



SANYO Semiconductors

DATA SHEET

An ON Semiconductor Company

2SA1416/2SC3646 — PNP / NPN Epitaxial Planar Silicon Transistor

High-Voltage Switching Applications

Features

- Adoption of FBET, MBIT processes
- High breakdown voltage and large current capacity
- Fast switching speed
- Ultrasmall size making it easy to provide high-density, small-sized hybrid IC's

Specifications () : 2SA1416

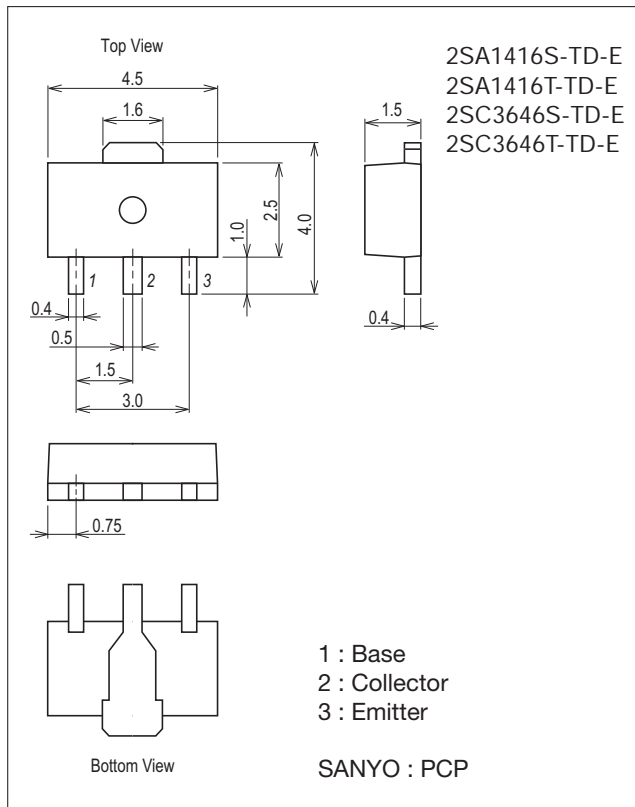
Absolute Maximum Ratings at Ta=25°C

| Parameter | Symbol | Conditions | Ratings | Unit |
|------------------------------|--------|---|-------------|------|
| Collector-to-Base Voltage | VCBO | | (-)120 | V |
| Collector-to-Emitter Voltage | VCEO | | (-)100 | V |
| Emitter-to-Base Voltage | VEBO | | (-)6 | V |
| Collector Current | IC | | (-)1 | A |
| Collector Current (Pulse) | ICP | | (-)2 | A |
| Collector Dissipation | PC | | 500 | mW |
| | | When mounted on ceramic substrate (250mm ² ×0.8mm) | 1.3 | W |
| Junction Temperature | Tj | | 150 | °C |
| Storage Temperature | Tstg | | -55 to +150 | °C |

Package Dimensions

unit : mm (typ)

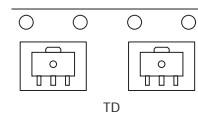
7007B-004



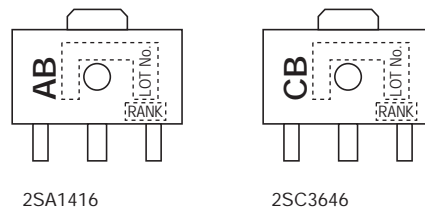
Product & Package Information

- Package : PCP
- JEITA, JEDEC : SC-62, SOT-89, TO-243
- Minimum Packing Quantity : 1,000 pcs./reel

