Ordering number : EN6912D

SANYO Semiconductors

DATA SHEET

An ON Semiconductor Company

2SA2039/2SC5706 — High-Current Switching Applications

PNP/NPN Epitaxial Planar Silicon Transistor

Applications

- DC / DC converter, relay drivers, lamp drivers, motor drivers, flash

Features

- Adoption of FBET and MBIT processes
- Low collector-to-emitter saturation voltage
- Large current capacitance
- High-speed switching
- High allowable power dissipation

Specifications ( ): 2SA2039

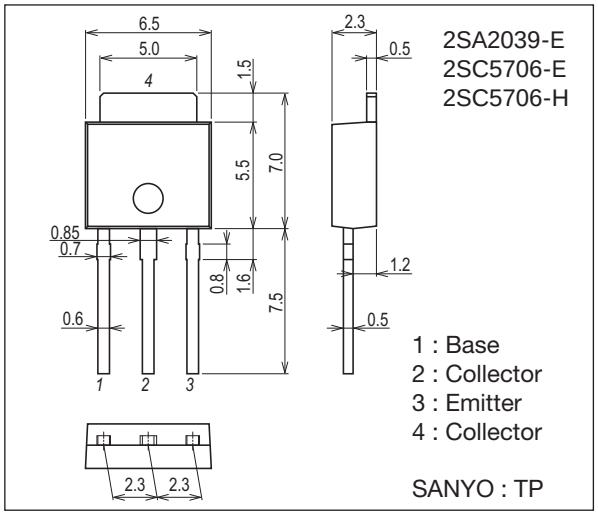
Absolute Maximum Ratings at Ta=25°C

Parameter	Symbol	Conditions	Ratings	Unit
Collector-to-Base Voltage	V_{CBO}		(–50)100	V
Collector-to-Emitter Voltage	V_{CES}		(–50)100	V
Collector-to-Emitter Voltage	V_{CEO}		(–)50	V
Emitter-to-Base Voltage	V_{EBO}		(–)6	V
Collector Current	I_C		(–)5	A
Collector Current (Pulse)	I_{CP}		(–)7.5	A

Continued on next page.

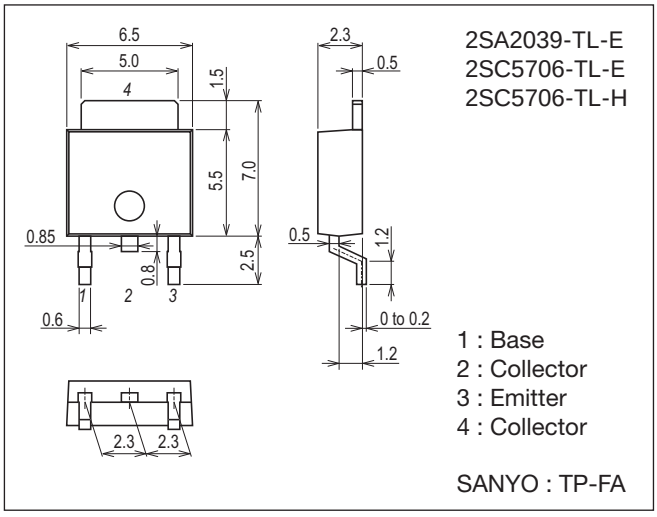
Package Dimensions unit : mm (typ)

7518-003



Package Dimensions unit : mm (typ)

7003-003

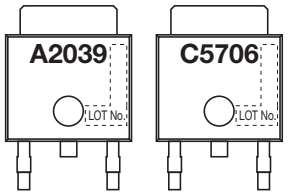


Product & Package Information

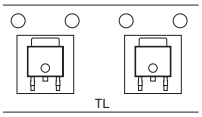
- Package : TP
- JEITA, JEDEC : SC-64, TO-251
- Minimum Packing Quantity : 500 pcs./bag

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

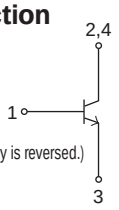
Marking (TP, TP-FA)



Packing Type (TP-FA) : TL



Electrical Connection



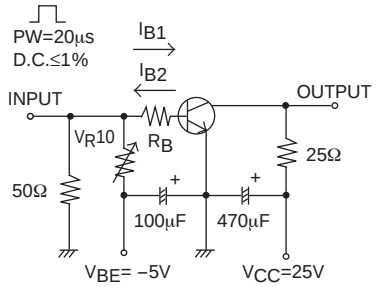
Continued from preceding page.

