



# 2SB1143/2SD1683

## Bipolar Transistor

(-50V, (-)4A, Low  $V_{CE(sat)}$ , (PNP)NPN Single TO-126ML

ON Semiconductor®

<http://onsemi.com>

### Applications

- Voltage regulators, relay drivers, lamp drivers, electrical equipment

### Features

- Adoption of FBET, MBIT processes
- Large current capacity and wide ASO
- Low saturation voltage

### Specifications ( ) : 2SB1143

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

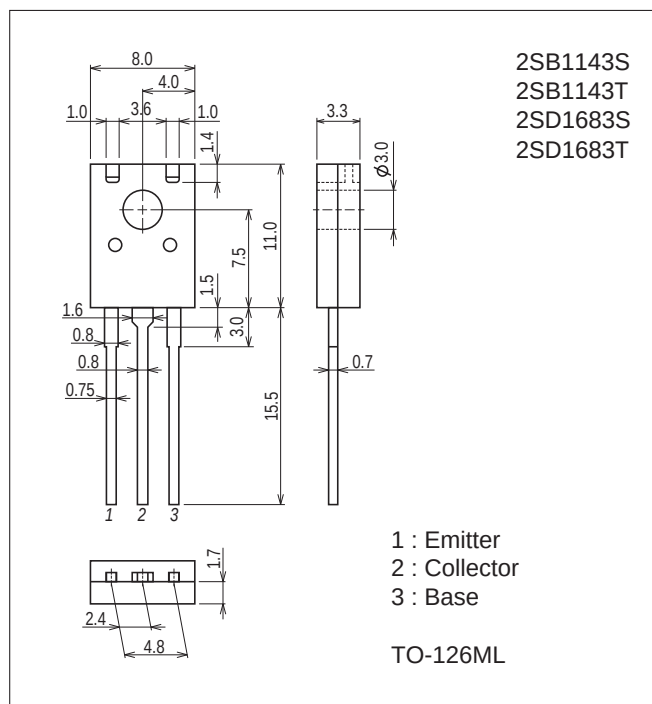
| Parameter                    | Symbol    | Conditions             | Ratings     | Unit             |
|------------------------------|-----------|------------------------|-------------|------------------|
| Collector-to-Base Voltage    | $V_{CBO}$ |                        | (-)60       | V                |
| Collector-to-Emitter Voltage | $V_{CEO}$ |                        | (-)50       | V                |
| Emitter-to-Base Voltage      | $V_{EBO}$ |                        | (-)6        | V                |
| Collector Current            | $I_C$     |                        | (-)4        | A                |
| Collector Current (Pulse)    | $I_{CP}$  |                        | (-)6        | A                |
| Collector Dissipation        | $P_C$     |                        | 1.5         | W                |
|                              |           | $T_c=25^\circ\text{C}$ | 10          | 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)

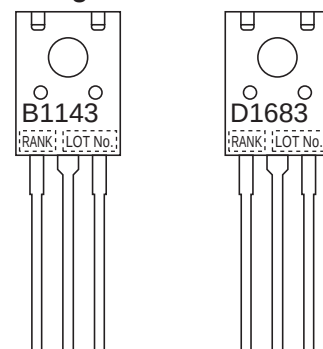
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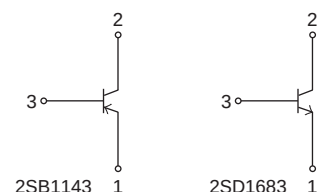
### Product & Package Information

- Package : TO-126ML
- JEITA, JEDEC : TO-126
- Minimum Packing Quantity : 200 pcs./bag

