



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.

() : 2SB904

Specifications

Absolute Maximum Ratings at $T_a = 25^\circ C$

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

Electrical Characteristics at $T_a = 25^\circ C$

| 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_{FE1} | $V_{CE} = (-)2V, I_C = (-)1A$ | 70* | | 280* | |
| | h_{FE2} | $V_{CE} = (-)2V, I_C = (-)10A$ | 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 |
|----|---|-----|-----|---|-----|-----|---|-----|

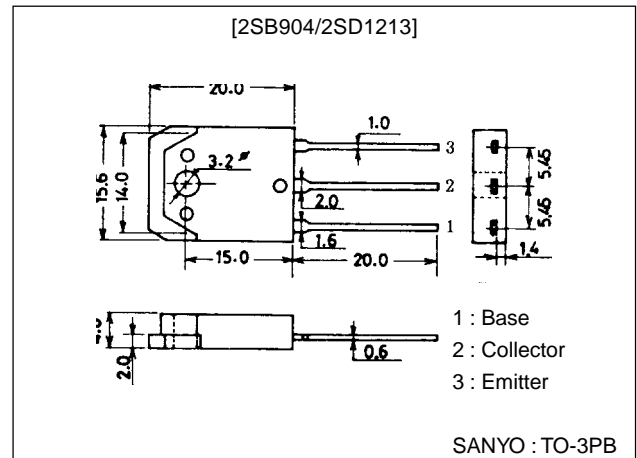
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Package Dimensions

unit:mm

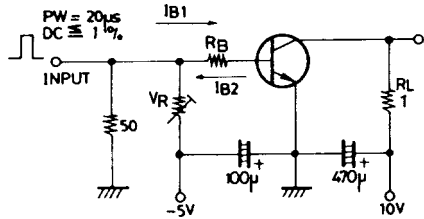
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2SB904/2SD1213

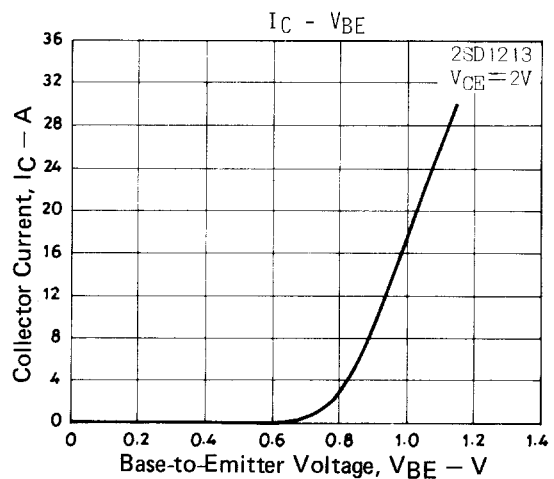
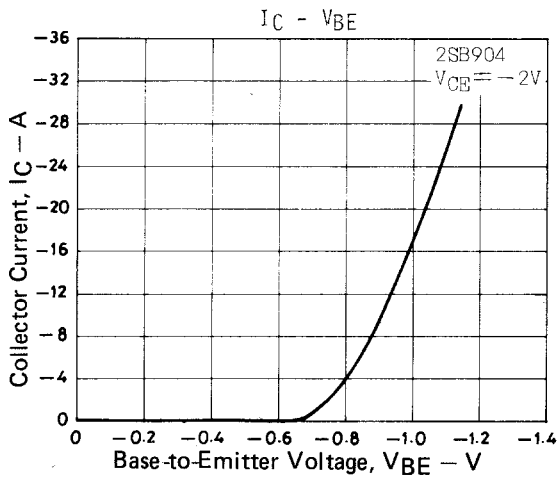
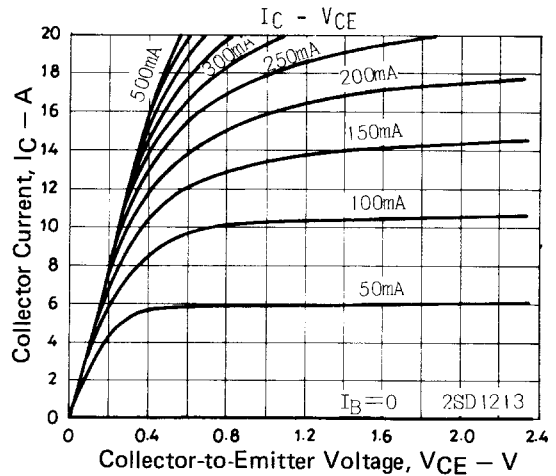
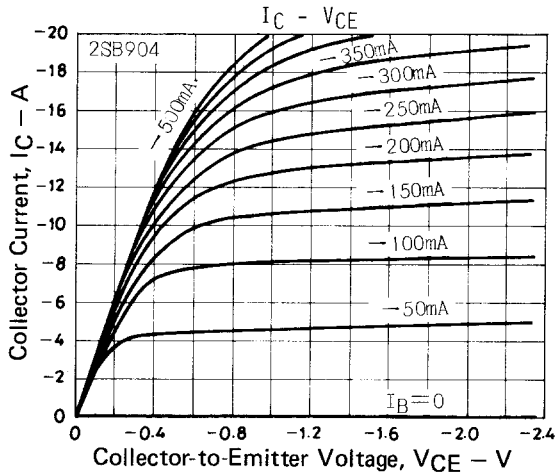
| Parameter | Symbol | Conditions | Ratings | | | Unit |
|--|---------------|-----------------------------|---------|-------|-----|------|
| | | | min | typ | max | |
| Gain-Bandwidth Product | f_T | $V_{CE}=(-)5V, I_C=(-)1A$ | | 120 | | MHz |
| Collector-to-Base Breakdown Voltage | $V_{(BR)CBO}$ | $I_C=(-)1mA, I_E=0$ | (-)60 | | | V |
| Collector-to-Emitter Breakdown Voltage | $V_{(BR)CEO}$ | $I_C=(-)1mA, R_{BE}=\infty$ | (-)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} | See specified Test Circuit | | (300) | | ns |
| | | | | 600 | | ns |
| Fall Time | t_f | See specified Test Circuit | | 20 | | ns |

