Ordering number : EN8275A

2SA2169/2SC6017

Bipolar Transistor
(-)50V, (-)10A, Low VCE(sat), (PNP)NPN Single TP/TP-FA

ON Semiconductor®
http://onsemi.com

Applications

- Relay drivers, lamp drivers, motor drivers

Features

- Adoption of MBIT processes
- Low collector-to-emitter saturation voltage
- Large current capacity
- High-speed switching

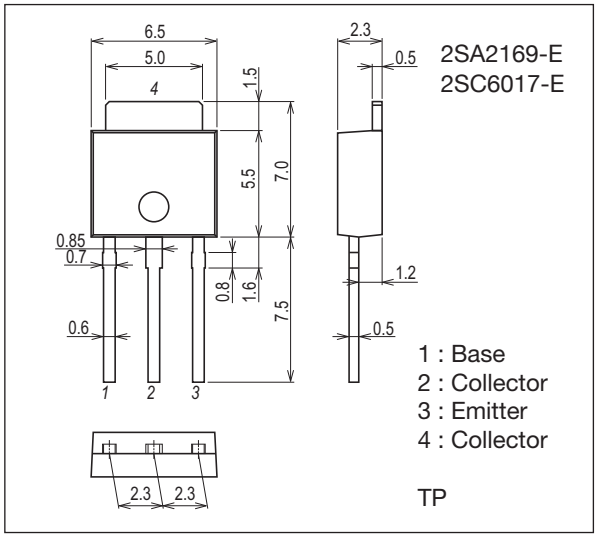
Specifications ( ): 2SA2169

Absolute Maximum Ratings at Ta=25°C

Parameter	Symbol	Conditions	Ratings	Unit
Collector-to-Base Voltage	V_{CBO}		(–50)100	V
Collector-to-Emitter Voltage	V_{CEO}		(–)50	V
Emitter-to-Base Voltage	V_{EBO}		(–)6	V
Collector Current	I_C		(–)10	A
Collector Current (Pulse)	I_{CP}	PW≤100μs	(–)13	A

Continued on next page.

Package Dimensions unit : mm (typ)
7518-003

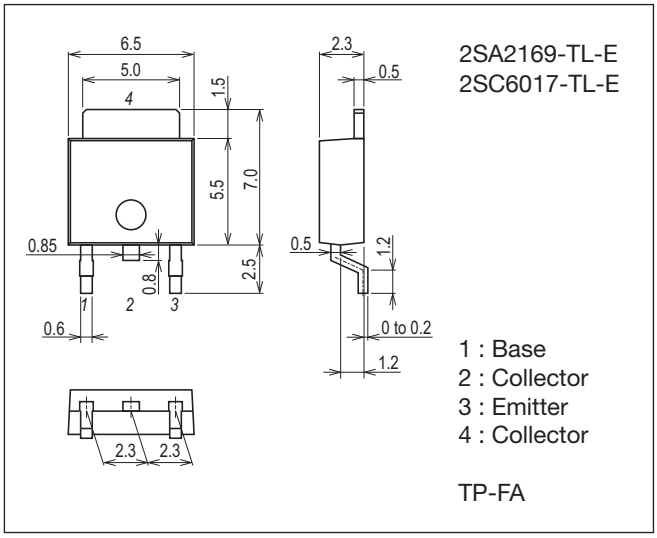


2SA2169-E
2SC6017-E

1 : Base
2 : Collector
3 : Emitter
4 : Collector

TP

Package Dimensions unit : mm (typ)
7003-003



2SA2169-TL-E
2SC6017-TL-E

1 : Base
2 : Collector
3 : Emitter
4 : Collector

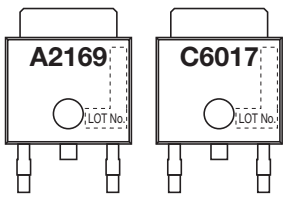
TP-FA

Product & Package Information

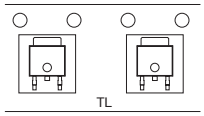
- Package : TP
- JEITA, JEDEC : SC-64, TO-251
- Minimum Packing Quantity : 500 pcs./bag

- Package : TP-FA
- JEITA, JEDEC : SC-63, TO-252
- Minimum Packing Quantity : 700 pcs./reel

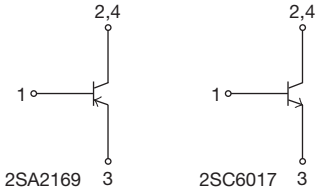
Marking (TP, TP-FA)



Packing Type (TP-FA) : TL



Electrical Connection



Semiconductor Components Industries, LLC, 2013

Continued from preceding page.