### Marking



### Electrical Connection



## 2SB1143 / 2SD1683

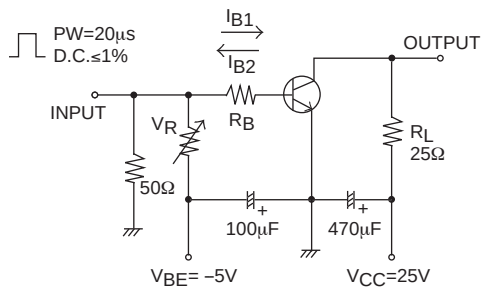
### Electrical Characteristics at Ta=25°C

| Parameter                               | Symbol        | Conditions                   | Ratings |           |           | Unit    |
|-----------------------------------------|---------------|------------------------------|---------|-----------|-----------|---------|
|                                         |               |                              | min     | typ       | max       |         |
| Collector Cutoff Current                | $I_{CBO}$     | $V_{CB}=(-)40V, I_E=0A$      |         |           | $(-)1$    | $\mu A$ |
| Emitter Cutoff Current                  | $I_{EBO}$     | $V_{EB}=(-)4V, I_C=0A$       |         |           | $(-)1$    | $\mu A$ |
| DC Current Gain                         | $h_{FE1}$     | $V_{CE}=(-)2V, I_C=(-)100mA$ | 100*    |           | 560*      |         |
|                                         | $h_{FE2}$     | $V_{CE}=(-)2V, I_C=(-)3A$    | 40      |           |           |         |
| Gain-Bandwidth Product                  | $f_T$         | $V_{CE}=(-)10V, I_C=(-)50mA$ |         | 150       |           | MHz     |
| Output Capacitance                      | $C_{ob}$      | $V_{CB}=(-)10V, f=1MHz$      |         | (39)25    |           | pF      |
| Collector-to-Emitter Saturation Voltage | $V_{CE(sat)}$ | $I_C=(-)2A, I_B=(-)100mA$    |         | (-350)190 | (-700)500 | mV      |
| Base-to-Emitter Saturation Voltage      | $V_{BE(sat)}$ | $I_C=(-)2A, I_B=(-)100mA$    |         | (-)0.94   | (-)1.2    | V       |
| Collector-to-Base Breakdown Voltage     | $V_{(BR)CBO}$ | $I_C=(-)10\mu A, I_E=0A$     | (-)60   |           |           | V       |
| Collector-to-Emitter Breakdown Voltage  | $V_{(BR)CEO}$ | $I_C=(-)1mA, R_{BE}=\infty$  | (-)50   |           |           | V       |
| Emitter-to-Base Breakdown Voltage       | $V_{(BR)EBO}$ | $I_E=(-)10\mu A, I_C=0A$     | (-)6    |           |           | V       |
| Turn-On Time                            | $t_{on}$      | See specified Test Circuit.  |         | (70)70    |           | ns      |
| Storage Time                            | $t_{stg}$     |                              |         | (450)650  |           | ns      |
| Fall Time                               | $t_f$         |                              |         | (30)35    |           | ns      |

\* : The 2SB1143/2SD1683 are classified by 100mA  $h_{FE}$  as follows :

| Rank     | R          | S          | T          | U          |
|----------|------------|------------|------------|------------|
| $h_{FE}$ | 100 to 200 | 140 to 280 | 200 to 400 | 280 to 560 |

