Ordering number : EN2101E

# 2SA1507/2SC3902

## Bipolar Transistor

### (–)160V, (–)1.5A, Low $V_{CE}$(sat), (PNP)NPN Single TO-126ML

ON Semiconductor®

http://onsemi.com

## Applications

・ Color TV audio output, converters, inverters

## Features

・ High breakdown voltage ・ Large current capacity ・ Adoption of FBET and MBIT process
・ The plastic-covered heat sink eliminates the need for an insulator when mounting the 2SA1507/2SC3902

## Specifications ( ): 2SA1507

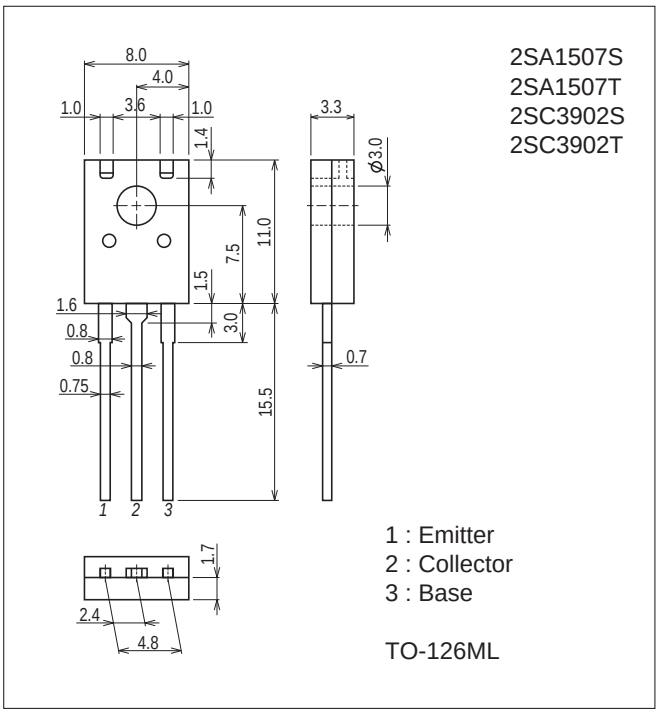
### Absolute Maximum Ratings at Ta=25°C

| 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 | $P_C$ | | 1.5 | W |
| | | Tc=25°C | 10 | W |
| Junction Temperature | Tj | | 150 | °C |
| Storage Temperature | Tstg | | –55 to +150 | °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

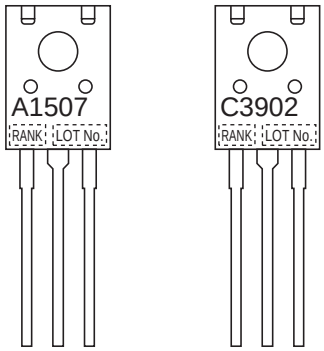
unit : mm (typ)
7516A-002



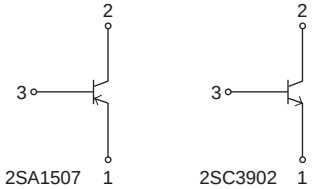

### Product & Package Information

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

### Marking




### Electrical Connection



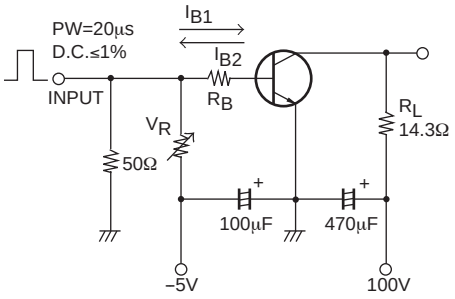
## Electrical Characteristics at Ta=25°C

