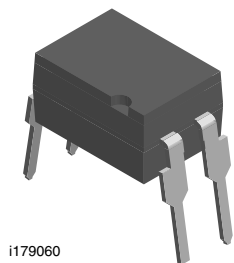
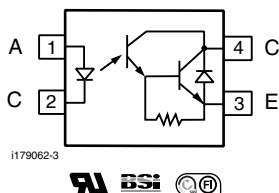


# Optocoupler, Photodarlington Output, High Gain, 300 V BV<sub>CEO</sub>



i179060



## FEATURES

- High collector emitter voltage,  $V_{CEO} = 300\text{ V}$
- High isolation test voltage:  $5300\text{ V}_{RMS}$
- Standard plastic DIP-4 package
- Compatible with Toshiba TLP627
- Compliant to RoHS Directive to 2002/95/EC and in accordance WEEE 2002/96/EC


**RoHS**  
COMPLIANT

## AGENCY APPROVALS

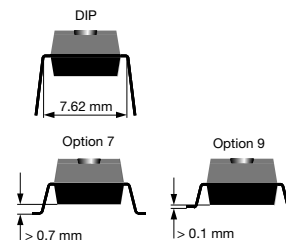
- UL - file no. E52744 system code H
- BSI IEC 60950; IEC 60065
- FIMKO

## DESCRIPTION

The SFH619A is optically coupled isolators with a gallium arsenide infrared LED and a silicon photodarlington sensor. Switching can be achieved while maintaining a high degree of isolation between driving and load circuits. These optocouplers can be used to replace reed and mercury relays with advantages of long life, high speed switching and elimination of magnetic fields.

## ORDERING INFORMATION

|             |          |          |          |          |          |          |                |          |          |          |               |          |                      |
|-------------|----------|----------|----------|----------|----------|----------|----------------|----------|----------|----------|---------------|----------|----------------------|
| <b>S</b>    | <b>F</b> | <b>H</b> | <b>6</b> | <b>1</b> | <b>9</b> | <b>A</b> | <b>-</b>       | <b>X</b> | <b>0</b> | <b>0</b> | <b>#</b>      | <b>T</b> | <b>#</b>             |
| PART NUMBER |          |          |          |          |          |          | PACKAGE OPTION |          |          |          | TAPE AND REEL |          | TAPE AND REEL OPTION |



| AGENCY CERTIFIED/PACKAGE | CTR (%)                       |
|--------------------------|-------------------------------|
| UL, BSI, FIMKO           | ≥ 1000                        |
| DIP-4                    | SFH619A                       |
| SMD-4, option 7          | SFH619A-X007T <sup>(1)</sup>  |
| SMD-4, option 9          | SFH619A-X009T <sup>(1)</sup>  |
| SMD-4, option 9          | SFH619A-X009T0 <sup>(2)</sup> |

## Notes

- Additional options may be possible, please contact sales office.
- <sup>(1)</sup> Also available in tubes; do not put T on the end.
- <sup>(2)</sup> Option with 90° rotation.

## ABSOLUTE MAXIMUM RATINGS (T<sub>amb</sub> = 25 °C, unless otherwise specified)

| PARAMETER                           | TEST CONDITION | SYMBOL     | VALUE | UNIT  |
|-------------------------------------|----------------|------------|-------|-------|
| <b>INPUT</b>                        |                |            |       |       |
| Peak reverse voltage                |                | $V_{RM}$   | 6     | V     |
| Forward continuous current          |                | $I_F$      | 60    | mA    |
| Derate linearly from 25 °C          |                |            | 1.33  | mW/°C |
| Power dissipation                   |                | $P_{diss}$ | 100   | mW    |
| <b>OUTPUT</b>                       |                |            |       |       |
| Collector emitter breakdown voltage |                | $BV_{CEO}$ | 300   | V     |
| Emitter collector breakdown voltage |                | $BV_{ECO}$ | 0.3   | V     |
| Collector (load) current            |                | $I_C$      | 125   | mA    |
| Derate linearly from 25 °C          |                |            | 2     | mW/°C |
| Power dissipation                   |                | $P_{diss}$ | 150   | mW    |

