Ordering number:ENN1032B

PNP/NPN Epitaxial Planar Silicon Transistors

# 2SA1248/2SC3116

## 160V/700mA Switching Applications

## Uses

· Color TV sound output, converters, inverters.

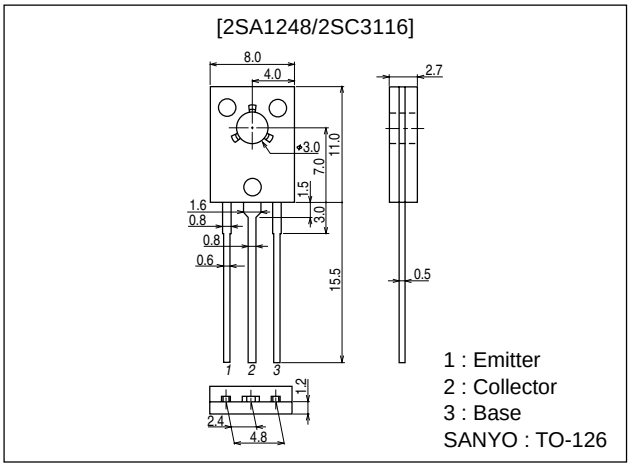
## Features

· High breakdown voltage.
· Large current capacity.
· Using MBIT process

## Package Dimensions

unit:mm

2009B




( ) : 2SA1248

## Specifications

### Absolute Maximum Ratings at Ta = 25˚C

| Parameter | Symbol | Conditions | Ratings | Unit |
|---|---|---|---|---|
| Collector-to-Base Voltage | $V_{CBO}$ | | (–)180 | V |
| Collector-to-Emitter Voltage | $V_{CEO}$ | | (–)160 | V |
| Emitter-to-Base Voltage | $V_{EBO}$ | | (–)6 | V |
| Collector Current | $I_C$ | | (–)0.7 | A |
| Collector Current (Pulse) | $I_{CP}$ | | (–)1.5 | A |
| Collector Dissipation | $P_C$ | | 1 | W |
| | | Tc=25˚C | 10 | 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 | $I_{CBO}$ | $V_{CB}$=(–)120V, $I_E$=0 | | | (–)1.0 | μA |
| Emitter Cutoff Current | $I_{EBO}$ | $V_{EB}$=(–)4V, $I_C$=0 | | | (–)1.0 | μA |
| DC Current Gain | $h_{FE}1$ | $V_{CE}$=(–)5V, $I_C$=(–)100mA | 100* | | 400* | |
| | $h_{FE}2$ | $V_{CE}$=(–)5V, $I_C$=(–)10mA | 90 | | | |
| Gain-Bandwidth Product | $f_T$ | $V_{CE}$=(–)10V, $I_C$=(–)50mA | | 120 | | MHz |

* : 2SA1248/2SC3116 are classified by follows according to $h_{FE}$ at 100mA.

Continued on next page.

| Rank | R | S | T |
|---|---|---|---|
| $h_{FE}$ | 100 to 200 | 140 to 280 | 200 to 400 |



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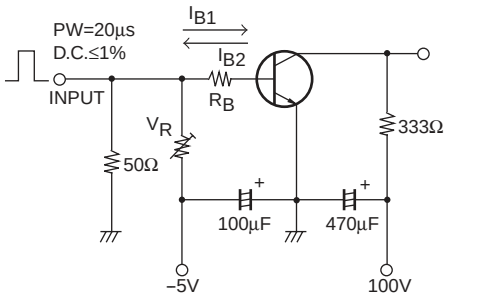
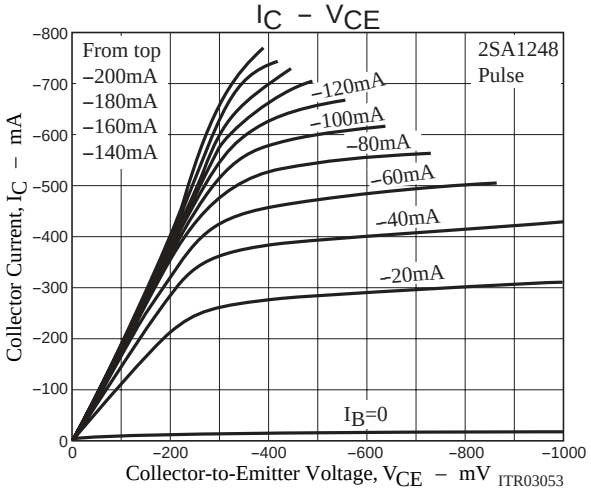
Continued from preceding page.

