Ordering number : ENA0492

SANYO Semiconductors

DATA SHEET

# CPH5518 — PNP / NPN Epitaxial Planar Silicon Transistors
# High-Current Switching Applications

## Applications

- Relay drivers, lamp drivers, motor drivers.

## Features

- Composite type with a PNP transistor and an NPN transistor contained in one package, facilitating high-density mounting.
- The CPH5518 consists of two chips encapsulated in a package which are equivalent to the CPH3116 and the CPH3216, respectively.
- Ultrasmall package facilitate miniaturization in end products (0.9mm mounting height).

( ) : PNP

## Specifications

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

| Parameter | Symbol | Conditions | Ratings | Unit |
|---|---|---|---|---|
| Collector-to-Base Voltage | $V_{CBO}$ | | (-50)80 | V |
| Collector-to-Emitter Voltage | $V_{CEO}$ | | (-)50 | V |
| Emitter-to-Base Voltage | $V_{EBO}$ | | (-)5 | V |
| Collector Current | $I_C$ | | (-)1.0 | A |
| Collector Current (Pulse) | $I_{CP}$ | | (-)3.0 | A |
| Base Current | $I_B$ | | (-)200 | mA |
| Collector Dissipation | $P_C$ | Mounted on a ceramic board (600mm²×0.8mm) 1unit | 0.9 | W |
| Total Dissipation | $P_C$ | Mounted on a ceramic board (600mm²×0.8mm) | 1.2 | W |
| Junction Temperature | Tj | | 150 | °C |
| Storage Temperature | Tstg | | -55 to +150 | °C |

Marking: EN



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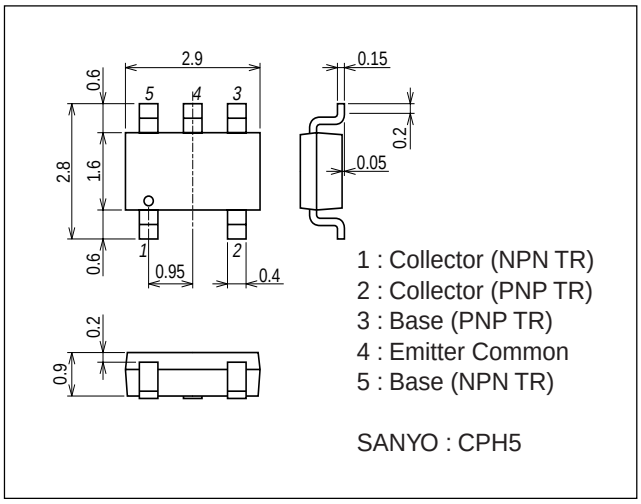
## Electrical Characteristics at Ta=25°C

| Parameter | Symbol | Conditions | Ratings | | | Unit |
|---|---|---|---|---|---|---|
| | | | min | typ | max | |
| Collector Cutoff Current | $I_{CBO}$ | $V_{CB}$=(-)40V, $I_E$=0A | | | (-)0.1 | μA |
| Emitter Cutoff Current | $I_{EBO}$ | $V_{EB}$=(-)4V, $I_C$=0A | | | (-)0.1 | μA |
| DC Current Gain | $h_{FE}$ | $V_{CE}$=(-)2V, $I_C$=(-)100mA | 200 | | 560 | |
| Gain-Bandwideth Product | $f_T$ | $V_{CE}$=(-)10V, $I_C$=(-)300mA | | 420 | | MHz |
| Output Capacitance | Cob | $V_{CB}$=(-)10V, f=1MHz | | (9)6 | | pF |
| Collector-to-Emitter Saturation Voltage | $V_{CE}$(sat) | $I_C$=(-)500mA, $I_B$=(-)10mA | | (-230) | (-380) | mV |
| | | | | 130 | 190 | mV |
| | | $I_C$=(-)300A, $I_B$=(-)6mA | | (-125) | (-200) | mV |
| | | | | 90 | 135 | mV |
| Base-to-Emitter Saturation Voltage | $V_{BE}$(sat) | $I_C$=(-)500mA, $I_B$=(-)10mA | | (-)0.81 | (-)1.2 | V |
| Collector-to-Base Breakdown Voltage | $V_{(BR)CBO}$ | $I_C$=(-)10μA, $I_E$=0A | (-50)80 | | | 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 | (-)5 | | | V |
| Turn-ON Time | $t_{on}$ | See specified Test Circuit. | | (36)38 | | ns |
| Storage Time | $t_{stg}$ | See specified Test Circuit. | | (173)332 | | ns |
| Fall Time | $t_f$ | See specified Test Circuit. | | (28)40 | | ns |

