Ordering number : EN2006D

SANYO Semiconductors

DATA SHEET

An ON Semiconductor Company

2SA1417/2SC3647 — High-Voltage Switching Applications

PNP / NPN Epitaxial Planar Silicon Transistor

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 ICs

Specifications ( ) : 2SA1417

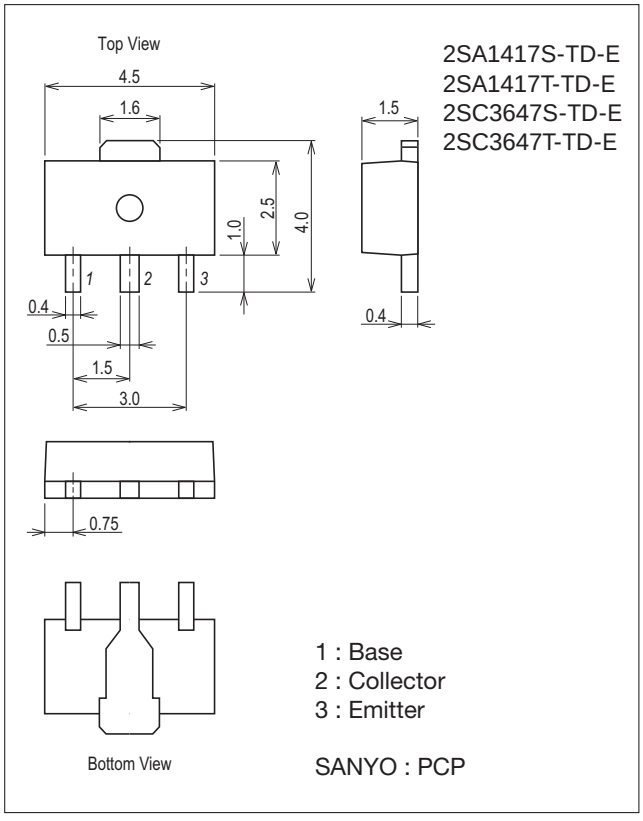
Absolute Maximum Ratings at Ta=25°C

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		(–)2	A
Collector Current (Pulse)	I_{CP}		(–)3	A
Collector Dissipation	P_C		500	mW
		When mounted on ceramic substrate (250mm^2×0.8mm)	1.5	W
Junction Temperature	Tj		150	°C
Storage Temperature	Tstg		–55 to +150	°C

Package Dimensions

unit : mm (typ)

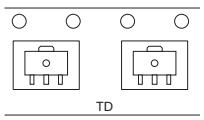
7007B-004



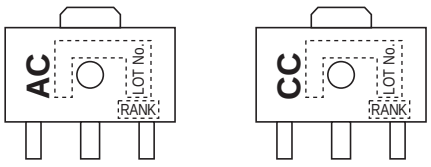
Product & Package Information

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

Packing Type: TD

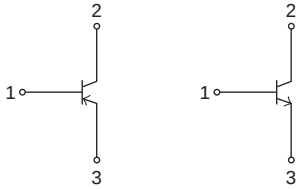


Marking



2SA1417 2SC3647

Electrical Connection



2SA1417 2SC3647

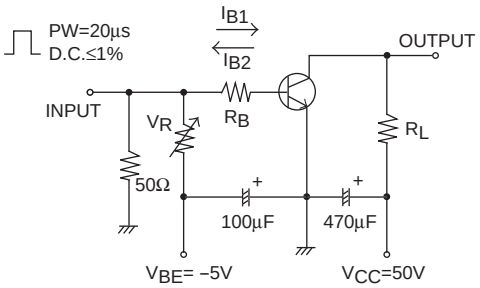
Electrical Characteristics at Ta=25°C

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	Cob	V_{CB}=(−)10V, f=1MHz		(25)16		pF
Collector-to-Emitter Saturation Voltage	V_{CE}(sat)	I_C=(−)1A, I_B=(−)100mA		(−0.22)0.13	(−0.6)0.4	V
Base-to-Emitter Saturation Voltage	V_{BE}(sat)	I_C=(−)1A, I_B=(−)100mA		(−)0.85	(−)1.2	V
Collector-to-Base Breakdown Voltage	$V_{(BR)CBO}$	I_C=(−)10μA, I_E=0A	(−)120			V
Collector-to-Emitter Breakdown Voltage	$V_{(BR)CEO}$	I_C=(−)1mA, R_{BE}=∞	(−)100			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.		(80)80		ns
Storage Time	t_{stg}			(750)1000		ns
Fall Time	t_f			(40)50		ns