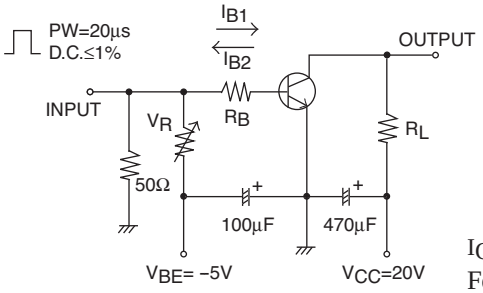
Parameter	Symbol	Conditions	Ratings	Unit
Base Current	I_B		(–)2	A
Collector Dissipation	P_C		0.95	W
		Tc=25°C	20	W
Junction Temperature	Tj		150	°C
Storage Temperature	Tstg		–55 to +150	°C

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}=(–)40V, I_E=0A			(–)10	μA
Emitter Cutoff Current	I_{EBO}	V_{EB}=(–)4V, I_C=0A			(–)10	μA
DC Current Gain	h_{FE}	V_{CE}=(–)2V, I_C=(–)1A	200		(560)700	
Gain-Bandwidth Product	f_T	V_{CE}=(–)5V, I_C=(–)1A		(130)200		MHz
Output Capacitance	Cob	V_{CB}=(–)10V, f=1MHz		(90)60		pF
Collector-to-Emitter Saturation Voltage	V_{CE}(sat)	I_C=(–)5A, I_B=(–)250mA		(–290)180	(–580)360	mV
Base-to-Emitter Saturation Voltage	V_{BE}(sat)	I_C=(–)5A, I_B=(–)250mA		(–)0.93	(–)1.4	V
Collector-to-Base Breakdown Voltage	$V_{(BR)CBO}$	I_C=(–)100μA, I_E=0A	(–50)100			V
Collector-to-Emitter Breakdown Voltage	$V_{(BR)CEO}$	I_C=(–)1mA, R_{BE}=∞	(–)50			V
Emitter-to-Base Breakdown Voltage	$V_{(BR)EBO}$	I_E=(–)100μA, I_C=0A	(–)6			V
Turn-On Time	t_{on}	See specified Test Circuit.		(70)40		ns
Storage Time	t_{stg}			(650)1000		ns
Fall Time	t_f			(60)80		ns

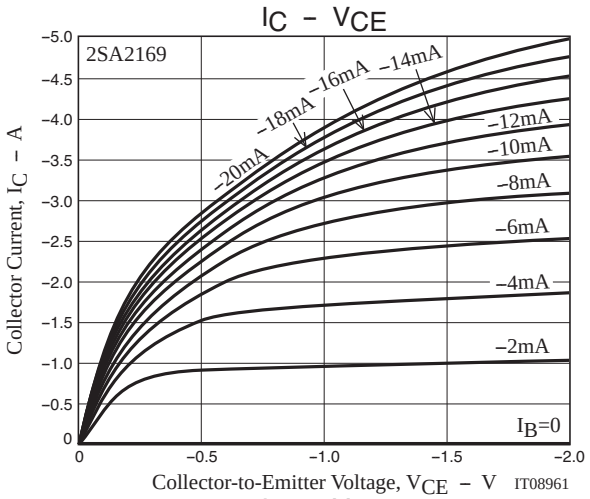
Switching Time Test Circuit

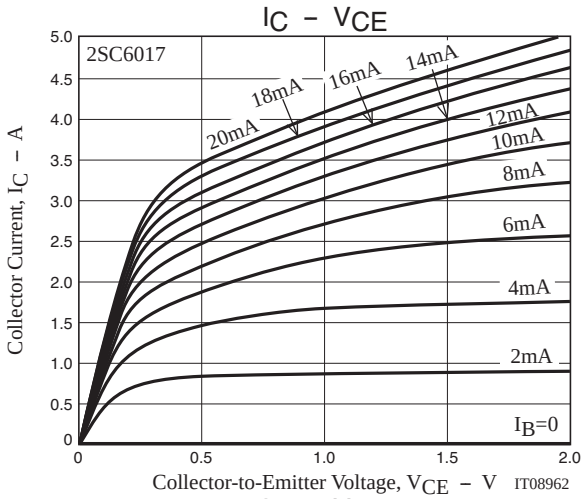


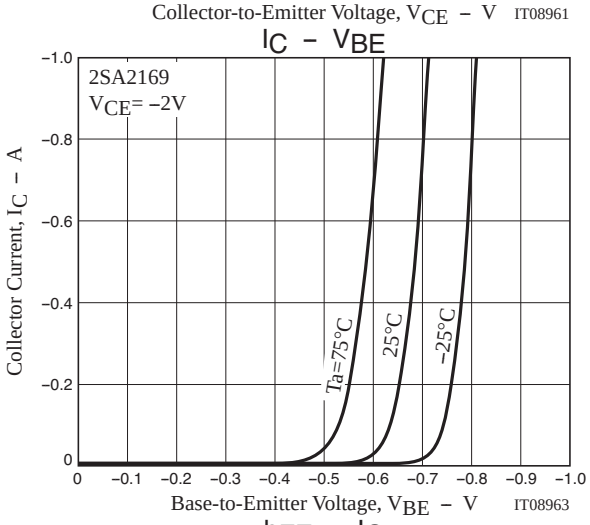
I_C=20I_{B1}= –20I_{B2}=3A
For PNP, the polarity is reversed.

