Ordering number : EN6913B

SANYO Semiconductors

DATA SHEET

2SA2040/2SC5707 — 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

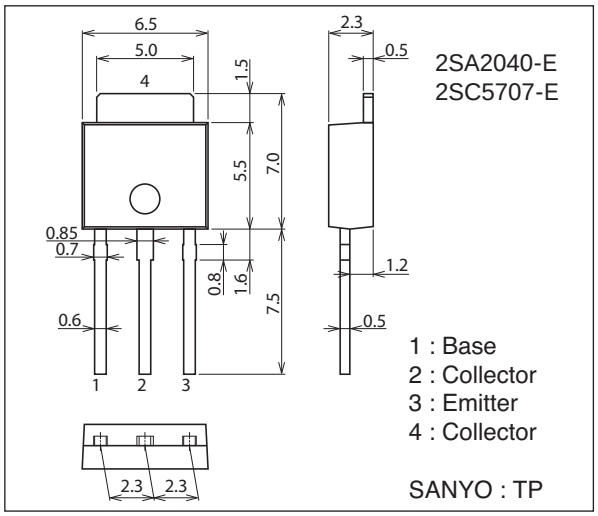
Specifications ( ): 2SA2040

Absolute Maximum Ratings at Ta=25°C

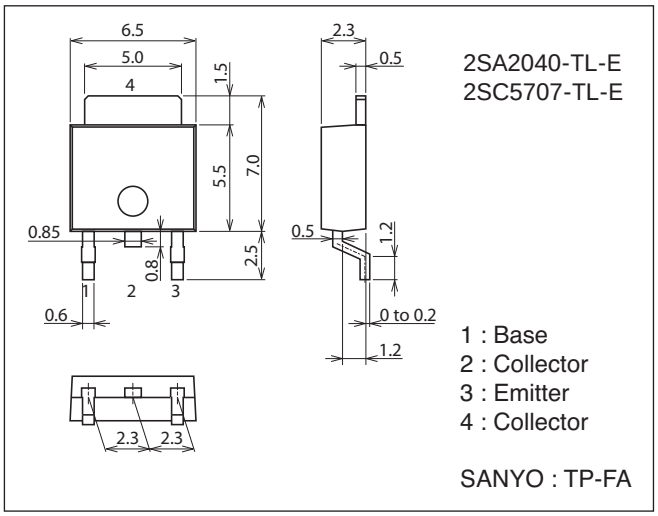
Parameter	Symbol	Conditions	Ratings	Unit
Collector-to-Base Voltage	V_{CBO}		(–50)100	V
Collector-to-Emitter Voltage	V_{CES}		(–50)100	V
Collector-to-Emitter Voltage	V_{CEO}		(–)50	V
Emitter-to-Base Voltage	V_{EBO}		(–)6	V
Collector Current	I_C		(–)8	A
Collector Current (Pulse)	I_{CP}		(–)11	A

Continued on next page.

Package Dimensions unit : mm (typ)
7518-003



Package Dimensions unit : mm (typ)
7003-003

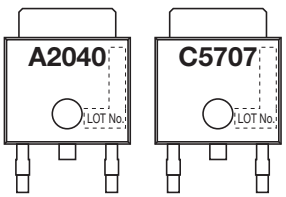


Product & Package Information

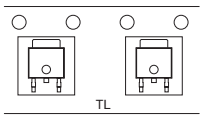
- Package : TP
- JEITA, JEDEC : SC-64, TO-251
- Minimum Packing Quantity : 500 pcs./bag

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

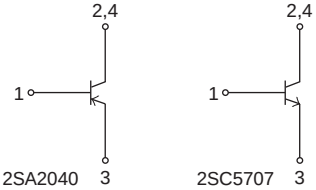
Marking (TP, TP-FA)



Packing Type (TP-FA) : TL



Electrical Connection



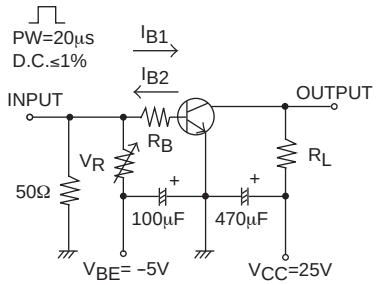
Continued from preceding page.

Parameter	Symbol	Conditions	Ratings	Unit
Base Current	I_B		(–)2	A
Collector Dissipation	P_C		1.0	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			(–)0.1	μA
Emitter Cutoff Current	I_{EBO}	V_{EB}=(–)4V, I_C=0A			(–)0.1	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		(290)330		MHz
Output Capacitance	Cob	V_{CB}=(–)10V, f=1MHz		(50)28		pF
Collector-to-Emitter Saturation Voltage	V_{CE}(sat)1	I_C=(–)3.5A, I_B=(–)175mA		(–230)160	(–390)240	mV
	V_{CE}(sat)2	I_C=(–)2A, I_B=(–)40mA		(–240)110	(–400)170	mV
Base-to-Emitter Saturation Voltage	V_{BE}(sat)	I_C=(–)2A, I_B=(–)40mA		(–)0.83	(–)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.		(40)30		ns
Storage Time	t_{stg}			(225)420		ns
Fall Time	t_f			25		ns

