Ordering number : EN2060B

SANYO Semiconductors

DATA SHEET

PNP / NPN Epitaxial Planar Silicon Transistors

2SB1142 / 2SD1682 — 50V / 2.5A High-Speed Switching Applications

Applications

- Power supplies, relay drivers, lamp drivers.

Features

- Adoption of FBET and MBIT processes.
- Low saturation voltage.
- Large current capacity and wide ASO.

Specifications ( ) : 2SB1142

Absolute Maximum Ratings at Ta=25°C

Parameter	Symbol	Conditions	Ratings	Unit
Collector-to-Base Voltage	V_{CBO}		(-)60	V
Collector-to-Emitter Voltage	V_{CEO}		(-)50	V
Emitter-to-Base Voltage	V_{EBO}		(-)6	V
Collector Current	I_C		(-)2.5	A
Collector Current (Pulse)	I_{CP}		(-)5.0	A
Collector Dissipation	P_C		1.5	W
		Tc=25°C	10	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}=(-)50V, I_E=0A			(-)100	nA
Emitter Cutoff Current	I_{EBO}	V_{EB}=(-)4V, I_C=0A			(-)100	nA
DC Current Gain	$h_{FE}1$	V_{CE}=(-)2V, I_C=(-)100mA	(100)*		(400)*	
			100*		560*	
	$h_{FE}2$	V_{CE}=(-)2V, I_C=(-)2A	35			

Continued on next page.

* : The 2SB1142 / 2SD1682 are classified by 100mA h_{FE} as follows :

	Rank	R	S	T	U
2SB1142	h_{FE}	100 to 200	140 to 280	200 to 400	
2SD1682	h_{FE}	100 to 200	140 to 280	200 to 400	280 to 560

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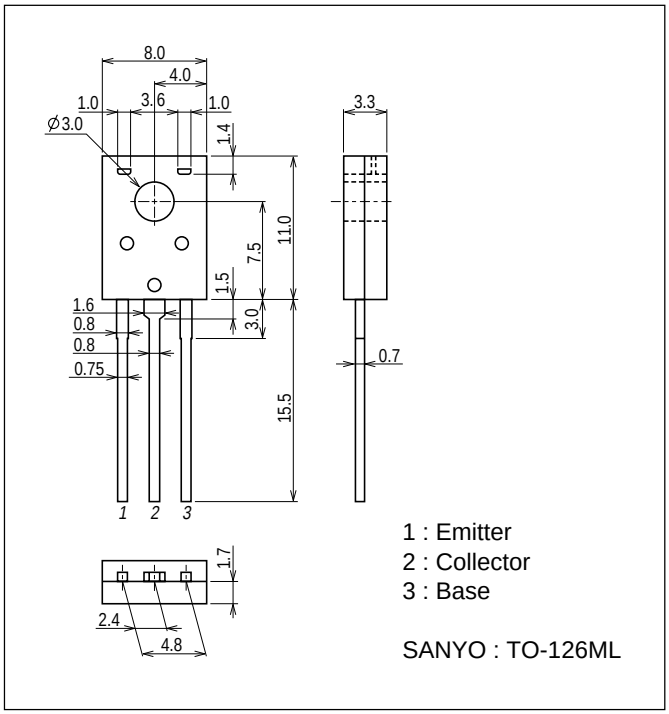
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Gain-Bandwidth Product	f_T	V_{CE}=(-)10V, I_C=(-)50mA		140		MHz
Output Capacitance	Cob	V_{CB}=(-)10V, f=1MHz		(25)16		pF
Collector-to-Emitter Saturation Voltage	V_{CE}(sat)	I_C=(-)1A, I_B=(-)50mA		(-250)110	(-500)300	mV
Base-to-Emitterr Saturation Voltage	V_{BE}(sat)	I_C=(-)1A, I_B=(-)50mA		(-)0.85	(-)1.2	V
Collector-to-Base Breakdown Voltage	$V_{(BR)CBO}$	I_C=(-)10μA, I_E=0A	(-)60			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.		(35)35		ns
Storage Time	t_{stg}	See specified Test Circuit.		(350)550		ns
Fall Time	t_f	See specified Test Circuit.		(30)30		ns

