Ordering number:686I

PNP/NPN Epitaxial Planar Silicon Transistors

# 2SB824/2SD1060

## 50V/5A Switching Applications

## Applications

· Suitable for relay drivers, high-speed inverters, converters, and other general large-current switching.

## Features

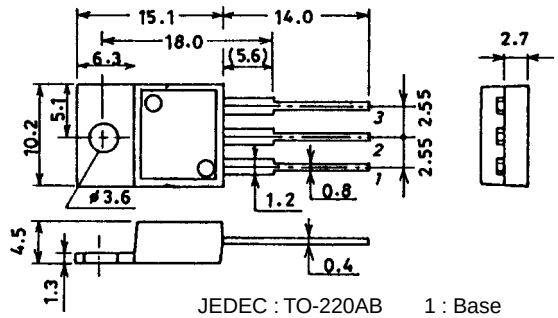
· Low collector-to-emitter saturation voltage : $V_{CE(sat)}$=(–)0.4V max/$I_C$=(–)3A, $I_B$=(–)0.3A.

## Package Dimensions

unit:mm

2010C

[2SB824/2SD1060]




JEDEC : TO-220AB
EIAJ : SC-46

1 : Base
2 : Collector
3 : Emitter

( ) : 2SB824

## 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 | $V_{CEO}$ | | (–)50 | V |
| Emitter-to-Base Voltage | $V_{EBO}$ | | (–)6 | V |
| Collector Current | $I_C$ | | (–)5 | A |
| Collector Current (Pulse) | $I_{CP}$ | | (–)9 | A |
| Collector Dissipation | $P_C$ | Tc=25˚C | 30 | 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, $I_C$=(–)3A | 30 | | | |
| Gain-Bandwidth Product | $f_T$ | $V_{CE}$=(–)5V, $I_C$=(–)1A | | 30 | | MHz |
| Output Capacitance | $C_{ob}$ | $V_{CB}$=(–)10V, f=1MHz | | 100 | | pF |
| | | | | (160) | | pF |

* : The 2SB824/2SD1060 are graded as follows by $h_{FE}$ at 1A :

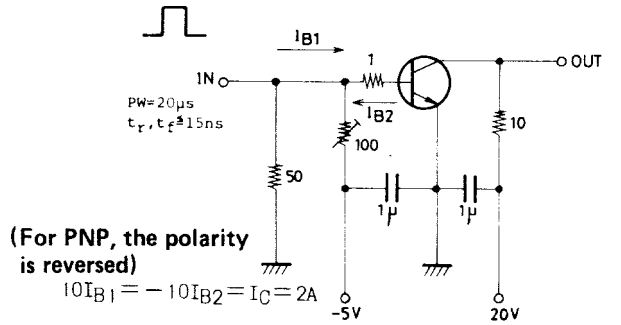
| | | |
|---|---|---|
| 70 Q 140 | 100 R 200 | 140 S 280 |



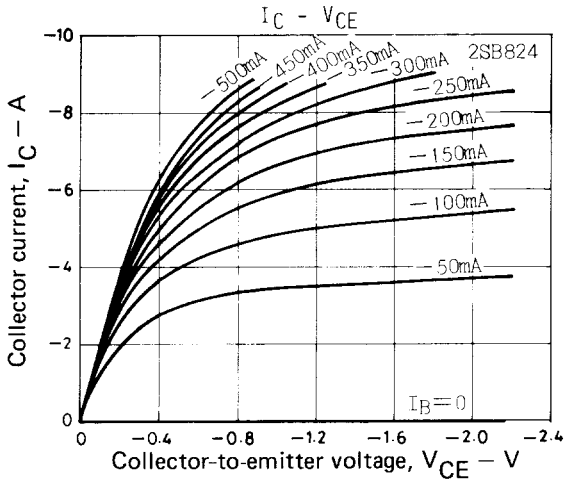

SANYO Electric Co.,Ltd. Semiconductor Bussiness Headquaters
TOKYO OFFICE Tokyo Bldg., 1-10, 1 Chome, Ueno, Taito-ku, TOKYO, 110-8534 JAPAN

