Ordering number : EN6912D

2SA2039/2SC5706

Bipolar Transistor
(-)50V, (-)5A, Low VCE(sat), (PNP)NPN Single TP/TP-FA

ON Semiconductor®
http://onsemi.com

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

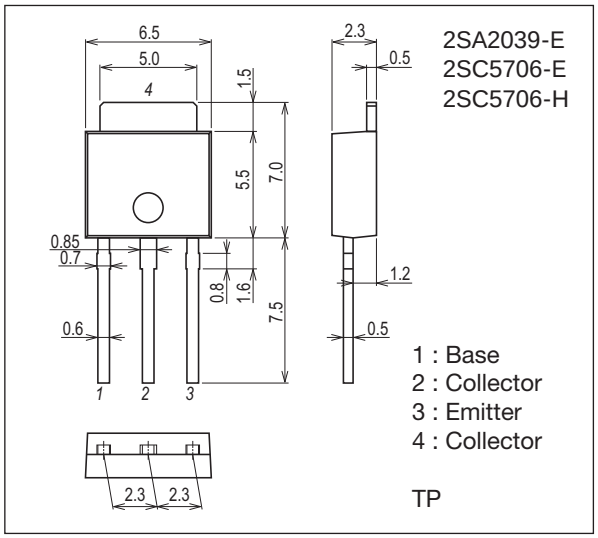
Specifications ( ): 2SA2039

Absolute Maximum Ratings at Ta=25°C

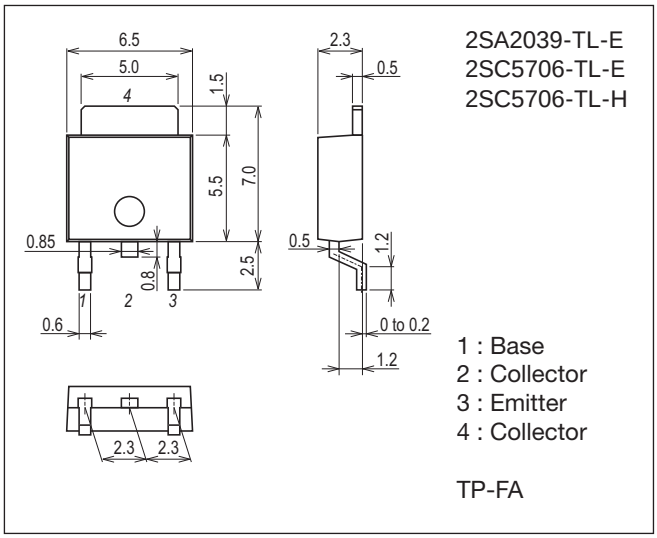
Parameter	Symbol	Conditions	Ratings	Unit
Collector-to-Base Voltage	V_{CBO}		(−50)100	V
Collector-to-Emitter Voltage	V_{CES}		(−50)100	V
Collector-to-Emitter Voltage	V_{CEO}		(−)50	V
Emitter-to-Base Voltage	V_{EBO}		(−)6	V
Collector Current	I_C		(−)5	A
Collector Current (Pulse)	I_{CP}		(−)7.5	A

Continued on next page.

Package Dimensions unit : mm (typ)
7518-003



Package Dimensions unit : mm (typ)
7003-003

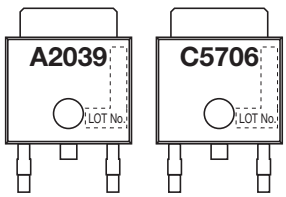


Product & Package Information

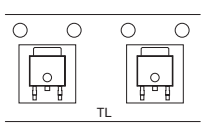
- Package : TP
- JEITA, JEDEC : SC-64, TO-251
- Minimum Packing Quantity : 500 pcs./bag

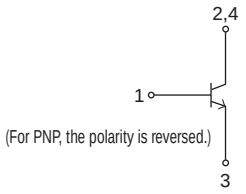
- Package : TP-FA
- JEITA, JEDEC : SC-63, TO-252
- Minimum Packing Quantity : 700 pcs./reel

Marking (TP, TP-FA)



Packing Type (TP-FA) : TL Electrical Connection





Continued from preceding page.

