



# CPH5902

## N-Channel JFET and NPN Bipolar Transistor 15V, 10 to 32mA, 50V, 150mA, Composite type CPH5

ON Semiconductor®

<http://onsemi.com>

### Features

- Composite type with J-FET and NPN transistors contained in the CPH5 package, improving the mounting efficiency greatly
- The CPH5902 contains a 2SK2394-equivalent chip and a 2SC4639-equivalent chip in one package
- Drain and emitter are shared

### Specifications

Absolute Maximum Ratings at Ta=25°C

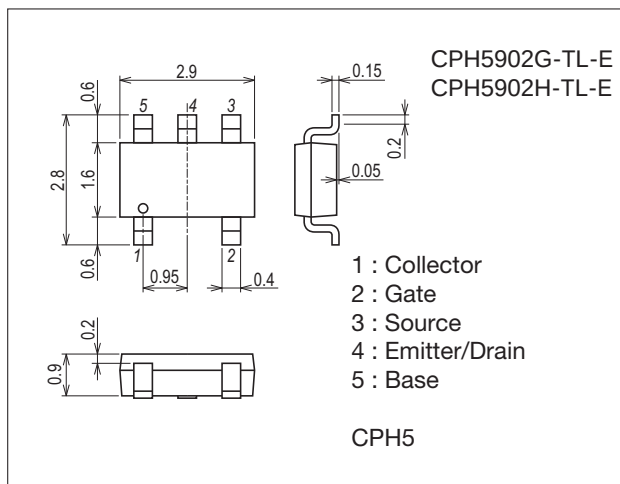
| Parameter                    | Symbol    | Conditions                                             | Ratings     | Unit |
|------------------------------|-----------|--------------------------------------------------------|-------------|------|
| [FET]                        |           |                                                        |             |      |
| 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 (600mm <sup>2</sup> ×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 (600mm <sup>2</sup> ×0.8mm) | 350         | mW   |
| [TR]                         |           |                                                        |             |      |
| Total Power Dissipation      | $P_T$     | Mounted on a ceramic board (600mm <sup>2</sup> ×0.8mm) | 500         | mW   |
| Junction Temperature         | $T_j$     |                                                        | 150         | °C   |
| Storage Temperature          | $T_{stg}$ |                                                        | -55 to +150 | °C   |

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

### Package Dimensions

unit : mm (typ)

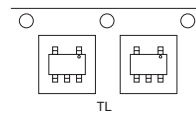
7017A-007



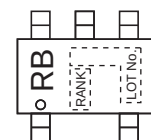
### Product & Package Information

- Package : CPH5
- JEITA, JEDEC : SC-74A, SOT-25
- Minimum Packing Quantity : 3,000 pcs./reel