Switching Time Test Circuit

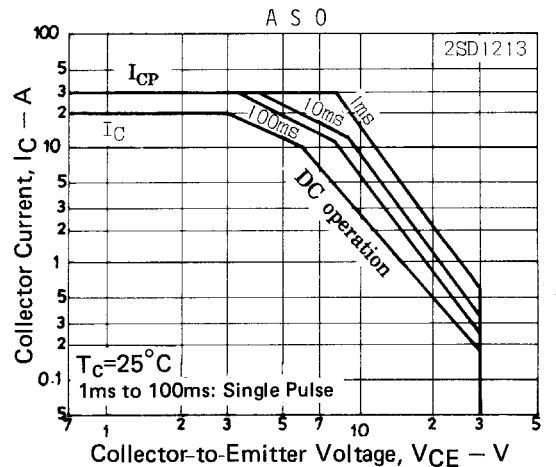
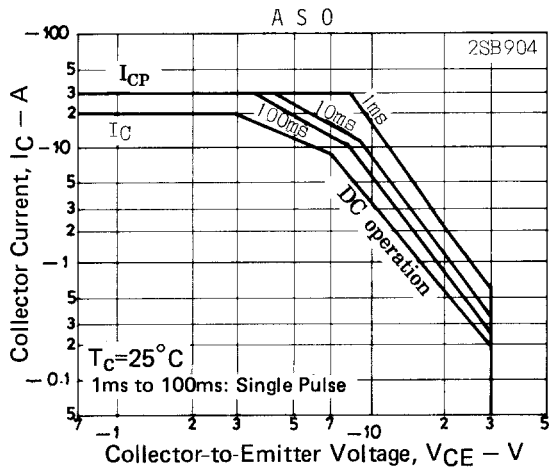
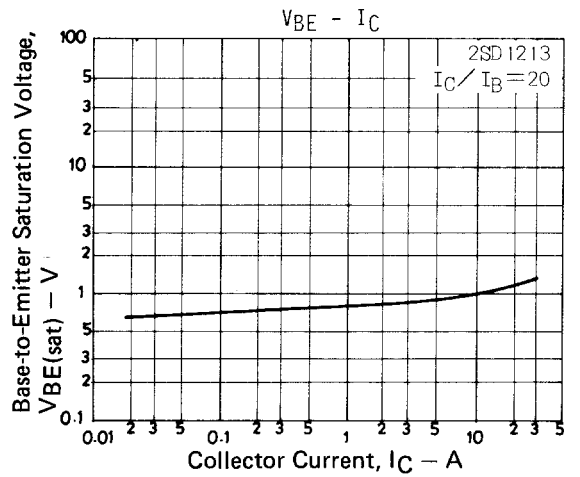
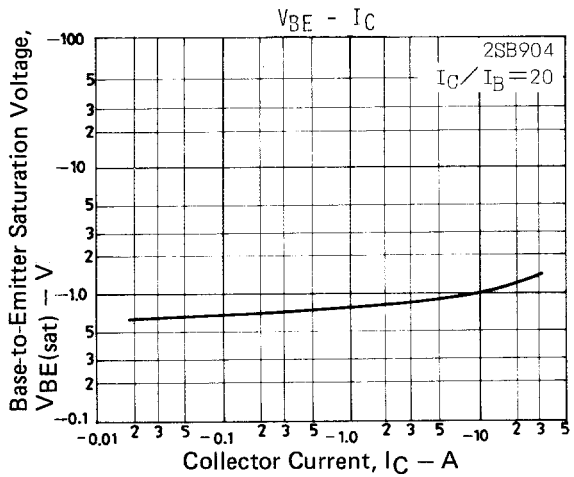
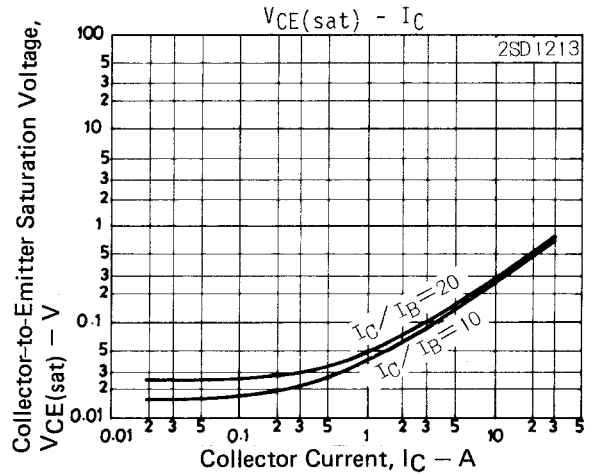
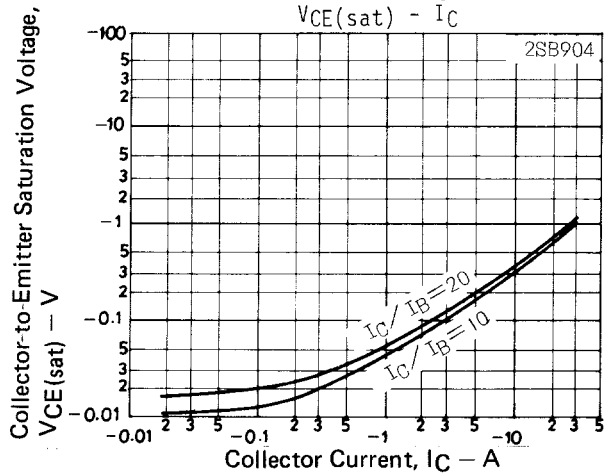
