Ordering number : EN1788C

SANYO Semiconductors

DATA SHEET

An ON Semiconductor Company

2SA1418/2SC3648 — High-Voltage Switching, Preriver Applications

PNP / NPN Epitaxial Planar Silicon Transistor

Applicaitons

- Color TV audio output, inverter

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 ( ) : 2SA1418

Absolute Maximum Ratings at Ta=25°C

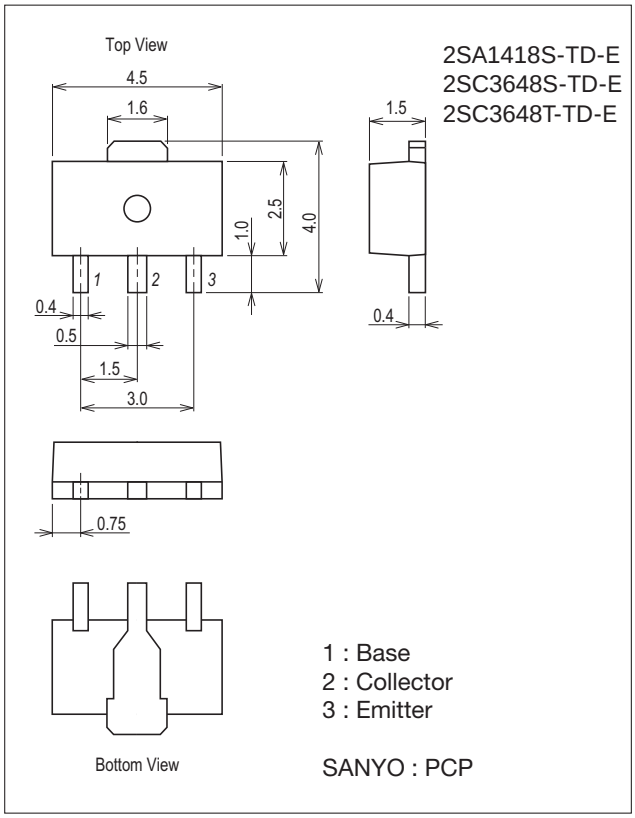
Parameter	Symbol	Conditions	Ratings	Unit
Collector-to-Base Voltage	V_{CBO}		(–)180	V
Collector-to-Emitter Voltage	V_{CEO}		(–)160	V
Emitter-to-Base Voltage	V_{EBO}		(–)6	V
Collector Current	I_C		(–)0.7	A
Collector Current (Pulse)	I_{CP}		(–)1.5	A

Continued on next page.

Package Dimensions

unit : mm (typ)

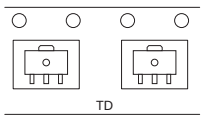
7007B-004



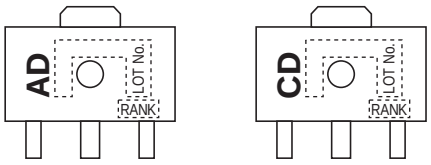
Product & Package Information

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

Packing Type: TD

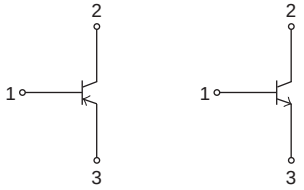


Marking



2SA1418 2SC3648

Electrical Connection



2SA1418 2SC3648

Continued from preceding page.

Parameter	Symbol	Conditions	Ratings	Unit
Collector Dissipation	P_C		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

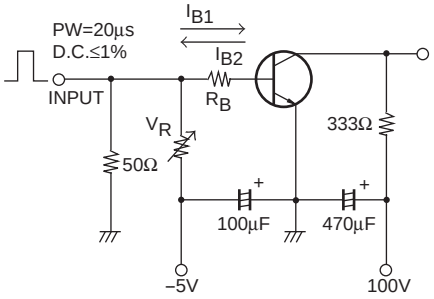
Electrical Characteristics at Ta=25°C

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Collector Cutoff Current	I_{CBO}	V_{CB}=(−)120V, I_E=0A			(−)0.1	μA
Emitter Cutoff Current	I_{EBO}	V_{EB}=(−)4V, I_C=0A			(−)0.1	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		(11)8		pF
Collector-to-Emitter Saturation Voltage	V_{CE}(sat)	I_C=(−)250mA, I_B=(−)25mA		(−0.2)0.12	(−0.5)0.4	V
Base-to-Emitter Saturation Voltage	V_{BE}(sat)	I_C=(−)250mA, I_B=(−)25mA		(−)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.		(60)50		ns
Storage Time	t_{stg}			(900)1000		ns
Fall Time	t_f			(60)60		ns