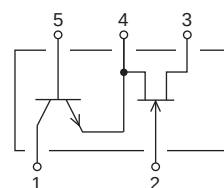
### Packing Type : TL



### Marking



### Electrical Connection



# CPH5902

## Electrical Characteristics at Ta=25°C

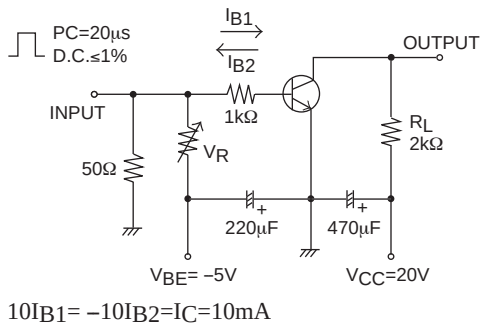
| Parameter                               | Symbol               | Conditions                                                            | Ratings |      |       | Unit |
|-----------------------------------------|----------------------|-----------------------------------------------------------------------|---------|------|-------|------|
|                                         |                      |                                                                       | min     | typ  | max   |      |
| [FET]                                   |                      |                                                                       |         |      |       |      |
| Gate-to-Drain Breakdown Voltage         | V(BR)GDS             | I <sub>G</sub> =-10μA, V <sub>GS</sub> =0V                            | -15     |      |       | V    |
| Gate Cutoff Current                     | I <sub>GSS</sub>     | V <sub>GS</sub> =-10V, V <sub>DS</sub> =0V                            |         |      | -1.0  | nA   |
| Cutoff Voltage                          | V <sub>GS(off)</sub> | V <sub>DS</sub> =5V, I <sub>D</sub> =100μA                            | -0.4    | -0.7 | -1.5  | V    |
| Drain Current                           | I <sub>DSS</sub>     | V <sub>DS</sub> =5V, V <sub>GS</sub> =0V                              | 10.0*   |      | 32.0* | mA   |
| Forward Transfer Admittance             | y <sub>fs</sub>      | V <sub>DS</sub> =5V, V <sub>GS</sub> =0V, f=1kHz                      | 24      | 38   |       | mS   |
| Input Capacitance                       | C <sub>iss</sub>     | V <sub>DS</sub> =5V, V <sub>GS</sub> =0V, f=1kHz                      |         | 10.0 |       | pF   |
| Reverse Transfer Capacitance            | C <sub>rss</sub>     | V <sub>DS</sub> =5V, V <sub>GS</sub> =0V, f=1kHz                      |         | 2.9  |       | pF   |
| Noise Figure                            | NF                   | V <sub>DS</sub> =5V, R <sub>g</sub> =1kΩ, I <sub>D</sub> =1mA, f=1kHz |         | 1.0  |       | dB   |
| [TR]                                    |                      |                                                                       |         |      |       |      |
| Collector Cutoff Current                | I <sub>CBO</sub>     | V <sub>CB</sub> =35V, I <sub>E</sub> =0A                              |         |      | 0.1   | μA   |
| Emitter Cutoff Current                  | I <sub>EBO</sub>     | V <sub>EB</sub> =4V, I <sub>C</sub> =0A                               |         |      | 0.1   | μA   |
| DC Current Gain                         | h <sub>FE</sub>      | V <sub>CE</sub> =6V, I <sub>C</sub> =1mA                              | 135     |      | 400   |      |
| Gain-Bandwidth Product                  | f <sub>T</sub>       | V <sub>CE</sub> =6V, I <sub>C</sub> =10mA                             |         | 200  |       | MHz  |
| Output Capacitance                      | C <sub>ob</sub>      | V <sub>CB</sub> =6V, f=1MHz                                           |         | 1.7  |       | pF   |
| Collector-to-Emitter Saturation Voltage | V <sub>CE(sat)</sub> | I <sub>C</sub> =50mA, I <sub>B</sub> =5mA                             |         | 0.08 | 0.4   | mV   |
| Base-to-Emitter Saturation Voltage      | V <sub>BE(sat)</sub> | I <sub>C</sub> =50mA, I <sub>B</sub> =5mA                             |         | 0.8  | 1.0   | V    |
| Collector-to-Base Breakdown Voltage     | V(BR)CBO             | I <sub>C</sub> =10μA, I <sub>E</sub> =0A                              | 55      |      |       | V    |
| Collector-to-Emitter Breakdown Voltage  | V(BR)CEO             | I <sub>C</sub> =1mA, R <sub>BE</sub> =∞                               | 50      |      |       | V    |
| Emitter-to-Base Breakdown Voltage       | V(BR)EBO             | I <sub>E</sub> =10μA, I <sub>C</sub> =0A                              | 6       |      |       | V    |
| Turn-On Time                            | t <sub>on</sub>      | See specified Test Circuit.                                           |         | 0.15 |       | ns   |
| Storage Time                            | t <sub>stg</sub>     |                                                                       |         | 0.75 |       | ns   |
| Fall Time                               | t <sub>f</sub>       |                                                                       |         | 0.20 |       | ns   |

\* : The CPH5902 is classified by  $I_{DSS}$  as follows : (unit : mA)

| Rank      | G            | H            |
|-----------|--------------|--------------|
| $I_{DSS}$ | 10.0 to 20.0 | 16.0 to 32.0 |

