Ordering number : ENN8278A

SANYO Semiconductors
DATA SHEET

An ON Semiconductor Company

TR : NPN Epitaxial Planar Silicon Transistor
FET : N-Channel Silicon Junction FET

# CPH5901 — High-Frequency Amplifier. AM Amplifier. Low-Frequency Amplifier Applications

## Features

- Composite type with J-FET and NPN transistors contained in the CPH5 package, improving the mounting efficiency greatly.
- The CPH5901 is formed with two chips, being equivalent to the 2SK932 and the other the 2SC4639, placed in one package.
- Common drain and emitter.

## Specifications

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

| Parameter | Symbol | Conditions | Ratings | Unit |
|---|---|---|---|---|
| [FET] | | | | |
| Drain-to-Source Voltage | $V_{DSX}$ | | 15 | V |
| Gate-to-Drain Voltage | $V_{GDS}$ | | −15 | V |
| Gate Current | $I_G$ | | 10 | mA |
| Drain Current | $I_D$ | | 50 | mA |
| Allowable Power Dissipation | $P_D$ | Mounted on a ceramic board (600mm²×0.8mm) | 350 | mW |
| [TR] | | | | |
| Collector-to-Base Voltage | $V_{CBO}$ | | 55 | V |
| Collector-to-Emitter Voltage | $V_{CEO}$ | | 50 | V |
| Emitter-to-Base Voltage | $V_{EBO}$ | | 6 | V |
| Collector Current | $I_C$ | | 150 | mA |
| Collector Current (Pulse) | $I_{CP}$ | | 300 | mA |
| Base Current | $I_B$ | | 30 | mA |
| Collector Dissipation | $P_C$ | Mounted on a ceramic board (600mm²×0.8mm) | 350 | mW |
| [Common Ratings] | | | | |
| Total Dissipation | $P_T$ | Mounted on a ceramic board (600mm²×0.8mm) | 500 | mW |
| Junction Temperature | Tj | | 150 | °C |
| Storage Temperature | Tstg | | −55 to +150 | °C |

Marking : 1A




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

## Electrical Characteristics at Ta=25°C

| Parameter | Symbol | Conditions | Ratings | | | Unit |
|---|---|---|---|---|---|---|
| | | | min | typ | max | |
| [FET] | | | | | | |
| Gate-to-Drain Breakdown Voltage | $V_{(BR)GDS}$ | $I_G$=–10μA, $V_{DS}$=0V | –15 | | | V |
| Gate Cutoff Current | $I_{GSS}$ | $V_{GS}$=–10V, $V_{DS}$=0V | | | –1.0 | nA |
| Cutoff Voltage | $V_{GS}$(off) | $V_{DS}$=5V, $I_D$=100μA | –0.2 | –0.6 | –1.4 | V |
| Drain Current | $I_{DSS}$ | $V_{DS}$=5V, $V_{GS}$=0V | 6.0* | | 20.0* | mA |
| Forward Transfer Admittance | \|yfs\| | $V_{DS}$=5V, $V_{GS}$=0V, f=1kHz | 25 | 50 | | mS |
| Input Capacitance | Ciss | $V_{DS}$=5V, $V_{GS}$=0V, f=1MHz | | 10 | | pF |
| Reverse Transfer Capacitance | Crss | $V_{DS}$=5V, $V_{GS}$=0V, f=1MHz | | 3.0 | | pF |
| Noise Figure | NF | $V_{DS}$=5V, Rg=1kΩ, $I_D$=1mA, f=1kHz | | 1.5 | | dB |
| [TR] | | | | | | |
| Collector Cutoff Current | $I_{CBO}$ | $V_{CB}$=35V, $I_E$=0A | | | 0.1 | μA |
| Emitter Cutoff Current | $I_{EBO}$ | $V_{EB}$=4V, $I_C$=0A | | | 0.1 | μA |
| DC Current Gain | $h_{FE}$ | $V_{CE}$=6V, $I_C$=1mA | 135 | | 400 | |
| Gain-Bandwidth Product | $f_T$ | $V_{CE}$=6V, $I_C$=10mA | | 200 | | MHz |
| Output Capacitance | Cob | $V_{CB}$=6V, f=1MHz | | 1.7 | | pF |
| Collector-to-Emitter Saturation Voltage | $V_{CE}$(sat) | $I_C$=50mA, $I_B$=5mA | | 0.08 | 0.4 | V |
| Base-to-Emitter Saturation Voltage | $V_{BE}$(sat) | $I_C$=50mA, $I_B$=5mA | | 0.8 | 1.0 | V |
| Collector-to-Base Breakdown Voltage | $V_{(BR)CBO}$ | $I_C$=10μA, $I_E$=0A | 55 | | | V |
| Collector-to-Emitter Breakdown Voltage | $V_{(BR)CEO}$ | $I_C$=1mA, $R_{BE}$=∞ | 50 | | | V |
| Emitter-to-Base Breakdown Voltage | $V_{(BR)EBO}$ | $I_E$=10μA, $I_C$=0A | 6 | | | V |
| Turn-ON Time | $t_{on}$ | See specified Test Circuit. | | 0.15 | | μs |
| Storage Time | $t_{stg}$ | See specified Test Circuit. | | 0.75 | | μs |
| Fall Time | $t_f$ | See specified Test Circuit. | | 0.20 | | μs |