## Package Dimensions

unit : mm (typ)

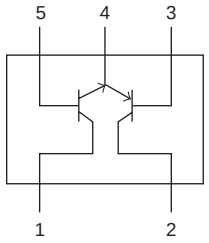
7017A-009




1 : Collector (NPN TR)
2 : Collector (PNP TR)
3 : Base (PNP TR)
4 : Emitter Common
5 : Base (NPN TR)

SANYO : CPH5

## Electlical Connection




1 : Collector (NPN TR)
2 : Collector (PNP TR)
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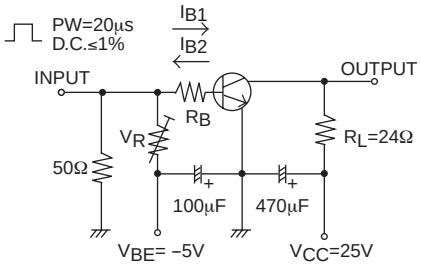
4 : Emitter Common
5 : Base (NPN TR)

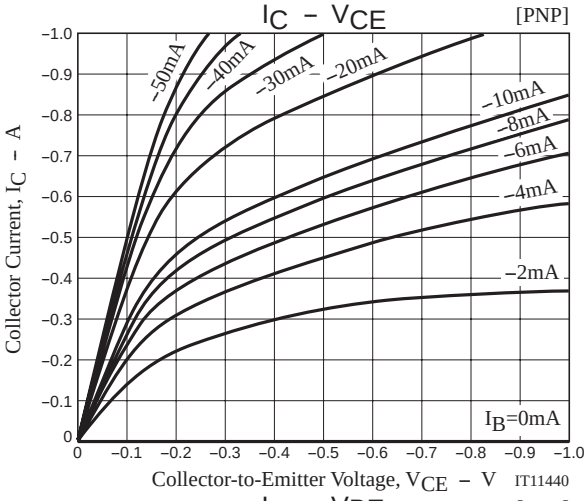
Top view