* : The 2SA1417 / 2S3647 are classified by 100mA h_{FE} as follws :

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

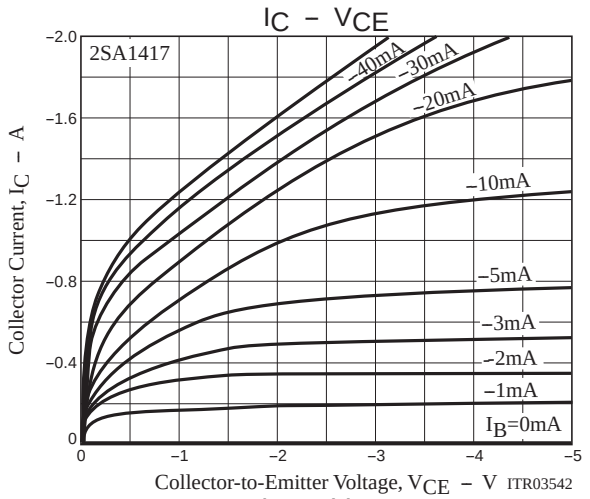
Switching Time Test Circuit

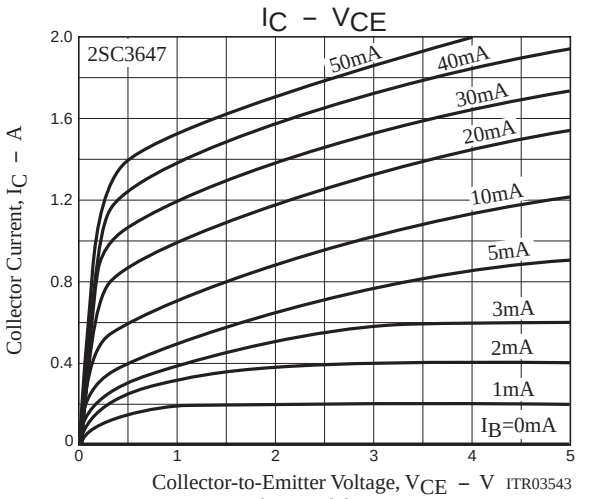


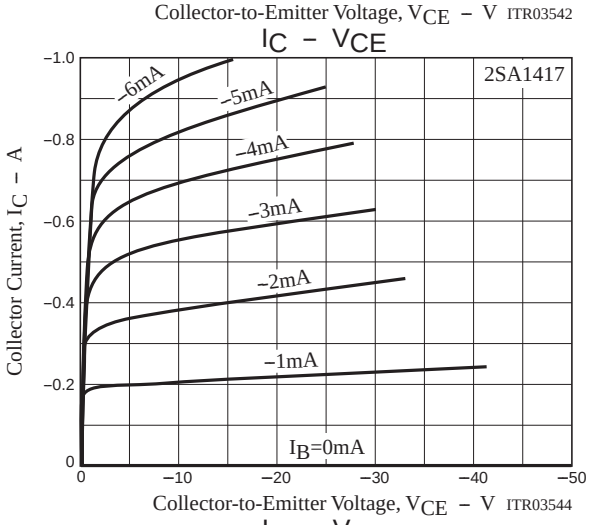
I_C=10I_{B1}= −10I_{B2}=0.7A
For PNP, the polarity is reversed.