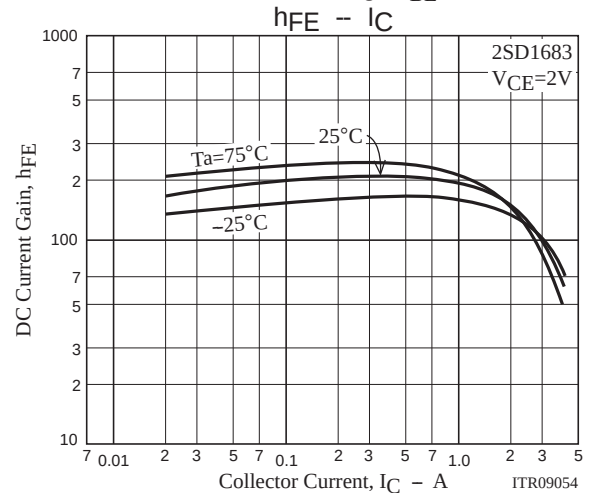
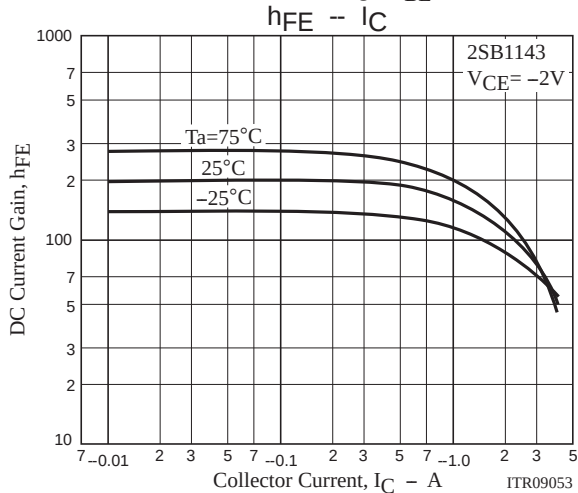
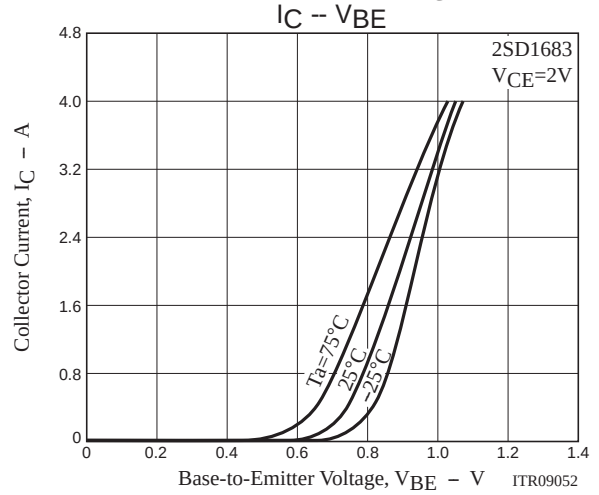
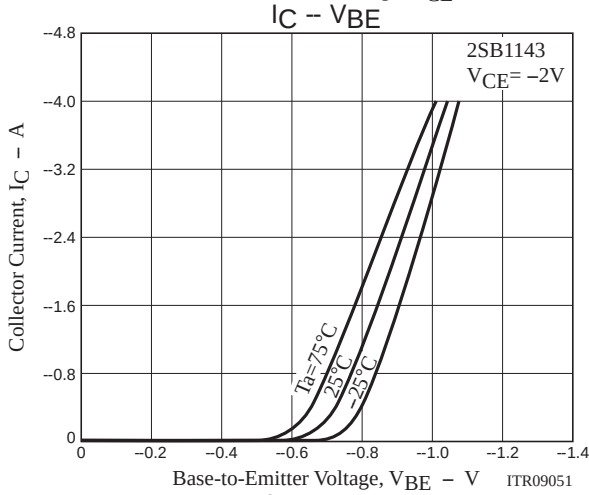
