



# 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.

( ) : 2SB1165

### Specifications

#### Absolute Maximum Ratings at $T_a = 25^\circ\text{C}$

Parameter	Symbol	Conditions	Ratings	Unit
Collector-to-Base Voltage	$V_{CB0}$		(-)60	V
Collector-to-Emitter Voltage	$V_{CE0}$		(-)50	V
Emitter-to-Base Voltage	$V_{EB0}$		(-)6	V
Collector Current	$I_C$		(-)5	A
Collector Current (Pulse)	$I_{CP}$		(-)8	A
Collector Dissipation	$P_C$		1.2	W
		$T_c=25^\circ\text{C}$	20	W
Junction Temperature	$T_j$		150	$^\circ\text{C}$
Storage Temperature	$T_{stg}$		-55 to +150	$^\circ\text{C}$

#### Electrical Characteristics at $T_a = 25^\circ\text{C}$

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Collector Cutoff Current	$I_{CB0}$	$V_{CB} = (-)40\text{V}, I_E = 0$			(-)1	$\mu\text{A}$
Emitter Cutoff Current	$I_{EB0}$	$V_{EB} = (-)4\text{V}, I_C = 0$			(-)1	$\mu\text{A}$
DC Current Gain	$h_{FE1}$	$V_{CE} = (-)2\text{V}, I_C = (-)0.5\text{A}$	70*		400*	
	$h_{FE2}$	$V_{CE} = (-)2\text{V}, I_C = (-)4\text{A}$	35			
Gain-Bandwidth Product	$f_T$	$V_{CE} = (-)5\text{V}, I_C = (-)1\text{A}$		180		MHz
				(130)		MHz

\* : The 2SB1165/2SD1722 are classified by 0.5A  $h_{FE}$  as follows :

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

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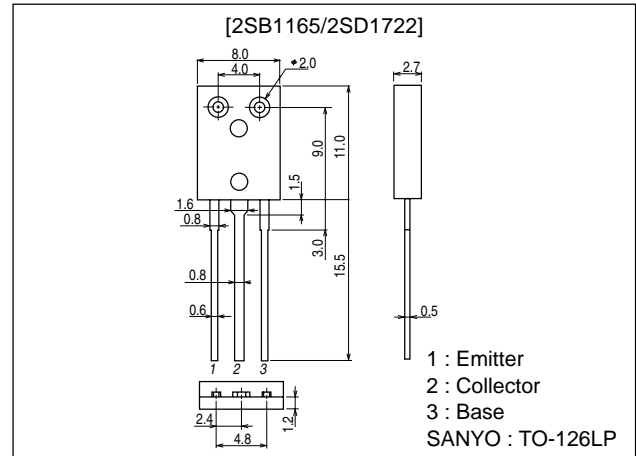
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### Package Dimensions

