Ordering number : EN1788C

2SA1418/2SC3648

Bipolar Transistor
(–)160V, (–)0.7A, Low V_{CE}(sat), (PNP)NPN Single PCP

ON Semiconductor®
http://onsemi.com

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

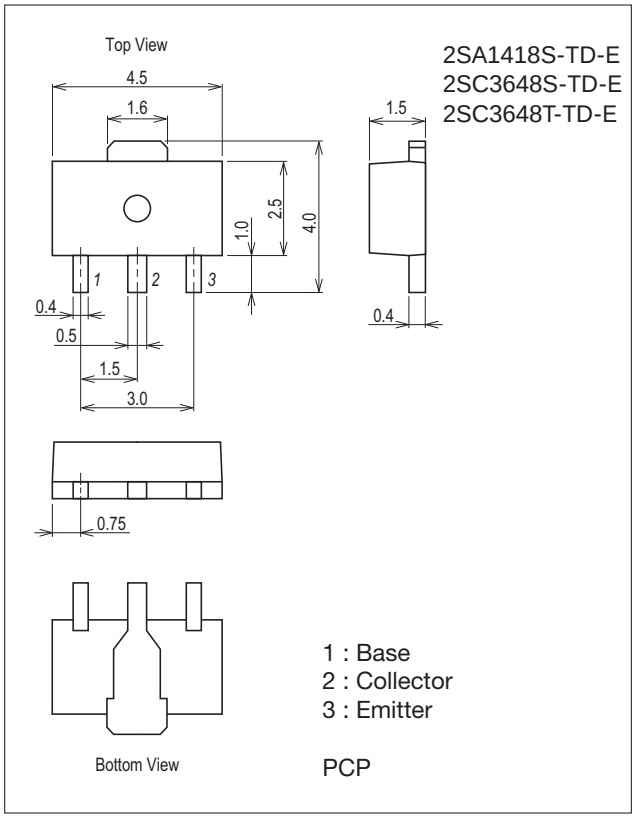
Specifications ( ) : 2SA1418

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

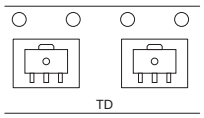
Continued on next page.

Package Dimensions
unit : mm (typ)
7007B-004

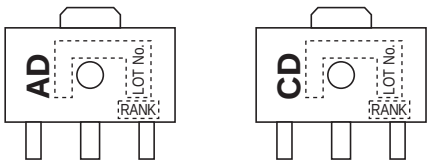


Product & Package Information
- Package : PCP
- JEITA, JEDEC : SC-62, SOT-89, TO-243
- Minimum Packing Quantity : 1,000 pcs./reel

Packing Type: TD

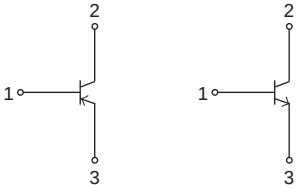


Marking



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

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.