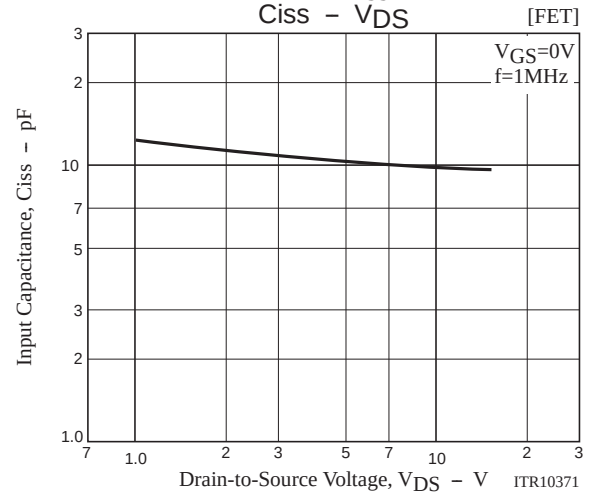
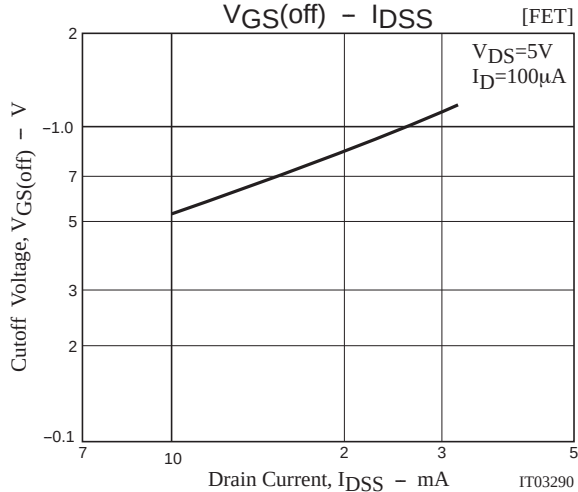
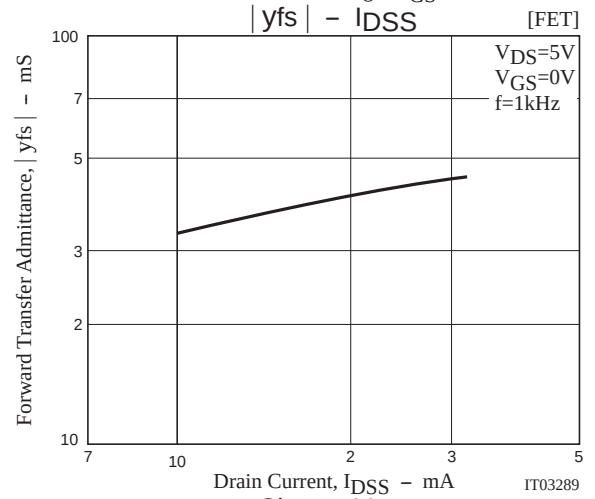
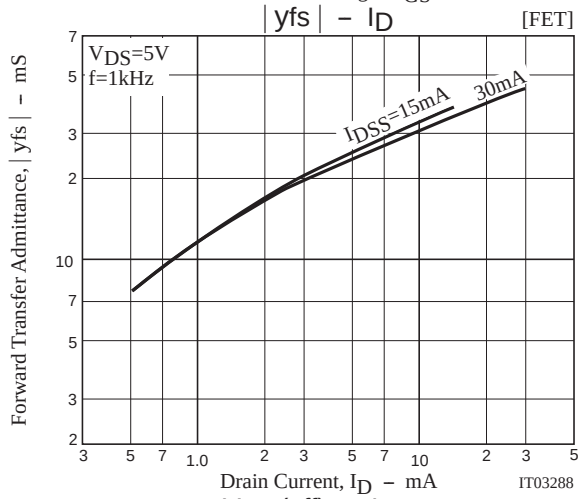
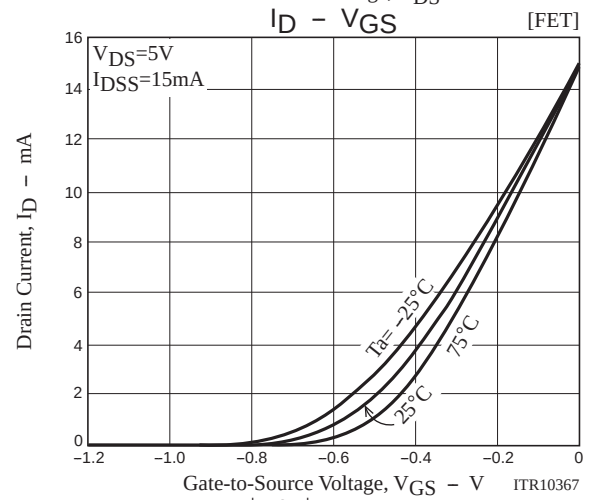
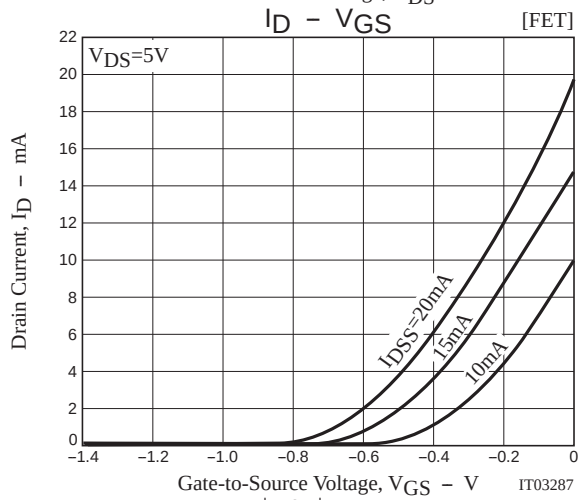
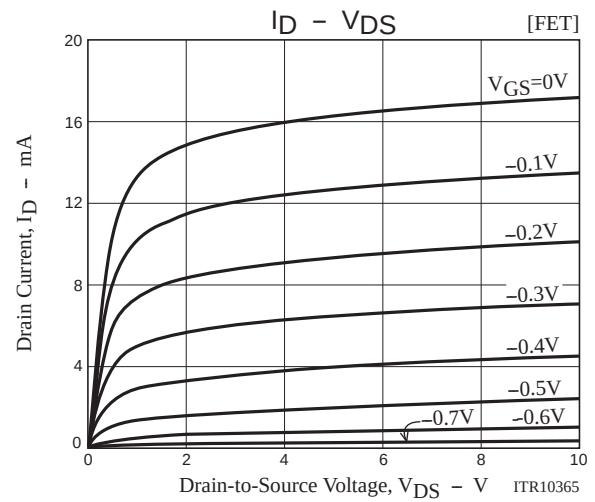
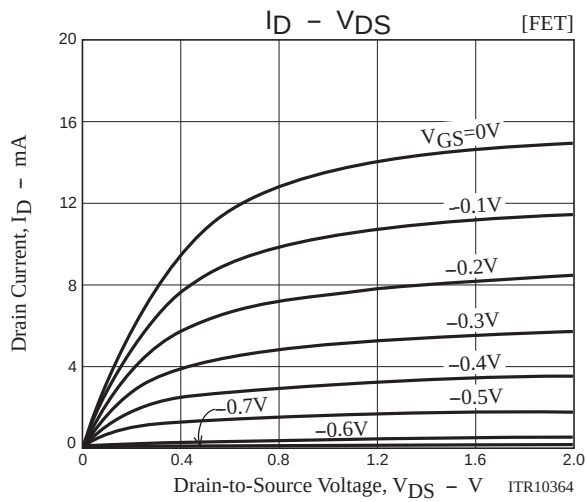
The specifications shown above are for each individual FET or transistor.