* : The 2SA1418 / 2SC3648 are classified by 100mA h_{FE} as follows :

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

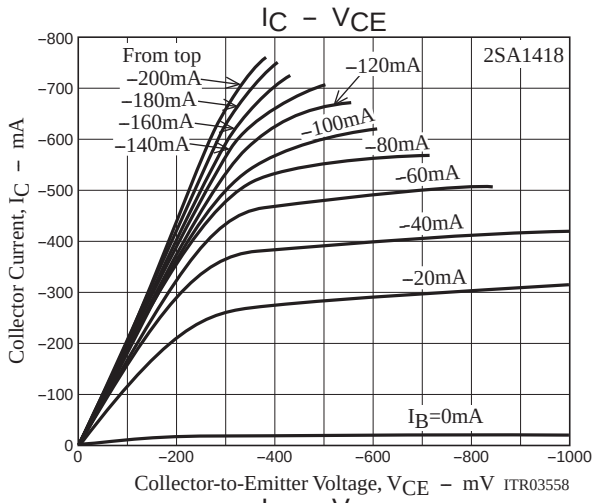
Switching Time Test Circuit

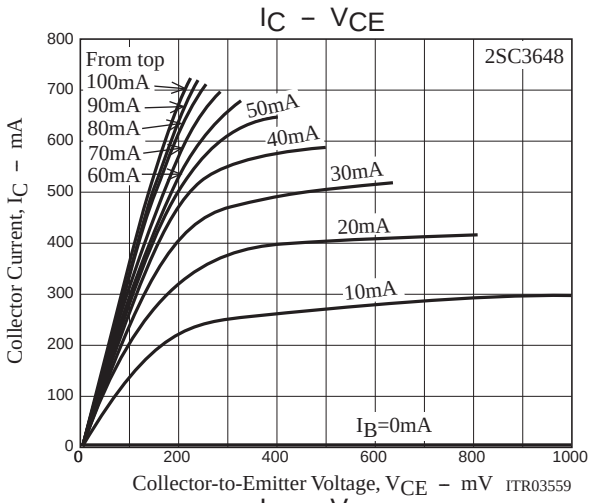


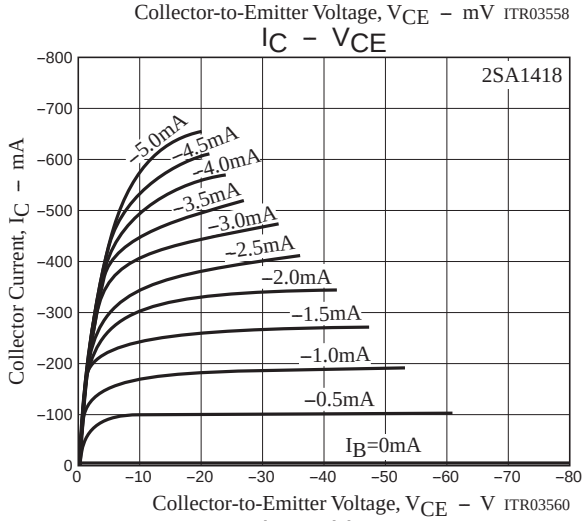
I_C=20I_{B1}=−20I_{B2}=300mA
(For PNP, the polarity is reversed)