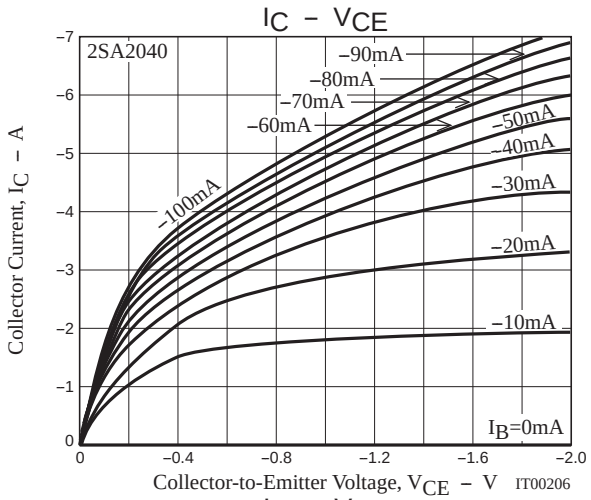
Switching Time Test Circuit

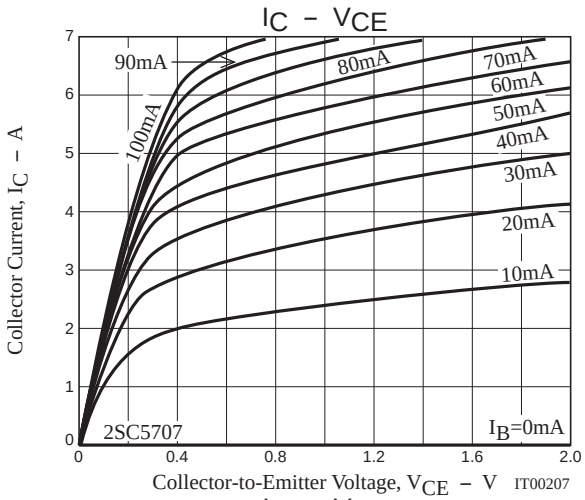


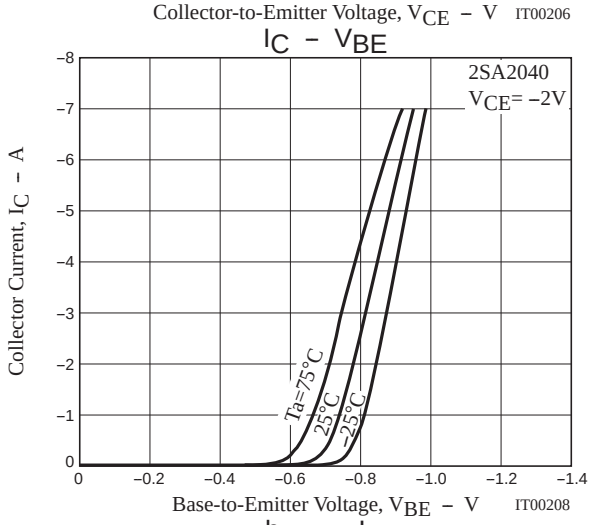
$20I_{B1}$= –$20I_{B2}$=I_C=2.5A
For PNP, the polarity is reversed.

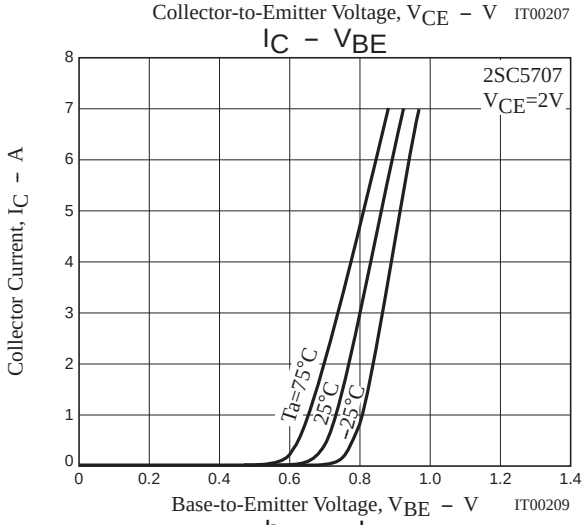
Ordering Information

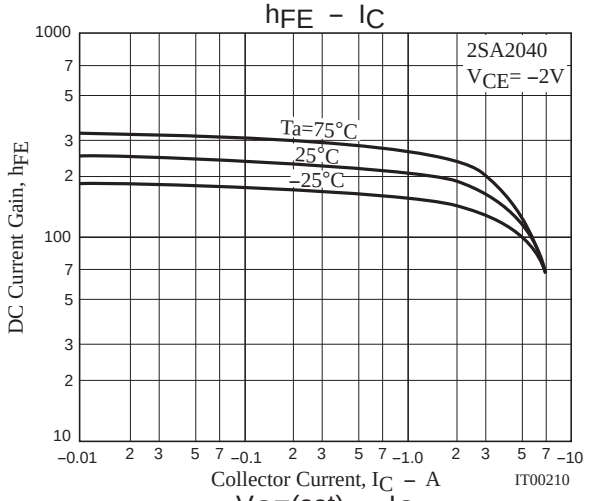
Device	Package	Shipping	memo
2SA2040-E	TP	500pcs./bag	Pb Free
2SC5707-E	TP	500pcs./bag	
2SA2040-TL-E	TP-FA	700pcs./reel	
2SC5707-TL-E	TP-FA	700pcs./reel	

