# 50C02CH

# Bipolar Transistor
# 50V, 0.5A, Low VCE(sat), NPN Single

ON Semiconductor®

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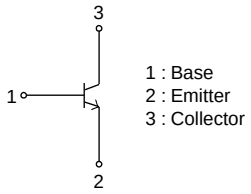
### Features

- Large Current Capacitance
- Low Collector to Emitter Saturation Voltage (Resistance): $R_{CE}$(sat) typ=175mΩ [$I_C$=0.5A, $I_B$=50mA]
- Ultrasmall Package Facilitates Miniaturization in End Products
- Small ON-Resistance (Ron)

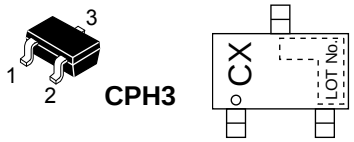
### Typical Applications

- Low-Frequency Amplifier
- High Speed Switching
- Small Motor Drive
- Muting Circuit

### ELECTRICAL CONNECTION




### MARKING




### ORDERING INFORMATION

See detailed ordering and shipping information on page 5 of this data sheet.

### SPECIFICATIONS

**ABSOLUTE MAXIMUM RATING** at Ta = 25°C (Note 1, 2)

| Parameter | Symbol | Value | Unit |
|---|---|---|---|
| Collector to Base Voltage | $V_{CBO}$ | 60 | V |
| Collector to Emitter Voltage | $V_{CEO}$ | 50 | V |
| Emitter to Base Voltage | $V_{EBO}$ | 5 | V |
| Collector Current | $I_C$ | 500 | mA |
| Collector Current (Pulse) | $I_{CP}$ | 1.0 | A |
| Collector Dissipation (Note 2) | $P_C$ | 700 | mW |
| Junction Temperature | Tj | 150 | °C |
| Storage Temperature | Tstg | −55 to +150 | °C |

Note 1 : Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

Note 2 : Surface mounted on ceramic substrate(600mm$^2$ × 0.8mm)

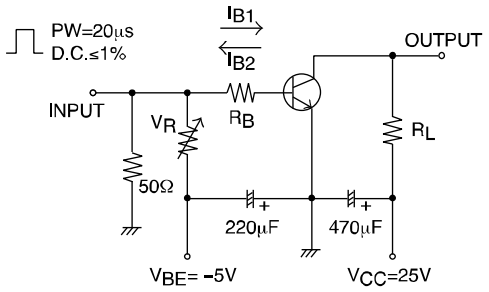
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**ELECTRICAL CHARACTERISTICS** at Ta = 25°C (Note 3)

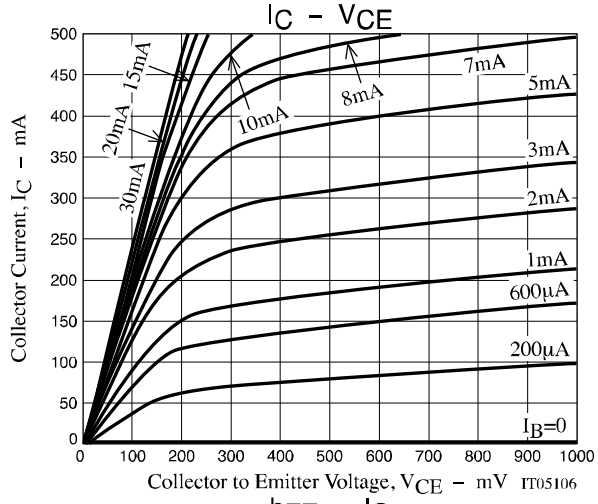
| Parameter | Symbol | Conditions | Value | | | Unit |
|---|---|---|---|---|---|---|
| | | | min | typ | max | |
| Collector Cutoff Current | $I_{CBO}$ | $V_{CB}$=40V, $I_E$=0A | | | 100 | nA |
| Emitter Cutoff Current | $I_{EBO}$ | $V_{EB}$=4V, $I_C$=0A | | | 100 | nA |
| DC Current Gain | $h_{FE}$ | $V_{CE}$=2V, $I_C$=10mA | 300 | | 800 | |
| Gain-Bandwidth Product | $f_T$ | $V_{CE}$=10V, $I_C$=50mA | | 500 | | MHz |
| Output Capacitance | Cob | $V_{CB}$=10V, f=1MHz | | 2.8 | | pF |
| Collector to Emitter Saturation Voltage | $V_{CE}$(sat) | $I_C$=100mA, $I_B$=10mA | | 50 | 100 | mV |
| Base to Emitter Saturation Voltage | $V_{BE}$(sat) | $I_C$=100mA, $I_B$=10mA | | 0.9 | 1.2 | V |
| Collector to Base Breakdown Voltage | $V_{(BR)CBO}$ | $I_C$=10μA, $I_E$=0A | 60 | | | V |
| Collector to Emitter Breakdown Voltage | $V_{(BR)CEO}$ | $I_C$=1mA, $R_{BE}$=∞ | 50 | | | V |
| Emitter to Base Breakdown Voltage | $V_{(BR)EBO}$ | $I_E$=10μA, $I_C$=0A | 5 | | | V |
| Turn-On Time | $t_{on}$ | See specified Test Circuit | | 30 | | ns |
| Storage Time | $t_{stg}$ | | | 340 | | ns |
| Fall Time | $t_f$ | | | 55 | | ns |