Parameter	Symbol	Conditions	Ratings	Unit
Base Current	I_B		(–)1.2	A
Collector Dissipation	P_C		0.8	W
		Tc=25°C	15	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			(–)1	μA
Emitter Cutoff Current	I_{EBO}	V_{EB}=(–)4V, I_C=0A			(–)1	μA
DC Current Gain	h_{FE}	V_{CE}=(–)2V, I_C=(–)500mA	200		560	
Gain-Bandwidth Product	f_T	V_{CE}=(–)10V, I_C=(–)500mA		(360)400		MHz
Output Capacitance	Cob	V_{CB}=(–)10V, f=1MHz		(24)15		pF
Collector-to-Emitter Saturation Voltage	V_{CE}(sat)1	I_C=(–)1A, I_B=(–)50mA		(–115)90	(–195)135	mV
	V_{CE}(sat)2	I_C=(–)2A, I_B=(–)100mA		(–255)160	(–430)240	mV
Base-to-Emitter Saturation Voltage	V_{BE}(sat)	V_{CE}=(–)2V, I_B=(–)100mA		(–)0.89	(–)1.2	V
Collector-to-Base Breakdown Voltage	$V_{(BR)CBO}$	I_C=(–)10μA, I_E=0A	(–50)100			V
Collector-to-Emitter Breakdown Voltage	$V_{(BR)CES}$	I_C=(–)100μA, R_{BE}=0Ω	(–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=(–)10μA, I_C=0A	(–)6			V
Turn-On Time	t_{on}	See specified Test Circuit.		(30)35		ns
Storage Time	t_{stg}			(230)300		ns
Fall Time	t_f			(15)20		ns

Switching Time Test Circuit

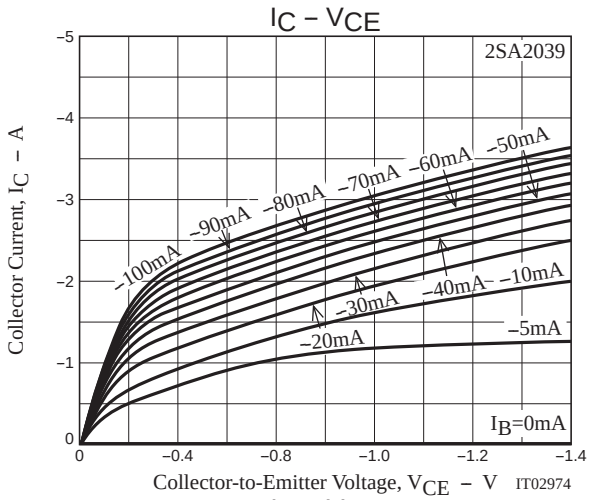


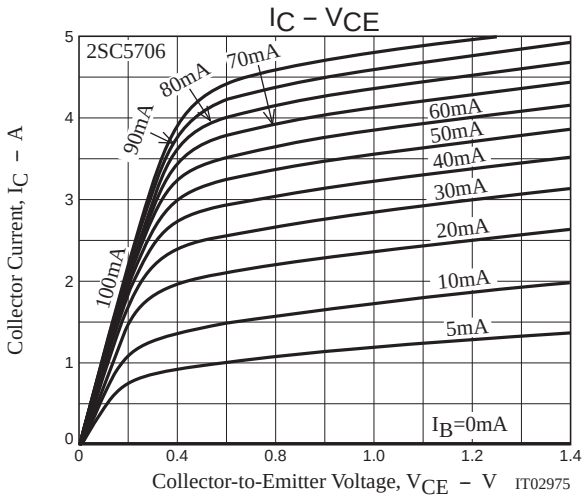
I_C=10I_{B1}= –10I_{B2}=1A

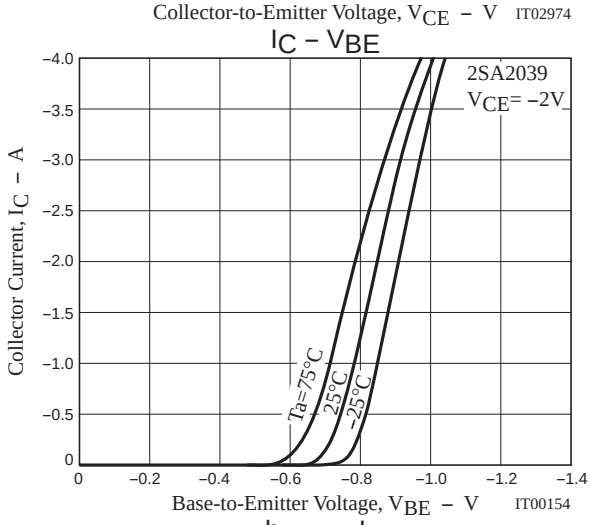
For PNP, the polarity is reversed.

