

SFH615-1X, SFH615-2X, SFH615-3X, SFH615-4X  
SFH615-1, SFH615-2, SFH615-3, SFH615-4



## LOW INPUT CURRENT PHOTOTRANSISTOR OPTICALLY COUPLED ISOLATORS

### APPROVALS

- UL recognised, File No. E91231
- 'X' SPECIFICATION APPROVALS
  - VDE 0884 in 3 available lead form : -
    - STD
    - G form
    - SMD approved to CECC 00802
  - Certified to EN60950 by the following Test Bodies :-
    - Nemko - Certificate No. P96102022
    - Fimko - Registration No. 192313-01..25
    - Semko - Reference No. 9639052 01
    - Demko - Reference No. 305969

### DESCRIPTION

The SFH615 series of optically coupled isolators consist of infrared light emitting diodes and NPN silicon photo transistors in space efficient dual in line plastic packages.

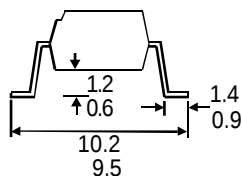
### FEATURES

- Options :-
  - 10mm lead spread - add G after part no.
  - Surface mount - add SM after part no.
  - Tape&reel - add SMT&R after part no.
- Low input current  $1\text{mA } I_F$
- High Current Transfer Ratios (40-320% at 10mA, 13% min at 1mA)
- High Isolation Voltage ( $5.3\text{kV}_{\text{RMS}}, 7.5\text{kV}_{\text{PK}}$ )
- High  $BV_{\text{CEO}}$  (70V min)
- All electrical parameters 100% tested
- Custom electrical selections available

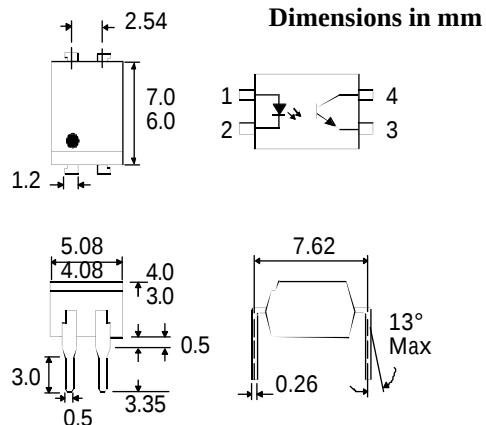
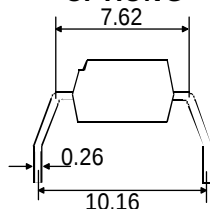
### APPLICATIONS

- Computer terminals
- Industrial systems controllers
- Measuring instruments
- Signal transmission between systems of different potentials and impedances

#### OPTIONSM SURFACE MOUNT



#### OPTIONG



### ABSOLUTE MAXIMUM RATINGS (25°C unless otherwise specified)

Storage Temperature \_\_\_\_\_ -55°C to + 125°C  
Operating Temperature \_\_\_\_\_ -55°C to + 100°C  
Lead Soldering Temperature  
(1/16 inch (1.6mm) from case for 10 secs) 260°C

### INPUT DIODE

Forward Current \_\_\_\_\_ 50mA  
Reverse Voltage \_\_\_\_\_ 6V  
Power Dissipation \_\_\_\_\_ 70mW

### OUTPUT TRANSISTOR

Collector-emitter Voltage  $BV_{\text{CEO}}$  \_\_\_\_\_ 70V  
Emitter-collector Voltage  $BV_{\text{ECO}}$  \_\_\_\_\_ 6V  
Power Dissipation \_\_\_\_\_ 150mW

### POWER DISSIPATION

Total Power Dissipation \_\_\_\_\_ 200mW  
(derate linearly 2.67mW/°C above 25°C)