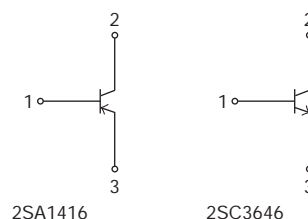
Packing Type: TD



Marking



Electrical Connection



2SA1416 / 2SC3646

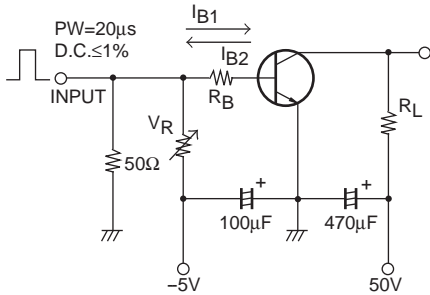
Electrical Characteristics at Ta=25°C

| Parameter | Symbol | Conditions | Ratings | | | Unit |
|---|---------------|-------------------------------|---------|-----------|-----------|------|
| | | | min | typ | max | |
| Collector Cutoff Current | I_{CBO} | $V_{CB}=(-)100V, I_E=0A$ | | | (-)100 | nA |
| Emitter Cutoff Current | I_{EBO} | $V_{EB}=(-)4V, I_C=0A$ | | | (-)100 | nA |
| DC Current Gain | h_{FE} | $V_{CE}=(-)5V, I_C=(-)100mA$ | 100* | | 400* | |
| Gain-Bandwidth Product | f_T | $V_{CE}=(-)10V, I_C=(-)100mA$ | | 120 | | MHz |
| Output Capacitance | C_{ob} | $V_{CB}=(-)10V, f=1MHz$ | | (13)8.5 | | pF |
| Collector-to-Emitter Saturation Voltage | $V_{CE(sat)}$ | $I_C=(-)400mA, I_B=(-)40mA$ | | (-0.2)0.1 | (-0.6)0.4 | V |
| Base-to-Emitter Saturation Voltage | $V_{BE(sat)}$ | $I_C=(-)400mA, I_B=(-)40mA$ | | (-)0.85 | (-)1.2 | V |
| Collector-to-Base Breakdown Voltage | $V_{(BR)CBO}$ | $I_C=(-)10\mu A, I_E=0A$ | (-)120 | | | V |
| Collector-to-Emitter Breakdown Voltage | $V_{(BR)CEO}$ | $I_C=(-)1mA, R_{BE}=\infty$ | (-)100 | | | 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. | | (80)80 | | ns |
| Storage Time | t_{stg} | | | (700)850 | | ns |
| Fall Time | t_f | | | (40)50 | | ns |

* : The 2SA1416 / 2SC3646 are classified by 100mA h_{FE} as follows :

