Ordering number : EN8275A

SANYO Semiconductors

DATA SHEET

2SA2169/2SC6017 — High-Current Switching Applications

PNP/NPN Epitaxial Planar Silicon Transistor

Applications

- Relay drivers, lamp drivers, motor drivers

Features

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

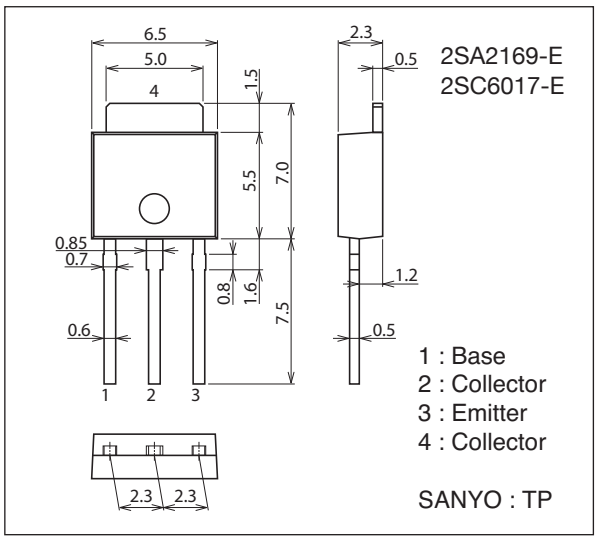
Specifications ( ): 2SA2169

Absolute Maximum Ratings at Ta=25°C

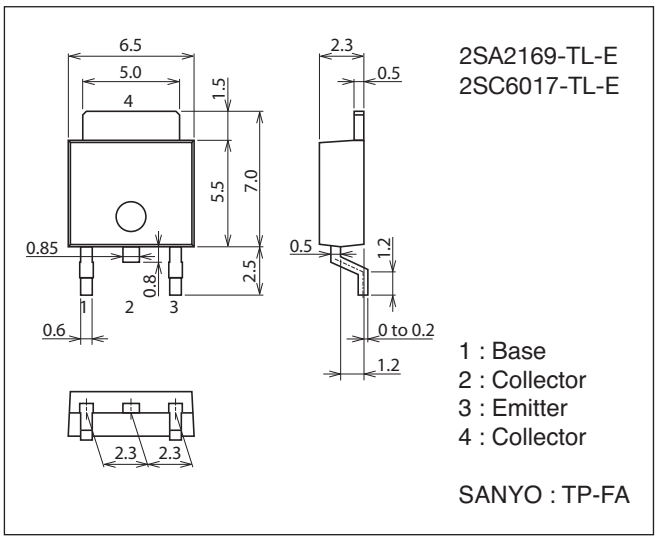
Parameter	Symbol	Conditions	Ratings	Unit
Collector-to-Base Voltage	V_{CBO}		(–50)100	V
Collector-to-Emitter Voltage	V_{CEO}		(–)50	V
Emitter-to-Base Voltage	V_{EBO}		(–)6	V
Collector Current	I_C		(–)10	A
Collector Current (Pulse)	I_{CP}	PW≤100μs	(–)13	A

Continued on next page.

Package Dimensions unit : mm (typ.)
7518-003



Package Dimensions unit : mm (typ.)
7003-003

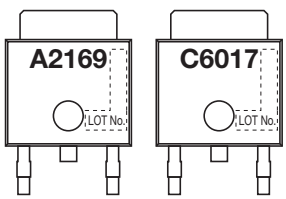


Product & Package Information

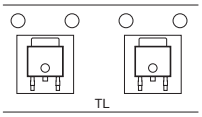
- Package : TP
- JEITA, JEDEC : SC-64, TO-251, SOT-553, DPAK
- Minimum Packing Quantity : 500 pcs./bag

- Package : TP-FA
- JEITA, JEDEC : SC-63, TO-252, SOT-428, DPAK
- Minimum Packing Quantity : 700 pcs./reel

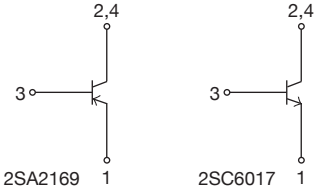
Marking (TP, TP-FA)



Packing Type (TP-FA) : TL



Electrical Connection



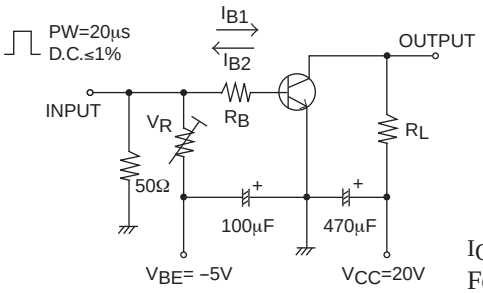
Continued from preceding page.