| Parameter | Symbol | Conditions | Ratings | | | Unit |
|---|---|---|---|---|---|---|
| | | | min | typ | max | |
| Collector Cutoff Current | $I_{CBO}$ | $V_{CB}$=(−)120V, $I_E$=0A | | | (−)1.0 | μA |
| Emitter Cutoff Current | $I_{EBO}$ | $V_{EB}$=(−)4V, $I_C$=0A | | | (−)1.0 | μA |
| DC Current Gain | $h_{FE}1$ | $V_{CE}$=(−)5V, $I_C$=(−)100mA | 100* | | 400* | |
| | $h_{FE}2$ | $V_{CE}$=(−)5V, $I_C$=(−)10mA | 90 | | | |
| Gain-Bandwidth Product | $f_T$ | $V_{CE}$=(−)10V, $I_C$=(−)50mA | | 120 | | MHz |
| Output Capacitance | Cob | $V_{CB}$=(−)10V, f=1MHz | | (22)14 | | pF |
| Collector-to-Emitter Saturation Voltage | $V_{CE}$(sat) | $I_C$=(−)500mA, $I_B$=(−)50mA | | (−0.2)0.13 | (−0.5)0.45 | V |
| Base-to-Emitter Saturation Voltage | $V_{BE}$(sat) | $I_C$=(−)500mA, $I_B$=(−)50mA | | (−)0.85 | (−)1.2 | V |
| Collector-to-Base Breakdown Voltage | $V_{(BR)CBO}$ | $I_C$=(−)10μA, $I_E$=0A | (−)180 | | | V |
| Collector-to-Emitter Breakdown Voltage | $V_{(BR)CEO}$ | $I_C$=(−)1mA, $R_{BE}$=∞ | (−)160 | | | V |
| Emitter-to-Base Breakdown Voltage | $V_{(BR)EBO}$ | $I_E$=(−)10μA, $I_C$=0A | (−)6 | | | V |
| Turn-On Time | $t_{on}$ | See specified Test Circuit. | | (0.7)0.04 | | μs |
| Storage Time | $t_{stg}$ | | | (0.7)1.2 | | μs |
| Fall Time | $t_f$ | | | (0.04)0.08 | | μs |

* : The 2SA1507 / 2SC3902 are classified by 100mA $h_{FE}$ as follows:

