

<b>SANYO</b>	No.1022A	<b>2SB904/2SD1213</b>
		PNP/NPN Epitaxial Planar Silicon Transistors
<b>30V/20A High-Speed Switching Applications</b>		

**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/ $T_a=25^\circ C$**

			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
		$T_c=25^\circ C$	60
Junction Temperature	$T_j$	150	$^\circ C$
Storage Temperature	$T_{stg}$	-55 to +150	$^\circ C$

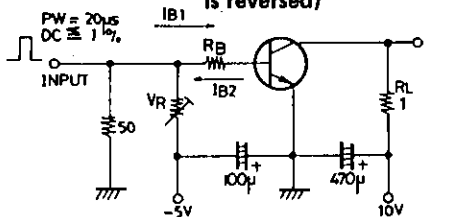
**Electrical Characteristics/ $T_a=25^\circ C$**

			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)	(-0.5)	V
				0.2	0.4	
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	$V_{(BR)CEO}$	$I_C = (-)1mA, R_{BE} = \infty$	(-)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
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**Switching Time Test Circuit (For PNP, the polarity is reversed)**

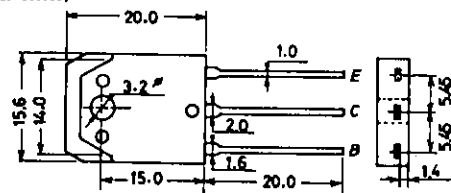


$20I_{B1} = -20I_{B2} = I_C = 10A$

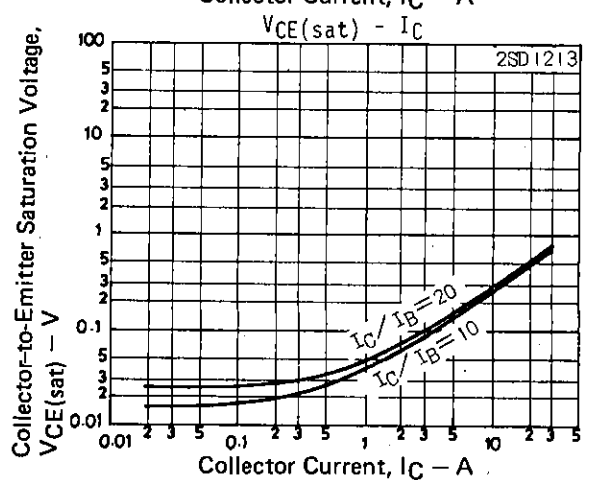
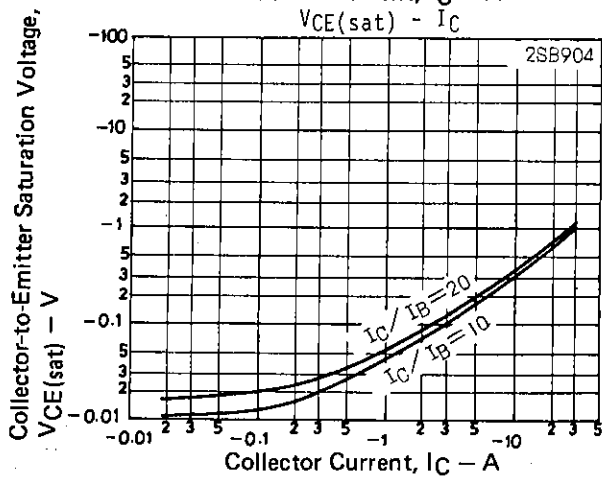
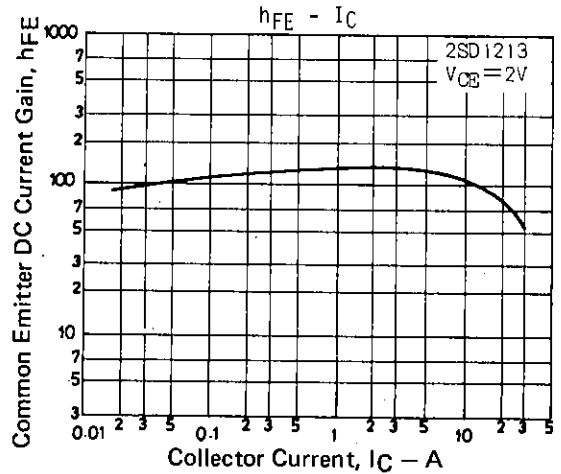
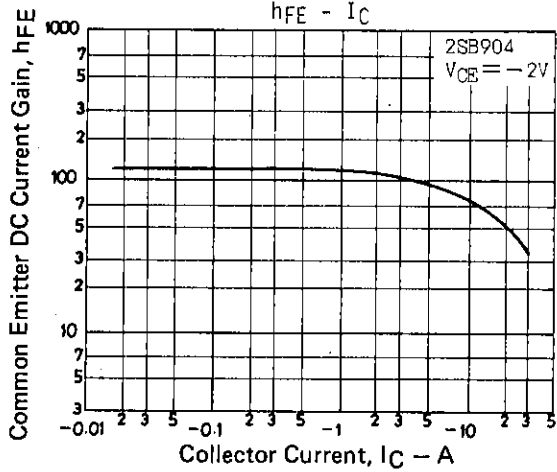
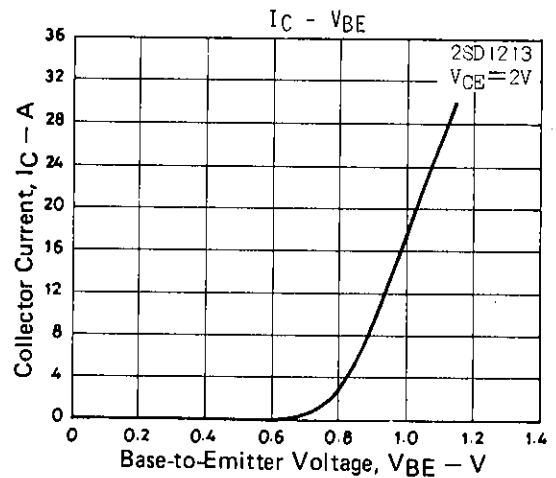
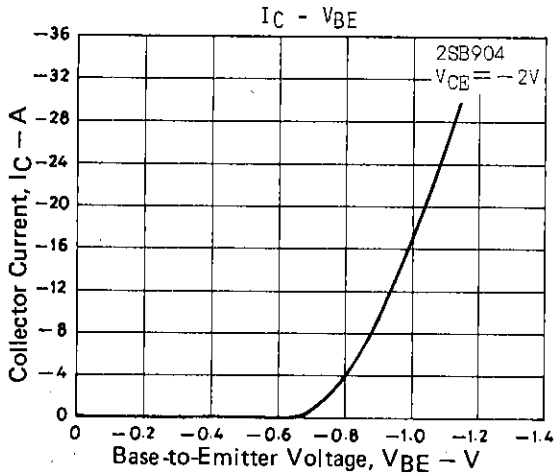
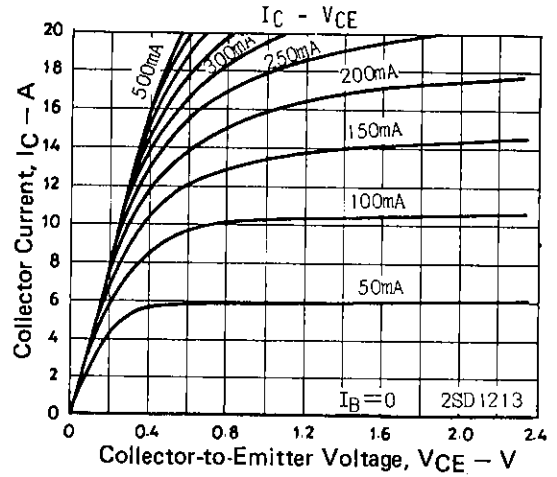
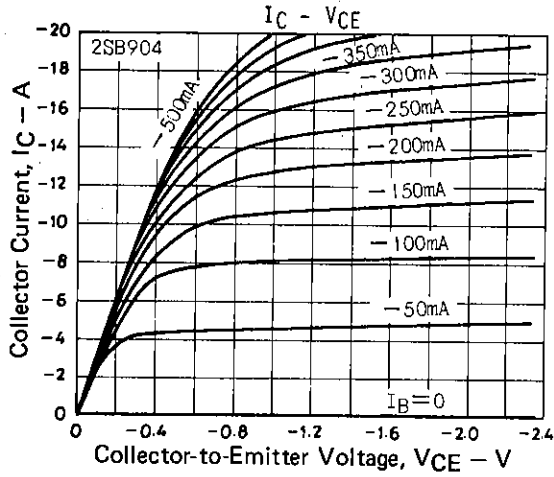
Unit (resistance:  $\Omega$ , capacitance: F)