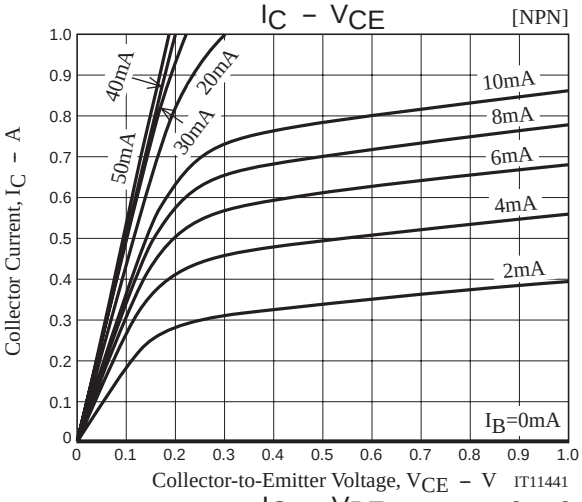
## Switching Time Test Circuit

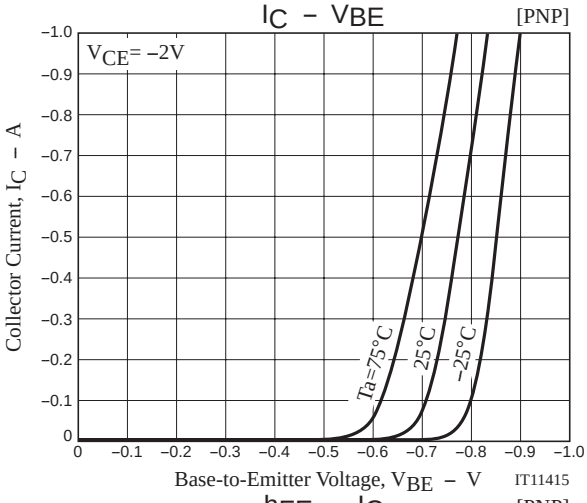


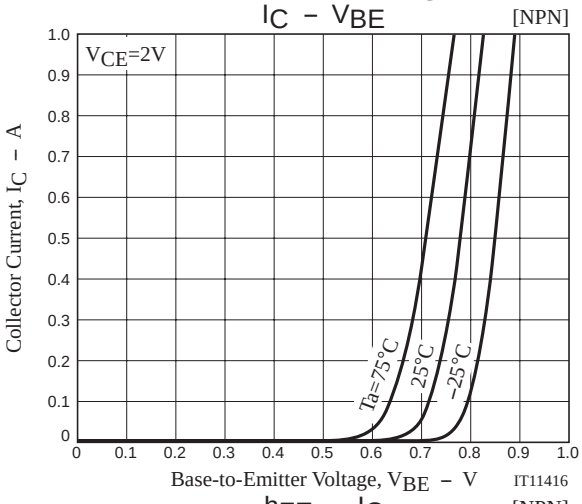

$I_C$=20$I_{B1}$= −20$I_{B2}$=500mA

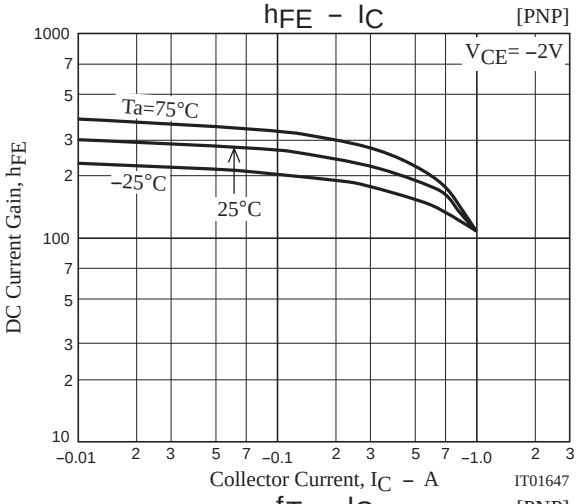
(For PNP, the polarity is reversed.)

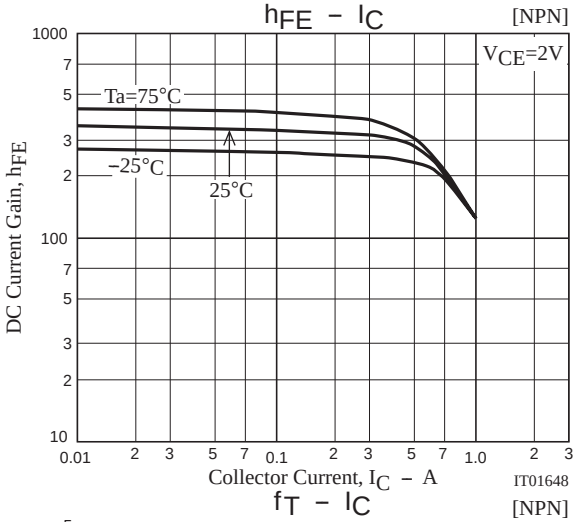

IC – VCE
[PNP]
Collector Current, IC – A
Collector-to-Emitter Voltage, VCE – V
IT11440
–50mA
–40mA
–30mA
–20mA
–10mA
–8mA
–6mA
–4mA
–2mA
IB=0mA

