE * description shows that the surface treatment of the terminal is lead free.

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

2SD1012

Outline Drawing

2SD1012G-SPA, 2SD1012F-SPA



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