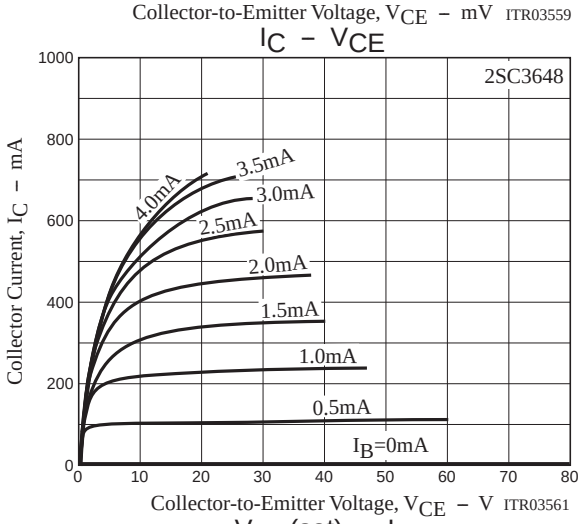
Ordering Information

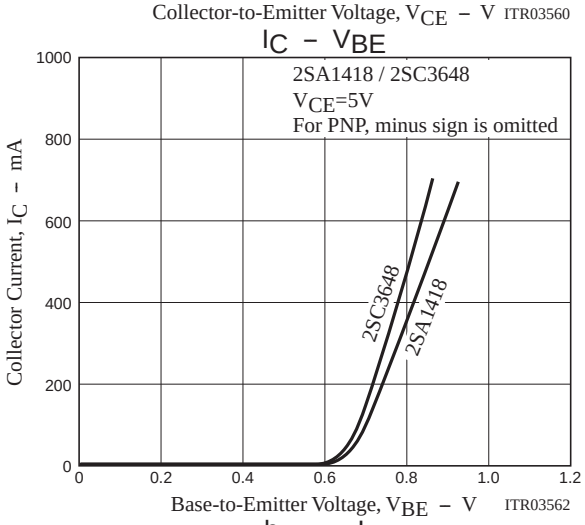
Device	Package	Shipping	memo
2SA1418S-TD-E	PCP	1,000pcs./reel	Pb Free
2SC3648S-TD-E	PCP	1,000pcs./reel	
2SC3648T-TD-E	PCP	1,000pcs./reel	

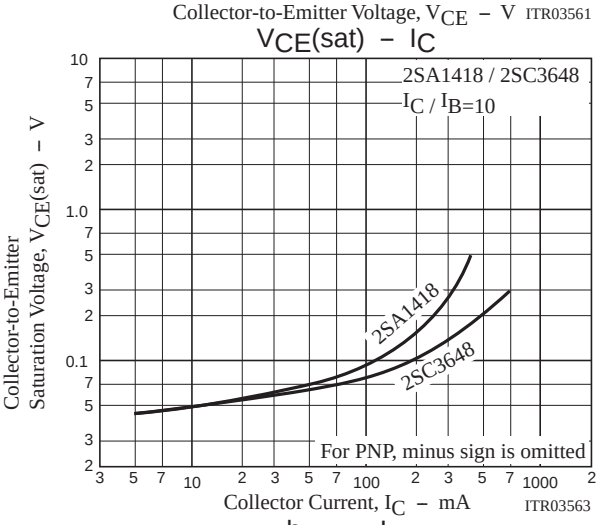

IC – VCE
2SA1418
From top
–200mA
–180mA
–160mA
–140mA
–120mA
–100mA
–80mA
–60mA
–40mA
–20mA
IB=0mA
Collector Current, IC – mA
Collector-to-Emitter Voltage, VCE – mV
ITR03558

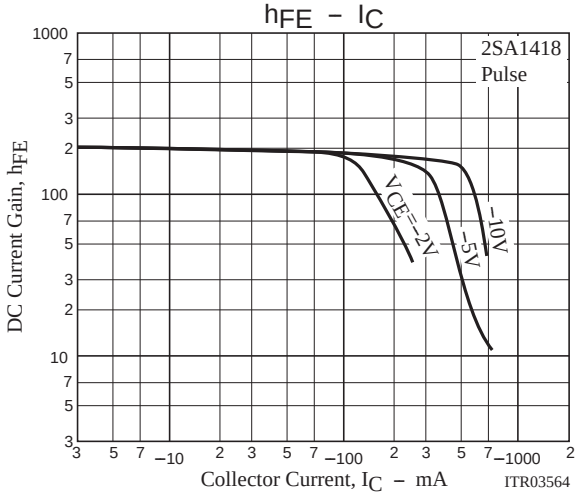

IC – VCE
2SC3648
From top
100mA
90mA
80mA
70mA
60mA
50mA
40mA
30mA
20mA
10mA
IB=0mA
Collector Current, IC – mA
Collector-to-Emitter Voltage, VCE – mV
ITR03559