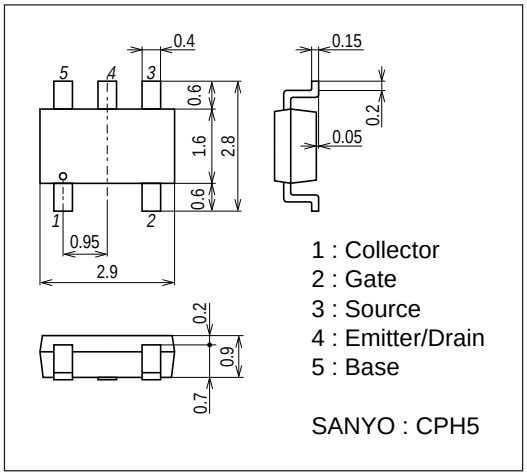
* : The CPH5901 is classified by $I_{DSS}$ as follows : (unit : mA)

| Rank | F | G |
|---|---|---|
| $I_{DSS}$ | 6.0 to 12.0 | 10.0 to 20.0 |

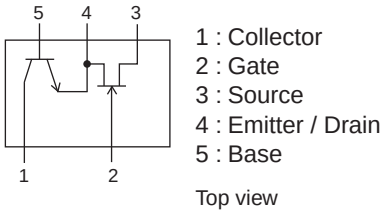
## Package Dimensions

unit : mm

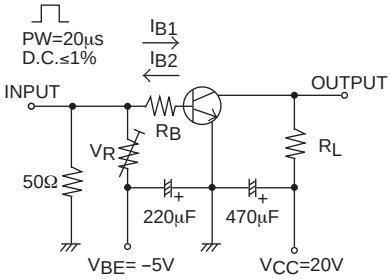
7017-007



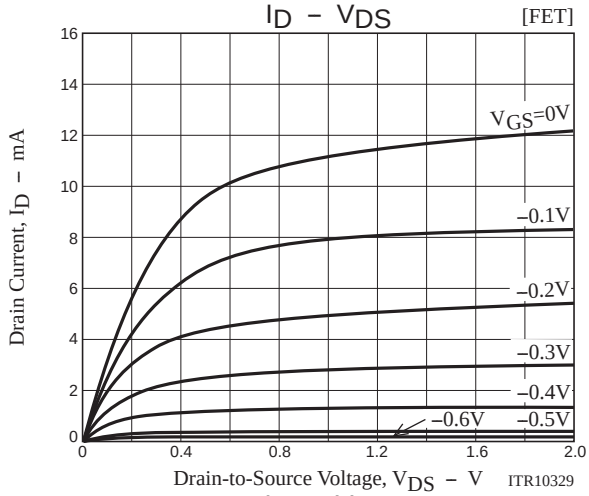

## Electrical Connection

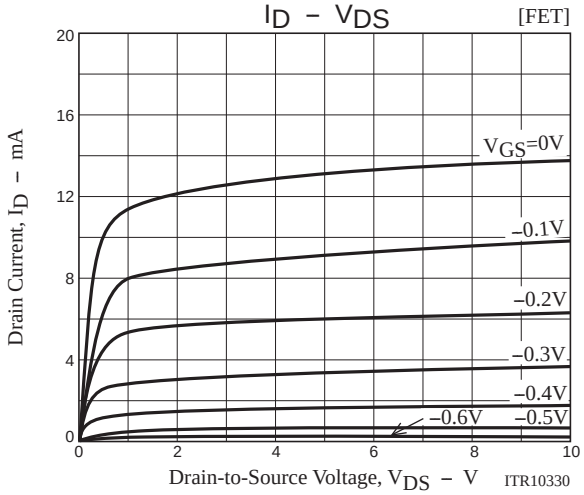