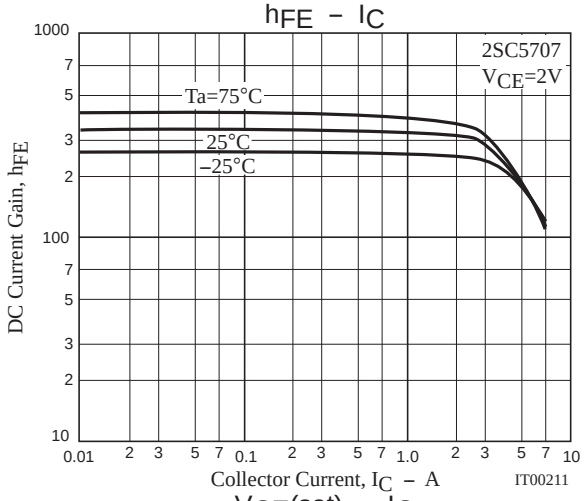

IC – VCE
2SA2040
–90mA
–80mA
–70mA
–60mA
–50mA
–40mA
–30mA
–20mA
–10mA
–100mA
IB=0mA
Collector Current, IC – A
Collector-to-Emitter Voltage, VCE – V
IT00206

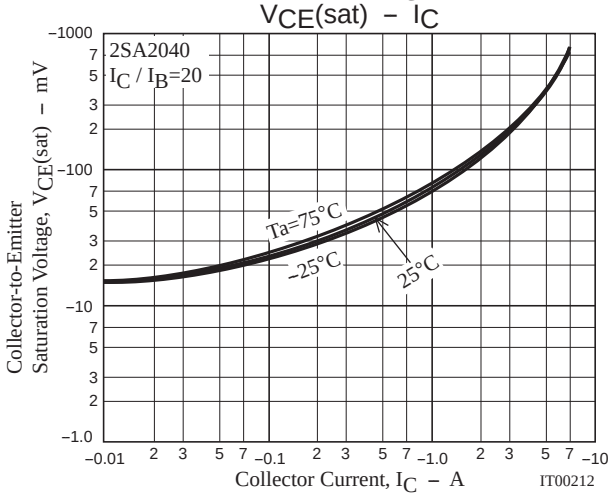

IC – VCE
90mA
80mA
70mA
60mA
50mA
40mA
30mA
20mA
10mA
100mA
2SC5707
IB=0mA
Collector Current, IC – A
Collector-to-Emitter Voltage, VCE – V
IT00207

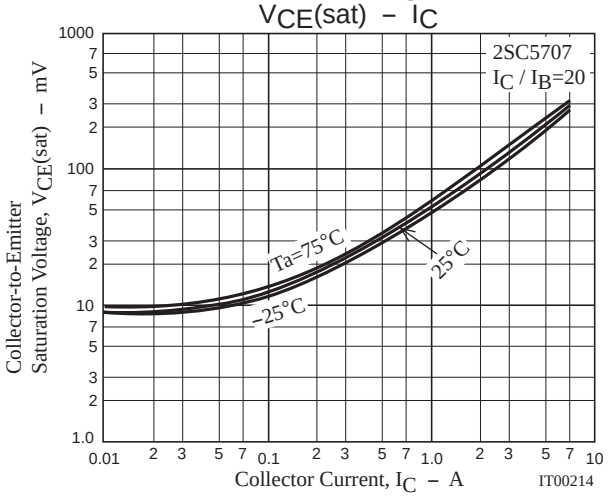

IC – VBE
2SA2040
VCE= –2V
Ta=75°C
25°C
–25°C
Collector Current, IC – A
Base-to-Emitter Voltage, VBE – V
IT00208

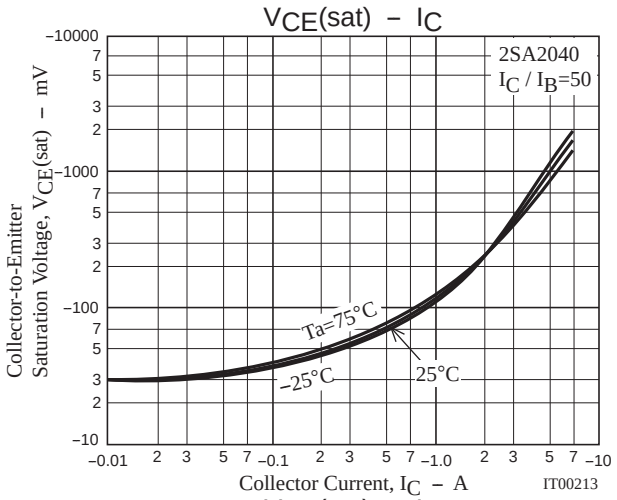

IC – VBE
2SC5707
VCE=2V
Ta=75°C
25°C
–25°C
Collector Current, IC – A
Base-to-Emitter Voltage, VBE – V
IT00209