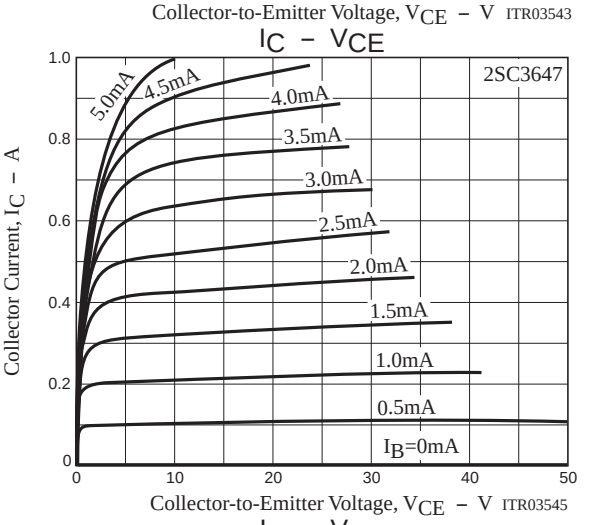
Ordering Information

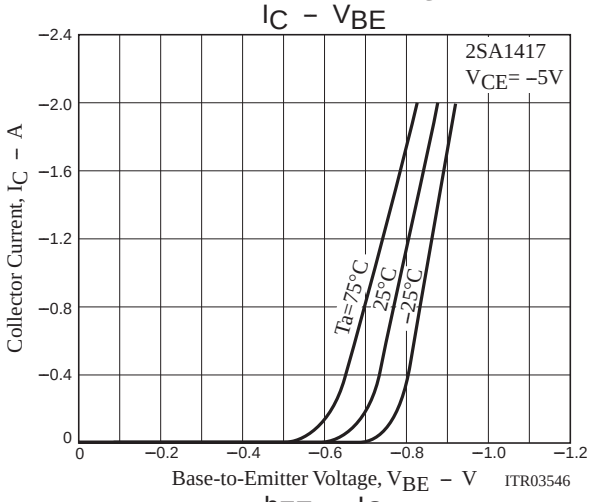
Device	Package	Shipping	memo
2SA1417S-TD-E	PCP	1,000pcs./reel	Pb Free
2SA1417T-TD-E	PCP	1,000pcs./reel	
2SC3647S-TD-E	PCP	1,000pcs./reel	
2SC3647T-TD-E	PCP	1,000pcs./reel	

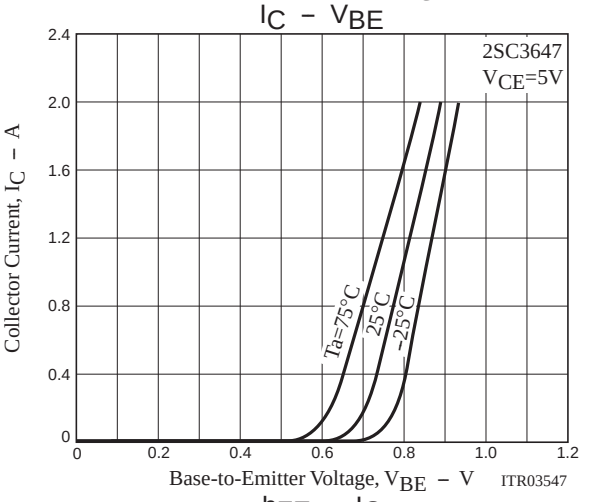

IC – VCE
2SA1417
–40mA
–30mA
–20mA
–10mA
–5mA
–3mA
–2mA
–1mA
IB=0mA
Collector Current, IC – A
Collector-to-Emitter Voltage, VCE – V
ITR03542

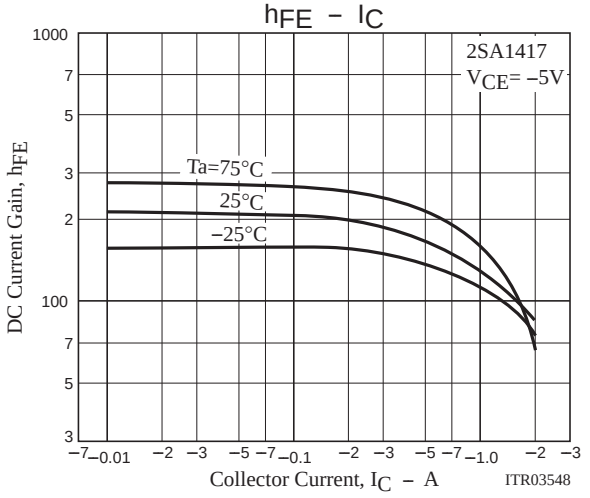

IC – VCE
2SC3647
50mA
40mA
30mA
20mA
10mA
5mA
3mA
2mA
1mA
IB=0mA
Collector Current, IC – A
Collector-to-Emitter Voltage, VCE – V
ITR03543