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

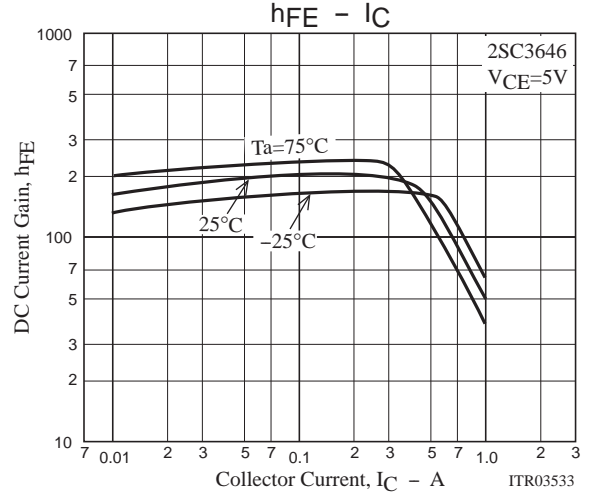
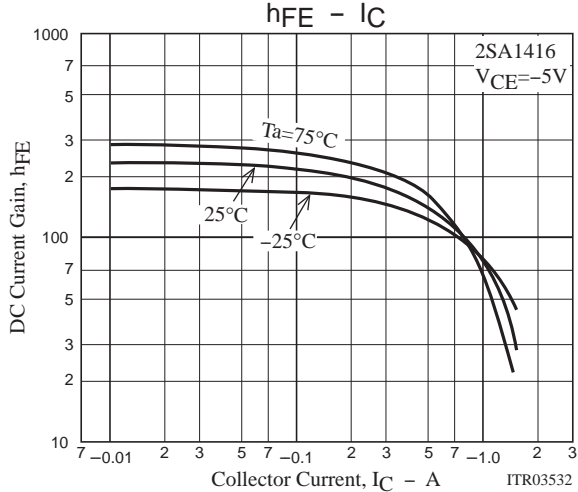
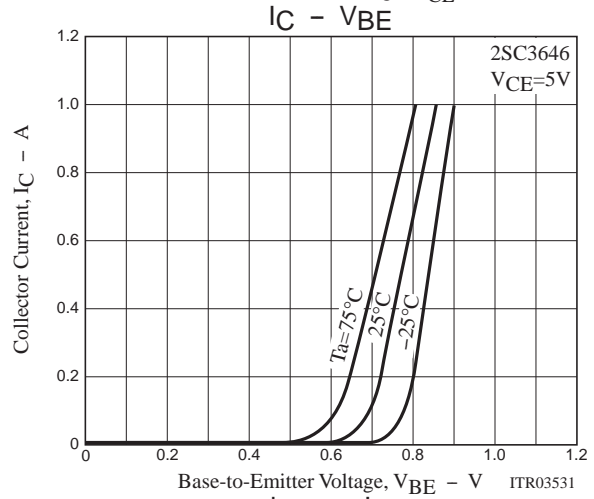
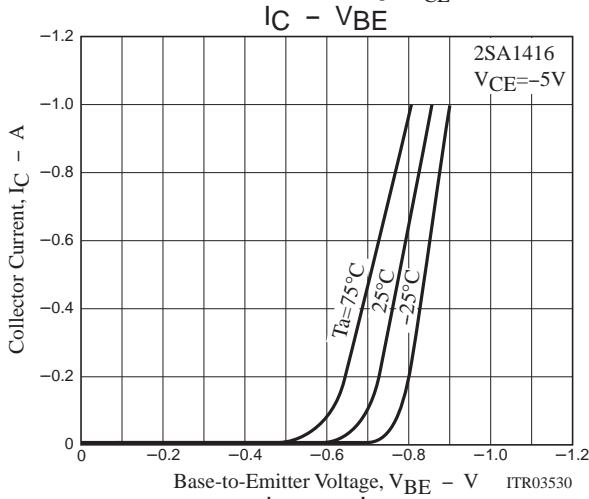