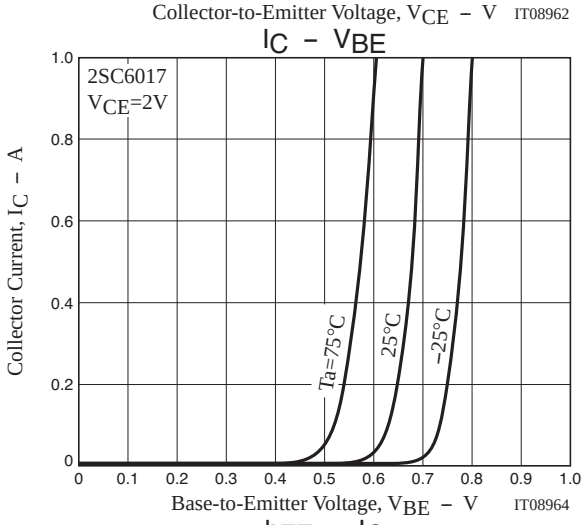
Ordering Information

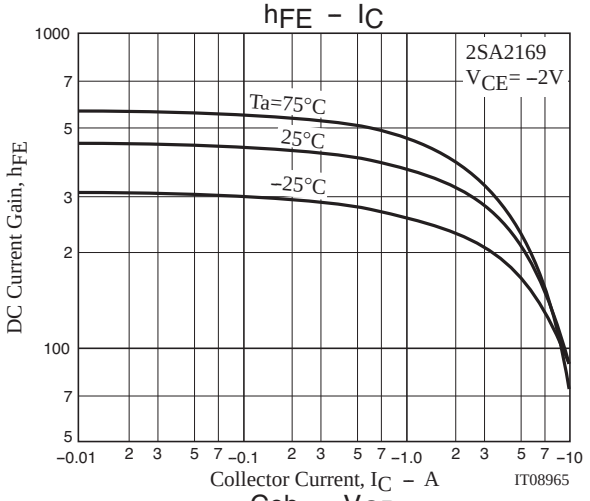
Device	Package	Shipping	memo
2SA2169-E	TP	500pcs./bag	Pb Free
2SC6017-E	TP	500pcs./bag	
2SA2169-TL-E	TP-FA	700pcs./reel	
2SC6017-TL-E	TP-FA	700pcs./reel	

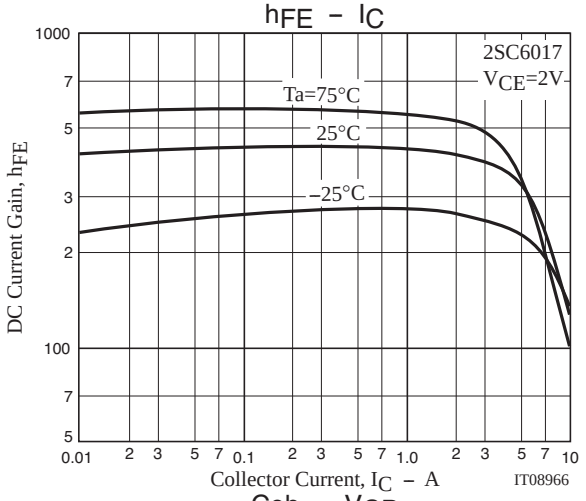

IC – VCE
2SA2169
–20mA
–18mA
–16mA
–14mA
–12mA
–10mA
–8mA
–6mA
–4mA
–2mA
IB=0
Collector Current, IC – A
Collector-to-Emitter Voltage, VCE – V
IT08961

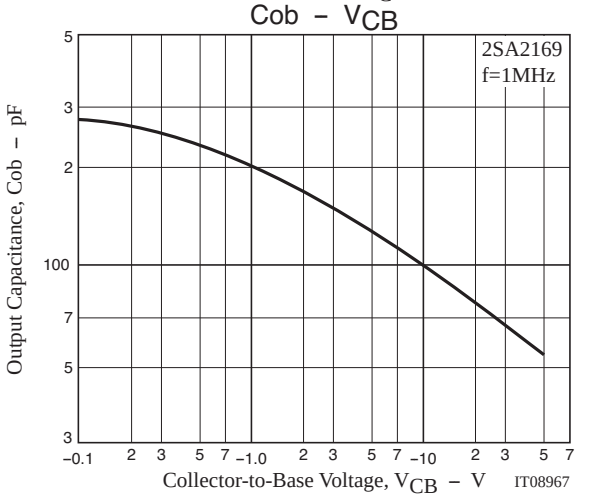

IC – VCE
2SC6017
20mA
18mA
16mA
14mA
12mA
10mA
8mA
6mA
4mA
2mA
IB=0
Collector Current, IC – A
Collector-to-Emitter Voltage, VCE – V
IT08962

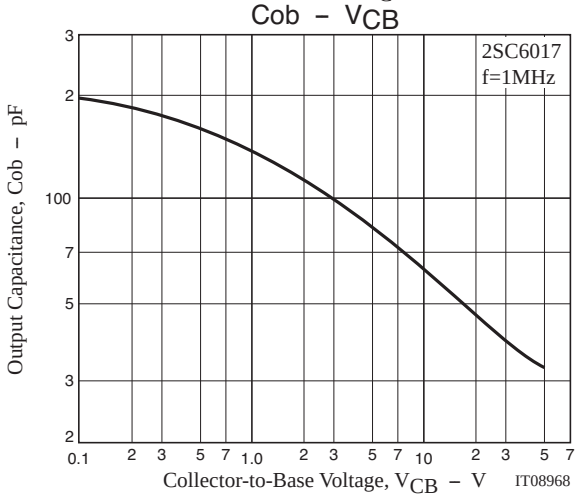

IC – VBE
2SA2169
VCE= –2V
Ta=75°C
25°C
–25°C
Collector Current, IC – A
Base-to-Emitter Voltage, VBE – V
IT08963