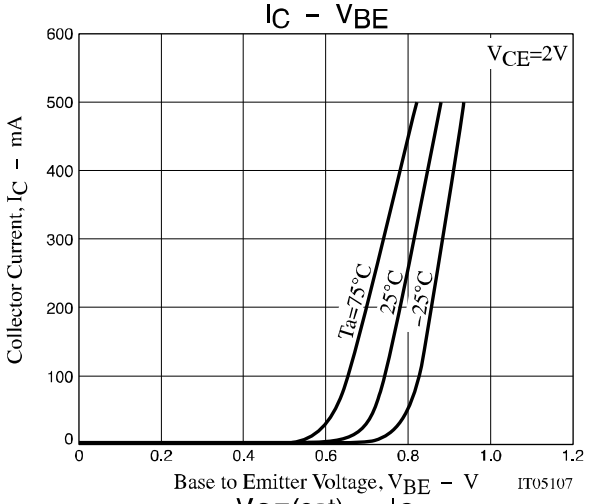
Note 3 : Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

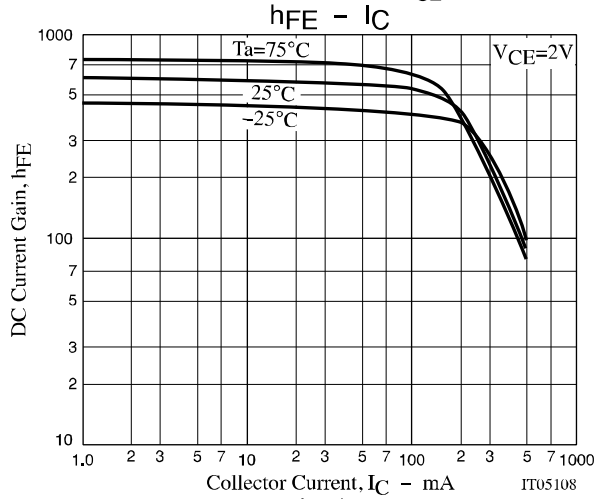
**Switching Time Test Circuit**

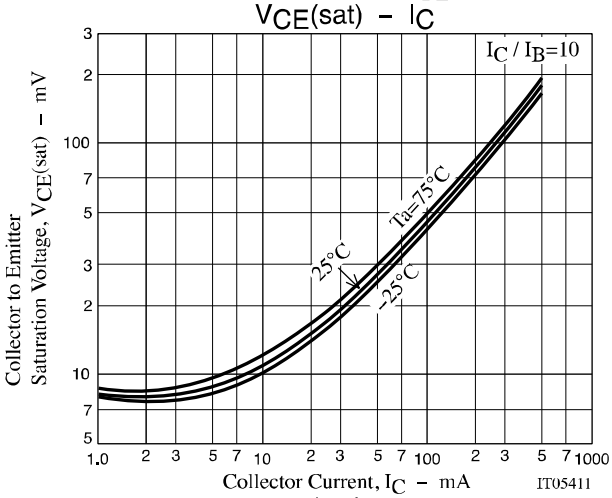


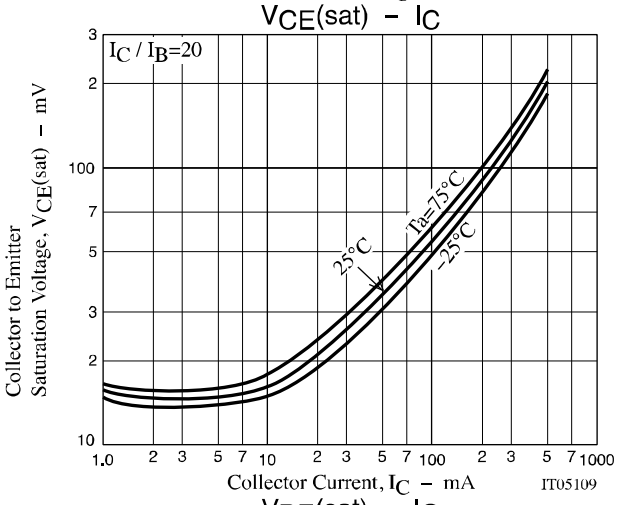

$I_C$=20$I_{B1}$= −20$I_{B2}$=200mA