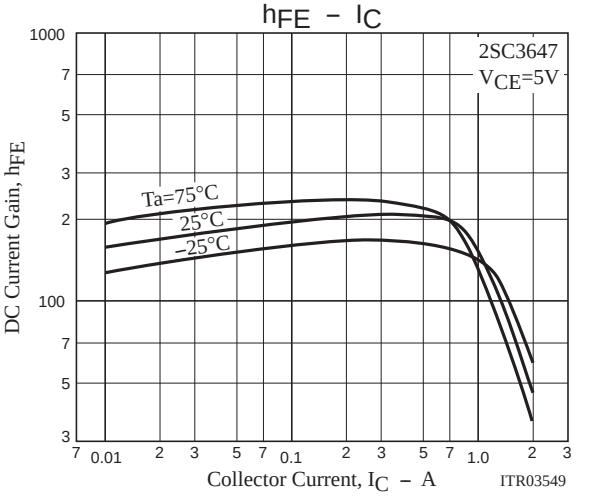

IC – VCE
2SA1417
–6mA
–5mA
–4mA
–3mA
–2mA
–1mA
IB=0mA
Collector Current, IC – A
Collector-to-Emitter Voltage, VCE – V
ITR03544

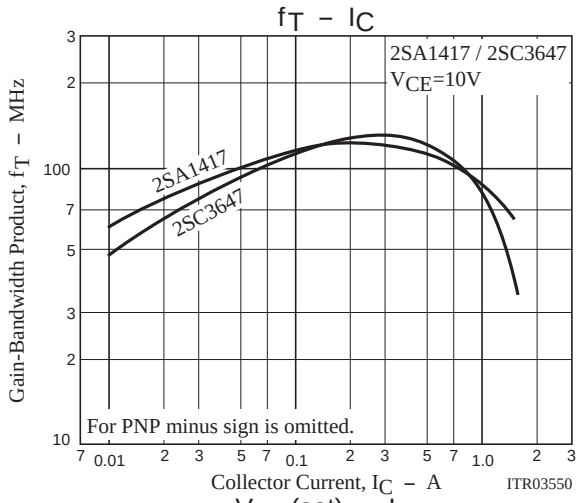

IC – VCE
2SC3647
5.0mA
4.5mA
4.0mA
3.5mA
3.0mA
2.5mA
2.0mA
1.5mA
1.0mA
0.5mA
IB=0mA
Collector Current, IC – A
Collector-to-Emitter Voltage, VCE – V
ITR03545

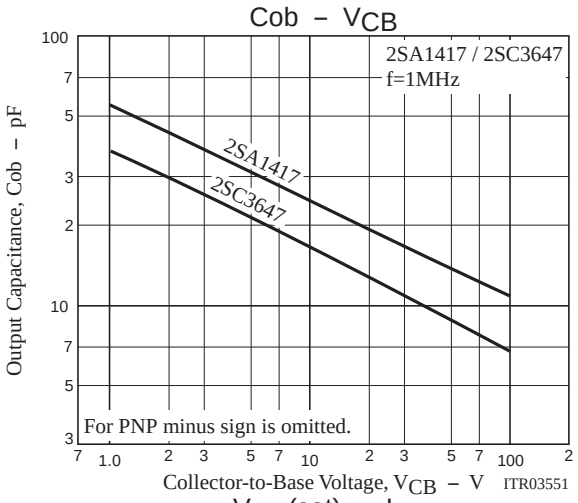

IC – VBE
2SA1417
VCE= –5V
Ta=75°C
25°C
–25°C
Collector Current, IC – A
Base-to-Emitter Voltage, VBE – V
ITR03546

