



2SA1416/2SC3646

Bipolar Transistor

(-)100V, (-)1A, Low $V_{CE(sat)}$, (PNP)NPN Single PCP

ON Semiconductor®

<http://onsemi.com>

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 $T_a=25^\circ\text{C}$

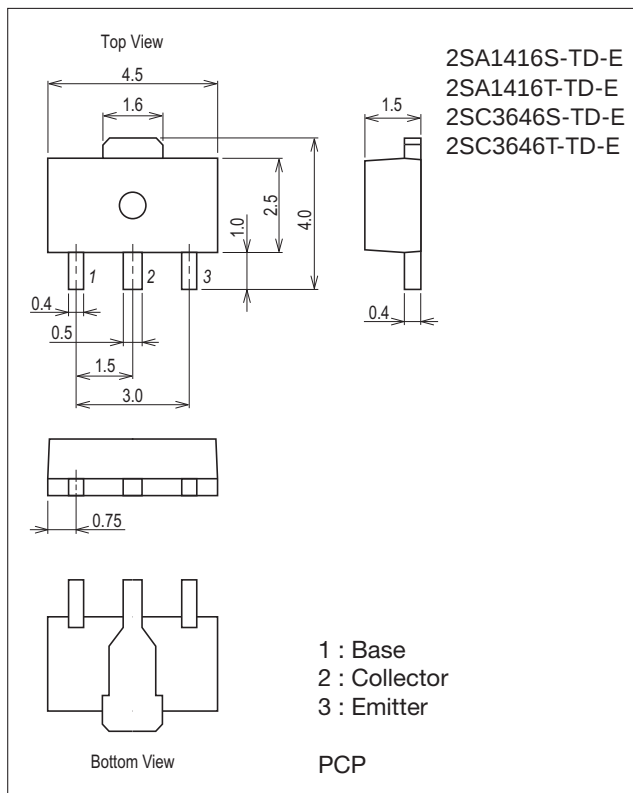
Parameter	Symbol	Conditions	Ratings	Unit
Collector-to-Base Voltage	V_{CBO}		(-)120	V
Collector-to-Emitter Voltage	V_{CEO}		(-)100	V
Emitter-to-Base Voltage	V_{EBO}		(-)6	V
Collector Current	I_C		(-)1	A
Collector Current (Pulse)	I_{CP}		(-)2	A
Collector Dissipation	P_C		500	mW
		When mounted on ceramic substrate (250mm ² ×0.8mm)	1.3	W
Junction Temperature	T_j		150	°C
Storage Temperature	T_{stg}		-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)

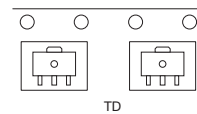
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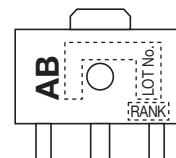
Product & Package Information