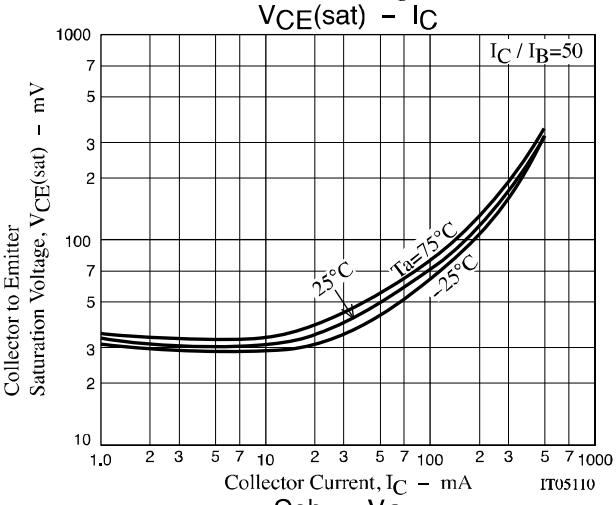

IC – VCE
Collector Current, IC – mA
Collector to Emitter Voltage, VCE – mV
IT05106
7mA
5mA
3mA
2mA
1mA
600µA
200µA
IB=0
15mA
20mA
30mA
10mA
8mA

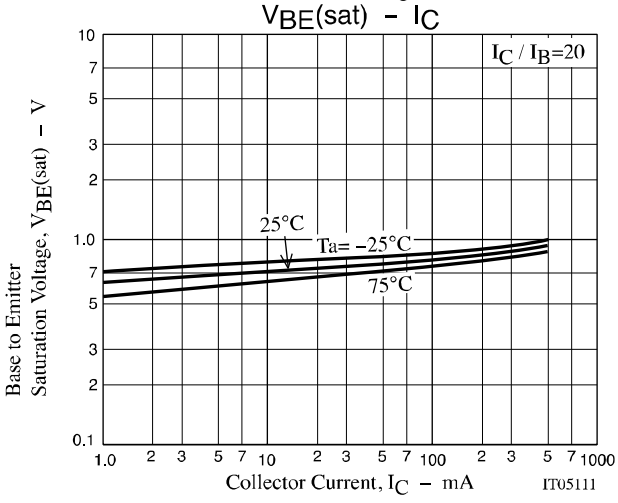

IC – VBE
VCE=2V
Collector Current, IC – mA
Base to Emitter Voltage, VBE – V
IT05107
Ta=75°C
25°C
–25°C