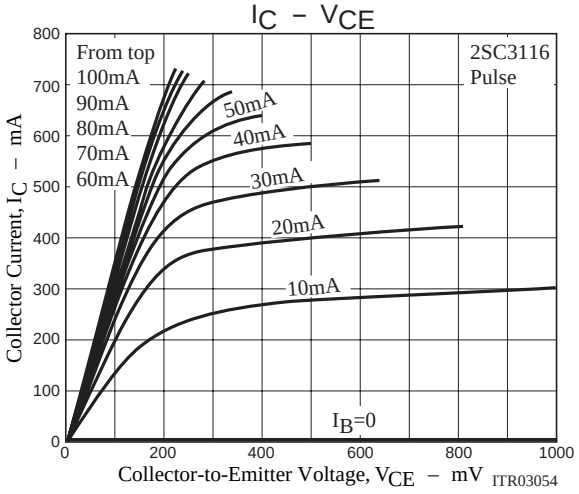
| Parameter | Symbol | Conditions | Ratings | | | Unit |
|---|---|---|---|---|---|---|
| | | | min | typ | max | |
| Common Base Output Capacitance | $C_{ob}$ | $V_{CB}$=(–)10V, f=1MHz | | 8 (11) | | pF |
| Collector-to-Emitter Saturation Voltage | $V_{CE(sat)}$ | $I_C$=(–)250mA, $I_B$=(–)25mA | | 0.12 (–0.2) | 0.4 (–0.5) | V |
| Base-to-Emitter Saturation Voltage | $V_{BE(sat)}$ | $I_C$=(–)250mA, $I_B$=(–)25mA | | (–)0.85 | (–)1.2 | V |
| Collector-to-Base Breakdown Voltage | $V_{(BR)CEO}$ | $I_C$=(–)10μA, $I_E$=0 | (–)180 | | | V |
| Collector-to-Emitter Breakdown Voltage | $V_{(BR)CEO}$ | IC=(–)1mA, $R_{BE}$=∞ | (–)160 | | | V |
| Emitter-to-Base Breakdown Voltage | $V_{(BR)EBO}$ | $I_E$=(–)10μA, $I_C$=0 | (–)6 | | | V |
| Turn-ON Time | $t_{on}$ | See Specified Test Circuit | | (60)50 | | ns |
| Storage Time | $t_{stg}$ | See Specified Test Circuit | | (900) 1000 | | ns |
| Fall Time | $t_f$ | See Specified Test Circuit | | (60)60 | | ns |

