Ordering number : EN6307C

2SA2013/2SC5566

Bipolar Transistor
(-)50V, (-)4A, Low VCE(sat), (PNP)NPN Single PCP

ON Semiconductor®
http://onsemi.com

Applicaitons
・ Relay drivers, lamp drivers, motor drivers, flash

Features
・ Adoption of FBET and MBIT processes
・ Low collector-to-emitter saturation voltage
・ Large current capacity
・ High-speed switching
・ Ultrasmall package facilitales miniaturization in end products
・ High allowable power dissipation

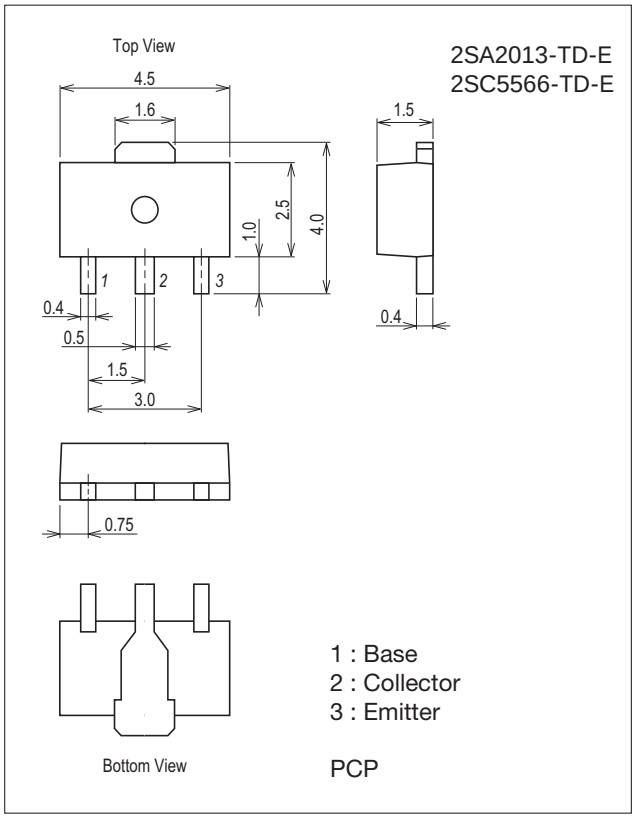
( )2SA2013

Specifications
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

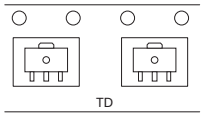
Continued on next page.

Package Dimensions
unit : mm (typ)
7007B-004

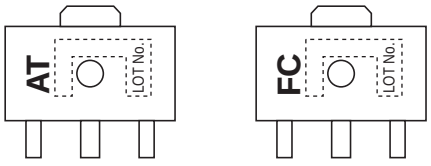


Product & Package Information
• Package : PCP
• JEITA, JEDEC : SC-62, SOT-89, TO-243
• Minimum Packing Quantity : 1,000 pcs./reel

Packing Type: TD

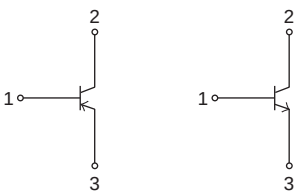


Marking



2SA2013 2SC5566

Electrical Connection



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Continued from preceding page.

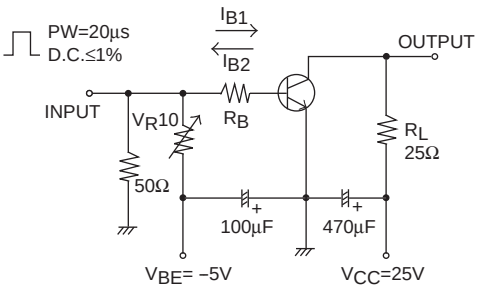
Parameter	Symbol	Conditions	Ratings	Unit
Collector Current	I_C		(–)4	A
Collector Current (Pulse)	I_{CP}		(–)7	A
Base Current	I_B		(–)600	mA
Collector Dissipation	P_C	When mounted on ceramic substrate (250mm^2×0.8mm)	1.3	W
		Tc=25°C	3.5	W
Junction Temperature	Tj		150	°C
Storage Temperature	Tstg		–55 to +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		(–105)85	(–180)130	mV
	V_{CE}(sat)2	I_C=(–)2A, I_B=(–)100mA		(–200)150	(–340)225	mV
Base-to-Emitter Saturation Voltage	V_{BE}(sat)	I_C=(–)2A, 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