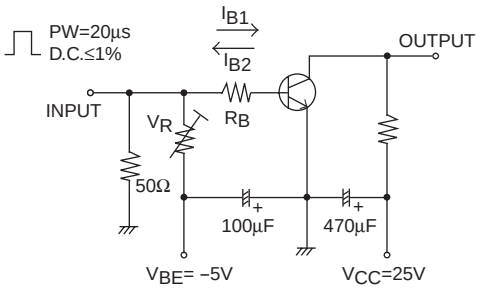
Package Dimensions

unit : mm (typ)

7516-002

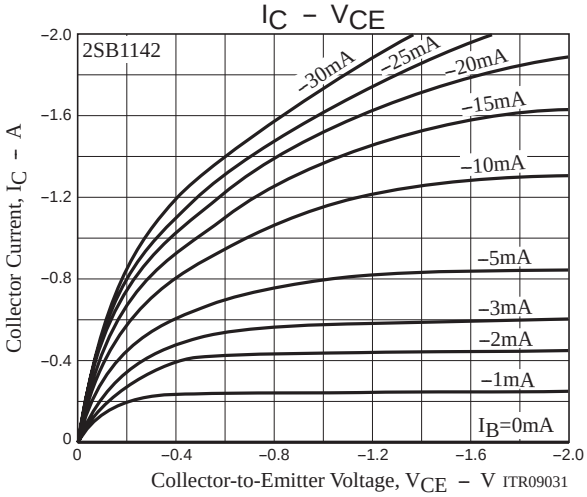


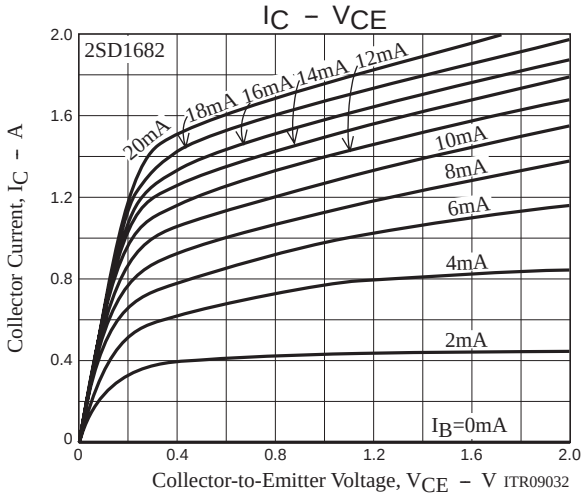
Switching Time Test Circuit

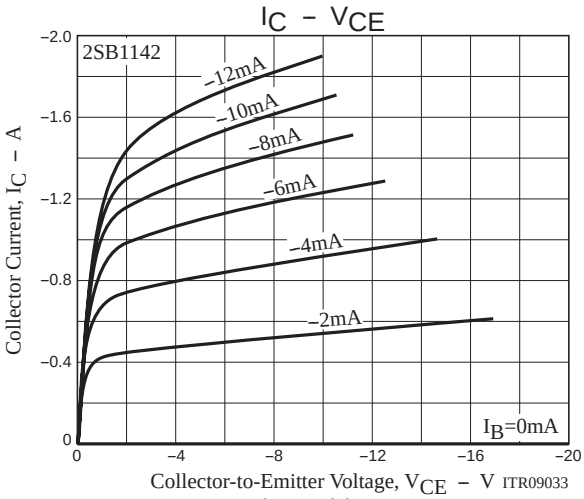


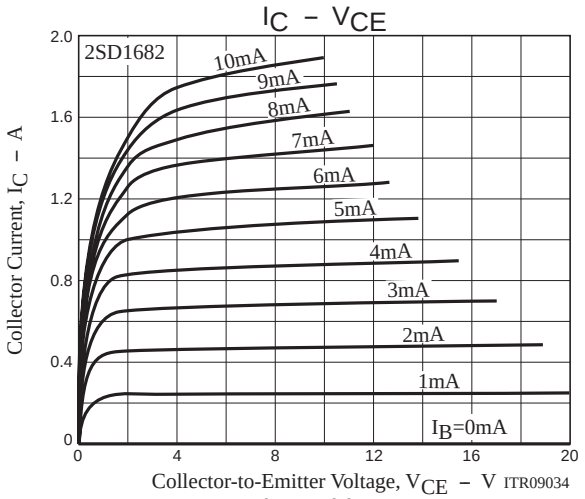
I_C=10I_{B1}= −10I_{B2}=1A