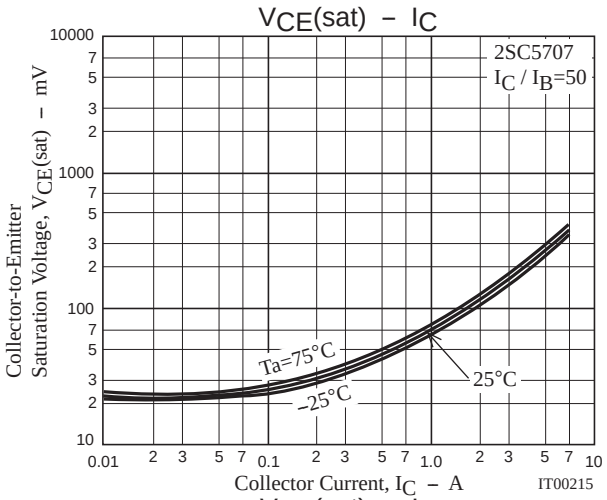

hFE – IC
2SA2040
VCE= –2V
Ta=75°C
25°C
–25°C
DC Current Gain, hFE
Collector Current, IC – A
IT00210

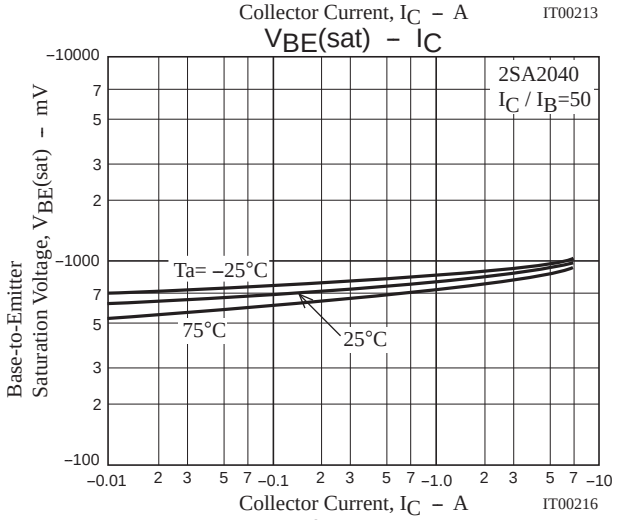

hFE – IC
2SC5707
VCE=2V
Ta=75°C
25°C
–25°C
DC Current Gain, hFE
Collector Current, IC – A
IT00211

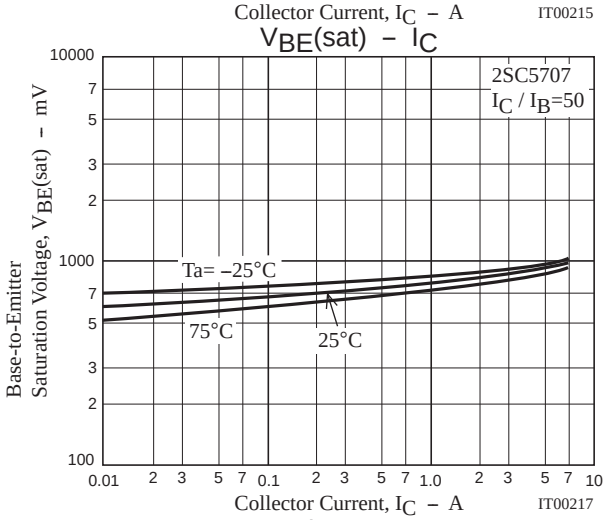

VCE(sat) – IC
2SA2040
IC / IB=20
Ta=75°C
–25°C
25°C
Collector-to-Emitter Saturation Voltage, VCE(sat) – mV
Collector Current, IC – A
IT00212

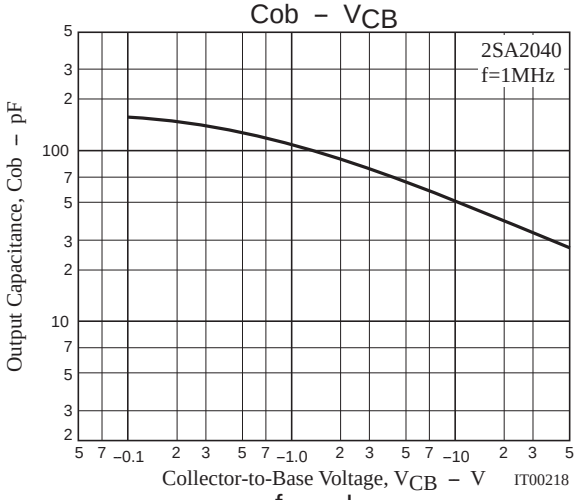

VCE(sat) – IC
2SC5707
IC / IB=20
Ta=75°C
–25°C
25°C
Collector-to-Emitter Saturation Voltage, VCE(sat) – mV
Collector Current, IC – A
IT00214