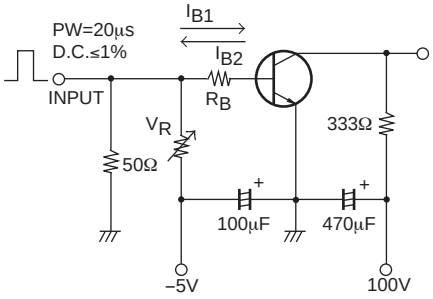
Electrical Characteristics at Ta=25°C

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

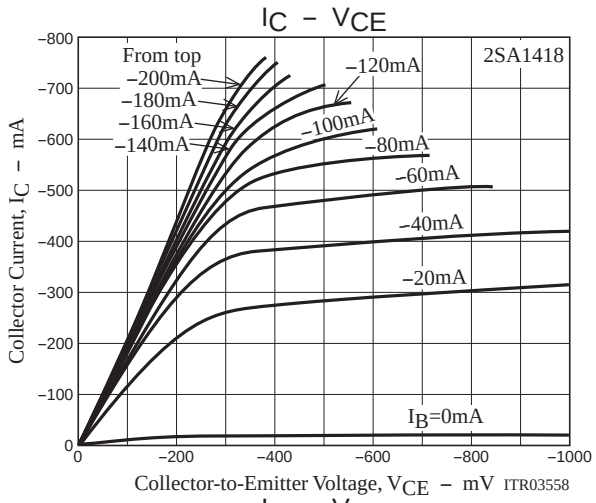
Switching Time Test Circuit

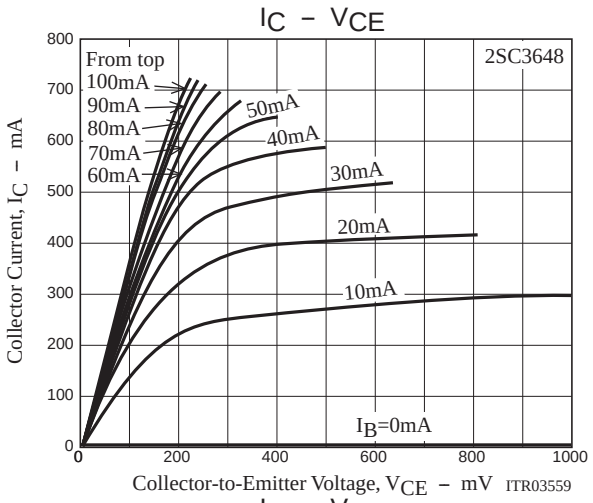


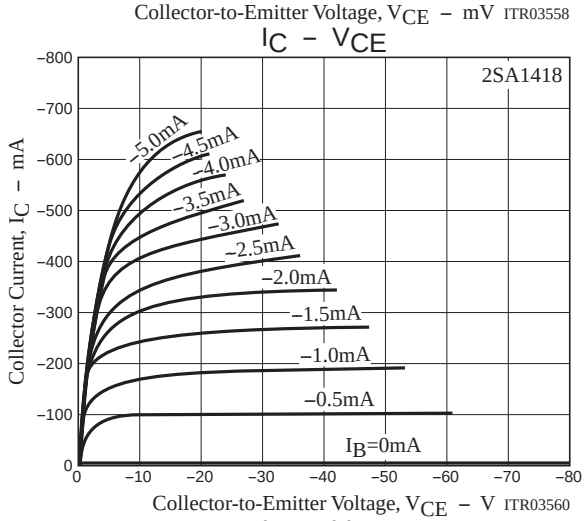
I_C=20I_{B1}=−20I_{B2}=300mA
(For PNP, the polarity is reversed)

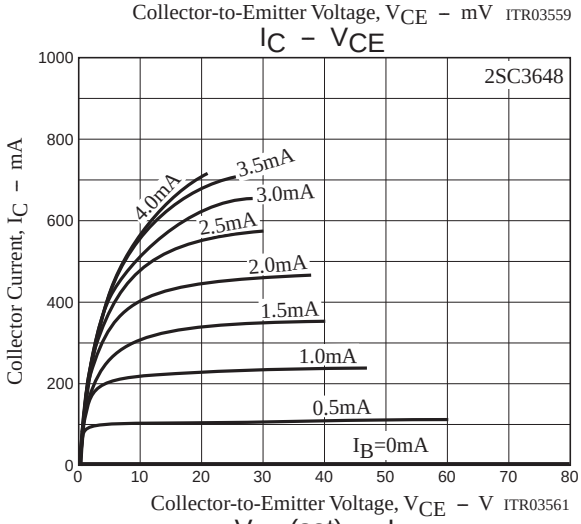
Ordering Information

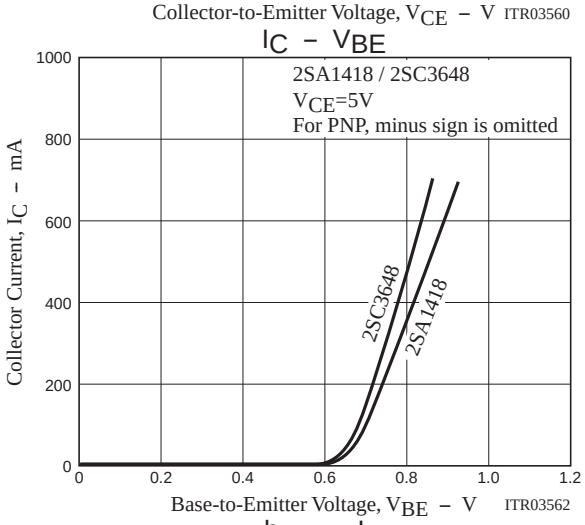
Device	Package	Shipping	memo
2SA1418S-TD-E	PCP	1,000pcs./reel	Pb Free
2SC3648S-TD-E	PCP	1,000pcs./reel	
2SC3648T-TD-E	PCP	1,000pcs./reel	