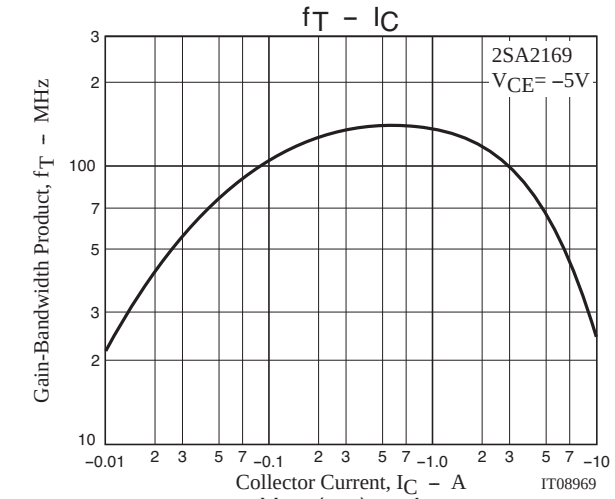

IC – VBE
2SC6017
VCE=2V
Ta=75°C
25°C
–25°C
Collector Current, IC – A
Base-to-Emitter Voltage, VBE – V
IT08964

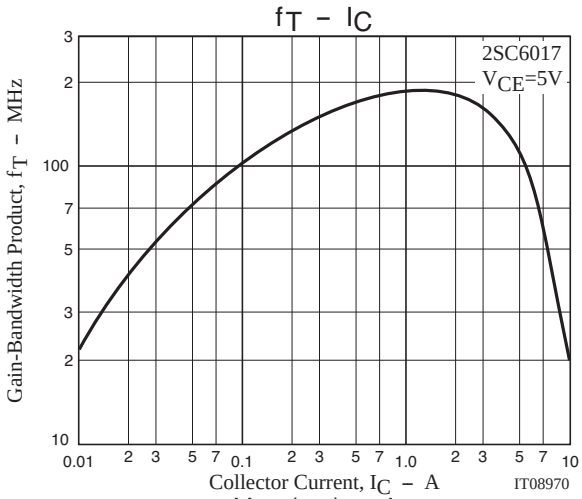

hFE – IC
2SA2169
VCE= –2V
Ta=75°C
25°C
–25°C
DC Current Gain, hFE
Collector Current, IC – A
IT08965

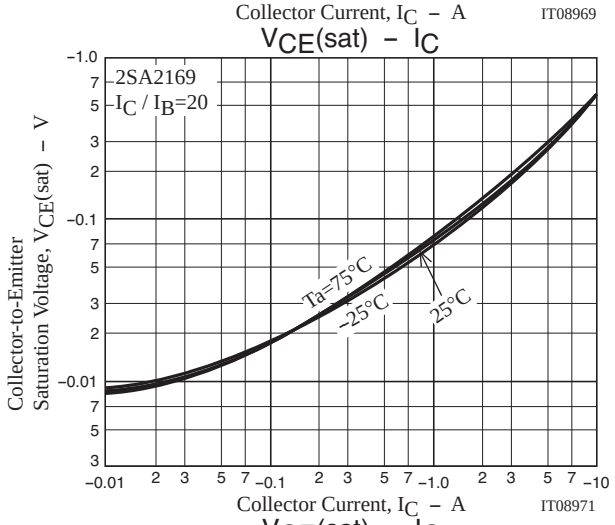

hFE – IC
2SC6017
VCE=2V
Ta=75°C
25°C
–25°C
DC Current Gain, hFE
Collector Current, IC – A
IT08966

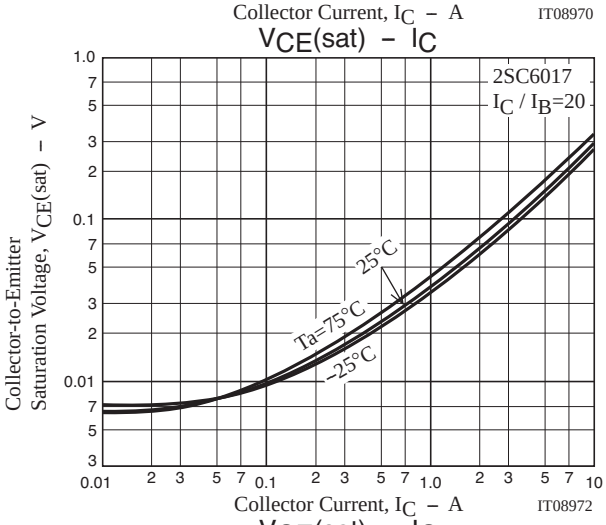

Cob – VCB
2SA2169
f=1MHz
Output Capacitance, Cob – pF
Collector-to-Base Voltage, VCB – V
IT08967