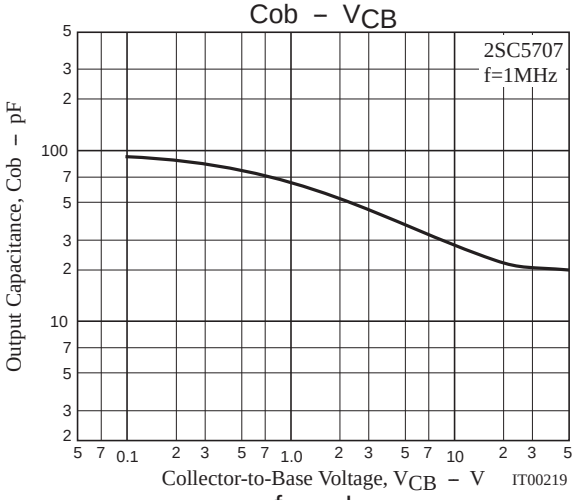

VCE(sat) – IC
2SA2040
IC / IB=50
Ta=75°C
–25°C
25°C
Collector-to-Emitter Saturation Voltage, VCE(sat) – mV
Collector Current, IC – A
IT00213

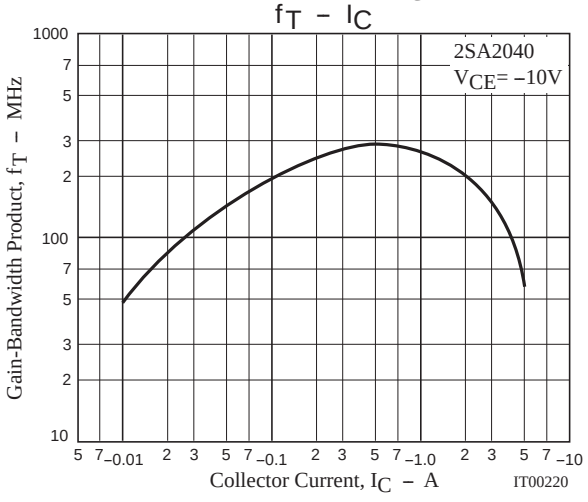

VCE(sat) – IC
2SC5707
IC / IB=50
Ta=75°C
–25°C
25°C
Collector-to-Emitter Saturation Voltage, VCE(sat) – mV
Collector Current, IC – A
IT00215

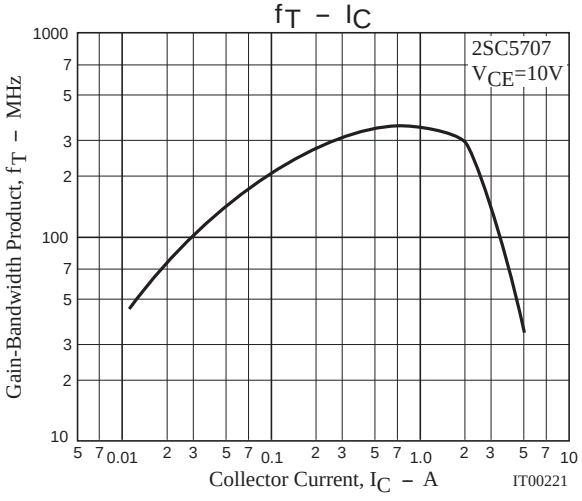

VBE(sat) – IC
2SA2040
IC / IB=50
Ta= –25°C
75°C
25°C
Base-to-Emitter Saturation Voltage, VBE(sat) – mV
Collector Current, IC – A
IT00216

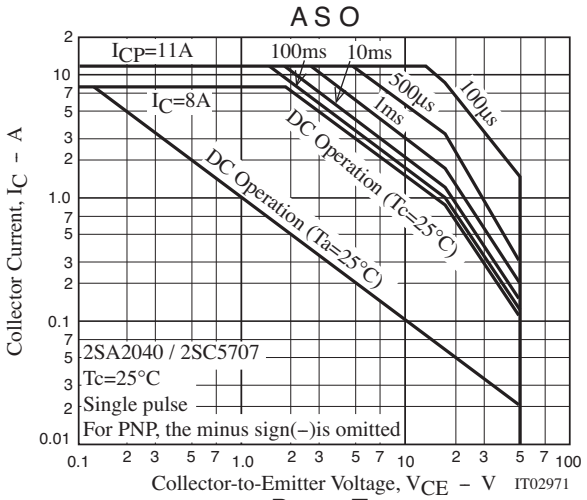

VBE(sat) – IC
2SC5707
IC / IB=50
Ta= –25°C
75°C
25°C
Base-to-Emitter Saturation Voltage, VBE(sat) – mV
Collector Current, IC – A
IT00217