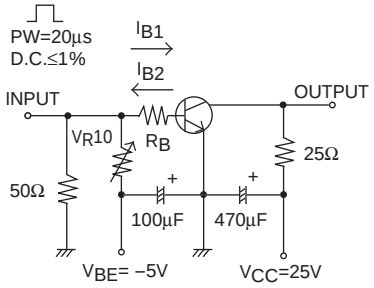
Parameter	Symbol	Conditions	Ratings	Unit
Base Current	I_B		(–)1.2	A
Collector Dissipation	P_C		0.8	W
		Tc=25°C	15	W
Junction Temperature	Tj		150	°C
Storage Temperature	Tstg		–55 to +150	°C

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			(–)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

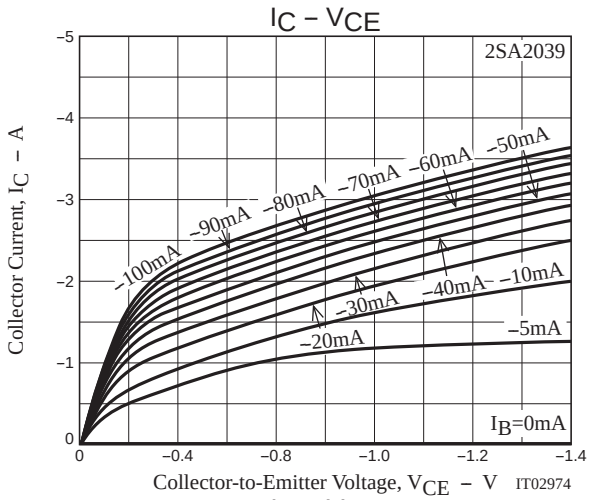


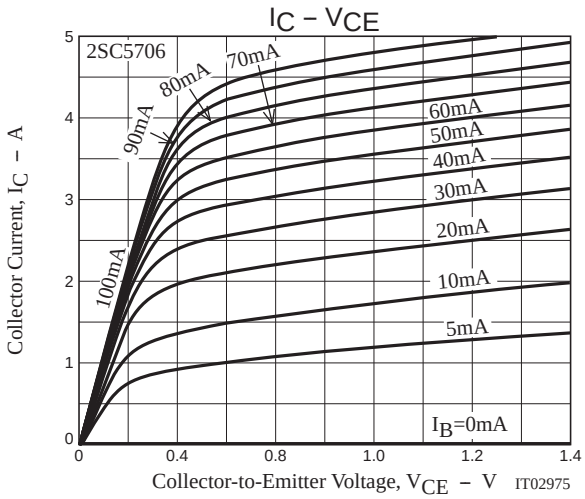
I_C=10I_{B1}= –10I_{B2}=1A

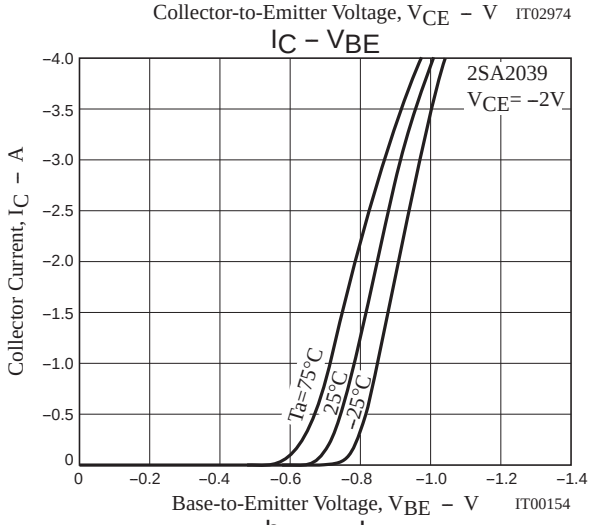
For PNP, the polarity is reversed.