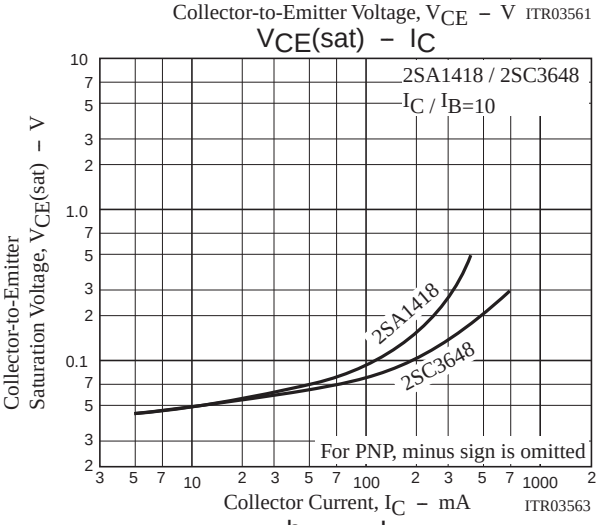

IC – VCE
2SA1418
From top
–200mA
–180mA
–160mA
–140mA
–120mA
–100mA
–80mA
–60mA
–40mA
–20mA
IB=0mA
Collector Current, IC – mA
Collector-to-Emitter Voltage, VCE – mV
ITR03558

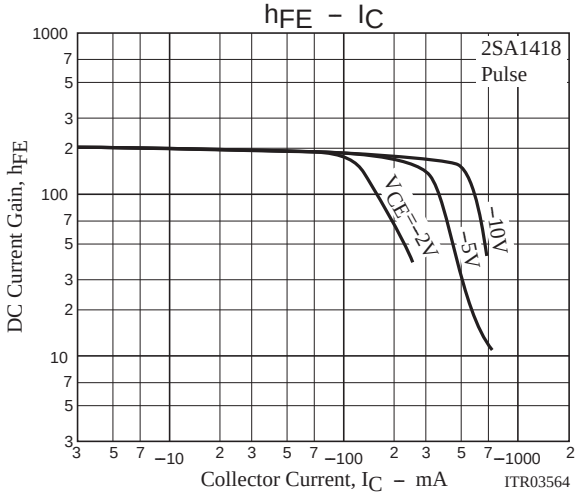

IC – VCE
2SC3648
From top
100mA
90mA
80mA
70mA
60mA
50mA
40mA
30mA
20mA
10mA
IB=0mA
Collector Current, IC – mA
Collector-to-Emitter Voltage, VCE – mV
ITR03559

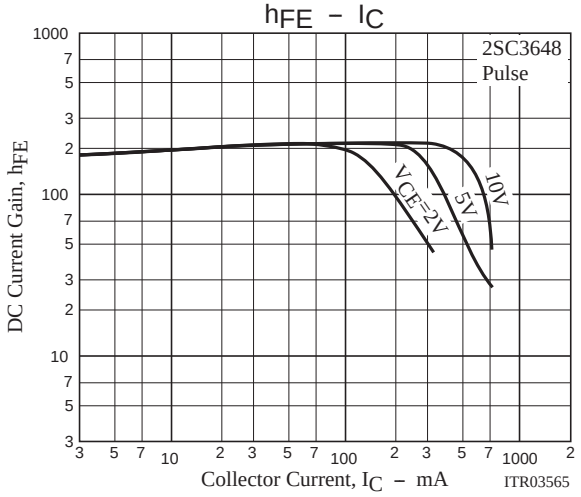

IC – VCE
2SA1418
–5.0mA
–4.5mA
–4.0mA
–3.5mA
–3.0mA
–2.5mA
–2.0mA
–1.5mA
–1.0mA
–0.5mA
IB=0mA
Collector Current, IC – mA
Collector-to-Emitter Voltage, VCE – V
ITR03560