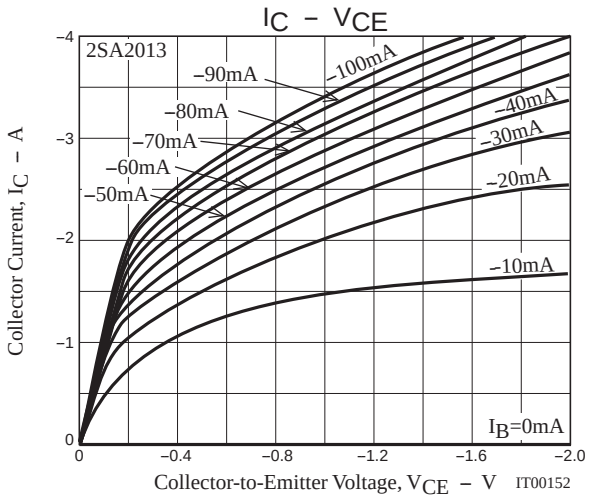
Switching Time Test Circuit

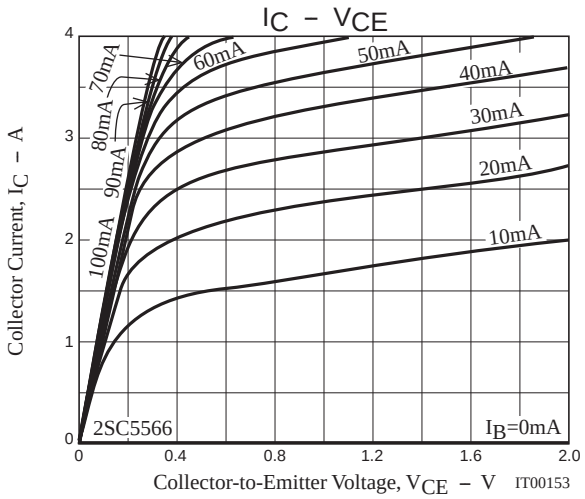


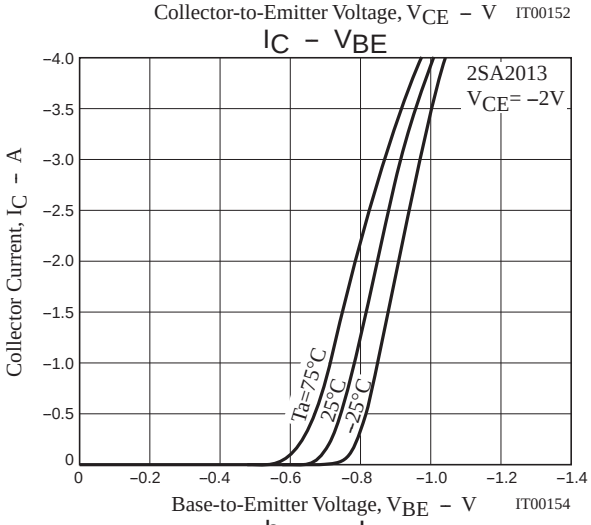
I_C=10I_{B1}= –10I_{B2}=1A
For PNP, the polarity is reversed.

