Ordering number:ENN2046A

PNP/NPN Epitaxial Planar Silicon Transistors

2SB1165/2SD1722

50V/5A Switching Applications

Applications

· Relay drivers, high-speed inverters, converters.

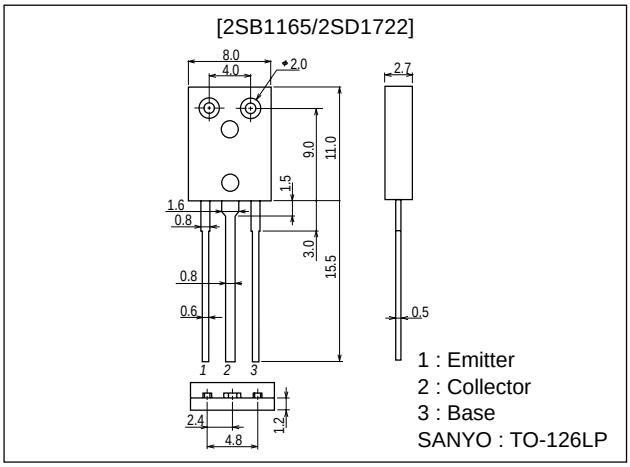
Features

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

Package Dimensions

unit:mm

2043B



( ) : 2SB1165

Specifications

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		(–)5	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}=(–)40V, 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}=(–)2V, I_C=(–)0.5A	70*		400*	
	$h_{FE}2$	V_{CE}=(–)2V, I_C=(–)4A	35			
Gain-Bandwidth Product	f_T	V_{CE}=(–)5V, I_C=(–)1A		180		MHz
				(130)		MHz

* : The 2SB1165/2SD1722 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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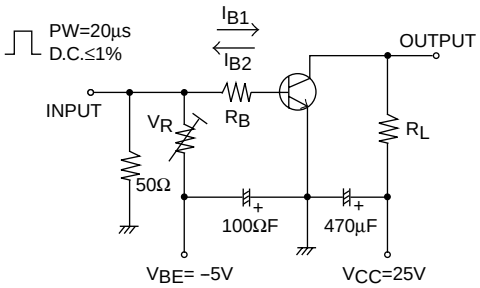
TOKYO OFFICE Tokyo Bldg., 1-10, 1 Chome, Ueno, Taito-ku, TOKYO, 110-8534 JAPAN

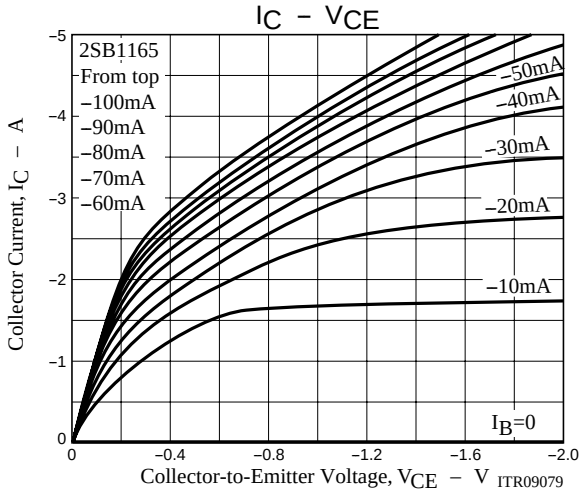
Continued from preceding page.