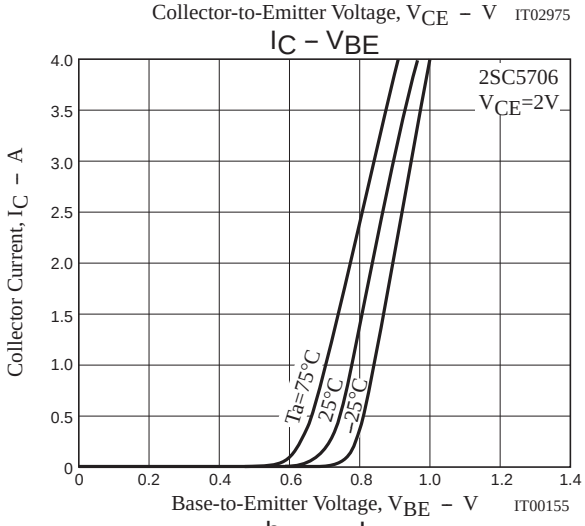
Ordering Information

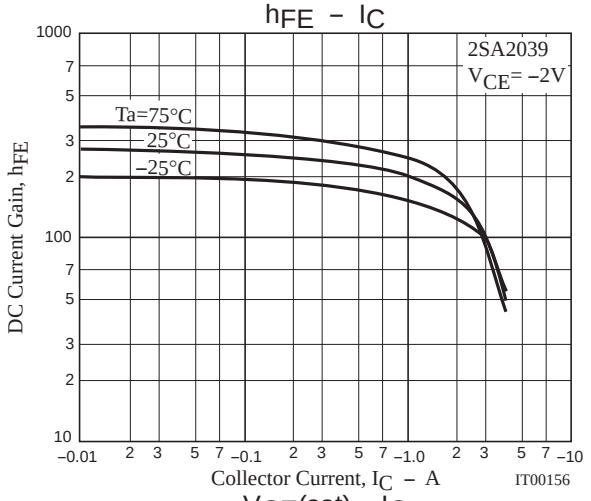
Device	Package	Shipping	memo
2SA2039-E	TP	500pcs./bag	Pb Free
2SC5706-E	TP	500pcs./bag	
2SC5706-H	TP	500pcs./bag	Pb Free & Halogen Free
2SA2039-TL-E	TP-FA	700pcs./reel	Pb Free
2SC5706-TL-E	TP-FA	700pcs./reel	
2SC5706-TL-H	TP-FA	700pcs./reel	Pb Free & Halogen Free

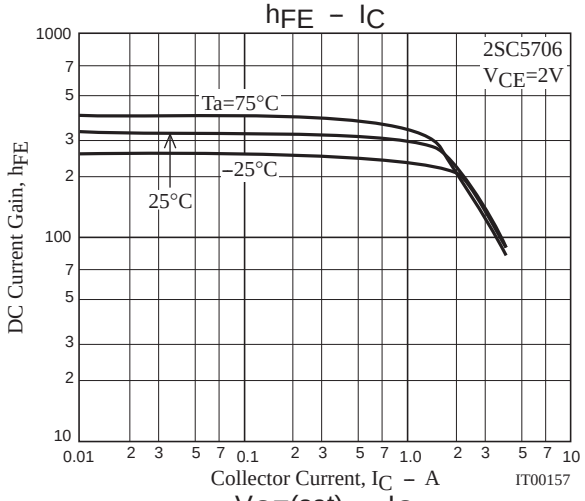

IC – VCE
2SA2039
Collector Current, IC – A
–100mA
–90mA
–80mA
–70mA
–60mA
–50mA
–40mA
–30mA
–20mA
–10mA
–5mA
IB=0mA
Collector-to-Emitter Voltage, VCE – V
IT02974

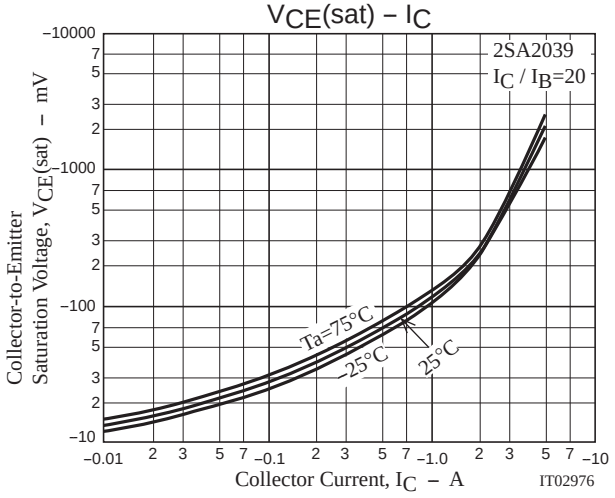

IC – VCE
2SC5706
Collector Current, IC – A
100mA
90mA
80mA
70mA
60mA
50mA
40mA
30mA
20mA
10mA
5mA
IB=0mA
Collector-to-Emitter Voltage, VCE – V
IT02975

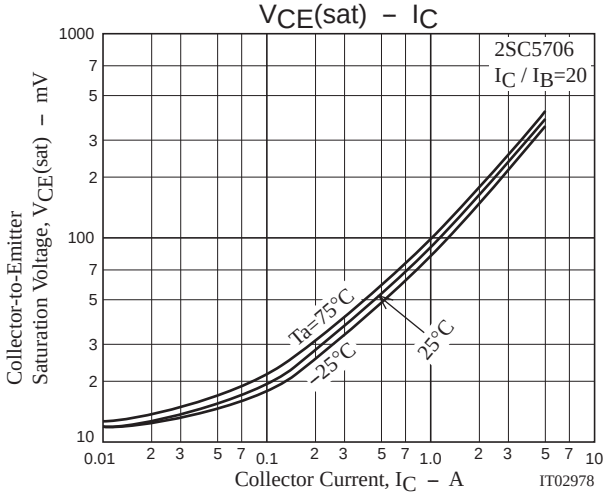

IC – VBE
2SA2039
VCE= –2V
Collector Current, IC – A
Ta=75°C
25°C
–25°C
Base-to-Emitter Voltage, VBE – V
IT00154