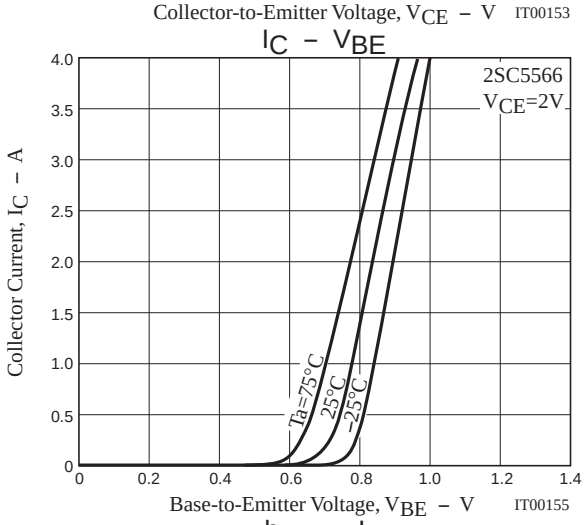
Ordering Information

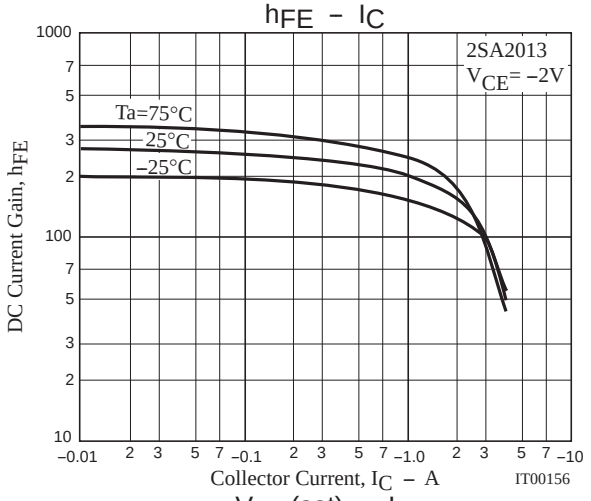
Device	Package	Shipping	memo
2SA2013-TD-E	PCP	1,000pcs./reel	Pb Free
2SC5566-TD-E	PCP	1,000pcs./reel	

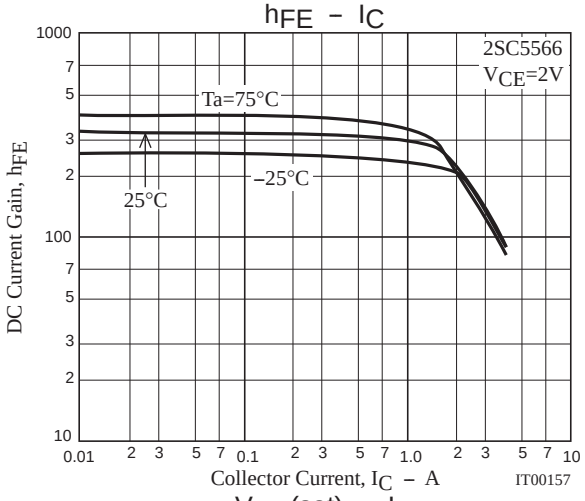

IC – VCE
2SA2013
–90mA
–100mA
–80mA
–70mA
–60mA
–50mA
–40mA
–30mA
–20mA
–10mA
IB=0mA
Collector Current, IC – A
Collector-to-Emitter Voltage, VCE – V
IT00152

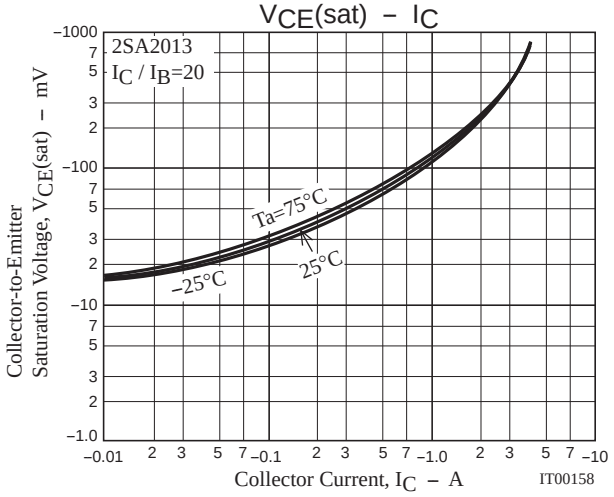

IC – VCE
70mA
60mA
50mA
40mA
80mA
30mA
90mA
20mA
100mA
10mA
2SC5566
IB=0mA
Collector Current, IC – A
Collector-to-Emitter Voltage, VCE – V
IT00153

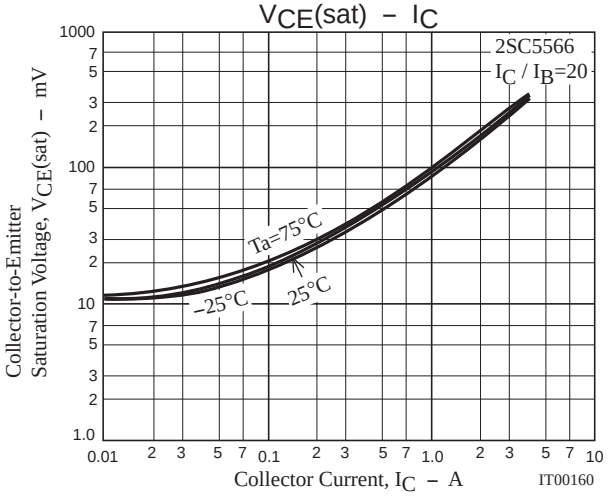

IC – VBE
2SA2013
VCE= –2V
Ta=75°C
25°C
–25°C
Collector Current, IC – A
Base-to-Emitter Voltage, VBE – V
IT00154