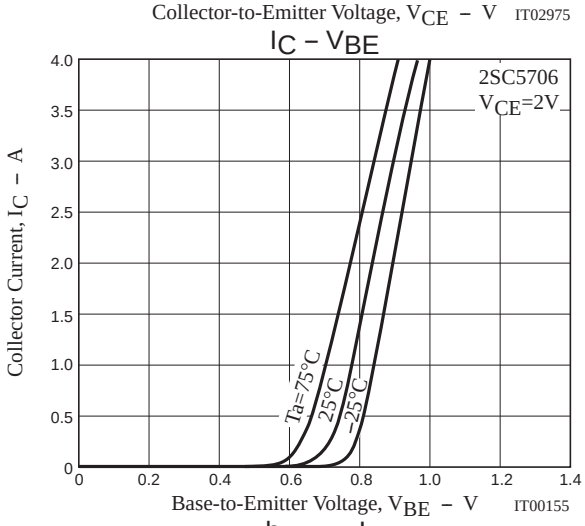
Ordering Information

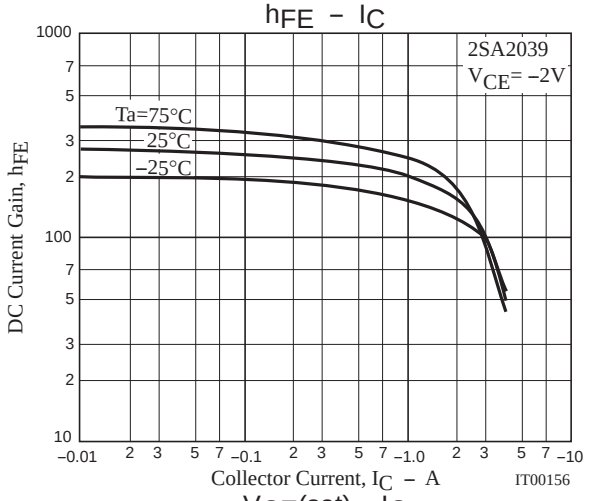
Device	Package	Shipping	memo
2SA2039-E	TP	500pcs./bag	Pb Free
2SC5706-E	TP	500pcs./bag	
2SC5706-H	TP	500pcs./bag	Pb Free & Halogen Free
2SA2039-TL-E	TP-FA	700pcs./reel	Pb Free
2SC5706-TL-E	TP-FA	700pcs./reel	
2SC5706-TL-H	TP-FA	700pcs./reel	Pb Free & Halogen Free

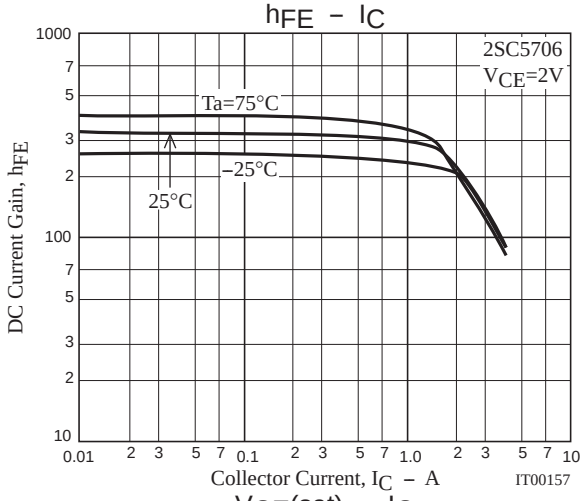

IC – VCE
2SA2039
Collector Current, IC – A
Collector-to-Emitter Voltage, VCE – V
IT02974
–100mA
–90mA
–80mA
–70mA
–60mA
–50mA
–40mA
–30mA
–20mA
–10mA
–5mA
IB=0mA

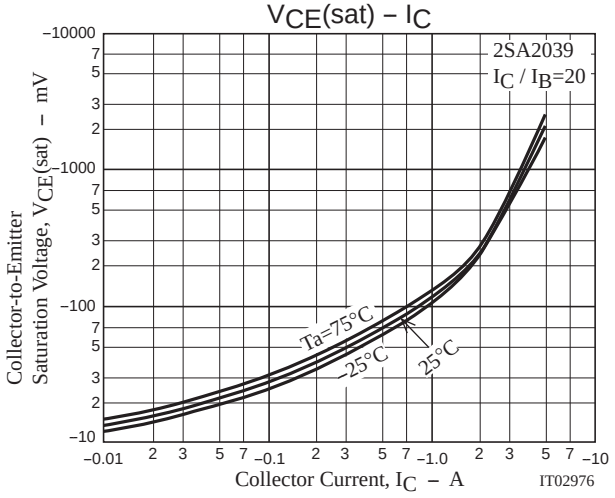

IC – VCE
2SC5706
Collector Current, IC – A
Collector-to-Emitter Voltage, VCE – V
IT02975
100mA
90mA
80mA
70mA
60mA
50mA
40mA
30mA
20mA
10mA
5mA
IB=0mA

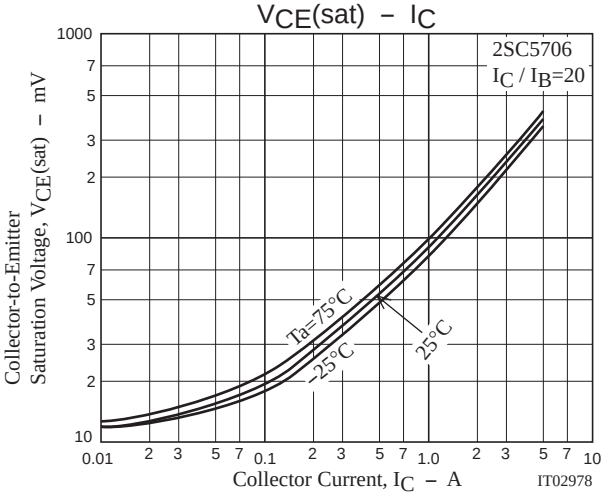

IC – VBE
2SA2039
VCE= –2V
Collector Current, IC – A
Base-to-Emitter Voltage, VBE – V
IT00154
Ta=75°C
25°C
–25°C