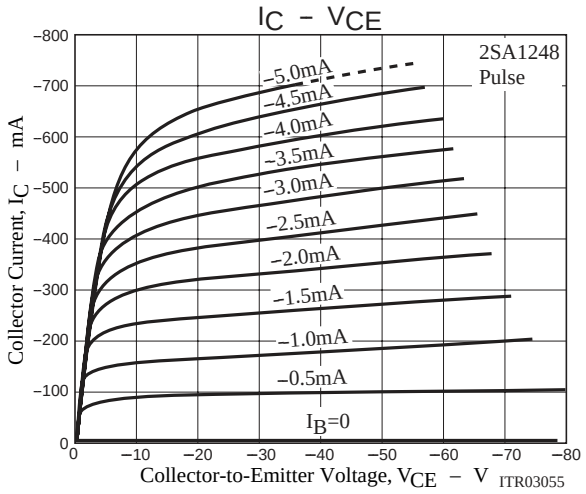
## Switching Time Test Circuit

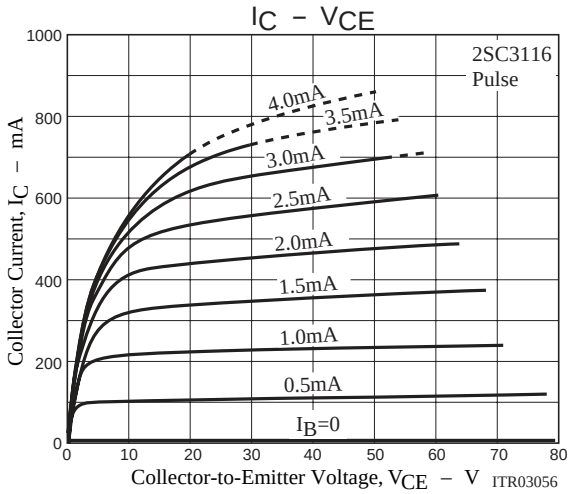


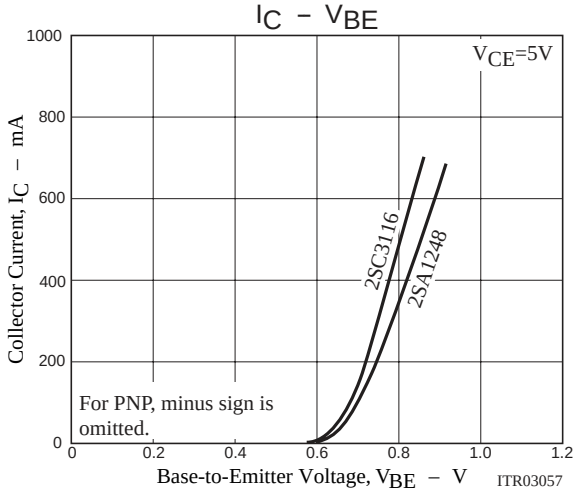

$20I_{B1}$=–$20I_{B2}$=$I_C$=300mA
(For PNP, the polarity is reversed.)