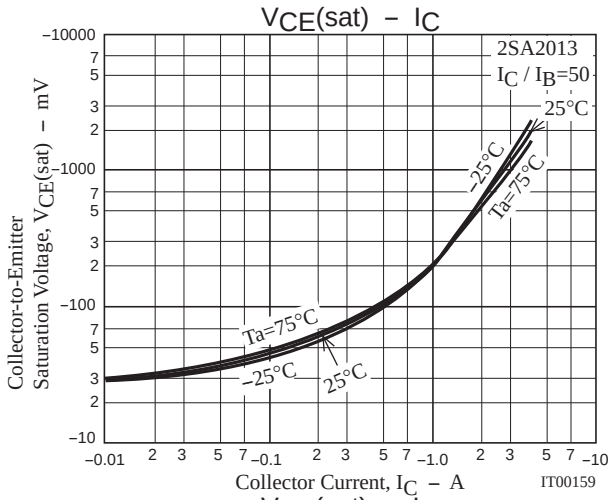

IC – VBE
2SC5566
VCE=2V
Ta=75°C
25°C
–25°C
Collector Current, IC – A
Base-to-Emitter Voltage, VBE – V
IT00155

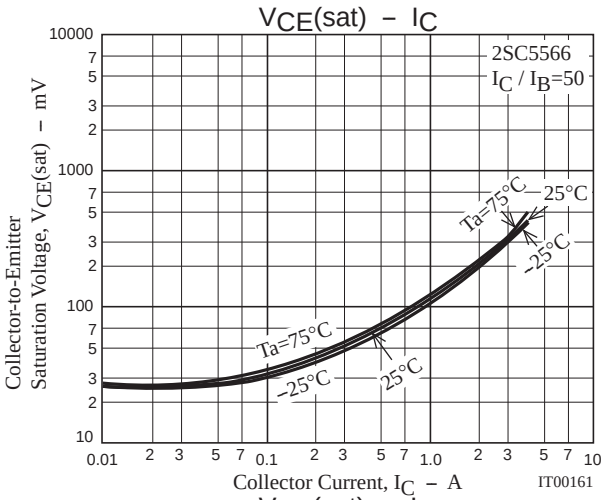

hFE – IC
2SA2013
VCE= –2V
Ta=75°C
25°C
–25°C
DC Current Gain, hFE
Collector Current, IC – A
IT00156

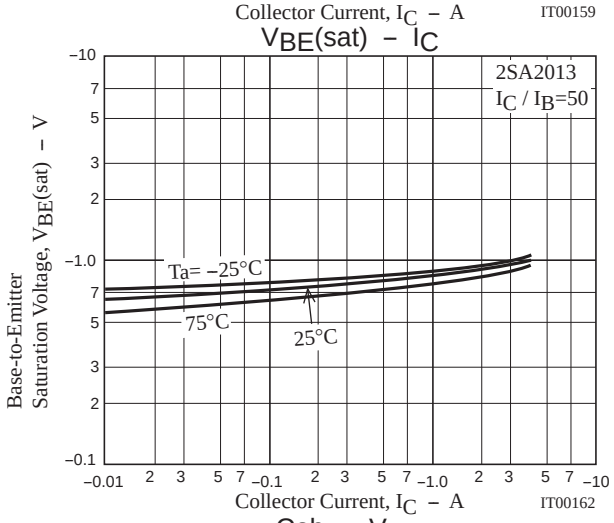

hFE – IC
2SC5566
VCE=2V
Ta=75°C
25°C
–25°C
DC Current Gain, hFE
Collector Current, IC – A
IT00157