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

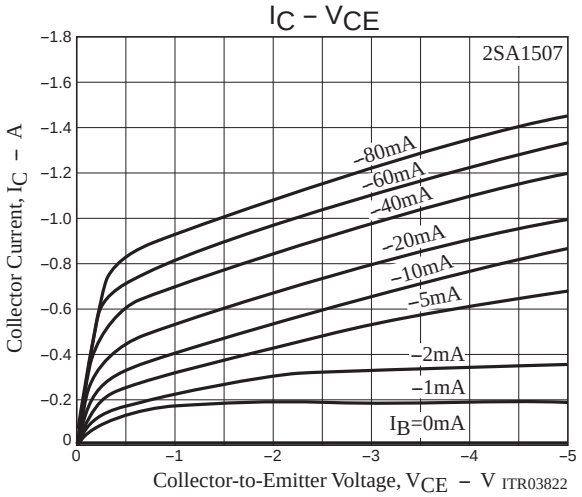
## Switching Time Test Circuit

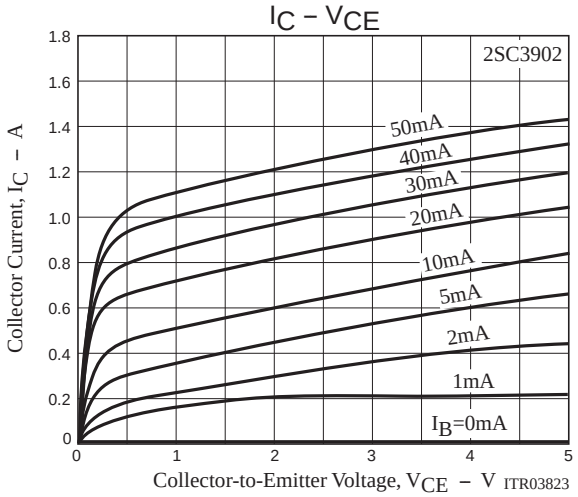


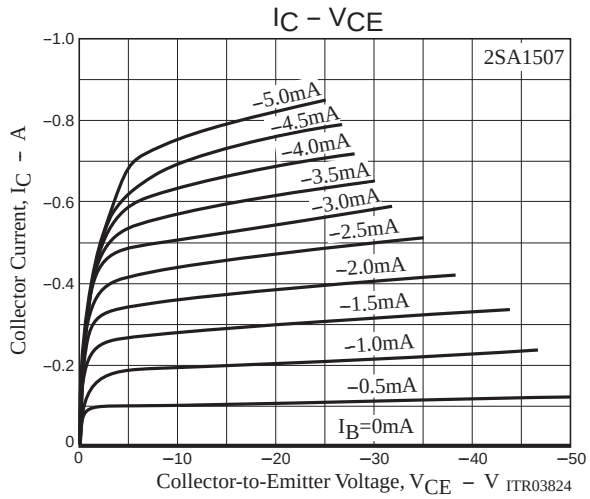

$I_C$=10$I_{B1}$=−10$I_{B2}$=0.7A
(For PNP, the polarity is reversed.)

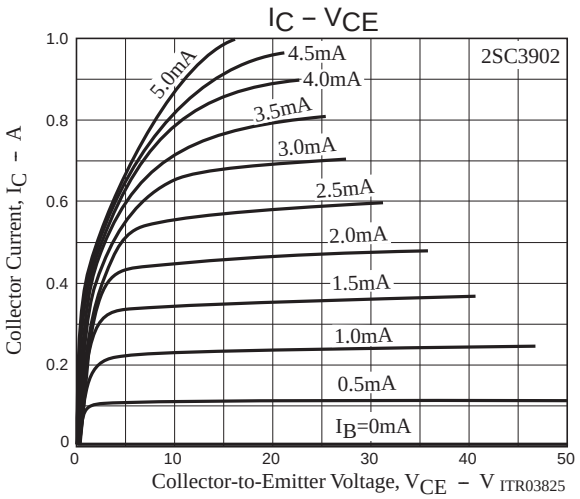
## Ordering Information

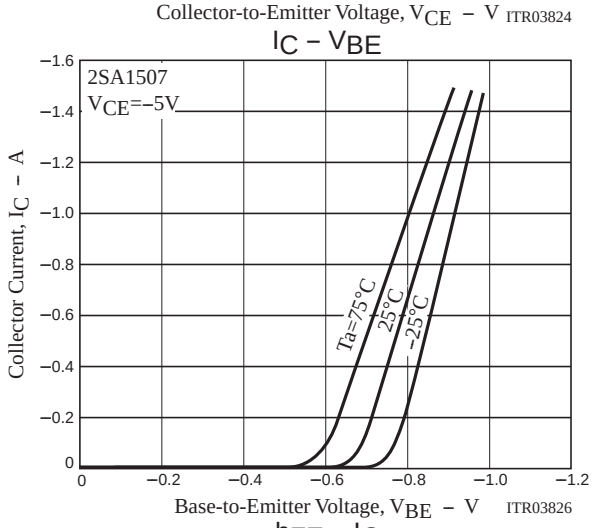
| Device | Package | Shipping | memo |
|---|---|---|---|
| 2SA1507S | TO-126ML | 200pcs./bag | Pb Free |
| 2SA1507T | TO-126ML | 200pcs./bag | |
| 2SC3902S | TO-126ML | 200pcs./bag | |
| 2SC3902T | TO-126ML | 200pcs./bag | |