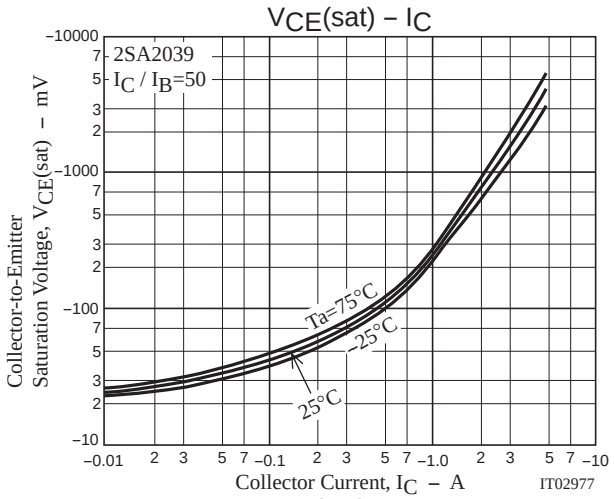

IC – VBE
2SC5706
VCE=2V
Collector Current, IC – A
Ta=75°C
25°C
–25°C
Base-to-Emitter Voltage, VBE – V
IT00155

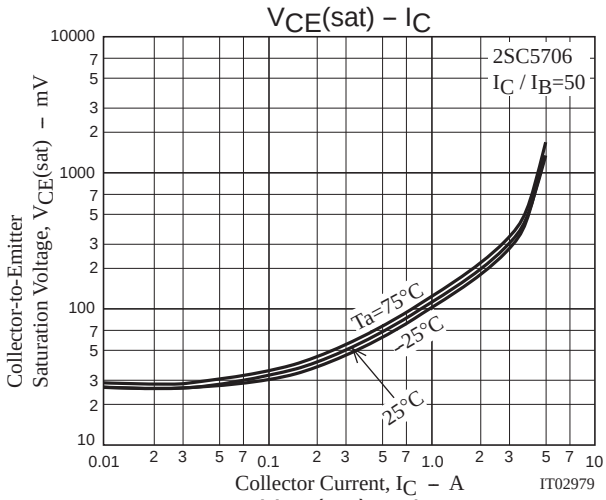

hFE – IC
2SA2039
VCE= –2V
DC Current Gain, hFE
Ta=75°C
25°C
–25°C
Collector Current, IC – A
IT00156

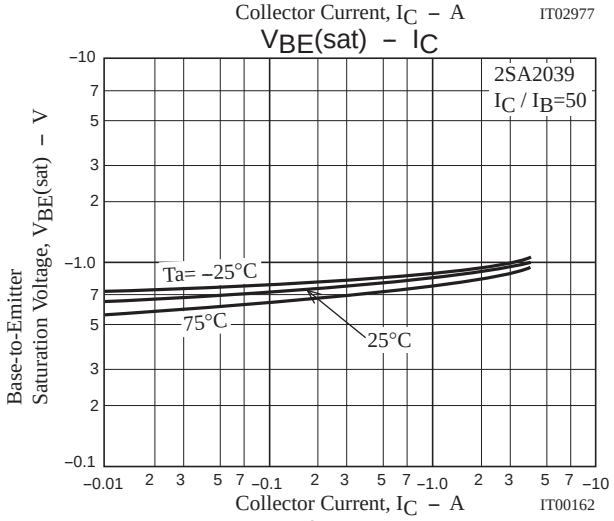

hFE – IC
2SC5706
VCE=2V
DC Current Gain, hFE
Ta=75°C
25°C
–25°C
Collector Current, IC – A
IT00157

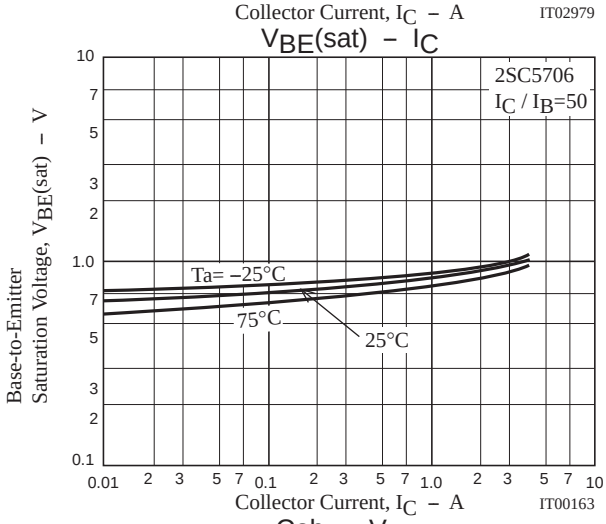

VCE(sat) – IC
2SA2039
IC / IB=20
Collector-to-Emitter Saturation Voltage, VCE(sat) – mV
Ta=75°C
–25°C
25°C
Collector Current, IC – A
IT02976