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

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

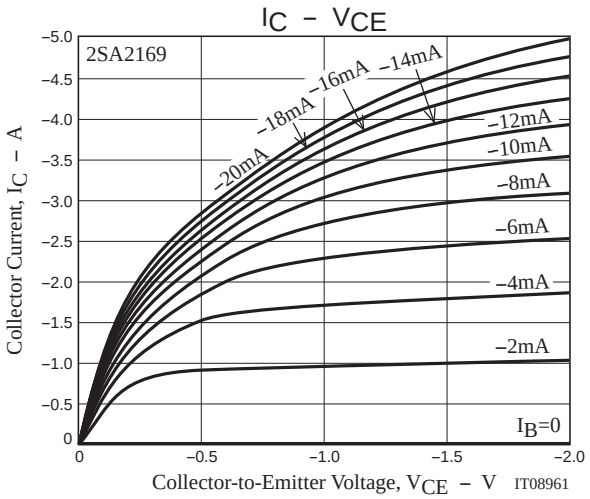
Switching Time Test Circuit

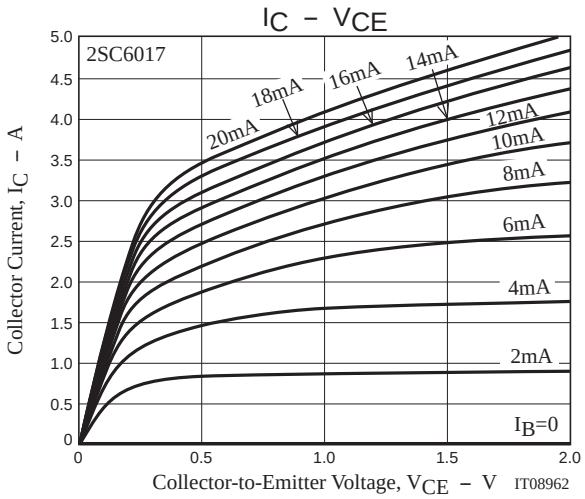


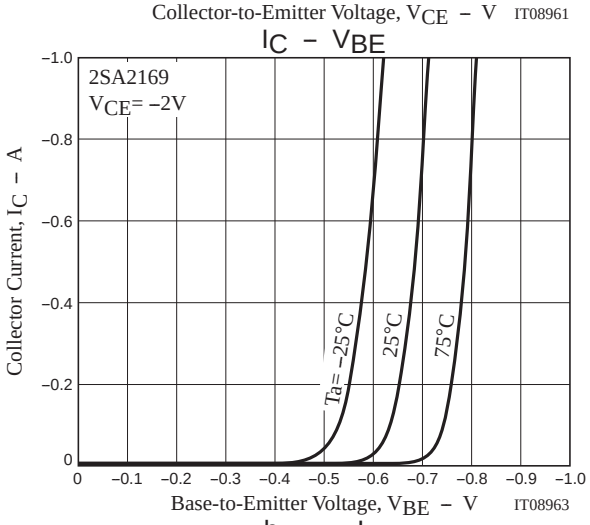
I_C=20I_{B1}= –20I_{B2}=3A
For PNP, the polarity is reversed.

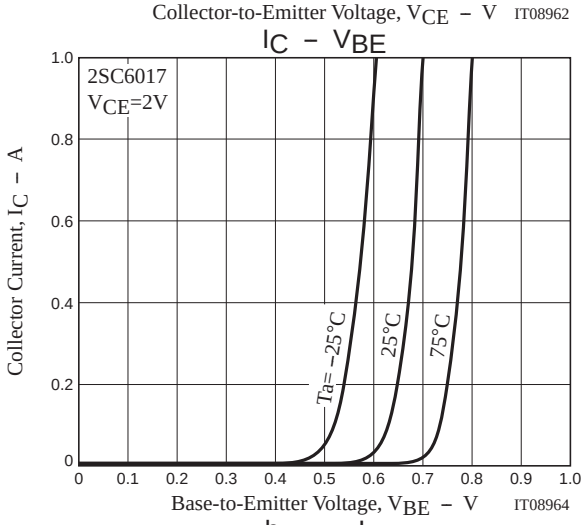
Ordering Information

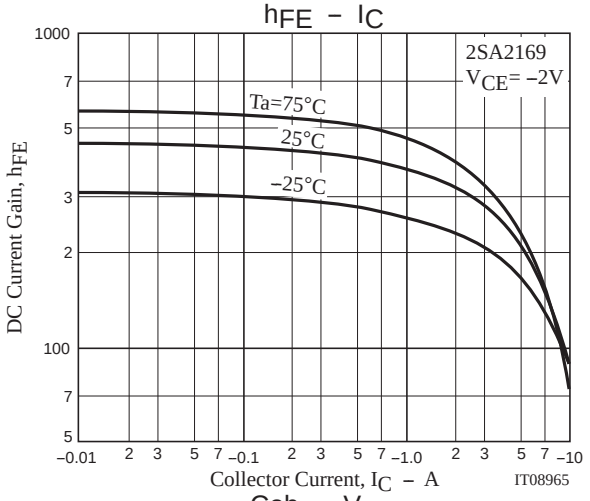
Device	Package	Shipping	memo
2SA2169-E	TP	500pcs./bag	Pb Free
2SC6017-E	TP	500pcs./bag	
2SA2169-TL-E	TP-FA	700pcs./reel	
2SC6017-TL-E	TP-FA	700pcs./reel	