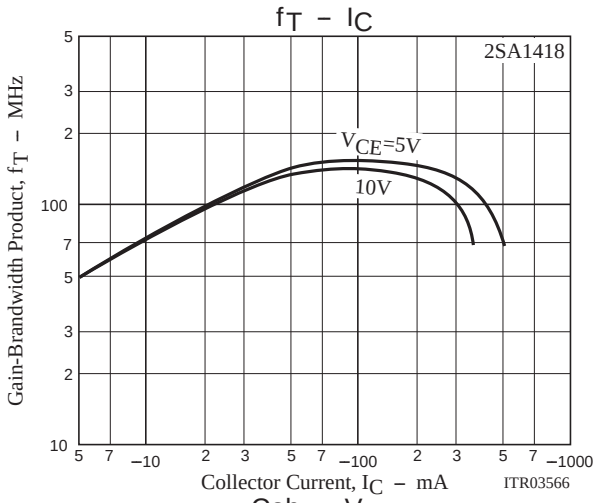

IC – VCE
2SC3648
4.0mA
3.5mA
3.0mA
2.5mA
2.0mA
1.5mA
1.0mA
0.5mA
IB=0mA
Collector Current, IC – mA
Collector-to-Emitter Voltage, VCE – V
ITR03561

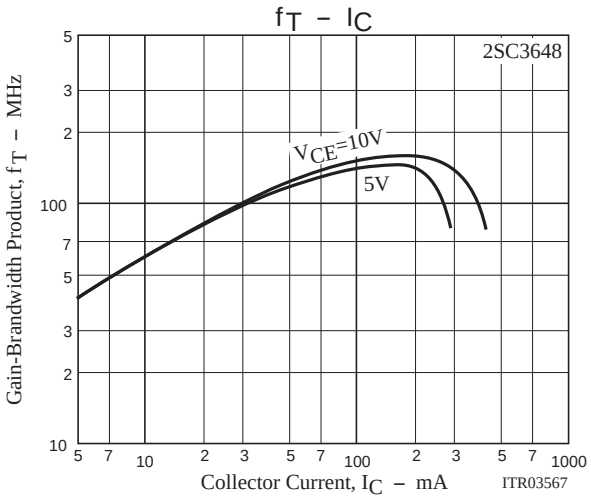

IC – VBE
2SA1418 / 2SC3648
VCE=5V
For PNP, minus sign is omitted
2SC3648
2SA1418
Collector Current, IC – mA
Base-to-Emitter Voltage, VBE – V
ITR03562

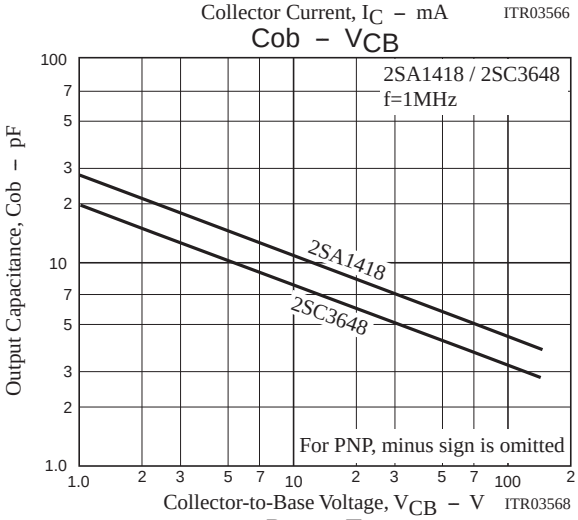

VCE(sat) – IC
2SA1418 / 2SC3648
IC / IB=10
2SA1418
2SC3648
For PNP, minus sign is omitted
Collector-to-Emitter Saturation Voltage, VCE(sat) – V
Collector Current, IC – mA
ITR03563

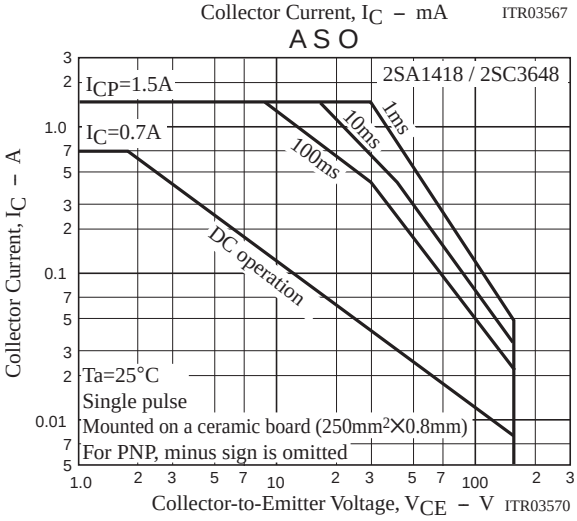

hFE – IC
2SA1418
Pulse
VCE=–2V
–5V
–10V
DC Current Gain, hFE
Collector Current, IC – mA
ITR03564