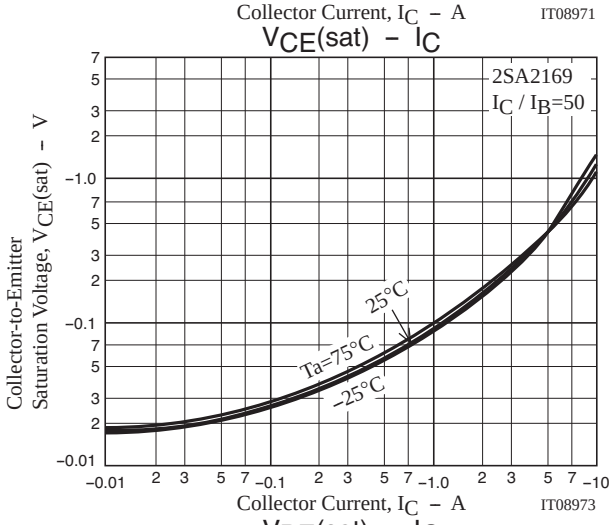

Cob – VCB
2SC6017
f=1MHz
Output Capacitance, Cob – pF
Collector-to-Base Voltage, VCB – V
IT08968

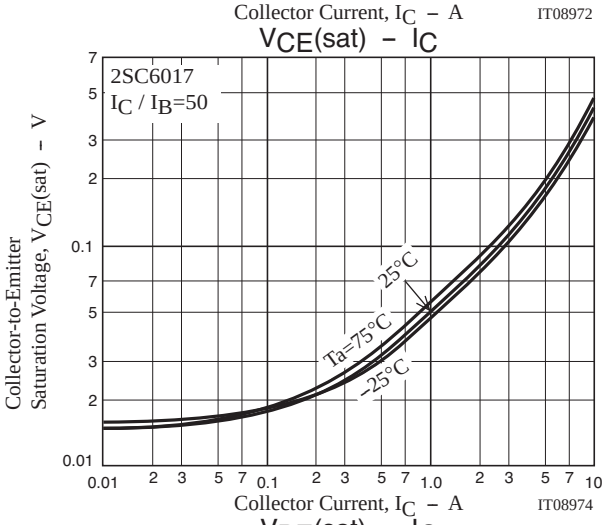

fT – IC
2SA2169
VCE= –5V
Gain-Bandwidth Product, fT – MHz
Collector Current, IC – A
IT08969

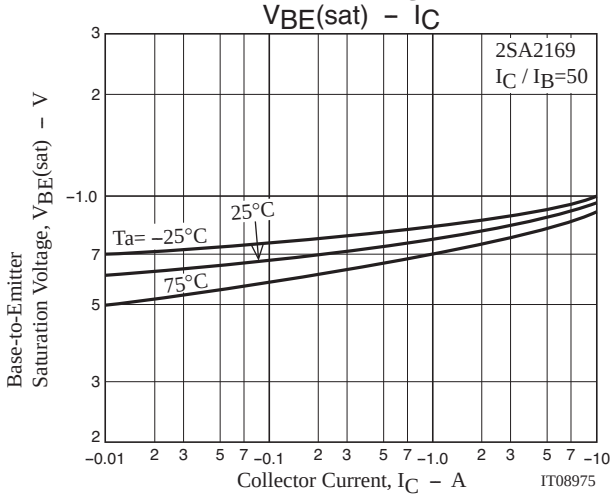

fT – IC
2SC6017
VCE=5V
Gain-Bandwidth Product, fT – MHz
Collector Current, IC – A
IT08970

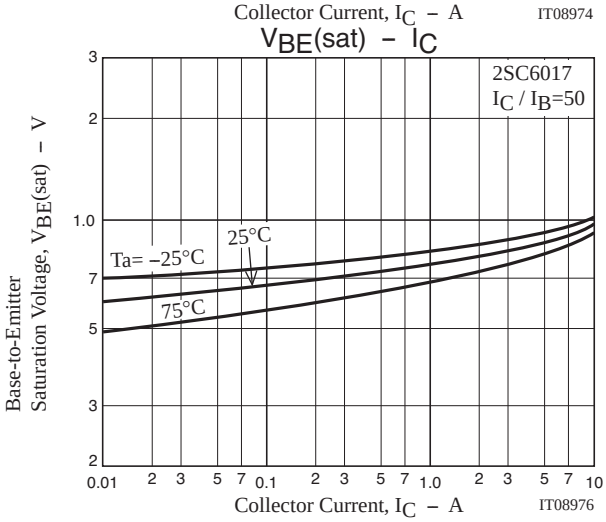

VCE(sat) – IC
2SA2169
IC / IB=20
Ta=75°C
–25°C
25°C
Collector-to-Emitter Saturation Voltage, VCE(sat) – V
Collector Current, IC – A
IT08971

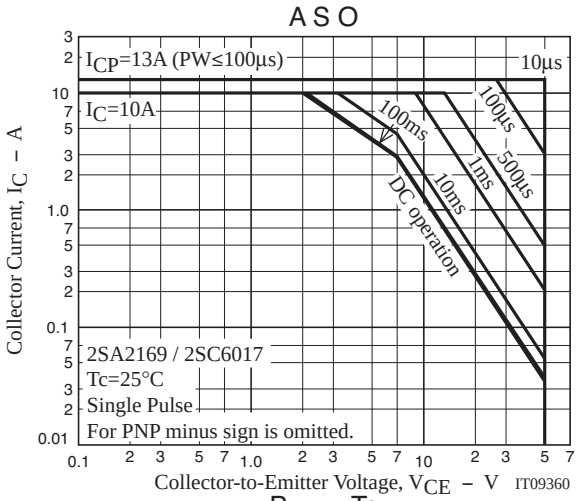

VCE(sat) – IC
2SC6017
IC / IB=20
25°C
Ta=75°C
–25°C
Collector-to-Emitter Saturation Voltage, VCE(sat) – V
Collector Current, IC – A
IT08972