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**ELECTRICAL CHARACTERISTICS (  $T_A = 25^\circ\text{C}$  Unless otherwise noted )**

| PARAMETER                                          |                                                                  | MIN  | TYP | MAX                             | UNITS            | TEST CONDITION                             |
|----------------------------------------------------|------------------------------------------------------------------|------|-----|---------------------------------|------------------|--------------------------------------------|
| Input                                              | Forward Voltage (V <sub>F</sub> )                                | 6    |     | 1.65                            | V                | I <sub>F</sub> = 50mA                      |
|                                                    | Reverse Voltage (V <sub>R</sub> )                                |      |     |                                 | V                | I <sub>R</sub> = 10μA                      |
|                                                    | Reverse Current (I <sub>R</sub> )                                |      |     | 10                              | μA               | V <sub>R</sub> = 6V                        |
| Output                                             | Collector-emitter Breakdown (BV <sub>CEO</sub> )<br>( Note 2 )   | 70   |     |                                 | V                | I <sub>C</sub> = 1mA                       |
|                                                    | Emitter-collector Breakdown (BV <sub>ECO</sub> )                 | 6    |     |                                 | V                | I <sub>E</sub> = 100μA                     |
|                                                    | Collector-emitter Dark Current (I <sub>CEO</sub> )<br>SFH615-1,2 |      |     | 50                              | nA               | V <sub>CE</sub> = 10V                      |
|                                                    | SFH615-3,4                                                       |      |     | 100                             | nA               |                                            |
| Coupled                                            | Current Transfer Ratio (CTR) (Note 2)                            |      |     |                                 |                  |                                            |
|                                                    | SFH615-1                                                         | 40   |     | 80                              | %                | 10mA I <sub>F</sub> , 5V V <sub>CE</sub>   |
|                                                    | SFH615-2                                                         | 63   |     | 125                             | %                |                                            |
|                                                    | SFH615-3                                                         | 100  |     | 200                             | %                |                                            |
|                                                    | SFH615-4                                                         | 160  |     | 320                             | %                |                                            |
|                                                    | SFH615-1                                                         | 13   |     |                                 | %                | 1mA I <sub>F</sub> , 5V V <sub>CE</sub>    |
|                                                    | SFH615-2                                                         | 22   |     |                                 | %                |                                            |
|                                                    | SFH615-3                                                         | 34   |     |                                 | %                |                                            |
|                                                    | SFH615-4                                                         | 56   |     |                                 | %                |                                            |
|                                                    | Collector-emitter Saturation Voltage V <sub>CESAT</sub>          |      |     | 0.4                             | V                | 10mA I <sub>F</sub> , 2.5mA I <sub>C</sub> |
|                                                    | Input to Output Isolation Voltage V <sub>ISO</sub>               | 5300 |     |                                 | V <sub>RMS</sub> | See note 1                                 |
|                                                    |                                                                  | 7500 |     |                                 | V <sub>PK</sub>  | See note 1                                 |
| Input-output Isolation Resistance R <sub>ISO</sub> | 5x10 <sup>10</sup>                                               |      | Ω   | V <sub>IO</sub> = 500V (note 1) |                  |                                            |

Note 1 Measured with input leads shorted together and output leads shorted together.

Note 2 Special Selections are available on request. Please consult the factory.

**SWITCHING CHARACTERISTICS**

1. Linear Operation (without saturation) Fig 1.  
 $I_F = 10\text{mA}$ ,  $V_{CC} = 5\text{V}$ ,  $R_L = 75\Omega$

|                            |     | UNITS         |
|----------------------------|-----|---------------|
| Turn-on Time $t_{on}$      | 3.0 | $\mu\text{s}$ |
| Rise Time $t_r$            | 2.0 | $\mu\text{s}$ |
| Turn-off Time $t_{off}$    | 2.3 | $\mu\text{s}$ |
| Fall Time $t_f$            | 2.0 | $\mu\text{s}$ |
| Cut-off Frequency $F_{CO}$ | 250 | kHz           |