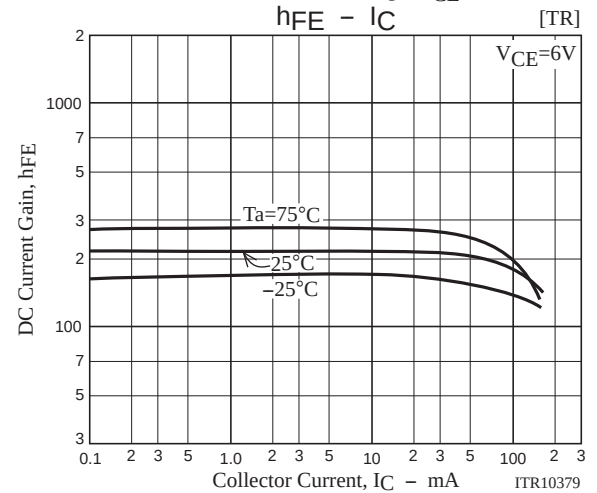
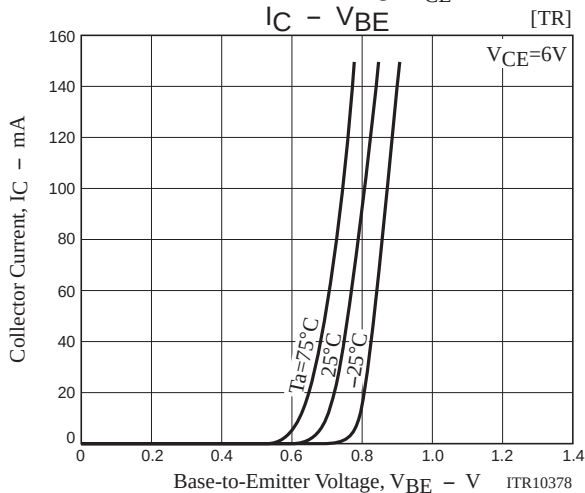
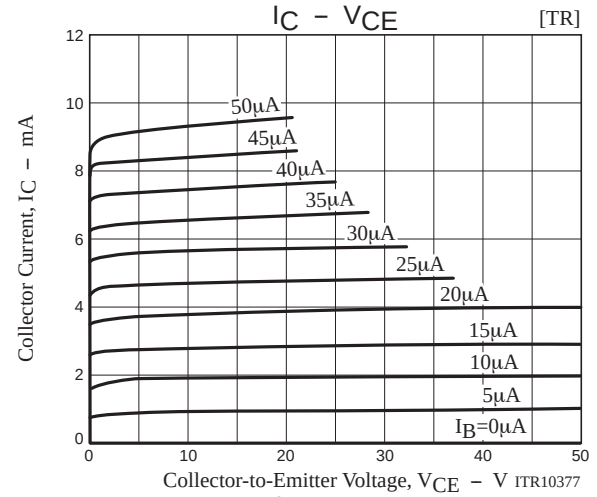
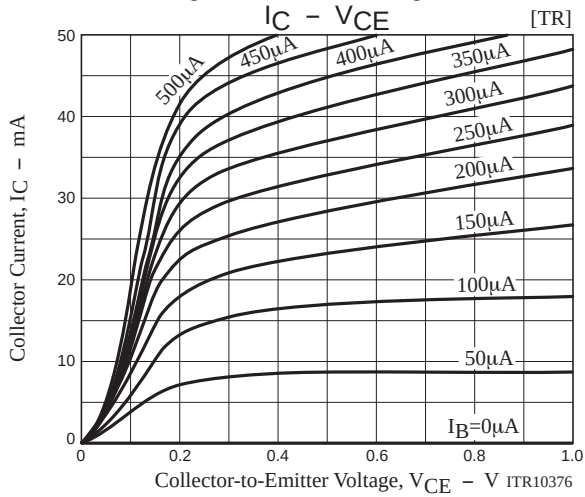