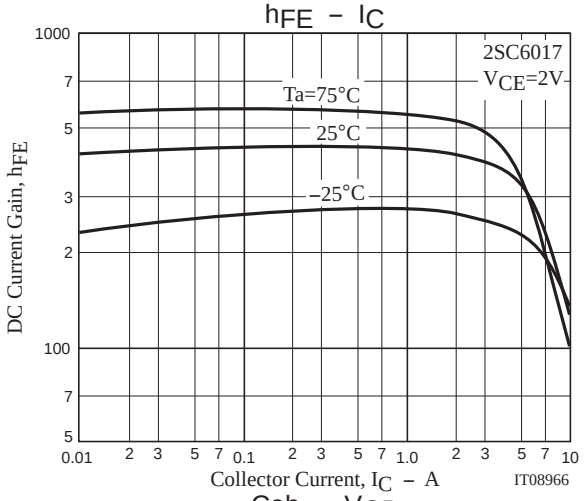

IC – VCE
2SA2169
–20mA
–18mA
–16mA
–14mA
–12mA
–10mA
–8mA
–6mA
–4mA
–2mA
IB=0
Collector Current, IC – A
Collector-to-Emitter Voltage, VCE – V
IT08961

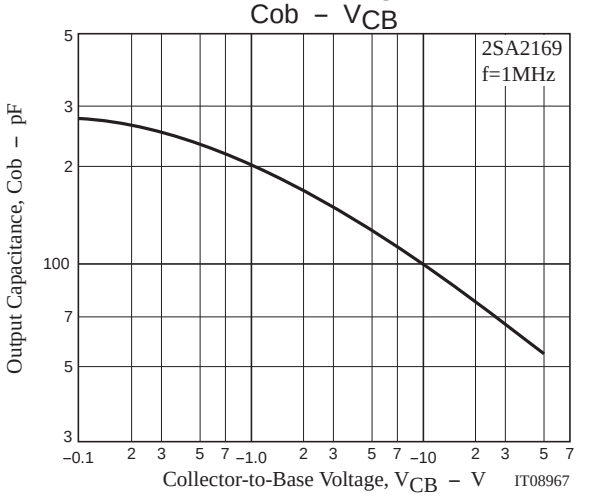

IC – VCE
2SC6017
20mA
18mA
16mA
14mA
12mA
10mA
8mA
6mA
4mA
2mA
IB=0
Collector Current, IC – A
Collector-to-Emitter Voltage, VCE – V
IT08962

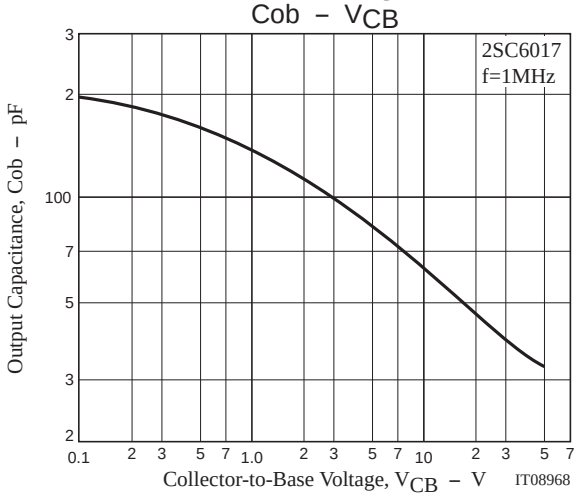

IC – VBE
2SA2169
VCE= –2V
Ta= –25°C
25°C
75°C
Collector Current, IC – A
Base-to-Emitter Voltage, VBE – V
IT08963

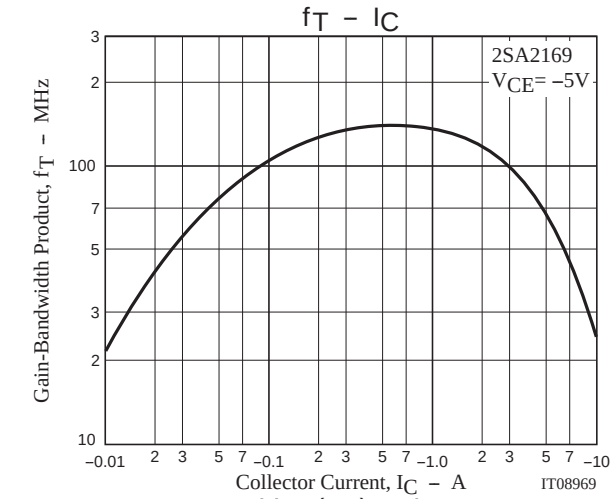

IC – VBE
2SC6017
VCE=2V
Ta= –25°C
25°C
75°C
Collector Current, IC – A
Base-to-Emitter Voltage, VBE – V
IT08964