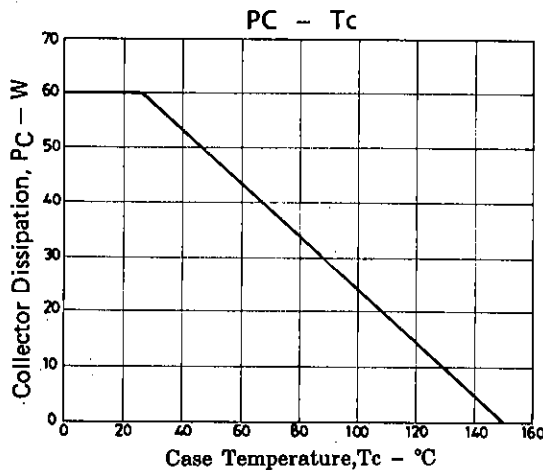
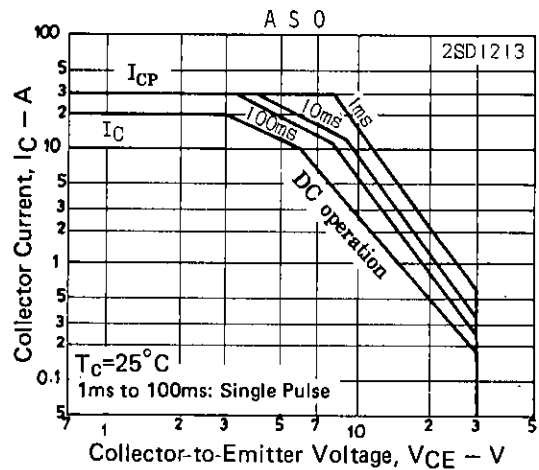
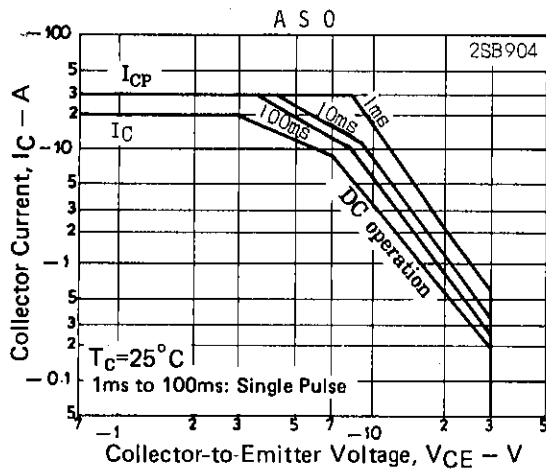
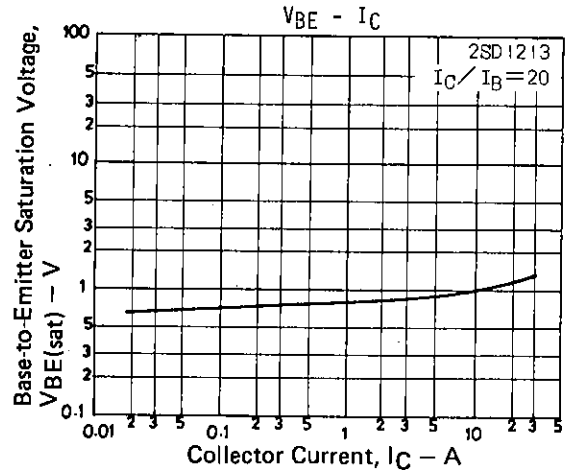
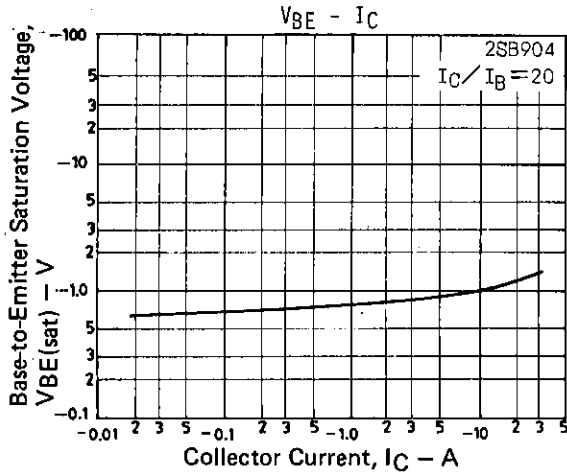
**Package Dimensions 2022**

(unit: mm)



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





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