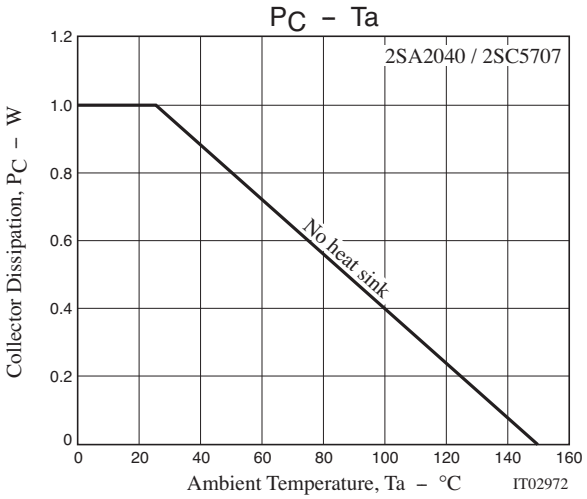

Cob – VCB
2SA2040
f=1MHz
Output Capacitance, Cob – pF
Collector-to-Base Voltage, VCB – V
IT00218

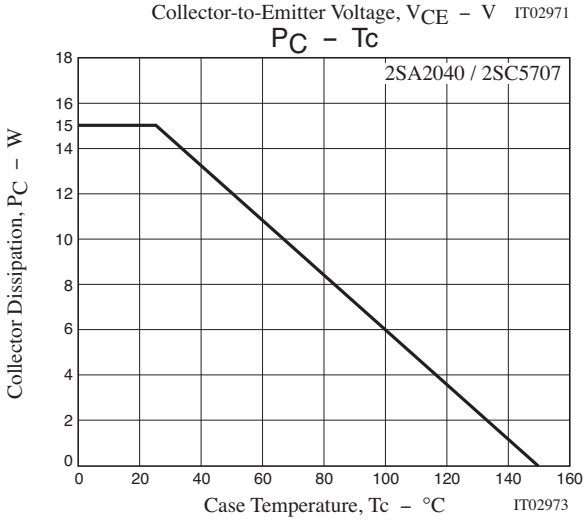

Cob – VCB
2SC5707
f=1MHz
Output Capacitance, Cob – pF
Collector-to-Base Voltage, VCB – V
IT00219


fT – IC
2SA2040
VCE= –10V
Gain-Bandwidth Product, fT – MHz
Collector Current, IC – A
IT00220


fT – IC
2SC5707
VCE=10V
Gain-Bandwidth Product, fT – MHz
Collector Current, IC – A
IT00221


A S O
ICP=11A
IC=8A
100ms
10ms
1ms
500µs
100µs
DC Operation (Tc=25°C)
DC Operation (Ta=25°C)
2SA2040 / 2SC5707
Tc=25°C
Single pulse
For PNP, the minus sign(–)is omitted
Collector Current, IC – A
Collector-to-Emitter Voltage, VCE – V
IT02971


PC – Ta
2SA2040 / 2SC5707
No heat sink
Collector Dissipation, PC – W
Ambient Temperature, Ta – °C
IT02972


PC – Tc
2SA2040 / 2SC5707
Collector Dissipation, PC – W
Case Temperature, Tc – °C
IT02973

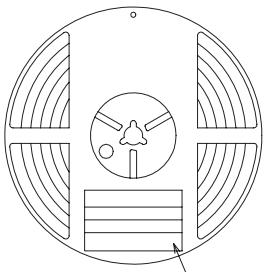
Taping Specification

2SA2040-TL-E, 2SC5707-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

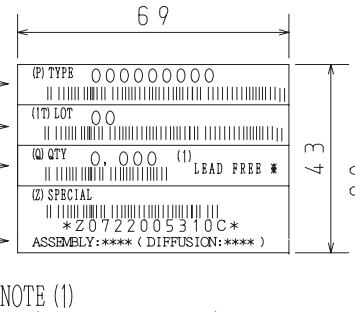
Packing method



Reel label

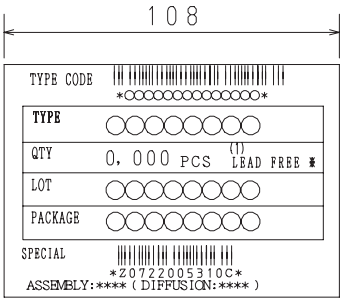
Reel label, Inner box label

(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.