**ABSOLUTE MAXIMUM RATINGS** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)

| PARAMETER                                           | TEST CONDITION                                                           | SYMBOL     | VALUE          | UNIT      |
|-----------------------------------------------------|--------------------------------------------------------------------------|------------|----------------|-----------|
| <b>COUPLER</b>                                      |                                                                          |            |                |           |
| Derate linearly from 25 °C                          |                                                                          |            | 3.33           | mW/°C     |
| Total power dissipation                             |                                                                          | $P_{tot}$  | 250            | mW        |
| Isolation test voltage between emitter and detector | $t = 1\text{ s}$                                                         | $V_{ISO}$  | 5300           | $V_{RMS}$ |
| Isolation resistance                                | $V_{IO} = 500\text{ V}$ , $T_{amb} = 25\text{ }^{\circ}\text{C}$         | $R_{IO}$   | $\geq 10^{12}$ | $\Omega$  |
|                                                     | $V_{IO} = 500\text{ V}$ , $T_{amb} = 100\text{ }^{\circ}\text{C}$        | $R_{IO}$   | $\geq 10^{11}$ | $\Omega$  |
| Storage temperature                                 |                                                                          | $T_{stg}$  | - 55 to + 150  | °C        |
| Operating temperature                               |                                                                          | $T_{amb}$  | - 55 to + 100  | °C        |
| Soldering temperature <sup>(1)</sup>                | max. 10 s, dip soldering: distance to seating plane $\geq 1.5\text{ mm}$ | $T_{slid}$ | 260            | °C        |

**Notes**

- Stresses in excess of the absolute maximum ratings can cause permanent damage to the device. Functional operation of the device is not implied at these or any other conditions in excess of those given in the operational sections of this document. Exposure to absolute maximum ratings for extended periods of the time can adversely affect reliability.

<sup>(1)</sup> Refer to reflow profile for soldering conditions for surface mounted devices (SMD). Refer to wave profile for soldering conditions for through hole devices (DIP).

**ELECTRICAL CHARACTERISTICS** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)

| PARAMETER                            | TEST CONDITION                                                | SYMBOL      | MIN. | TYP. | MAX. | UNIT          |
|--------------------------------------|---------------------------------------------------------------|-------------|------|------|------|---------------|
| <b>INPUT</b>                         |                                                               |             |      |      |      |               |
| Forward voltage                      | $I_F = 10\text{ mA}$                                          | $V_F$       |      | 1.2  | 1.5  | V             |
| Reverse current                      | $V_R = 6\text{ V}$                                            | $I_R$       |      | 0.02 | 10   | $\mu\text{A}$ |
| Capacitance                          | $V_R = 0\text{ V}$                                            | $C_O$       |      | 14   |      | pF            |
| <b>OUTPUT</b>                        |                                                               |             |      |      |      |               |
| Collector emitter breakdown voltage  | $I_{CE} = 100\text{ }\mu\text{A}$                             | $BV_{CEO}$  | 300  |      |      | V             |
| Emitter collector breakdown voltage  | $I_{EC} = 100\text{ }\mu\text{A}$                             | $BV_{ECO}$  | 0.3  |      |      | V             |
| Collector emitter dark current       | $V_{CE} = 200\text{ V}$ , $T_A = 25\text{ }^{\circ}\text{C}$  | $I_{CEO}$   |      | 10   | 200  | nA            |
|                                      | $V_{CE} = 200\text{ V}$ , $T_A = 100\text{ }^{\circ}\text{C}$ | $I_{CEO}$   |      |      | 20   | nA            |
| Collector emitter capacitance        | $V_{CE} = 0\text{ V}$ , $f = 1\text{ MHz}$                    | $C_{CE}$    |      | 39   |      | pF            |
| <b>COUPLER</b>                       |                                                               |             |      |      |      |               |
| Collector emitter saturation voltage | $I_F = 1\text{ mA}$ , $I_C = 10\text{ mA}$                    | $V_{CEsat}$ |      |      | 1    | V             |
|                                      | $I_F = 10\text{ mA}$ , $I_C = 100\text{ mA}$                  | $V_{CEsat}$ | 0.3  |      | 1.2  | V             |
| Coupling capacitance                 | $V_{I-O} = 0\text{ V}$ , $f = 1\text{ MHz}$                   | $C_C$       |      | 0.6  |      | pF            |