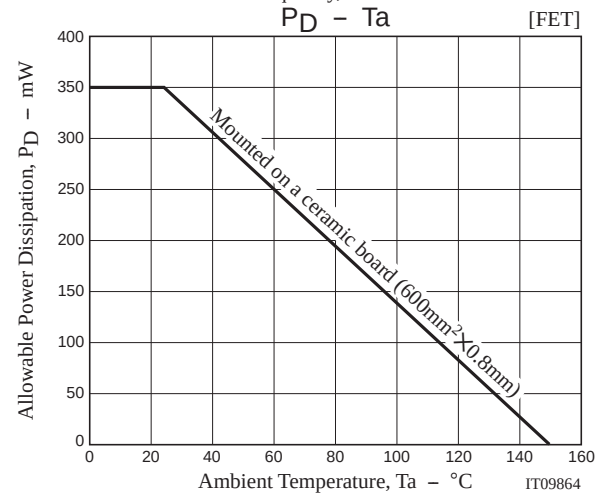
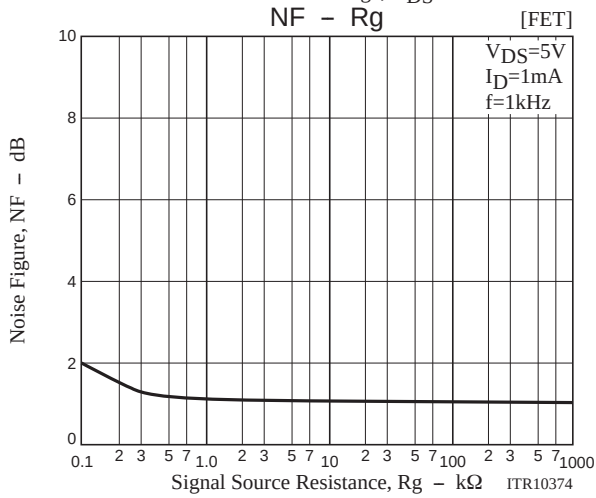
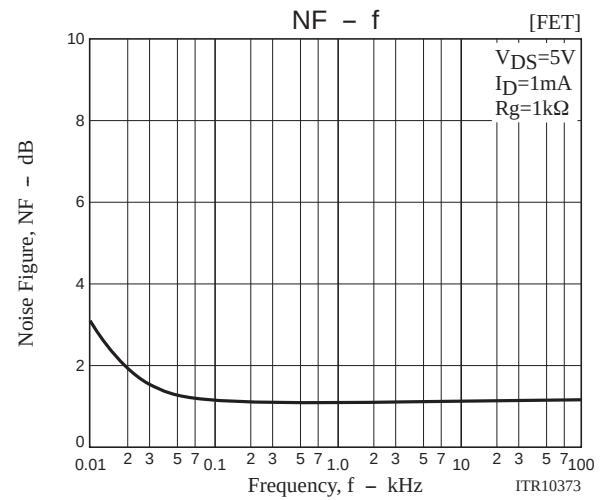
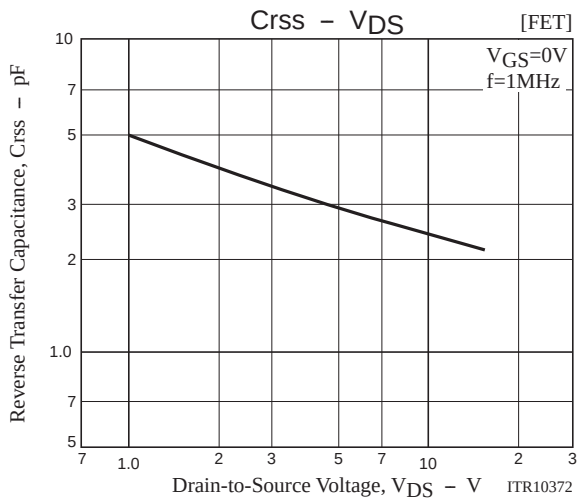
## Switching Time Test Circuit