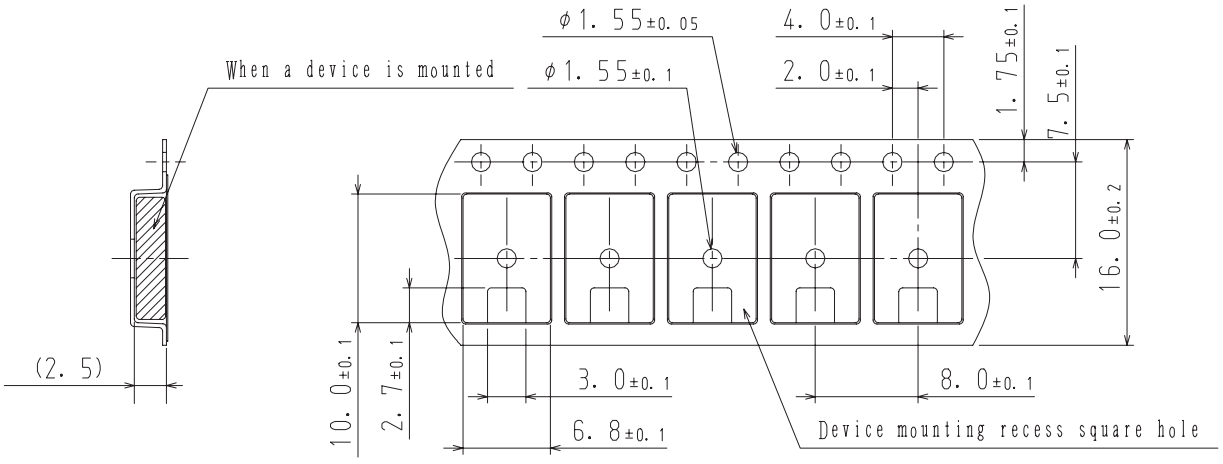


NOTE (1)
The LEAD FREE ※ description shows that the surface treatment of the terminal is lead free.

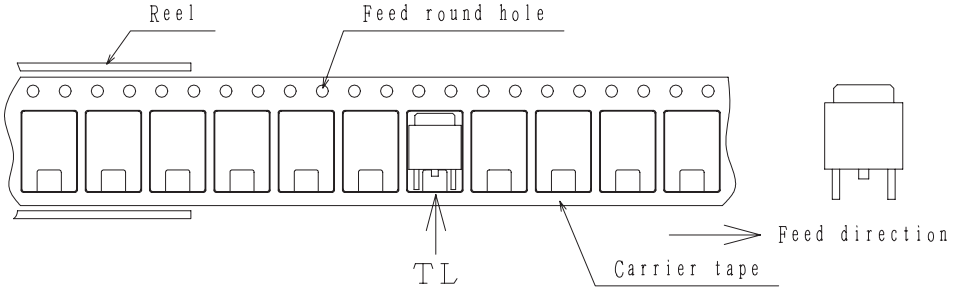
Label	JEITA Phase
LEAD FREE 3	JEITA Phase 3A
LEAD FREE 4	JEITA Phase 3