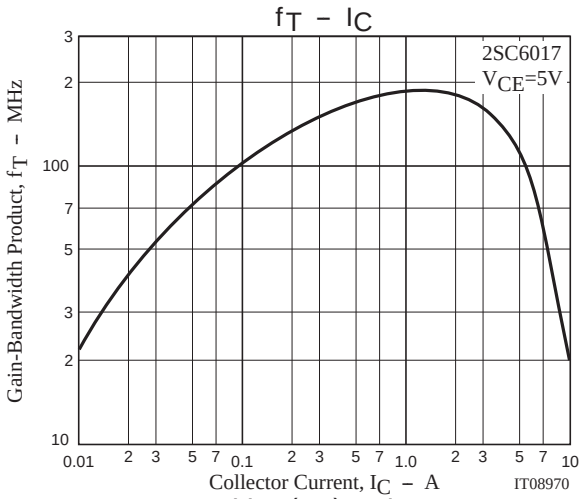

hFE – IC
2SA2169
VCE= –2V
Ta=75°C
25°C
–25°C
DC Current Gain, hFE
Collector Current, IC – A
IT08965

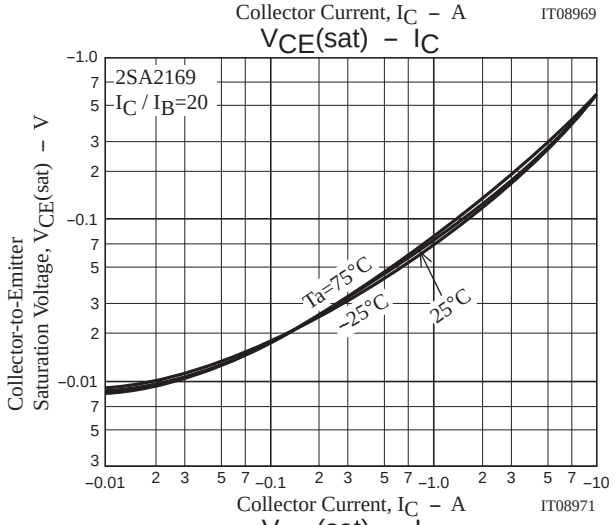

hFE – IC
2SC6017
VCE=2V
Ta=75°C
25°C
–25°C
DC Current Gain, hFE
Collector Current, IC – A
IT08966

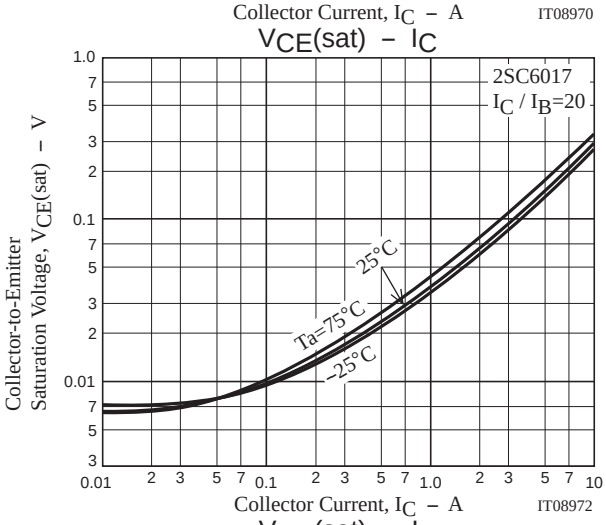

Cob – VCB
2SA2169
f=1MHz
Output Capacitance, Cob – pF
Collector-to-Base Voltage, VCB – V
IT08967

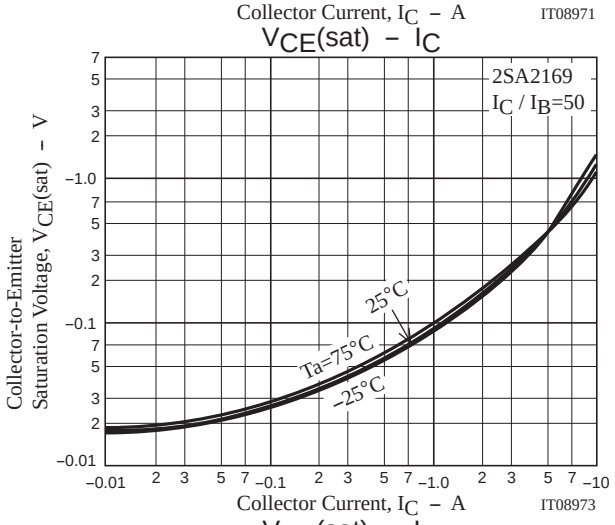

Cob – VCB
2SC6017
f=1MHz
Output Capacitance, Cob – pF
Collector-to-Base Voltage, VCB – V
IT08968