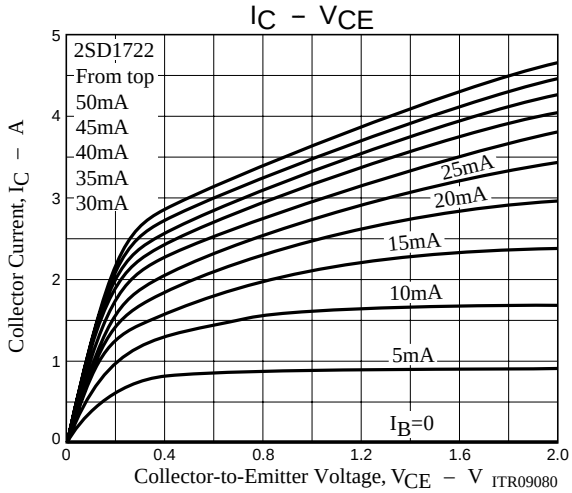
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Output Capacitance	C_{ob}	V_{CB}=(–)10V, f=1MHz		40(60)		pF
Collector-to-Emitter Saturation Voltage	$V_{CE(sat)}$	I_C=(–)3A, I_B=(–)0.15A		220	400	mV
				(–280)	(–550)	mV
Base-to-Emitter Saturation Voltage	$V_{BE(sat)}$	I_C=(–)3A, I_B=(–)0.15A		(–)0.95	(–)1.3	V
Collector-to-Base Breakdown Voltage	$V_{(BR)CBO}$	I_C=(–)10μA, I_E=0	(–)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=0	(–)6			V
Turn-ON Time	t_{on}	See specified Test Circuit		(50)50		ns
Storage Time	t_{stg}	See specified Test Circuit		500		ns
				(450)		ns
Fall Time	t_f	See specified Test Circuit		20(20)		ns

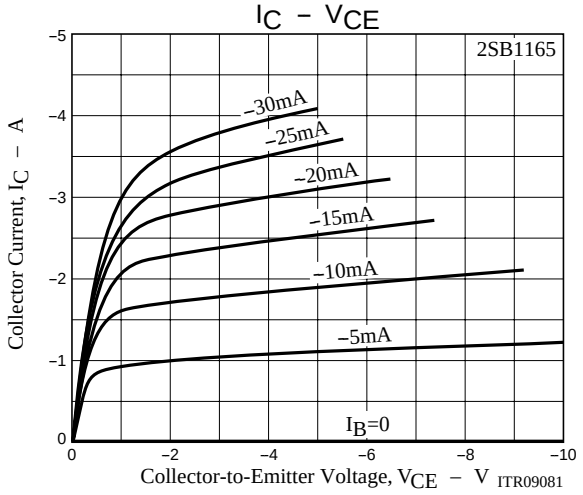
Switching Time Test Circuit

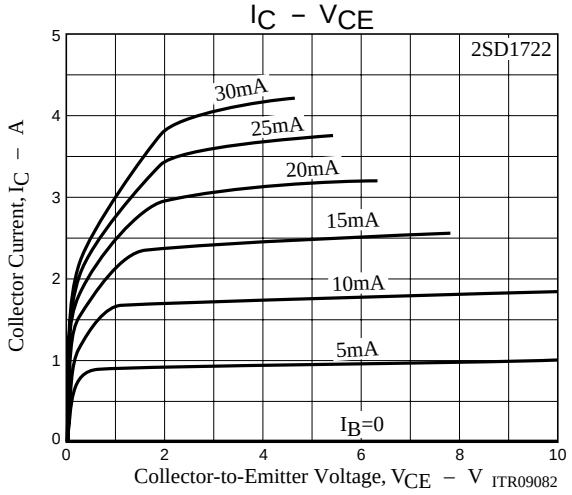


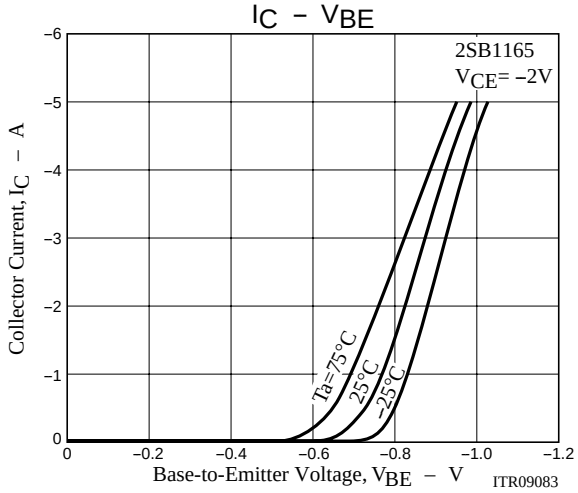
I_C=10I_{B1}= −10I_{B2}=2A
(For PNP, the polarity is reversed.)

