Ordering number:1022A

PNP/NPN Epitaxial Planar Silicon Transistors

2SB904/2SD1213

30V/12A High-Speed Switching Applications

Applications

· Large current switching of relay drivers, high-speed inverters, converters.

Features

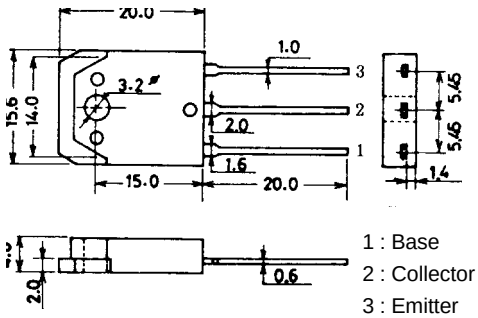
· Low collector-to-emitter saturation voltage : $V_{CE(sat)}$=–0.5V (PNP), 0.4V (NPN) max.
· Large current capacity.

Package Dimensions

unit:mm

2022A

[2SB904/2SD1213]



SANYO : TO-3PB

( ) : 2SB904

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}		(–)30	V
Emitter-to-Base Voltage	V_{EBO}		(–)6	V
Collector Current	I_C		(–)20	A
Collector Current (Pulse)	I_{CP}		(–)30	A
Collector Dissipation	P_C		2.5	W
		Tc=25˚C	60	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			(–)0.1	mA
Emitter Cutoff Current	I_{EBO}	V_{EB}=(–)4V, I_C=0			(–)0.1	mA
DC Current Gain	$h_{FE}1$	V_{CE}=(–)2V, I_C=(–)1A	70*		280*	
	$h_{FE}2$	V_{CE}=(–)2V, I_C=(–)10A	30			
Collector-to-Emitter Saturation Voltage	$V_{CE(sat)}$	I_C=(–)8A, I_B=(–)0.4A		(–0.25)	(–0.5)	V
				0.2	0.4	V

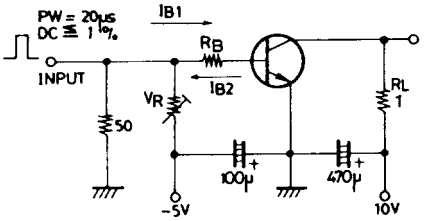
* : The 2SB904/2SD1213 are classified as follows according to h_{FE} at 1A.

70 Q 140	100 R 200	140 S 280

SANYO Electric Co.,Ltd. Semiconductor Bussiness Headquaters
TOKYO OFFICE Tokyo Bldg., 1-10, 1 Chome, Ueno, Taito-ku, TOKYO, 110-8534 JAPAN

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Gain-Bandwidth Product	f_T	V_{CE}=(–)5V, I_C=(–)1A		120		MHz
Collector-to-Base Breakdown Voltage	$V_{(BR)CBO}$	I_C=(–)1mA, I_E=0	(–)60			V
Collector-to-Emitter Breakdown Voltage	$V_{(BR)CEO}$	I_C=(–)1mA, R_{BE}=∞	(–)30			V
Emitter-to-Base Breakdown Voltage	$V_{(BR)EBO}$	I_E=(–)1mA, I_C=0	(–)6			V
Turn-ON Time	t_{on}	See specified Test Circuit		300		ns
Storage Time	t_{stg}	See specified Test Circuit		(300)		ns
				600		ns
Fall Time	t_f	See specified Test Circuit		20		ns

