Ordering number:ENN2479B

PNP/NPN Epitaxial Planar Silicon Transistors

2SA1607/2SC4168

High-Speed Switching Applications

Features

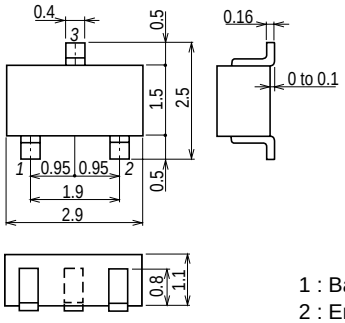
- Fast switching speed.
- High gain-bandwidth product.
- Low saturation voltage.

Package Dimensions

unit:mm

2018B

[2SA1607/2SC4168]



1 : Base
2 : Emitter
3 : Collector
SANYO : CP

( ) : 2SA1607

Specifications

Absolute Maximum Ratings at Ta = 25˚C

Parameter	Symbol	Conditions	Ratings	Unit
Collector-to-Base Voltage	V_{CBO}		(–)40	V
Collector-to-Emitter Voltage	V_{CEO}		(–)20	V
Emitter-to-Base Voltage	V_{EBO}		(–)5	V
Collector Current	I_C		(–)150	mA
Collector Current (Pulse)	I_{CP}		(–)300	mA
Base Current	I_B		(–)30	mA
Collector Dissipation	P_C		200	mW
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}=(–)30V, I_E=0			(–)0.1	μA
Emitter Cutoff Current	I_{EBO}	V_{EB}=(–)4V, I_C=0			(–)0.1	μA
DC Current Gain	h_{FE}	V_{CE}=(–)1V, I_C=(–)10mA	60*		270*	
					(180)	
Gain-Bandwidth Product	f_T	V_{CE}=(–)10V, I_C=(–)10mA		700		MHz
				(400)		MHz

Continued on next page.

SANYO Electric Co.,Ltd. Semiconductor Company
TOKYO OFFICE Tokyo Bldg., 1-10, 1 Chome, Ueno, Taito-ku, TOKYO, 110-8534 JAPAN

Continued from preceding page.

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Output Capacitance	C_{ob}	V_{CB}=(–)10V, f=1MHz		(2.9)		pF
				2.6		pF
Collector-to-Emitter Saturation Voltage	$V_{CE(sat)}$	I_C=(–)10mA, I_B=(–)1mA		0.08	(–)0.2	V
				(–0.07)		V
Base-to-Emitter Saturation Voltage	$V_{BE(sat)}$	I_C=(–)10mA, I_B=(–)1mA		0.72	(–)1.0	V
				(–0.75)		V
Collector-to-Base Breakdown Voltage	$V_{(BR)CBO}$	I_C=(–)10μA, I_E=0	(–)40			V
Collector-to-Emitter Breakdown Voltage	$V_{(BR)CEO}$	I_C=(–)1mA, R_{BE}=∞	(–)20			V
Emitter-to-Base Breakdown Votage	$V_{(BR)EBO}$	I_E=(–)10μA, I_C=0	(–)5			V
Delay Time	t_d	See specified Test Circuit		(14)11	20	ns
Rise Time	t_r	See specified Test Circuit		(11)10	20	ns
Storage Time	t_{stg}	See specified Test Circuit		(80)70	180	ns
Fall Time	t_f	See specified Test Circuit		(16)15	25	ns

* : The 2SA1607/2SC4168 are classified by 10mA h_{FE} as follows :