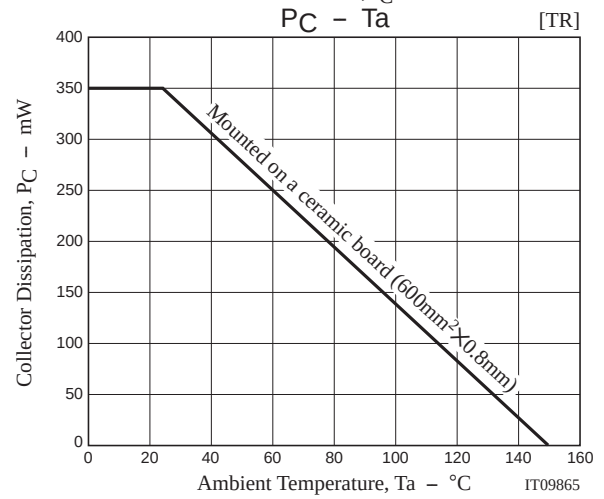
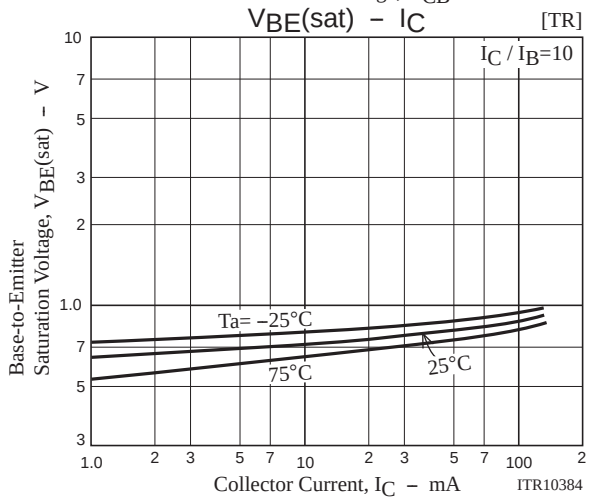
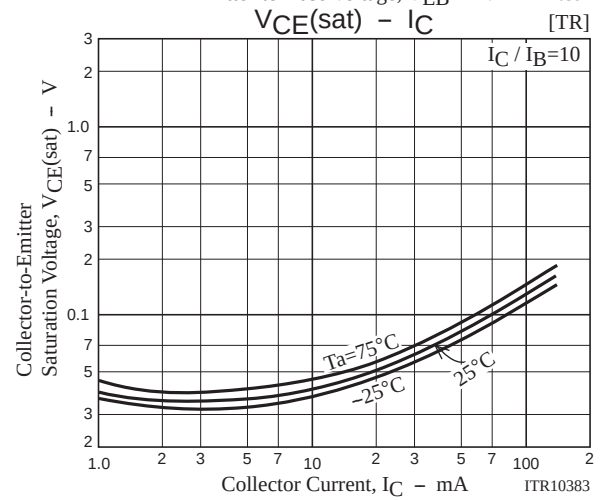
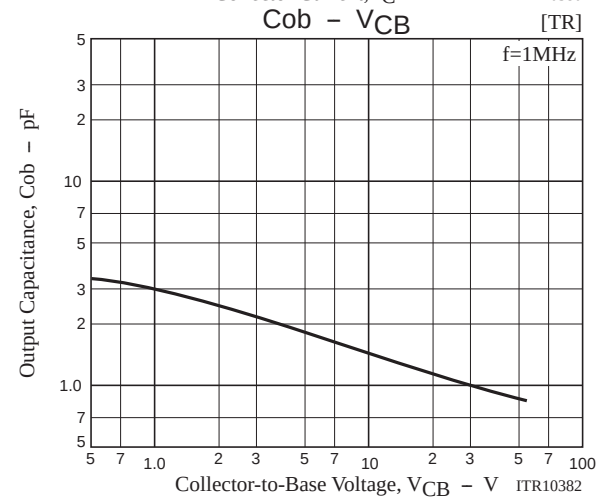
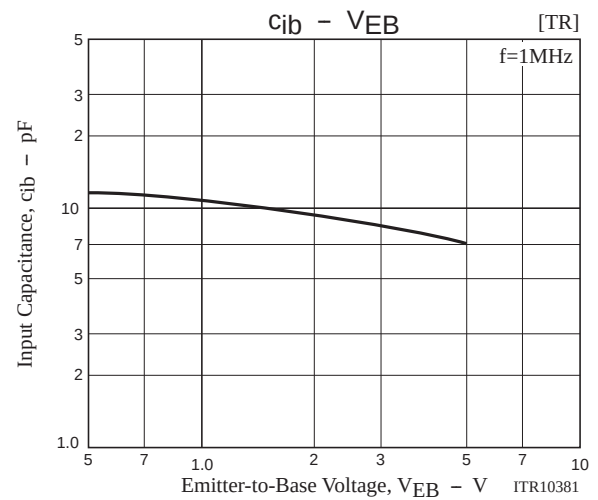
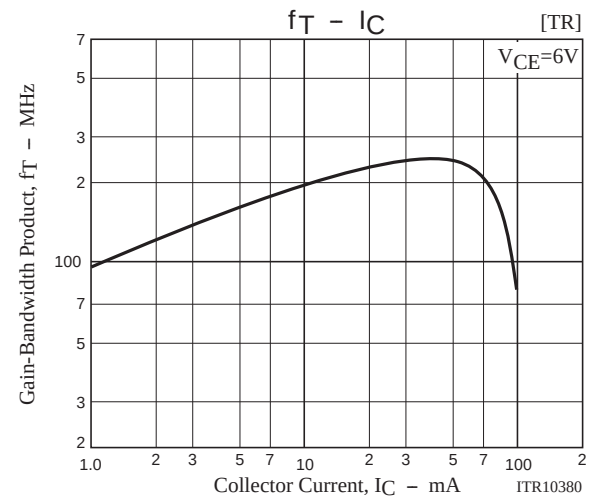