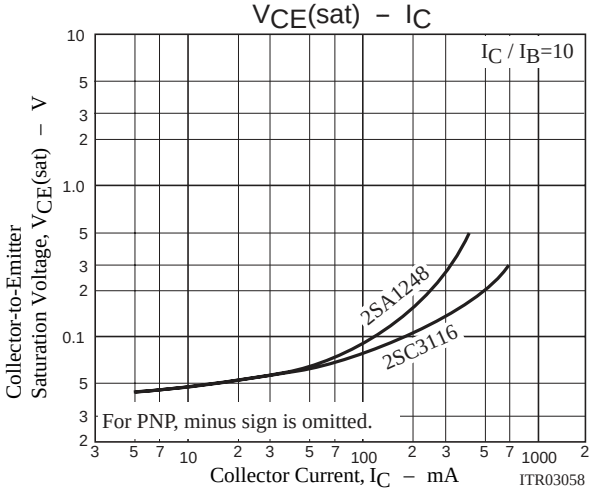


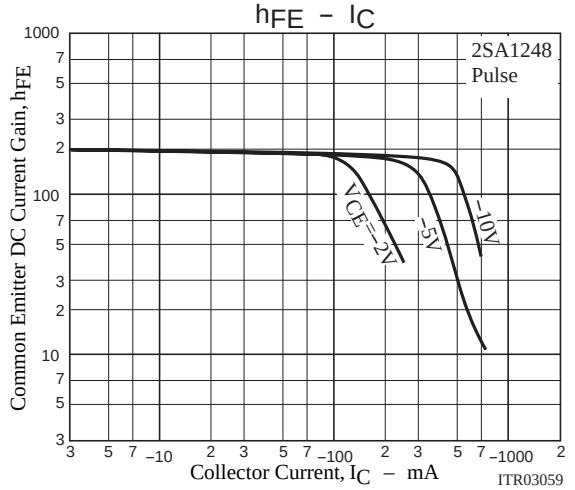



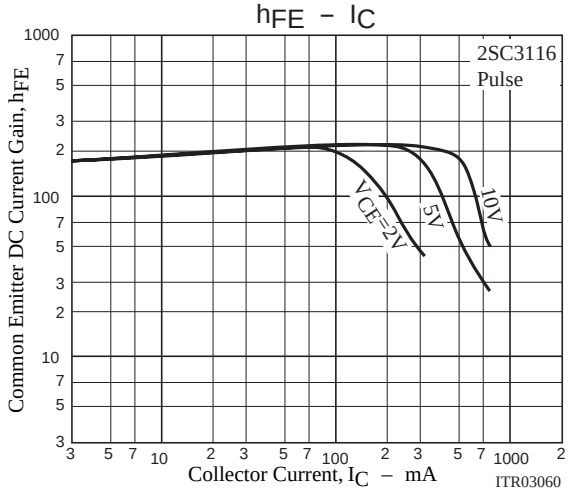



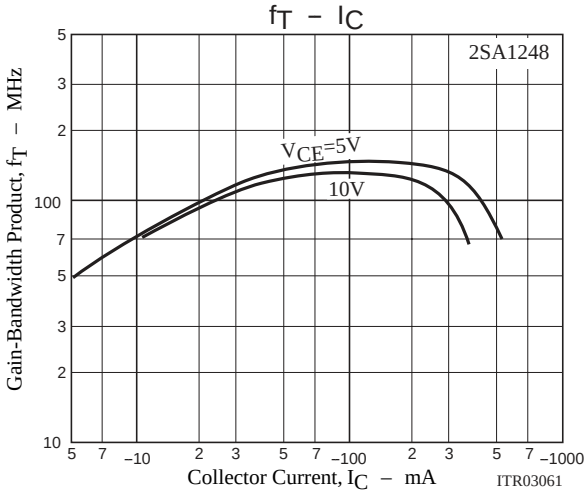



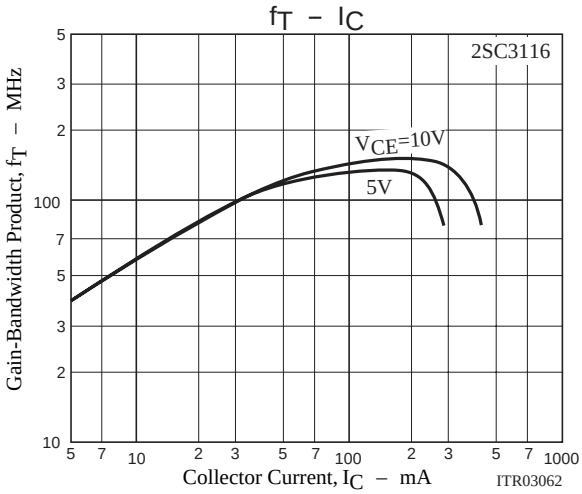

IC – VBE
VCE=5V
2SC3116
2SA1248
For PNP, minus sign is omitted.
Collector Current, IC – mA
Base-to-Emitter Voltage, VBE – V
ITR03057

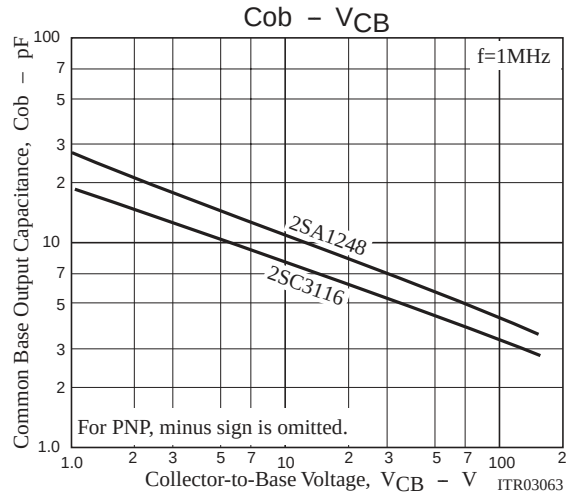

VCE(sat) – IC
IC / IB=10
2SA1248
2SC3116
For PNP, minus sign is omitted.
Collector-to-Emitter Saturation Voltage, VCE(sat) – V
Collector Current, IC – mA
ITR03058

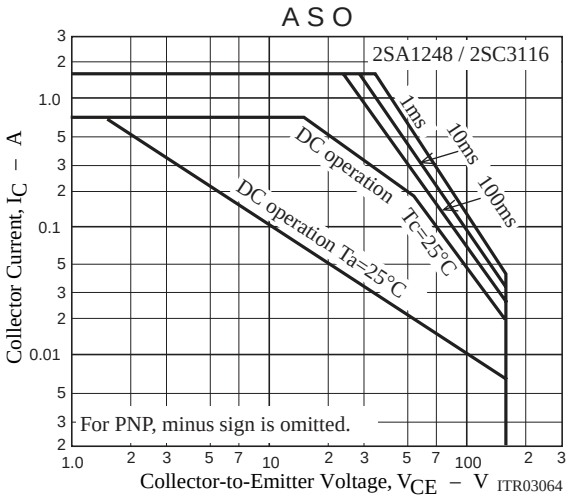

hFE – IC
2SA1248
Pulse
VCE=–2V
–5V
–10V
Common Emitter DC Current Gain, hFE
Collector Current, IC – mA
ITR03059


hFE – IC
2SC3116
Pulse
VCE=2V
5V
10V
Common Emitter DC Current Gain, hFE
Collector Current, IC – mA
ITR03060


fT – IC
2SA1248
VCE=5V
10V
Gain-Bandwidth Product, fT – MHz
Collector Current, IC – mA
ITR03061


fT – IC
2SC3116
VCE=10V
5V
Gain-Bandwidth Product, fT – MHz
Collector Current, IC – mA
ITR03062


Cob – VCB
f=1MHz
2SA1248
2SC3116
For PNP, minus sign is omitted.
Common Base Output Capacitance, Cob – pF
Collector-to-Base Voltage, VCB – V
ITR03063


A S O
2SA1248 / 2SC3116
1ms
10ms
100ms
DC operation Tc=25°C
DC operation Ta=25°C
For PNP, minus sign is omitted.
Collector Current, IC – A
Collector-to-Emitter Voltage, VCE – V
ITR03064