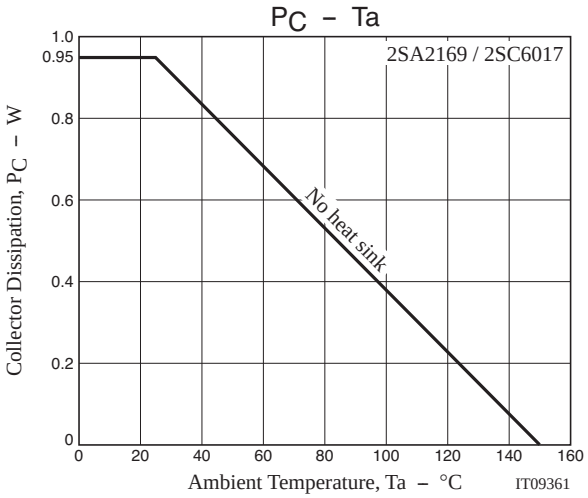

VCE(sat) – IC
2SA2169
IC / IB=50
25°C
Ta=75°C
–25°C
Collector-to-Emitter Saturation Voltage, VCE(sat) – V
Collector Current, IC – A
IT08973

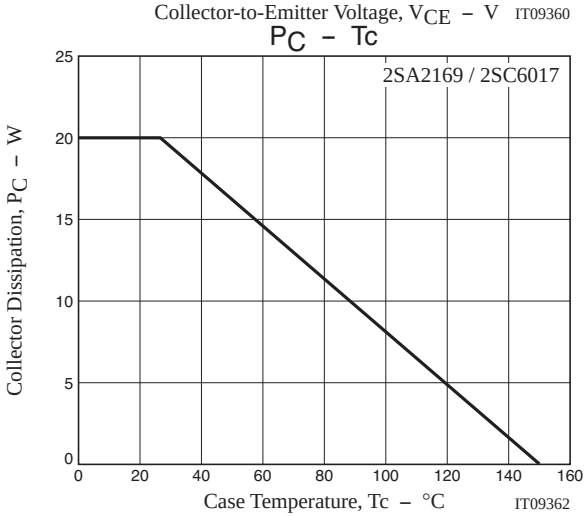

VCE(sat) – IC
2SC6017
IC / IB=50
25°C
Ta=75°C
–25°C
Collector-to-Emitter Saturation Voltage, VCE(sat) – V
Collector Current, IC – A
IT08974


VBE(sat) – IC
2SA2169
IC / IB=50
Ta= –25°C
25°C
75°C
Base-to-Emitter Saturation Voltage, VBE(sat) – V
Collector Current, IC – A
IT08975


VBE(sat) – IC
2SC6017
IC / IB=50
Ta= –25°C
25°C
75°C
Base-to-Emitter Saturation Voltage, VBE(sat) – V
Collector Current, IC – A
IT08976


A S O
I_{CP}=13A (PW≤100μs)
10μs
I_C=10A
100μs
100ms
500μs
1ms
10ms
DC operation
2SA2169 / 2SC6017
Tc=25°C
Single Pulse
For PNP minus sign is omitted.
Collector Current, I_C – A
Collector-to-Emitter Voltage, V_{CE} – V
IT09360


P_C – Ta
2SA2169 / 2SC6017
No heat sink
Collector Dissipation, P_C – W
Ambient Temperature, Ta – °C
IT09361


P_C – Tc
2SA2169 / 2SC6017
Collector Dissipation, P_C – W
Case Temperature, Tc – °C
IT09362

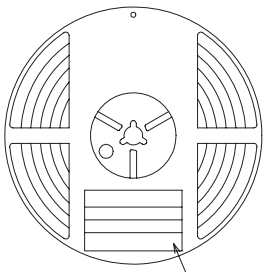
Taping Specification

2SA2169-TL-E, 2SC6017-TL-E

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)
TP-FA	TP	700	2,100	12,600	3 reels contained Dimensions:mm (external) 183×72×185	6 inner boxes contained Dimensions:mm (external) 440×195×210

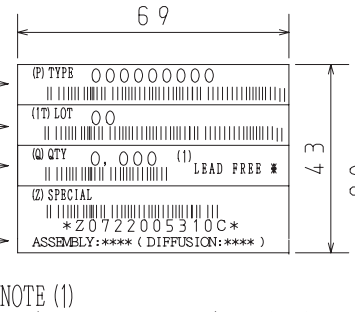
Packing method



Reel label

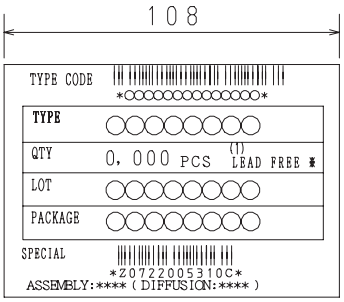
Reel label, Inner box label

(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.