## Ordering Information

| Device        | Package | Shipping       | memo    |
|---------------|---------|----------------|---------|
| CPH5902G-TL-E | CPH5    | 3,000pcs./reel | Pb Free |
| CPH5902H-TL-E | CPH5    | 3,000pcs./reel |         |







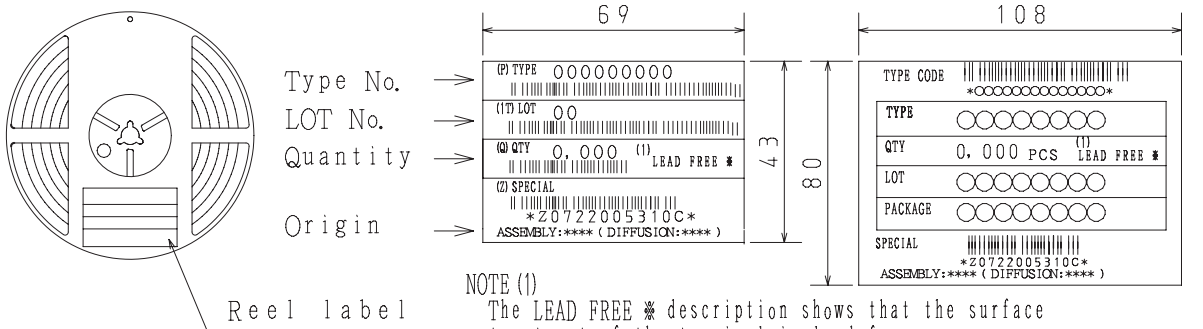
## Embossed Taping Specification

CPH5902G-TL-E, CPH5902H-TL-E

## 1. Packing Format

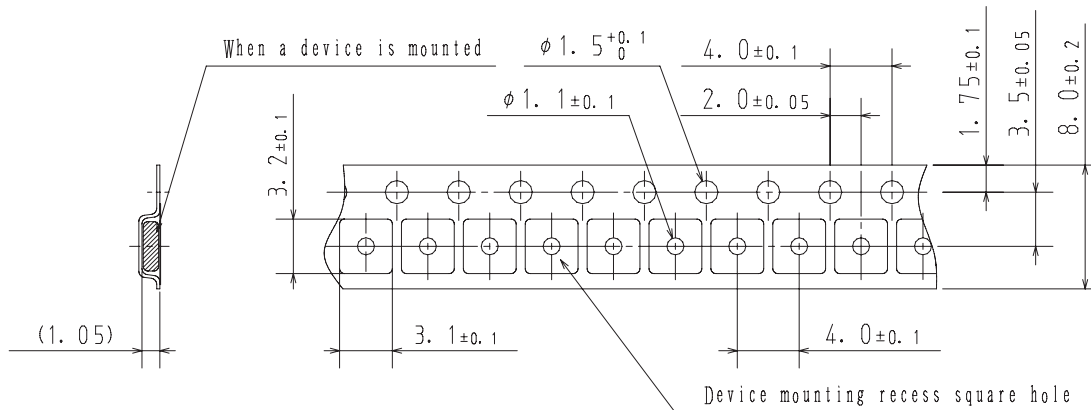
| Package Name | Carrier Tape Type | Maximum Number of devices contained (pcs) |           |           | Packing format                                              |                                                                    |
|--------------|-------------------|-------------------------------------------|-----------|-----------|-------------------------------------------------------------|--------------------------------------------------------------------|
|              |                   | Reel                                      | Inner box | Outer box | Inner BOX (C-1)                                             | Outer BOX (A-7)                                                    |
| CPH5         | CPH6              | 3,000                                     | 15,000    | 90,000    | 5 reels contained<br>Dimensions:mm (external)<br>183×72×185 | 6 inner boxes contained<br>Dimensions:mm (external)<br>440×195×210 |