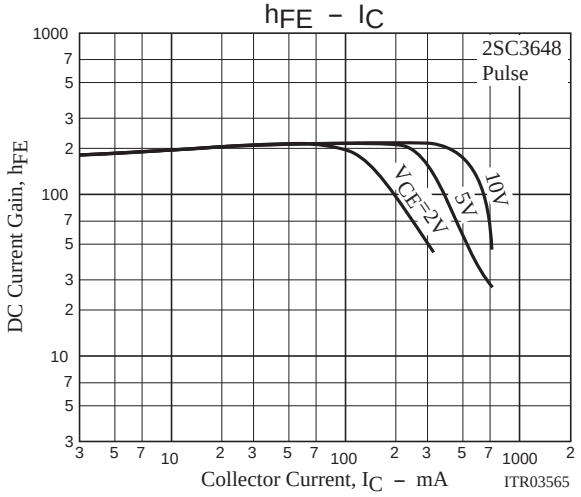

IC – VCE
2SA1418
–5.0mA
–4.5mA
–4.0mA
–3.5mA
–3.0mA
–2.5mA
–2.0mA
–1.5mA
–1.0mA
–0.5mA
IB=0mA
Collector Current, IC – mA
Collector-to-Emitter Voltage, VCE – V
ITR03560

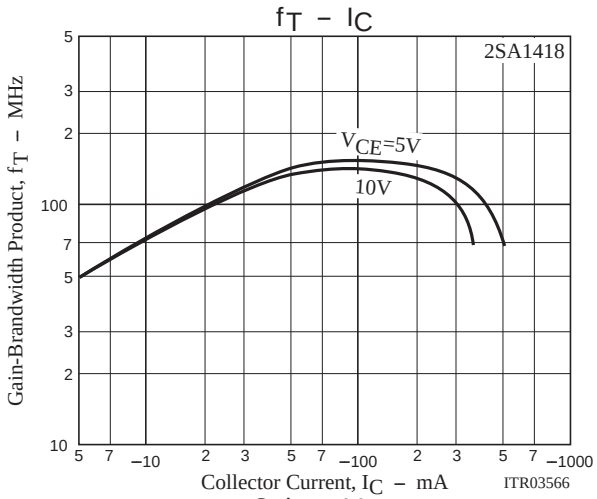

IC – VCE
2SC3648
4.0mA
3.5mA
3.0mA
2.5mA
2.0mA
1.5mA
1.0mA
0.5mA
IB=0mA
Collector Current, IC – mA
Collector-to-Emitter Voltage, VCE – V
ITR03561

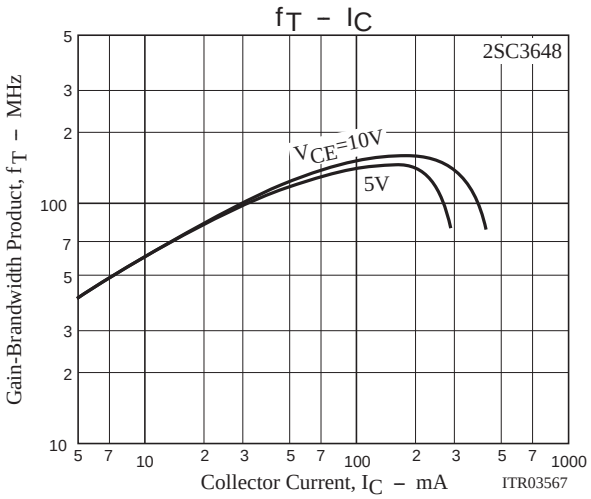

IC – VBE
2SA1418 / 2SC3648
VCE=5V
For PNP, minus sign is omitted
2SC3648
2SA1418
Collector Current, IC – mA
Base-to-Emitter Voltage, VBE – V
ITR03562