2SA1607

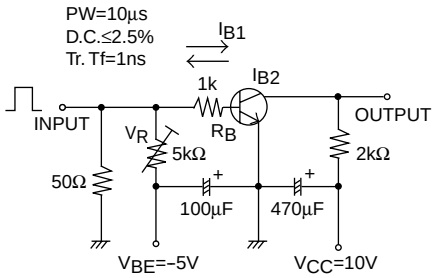
Rank	3	4
h_{FE}	60 to 120	90 to 180

2SC4168

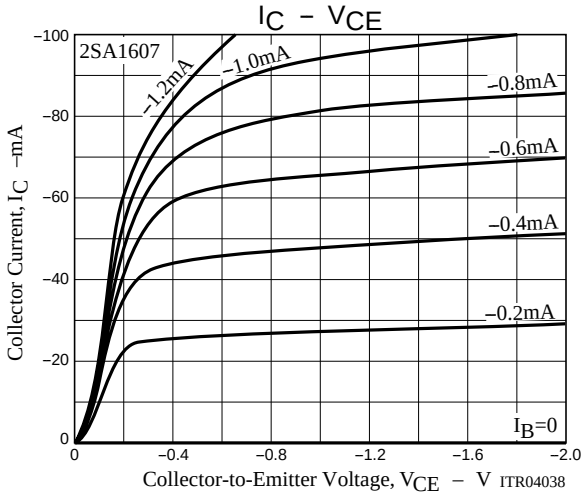
Rank	3	4	5
h_{FE}	60 to 120	90 to 180	135 to 270

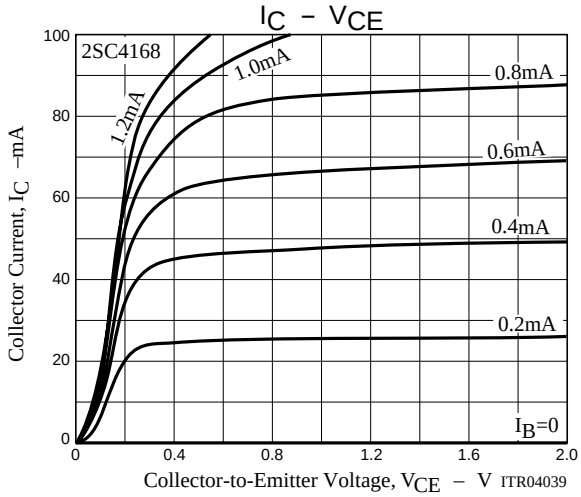
Marking 2SA1607 : YL
2SC4168 : GT
h_{FE} rank 2SA1607 : 3, 4
2SC4168 : 3, 4, 5