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

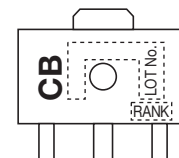
Packing Type: TD



Marking

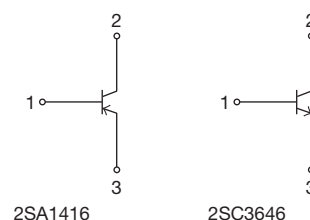


2SA1416



2SC3646

Electrical Connection



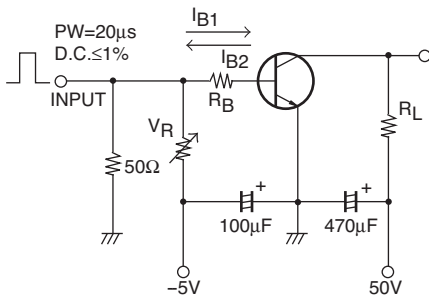
Electrical Characteristics at Ta=25°C

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

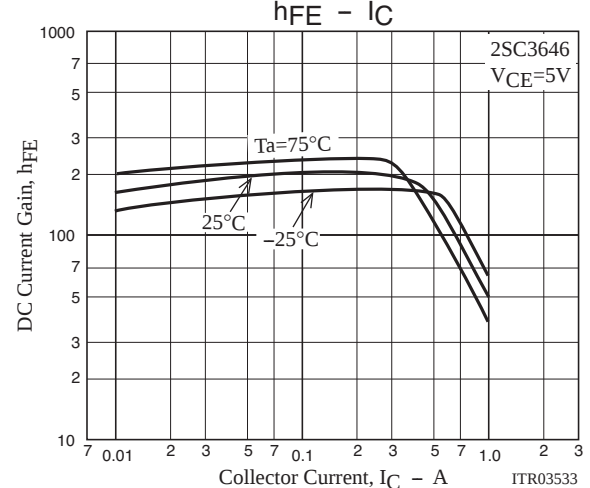
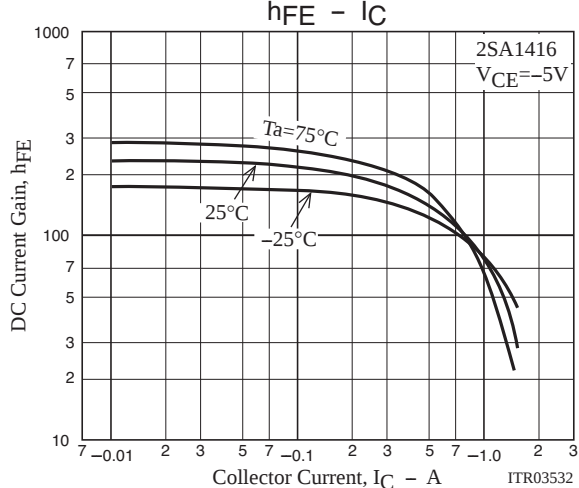
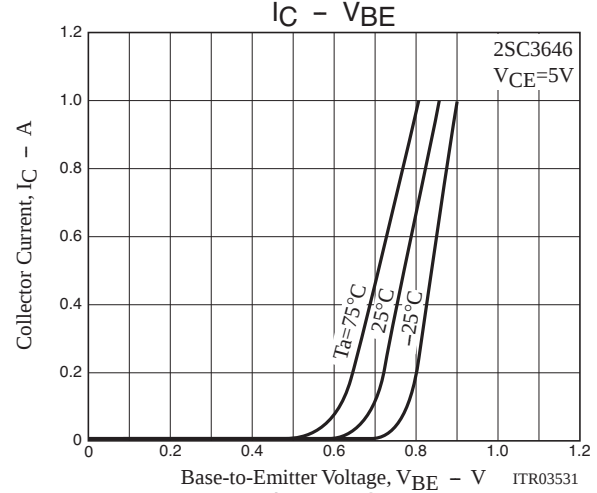
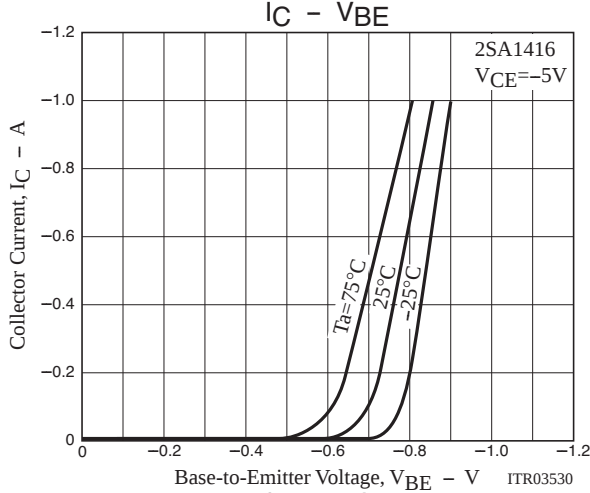
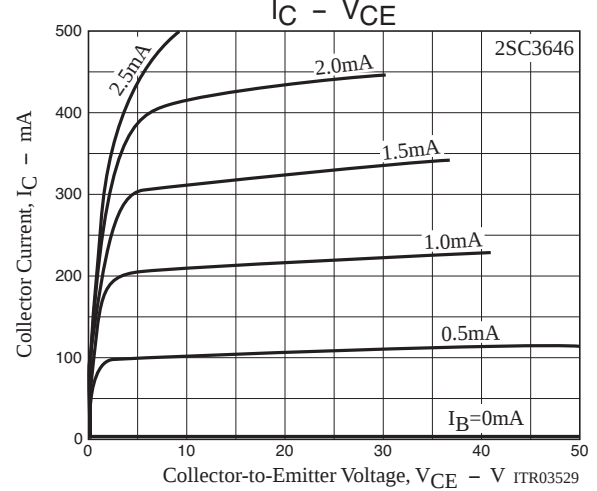
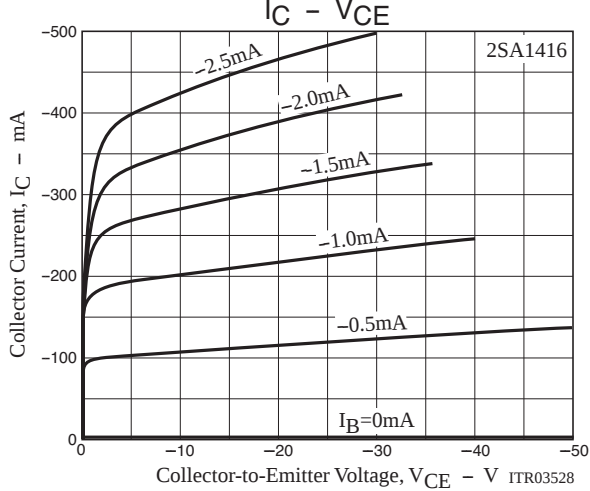
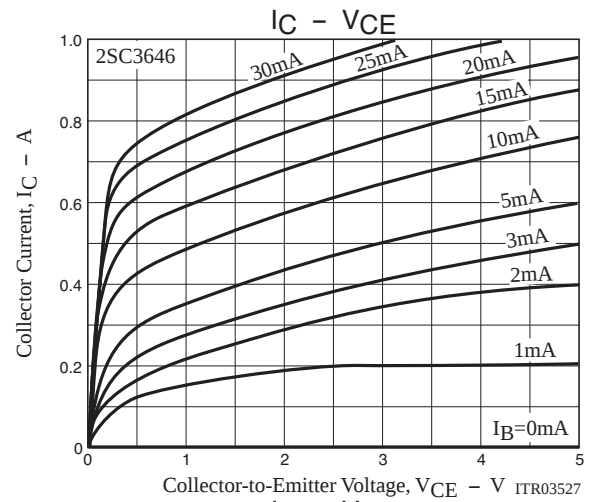
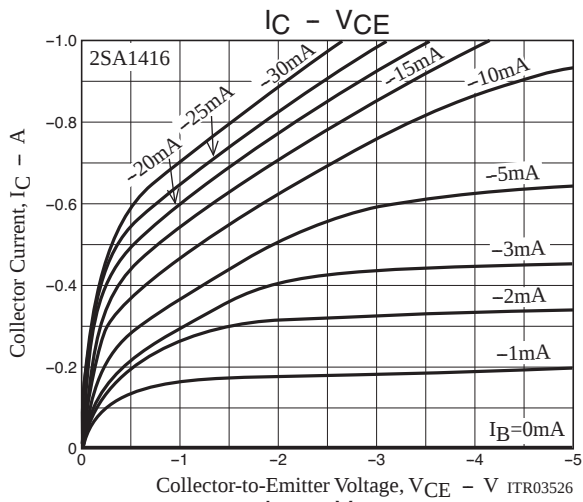
Switching Time Test Circuit

