Ordering number: EN1022A

SANYO No.1022A

2SB904/2SD1213

PNP/NPN Epitaxial Planar Silicon Transistors

30V/20A High-Speed Switching Applications

Use

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

Features

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

( ): 2SB904

Absolute Maximum Ratings/T_a=25°C

				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
		T_c=25°C	60	W
Junction Temperature	T_j		150	°C
Storage Temperature	T_{stg}		−55 to +150	°C

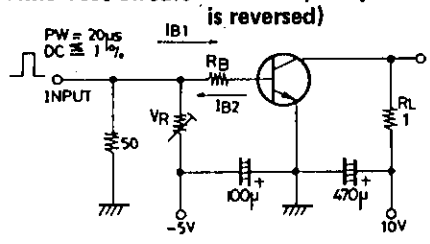
Electrical Characteristics/T_a=25°C

			min	typ	max	unit
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
Common emitter 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) 0.2	(−0.5) 0.4	V
Gain Band-width 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}	"		(300)600		ns
Fall Time	t_f	"		20		ns

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

70	Q	140	100	R	200	140	S	280

Switching Time Test Circuit (For PNP, the polarity is reversed)

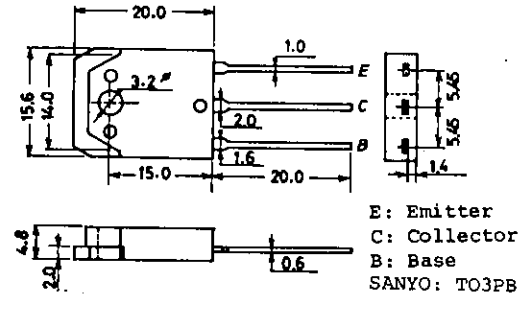


$20I_{B1}=-20I_{B2}=I_C=10A$

Unit (resistance: Ω, capacitance: F)

Package Dimensions 2022

(unit: mm)



E: Emitter
C: Collector
B: Base
SANYO: TO3PB

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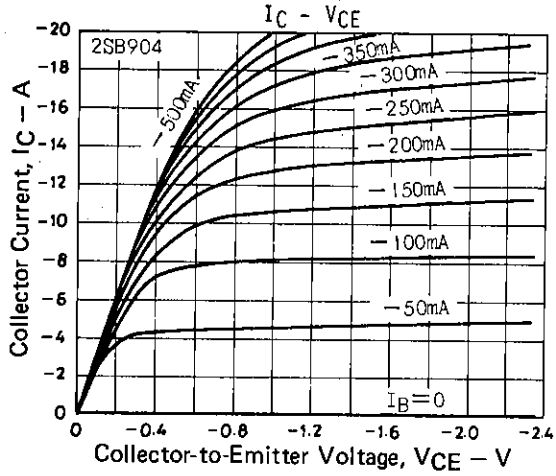
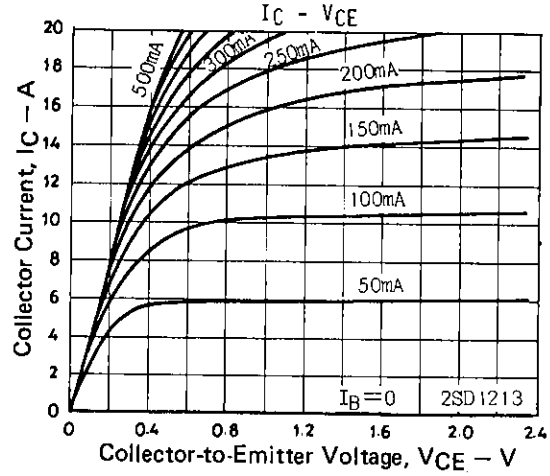
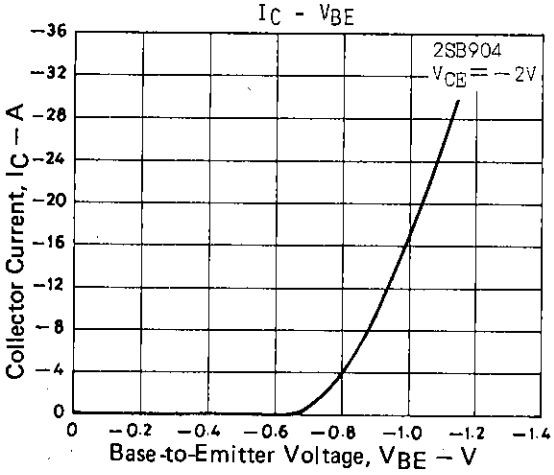
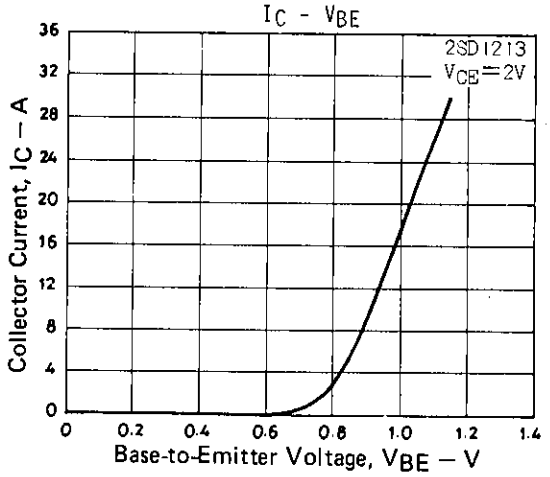
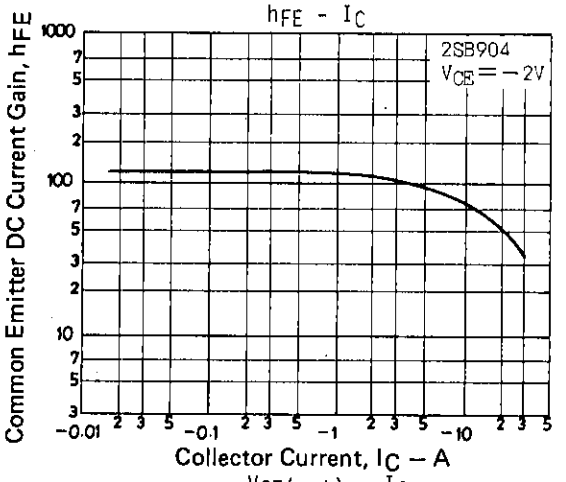
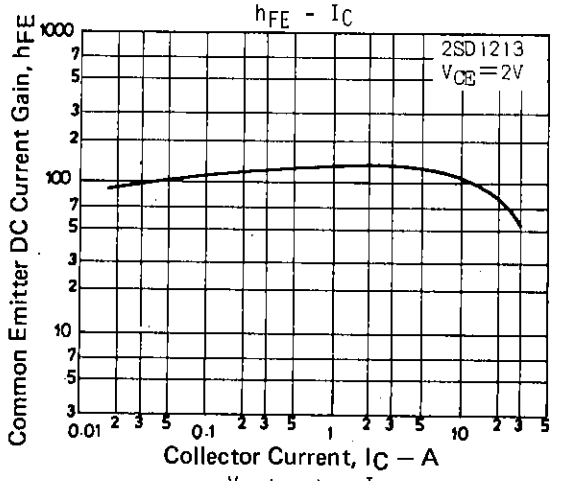