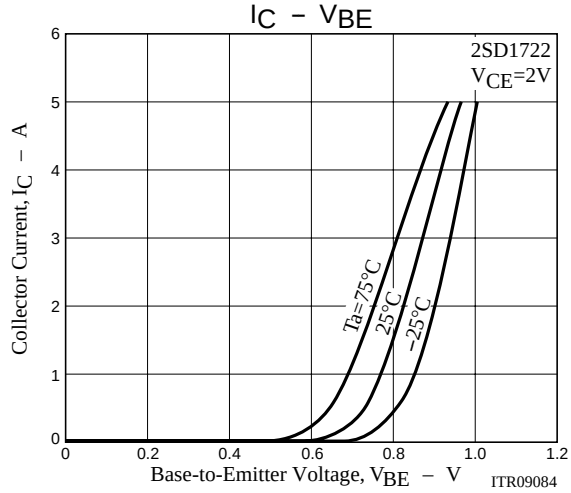


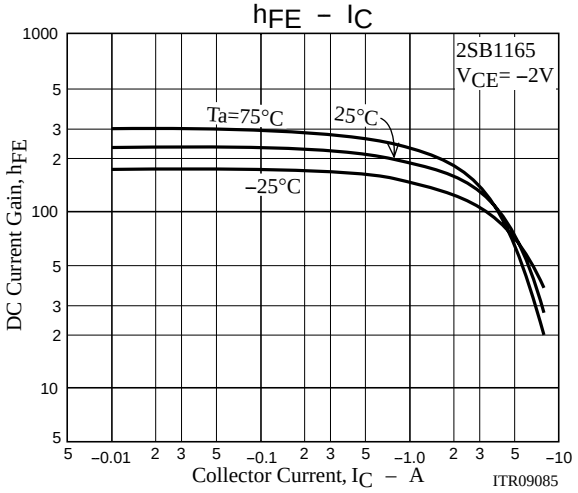


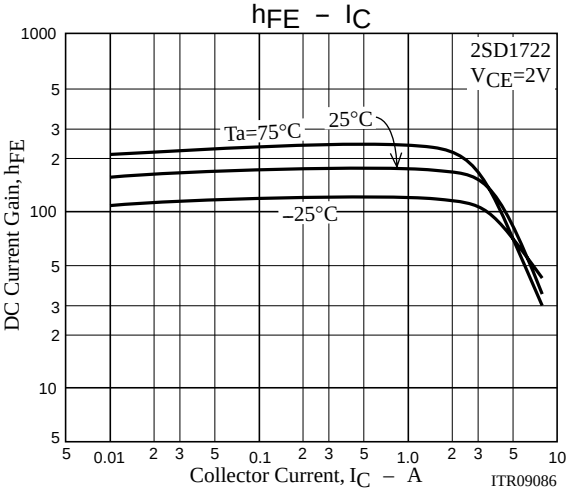


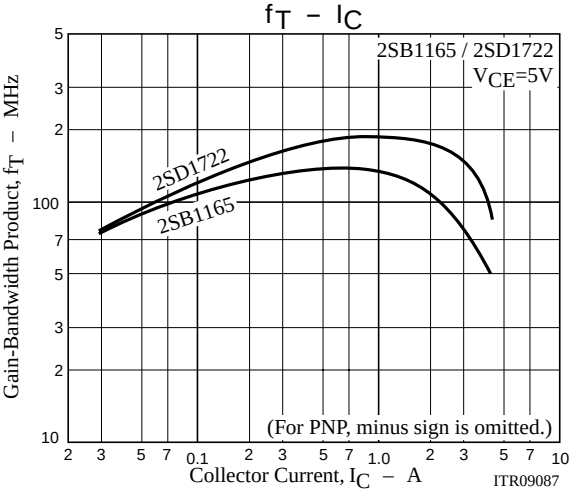


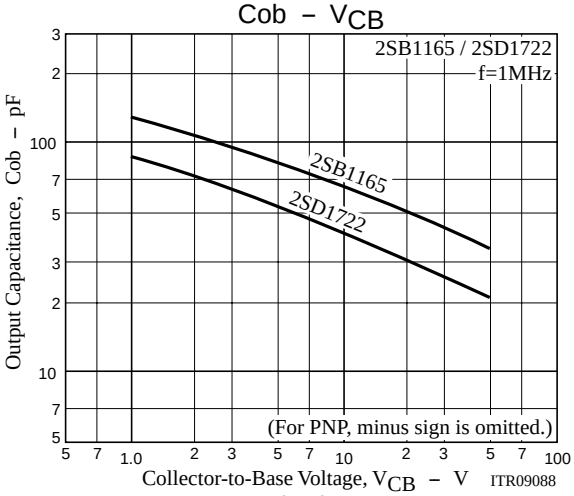

IC – VBE
2SB1165
VCE= –2V
Collector Current, IC – A
Base-to-Emitter Voltage, VBE – V
Ta=75°C
25°C
–25°C
ITR09083

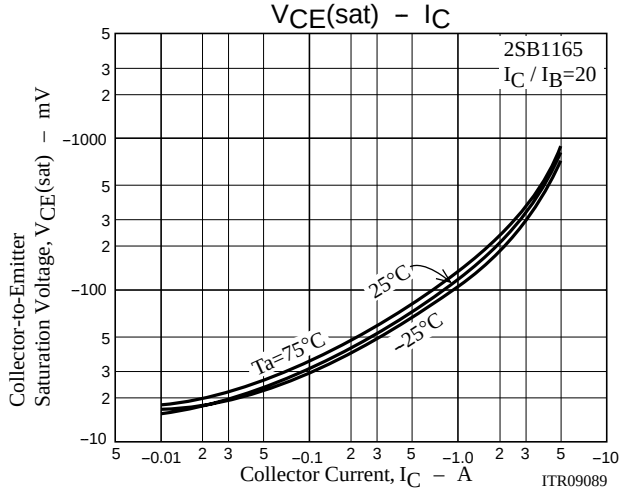

IC – VBE
2SD1722
VCE=2V
Collector Current, IC – A
Base-to-Emitter Voltage, VBE – V
Ta=75°C