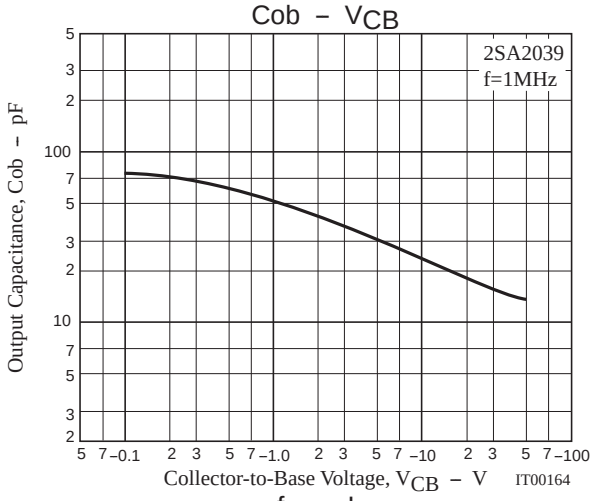

VCE(sat) – IC
2SC5706
IC / IB=20
Collector-to-Emitter Saturation Voltage, VCE(sat) – mV
Ta=75°C
–25°C
25°C
Collector Current, IC – A
IT02978

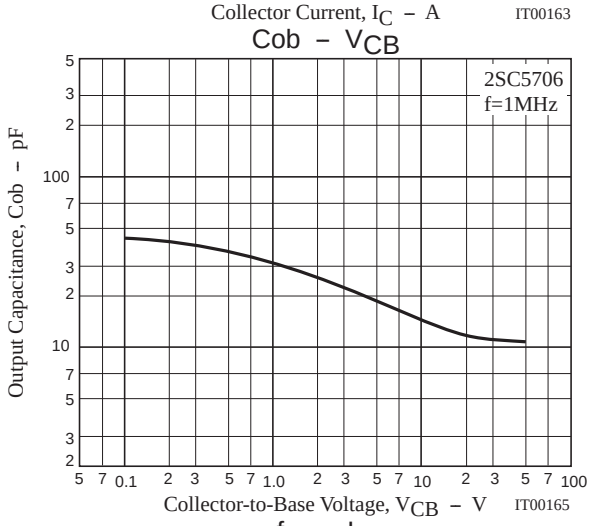

VCE(sat) – IC
2SA2039
IC / IB=50
Ta=75°C
–25°C
25°C
Collector-to-Emitter Saturation Voltage, VCE(sat) – mV
Collector Current, IC – A
IT02977

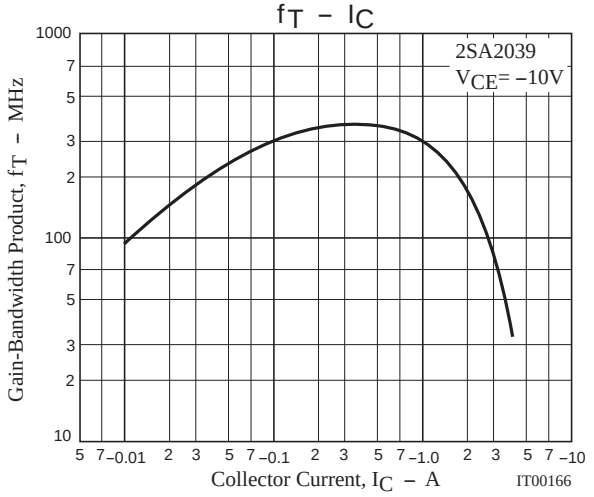

VCE(sat) – IC
2SC5706
IC / IB=50
Ta=75°C
–25°C
25°C
Collector-to-Emitter Saturation Voltage, VCE(sat) – mV
Collector Current, IC – A
IT02979