Taping configuration

1. Carrier tape size (unit:mm)



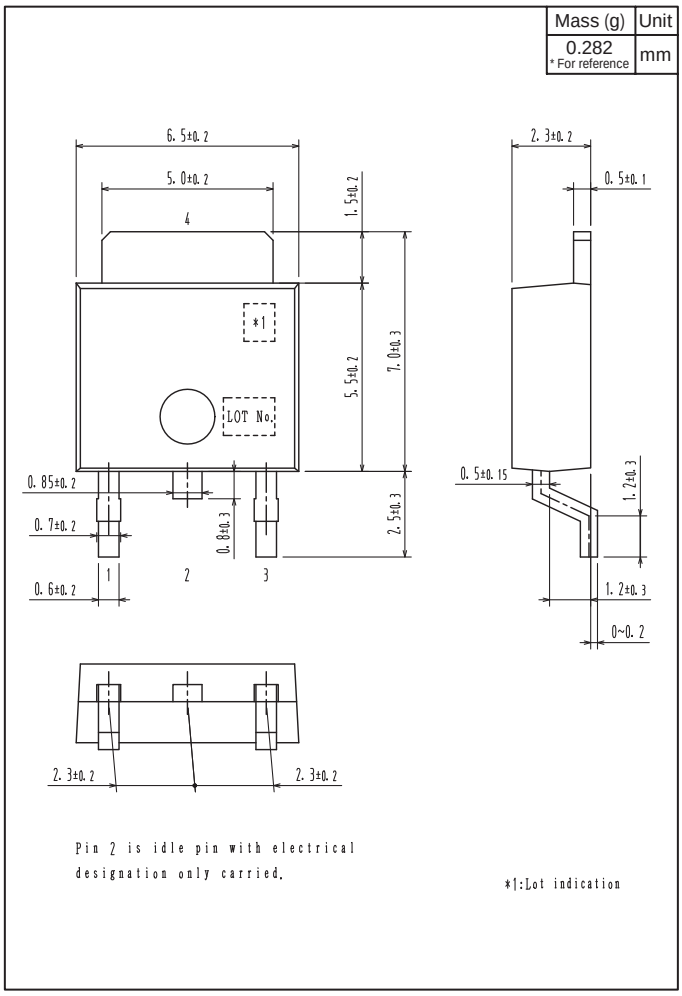
2. Device placement direction



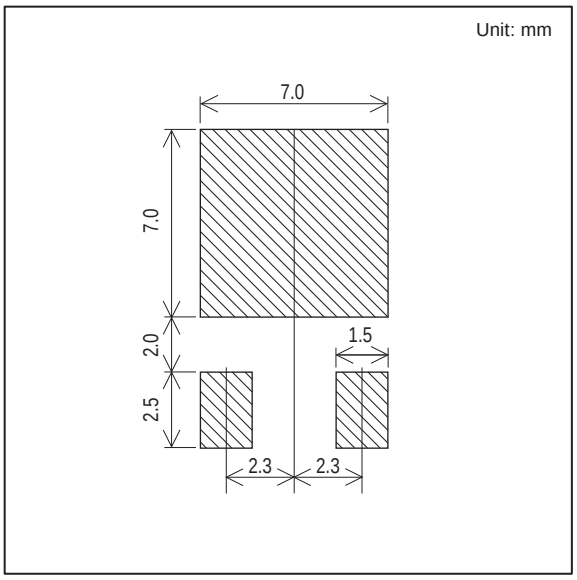
Those with one electrode terminal on the feed hole side·····TL

Outline Drawing

2SA2040-TL-E, 2SC5707-TL-E



Land Pattern Example



Bag Packing Specification

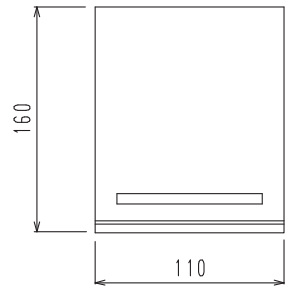
2SA2040-E, 2SC5707-E

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

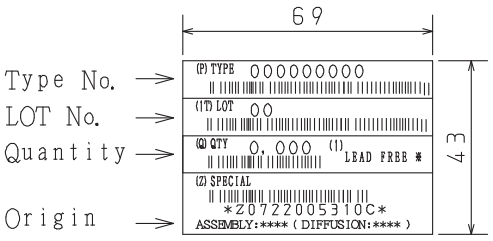
2. Bag dimensions

(unit: mm)



3. Bag label, Inner box label

(unit: mm)



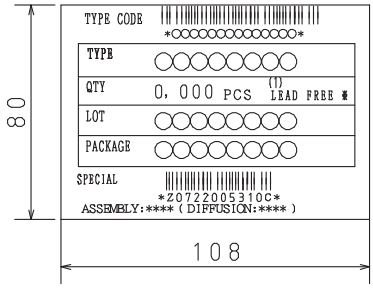
NOTE (1)
The LEAD FREE ※ description shows that the surface treatment of the terminal is lead free.

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

4. Outer box label

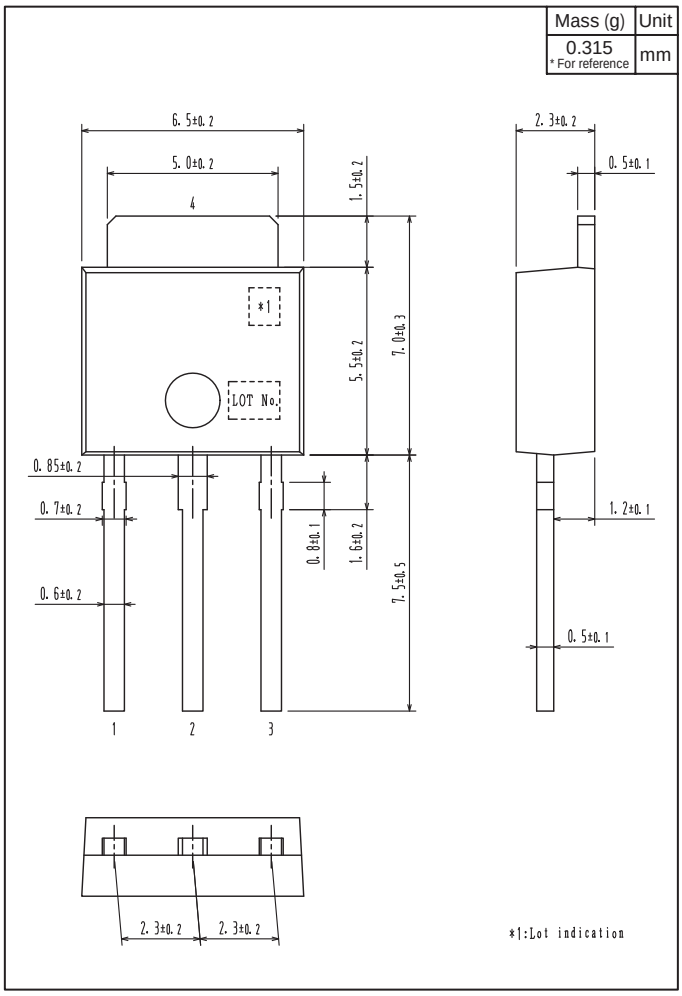
(unit: mm)

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



Outline Drawing

2SA2040-E, 2SC5707-E



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