unit:mm

2043B

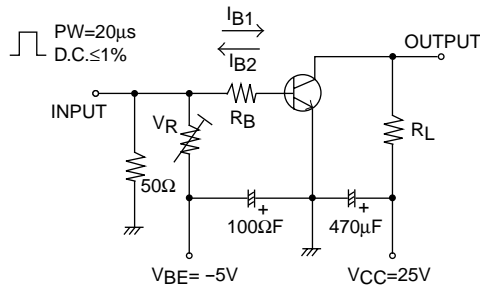


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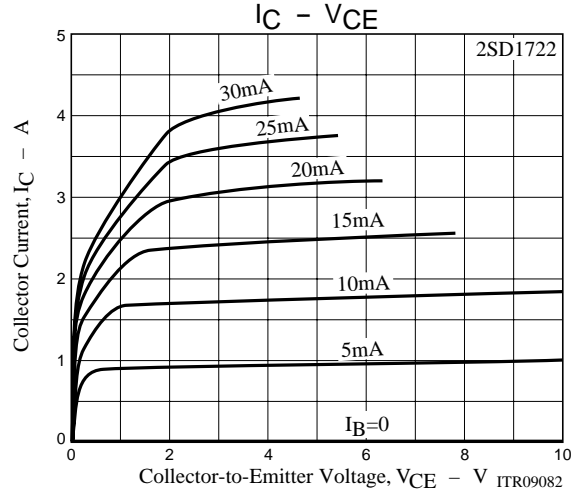
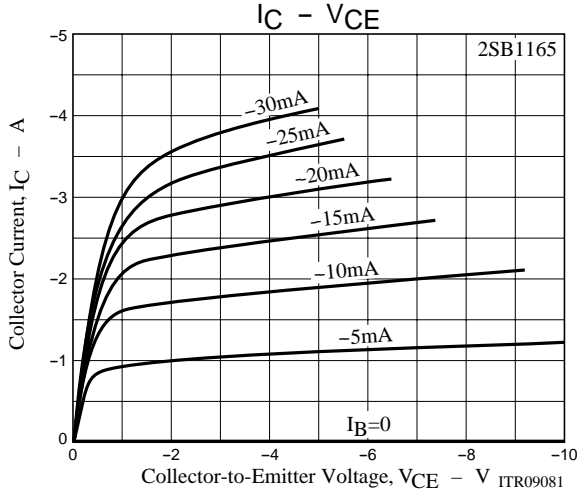
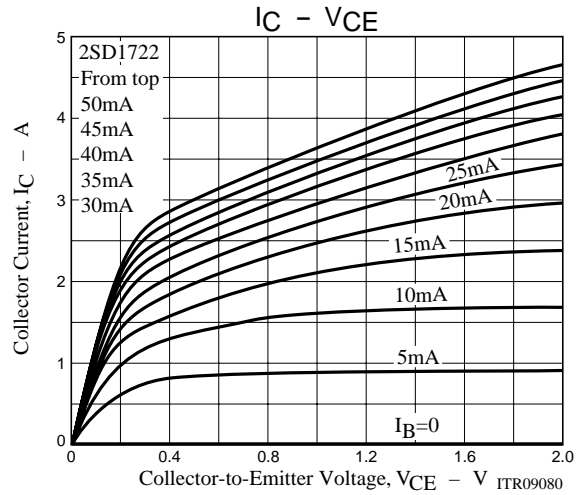
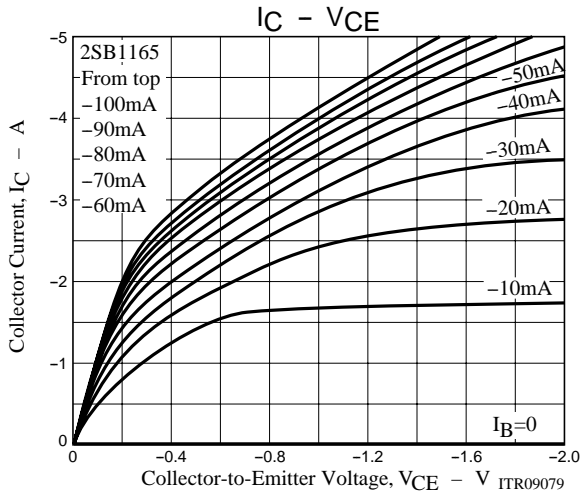
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Output Capacitance	$C_{ob}$	$V_{CB}(-)10V, f=1MHz$		40(60)		pF
Collector-to-Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C(-)3A, I_B(-)0.15A$		220	400	mV
Base-to-Emitter Saturation Voltage	$V_{BE(sat)}$	$I_C(-)3A, I_B(-)0.15A$		(-280)	(-550)	mV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