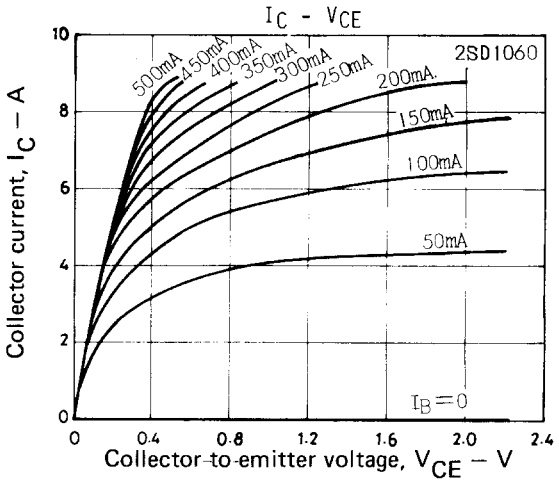
| Parameter | Symbol | Conditions | Ratings | | | Unit |
|---|---|---|---|---|---|---|
| | | | min | typ | max | |
| Collector-to-Emitter Saturation Voltage | $V_{CE(sat)}$ | $I_C$=(–)3A, $I_B$=(–)0.3A | | | (–)0.4 | V |
| Collector-to-Base Breakdown Voltage | $V_{(BR)CBO}$ | $I_C$=(–)1mA, $I_E$=0 | (–)60 | | | V |
| Collector-to-Emitter Breakdown Voltage | $V_{(BR)CEO}$ | $I_C$=(–)1mA, $R_{BE}$=∞ | (–)50 | | | 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. | | 0.1 | | μs |
| Storage Time | $t_{stg}$ | See specified test circuit. | | (0.7) | | μs |
| | | | | 1.4 | | μs |
| Fall Time | $t_f$ | See specified test circuit. | | 0.2 | | μs |

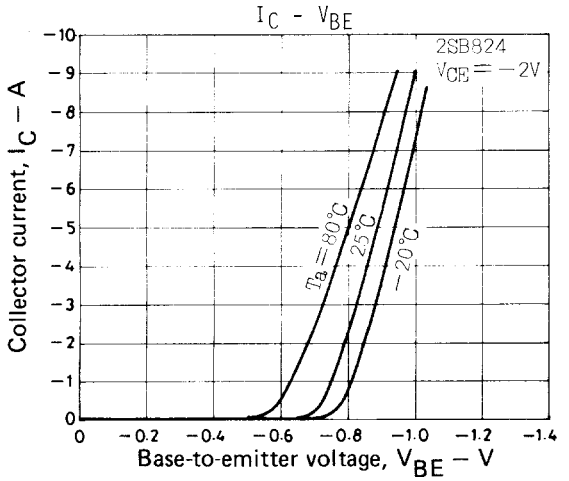
## Switching Time Test Circuit

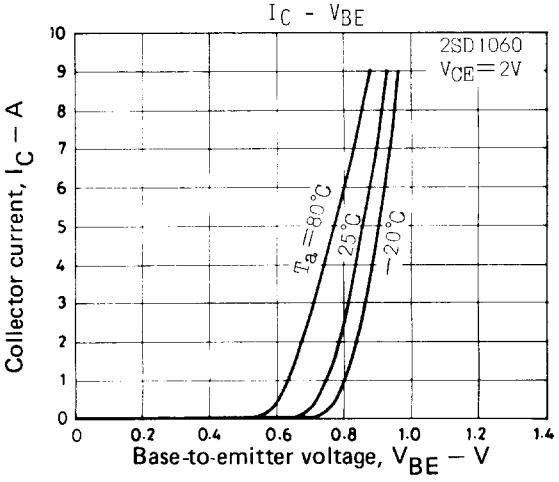


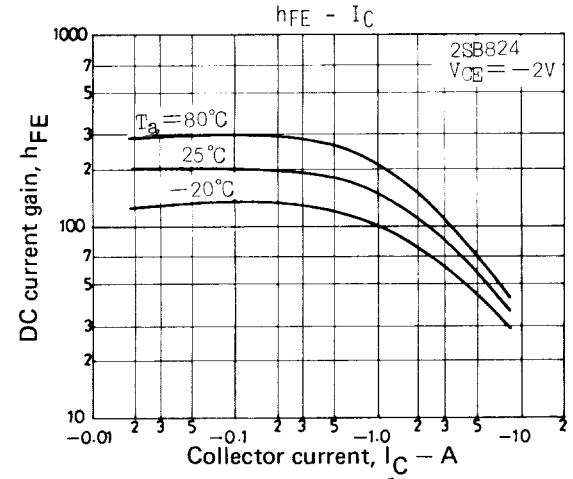

Unit (resistance : Ω, capacitance : F)