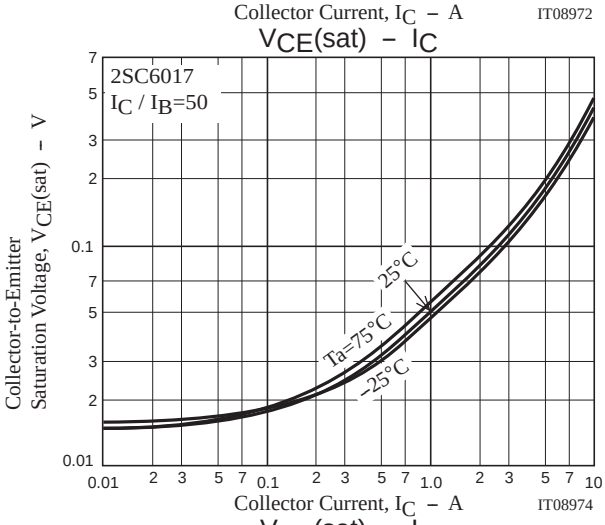

fT – IC
2SA2169
VCE= –5V
Gain-Bandwidth Product, fT – MHz
Collector Current, IC – A
IT08969

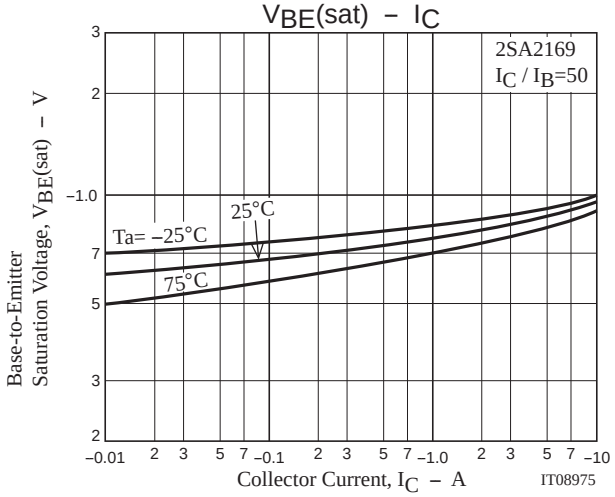

fT – IC
2SC6017
VCE=5V
Gain-Bandwidth Product, fT – MHz
Collector Current, IC – A
IT08970

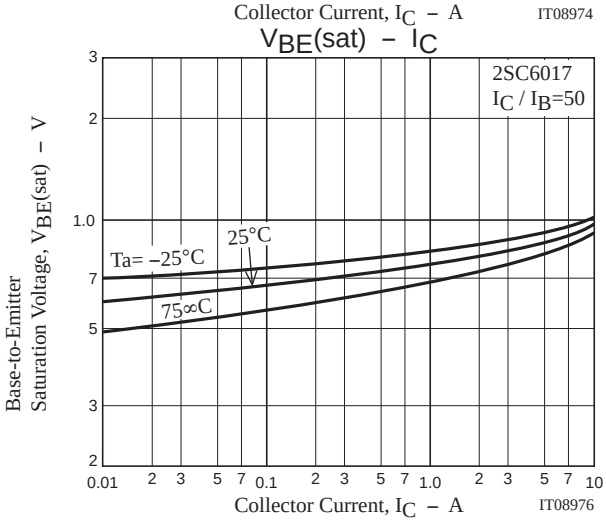

VCE(sat) – IC
2SA2169
IC / IB=20
Ta=75°C
–25°C
25°C
Collector-to-Emitter Saturation Voltage, VCE(sat) – V
Collector Current, IC – A
IT08971

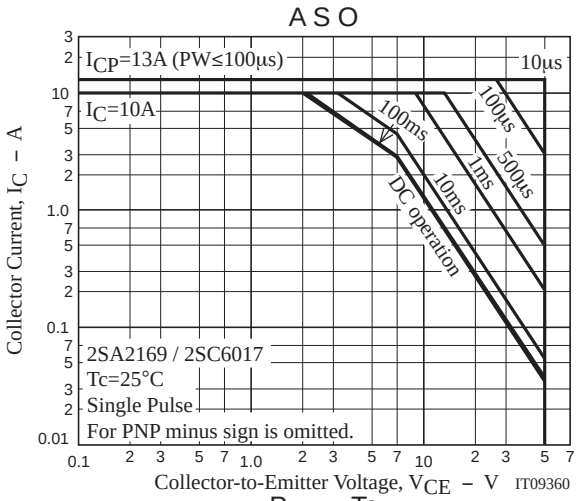

VCE(sat) – IC
2SC6017
IC / IB=20
25°C
Ta=75°C
–25°C
Collector-to-Emitter Saturation Voltage, VCE(sat) – V
Collector Current, IC – A
IT08972