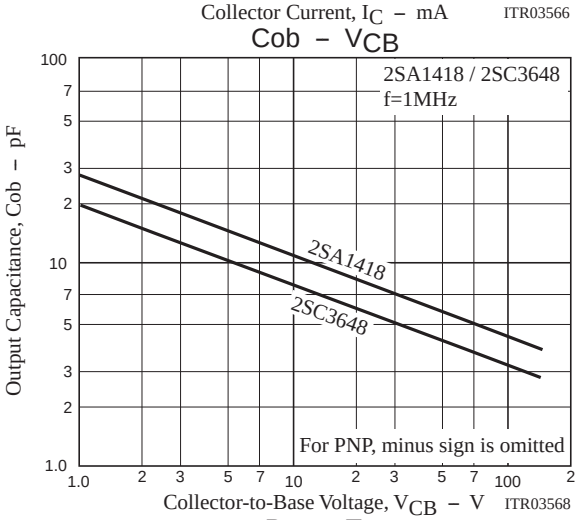

VCE(sat) – IC
2SA1418 / 2SC3648
IC / IB=10
2SA1418
2SC3648
For PNP, minus sign is omitted
Collector-to-Emitter Saturation Voltage, VCE(sat) – V
Collector Current, IC – mA
ITR03563

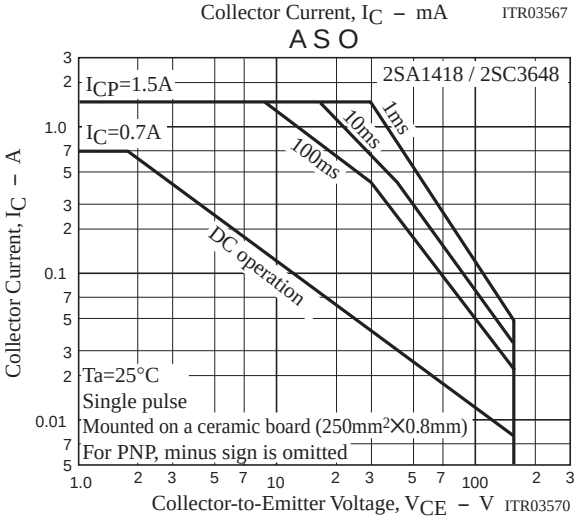

hFE – IC
2SA1418
Pulse
VCE=–2V
–5V
–10V
DC Current Gain, hFE
Collector Current, IC – mA
ITR03564

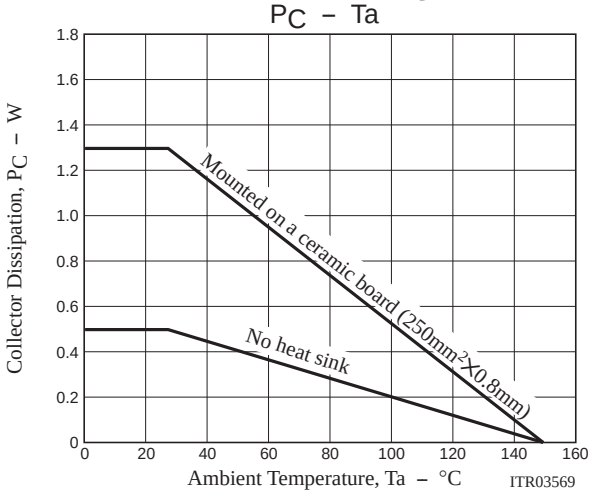

hFE – IC
2SC3648
Pulse
VCE=2V
5V
10V
DC Current Gain, hFE
Collector Current, IC – mA
ITR03565


fT – IC
2SA1418
VCE=5V
10V
Gain-Brandwidth Product, fT – MHz
Collector Current, IC – mA
ITR03566


fT – IC
2SC3648
VCE=10V
5V
Gain-Brandwidth Product, fT – MHz
Collector Current, IC – mA
ITR03567


Cob – VCB
2SA1418 / 2SC3648
f=1MHz
2SA1418
2SC3648
For PNP, minus sign is omitted
Output Capacitance, Cob – pF
Collector-to-Base Voltage, VCB – V
ITR03568


A S O
2SA1418 / 2SC3648
ICP=1.5A
IC=0.7A
1ms
10ms
100ms
DC operation
Ta=25°C
Single pulse
Mounted on a ceramic board (250mm2×0.8mm)
For PNP, minus sign is omitted
Collector Current, IC – A
Collector-to-Emitter Voltage, VCE – V
ITR03570


PC – Ta
Mounted on a ceramic board (250mm2×0.8mm)
No heat sink
Collector Dissipation, PC – W
Ambient Temperature, Ta – °C
ITR03569