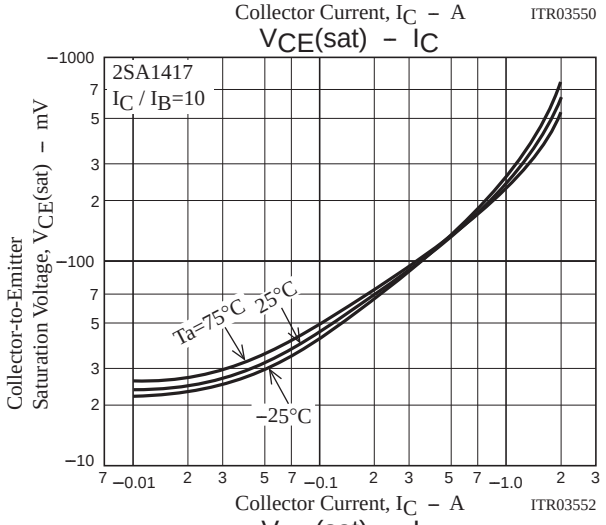

IC – VBE
2SC3647
VCE=5V
Ta=75°C
25°C
–25°C
Collector Current, IC – A
Base-to-Emitter Voltage, VBE – V
ITR03547

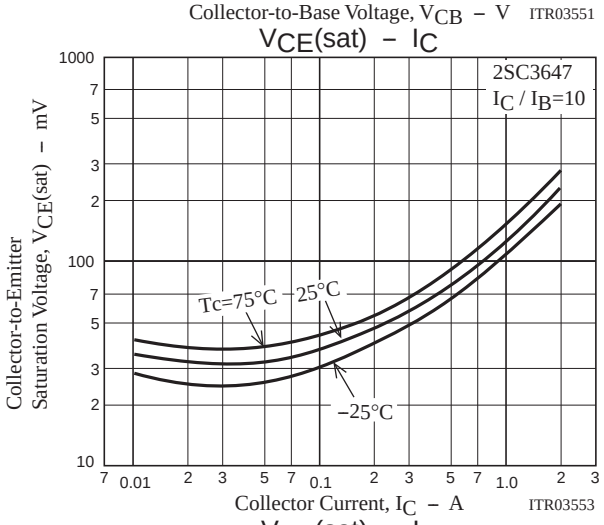

hFE – IC
2SA1417
VCE= –5V
Ta=75°C
25°C
–25°C
DC Current Gain, hFE
Collector Current, IC – A
ITR03548

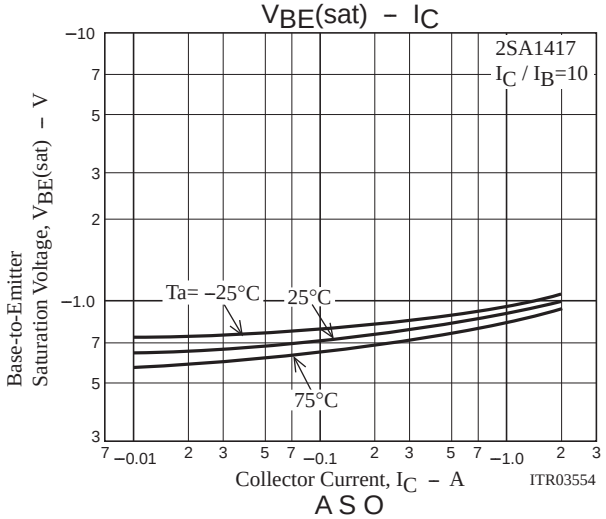

hFE – IC
2SC3647
VCE=5V
Ta=75°C
25°C
–25°C
DC Current Gain, hFE
Collector Current, IC – A
ITR03549

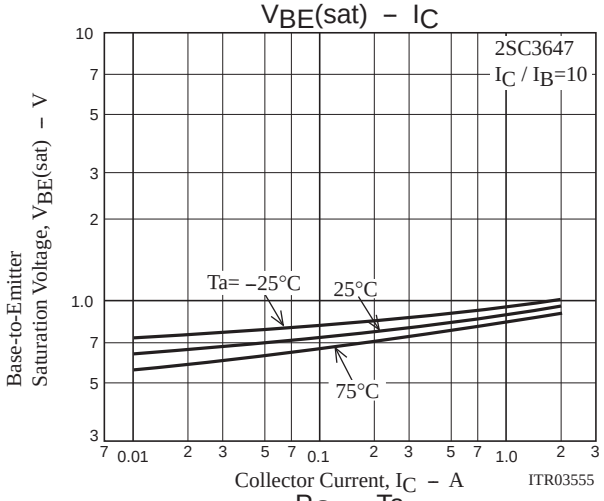

fT – IC
2SA1417 / 2SC3647
VCE=10V
2SA1417
2SC3647
For PNP minus sign is omitted.
Gain-Bandwidth Product, fT – MHz
Collector Current, IC – A
ITR03550

