Ordering number : ENN2041B

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DATA SHEET

PNP/NPN Epitaxial Planar Silicon Transistors

2SB1144/2SD1684 — 100V/1.5A Switching Application

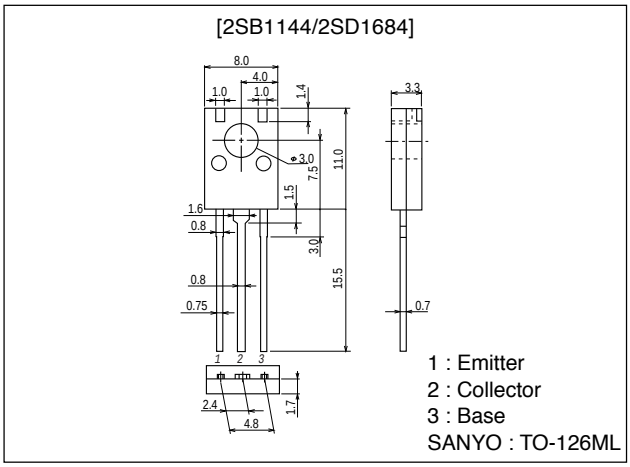
Features

- Adoption of FBET and MBIT processes.
- High breakdown voltage.
- Large current capacity.
- Low saturation voltage.
- Plastic-covered heat sink facilitating high-density mounting.

Package Dimensions

unit:mm

2042B



( ) : 2SB1144

Specifications

Absolute Maximum Ratings at Ta = 25˚C

Parameter	Symbol	Conditions	Ratings	Unit
Collector-to-Base Voltage	V_{CBO}		(–)120	V
Collector-to-Emitter Voltage	V_{CEO}		(–)100	V
Emitter-to-Base Voltage	V_{EBO}		(–)6	V
Collector Current	I_C		(–)1.5	A
Collector Current (Pulse)	I_{CP}		(–)2.0	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}=(–)100V, I_E=0			(–)100	nA
Emitter Cutoff Current	I_{EBO}	V_{EB}=(–)4V, I_C=0			(–)100	nA
DC Current Gain	$h_{FE}1$	V_{CE}=(–)5V, I_C=(–)100mA	100*		400*	
	$h_{FE}2$	V_{CE}=(–)5V, I_C=(–)1A	30			
Gain-Bandwidth Product	f_T	V_{CE}=(–)10V, I_C=(–)50mA		(100)		MHz
				120		MHz

* : The 2SB1144/2SD1684 are classified by 100mA h_{FE} as follows :