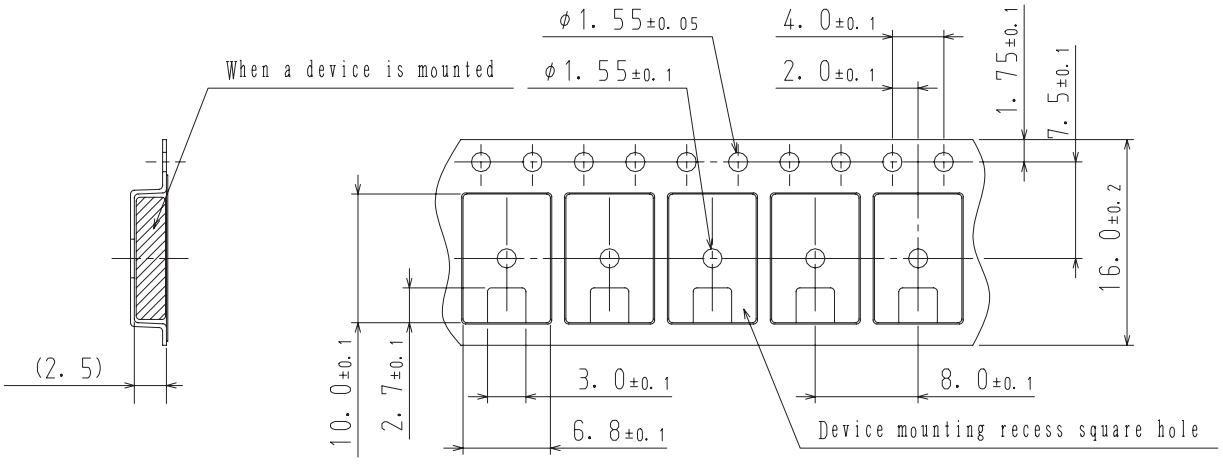


NOTE (1)
The LEAD FREE ※ description shows that the surface treatment of the terminal is lead free.

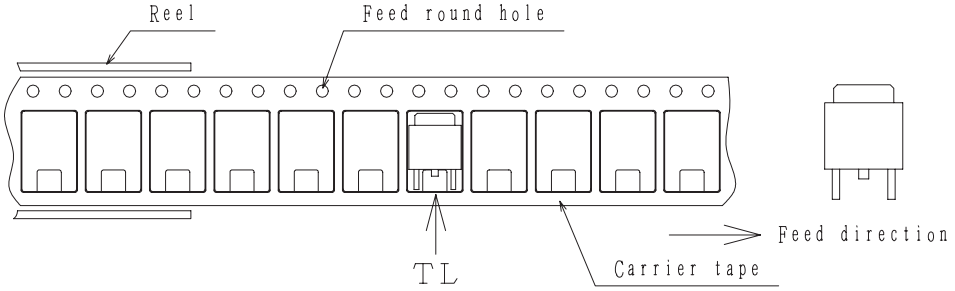
Label	JEITA Phase
LEAD FREE 3	JEITA Phase 3A
LEAD FREE 4	JEITA Phase 3