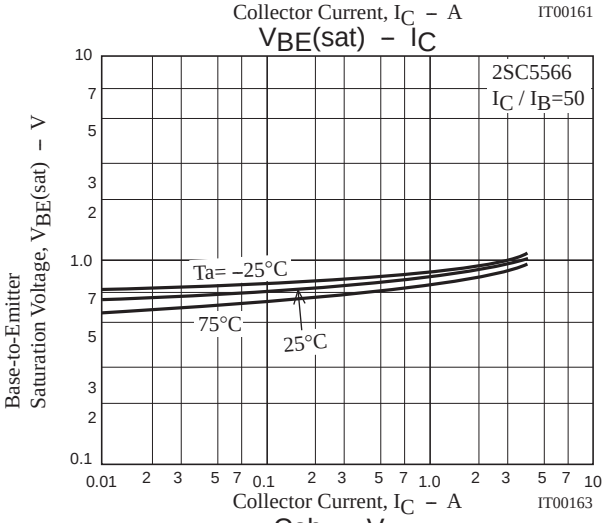

VCE(sat) – IC
2SA2013
IC / IB=20
Ta=75°C
25°C
–25°C
Collector-to-Emitter Saturation Voltage, VCE(sat) – mV
Collector Current, IC – A
IT00158

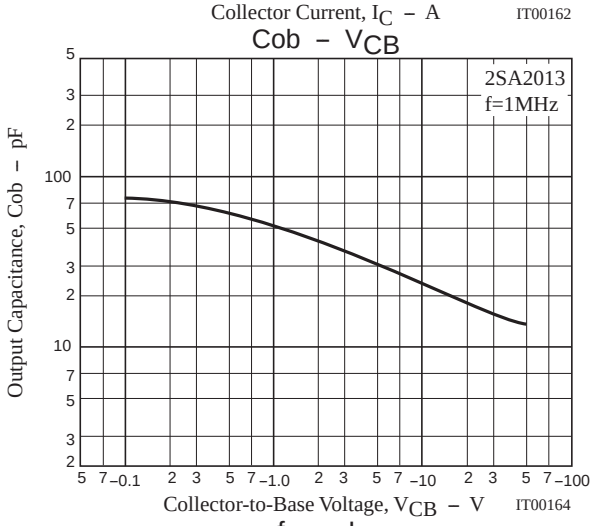

VCE(sat) – IC
2SC5566
IC / IB=20
Ta=75°C
25°C
–25°C
Collector-to-Emitter Saturation Voltage, VCE(sat) – mV
Collector Current, IC – A
IT00160

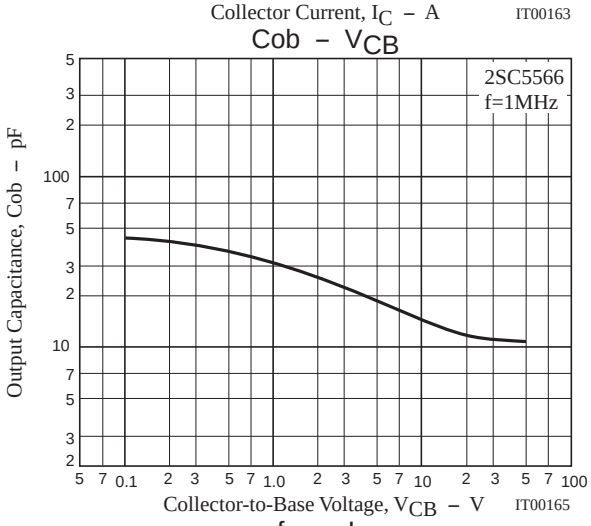

VCE(sat) – IC
2SA2013
IC / IB=50
25°C
–25°C
Ta=75°C
Ta=75°C
–25°C
25°C
Collector-to-Emitter Saturation Voltage, VCE(sat) – mV
Collector Current, IC – A
IT00159

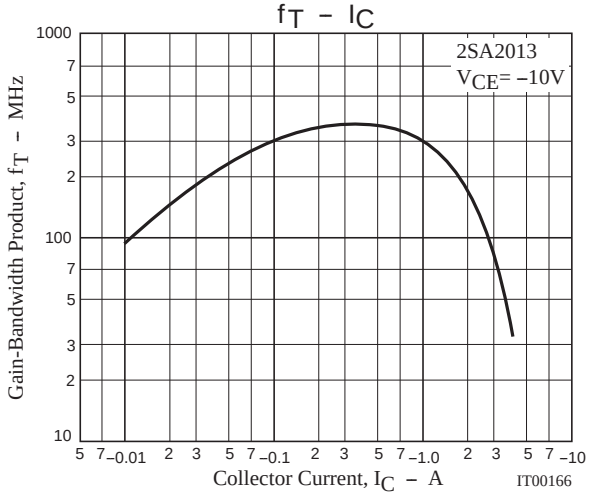

VCE(sat) – IC
2SC5566
IC / IB=50
Ta=75°C
25°C
–25°C
Ta=75°C
–25°C
25°C
Collector-to-Emitter Saturation Voltage, VCE(sat) – mV
Collector Current, IC – A
IT00161