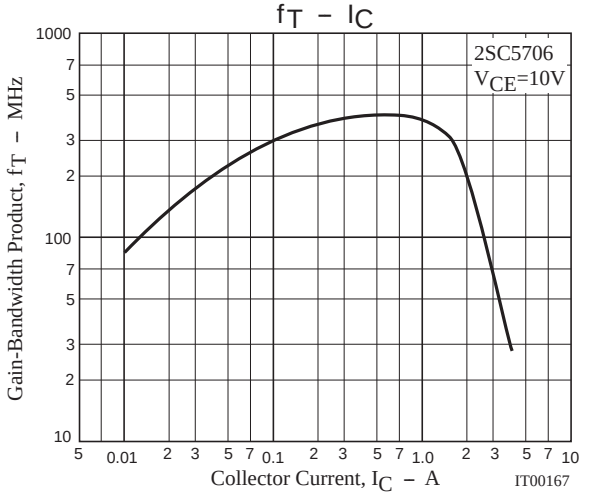

VBE(sat) – IC
2SA2039
IC / IB=50
Ta= –25°C
75°C
25°C
Base-to-Emitter Saturation Voltage, VBE(sat) – V
Collector Current, IC – A
IT00162

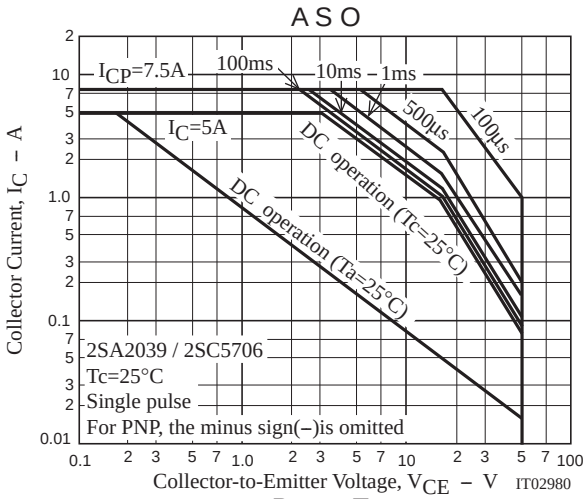

VBE(sat) – IC
2SC5706
IC / IB=50
Ta= –25°C
75°C
25°C
Base-to-Emitter Saturation Voltage, VBE(sat) – V
Collector Current, IC – A
IT00163

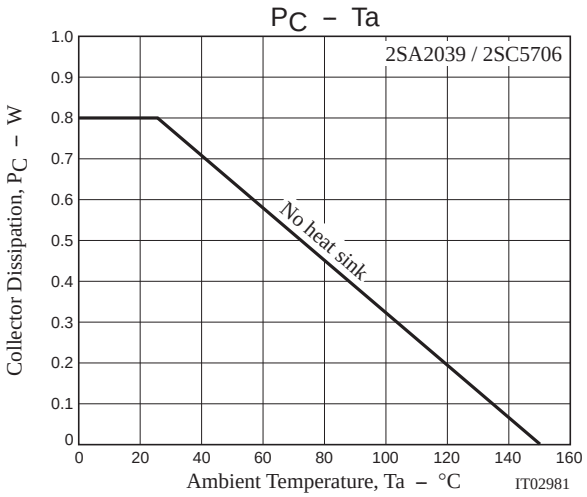

Cob – VCB
2SA2039
f=1MHz
Output Capacitance, Cob – pF
Collector-to-Base Voltage, VCB – V
IT00164

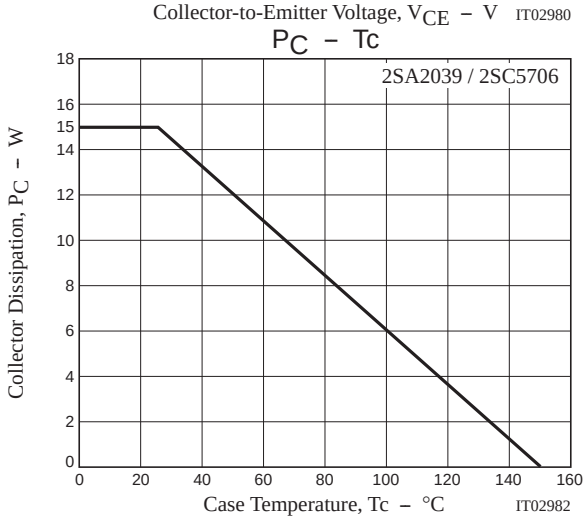

Cob – VCB
2SC5706
f=1MHz
Output Capacitance, Cob – pF
Collector-to-Base Voltage, VCB – V
IT00165