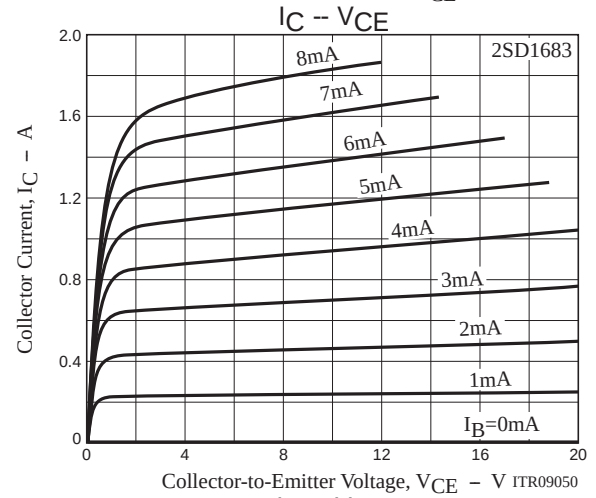
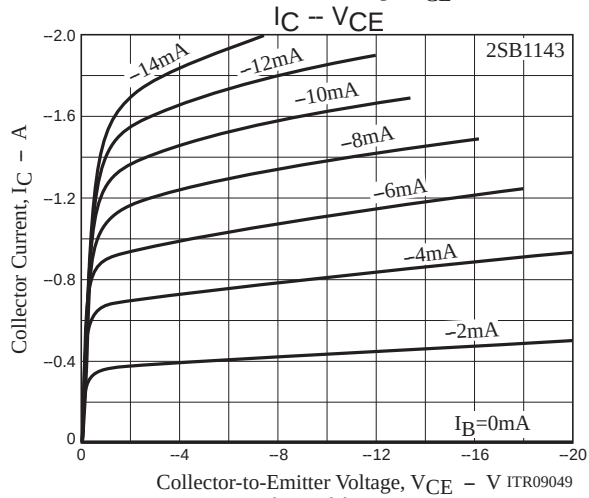
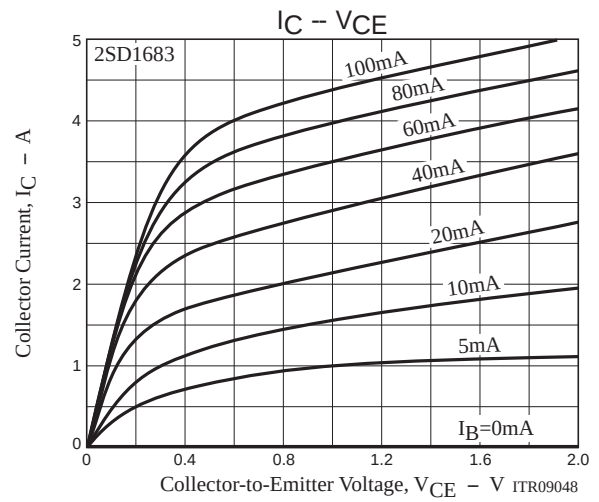
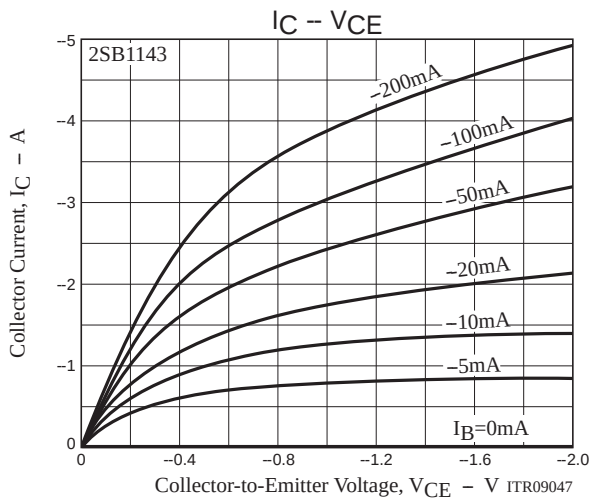
### Switching Time Test Circuit