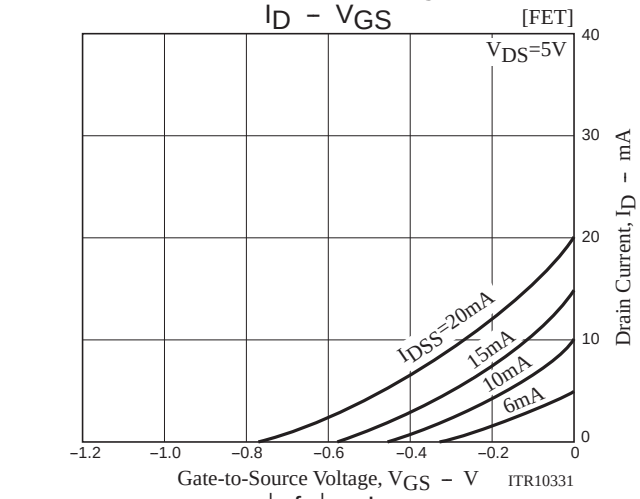

## Switching Time Test Circuit

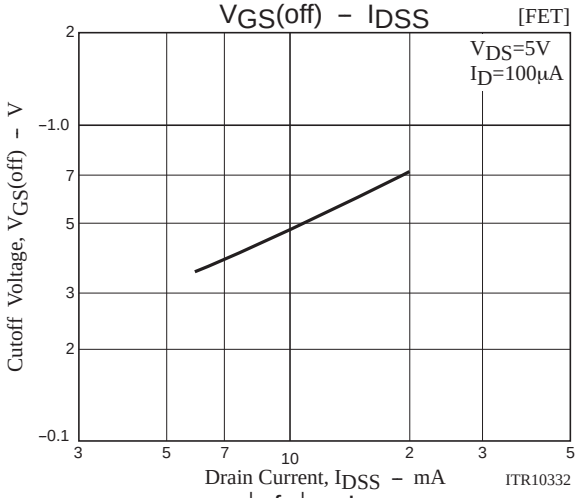


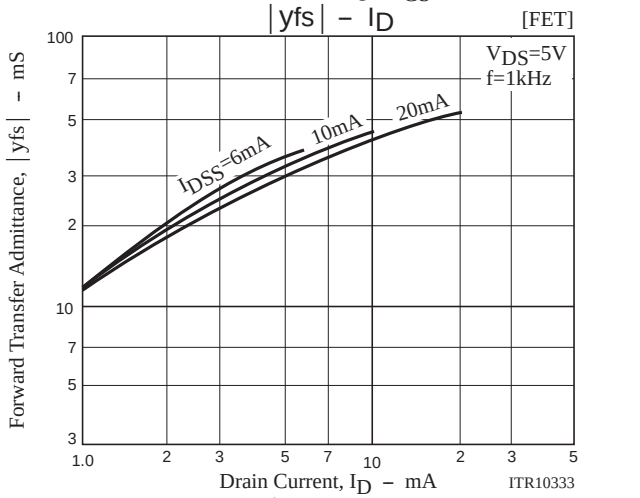

$10I_{B1}$= –$10I_{B2}$= $I_C$=10mA

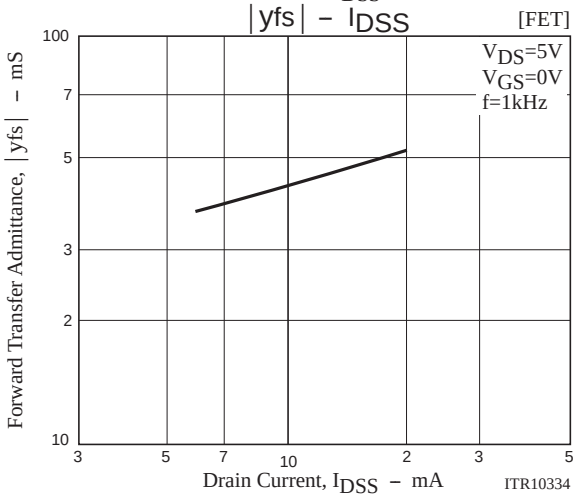

ID – VDS [FET]
Drain Current, ID – mA
VGS=0V
–0.1V
–0.2V
–0.3V
–0.4V
–0.5V
–0.6V
Drain-to-Source Voltage, VDS – V
ITR10329