Rank	R	S	T
h_{FE}	100 to 200	140 to 280	200 to 400

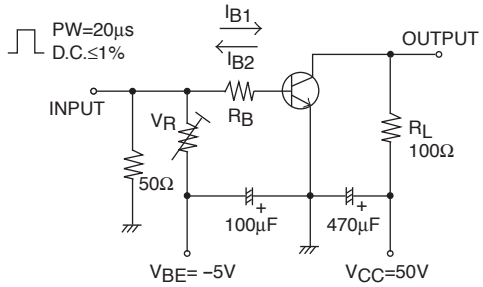
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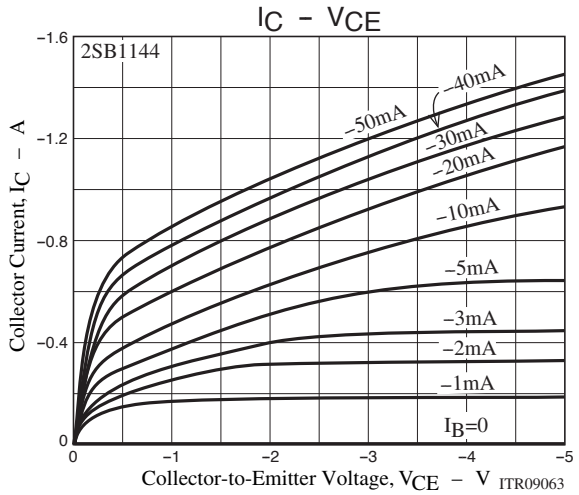
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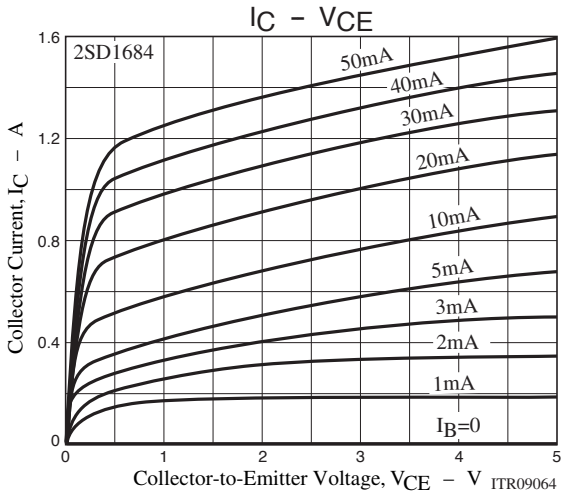
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Output Capacitance	C_{ob}	V_{CB}=(–)10V, f=1MHz		(18)11		pF
Collector-to-Emitter Saturation Voltage	$V_{CE(sat)}$	I_C=(–)500mA, I_B=(–)50mA		(–180)	(–500)	mV
				100	300	mV
Base-to-Emitter Saturation Voltage	$V_{BE(sat)}$	I_C=(–)500mA, I_B=(–)50mA		(–)0.85	(–)1.2	V
Collector-to-Base Breakdown Voltage	$V_{(BR)CBO}$	I_C=(–)10μA, I_E=0	(–)120			V
Collector-to-Emitter Breakdown Voltage	$V_{(BR)CEO}$	I_C=(–)1mA, R_{BE}=∞	(–)100			V
Emitter-to-Base Breakdown Voltage	$V_{(BR)EBO}$	I_E=(–)10μA, I_C=0	(–)6			V
Turn-ON Time	t_{on}	See specified Test Circuit		(80)80		ns
Storage Time	t_{stg}	See specified Test Circuit		1000		ns
				(750)		ns
Fall Time	t_f	See specified Test Circuit		(40)50		ns