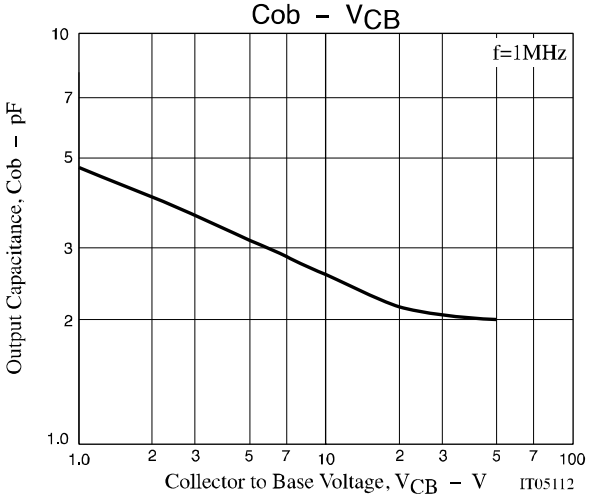

hFE – IC
DC Current Gain, hFE
Collector Current, IC – mA
IT05108
Ta=75°C
25°C
–25°C
VCE=2V

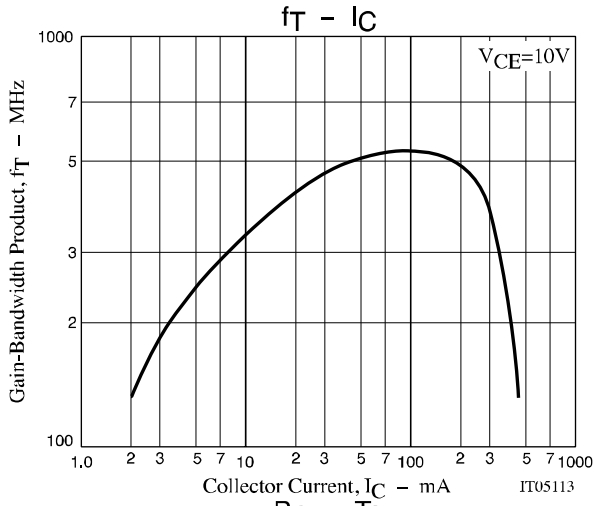

VCE(sat) – IC
IC / IB=10
Collector to Emitter
Saturation Voltage, VCE(sat) – mV
Collector Current, IC – mA
IT05411
Ta=75°C
25°C
–25°C

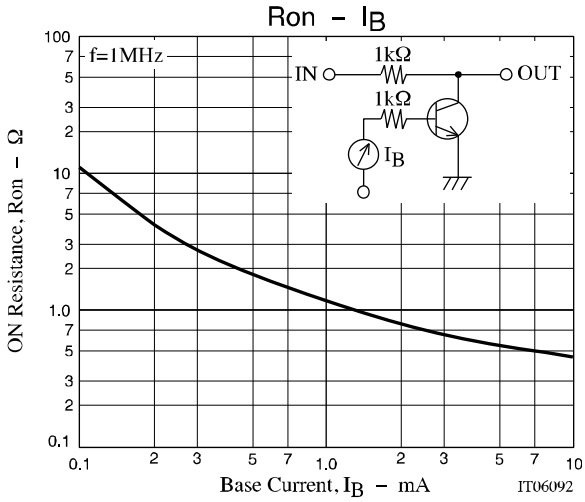

VCE(sat) – IC
IC / IB=20
Collector to Emitter
Saturation Voltage, VCE(sat) – mV
Collector Current, IC – mA
IT05109
Ta=75°C
25°C
–25°C

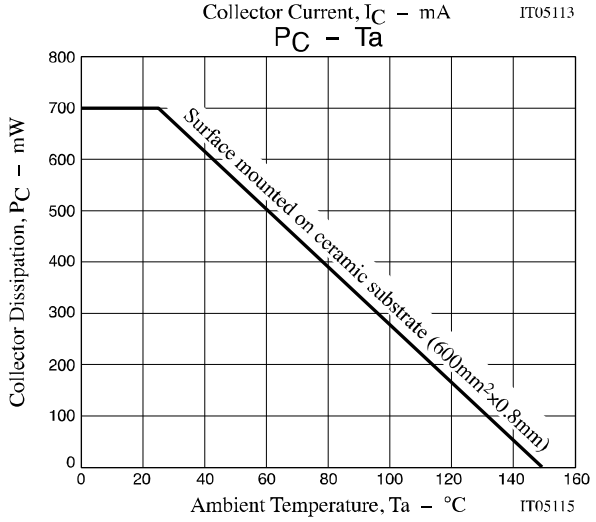

VCE(sat) – IC
IC / IB=50
Collector to Emitter
Saturation Voltage, VCE(sat) – mV
Collector Current, IC – mA
IT05110
Ta=75°C
25°C
–25°C