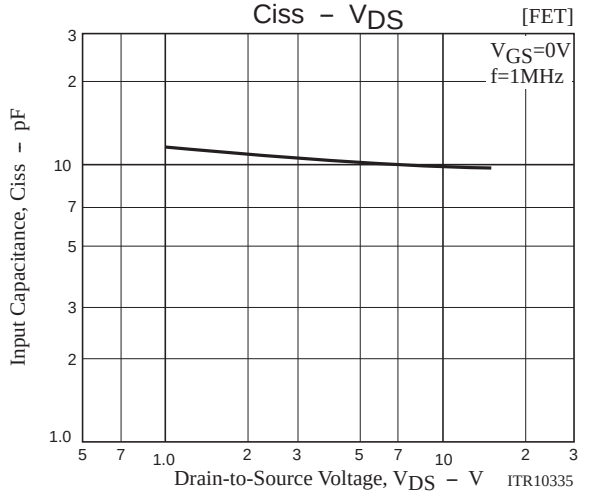

ID – VDS [FET]
Drain Current, ID – mA
VGS=0V
–0.1V
–0.2V
–0.3V
–0.4V
–0.5V
–0.6V
Drain-to-Source Voltage, VDS – V
ITR10330

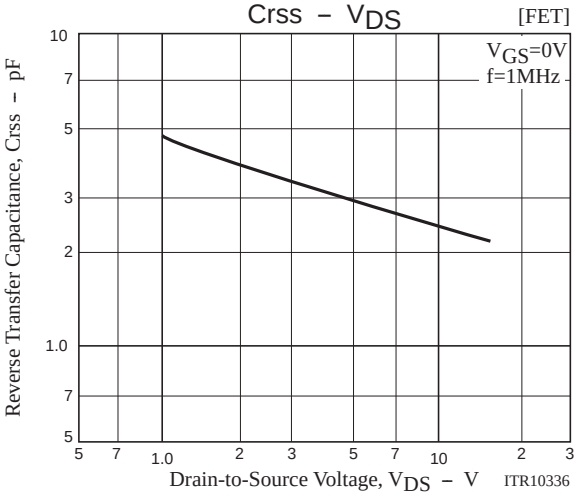

ID – VGS [FET]
VDS=5V
IDSS=20mA
15mA
10mA
6mA
Drain Current, ID – mA
Gate-to-Source Voltage, VGS – V
ITR10331


VGS(off) – IDSS [FET]
VDS=5V
ID=100μA
Cutoff Voltage, VGS(off) – V
Drain Current, IDSS – mA
ITR10332

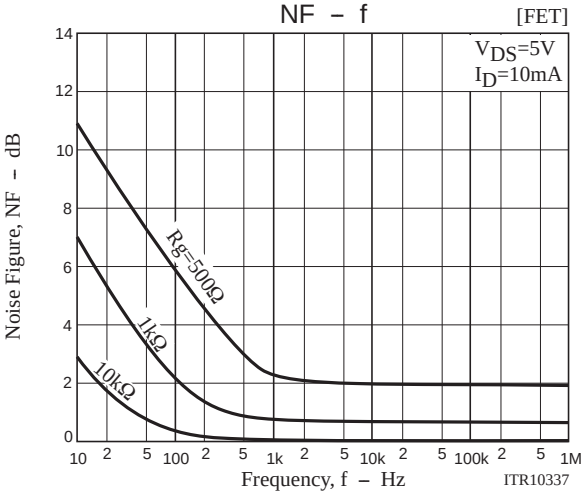

|yfs| – ID [FET]
VDS=5V
f=1kHz
IDSS=6mA
10mA
20mA
Forward Transfer Admittance, |yfs| – mS
Drain Current, ID – mA
ITR10333


|yfs| – IDSS [FET]
VDS=5V
VGS=0V
f=1kHz
Forward Transfer Admittance, |yfs| – mS
Drain Current, IDSS – mA
ITR10334