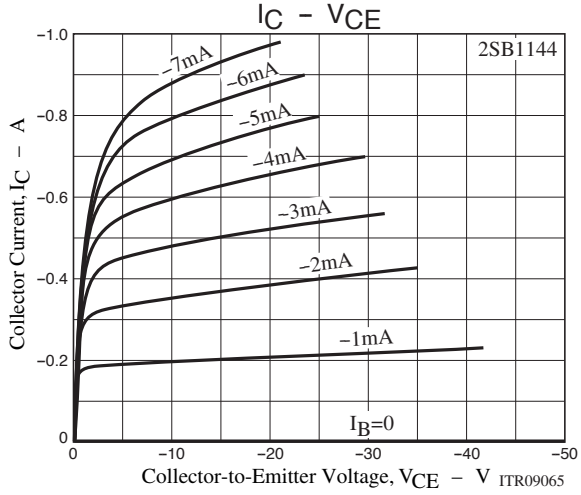
Switching Time Test Circuit

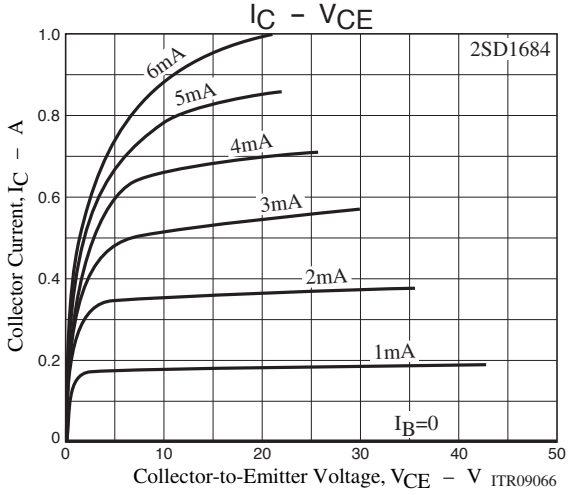


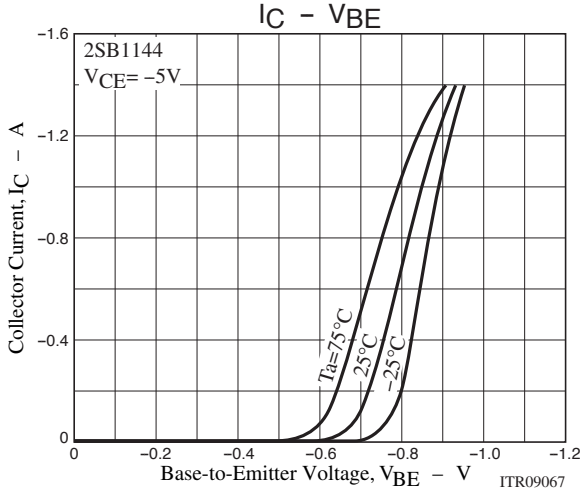
I_C=10I_{B1}= −10I_{B2}=500mA

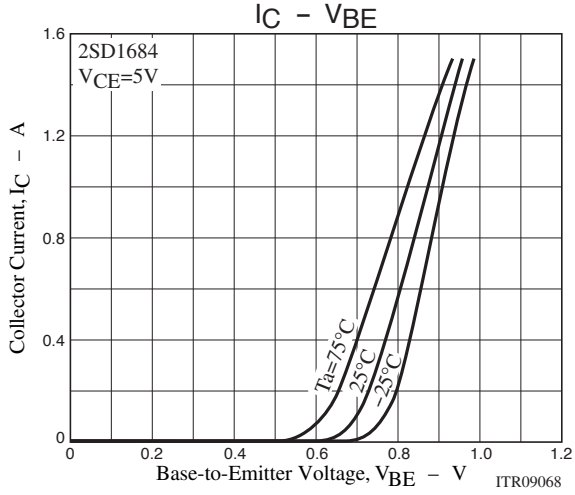


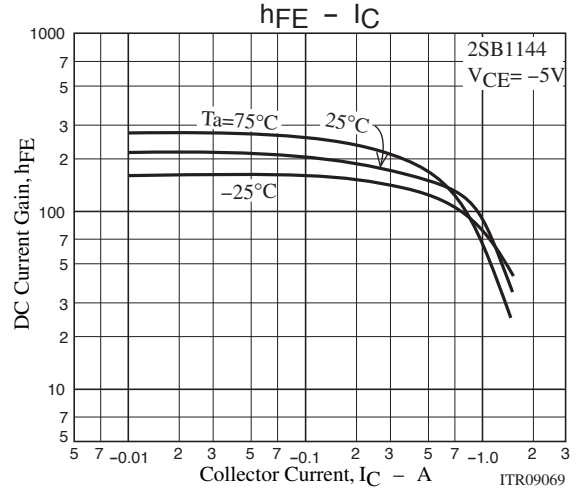


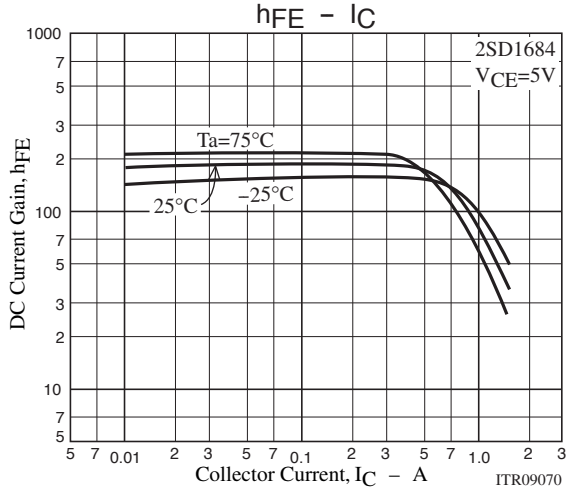