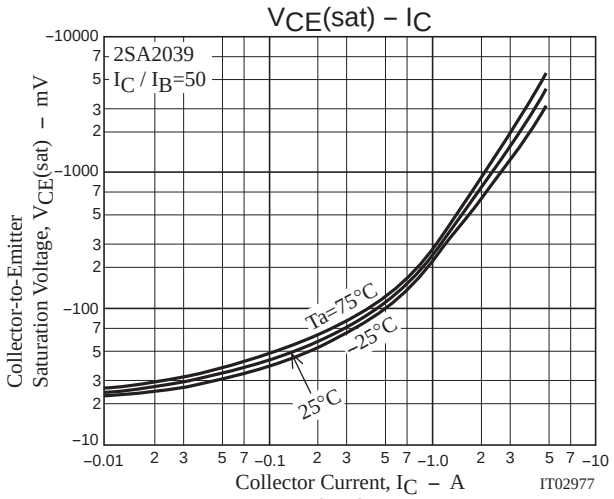

IC – VBE
2SC5706
VCE=2V
Collector Current, IC – A
Base-to-Emitter Voltage, VBE – V
IT00155
Ta=75°C
25°C
–25°C

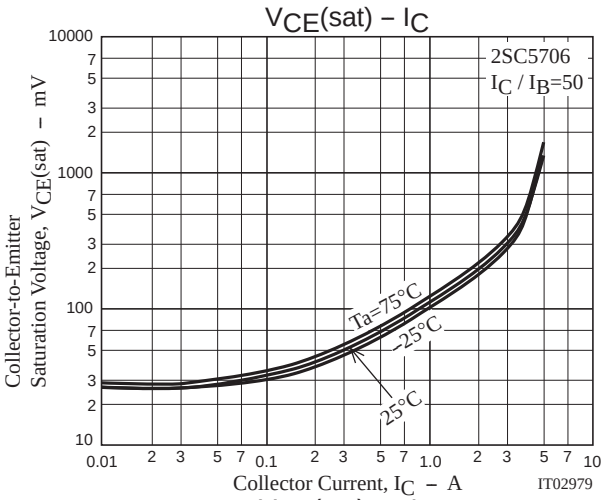

hFE – IC
2SA2039
VCE= –2V
DC Current Gain, hFE
Collector Current, IC – A
IT00156
Ta=75°C
25°C
–25°C

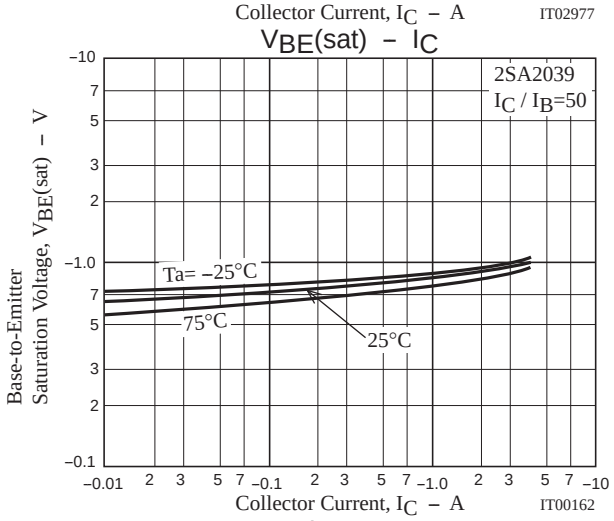

hFE – IC
2SC5706
VCE=2V
DC Current Gain, hFE
Collector Current, IC – A
IT00157
Ta=75°C
25°C
–25°C

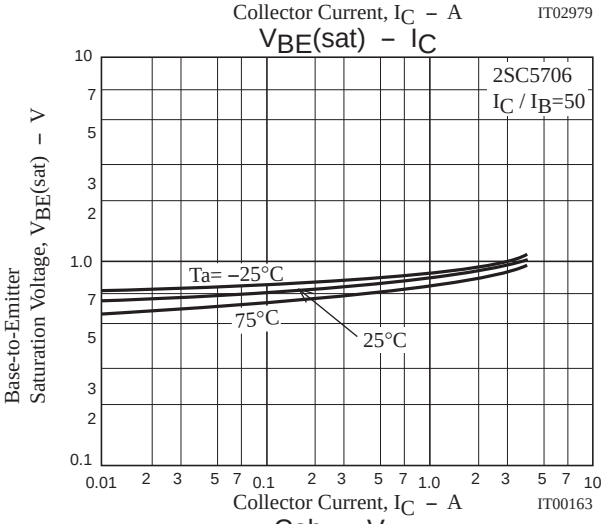

VCE(sat) – IC
2SA2039
IC / IB=20
Collector-to-Emitter Saturation Voltage, VCE(sat) – mV
Collector Current, IC – A
IT02976
Ta=75°C
–25°C
25°C

