Ordering number:ENN2048B

PNP/NPN Epitaxial Planar Silicon Transistors

2SB1168/2SD1725

Large Current Switching Applications

An ON Semiconductor Company

Features

· Relay drivers, high-speed inverters, converters.

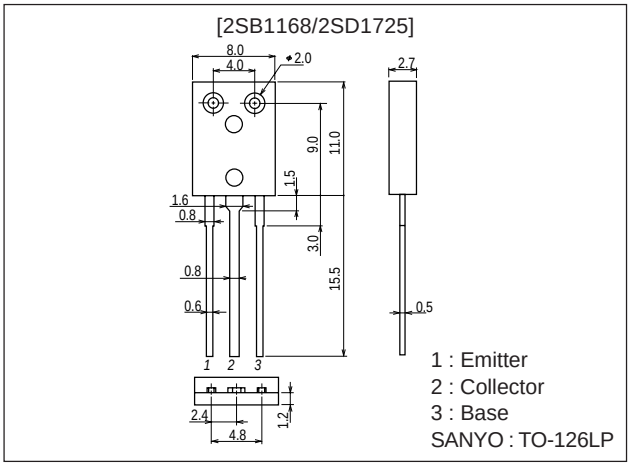
Features

· Low collector-to-emitter saturation voltage.
· High f_T.
· Excellent linearity of h_{FE}.
· Short switching time.

Package Dimensions

unit:mm

2043B



Specifications

( ) : 2SB1168

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		(–)4	A
Collector Current (Pulse)	I_{CP}		(–)8	A
Collector Dissipation	P_C		1.2	W
		Tc=25˚C	20	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			(–)1	μA
Emitter Cutoff Current	I_{EBO}	V_{EB}=(–)4V, I_C=0			(–)1	μA
DC Current Gain	$h_{FE}1$	V_{CE}=(–)5V, I_C=(–)0.5A	70*		400*	
	$h_{FE}2$	V_{CE}=(–)5V, I_C=(–)3A	40			
Gain-Bandwidth Product	f_T	V_{CE}=(–)10V, I_C=(–)0.5A		(130)		MHz
				180		MHz

* : The 2SB1168/2SD1725 are classified by 0.5A h_{FE} as follows :

Continued on next page.

Rank	Q	R	S	T
h_{FE}	70 to 140	100 to 200	140 to 280	200 to 400

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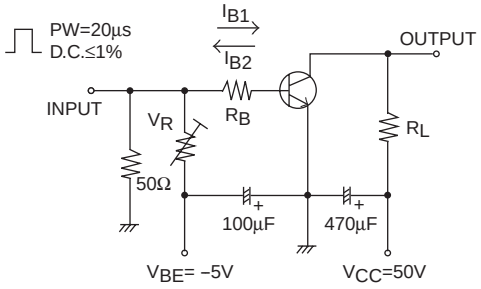
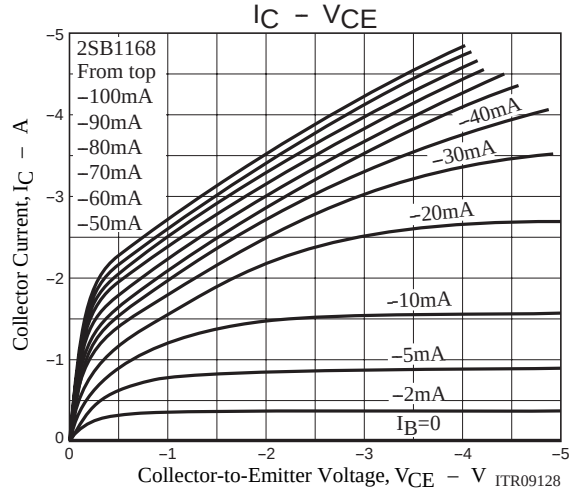
Continued from preceding page.