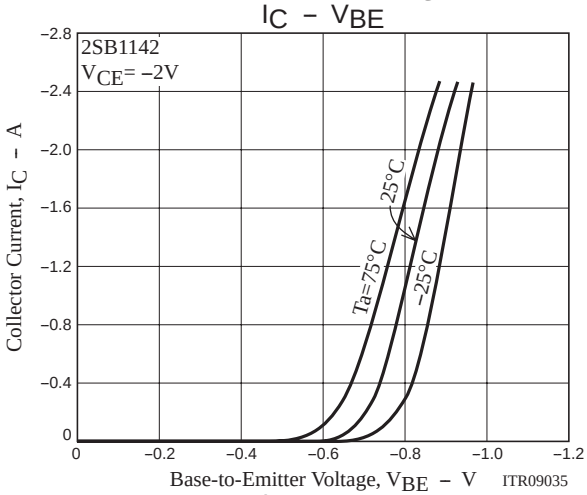
For PNP, the polarity is reversed.

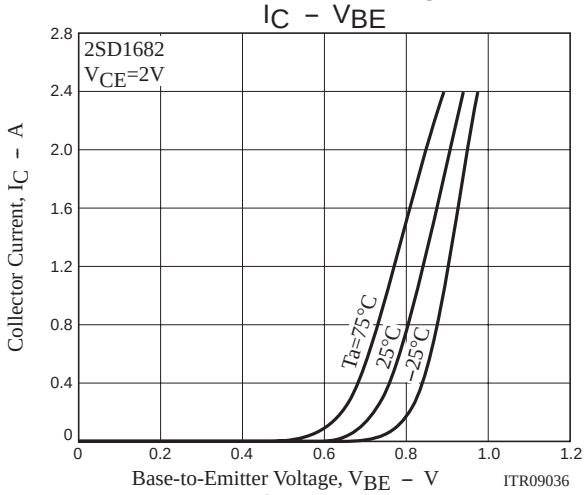


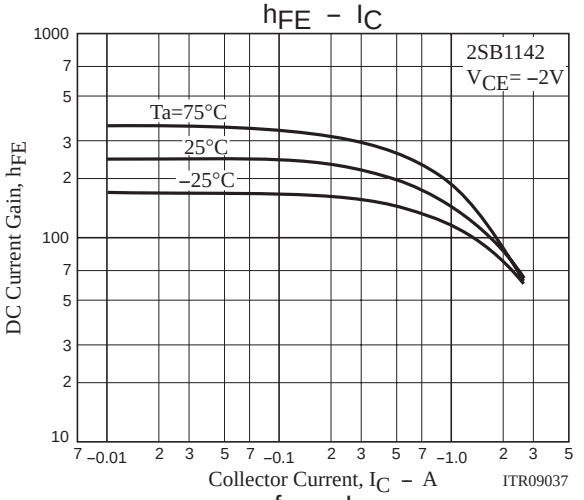


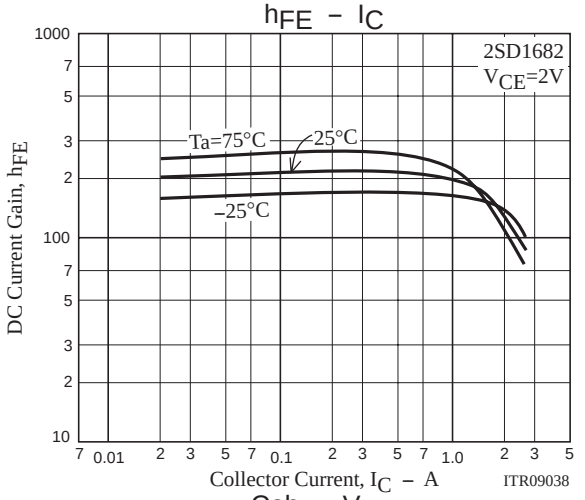

IC – VCE
2SB1142
–12mA
–10mA
–8mA
–6mA
–4mA
–2mA
IB=0mA
Collector Current, IC – A
Collector-to-Emitter Voltage, VCE – V
ITR09033