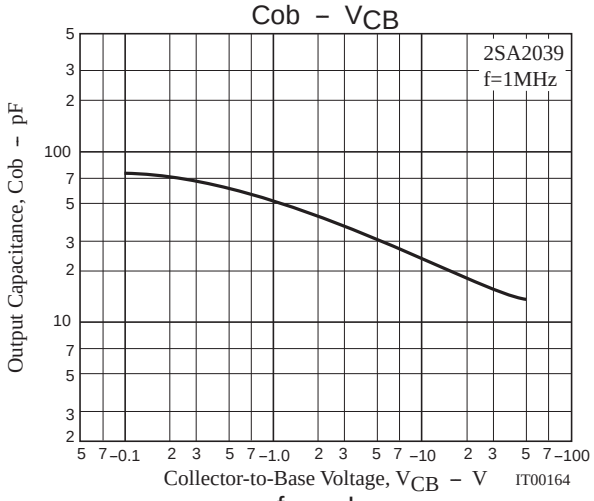

VCE(sat) – IC
2SC5706
IC / IB=20
Collector-to-Emitter Saturation Voltage, VCE(sat) – mV
Collector Current, IC – A
IT02978
Ta=75°C
–25°C
25°C

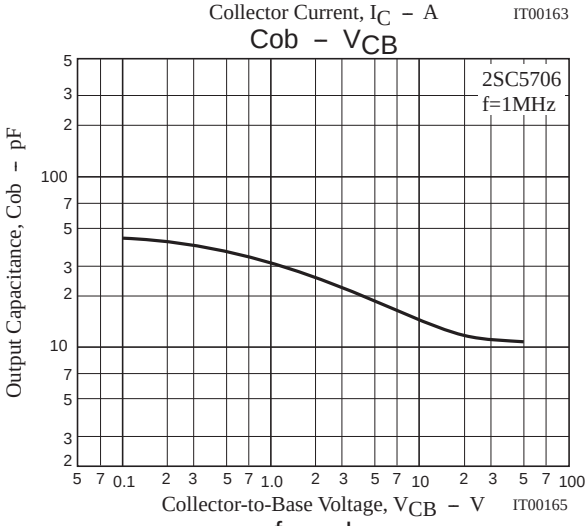

VCE(sat) – IC
2SA2039
IC / IB=50
Ta=75°C
–25°C
25°C
Collector-to-Emitter Saturation Voltage, VCE(sat) – mV
Collector Current, IC – A
IT02977

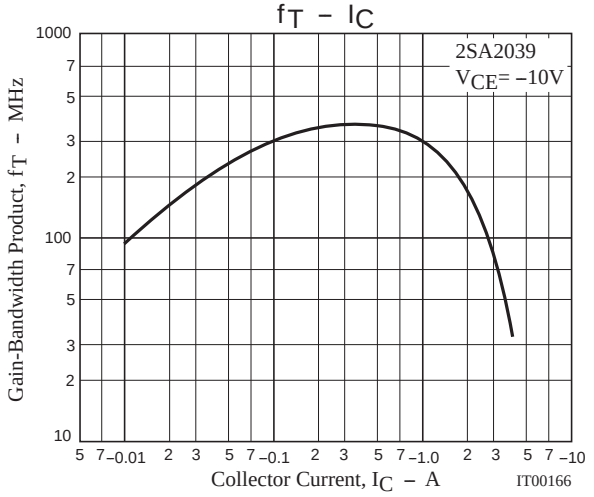

VCE(sat) – IC
2SC5706
IC / IB=50
Ta=75°C
–25°C
25°C
Collector-to-Emitter Saturation Voltage, VCE(sat) – mV
Collector Current, IC – A
IT02979

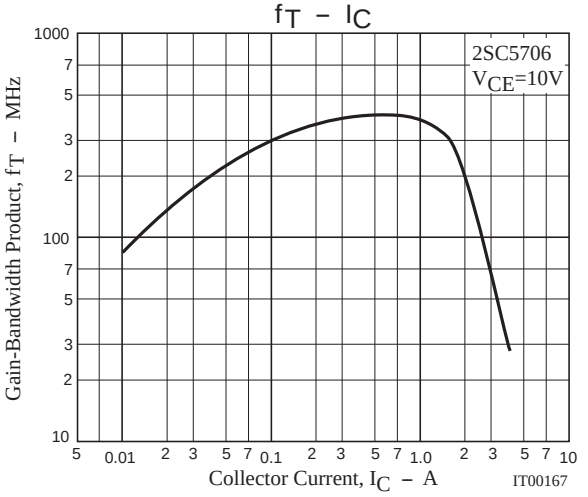

VBE(sat) – IC
2SA2039
IC / IB=50
Ta= –25°C
75°C
25°C
Base-to-Emitter Saturation Voltage, VBE(sat) – V
Collector Current, IC – A
IT00162

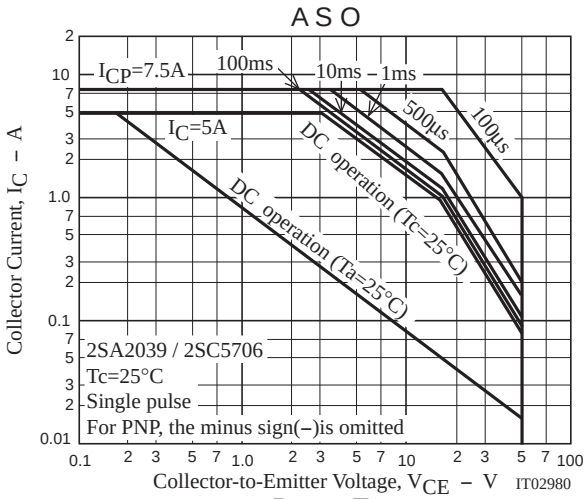

VBE(sat) – IC
2SC5706
IC / IB=50
Ta= –25°C
75°C
25°C
Base-to-Emitter Saturation Voltage, VBE(sat) – V
Collector Current, IC – A
IT00163