VBE(sat) – IC
IC / IB=20
Base to Emitter
Saturation Voltage, VBE(sat) – V
Collector Current, IC – mA
IT05111
25°C
Ta= –25°C
75°C


Cob – VCB
f=1MHz
Output Capacitance, Cob – pF
Collector to Base Voltage, VCB – V
IT05112


fT – IC
VCE=10V
Gain-Bandwidth Product, fT – MHz
Collector Current, IC – mA
IT05113

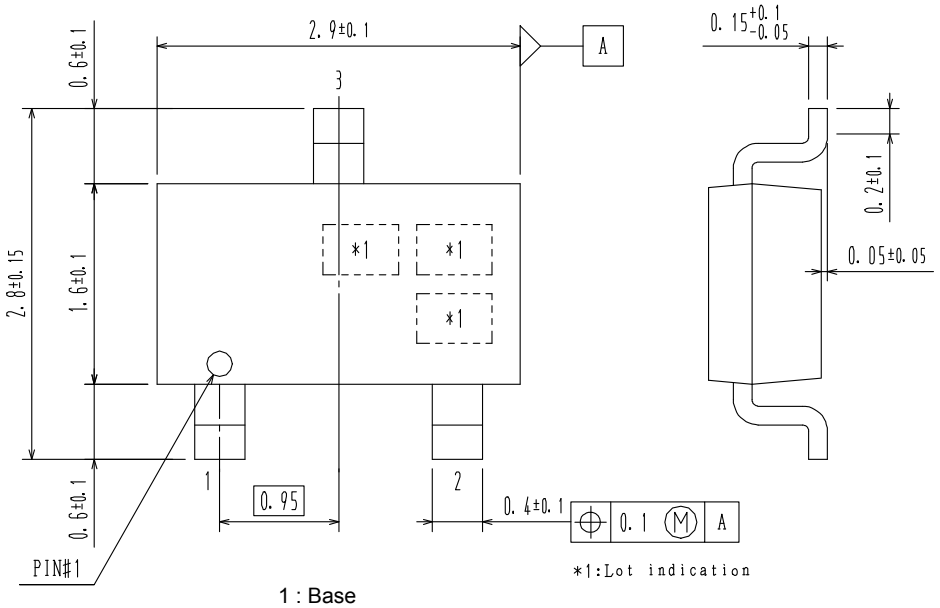

Ron – IB
f=1MHz
1kΩ
IN
OUT
1kΩ
IB
ON Resistance, Ron – Ω
Base Current, IB – mA
IT06092


PC – Ta
Surface mounted on ceramic substrate (600mm2×0.8mm)
Collector Dissipation, PC – mW
Ambient Temperature, Ta – °C
IT05115

## PACKAGE DIMENSIONS

unit : mm

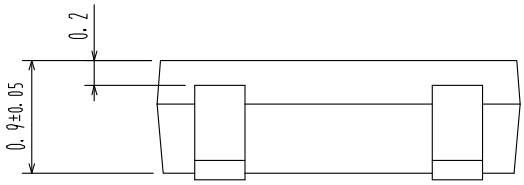
**CPH3**
CASE 318BA
ISSUE O



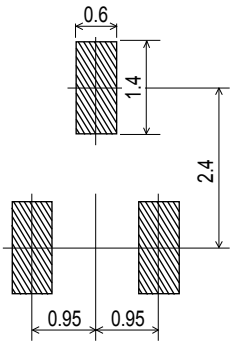

1 : Base

2 : Emitter

3 : Collector




**Recommended Soldering Footprint**




## ORDERING INFORMATION

| Device | Marking | Package | Shipping (Qty / Packing) |
|---|---|---|---|
| 50C02CH-TL-E | CX | CPH3 (Pb-Free) | 3,000 / Tape & Reel |

† For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D. http://www.onsemi.com/pub_link/Collateral/BRD8011-D.PDF

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