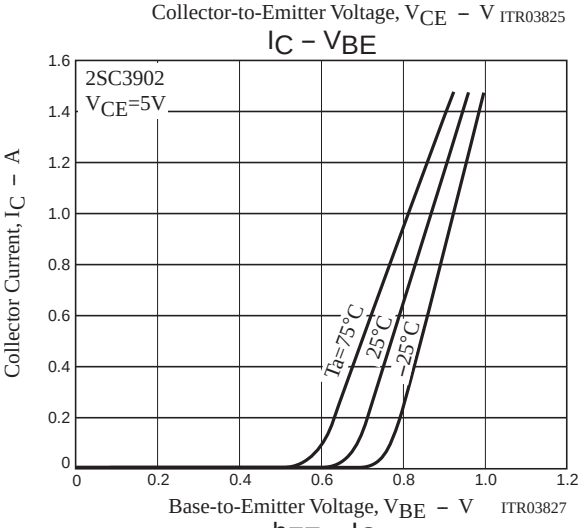


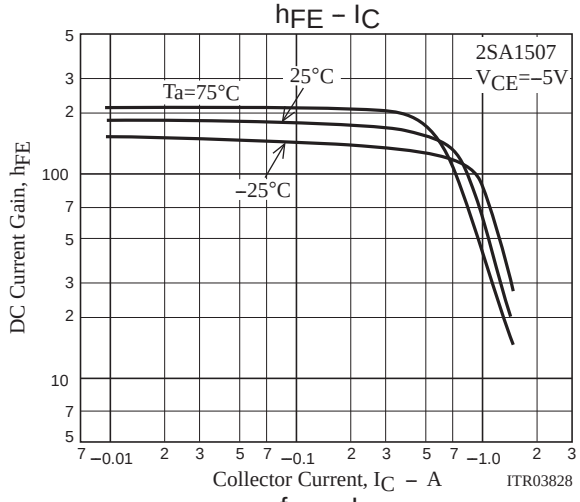



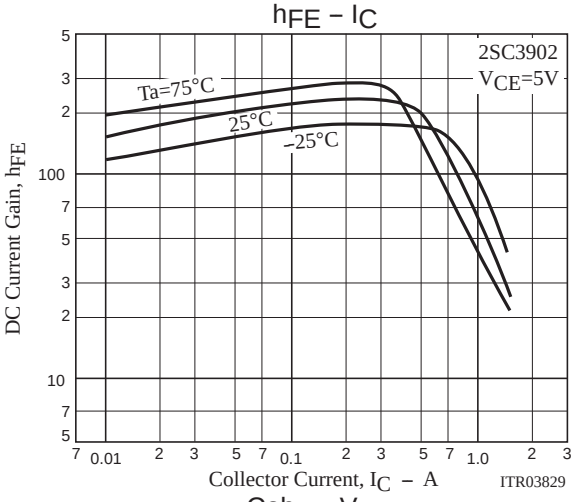

IC – VCE
2SA1507
–5.0mA
–4.5mA
–4.0mA
–3.5mA
–3.0mA
–2.5mA
–2.0mA
–1.5mA
–1.0mA
–0.5mA
IB=0mA
Collector Current, IC – A
Collector-to-Emitter Voltage, VCE – V
ITR03824

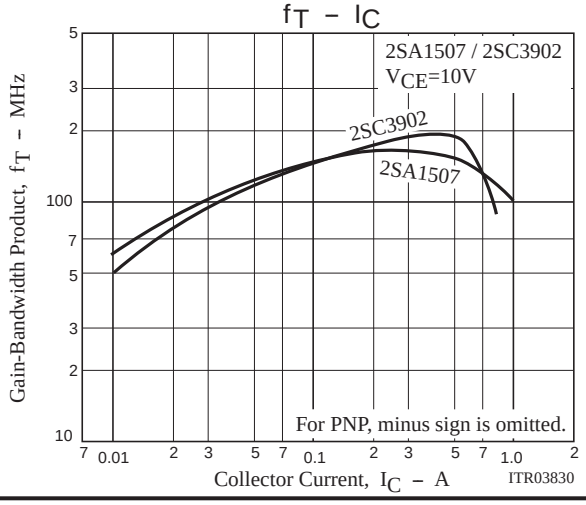

IC – VCE
2SC3902
5.0mA
4.5mA
4.0mA
3.5mA
3.0mA
2.5mA
2.0mA
1.5mA
1.0mA
0.5mA
IB=0mA
Collector Current, IC – A
Collector-to-Emitter Voltage, VCE – V
ITR03825