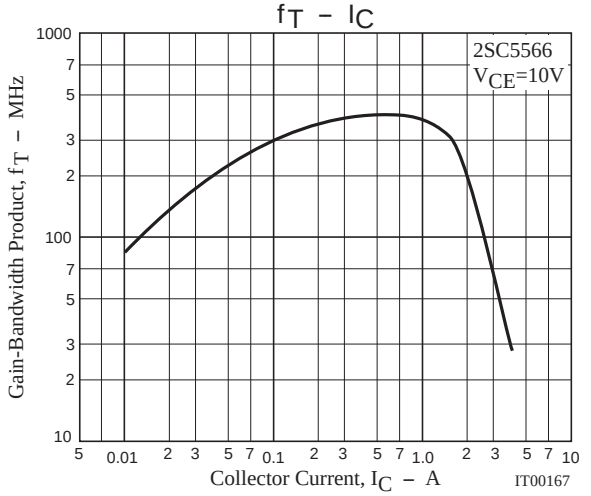

VBE(sat) – IC
2SA2013
IC / IB=50
Ta= –25°C
75°C
25°C
Base-to-Emitter Saturation Voltage, VBE(sat) – V
Collector Current, IC – A
IT00162

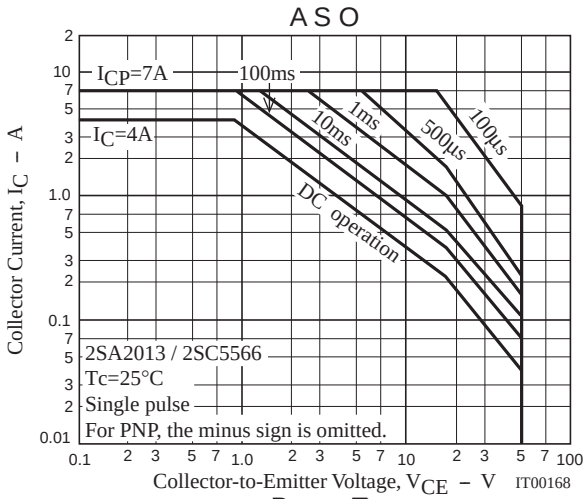

VBE(sat) – IC
2SC5566
IC / IB=50
Ta= –25°C
75°C
25°C
Base-to-Emitter Saturation Voltage, VBE(sat) – V
Collector Current, IC – A
IT00163

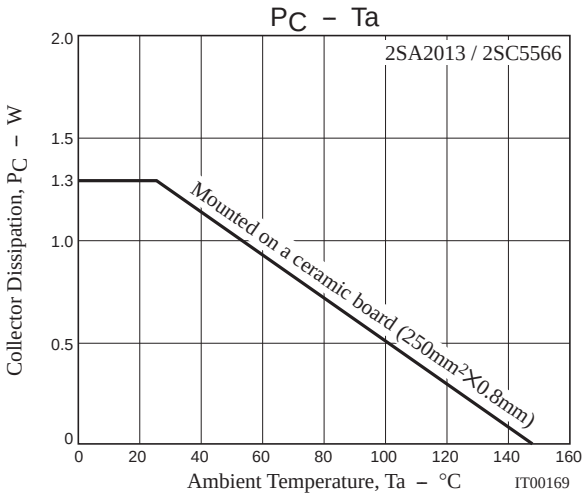

Cob – VCB
2SA2013
f=1MHz
Output Capacitance, Cob – pF
Collector-to-Base Voltage, VCB – V
IT00164

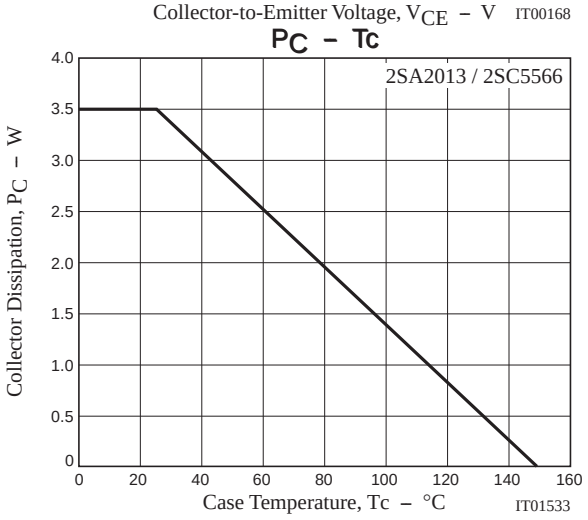

Cob – VCB
2SC5566
f=1MHz
Output Capacitance, Cob – pF
Collector-to-Base Voltage, VCB – V
IT00165