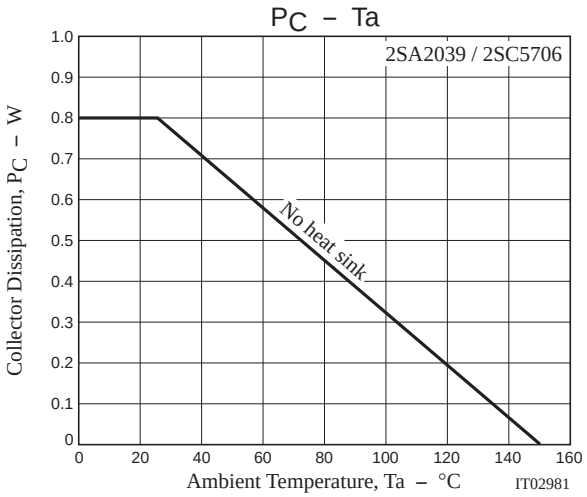

Cob – VCB
2SA2039
f=1MHz
Output Capacitance, Cob – pF
Collector-to-Base Voltage, VCB – V
IT00164

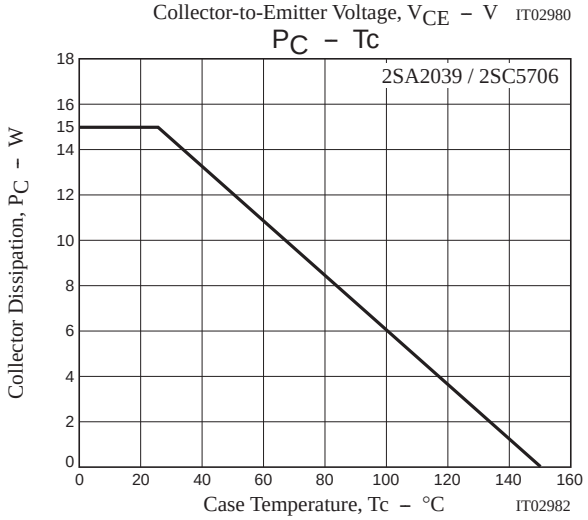

Cob – VCB
2SC5706
f=1MHz
Output Capacitance, Cob – pF
Collector-to-Base Voltage, VCB – V
IT00165


fT – IC
2SA2039
VCE= –10V
Gain-Bandwidth Product, fT – MHz
Collector Current, IC – A
IT00166


fT – IC
2SC5706
VCE=10V
Gain-Bandwidth Product, fT – MHz
Collector Current, IC – A
IT00167


ASO
Collector Current, I_C – A
I_{CP}=7.5A
100ms
10ms
1ms
500µs
100µs
I_C=5A
DC operation (Tc=25°C)
DC operation (Ta=25°C)
2SA2039 / 2SC5706
Tc=25°C
Single pulse
For PNP, the minus sign(–)is omitted
Collector-to-Emitter Voltage, V_{CE} – V
IT02980


P_C – Ta
Collector Dissipation, P_C – W
2SA2039 / 2SC5706
No heat sink
Ambient Temperature, Ta – °C
IT02981


P_C – Tc
Collector Dissipation, P_C – W
2SA2039 / 2SC5706
Case Temperature, Tc – °C
IT02982

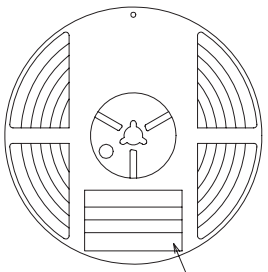
Taping Specification

2SA2039-TL-E, 2SC5706-TL-E, 2SC5706-TL-H

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

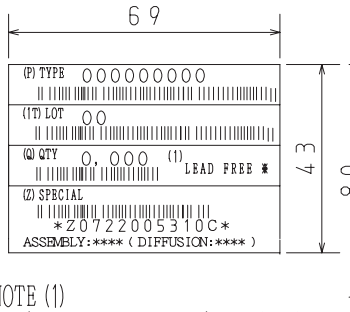
Packing method



Type No.
LOT No.
Quantity
Origin

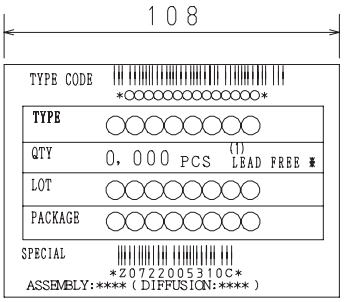
Reel label

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.