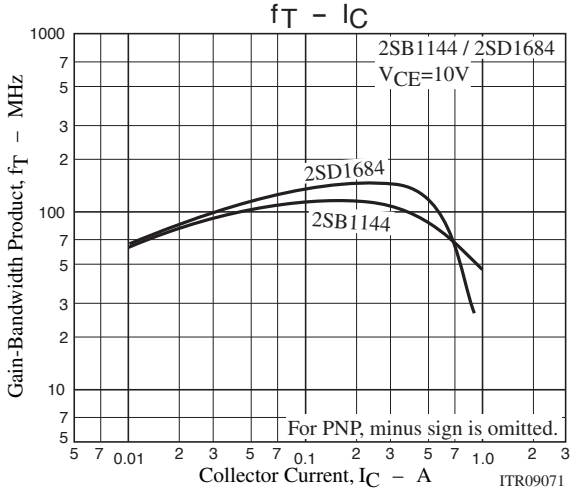


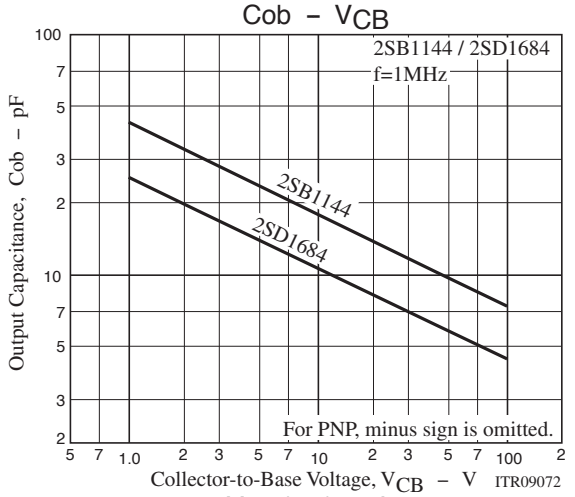

IC – VBE
2SB1144
VCE= –5V
Ta=75°C
25°C
–25°C
Collector Current, IC – A
Base-to-Emitter Voltage, VBE – V
ITR09067

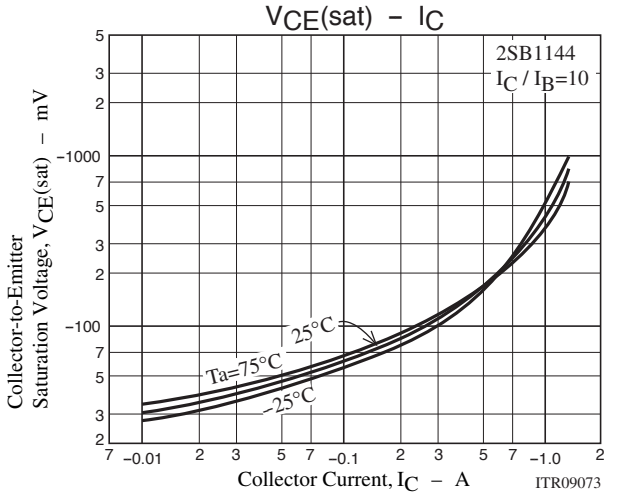

IC – VBE
2SD1684
VCE=5V
Ta=75°C
25°C
–25°C
Collector Current, IC – A
Base-to-Emitter Voltage, VBE – V
ITR09068