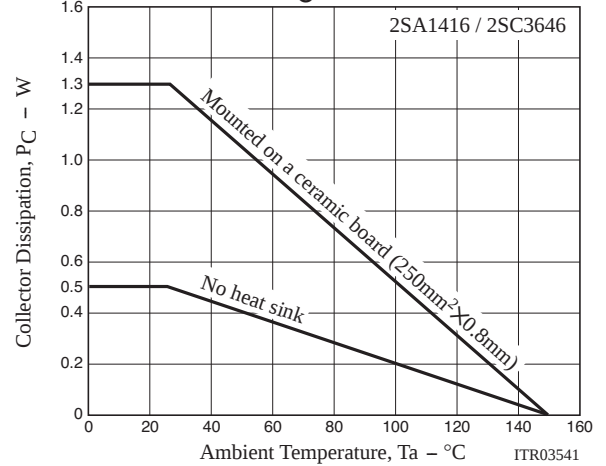
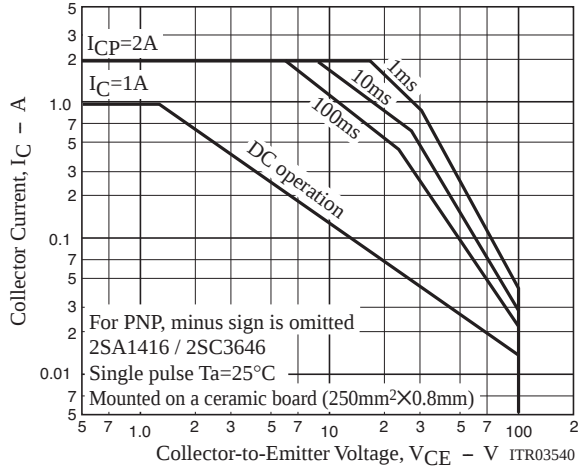
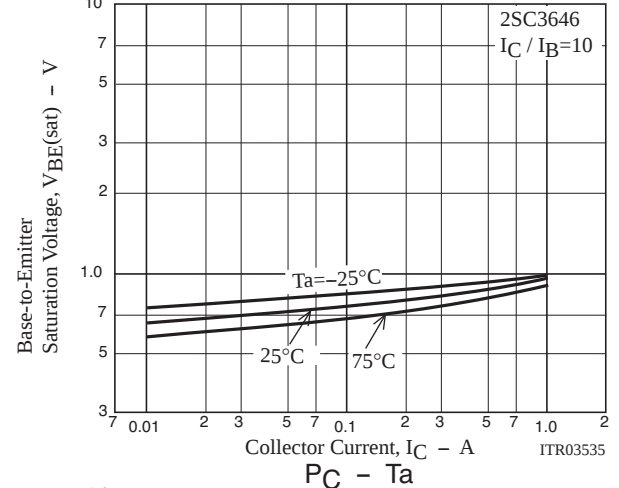
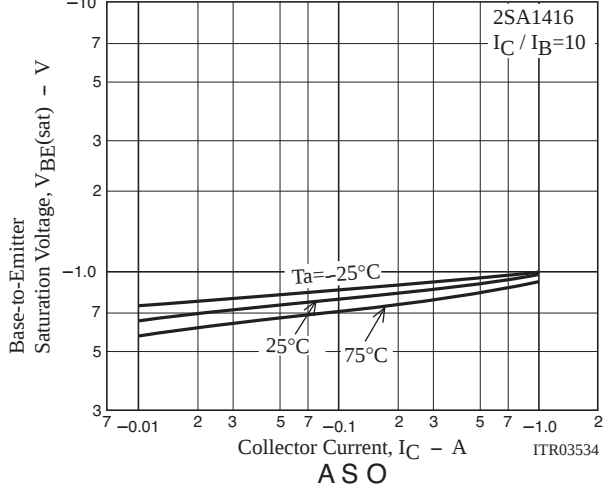