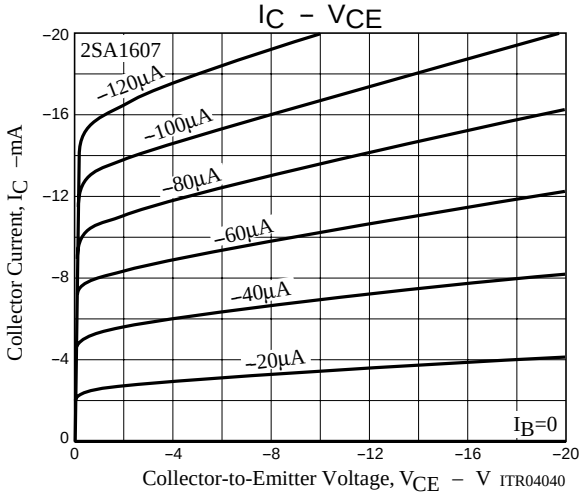
Switching Time Test Circuit

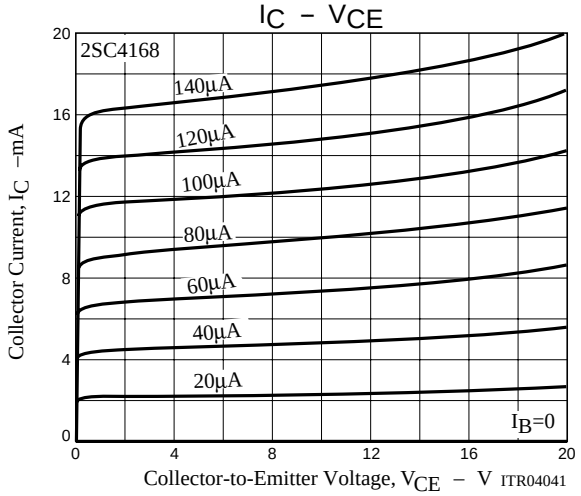


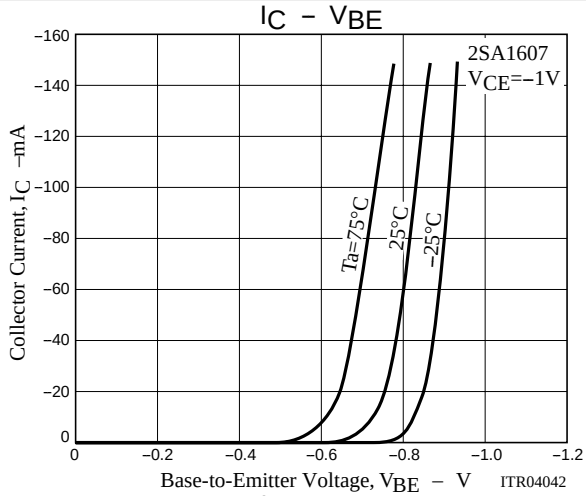
$5I_{B1}$= –$5I_{B2}$= I_C=50mA
For PNP, the polarity is reversed.