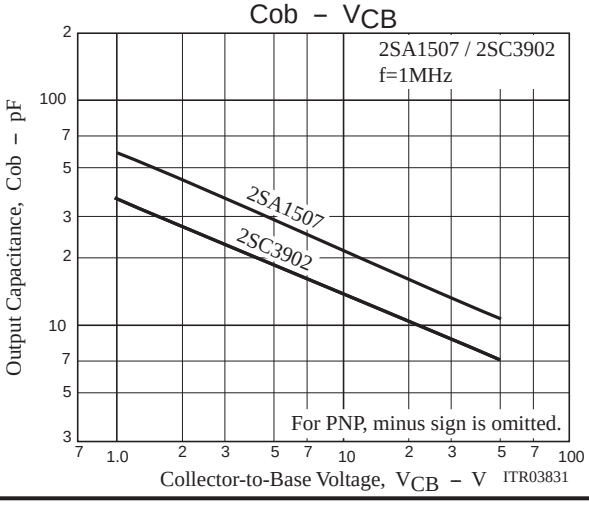

IC – VBE
2SA1507
VCE=–5V
Ta=75°C
25°C
–25°C
Collector Current, IC – A
Base-to-Emitter Voltage, VBE – V
ITR03826

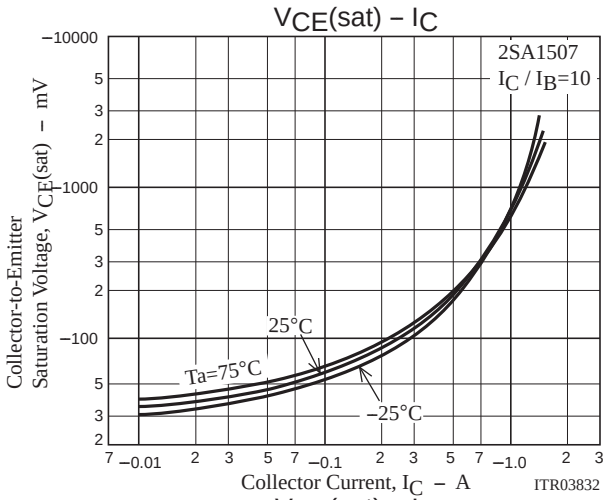

IC – VBE
2SC3902
VCE=5V
Ta=75°C
25°C
–25°C
Collector Current, IC – A
Base-to-Emitter Voltage, VBE – V
ITR03827

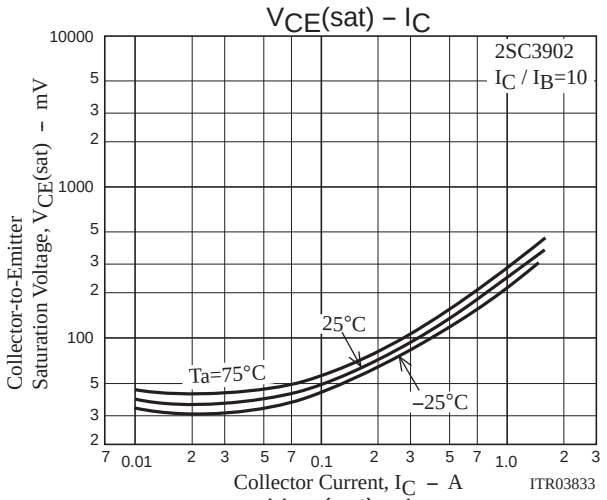

hFE – IC
2SA1507
VCE=–5V
Ta=75°C
25°C
–25°C
DC Current Gain, hFE
Collector Current, IC – A
ITR03828