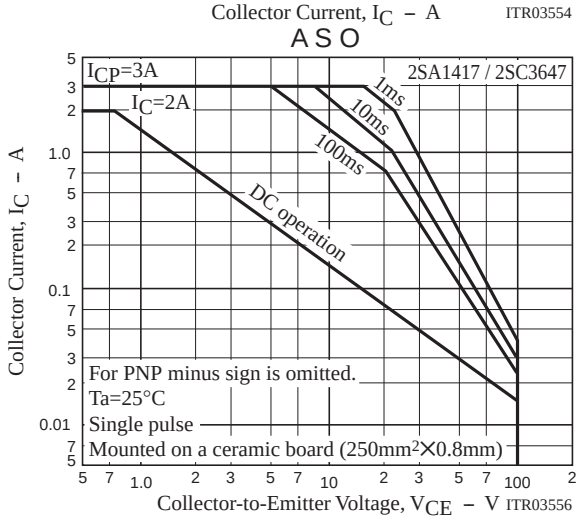

Cob – VCB
2SA1417 / 2SC3647
f=1MHz
2SA1417
2SC3647
For PNP minus sign is omitted.
Output Capacitance, Cob – pF
Collector-to-Base Voltage, VCB – V
ITR03551

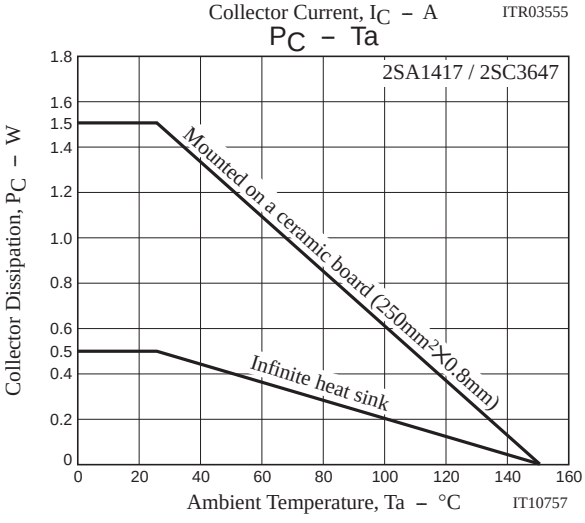

VCE(sat) – IC
2SA1417
IC / IB=10
Ta=75°C
25°C
–25°C
Collector-to-Emitter Saturation Voltage, VCE(sat) – mV
Collector Current, IC – A
ITR03552


VCE(sat) – IC
2SC3647
IC / IB=10
Tc=75°C
25°C
–25°C
Collector-to-Emitter Saturation Voltage, VCE(sat) – mV
Collector Current, IC – A
ITR03553


VBE(sat) – IC
2SA1417
IC / IB=10
Ta= –25°C
25°C
75°C
Base-to-Emitter Saturation Voltage, VBE(sat) – V
Collector Current, IC – A
ITR03554


VBE(sat) – IC
2SC3647
IC / IB=10
Ta= –25°C
25°C
75°C
Base-to-Emitter Saturation Voltage, VBE(sat) – V
Collector Current, IC – A
ITR03555


A S O
ICP=3A
IC=2A
2SA1417 / 2SC3647
1ms
10ms
100ms
DC operation
For PNP minus sign is omitted.
Ta=25°C
Single pulse
Mounted on a ceramic board (250mm²×0.8mm)
Collector Current, IC – A
Collector-to-Emitter Voltage, VCE – V
ITR03556


PC – Ta
2SA1417 / 2SC3647
Mounted on a ceramic board (250mm²×0.8mm)
Infinite heat sink
Collector Dissipation, PC – W
Ambient Temperature, Ta – °C
IT10757