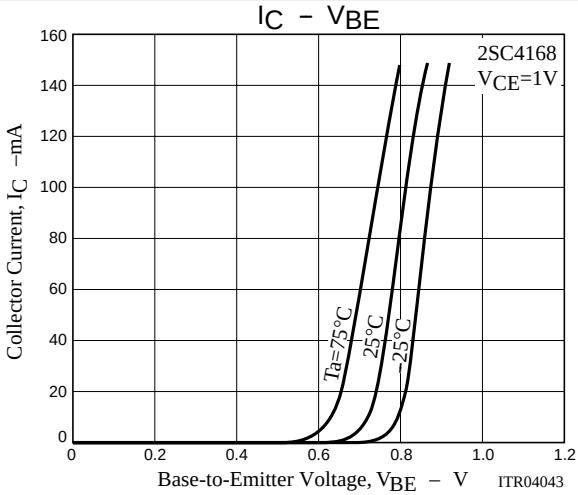


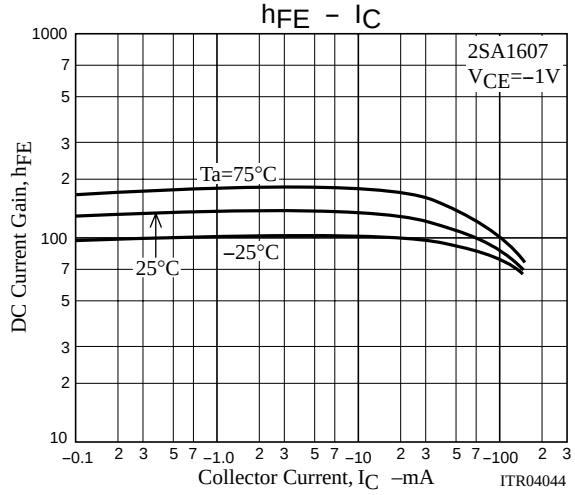


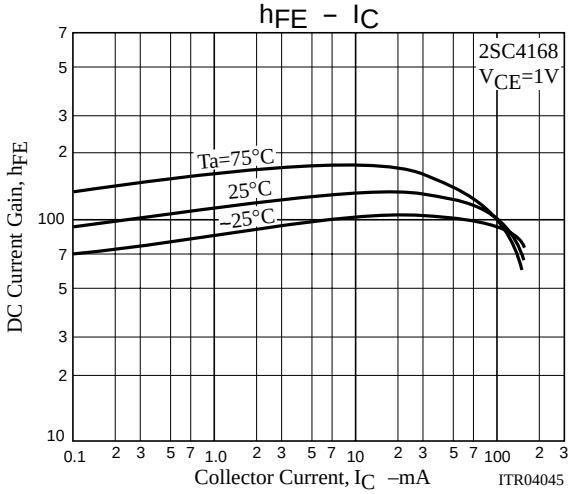


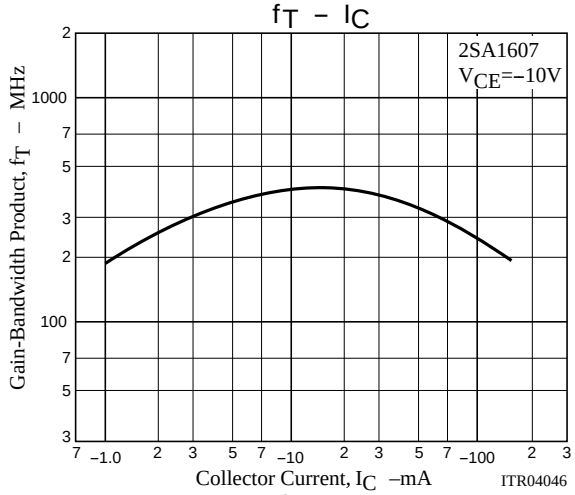


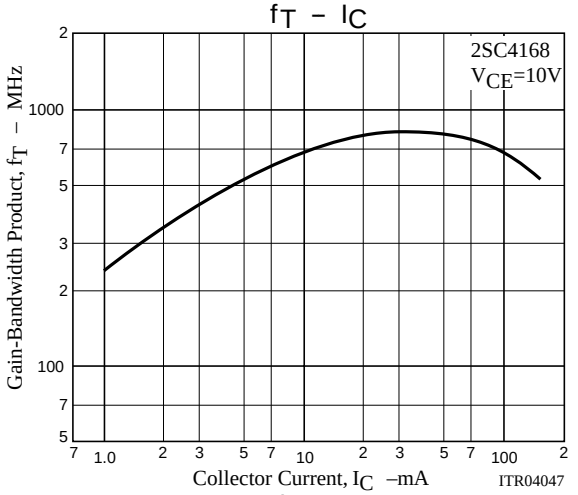

IC – VBE
2SA1607
VCE=–1V
Ta=75°C
25°C
–25°C
Collector Current, IC –mA
Base-to-Emitter Voltage, VBE – V
ITR04042

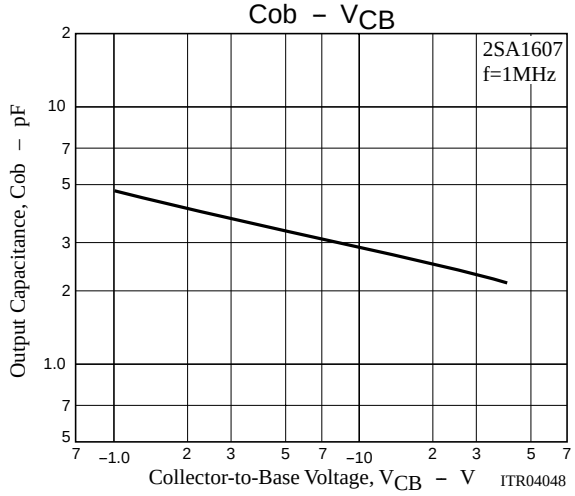

IC – VBE
2SC4168
VCE=1V
Ta=75°C
25°C
–25°C
Collector Current, IC –mA
Base-to-Emitter Voltage, VBE – V
ITR04043