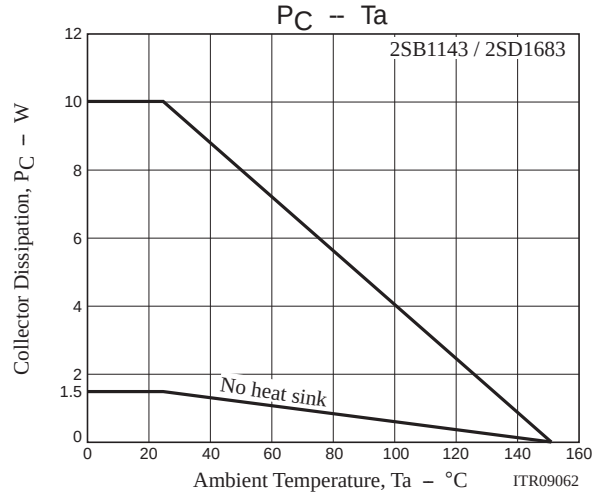
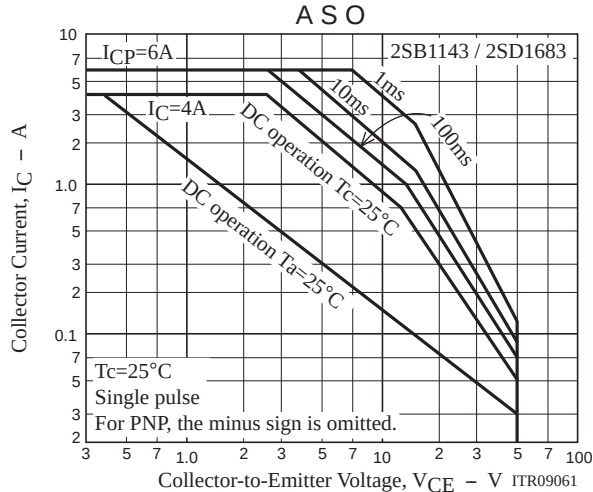
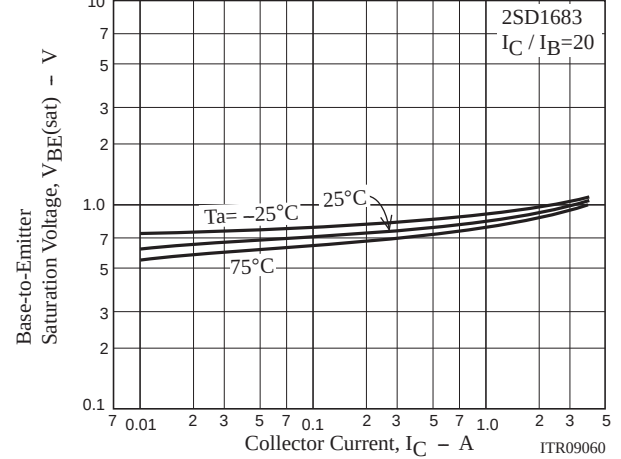
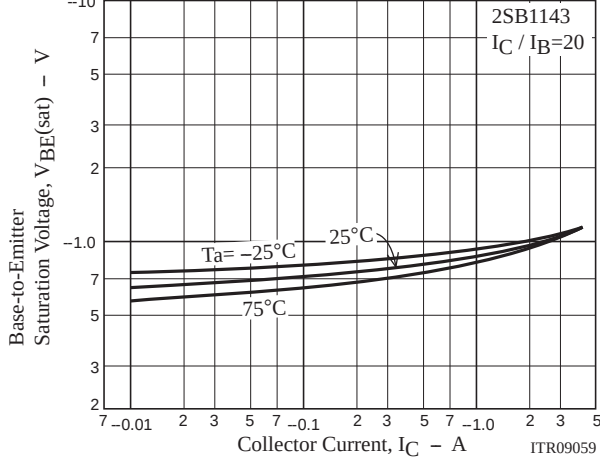