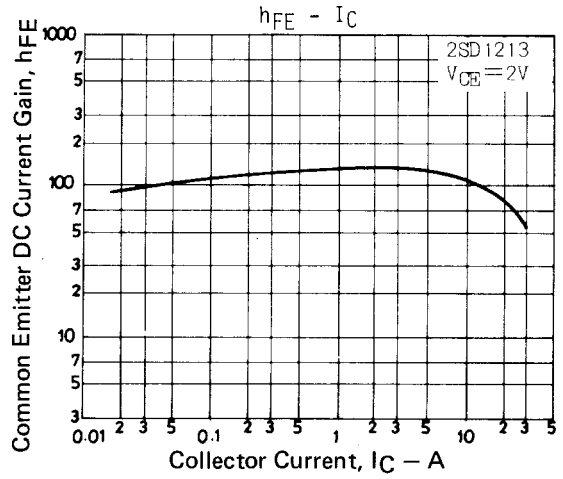
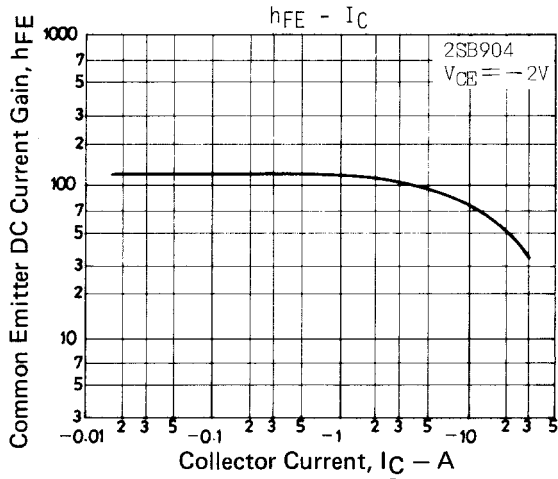


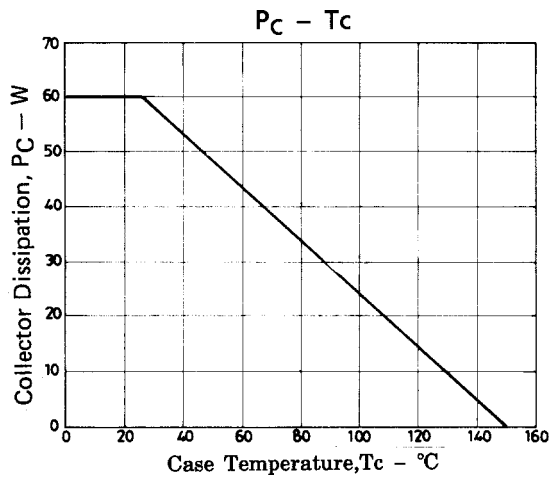
$$20I_{B1} = -20I_{B2} = I_C = 10A$$

(For PNP, the polarity is reversed)
Unit (resistance : Ω , capacitance : F)



2SB904/2SD1213





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