## Switching Time Test Circuit

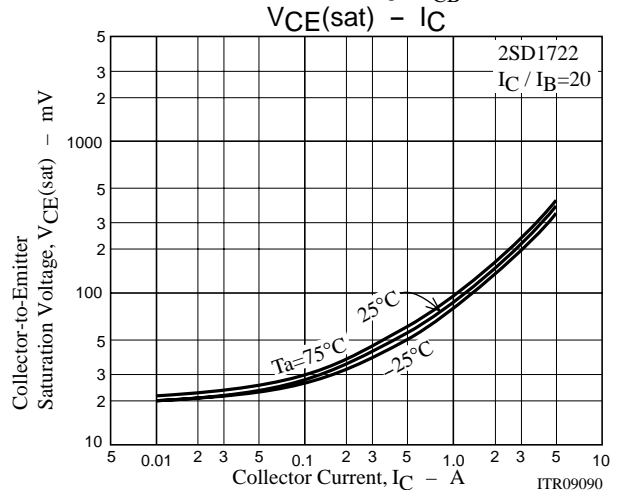
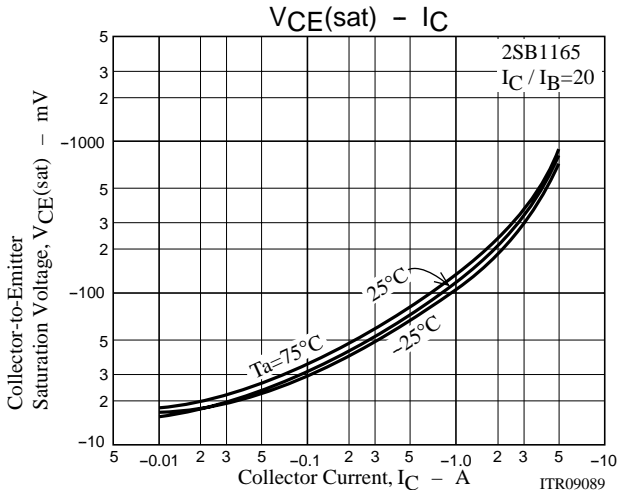
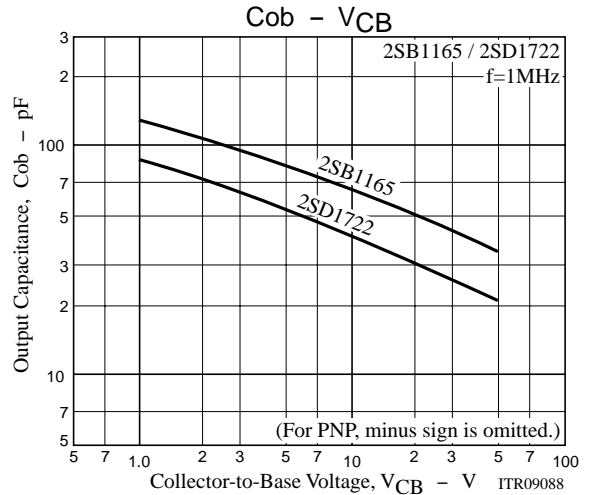
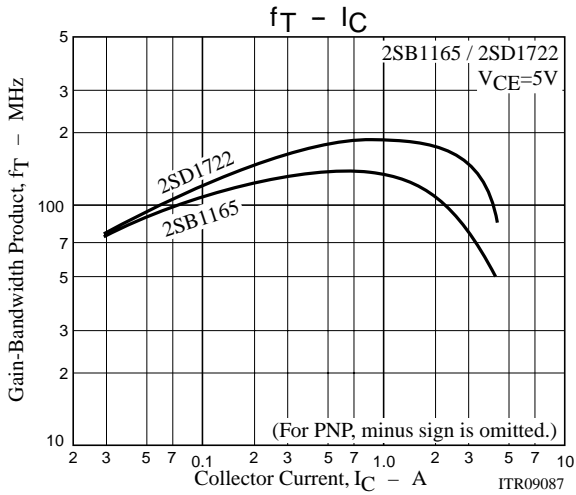