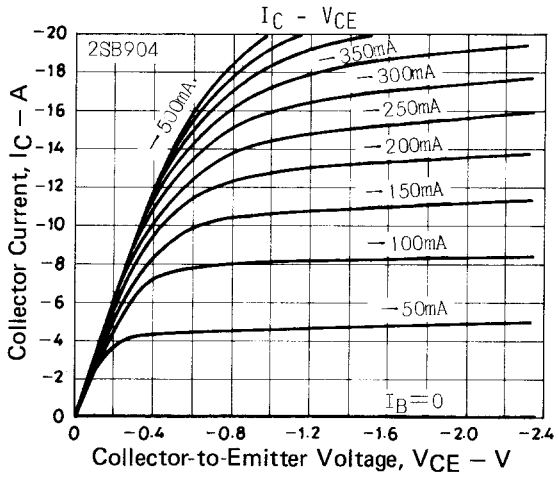
Switching Time Test Circuit

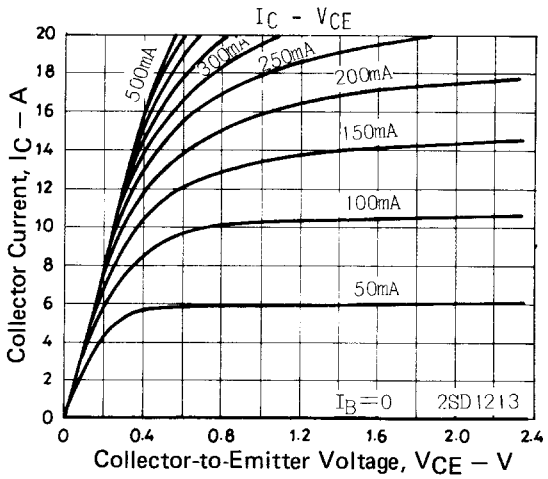


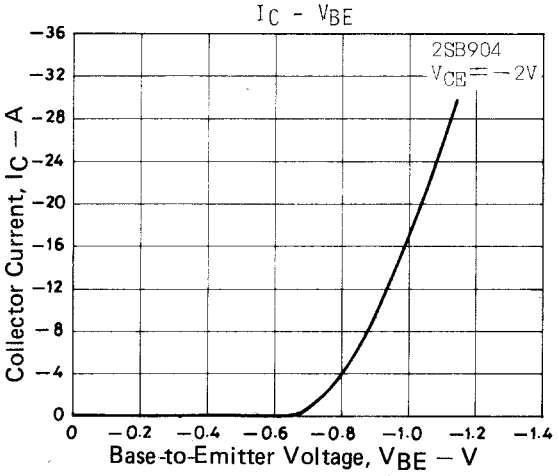
$20I_{B1} = -20I_{B2} = I_C = 10A$

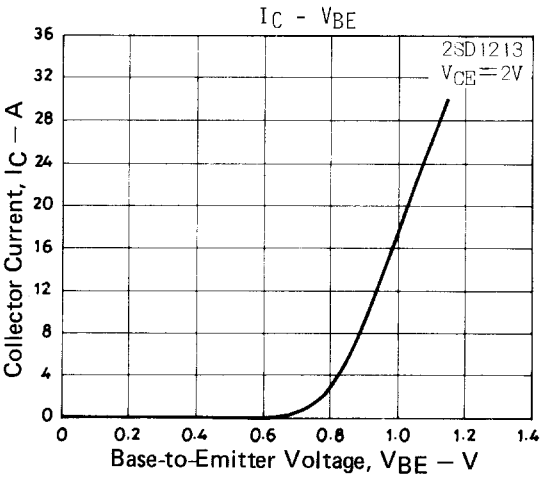
(For PNP, the polarity is reversed)

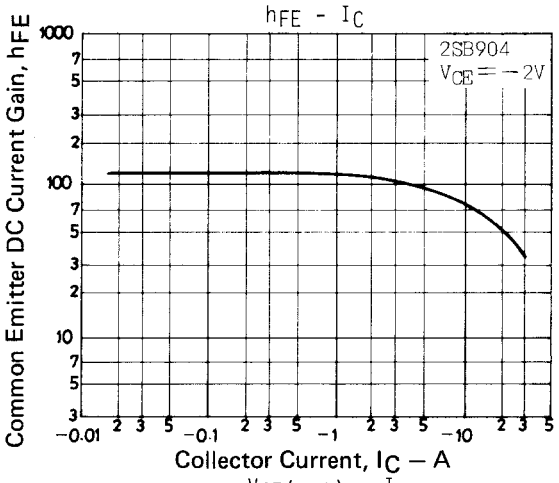
Unit (resistance : Ω, capacitance : F)