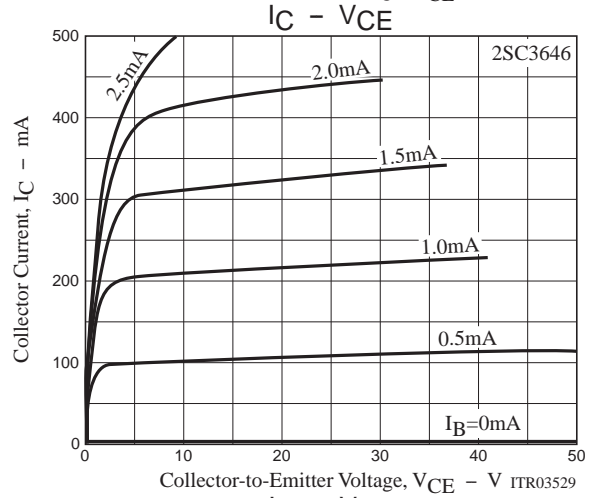
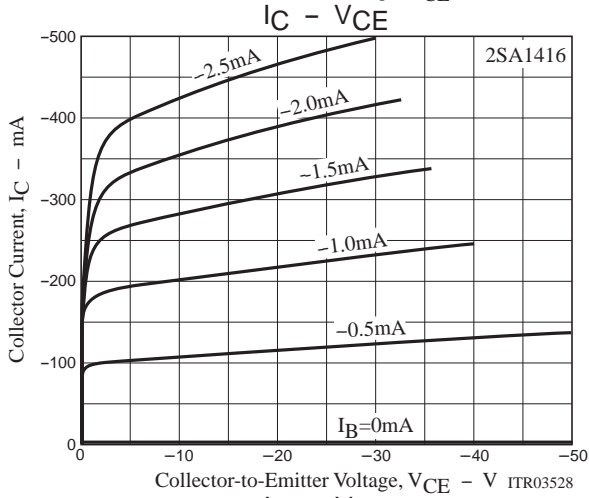
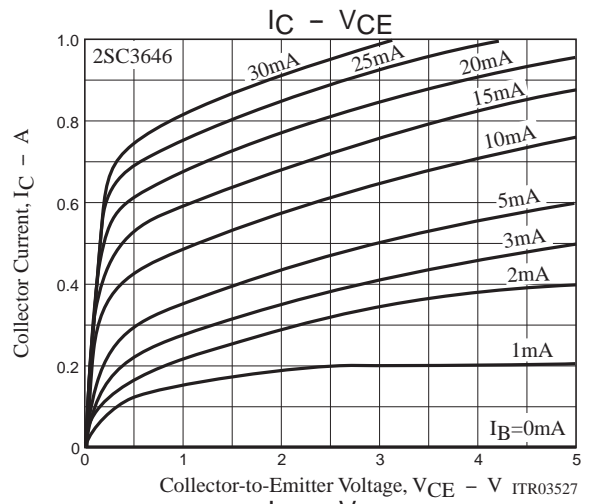
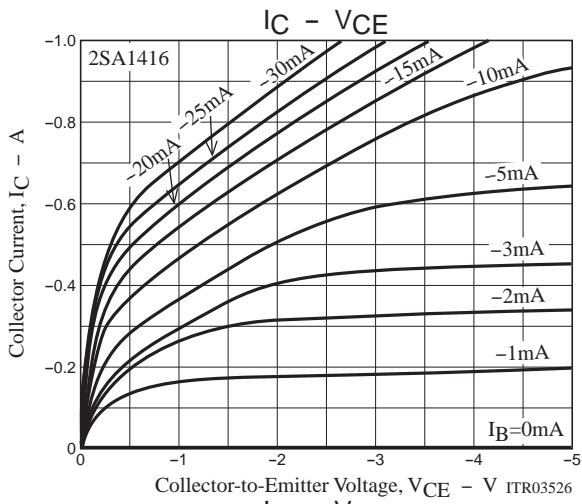
Switching Time Test Circuit