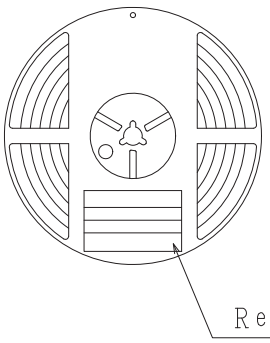
Embossed Taping Specification

2SA1417S-TD-E, 2SA1417T-TD-E, 2SC3647S-TD-E, 2SC3647T-TD-E

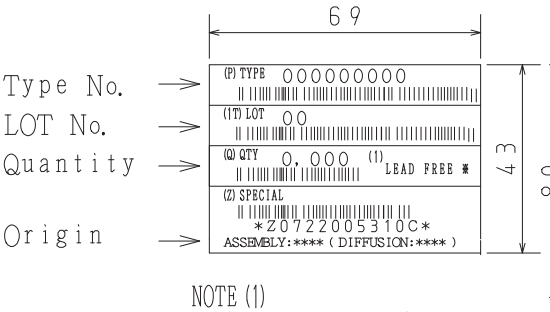
1. Packing Format

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

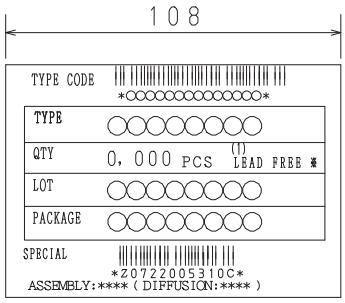


Reel label, Inner box label (unit:mm)



Outer box label

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

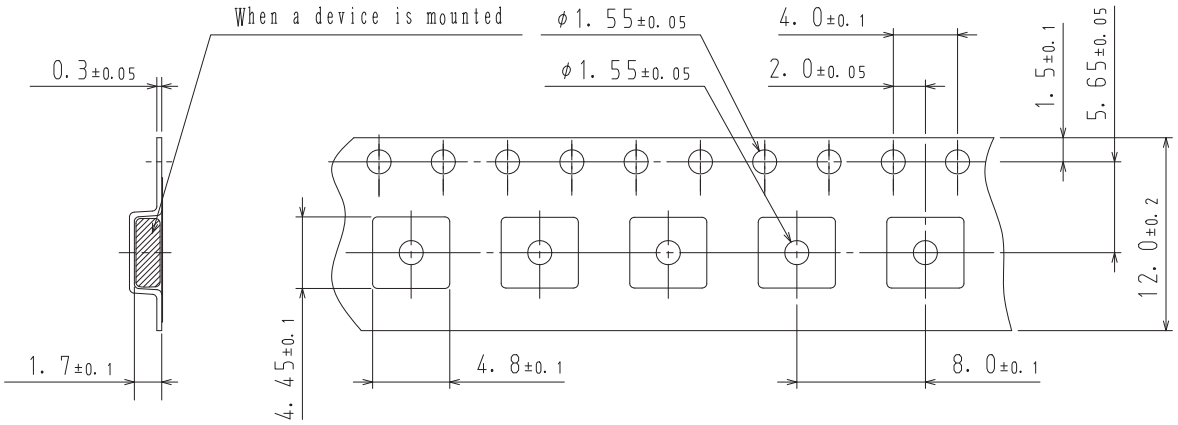


NOTE (1)
The LEAD FREE ※ description shows that the surface treatment of the terminal is lead free.

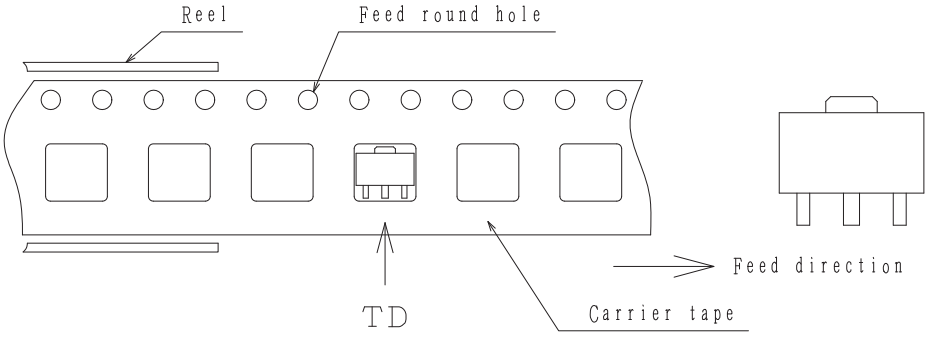
Label	JEITA Phase
LEAD FREE 3	JEITA Phase 3A
LEAD FREE 4	JEITA Phase 3