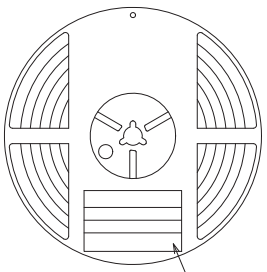
Bag Packing Specification

2SA1418S-TD-E, 2SC3648S-TD-E, 2SC3648T-TD-E

1. Packing Format

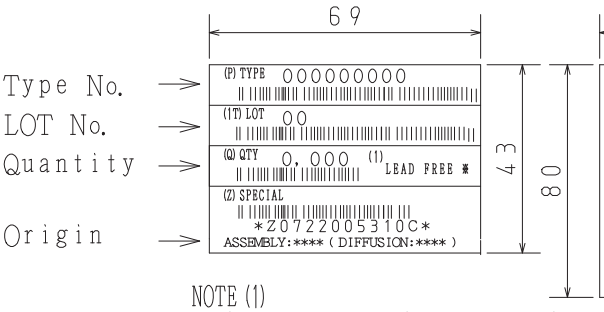
Package Name	Carrier Tape Type	Maximum Number of devices contained (pcs)			Packing format	
		Reel	Inner box	Outer box	Inner BOX (C-1)	Outer BOX (A-7)
PCP	PCP	1,000	4,000	24,000	4 reels contained Dimensions:mm (external) 183×72×185	6 inner boxes contained Dimensions:mm (external) 440×195×210

Packing method



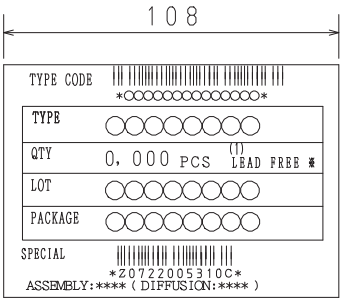
Reel label

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.

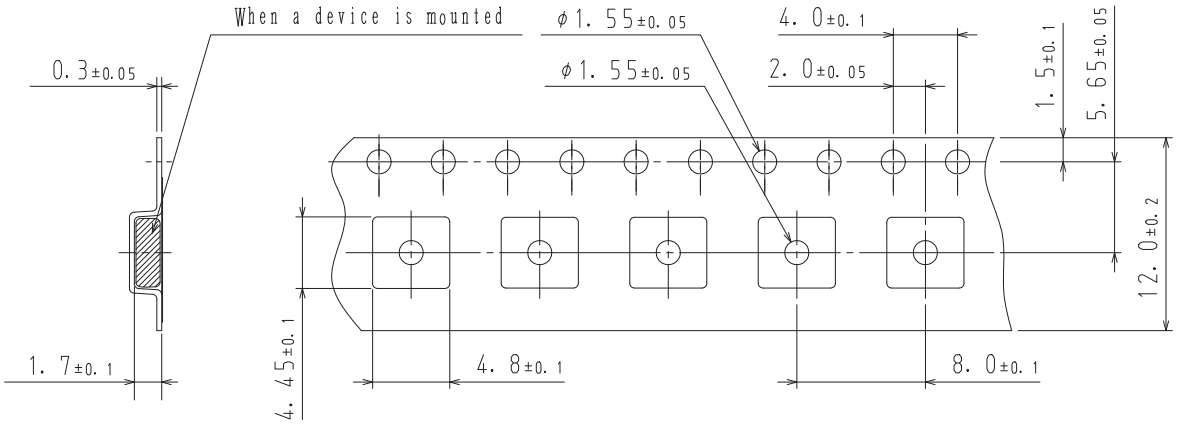


NOTE (1)
The LEAD FREE ※ description shows that the surface treatment of the terminal is lead free.