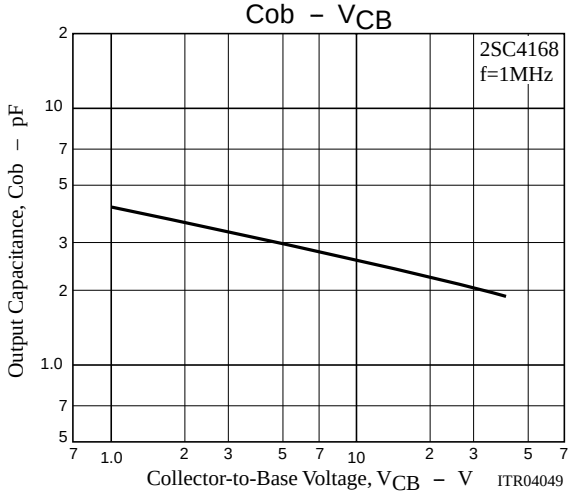

hFE – IC
2SA1607
VCE=–1V
Ta=75°C
25°C
–25°C
DC Current Gain, hFE
Collector Current, IC –mA
ITR04044

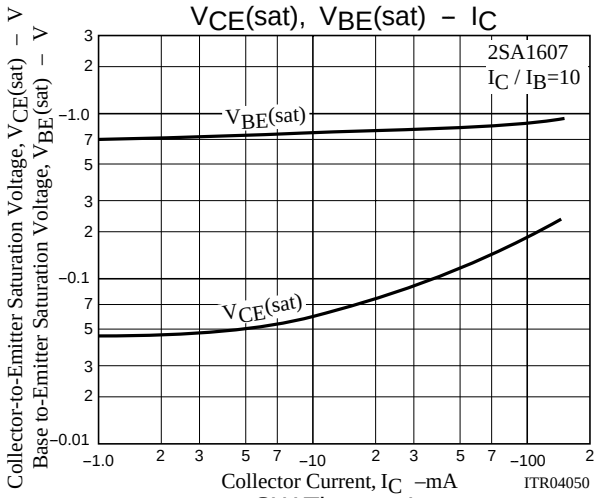

hFE – IC
2SC4168
VCE=1V
Ta=75°C
25°C
–25°C
DC Current Gain, hFE
Collector Current, IC –mA
ITR04045

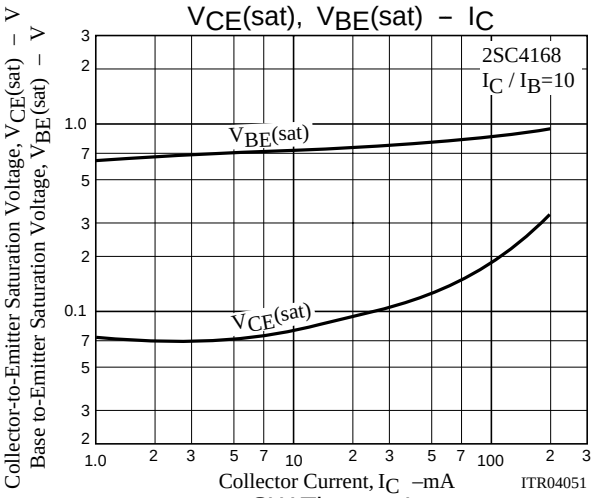

fT – IC
2SA1607
VCE=–10V
Gain-Bandwidth Product, fT – MHz
Collector Current, IC –mA
ITR04046

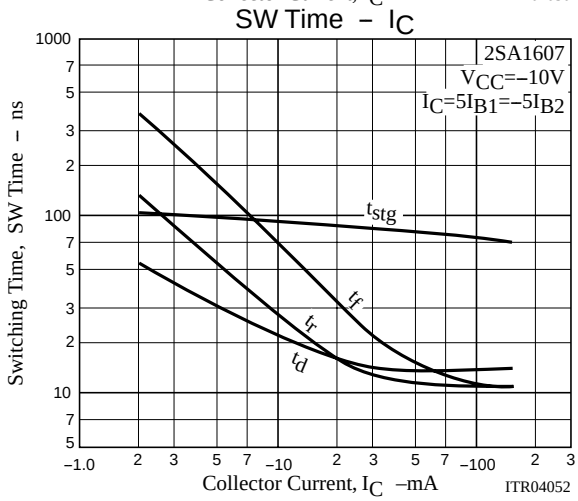

fT – IC
2SC4168
VCE=10V
Gain-Bandwidth Product, fT – MHz
Collector Current, IC –mA
ITR04047