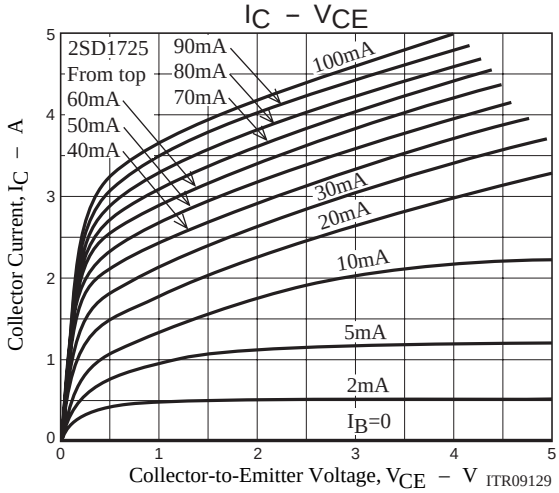
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Output Capacitance	C_{ob}	V_{CB}=(–)10V, f=1MHz		40(65)		pF
Collector-to-Emitter Saturation Voltage	$V_{CE(sat)}$	I_C=(–)2A, I_B=(–)0.2A		(–200)	(–500)	mV
				150	400	mV
Base-to-Emitter Saturation Voltage	$V_{BE(sat)}$	I_C=(–)2A, I_B=(–)0.2A		(–)0.9	(–)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		(100)		ns
				100		ns
Storage Time	t_{stg}			900		ns
				(800)		ns
Fall Time	t_f			50(50)		ns

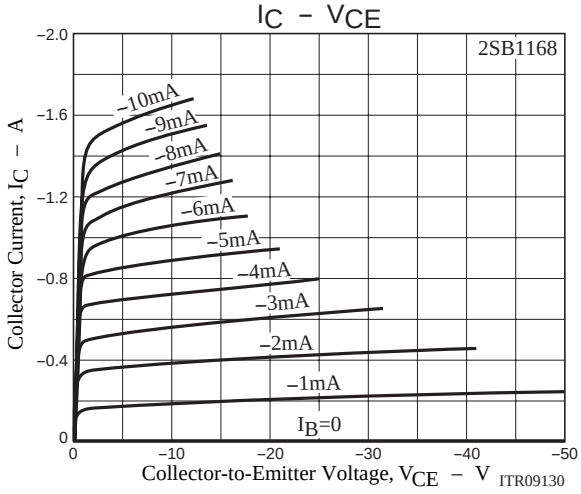
Switching Time Test Circuit

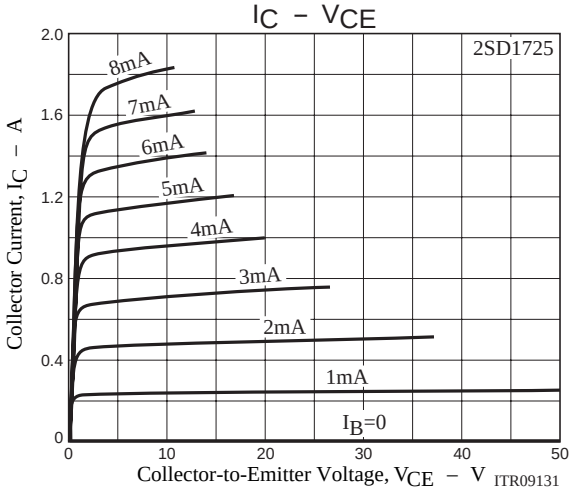


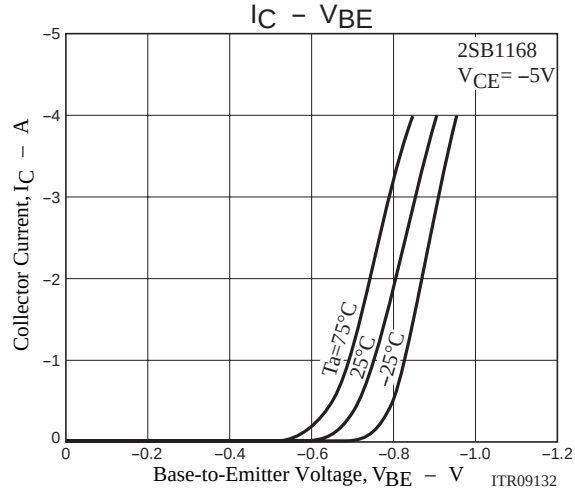
I_C=10I_{B1}= –10I_{B2}=2A
For PNP, the polarity is reversed.