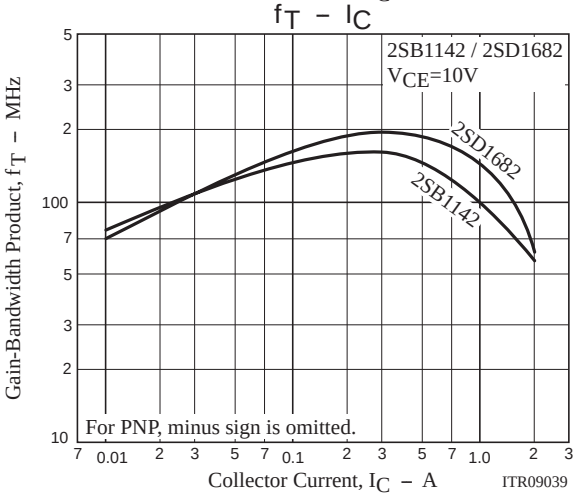

IC – VCE
2SD1682
10mA
9mA
8mA
7mA
6mA
5mA
4mA
3mA
2mA
1mA
IB=0mA
Collector Current, IC – A
Collector-to-Emitter Voltage, VCE – V
ITR09034

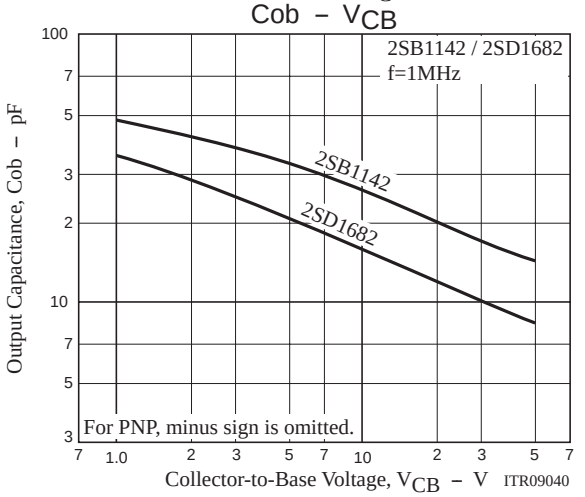

IC – VBE
2SB1142
VCE= –2V
25°C
Ta=75°C
–25°C
Collector Current, IC – A
Base-to-Emitter Voltage, VBE – V
ITR09035

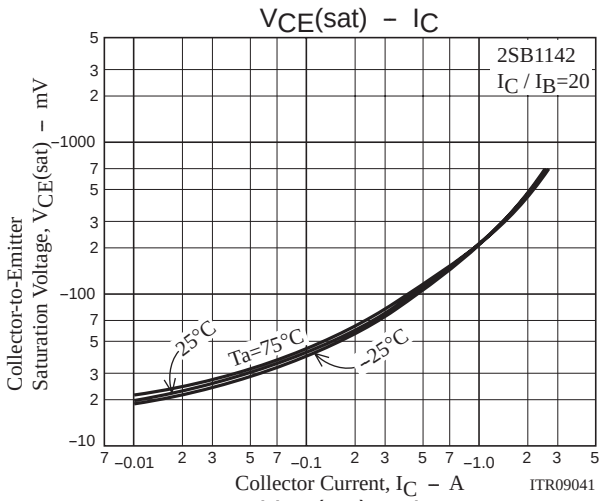

IC – VBE
2SD1682
VCE=2V
Ta=75°C
25°C
–25°C
Collector Current, IC – A
Base-to-Emitter Voltage, VBE – V
ITR09036