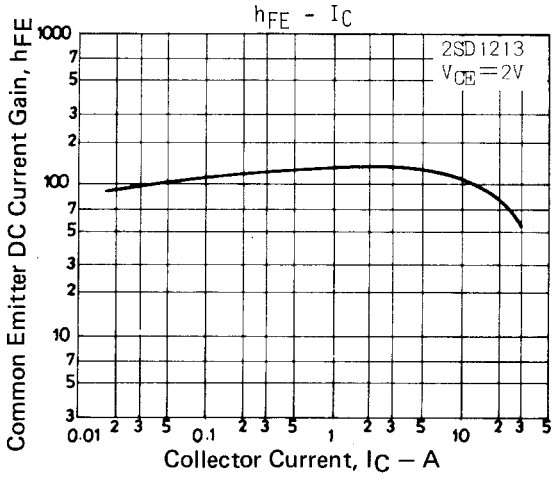


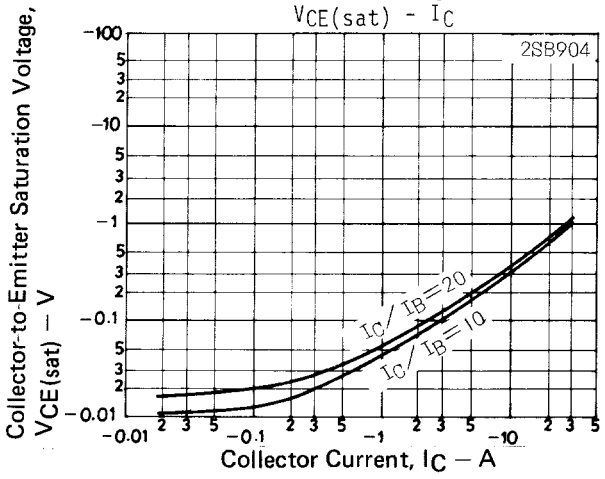


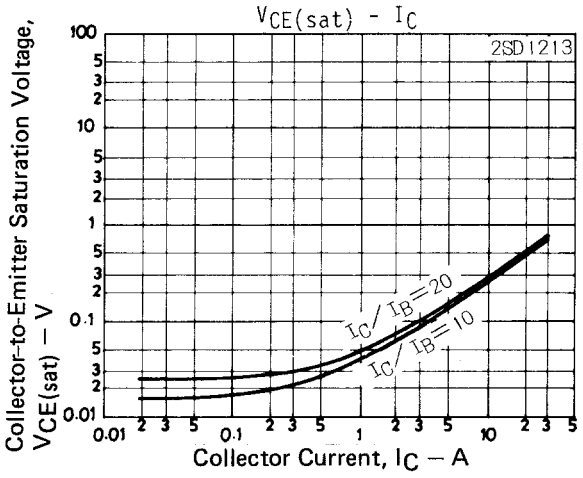


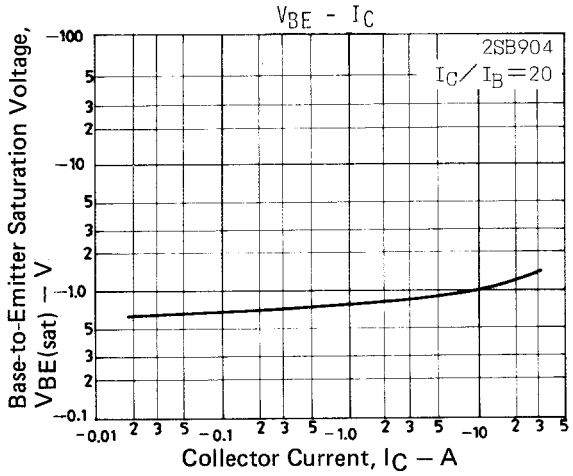


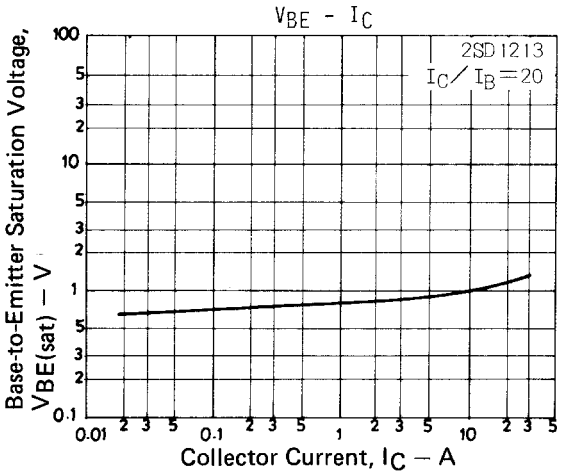

hFE - IC
2SB904
VCE=−2V
Common Emitter DC Current Gain, hFE
Collector Current, IC − A

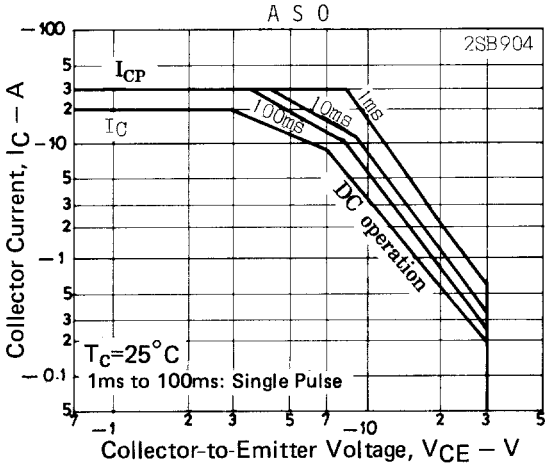

hFE - IC
2SD1213
VCE=2V
Common Emitter DC Current Gain, hFE
Collector Current, IC − A

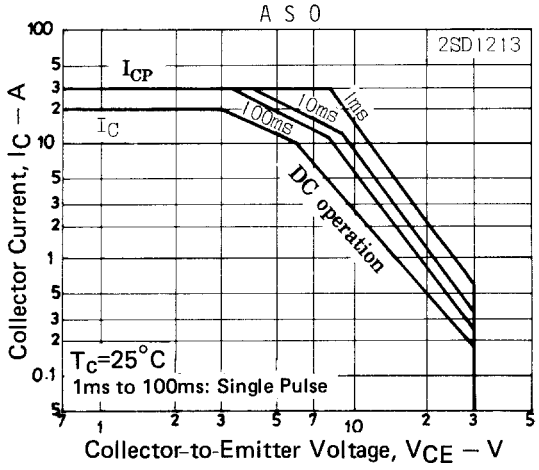

VCE(sat) - IC
2SB904
IC/IB=20
IC/IB=10
Collector-to-Emitter Saturation Voltage, VCE(sat) − V
Collector Current, IC − A


VCE(sat) - IC
2SD1213
IC/IB=20
IC/IB=10
Collector-to-Emitter Saturation Voltage, VCE(sat) − V
Collector Current, IC − A


VBE - IC
2SB904
IC/IB=20
Base-to-Emitter Saturation Voltage, VBE(sat) − V
Collector Current, IC − A


VBE - IC
2SD1213
IC/IB=20
Base-to-Emitter Saturation Voltage, VBE(sat) − V
Collector Current, IC − A


A S O
2SB904
ICP
IC
1ms
10ms
100ms
DC operation
TC=25°C
1ms to 100ms: Single Pulse
Collector Current, IC − A
Collector-to-Emitter Voltage, VCE − V


A S O
2SD1213
ICP
IC
1ms
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100ms
DC operation
TC=25°C
1ms to 100ms: Single Pulse
Collector Current, IC − A
Collector-to-Emitter Voltage, VCE − V