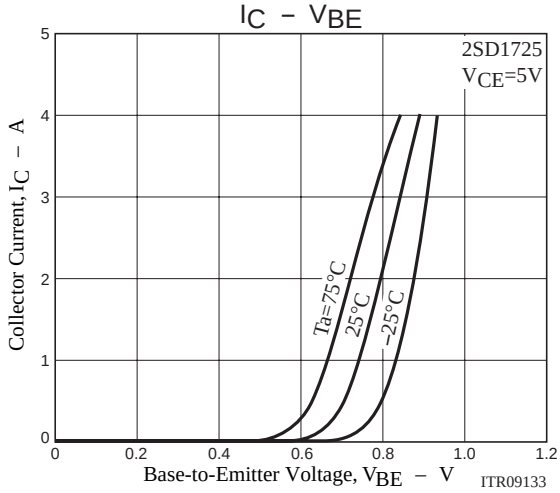


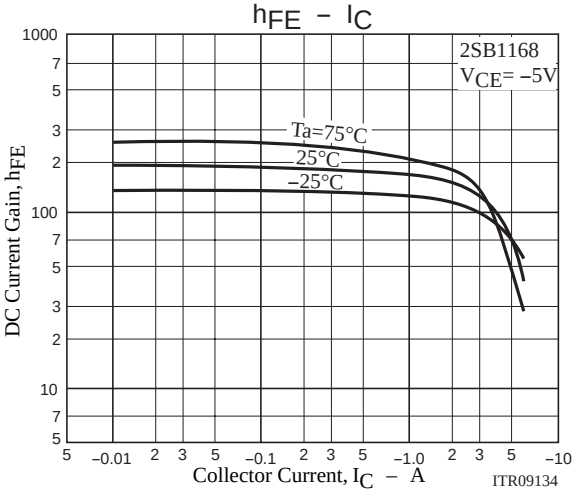


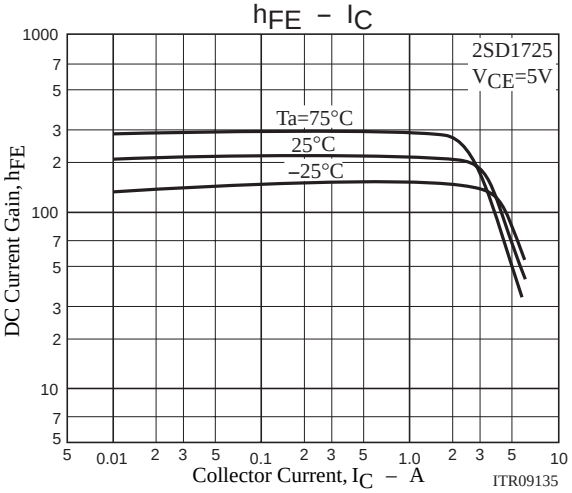


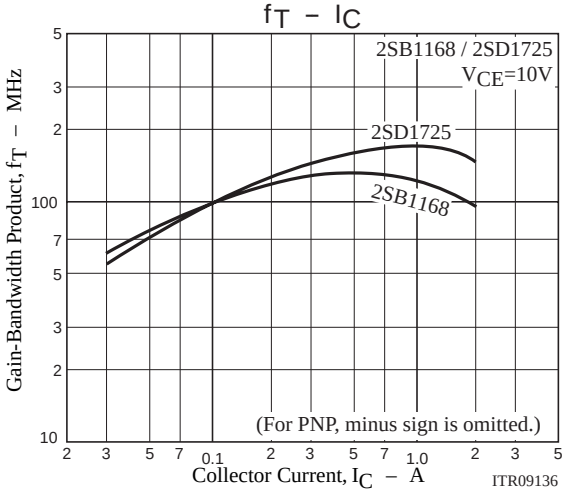


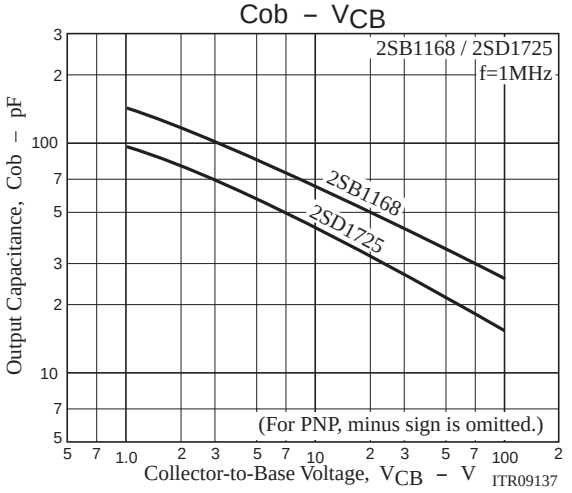

IC – VBE
2SB1168
VCE= –5V
Collector Current, IC – A
Base-to-Emitter Voltage, VBE – V
Ta=75°C
25°C
–25°C
ITR09132