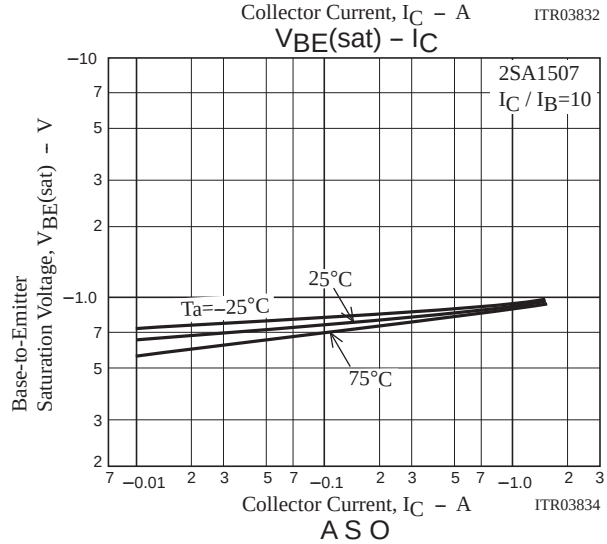

hFE – IC
2SC3902
VCE=5V
Ta=75°C
25°C
–25°C
DC Current Gain, hFE
Collector Current, IC – A
ITR03829

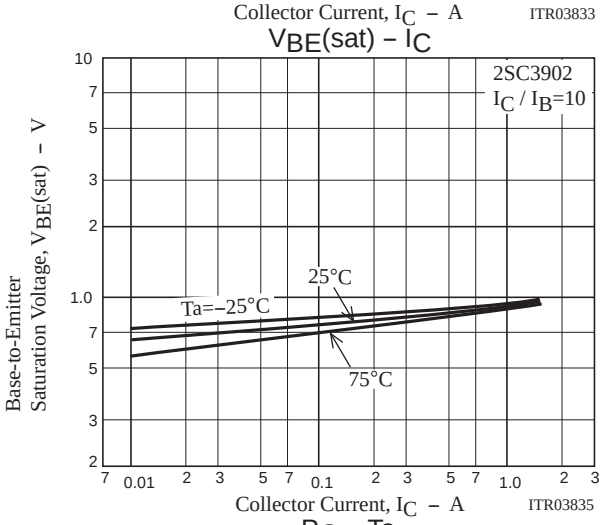

fT – IC
2SA1507 / 2SC3902
VCE=10V
2SC3902
2SA1507
For PNP, minus sign is omitted.
Gain-Bandwidth Product, fT – MHz
Collector Current, IC – A
ITR03830

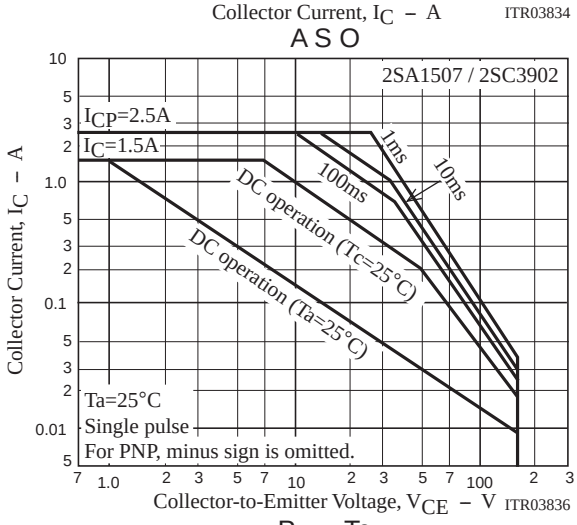

Cob – VCB
2SA1507 / 2SC3902
f=1MHz
2SA1507
2SC3902
For PNP, minus sign is omitted.
Output Capacitance, Cob – pF
Collector-to-Base Voltage, VCB – V
ITR03831