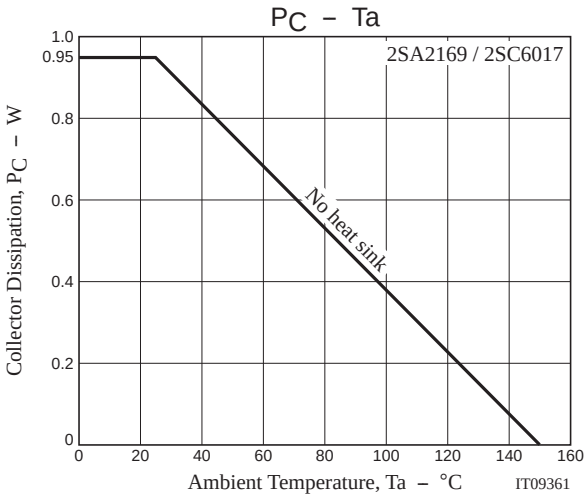

VCE(sat) – IC
2SA2169
IC / IB=50
25°C
Ta=75°C
–25°C
Collector-to-Emitter Saturation Voltage, VCE(sat) – V
Collector Current, IC – A
IT08973

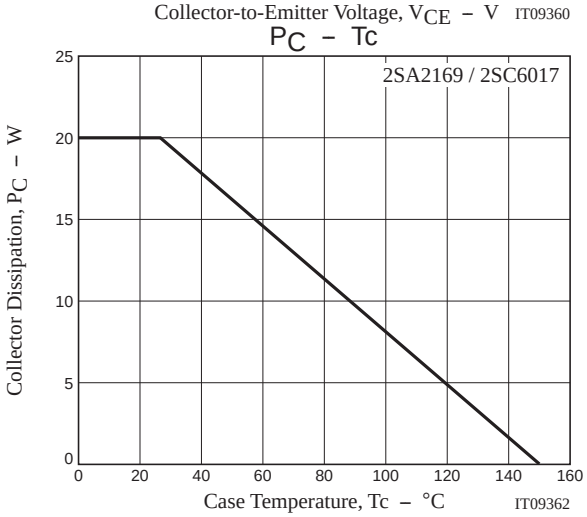

VCE(sat) – IC
2SC6017
IC / IB=50
25°C
Ta=75°C
–25°C
Collector-to-Emitter Saturation Voltage, VCE(sat) – V
Collector Current, IC – A
IT08974


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

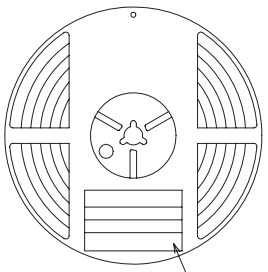
Taping Specification

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

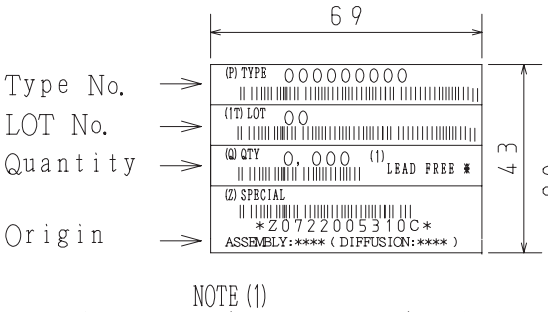
Packing method



Reel label

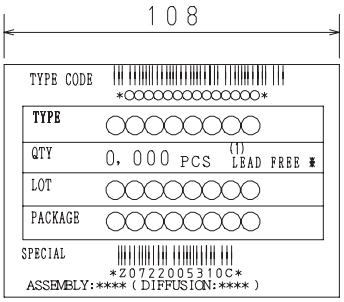
Reel label, Inner box label

(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.