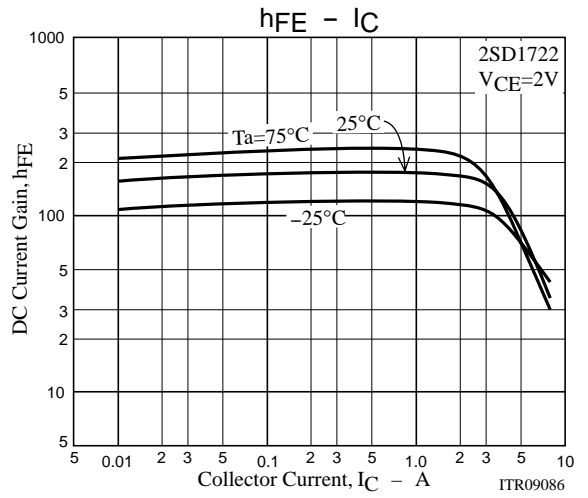
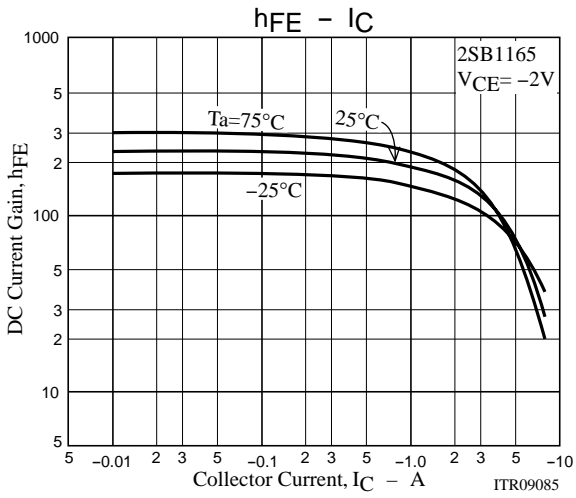
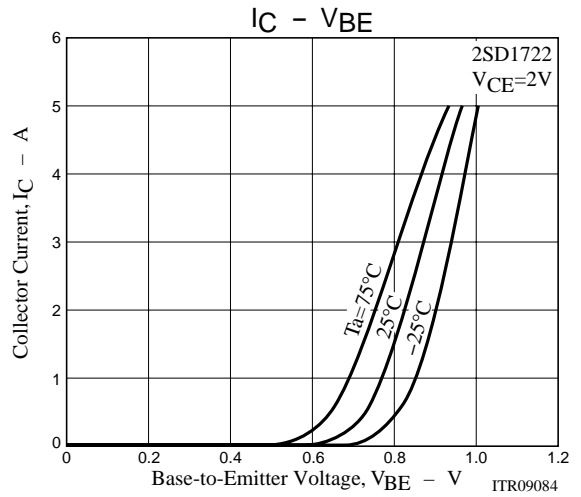
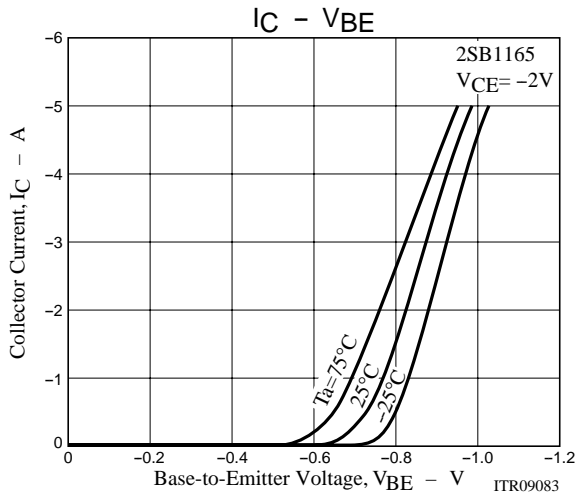