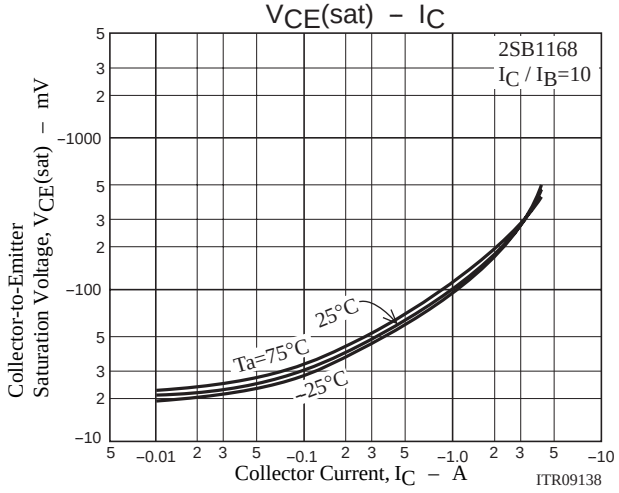

IC – VBE
2SD1725
VCE=5V
Collector Current, IC – A
Base-to-Emitter Voltage, VBE – V
Ta=75°C
25°C
–25°C
ITR09133

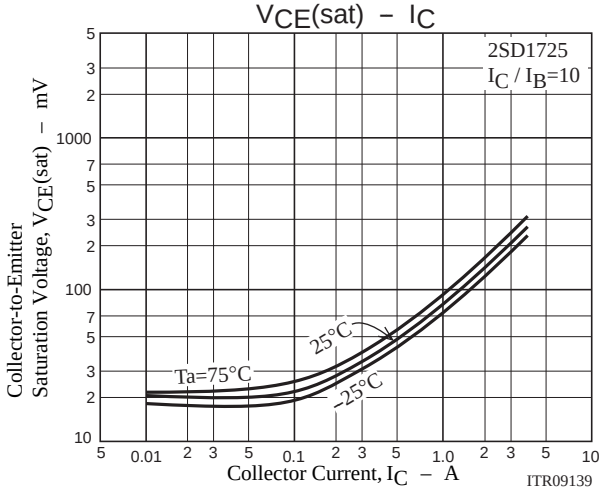

hFE – IC
2SB1168
VCE= –5V
DC Current Gain, hFE
Collector Current, IC – A
Ta=75°C
25°C
–25°C
ITR09134

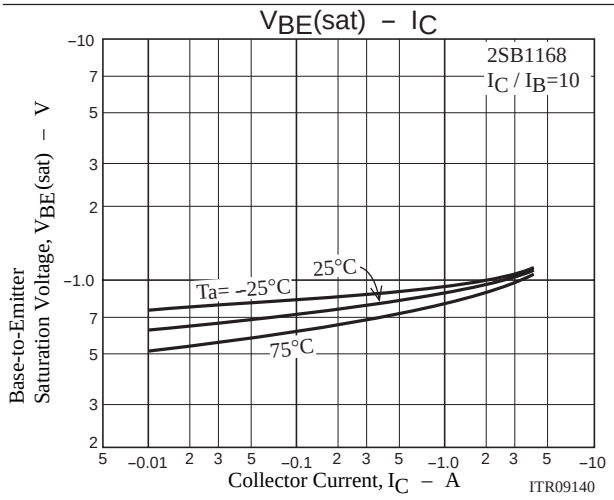

hFE – IC
2SD1725
VCE=5V
DC Current Gain, hFE
Collector Current, IC – A
Ta=75°C
25°C
–25°C
ITR09135

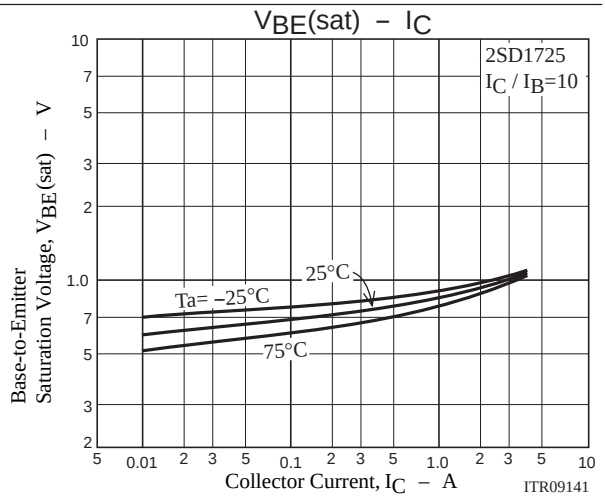

fT – IC
2SB1168 / 2SD1725
VCE=10V
Gain-Bandwidth Product, fT – MHz
Collector Current, IC – A
2SD1725
2SB1168
(For PNP, minus sign is omitted.)
ITR09136