25°C
–25°C
ITR09084

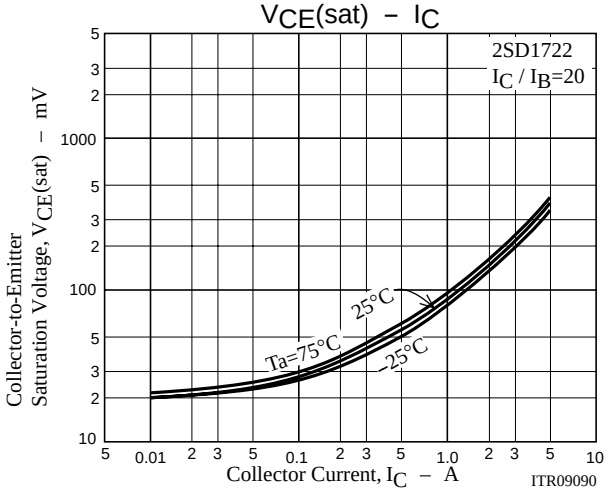

hFE – IC
2SB1165
VCE= –2V
DC Current Gain, hFE
Collector Current, IC – A
Ta=75°C
25°C
–25°C
ITR09085


hFE – IC
2SD1722
VCE=2V
DC Current Gain, hFE
Collector Current, IC – A
Ta=75°C
25°C
–25°C
ITR09086

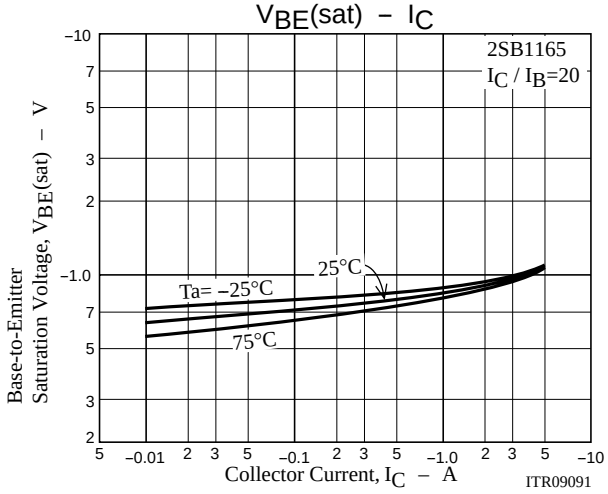

fT – IC
2SB1165 / 2SD1722
VCE=5V
Gain-Bandwidth Product, fT – MHz
Collector Current, IC – A
2SD1722
2SB1165
(For PNP, minus sign is omitted.)
ITR09087