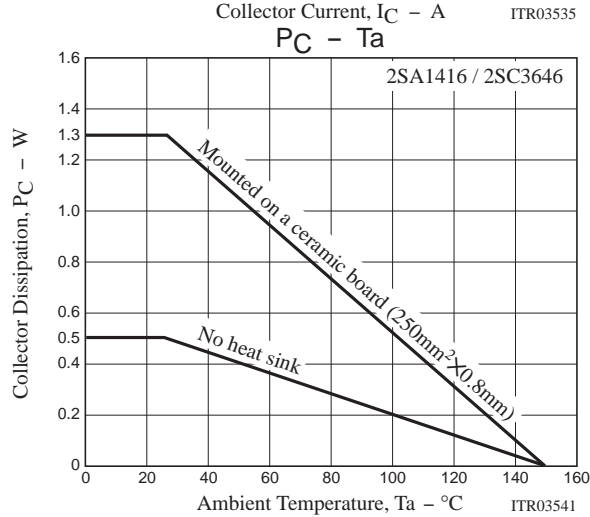
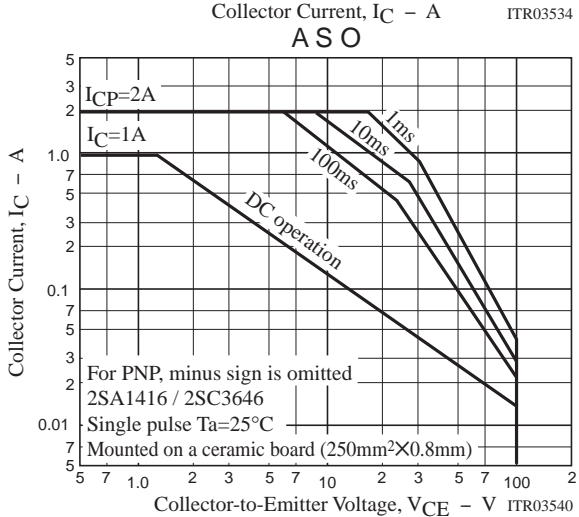
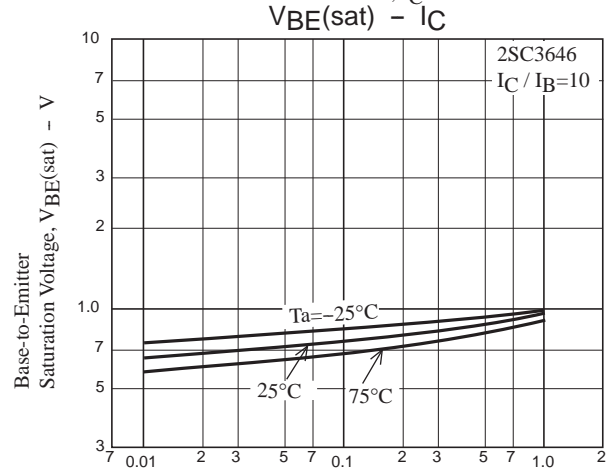
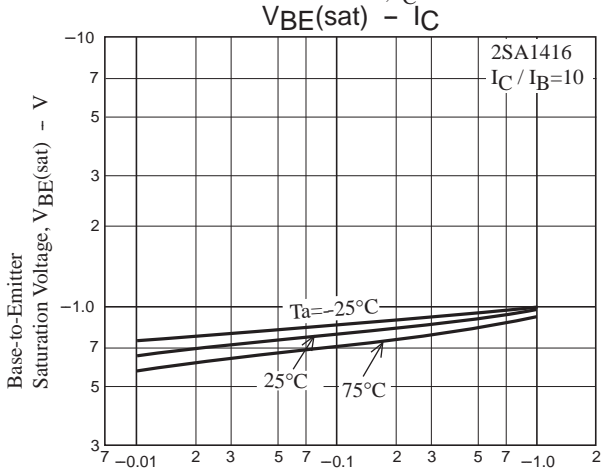
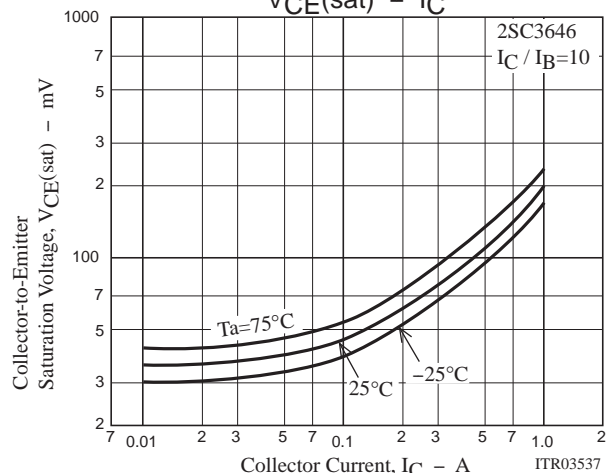
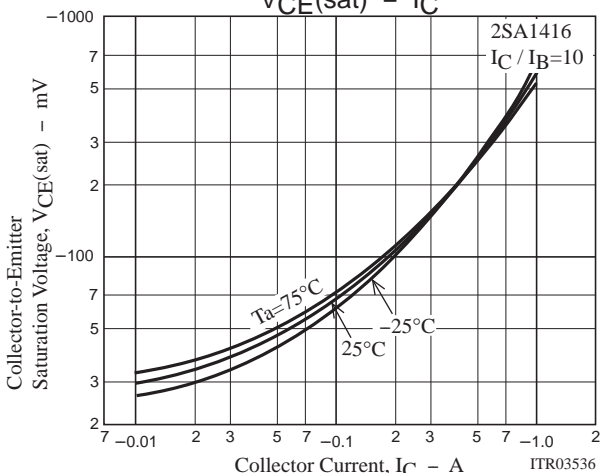
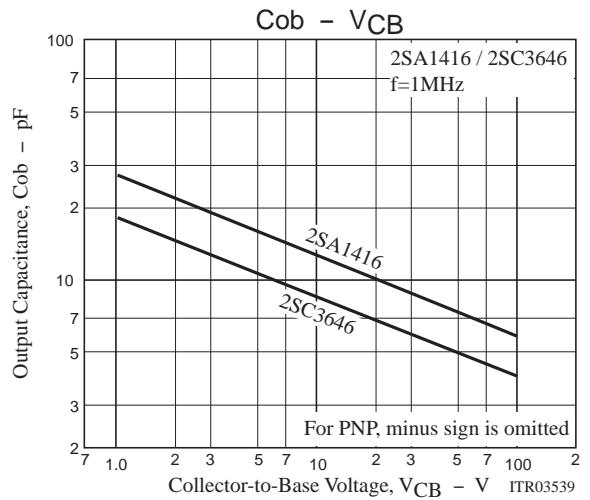
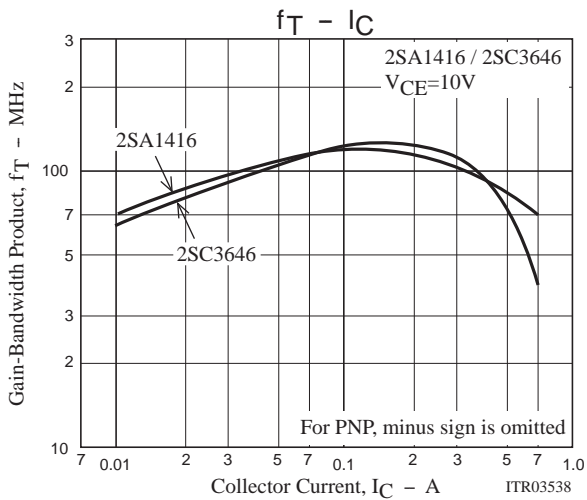