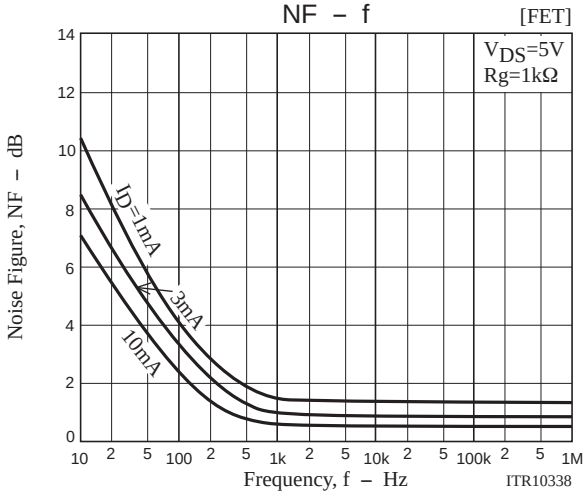

Ciss – VDS [FET]
VGS=0V
f=1MHz
Input Capacitance, Ciss – pF
Drain-to-Source Voltage, VDS – V
ITR10335


Crss – VDS [FET]
VGS=0V
f=1MHz
Reverse Transfer Capacitance, Crss – pF
Drain-to-Source Voltage, VDS – V
ITR10336

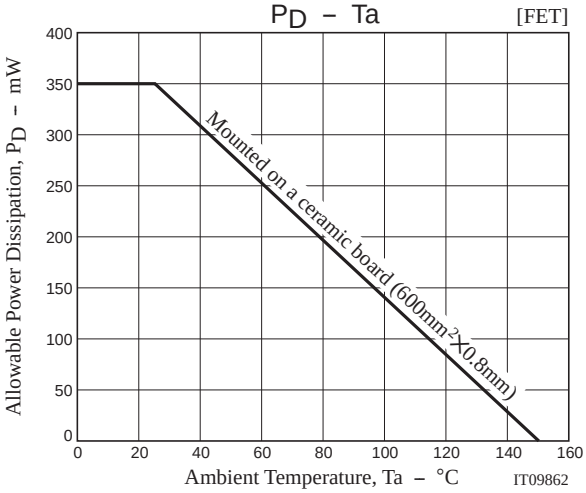
NF – f [FET]



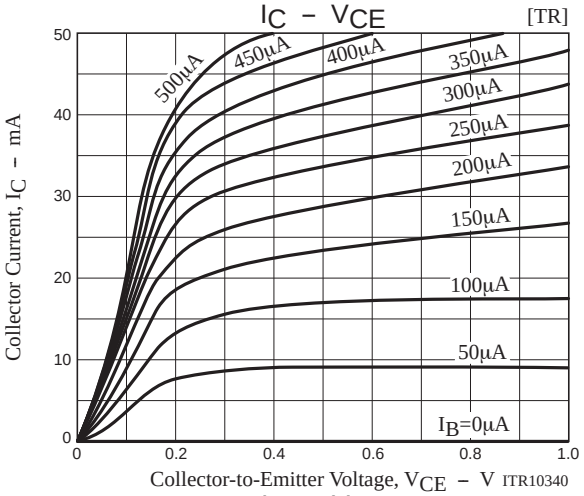

NF – f [FET]



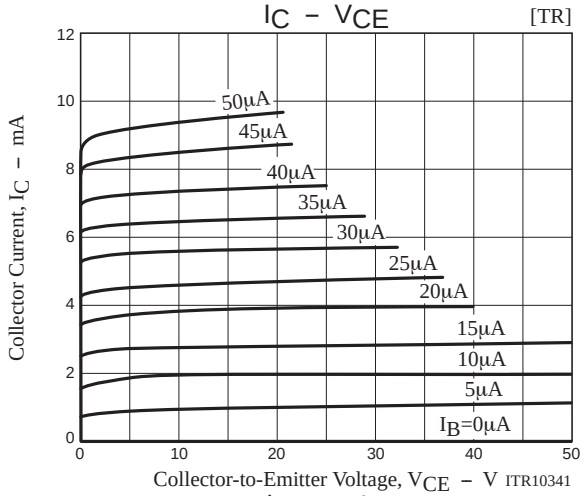

$P_D$ – Ta [FET]