Taping configuration

1. Carrier tape size (unit:mm)



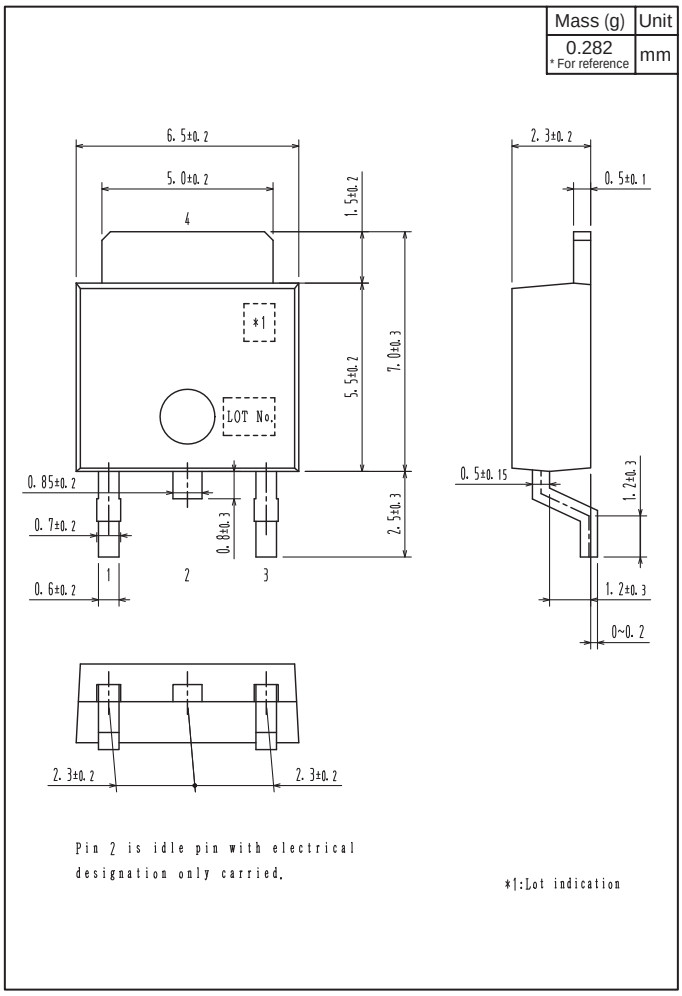
2. Device placement direction



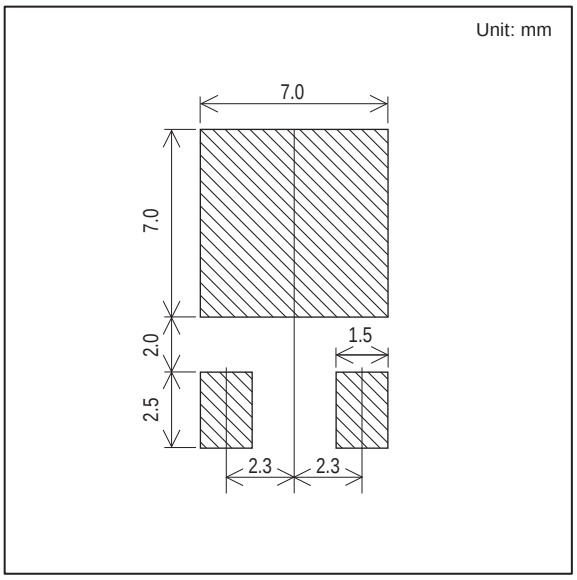
Those with one electrode terminal on the feed hole side·····TL

Outline Drawing

2SA2169-TL-E, 2SC6017-TL-E



Land Pattern Example



Bag Packing Specification

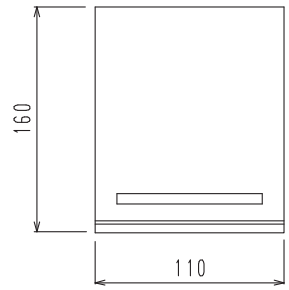
2SA2169-E, 2SC6017-E

1. Packing Format

Package Name	Maximum Number of devices contained (pcs)			
	Bag	Inner box	Outer box	
TP		B-1	A-1	A-2
	500	10,000	50,000	30,000
	Packing format (Dimensions: mm (external))			
	Inner box		Outer box	
	B-1		A-1	A-2
	445×225×55		470×250×300	470×250×190

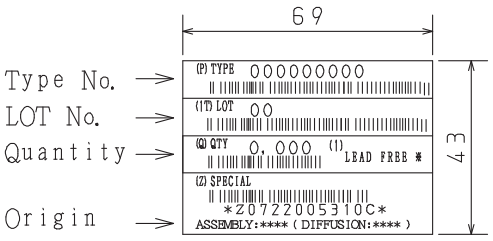
2. Bag dimensions

(unit: mm)



3. Bag label, Inner box label

(unit: mm)



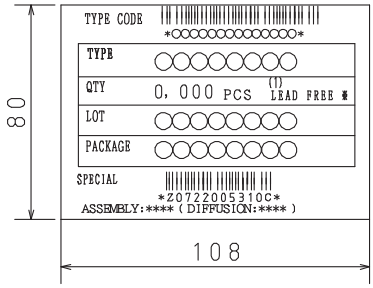
NOTE (1)
The LEAD FREE ※ description shows that the surface treatment of the terminal is lead free.

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

4. Outer box label

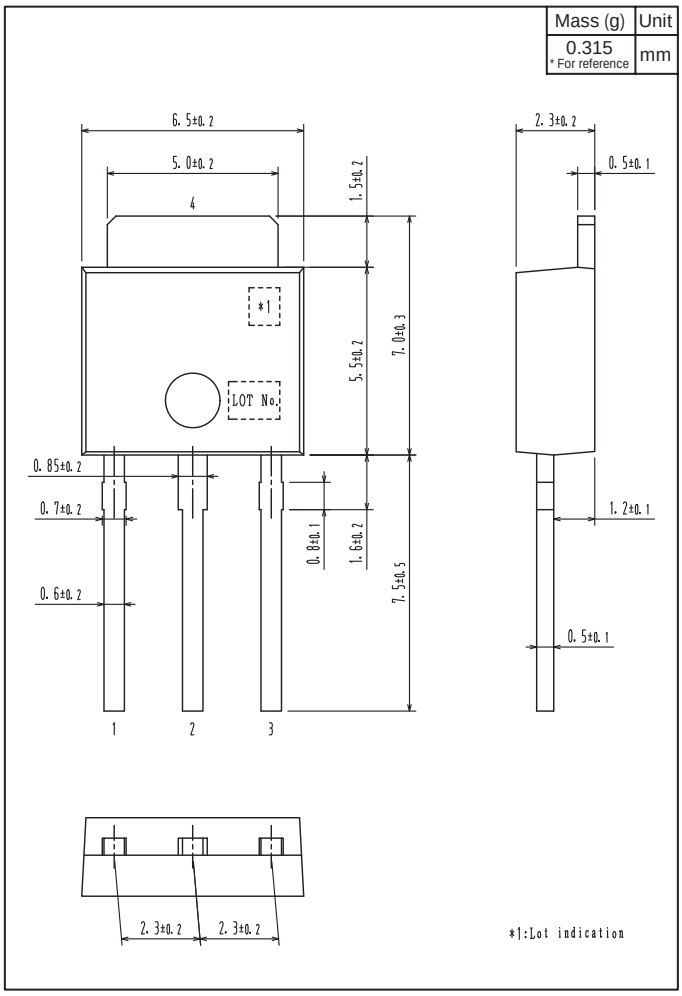
(unit: mm)

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



Outline Drawing

2SA2169-E, 2SC6017-E



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