2. Taping configuration

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



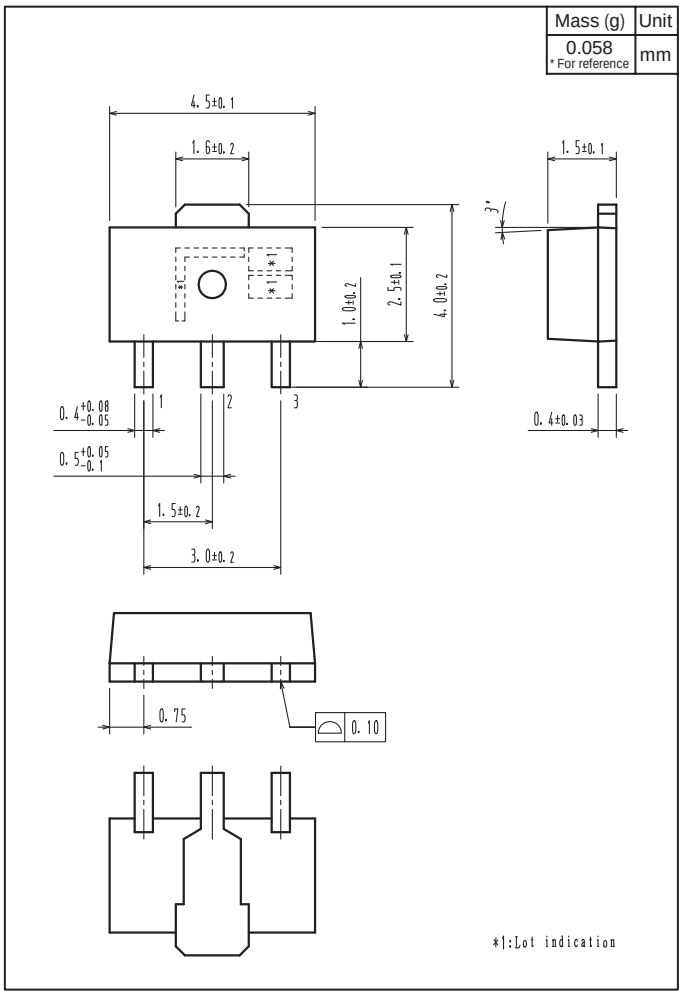
2-2. Device placement direction



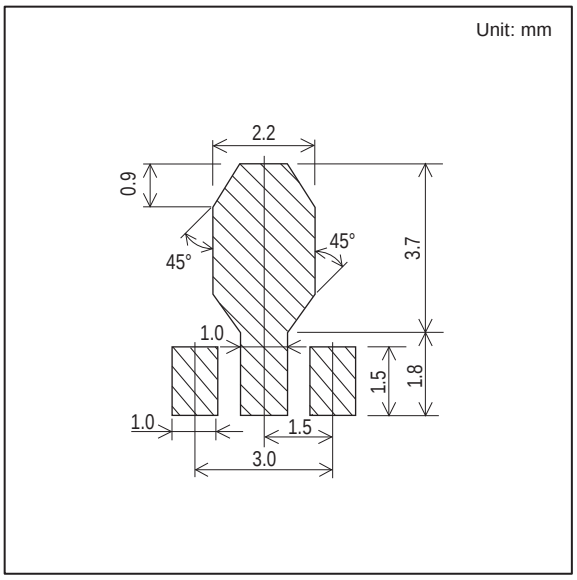
Those with pin 1 index on the feed hole side·····TD

Outline Drawing

2SA1417S-TD-E, 2SA1417T-TD-E, 2SC3647S-TD-E, 2SC3647T-TD-E



Land Pattern Example



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Адрес: 105318, г.Москва, ул.Щербаковская д.3, офис 1107

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http://moschip.ru/get-element

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Сотрудничество с глобальными дистрибьюторами электронных компонентов, предоставляет возможность заказывать и получать с международных складов практически любой перечень компонентов в оптимальные для Вас сроки.

На всех этапах разработки и производства наши партнеры могут получить квалифицированную поддержку опытных инженеров.

Система менеджмента качества компании отвечает требованиям в соответствии с ГОСТ Р ИСО 9001, ГОСТ РВ 0015-002 и ЭС РД 009

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