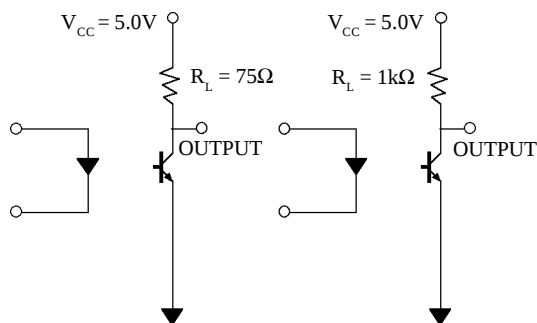
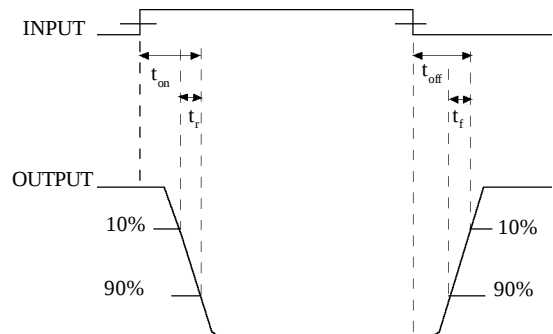


FIG 1

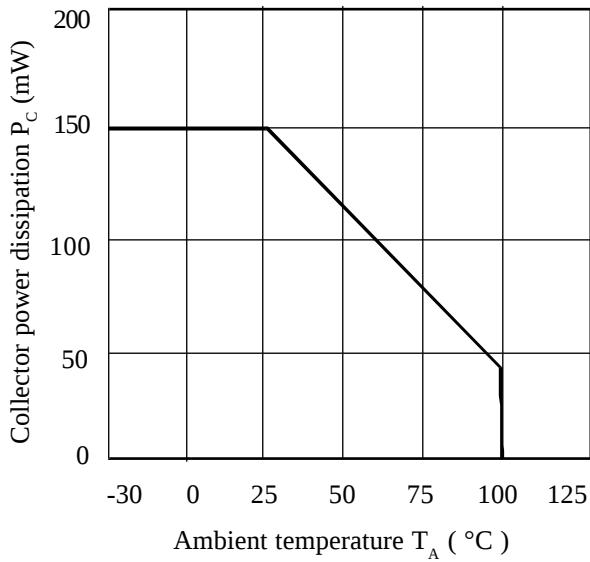
FIG 2

2. Switching Operation (with saturation) Fig 2  
 $V_{CC} = 5\text{V}$ ,  $R_L = 1\text{k}\Omega$

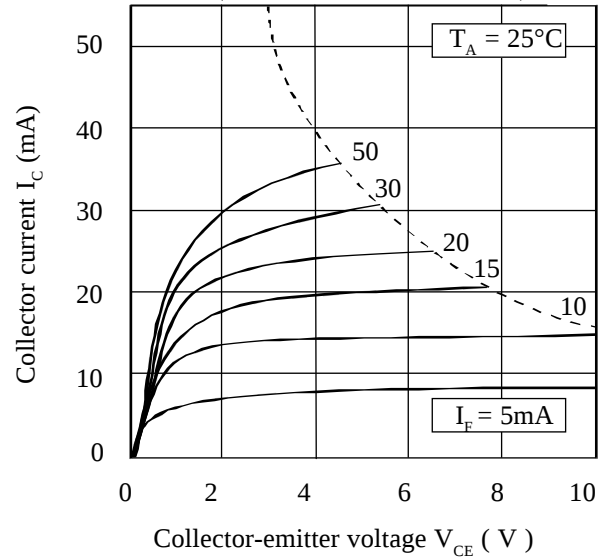
| GROUP                   | -1<br>( $I_F = 20\text{mA}$ ) | -2 and -3<br>( $I_F = 10\text{mA}$ ) | -4<br>( $I_F = 5\text{mA}$ ) | UNITS         |
|-------------------------|-------------------------------|--------------------------------------|------------------------------|---------------|
| Turn-on Time $t_{on}$   | 3.0                           | 4.2                                  | 6.0                          | $\mu\text{s}$ |
| Rise Time $t_r$         | 2.0                           | 3.0                                  | 4.6                          | $\mu\text{s}$ |
| Turn-off Time $t_{off}$ | 18                            | 23                                   | 25                           | $\mu\text{s}$ |
| Fall Time $t_f$         | 11                            | 14                                   | 15                           | $\mu\text{s}$ |
| $V_{CESAT}$             | $\leq 0.4$                    |                                      |                              | V             |