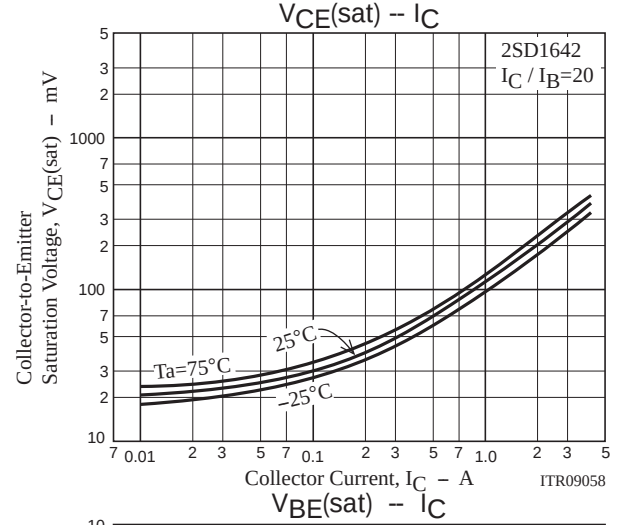
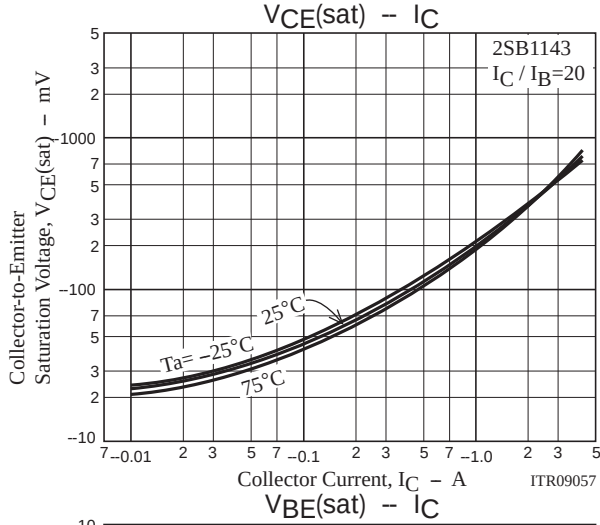
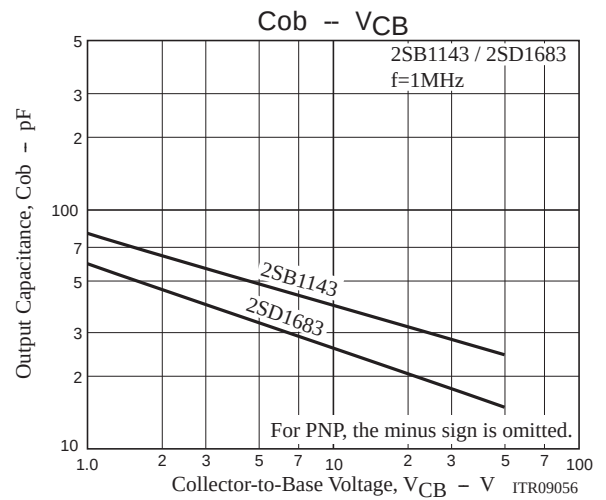
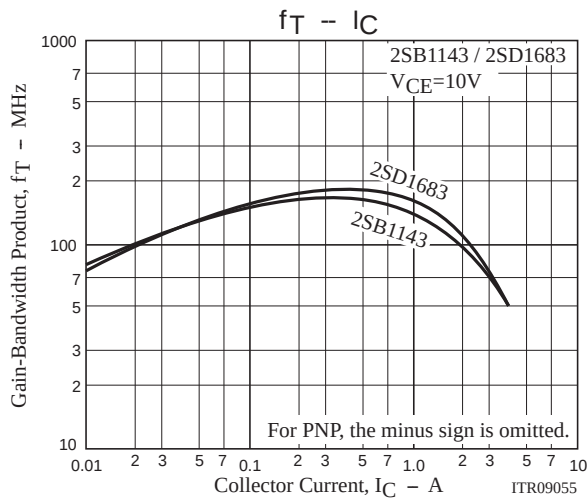