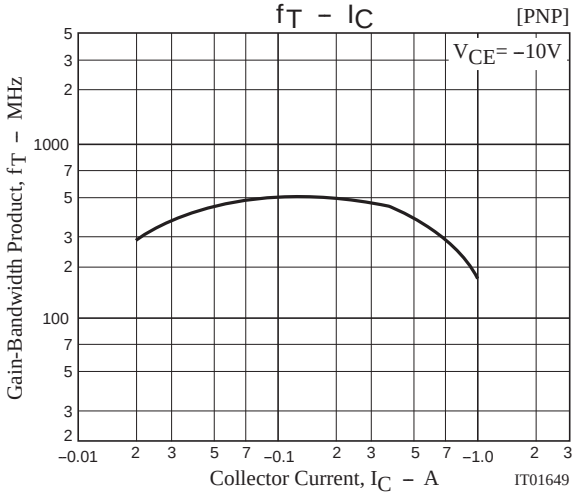

IC – VCE
[NPN]
Collector Current, IC – A
Collector-to-Emitter Voltage, VCE – V
IT11441
50mA
40mA
30mA
20mA
10mA
8mA
6mA
4mA
2mA
IB=0mA

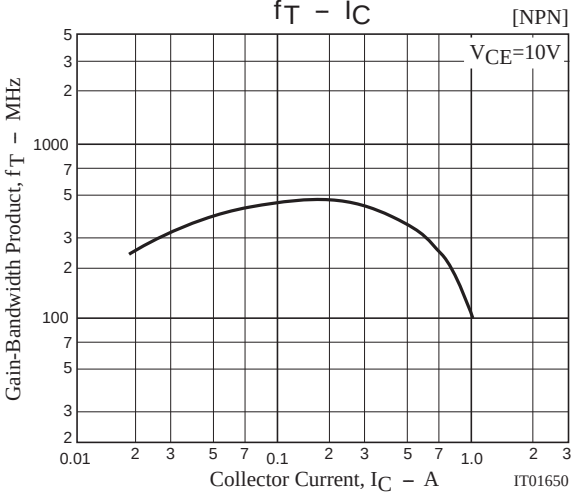

IC – VBE
[PNP]
VCE= –2V
Collector Current, IC – A
Base-to-Emitter Voltage, VBE – V
IT11415
Ta=75°C
25°C
–25°C

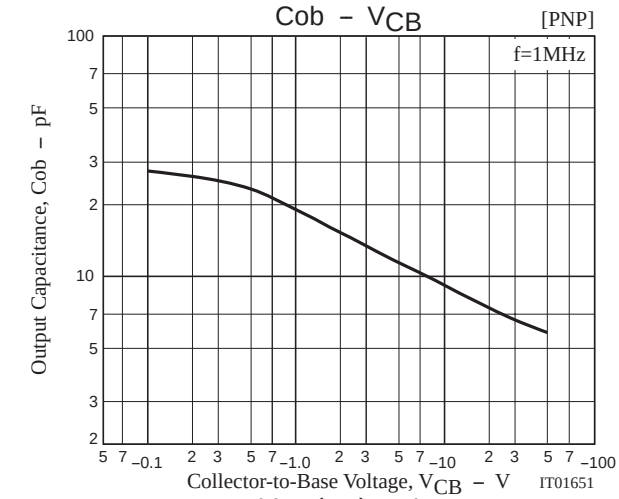

IC – VBE
[NPN]
VCE=2V
Collector Current, IC – A
Base-to-Emitter Voltage, VBE – V
IT11416
Ta=75°C
25°C
–25°C

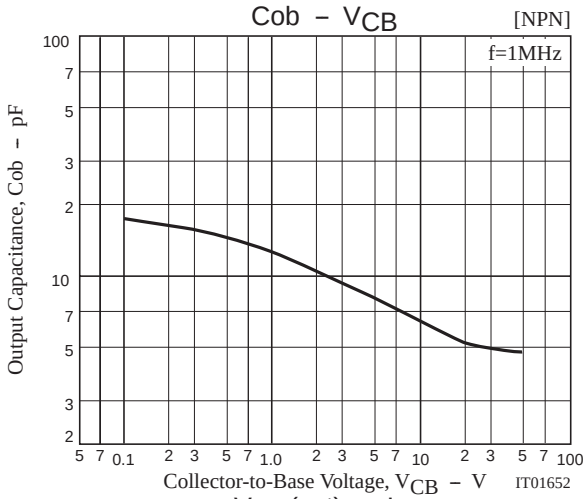

hFE – IC
[PNP]
VCE= –2V
DC Current Gain, hFE
Collector Current, IC – A
IT01647
Ta=75°C
–25°C
25°C