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


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

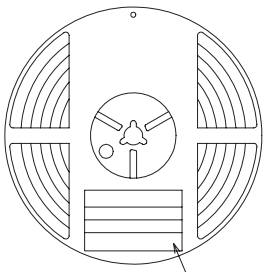
Taping Specification

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

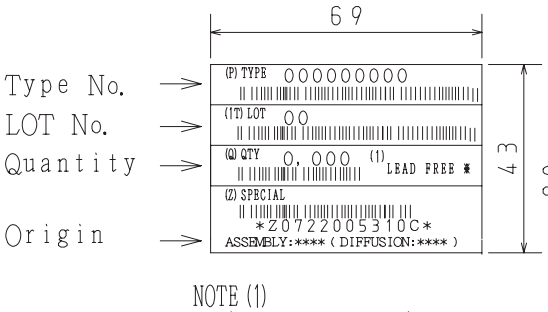
Packing method



Reel label

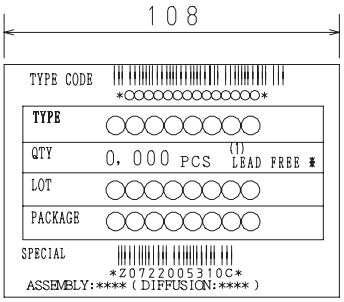
Reel label, Inner box label

(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.

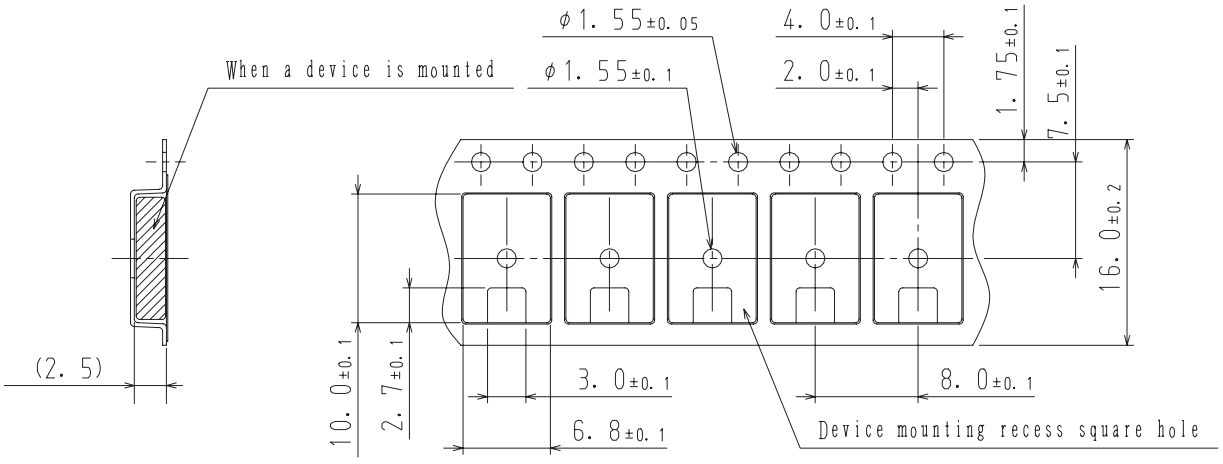


NOTE (1)
The LEAD FREE ※ description shows that the surface treatment of the terminal is lead free.

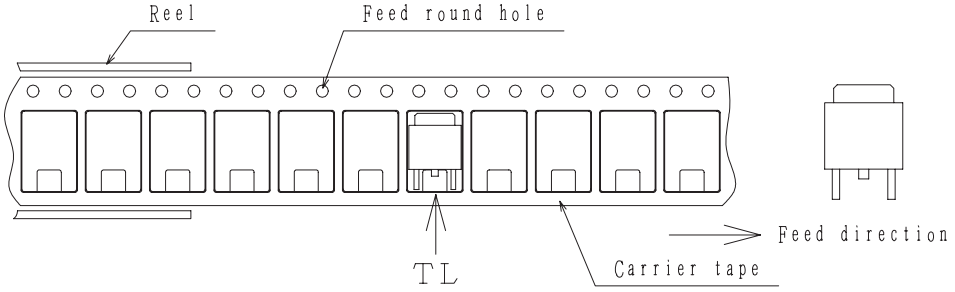
Label	JEITA Phase
LEAD FREE 3	JEITA Phase 3A
LEAD FREE 4	JEITA Phase 3