## Packing method

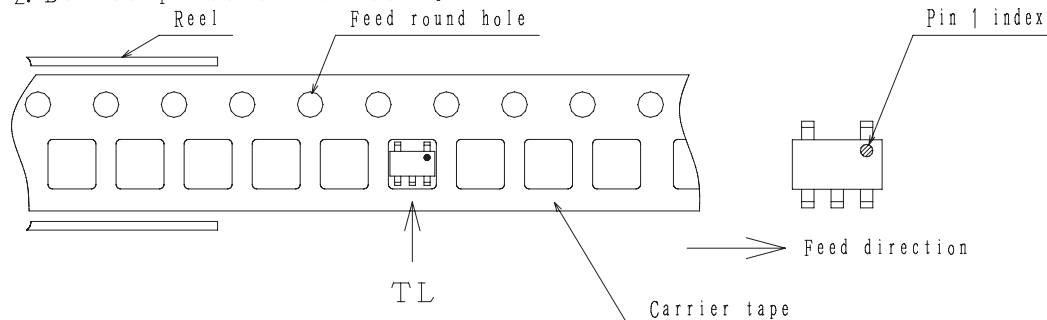


## 2. Taping configuration

## 2-1. Carrier tape size (unit:mm)



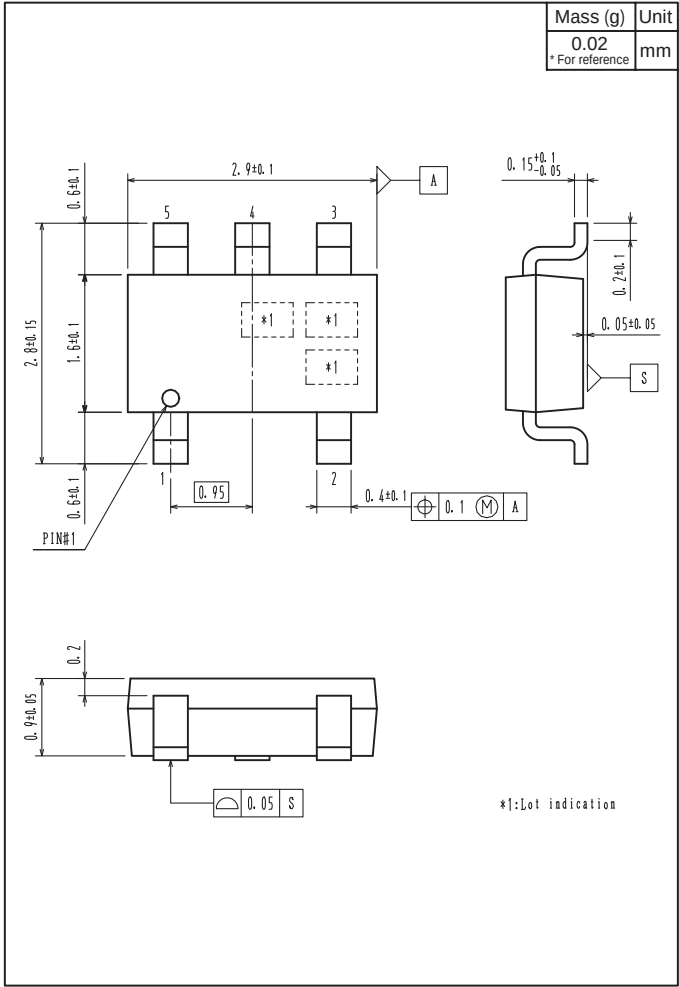
## 2-2. Device placement direction



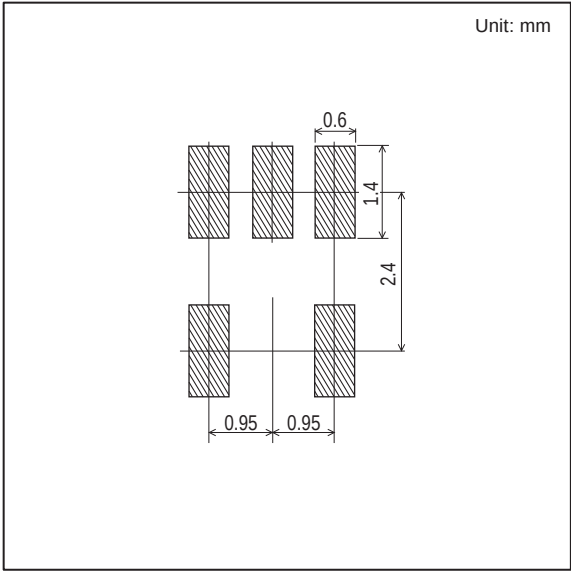
Those with pin 1 index on the feed hole side.....TL

Outline Drawing

CPH5902G-TL-E, CPH5902H-TL-E



Land Pattern Example



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