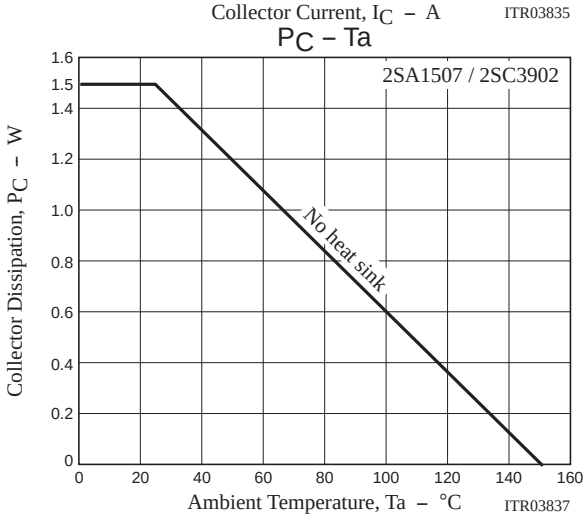

VCE(sat) – IC
2SA1507
IC / IB=10
25°C
Ta=75°C
–25°C
Collector-to-Emitter Saturation Voltage, VCE(sat) – mV
Collector Current, IC – A
ITR03832

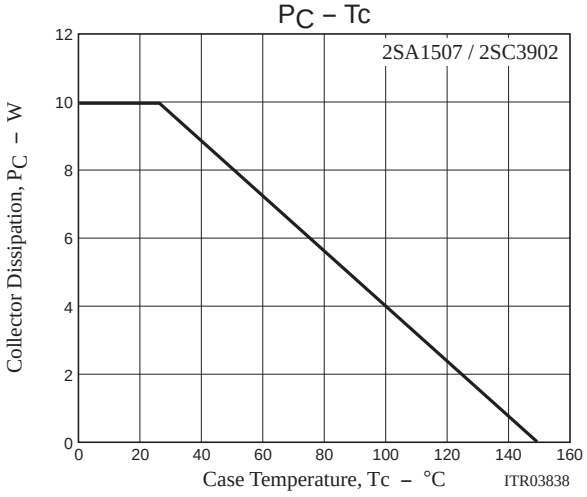

VCE(sat) – IC
2SC3902
IC / IB=10
25°C
Ta=75°C
–25°C
Collector-to-Emitter Saturation Voltage, VCE(sat) – mV
Collector Current, IC – A
ITR03833


VBE(sat) – IC
2SA1507
IC / IB=10
25°C
Ta=–25°C
75°C
Base-to-Emitter Saturation Voltage, VBE(sat) – V
Collector Current, IC – A
ITR03834


VBE(sat) – IC
2SC3902
IC / IB=10
25°C
Ta=–25°C
75°C
Base-to-Emitter Saturation Voltage, VBE(sat) – V
Collector Current, IC – A
ITR03835


A S O
2SA1507 / 2SC3902
ICP=2.5A
IC=1.5A
1ms
10ms
100ms
DC operation (Tc=25°C)
DC operation (Ta=25°C)
Ta=25°C
Single pulse
For PNP, minus sign is omitted.
Collector Current, IC – A
Collector-to-Emitter Voltage, VCE – V
ITR03836


PC – Ta
2SA1507 / 2SC3902
No heat sink
Collector Dissipation, PC – W
Ambient Temperature, Ta – °C
ITR03837


PC – Tc
2SA1507 / 2SC3902
Collector Dissipation, PC – W
Case Temperature, Tc – °C
ITR03838