Taping configuration

1. Carrier tape size (unit:mm)



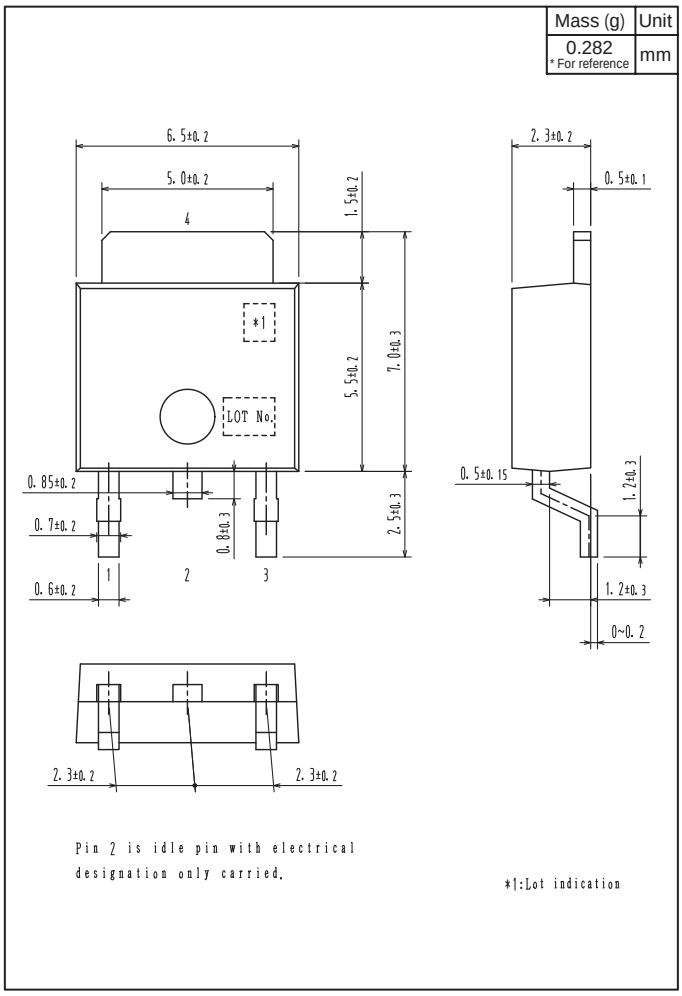
2. Device placement direction



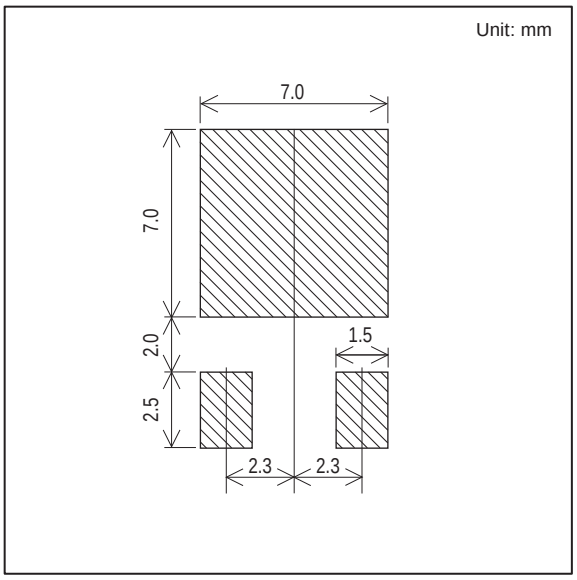
Those with one electrode terminal on the feed hole side·····TL

Outline Drawing

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



Land Pattern Example



Bag Packing Specification

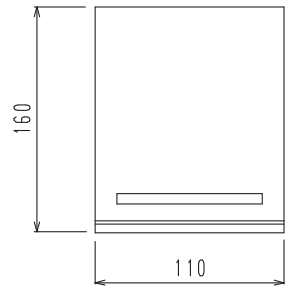
2SA2039-E, 2SC5706-E, 2SC5706-H

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

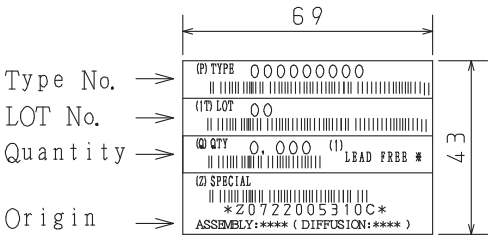
2. Bag dimensions

(unit: mm)



3. Bag label, Inner box label

(unit: mm)



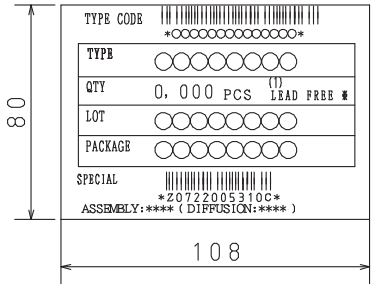
NOTE (1)
The LEAD FREE ※ description shows that the surface treatment of the terminal is lead free.

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