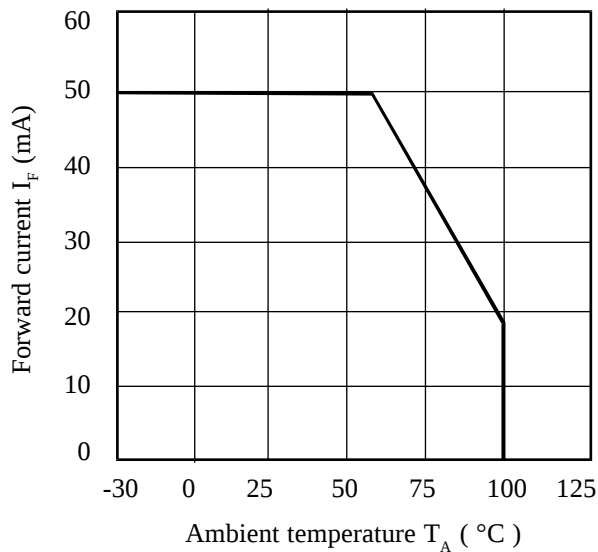
**Collector Power Dissipation vs. Ambient Temperature**



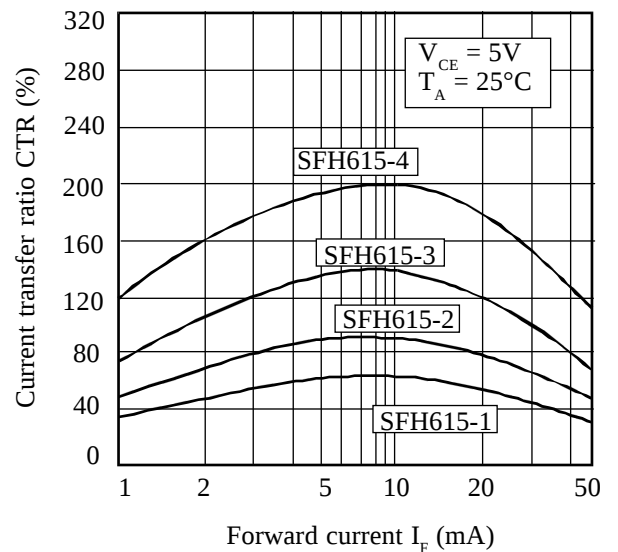
**Collector Current vs. Collector-emitter Voltage (normalised to SFH615-3)**



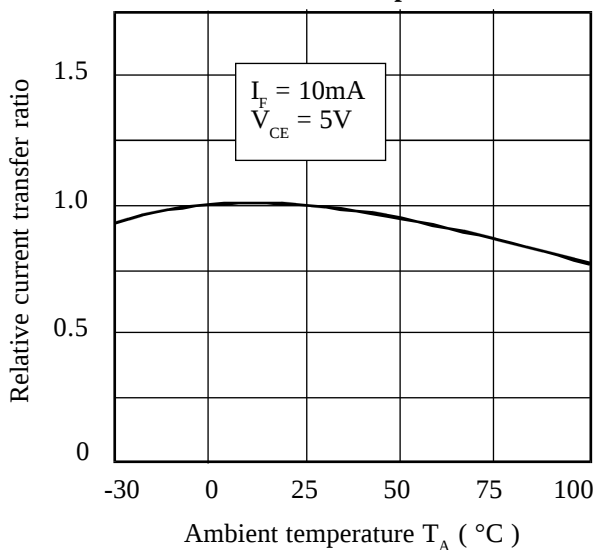
**Forward Current vs. Ambient Temperature**



**Current Transfer Ratio vs. Forward Current**



**Relative Current Transfer Ratio vs. Ambient Temperature**



**Collector-emitter Saturation Voltage vs. Ambient Temperature**