fT – IC
2SA2013
VCE= –10V
Gain-Bandwidth Product, fT – MHz
Collector Current, IC – A
IT00166


fT – IC
2SC5566
VCE=10V
Gain-Bandwidth Product, fT – MHz
Collector Current, IC – A
IT00167


A S O
I_{CP}=7A
100ms
I_C=4A
1ms
10ms
500µs
100µs
DC operation
2SA2013 / 2SC5566
Tc=25°C
Single pulse
For PNP, the minus sign is omitted.
Collector Current, I_C – A
Collector-to-Emitter Voltage, V_{CE} – V
IT00168


P_C – Ta
2SA2013 / 2SC5566
Mounted on a ceramic board (250mm²X0.8mm)
Collector Dissipation, P_C – W
Ambient Temperature, Ta – °C
IT00169


P_C – Tc
2SA2013 / 2SC5566
Collector Dissipation, P_C – W
Case Temperature, Tc – °C
IT01533

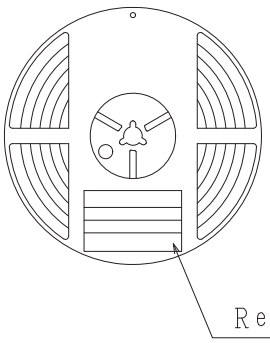
Bag Packing Specification

2SA2013-TD-E, 2SC5566-TD-E

1. Packing Format

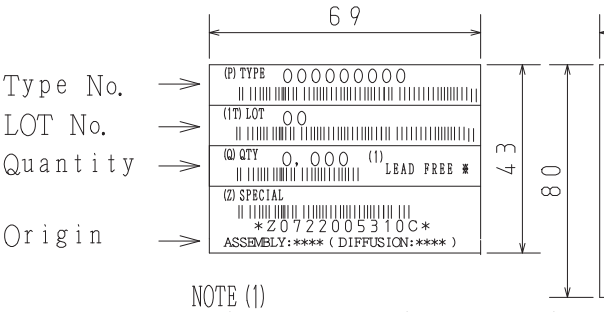
Package Name	Carrier Tape Type	Maximum Number of devices contained (pcs)			Packing format	
		Reel	Inner box	Outer box	Inner BOX (C-1)	Outer BOX (A-7)
PCP	PCP	1,000	4,000	24,000	4 reels contained Dimensions:mm (external) 183×72×185	6 inner boxes contained Dimensions:mm (external) 440×195×210

Packing method



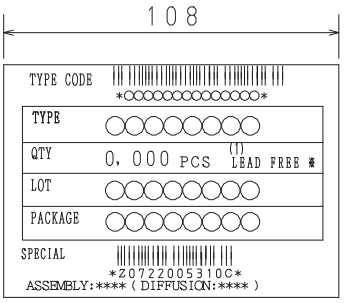
Reel label

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.