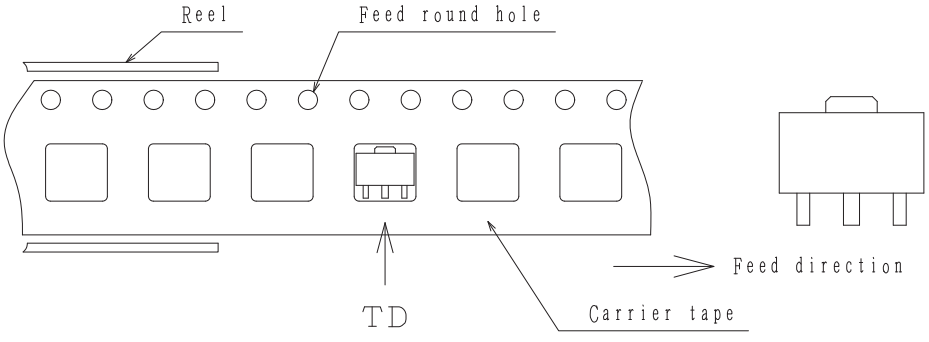
Label	JEITA Phase
LEAD FREE 3	JEITA Phase 3A
LEAD FREE 4	JEITA Phase 3

2. Taping configuration

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



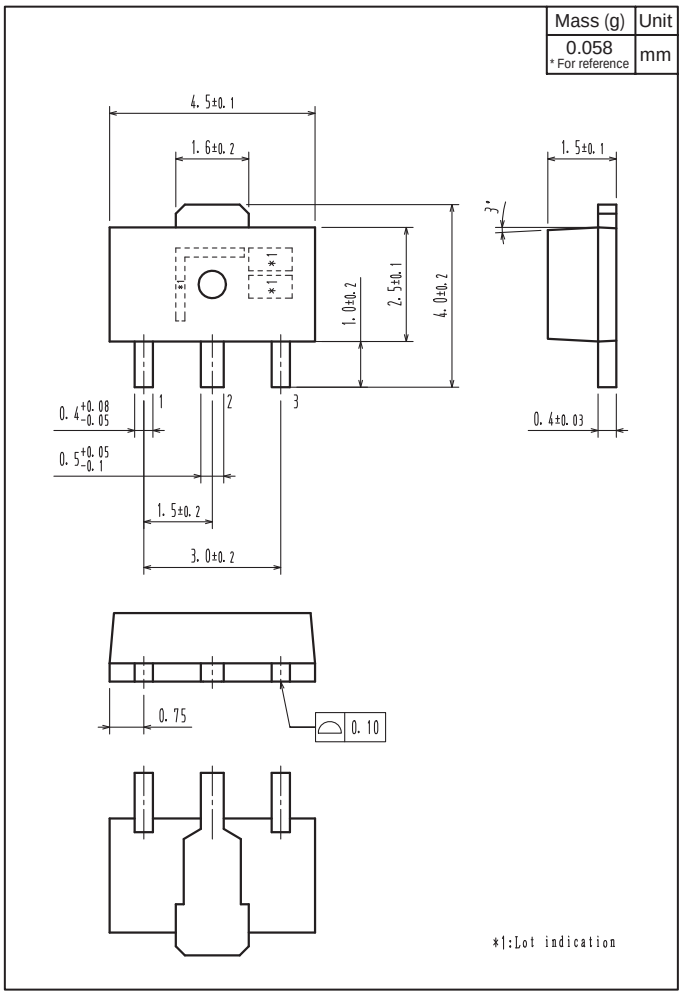
2-2. Device placement direction



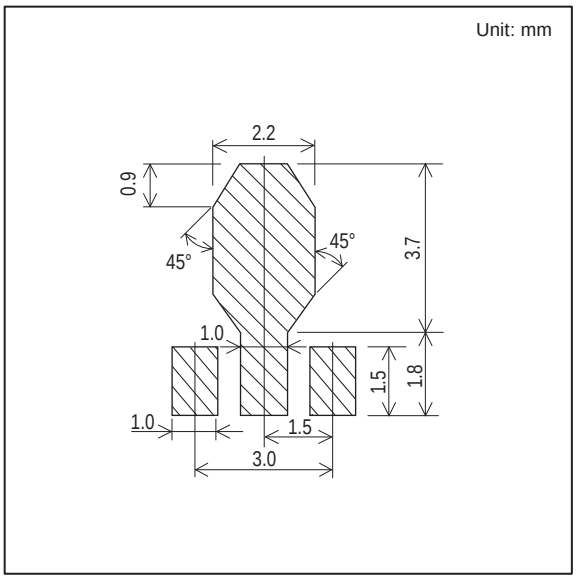
Those with pin 1 index on the feed hole side·····TD

Outline Drawing

2SA1418S-TD-E, 2SC3648S-TD-E, 2SC3648T-TD-E



Land Pattern Example



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