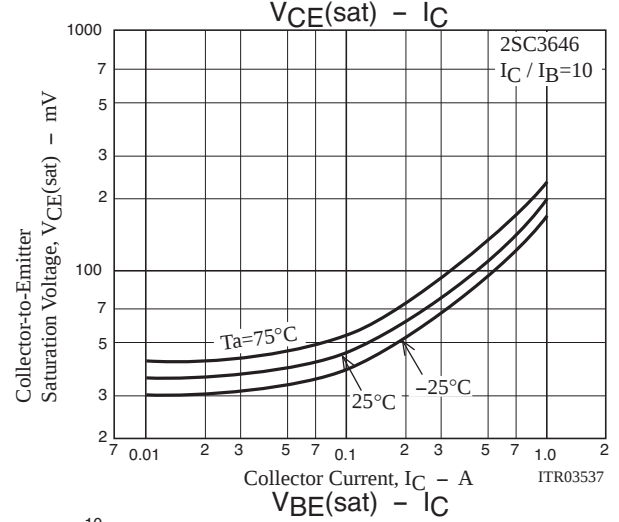
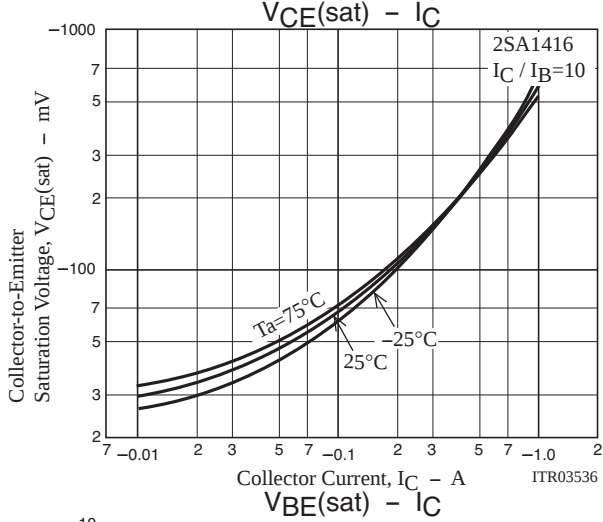
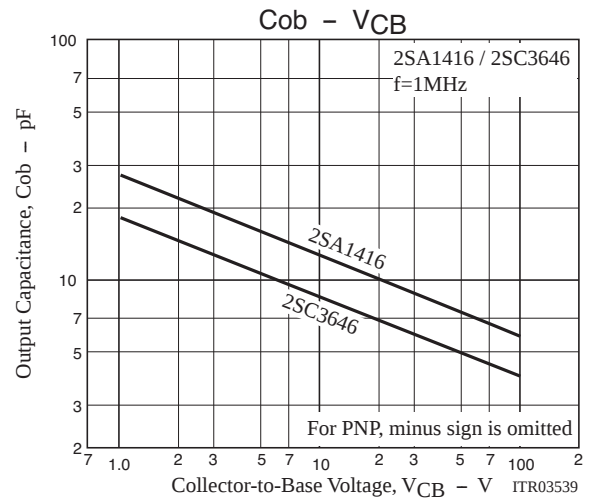
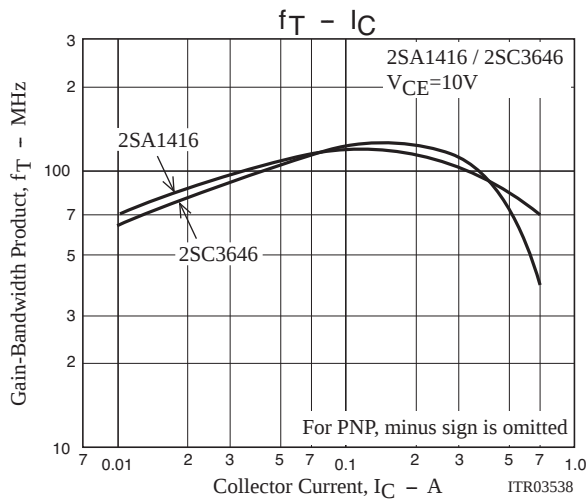