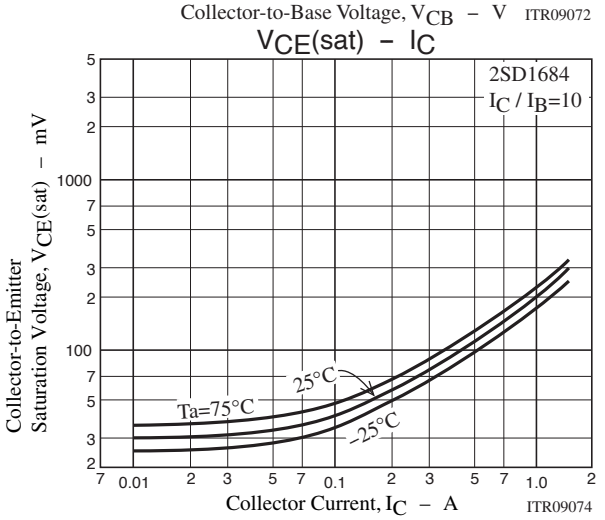

hFE – IC
2SB1144
VCE= –5V
Ta=75°C
25°C
–25°C
DC Current Gain, hFE
Collector Current, IC – A
ITR09069

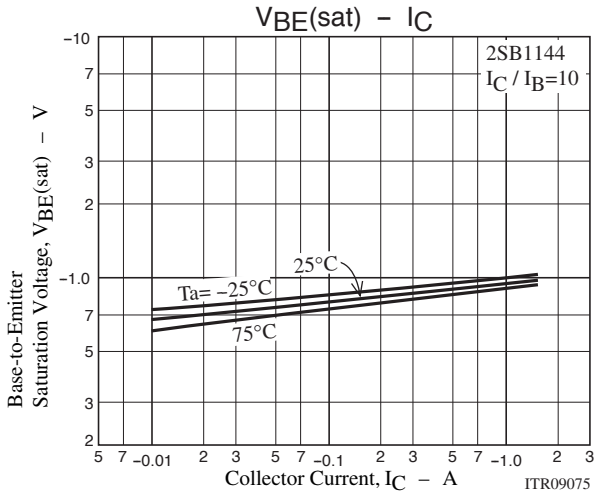

hFE – IC
2SD1684
VCE=5V
Ta=75°C
25°C
–25°C
DC Current Gain, hFE
Collector Current, IC – A
ITR09070

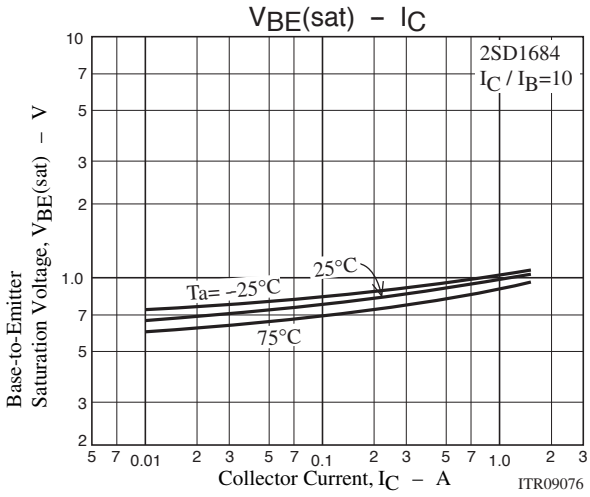

fT – IC
2SB1144 / 2SD1684
VCE=10V
2SD1684
2SB1144
For PNP, minus sign is omitted.
Gain-Bandwidth Product, fT – MHz
Collector Current, IC – A
ITR09071