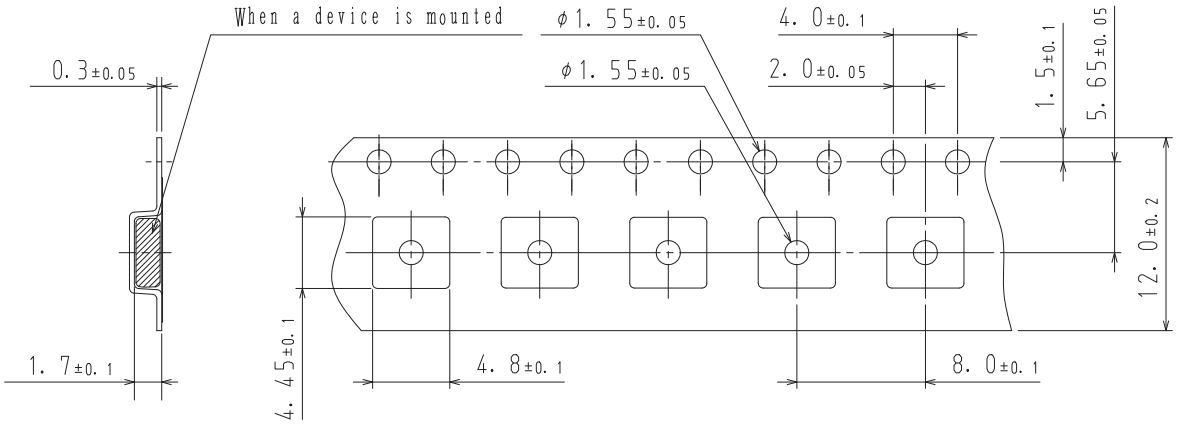


NOTE (1)
The LEAD FREE ※ description shows that the surface treatment of the terminal is lead free.

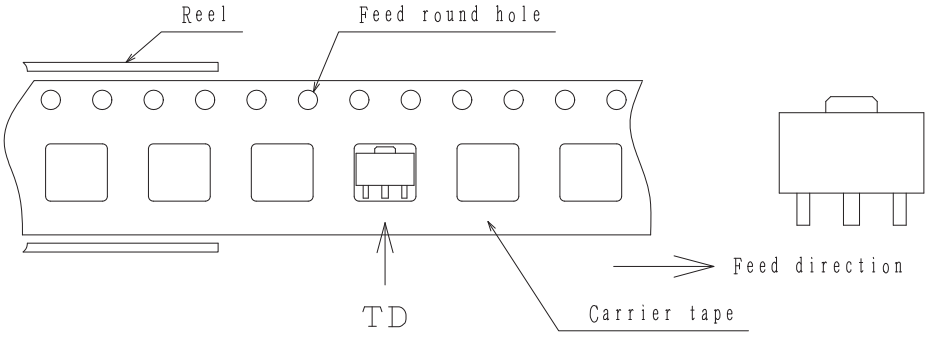
Label	JEITA Phase
LEAD FREE 3	JEITA Phase 3A
LEAD FREE 4	JEITA Phase 3

2. Taping configuration

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



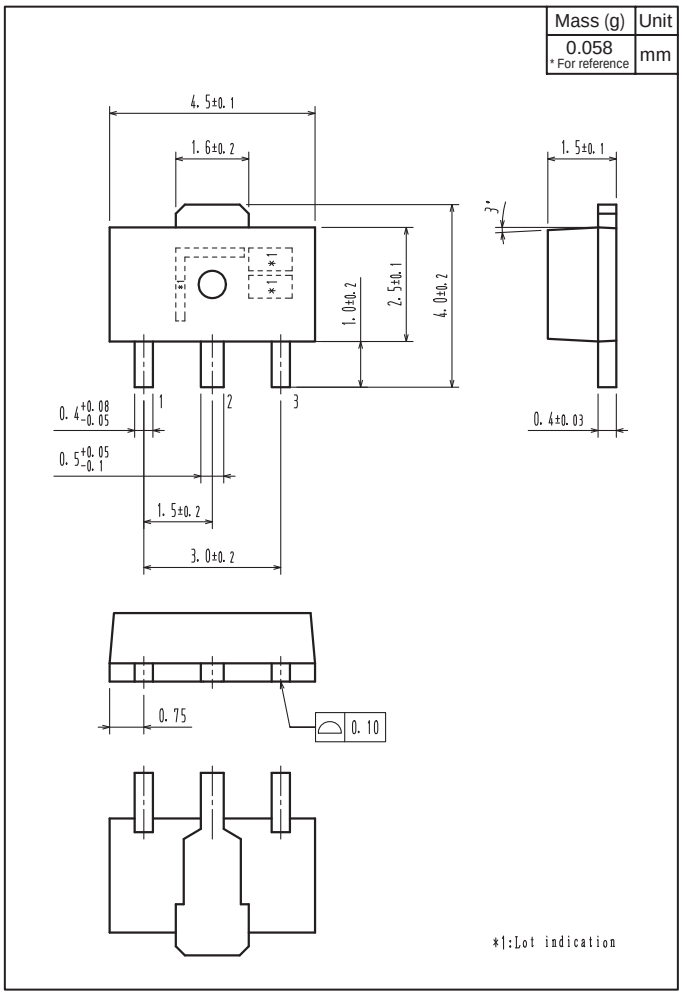
2-2. Device placement direction



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

Outline Drawing

2SA2013-TD-E, 2SC5566-TD-E



Land Pattern Example