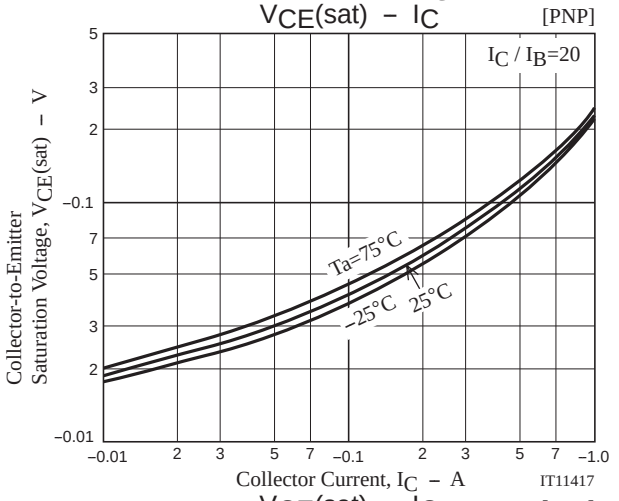

hFE – IC
[NPN]
VCE=2V
DC Current Gain, hFE
Collector Current, IC – A
IT01648
Ta=75°C
–25°C
25°C

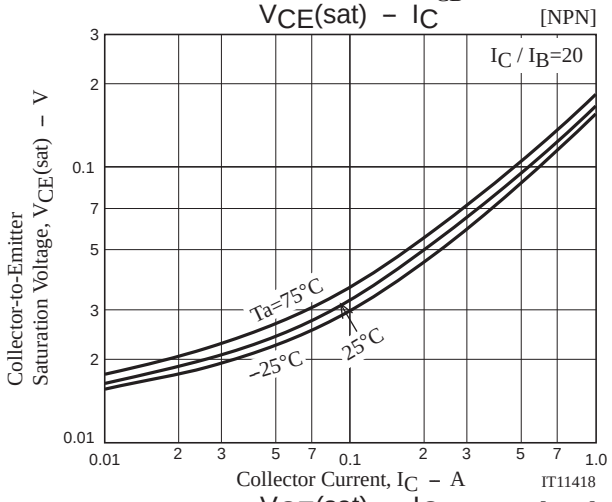

fT – IC
[PNP]
VCE= –10V
Gain-Bandwidth Product, fT – MHz
Collector Current, IC – A
IT01649

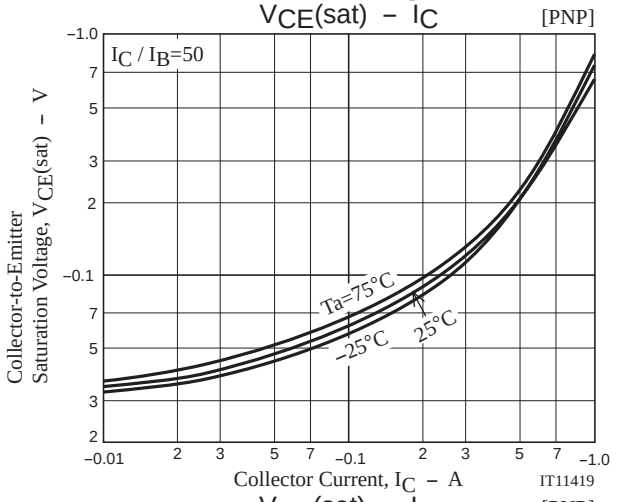

fT – IC
[NPN]
VCE=10V
Gain-Bandwidth Product, fT – MHz
Collector Current, IC – A
IT01650