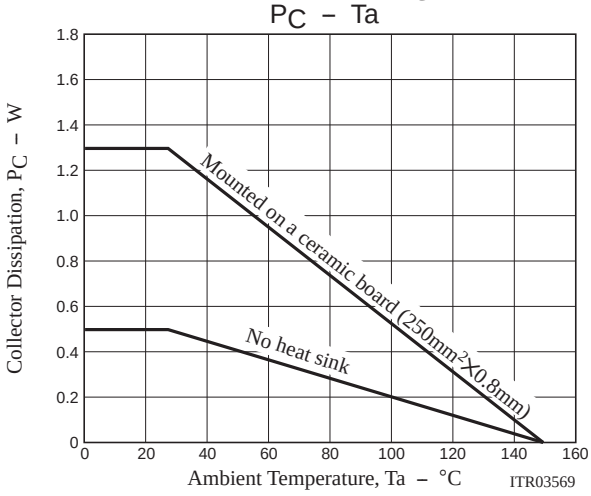

hFE – IC
2SC3648
Pulse
VCE=2V
5V
10V
DC Current Gain, hFE
Collector Current, IC – mA
ITR03565


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

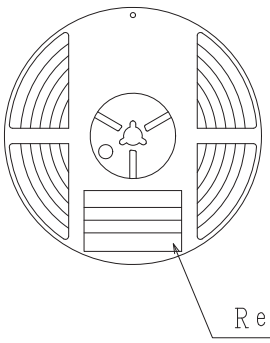
Bag Packing Specification

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

1. Packing Format

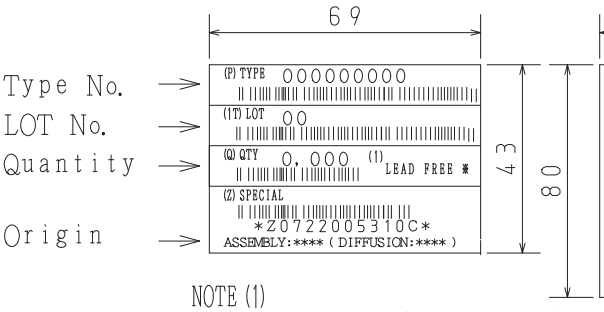
Package Name	Carrier Tape Type	Maximum Number of devices contained (pcs)			Packing format	
		Reel	Inner box	Outer box	Inner BOX (C-1)	Outer BOX (A-7)
PCP	PCP	1,000	4,000	24,000	4 reels contained Dimensions:mm (external) 183×72×185	6 inner boxes contained Dimensions:mm (external) 440×195×210

Packing method



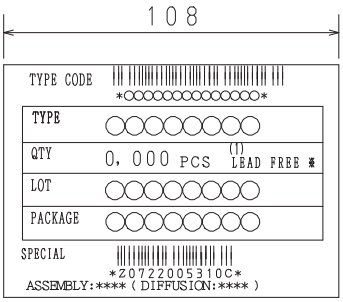
Reel label

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.