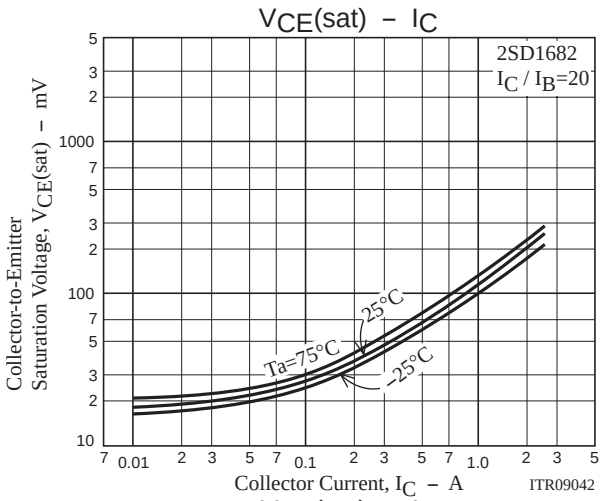

hFE – IC
2SB1142
VCE= –2V
Ta=75°C
25°C
–25°C
DC Current Gain, hFE
Collector Current, IC – A
ITR09037

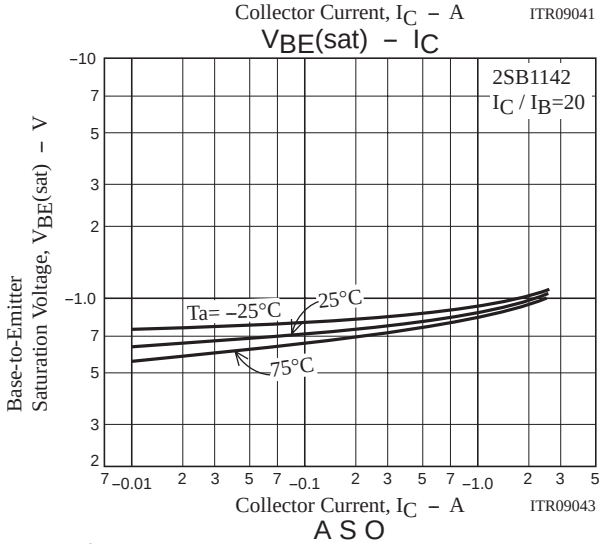

hFE – IC
2SD1682
VCE=2V
Ta=75°C
25°C
–25°C
DC Current Gain, hFE
Collector Current, IC – A
ITR09038

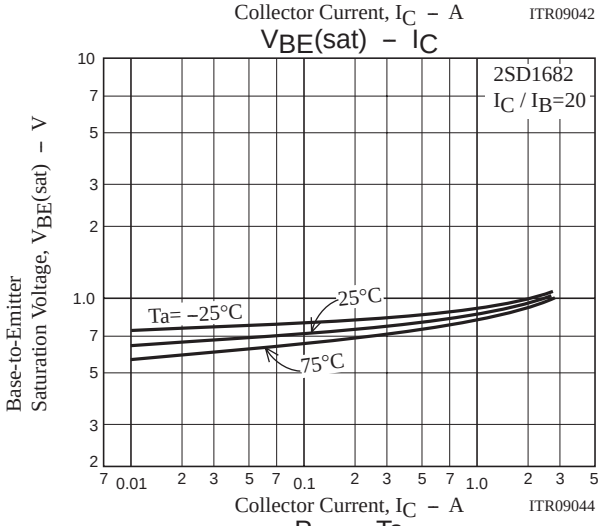

fT – IC
2SB1142 / 2SD1682
VCE=10V
2SD1682
2SB1142
For PNP, minus sign is omitted.
Gain-Bandwidth Product, fT – MHz
Collector Current, IC – A
ITR09039