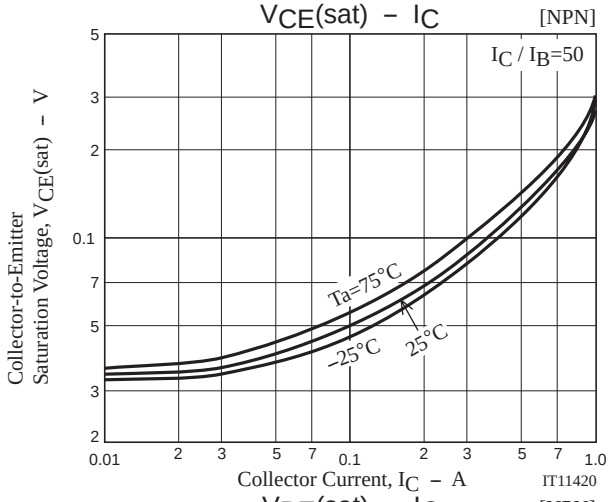

Cob – VCB [PNP]
f=1MHz
Output Capacitance, Cob – pF
Collector-to-Base Voltage, VCB – V
IT01651

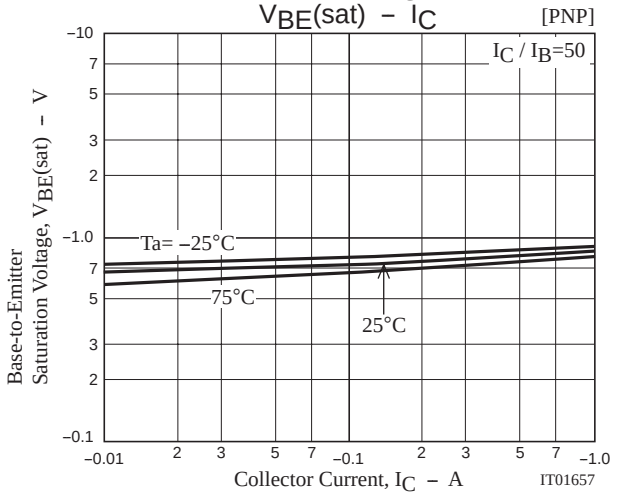

Cob – VCB [NPN]
f=1MHz
Output Capacitance, Cob – pF
Collector-to-Base Voltage, VCB – V
IT01652

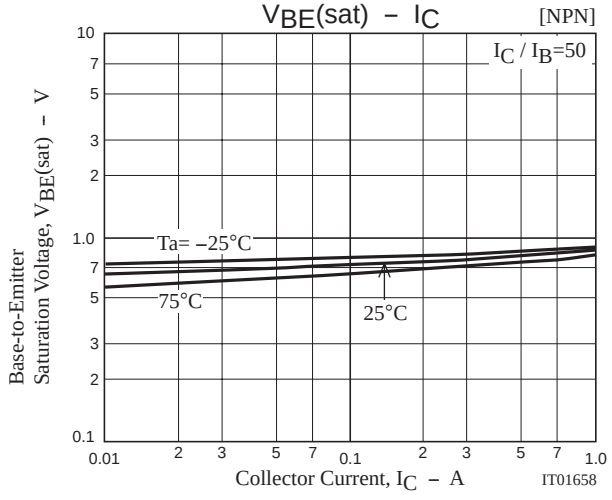

VCE(sat) – IC [PNP]
IC / IB=20
Ta=75°C
–25°C
25°C
Collector-to-Emitter Saturation Voltage, VCE(sat) – V
Collector Current, IC – A
IT11417


VCE(sat) – IC [NPN]
IC / IB=20
Ta=75°C
–25°C
25°C
Collector-to-Emitter Saturation Voltage, VCE(sat) – V
Collector Current, IC – A
IT11418


VCE(sat) – IC [PNP]
IC / IB=50
Ta=75°C
–25°C
25°C
Collector-to-Emitter Saturation Voltage, VCE(sat) – V
Collector Current, IC – A
IT11419


VCE(sat) – IC [NPN]
IC / IB=50
Ta=75°C
–25°C
25°C
Collector-to-Emitter Saturation Voltage, VCE(sat) – V
Collector Current, IC – A
IT11420


VBE(sat) – IC [PNP]
IC / IB=50
Ta= –25°C
75°C
25°C
Base-to-Emitter Saturation Voltage, VBE(sat) – V
Collector Current, IC – A
IT01657


VBE(sat) – IC [NPN]
IC / IB=50
Ta= –25°C
75°C
25°C
Base-to-Emitter Saturation Voltage, VBE(sat) – V
Collector Current, IC – A
IT01658