$I_C=10I_{B1}=-10I_{B2}=400mA$
(For PNP, the polarity is reversed)

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

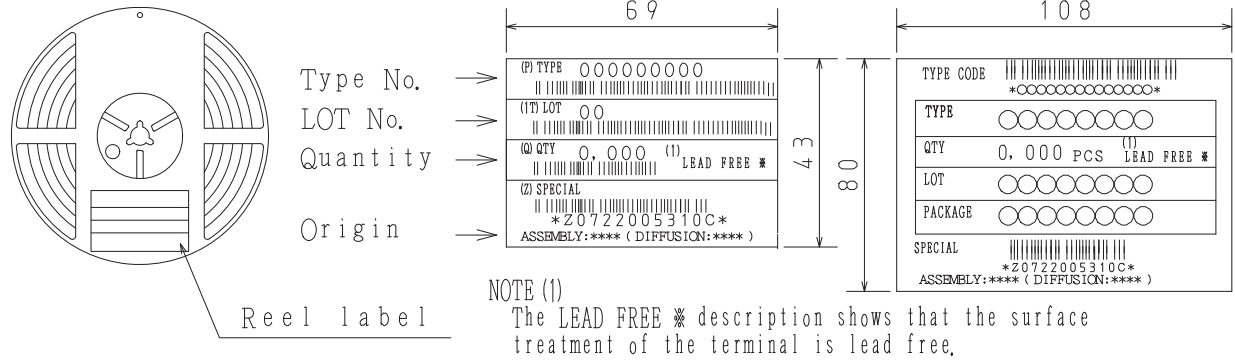
1. Packing Format

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.

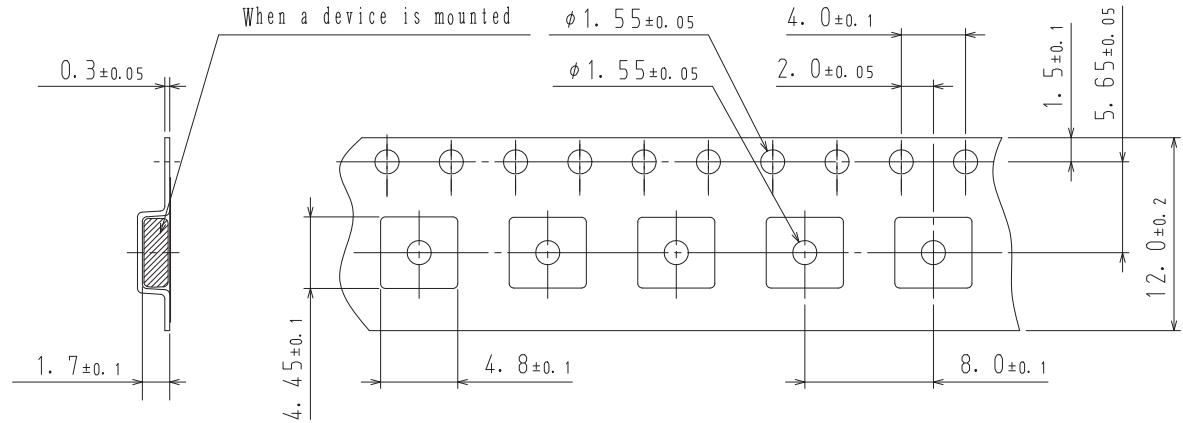
Packing method



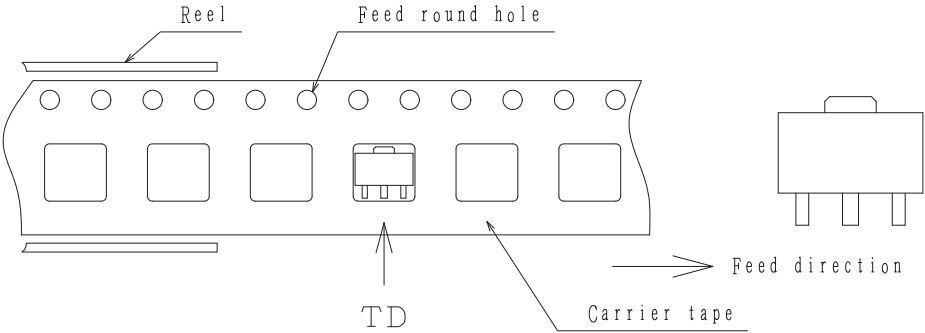
Label	JEITA Phase
LEAD FREE 3	JEITA Phase 3A
LEAD FREE 4	JEITA Phase 3