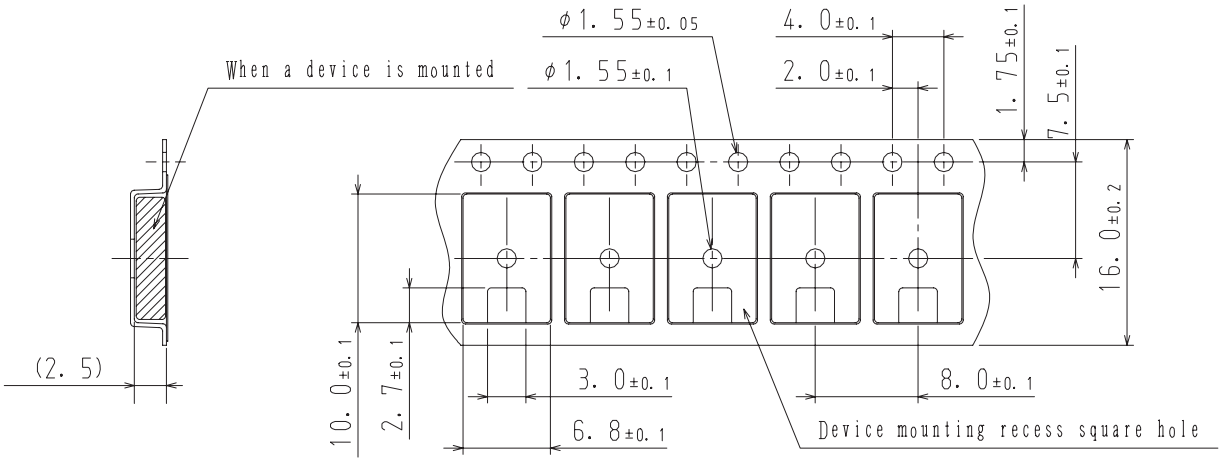


NOTE (1)
The LEAD FREE ※ description shows that the surface treatment of the terminal is lead free.

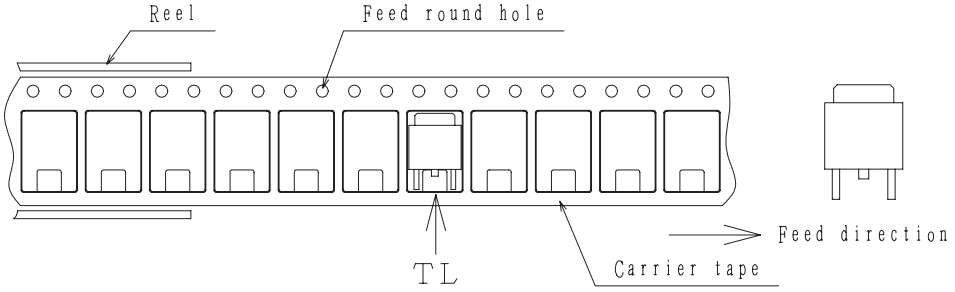
Label	JEITA Phase
LEAD FREE 3	JEITA Phase 3A
LEAD FREE 4	JEITA Phase 3