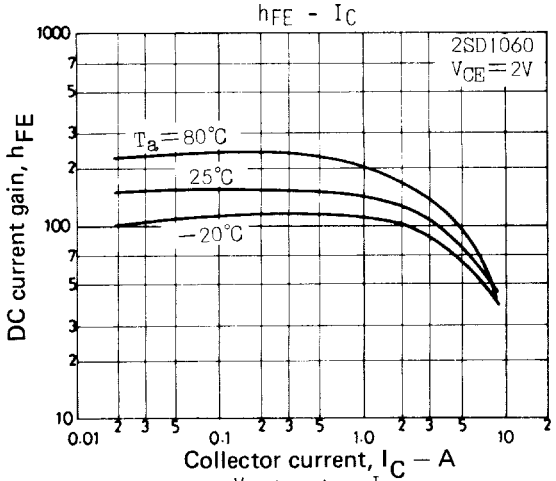


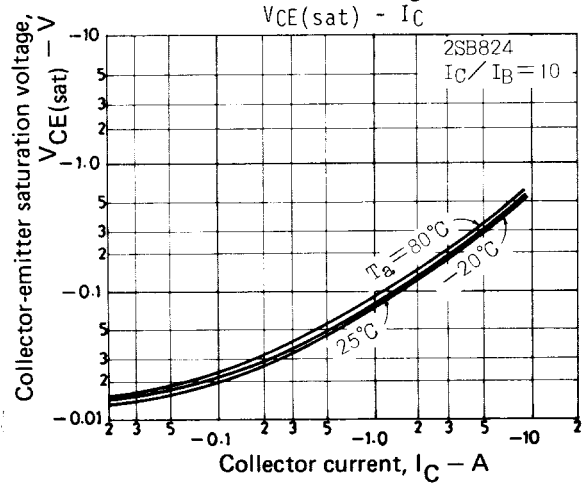



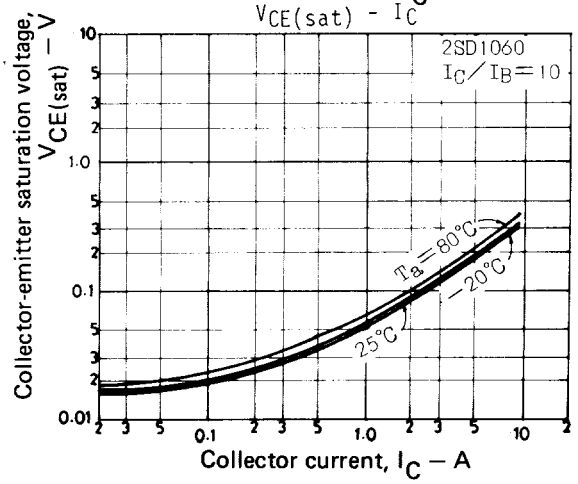



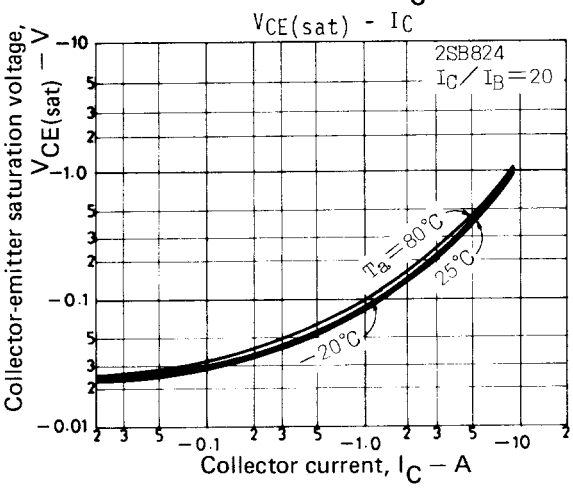



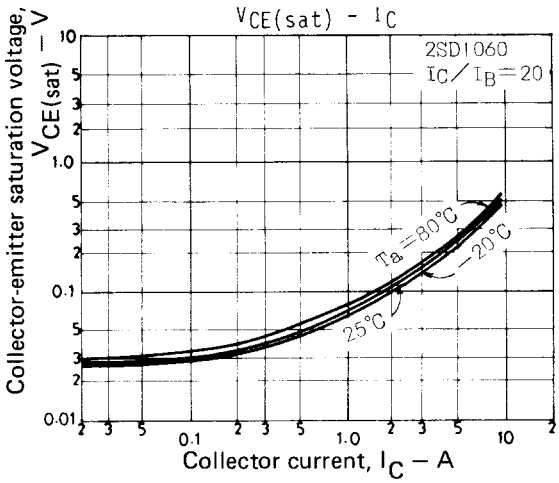

hFE - IC
2SB824
VCE=−2V
Ta=80°C
25°C
−20°C
DC current gain, hFE
Collector current, IC − A

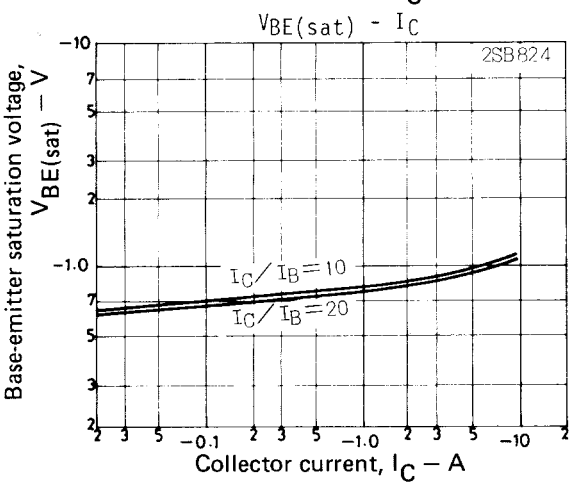

hFE - IC
2SD1060
VCE=2V
Ta=80°C
25°C
−20°C
DC current gain, hFE
Collector current, IC − A

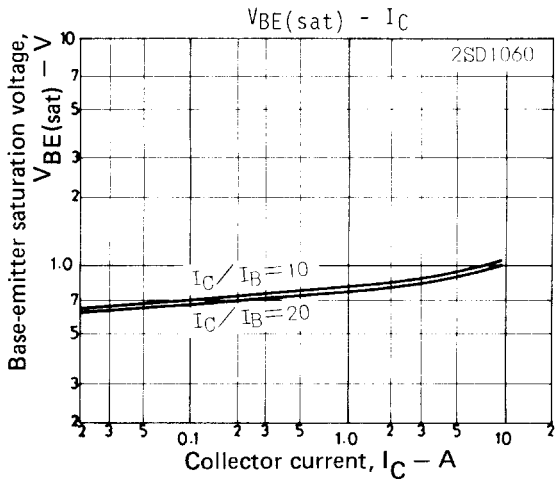

VCE(sat) - IC
2SB824
IC/IB=10
Ta=80°C
−20°C
25°C
Collector-emitter saturation voltage, VCE(sat) − V
Collector current, IC − A


VCE(sat) - IC
2SD1060
IC/IB=10
Ta=80°C
−20°C
25°C
Collector-emitter saturation voltage, VCE(sat) − V
Collector current, IC − A


VCE(sat) - IC
2SB824
IC/IB=20
Ta=80°C
25°C
−20°C
Collector-emitter saturation voltage, VCE(sat) − V
Collector current, IC − A


VCE(sat) - IC
2SD1060
IC/IB=20
Ta=80°C
−20°C
25°C
Collector-emitter saturation voltage, VCE(sat) − V
Collector current, IC − A


VBE(sat) - IC
2SB824
IC/IB=10
IC/IB=20
Base-emitter saturation voltage, VBE(sat) − V
Collector current, IC − A


VBE(sat) - IC
2SD1060
IC/IB=10
IC/IB=20
Base-emitter saturation voltage, VBE(sat) − V
Collector current, IC − A