$I_C=10I_{B1}=-10I_{B2}=400mA$
 (For PNP, the polarity is reversed)

Ordering Information

| Device | Package | Shipping | memo |
|---------------|---------|----------------|---------|
| 2SA1416S-TD-E | PCP | 1,000pcs./reel | Pb Free |
| 2SA1416T-TD-E | PCP | 1,000pcs./reel | |
| 2SC3646S-TD-E | PCP | 1,000pcs./reel | |
| 2SC3646T-TD-E | PCP | 1,000pcs./reel | |





Bag Packing Specification

2SA1416S-TD-E, 2SA1416T-TD-E, 2SC3646S-TD-E, 2SC3646T-TD-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) |
| PCP | PCP | 1,000 | 4,000 | 24,000 | 4 reels contained Dimensions:mm (external) 183×72×185 | 6 inner boxes contained Dimensions:mm (external) 440×195×210 |

Reel label, Inner box label
(unit :mm)

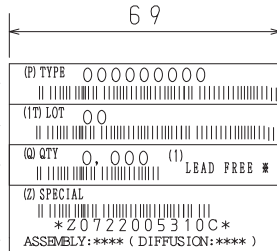
Outer box label
It is a label at the time of factory shipments.
The form of a label may change in physical distribution process.

Packing method



Type No.
LOT No.
Quantity
Origin

Reel label



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



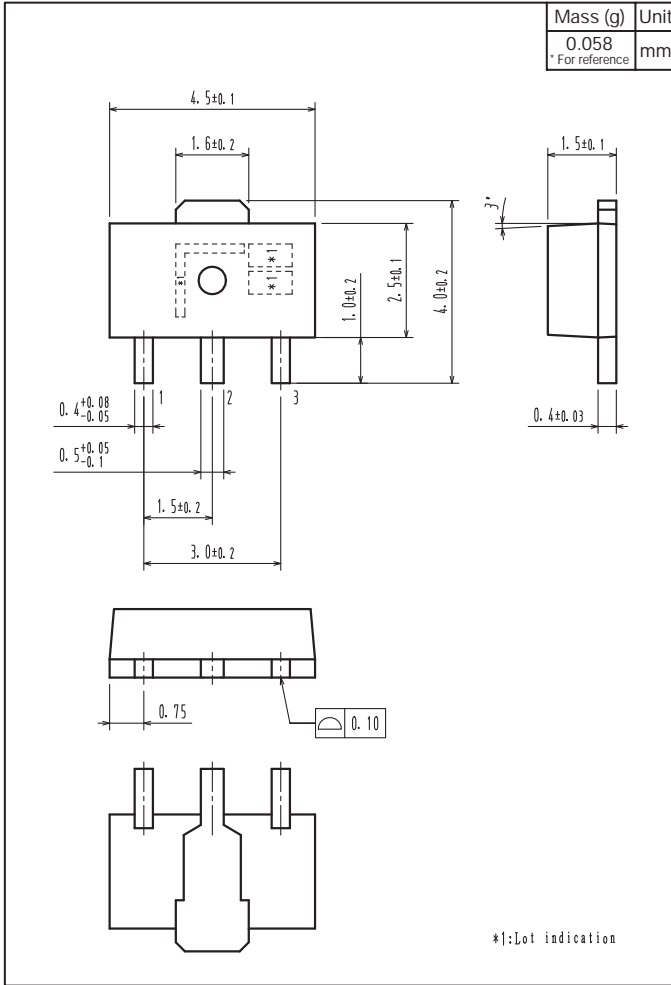
Those with pin 1 index on the feed hole side.....TD

2SA1416 / 2SC3646

Outline Drawing

Land Pattern Example

2SA1416S-TD-E, 2SA1416T-TD-E, 2SC3646S-TD-E, 2SC3646T-TD-E



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