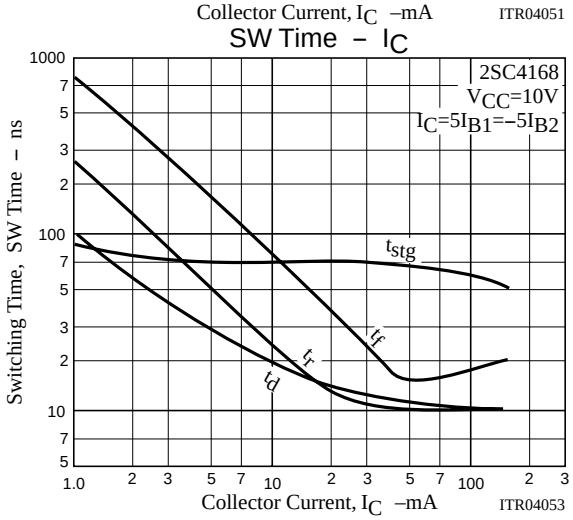

Cob – VCB
2SA1607
f=1MHz
Output Capacitance, Cob – pF
Collector-to-Base Voltage, VCB – V
ITR04048

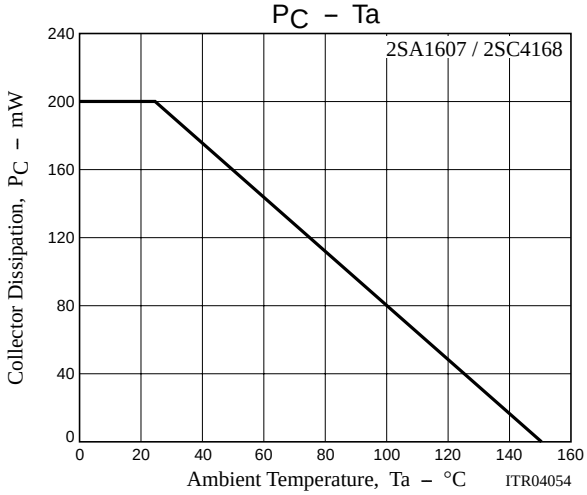

Cob – VCB
2SC4168
f=1MHz
Output Capacitance, Cob – pF
Collector-to-Base Voltage, VCB – V
ITR04049


VCE(sat), VBE(sat) – IC
2SA1607
IC / IB=10
VBE(sat)
VCE(sat)
Collector-to-Emitter Saturation Voltage, VCE(sat) – V
Base to-Emitter Saturation Voltage, VBE(sat) – V
Collector Current, IC –mA
ITR04050


VCE(sat), VBE(sat) – IC
2SC4168
IC / IB=10
VBE(sat)
VCE(sat)
Collector-to-Emitter Saturation Voltage, VCE(sat) – V
Base to-Emitter Saturation Voltage, VBE(sat) – V
Collector Current, IC –mA
ITR04051


SW Time – IC
2SA1607
VCC=–10V
IC=5IB1=–5IB2
tstg
tf
tr
td
Switching Time, SW Time – ns
Collector Current, IC –mA
ITR04052


SW Time – IC
2SC4168
VCC=10V
IC=5IB1=–5IB2
tstg
tf
tr
td
Switching Time, SW Time – ns
Collector Current, IC –mA
ITR04053


PC – Ta
2SA1607 / 2SC4168
Collector Dissipation, PC – mW
Ambient Temperature, Ta – °C
ITR04054