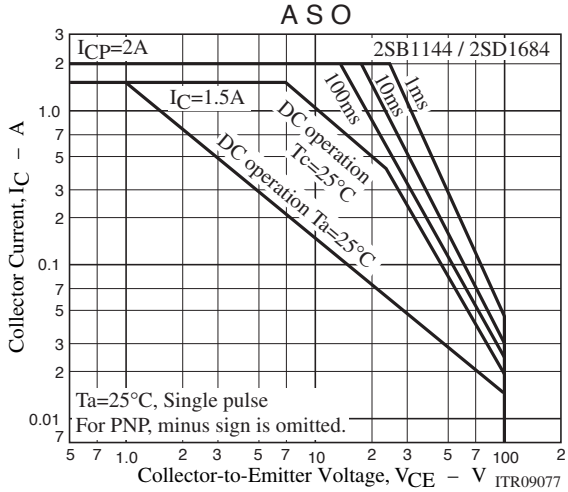

Cob – VCB
2SB1144 / 2SD1684
f=1MHz
2SB1144
2SD1684
For PNP, minus sign is omitted.
Output Capacitance, Cob – pF
Collector-to-Base Voltage, VCB – V
ITR09072

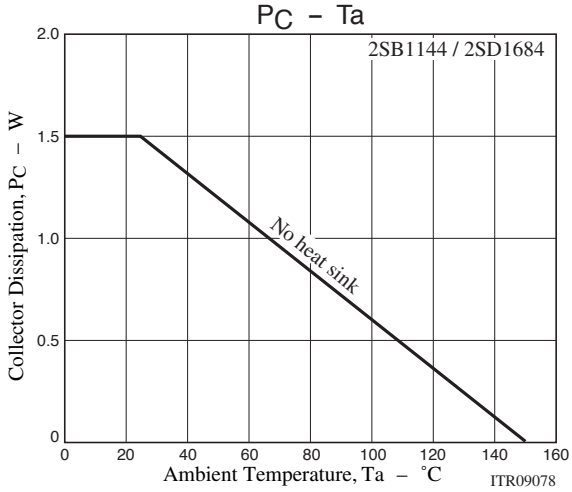

VCE(sat) – IC
2SB1144
IC / IB=10
25°C
Ta=75°C
–25°C
Collector-to-Emitter Saturation Voltage, VCE(sat) – mV
Collector Current, IC – A
ITR09073

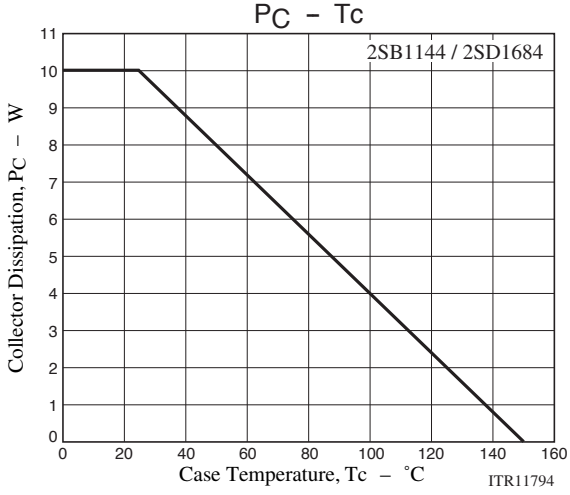

VCE(sat) – IC
2SD1684
IC / IB=10
25°C
Ta=75°C
–25°C
Collector-to-Emitter Saturation Voltage, VCE(sat) – mV
Collector Current, IC – A
ITR09074


VBE(sat) – IC
2SB1144
IC / IB=10
Ta= –25°C
25°C
75°C
Base-to-Emitter Saturation Voltage, VBE(sat) – V
Collector Current, IC – A
ITR09075


VBE(sat) – IC
2SD1684
IC / IB=10
Ta= –25°C
25°C
75°C
Base-to-Emitter Saturation Voltage, VBE(sat) – V
Collector Current, IC – A
ITR09076


A S O
ICP=2A
2SB1144 / 2SD1684
IC=1.5A
100ms
10ms
1ms
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
ITR09077


PC – Ta
2SB1144 / 2SD1684
No heat sink
Collector Dissipation, PC – W
Ambient Temperature, Ta – °C
ITR09078


PC – Tc
2SB1144 / 2SD1684
Collector Dissipation, PC – W
Case Temperature, Tc – °C
ITR11794

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