**Bag Packing Specification**

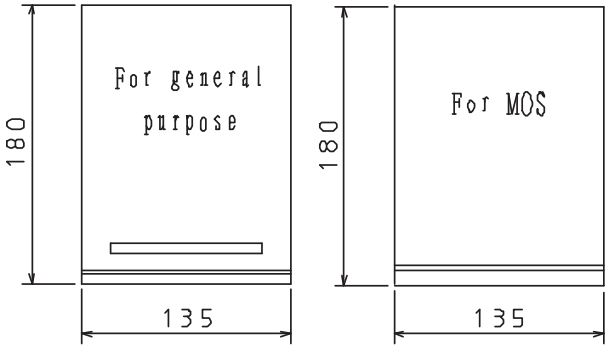
2SA1507S, 2SA1507T, 2SC3902S, 2SC3902T

## 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 |

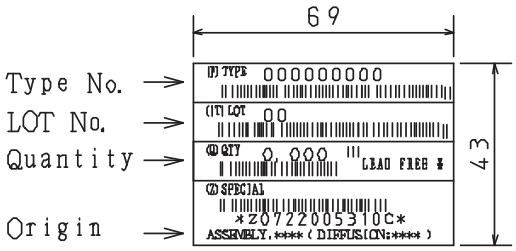
## 2. Bag dimensions

(unit:mm)




## 3. Bag label, Inner box label

(unit:mm)



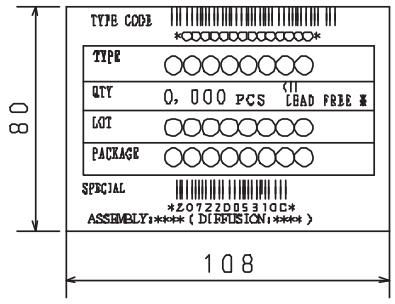

NOTE (1)
The LEAD FREE ※ description shows that the surface treatment of the terminal is lead free.

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

## 4. Outer box label

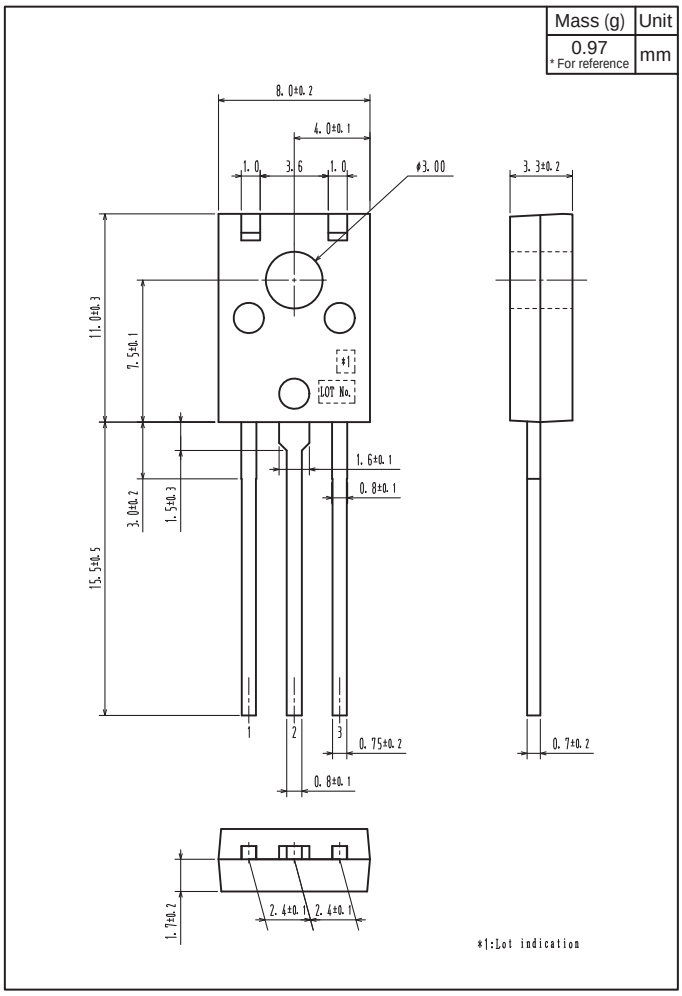
(unit:mm)

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



## Outline Drawing

2SA1507S, 2SA1507T, 2SC3902S, 2SC3902T



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