Cob – VCB
2SB1165 / 2SD1722
f=1MHz
Output Capacitance, Cob – pF
Collector-to-Base Voltage, VCB – V
2SB1165
2SD1722
(For PNP, minus sign is omitted.)
ITR09088

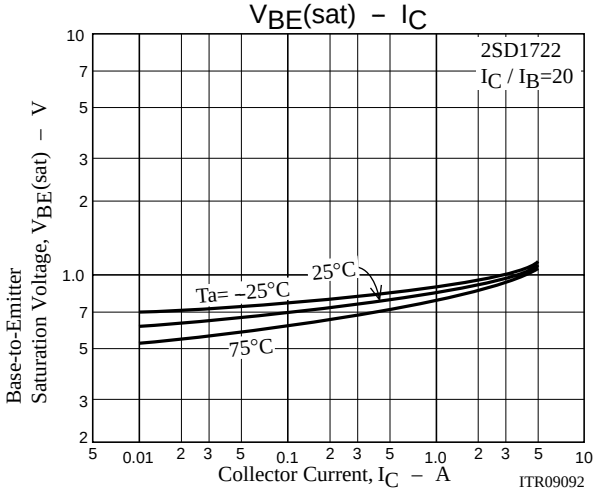

VCE(sat) – IC
2SB1165
IC / IB=20
Collector-to-Emitter Saturation Voltage, VCE(sat) – mV
Collector Current, IC – A
25°C
Ta=75°C
–25°C
ITR09089


VCE(sat) – IC
2SD1722
IC / IB=20
Collector-to-Emitter Saturation Voltage, VCE(sat) – mV
Collector Current, IC – A
25°C
Ta=75°C
–25°C
ITR09090

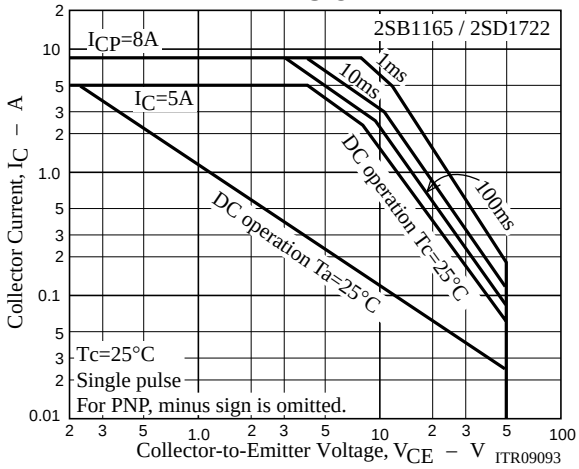
$V_{BE}(sat)$ – I_C



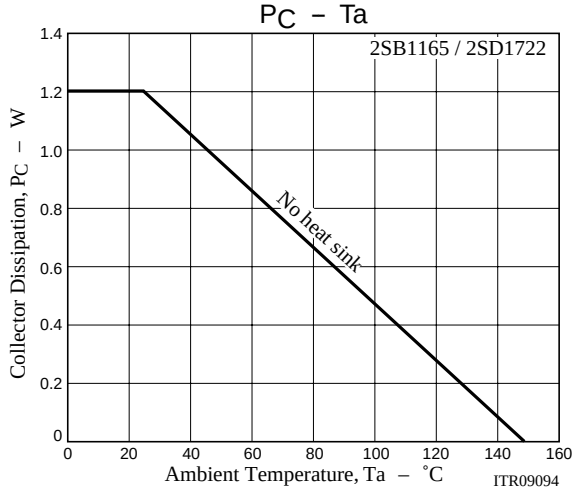
$V_{BE}(sat)$ – I_C



A S O



P_C – Ta



P_C – Ta