I_C - V_{CE}
2SB904
−500mA
−350mA
−300mA
−250mA
−200mA
−150mA
−100mA
−50mA
I_B=0
Collector Current, I_C – A
Collector-to-Emitter Voltage, V_{CE} – V

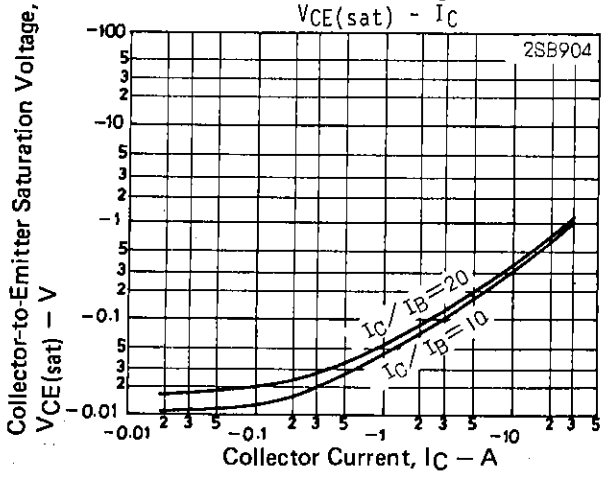

I_C - V_{CE}
500mA
300mA
250mA
200mA
150mA
100mA
50mA
I_B=0
2SD1213
Collector Current, I_C – A
Collector-to-Emitter Voltage, V_{CE} – V

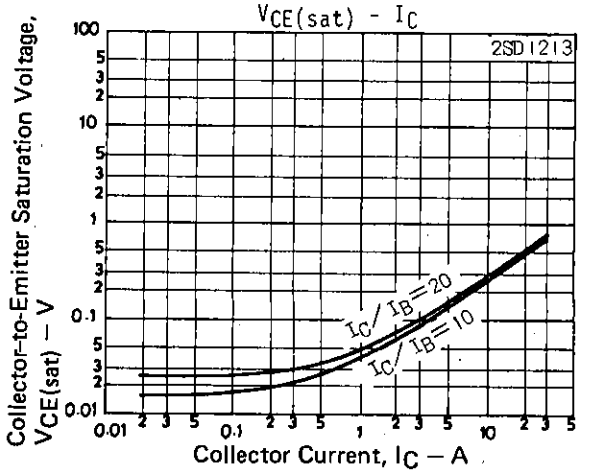

I_C - V_{BE}
2SB904
V_{CE}=−2V
Collector Current, I_C – A
Base-to-Emitter Voltage, V_{BE} – V


I_C - V_{BE}
2SD1213
V_{CE}=2V
Collector Current, I_C – A
Base-to-Emitter Voltage, V_{BE} – V


h_{FE} - I_C
2SB904
V_{CE}=−2V
Common Emitter DC Current Gain, h_{FE}
Collector Current, I_C – A


h_{FE} - I_C
2SD1213
V_{CE}=2V
Common Emitter DC Current Gain, h_{FE}
Collector Current, I_C – A


$V_{CE(sat)}$ - I_C
2SB904
I_C/I_B=20
I_C/I_B=10
Collector-to-Emitter Saturation Voltage, $V_{CE(sat)}$ – V
Collector Current, I_C – A


$V_{CE(sat)}$ - I_C
2SD1213
I_C/I_B=20
I_C/I_B=10
Collector-to-Emitter Saturation Voltage, $V_{CE(sat)}$ – V
Collector Current, I_C – A