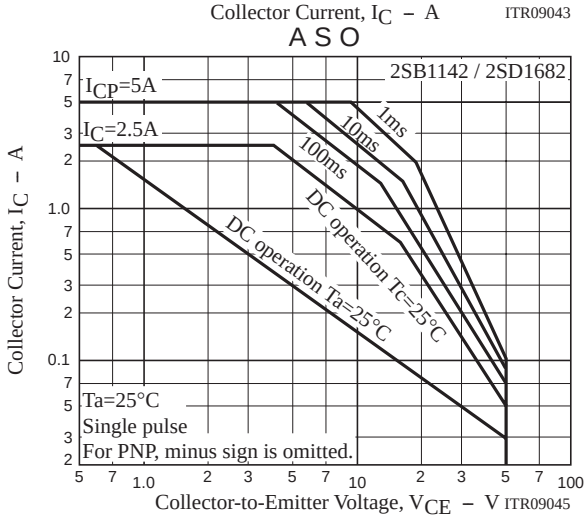

Cob – VCB
2SB1142 / 2SD1682
f=1MHz
2SB1142
2SD1682
For PNP, minus sign is omitted.
Output Capacitance, Cob – pF
Collector-to-Base Voltage, VCB – V
ITR09040

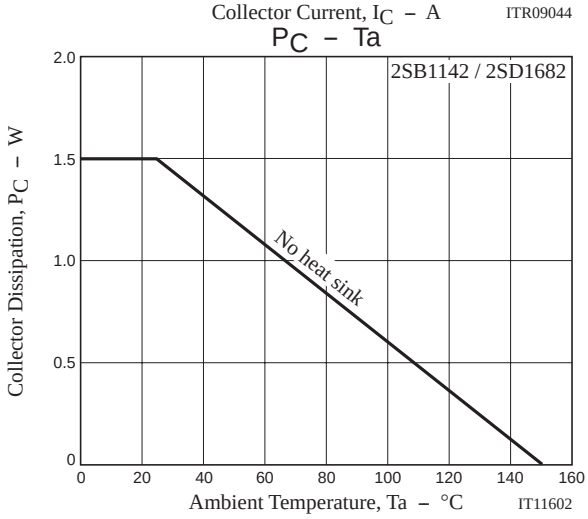

VCE(sat) – IC
2SB1142
IC / IB=20
Collector-to-Emitter Saturation Voltage, VCE(sat) – mV
25°C
Ta=75°C
–25°C
Collector Current, IC – A
ITR09041

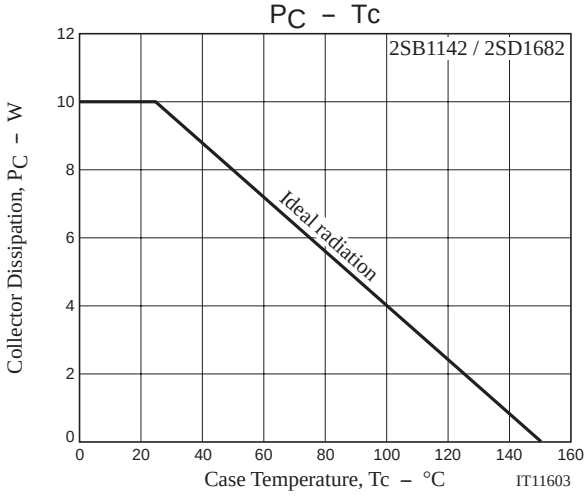

VCE(sat) – IC
2SD1682
IC / IB=20
Collector-to-Emitter Saturation Voltage, VCE(sat) – mV
25°C
Ta=75°C
–25°C
Collector Current, IC – A
ITR09042


VBE(sat) – IC
2SB1142
IC / IB=20
Base-to-Emitter Saturation Voltage, VBE(sat) – V
Ta= –25°C
25°C
75°C
Collector Current, IC – A
ITR09043


VBE(sat) – IC
2SD1682
IC / IB=20
Base-to-Emitter Saturation Voltage, VBE(sat) – V
Ta= –25°C
25°C
75°C
Collector Current, IC – A
ITR09044


A S O
2SB1142 / 2SD1682
ICP=5A
IC=2.5A
1ms
10ms
100ms
DC operation Tc=25°C
DC operation Ta=25°C
Ta=25°C
Single pulse
For PNP, minus sign is omitted.
Collector Current, IC – A
Collector-to-Emitter Voltage, VCE – V
ITR09045


PC – Ta
2SB1142 / 2SD1682
No heat sink
Collector Dissipation, PC – W
Ambient Temperature, Ta – °C
IT11602


PC – Tc
2SB1142 / 2SD1682
Ideal radiation
Collector Dissipation, PC – W
Case Temperature, Tc – °C
IT11603