2. Taping configuration

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



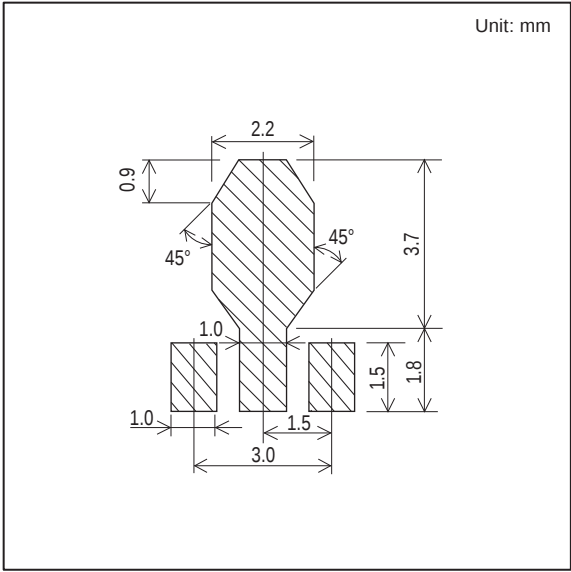
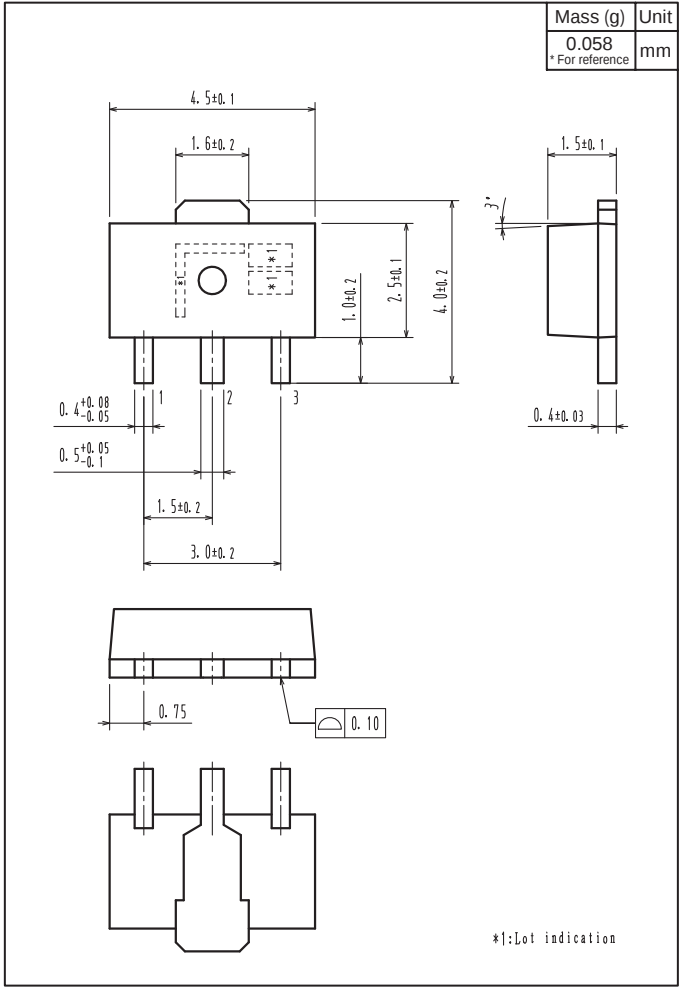
2-2. Device placement direction



Outline Drawing

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

Land Pattern Example



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