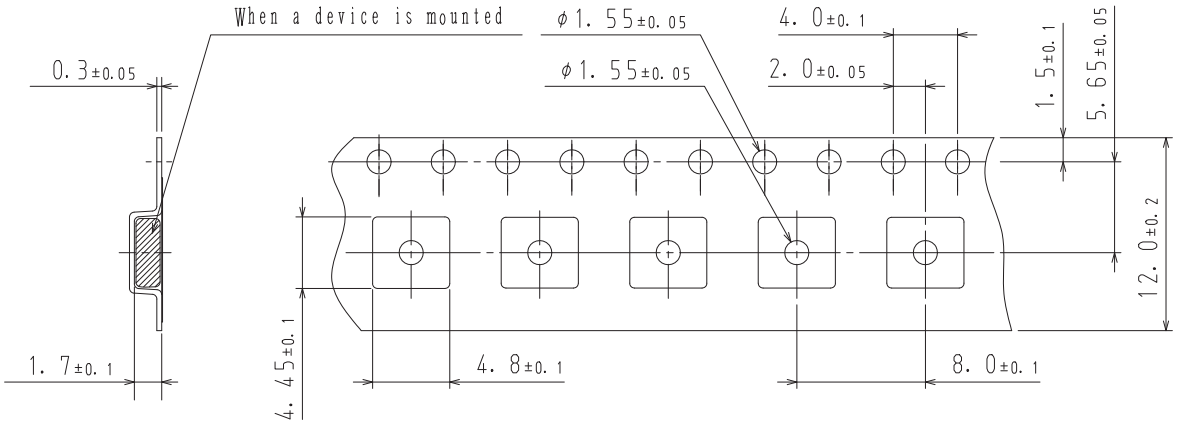


NOTE (1)
The LEAD FREE ※ description shows that the surface treatment of the terminal is lead free.

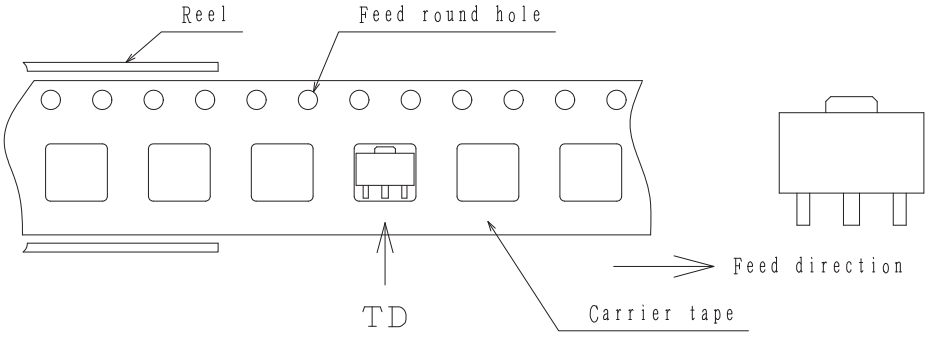
Label	JEITA Phase
LEAD FREE 3	JEITA Phase 3A
LEAD FREE 4	JEITA Phase 3

2. Taping configuration

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



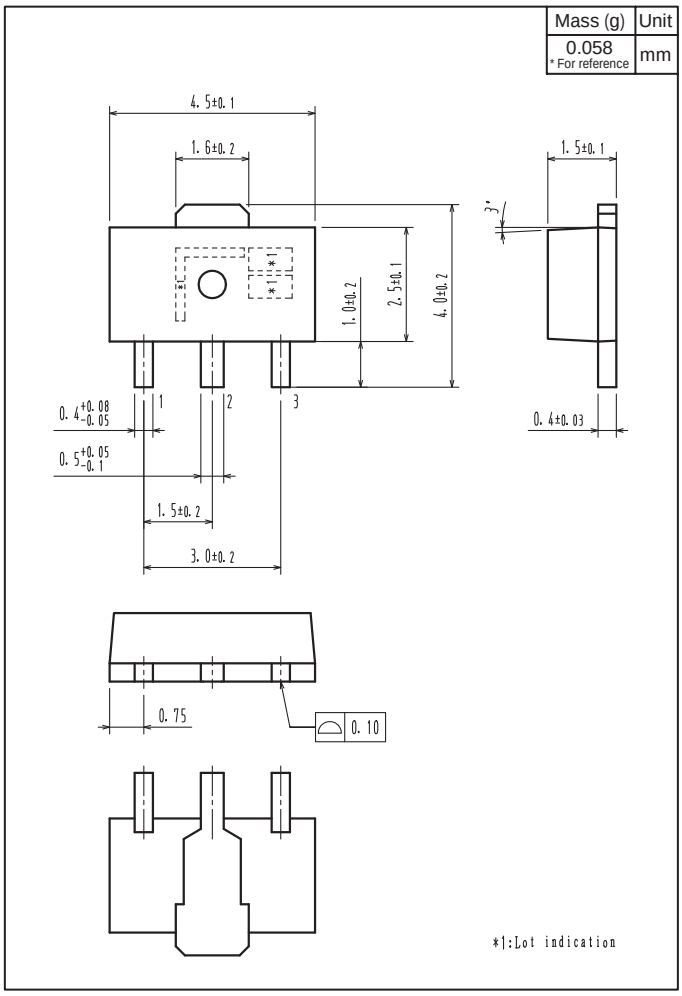
2-2. Device placement direction



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