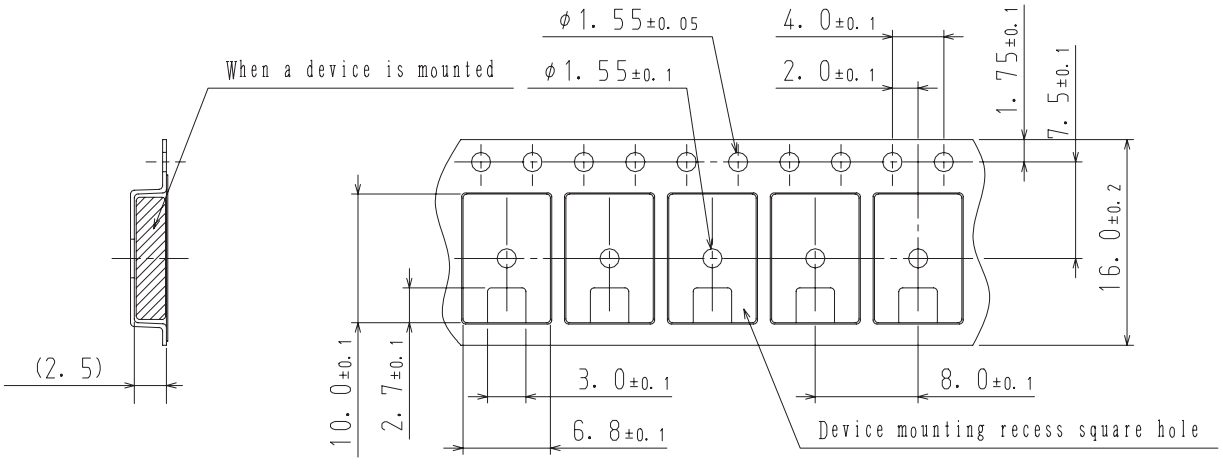


NOTE (1)
The LEAD FREE ※ description shows that the surface treatment of the terminal is lead free.

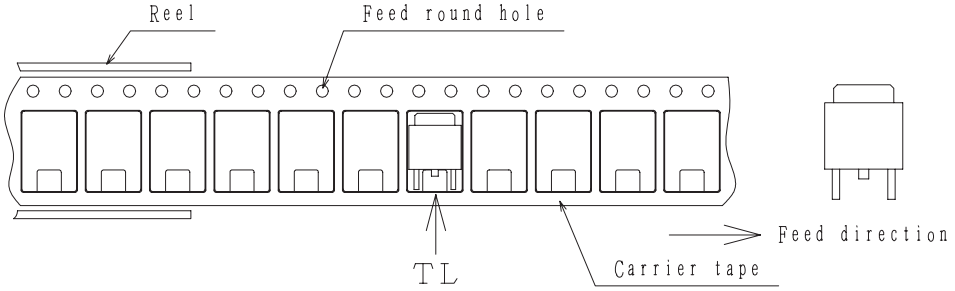
Label	JEITA Phase
LEAD FREE 3	JEITA Phase 3A
LEAD FREE 4	JEITA Phase 3