$I_C=10I_{B1}=-10I_{B2}=1A$   
(For PNP, the polarity is reversed.)

### Ordering Information

| Device   | Package  | Shipping    | memo    |
|----------|----------|-------------|---------|
| 2SB1143S | TO-126ML | 200pcs./bag | Pb Free |
| 2SB1143T | TO-126ML | 200pcs./bag |         |
| 2SD1683S | TO-126ML | 200pcs./bag |         |
| 2SD1683T | TO-126ML | 200pcs./bag |         |





Bag Packing Specification

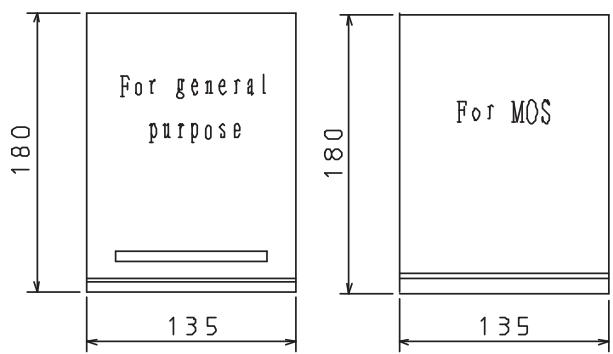
2SB1143S, 2SB1143T, 2SD1683S, 2SD1683T

1. Packing Format

| Package Name | Maximum Number of devices contained (pcs) |           |           | Packing format                                                     |                                                                           |
|--------------|-------------------------------------------|-----------|-----------|--------------------------------------------------------------------|---------------------------------------------------------------------------|
|              | Bag                                       | Inner box | Outer box | Inner BOX                                                          | Outer BOX                                                                 |
| TO-126ML     | 200                                       | 4,000     | 12,000    | B-1<br>20 bags contained<br>Dimensions:mm (external)<br>445×225×55 | A-2<br>3 inner boxes contained<br>Dimensions:mm (external)<br>470×250×190 |

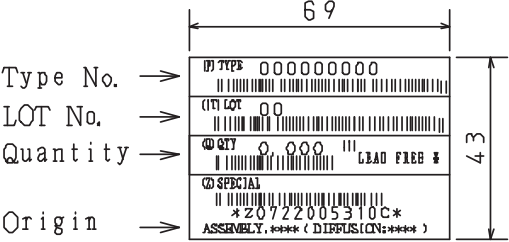
2. Bag dimensions

(unit:mm)



3. Bag label, Inner box label

(unit:mm)



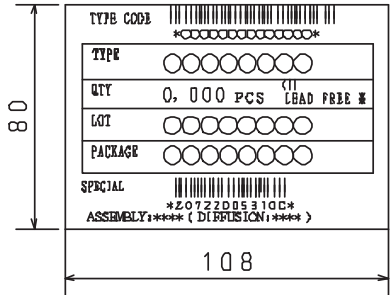
NOTE (1)  
The LEAD FREE \* description shows that the surface treatment of the terminal is lead free.

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

4. Outer box label

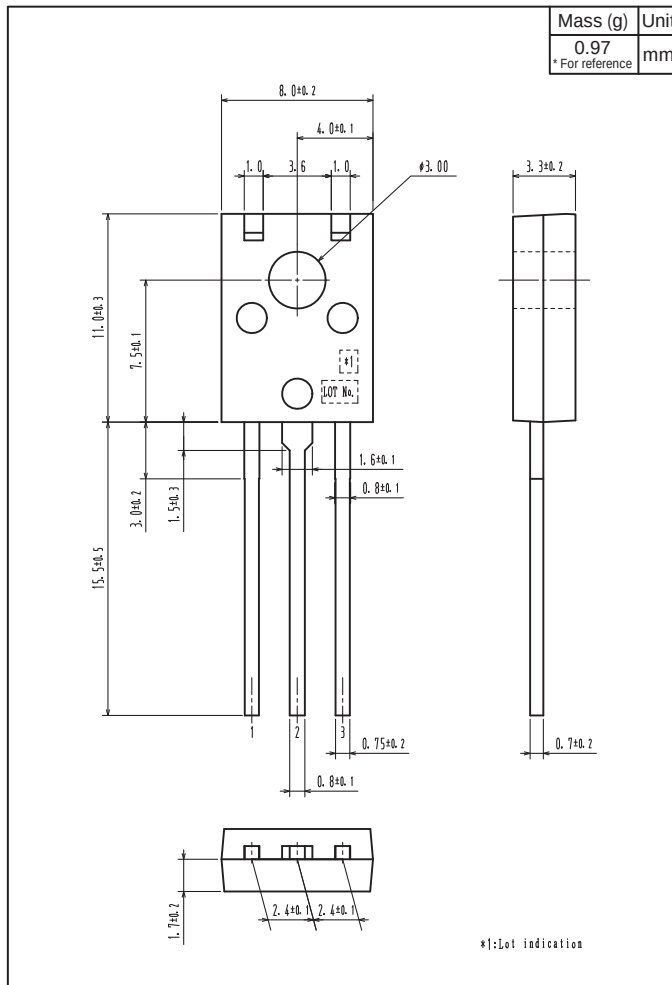
(unit:mm)

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



## Outline Drawing

2SB1143S, 2SB1143T, 2SD1683S, 2SD1683T



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