$$I_C = 10I_{B1} = -10I_{B2} = 2A$$

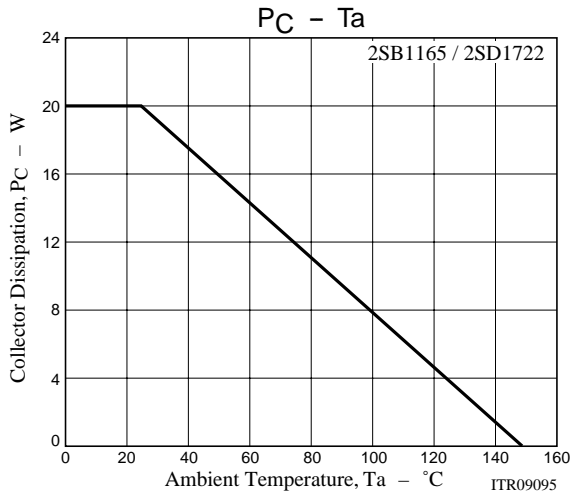
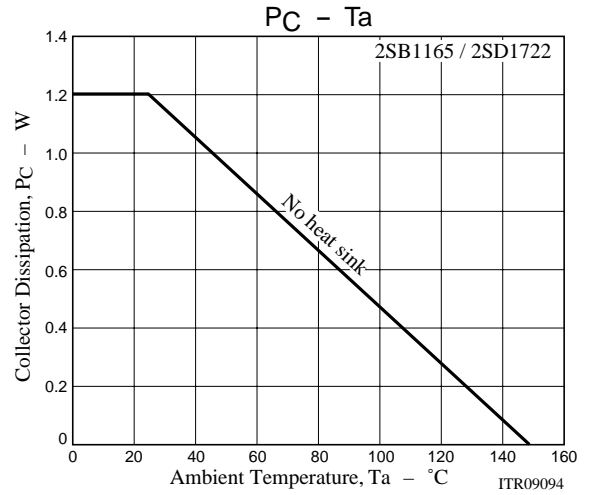
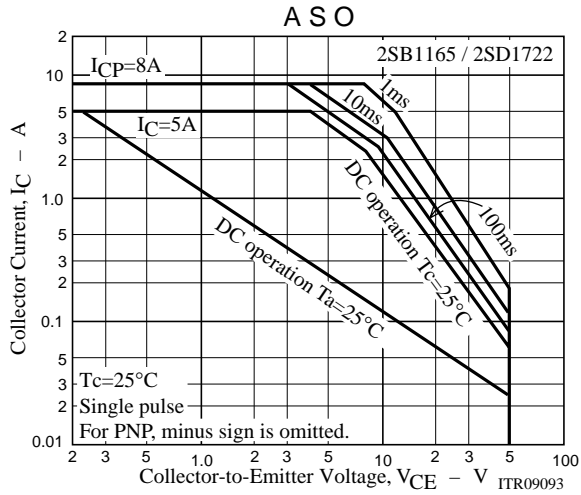
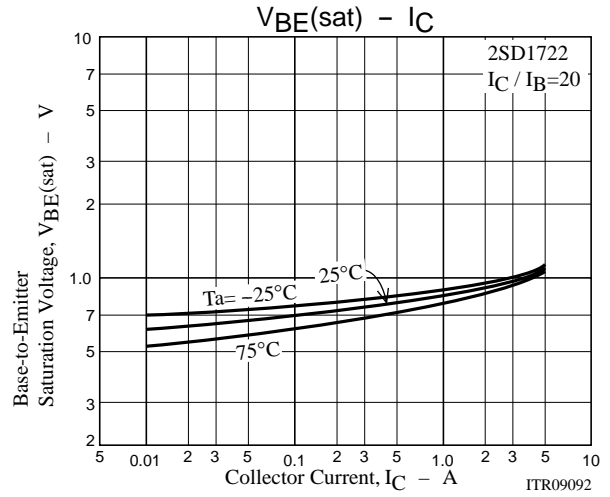
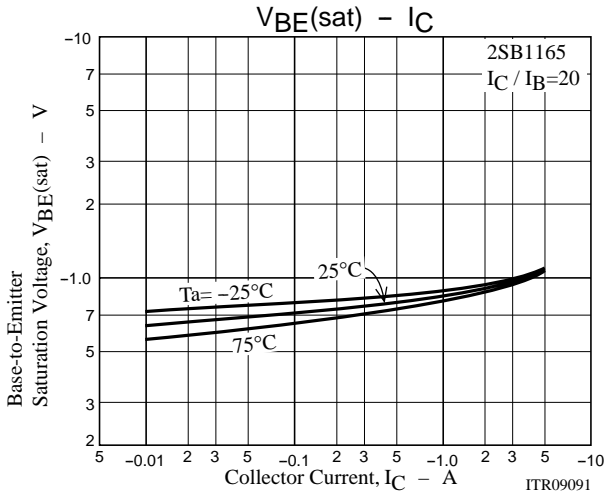
(For PNP, the polarity is reversed.)



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