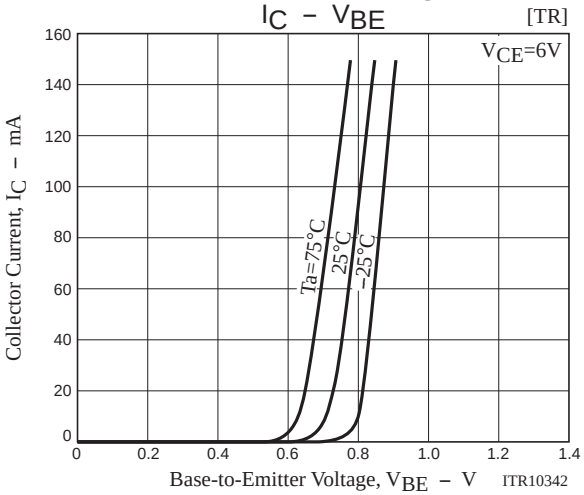

$I_C$ – $V_{CE}$ [TR]



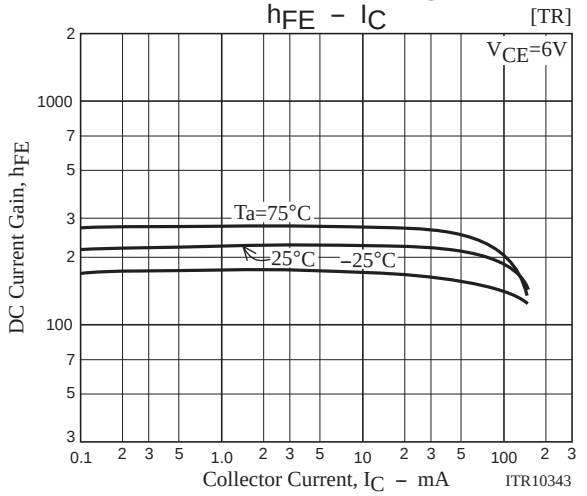

$I_C$ – $V_{CE}$ [TR]

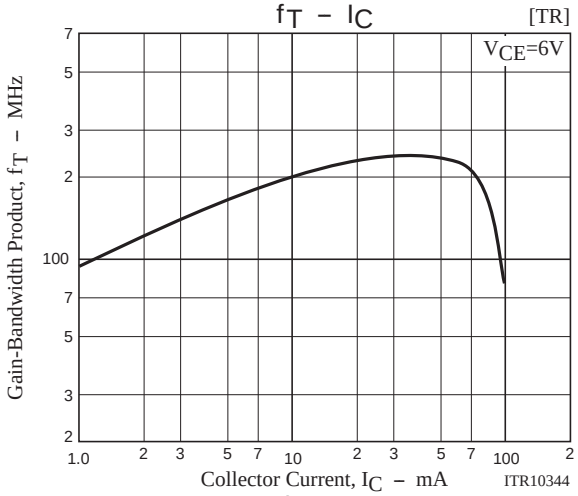


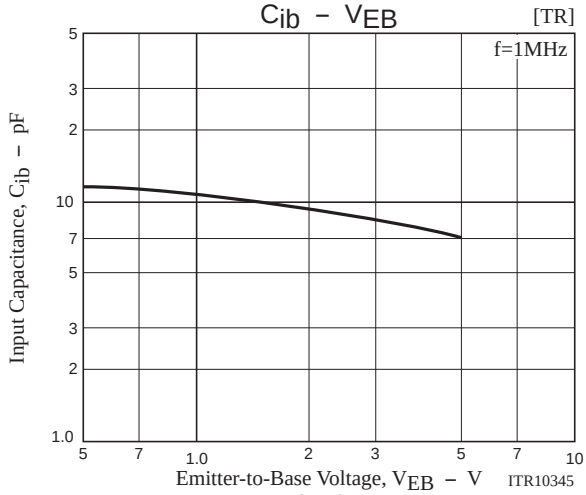

$I_C$ – $V_{BE}$ [TR]