Taping configuration

1. Carrier tape size (unit:mm)



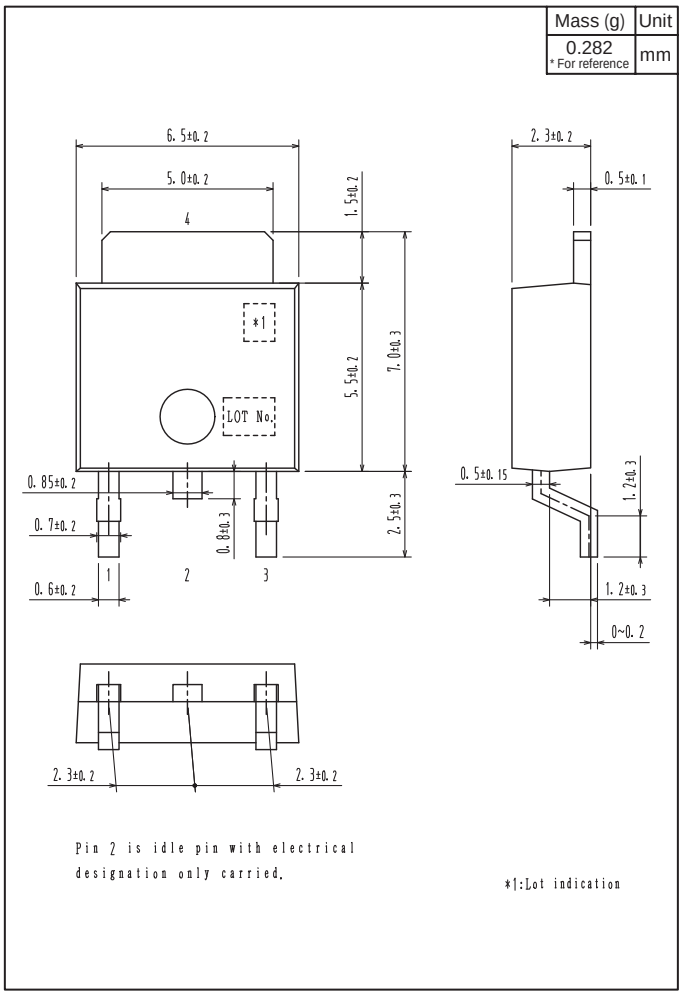
2. Device placement direction



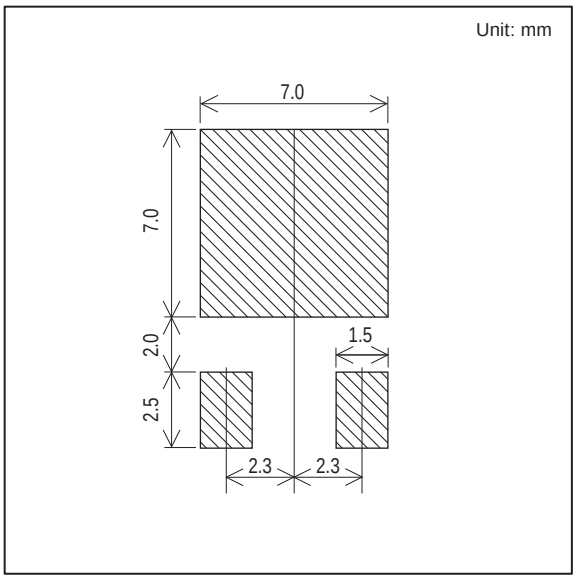
Those with one electrode terminal on the feed hole side·····TL

Outline Drawing

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



Land Pattern Example



Bag Packing Specification

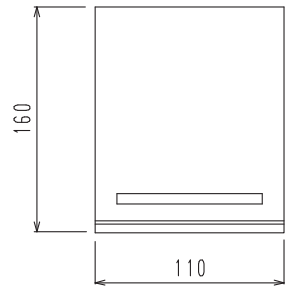
2SA2169-E, 2SC6017-E

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	

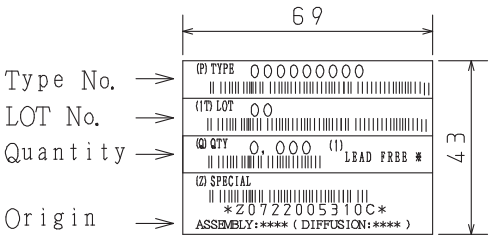
2. Bag dimensions

(unit: mm)



3. Bag label, Inner box label

(unit: mm)



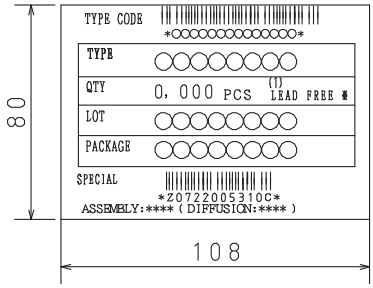
NOTE (1)
The LEAD FREE ※ description shows that the surface treatment of the terminal is lead free.

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

4. Outer box label

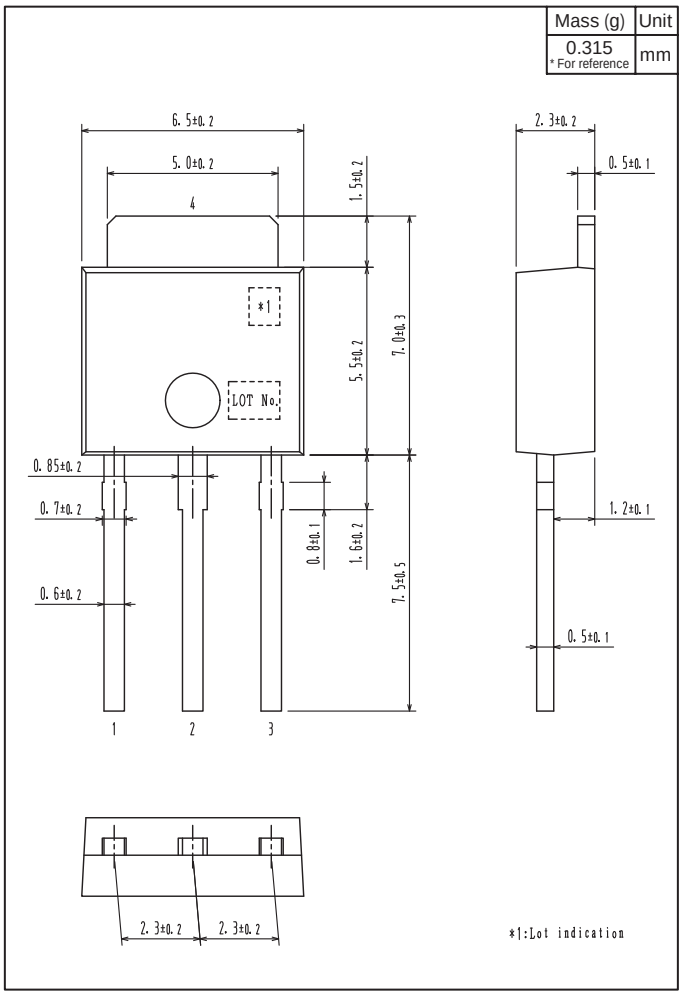
(unit: mm)

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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