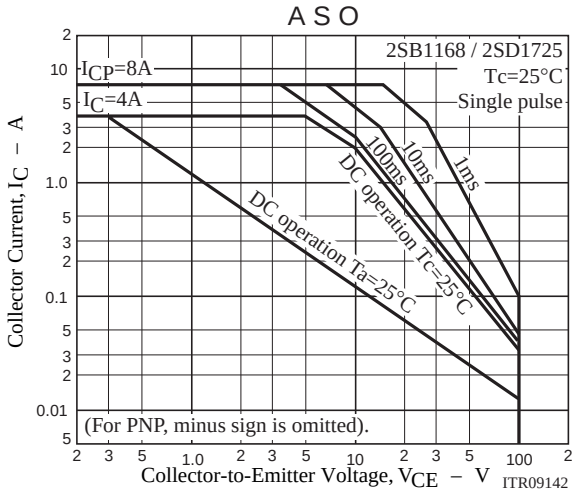

Cob – VCB
2SB1168 / 2SD1725
f=1MHz
Output Capacitance, Cob – pF
Collector-to-Base Voltage, VCB – V
2SB1168
2SD1725
(For PNP, minus sign is omitted.)
ITR09137

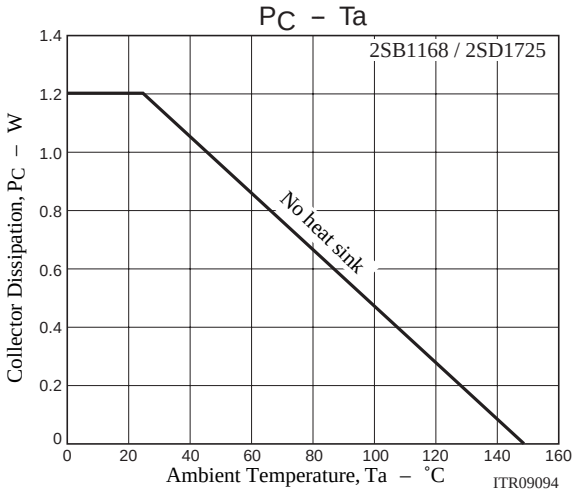

VCE(sat) – IC
2SB1168
IC / IB=10
Collector-to-Emitter Saturation Voltage, VCE(sat) – mV
Collector Current, IC – A
Ta=75°C
25°C
–25°C
ITR09138

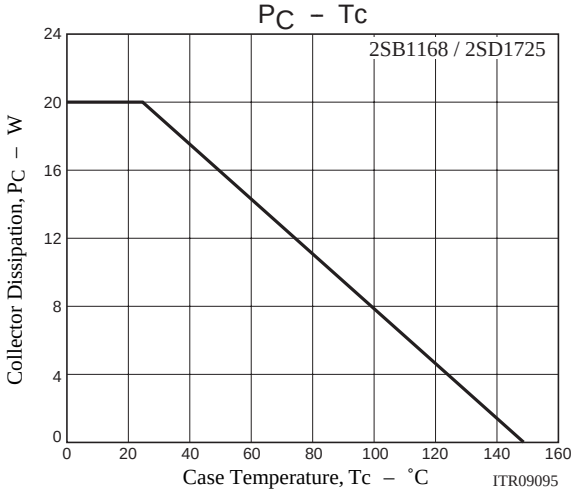

VCE(sat) – IC
2SD1725
IC / IB=10
Collector-to-Emitter Saturation Voltage, VCE(sat) – mV
Collector Current, IC – A
Ta=75°C
25°C
–25°C
ITR09139


VBE(sat) – IC
2SB1168
IC / IB=10
Ta= –25°C
25°C
75°C
Base-to-Emitter Saturation Voltage, VBE(sat) – V
Collector Current, IC – A
ITR09140


VBE(sat) – IC
2SD1725
IC / IB=10
Ta= –25°C
25°C
75°C
Base-to-Emitter Saturation Voltage, VBE(sat) – V
Collector Current, IC – A
ITR09141


A S O
2SB1168 / 2SD1725
Tc=25°C
Single pulse
ICP=8A
IC=4A
100ms
10ms
1ms
DC operation Tc=25°C
DC operation Ta=25°C
(For PNP, minus sign is omitted).
Collector Current, IC – A
Collector-to-Emitter Voltage, VCE – V
ITR09142


PC – Ta
2SB1168 / 2SD1725
No heat sink
Collector Dissipation, PC – W
Ambient Temperature, Ta – °C
ITR09094


PC – Tc
2SB1168 / 2SD1725
Collector Dissipation, PC – W
Case Temperature, Tc – °C
ITR09095

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