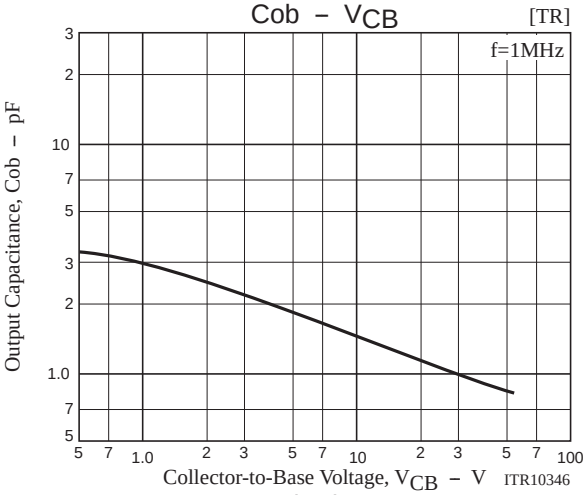


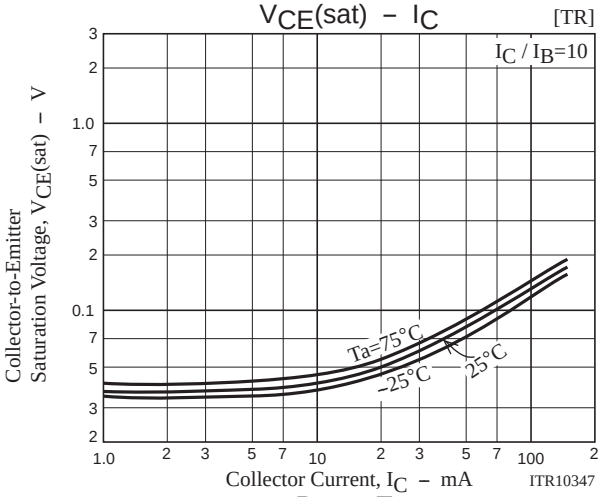

$h_{FE}$ – $I_C$ [TR]

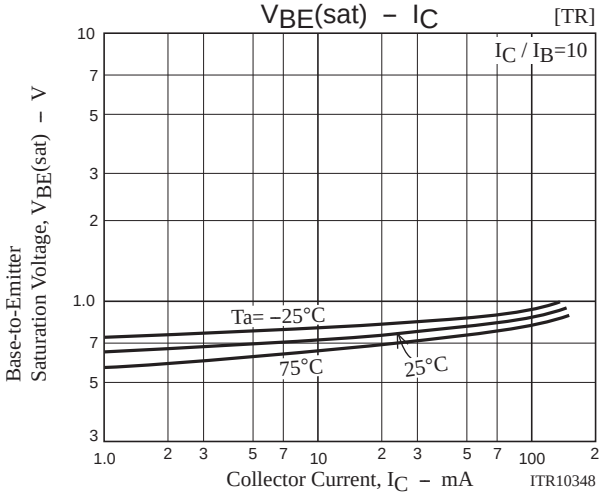


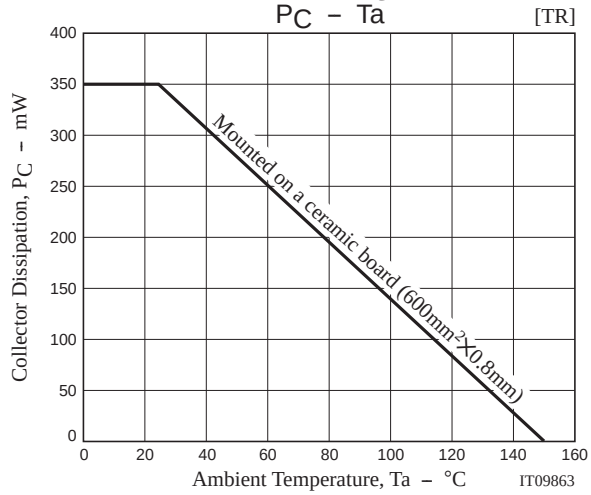

fT – IC
[TR]
VCE=6V
Gain-Bandwidth Product, fT – MHz
Collector Current, IC – mA
ITR10344


Cib – VEB
[TR]
f=1MHz
Input Capacitance, Cib – pF
Emitter-to-Base Voltage, VEB – V
ITR10345


Cob – VCB
[TR]
f=1MHz
Output Capacitance, Cob – pF
Collector-to-Base Voltage, VCB – V
ITR10346


VCE(sat) – IC
[TR]
IC / IB=10
Collector-to-Emitter Saturation Voltage, VCE(sat) – V
Ta=75°C
25°C
–25°C
Collector Current, IC – mA
ITR10347


VBE(sat) – IC
[TR]
IC / IB=10
Base-to-Emitter Saturation Voltage, VBE(sat) – V
Ta= –25°C
75°C
25°C
Collector Current, IC – mA
ITR10348


PC – Ta
[TR]
Collector Dissipation, PC – mW
Mounted on a ceramic board (600mm2×0.8mm)
Ambient Temperature, Ta – °C
IT09863