Taping configuration

1. Carrier tape size (unit:mm)



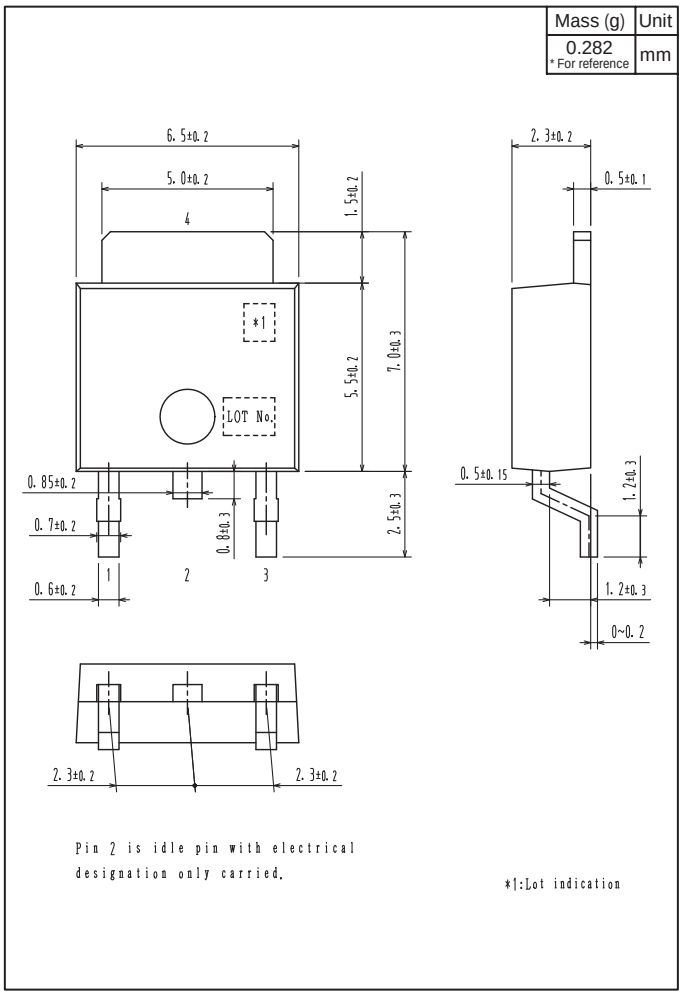
2. Device placement direction



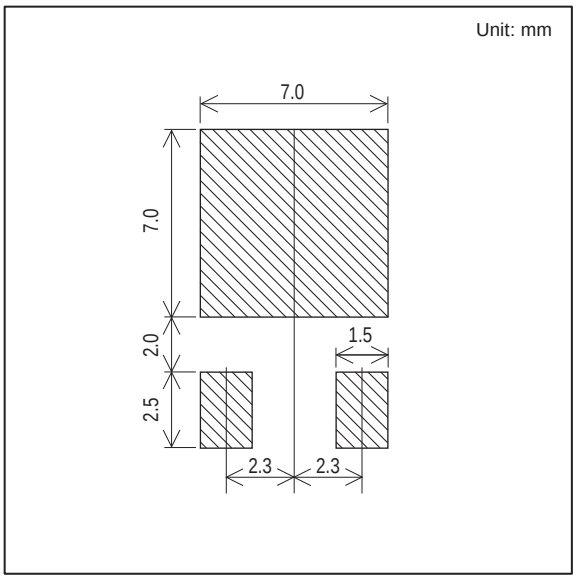
Those with one electrode terminal on the feed hole side·····TL

Outline Drawing

2SA2039-TL-E, 2SC5706-TL-E, 2SC5706-TL-H



Land Pattern Example



Bag Packing Specification

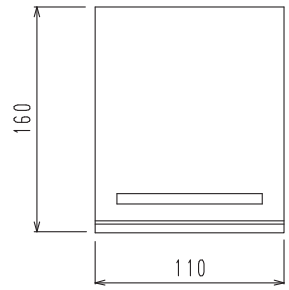
2SA2039-E, 2SC5706-E, 2SC5706-H

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

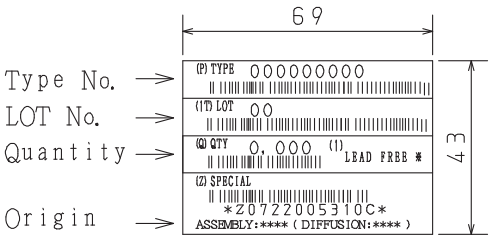
2. Bag dimensions

(unit: mm)



3. Bag label, Inner box label

(unit: mm)



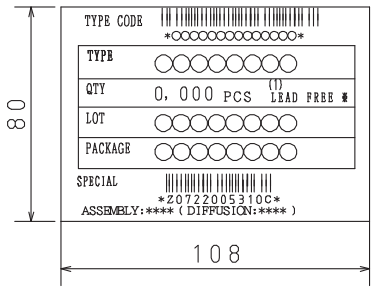
NOTE (1)
The LEAD FREE ※ description shows that the surface treatment of the terminal is lead free.

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

4. Outer box label

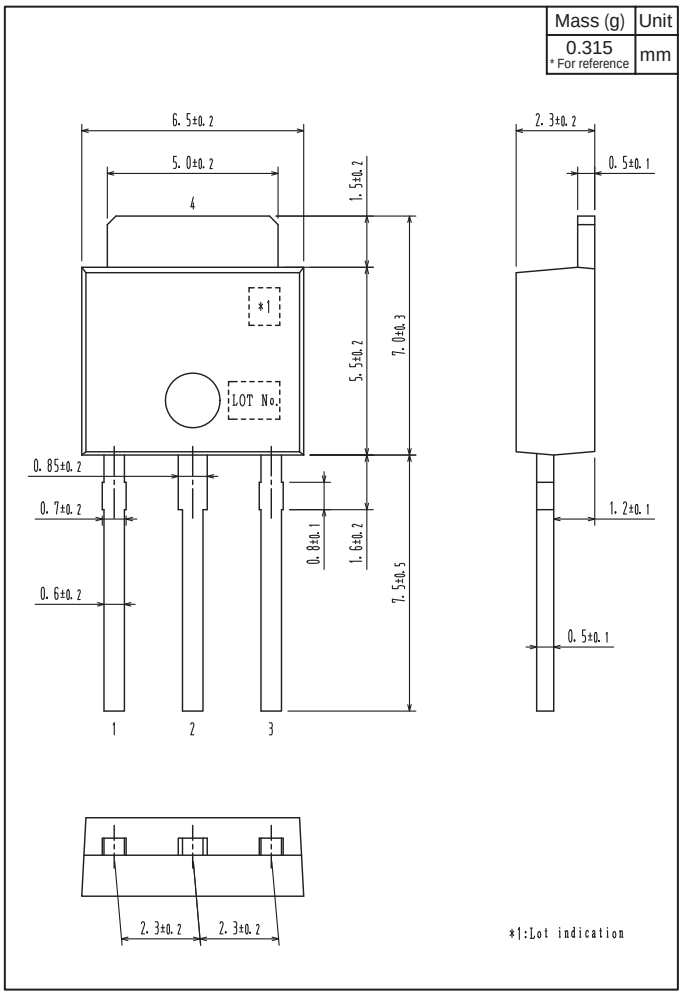
(unit: mm)

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



Outline Drawing

2SA2039-E, 2SC5706-E, 2SC5706-H



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