**Note**

- Minimum and maximum values are testing requirements. Typical values are characteristics of the device and are the result of engineering evaluation. Typical values are for information only and are not part of the testing requirements.

**CURRENT TRANSFER RATIO**

| PARAMETER               | TEST CONDITION                              | SYMBOL | MIN. | TYP. | MAX. | UNIT |
|-------------------------|---------------------------------------------|--------|------|------|------|------|
| Coupling transfer ratio | $I_F = 1\text{ mA}$ , $V_{CE} = 1\text{ V}$ | CTR    | 1000 |      |      | %    |

**SWITCHING CHARACTERISTICS**

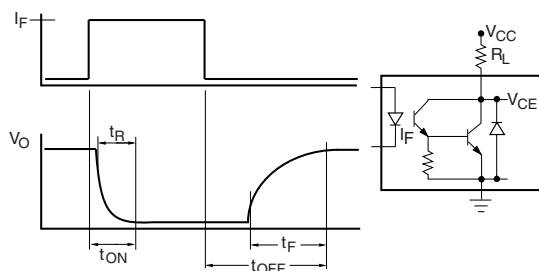
| PARAMETER     | TEST CONDITION                                                            | SYMBOL    | MIN. | TYP. | MAX. | UNIT          |
|---------------|---------------------------------------------------------------------------|-----------|------|------|------|---------------|
| Rise time     | $V_{CC} = 10\text{ V}$ , $I_C = 10\text{ mA}$ , $R_L = 100\text{ }\Omega$ | $t_r$     |      | 3.5  |      | $\mu\text{s}$ |
|               | $V_{CC} = 10\text{ V}$ , $I_F = 16\text{ mA}$ , $R_L = 180\text{ }\Omega$ | $t_r$     |      | 1    |      | $\mu\text{s}$ |
| Fall time     | $V_{CC} = 10\text{ V}$ , $I_C = 10\text{ mA}$ , $R_L = 100\text{ }\Omega$ | $t_f$     |      | 14.5 |      | $\mu\text{s}$ |
|               | $V_{CC} = 10\text{ V}$ , $I_F = 16\text{ mA}$ , $R_L = 180\text{ }\Omega$ | $t_f$     |      | 20.5 |      | $\mu\text{s}$ |
| Turn-on time  | $V_{CC} = 10\text{ V}$ , $I_C = 10\text{ mA}$ , $R_L = 100\text{ }\Omega$ | $t_{on}$  |      | 4.5  |      | $\mu\text{s}$ |
|               | $V_{CC} = 10\text{ V}$ , $I_F = 16\text{ mA}$ , $R_L = 180\text{ }\Omega$ | $t_{on}$  |      | 1.5  |      | $\mu\text{s}$ |
| Turn-off time | $V_{CC} = 10\text{ V}$ , $I_C = 10\text{ mA}$ , $R_L = 100\text{ }\Omega$ | $t_{off}$ |      | 29   |      | $\mu\text{s}$ |
|               | $V_{CC} = 10\text{ V}$ , $I_F = 16\text{ mA}$ , $R_L = 180\text{ }\Omega$ | $t_{off}$ |      | 53.5 |      | $\mu\text{s}$ |

**SAFETY AND INSULATION RATINGS**

| PARAMETER                                               | TEST CONDITION         | SYMBOL | MIN.  | TYP.      | MAX. | UNIT |
|---------------------------------------------------------|------------------------|--------|-------|-----------|------|------|
| Climatic classification<br>(according to IEC 68 part 1) |                        |        |       | 55/100/21 |      |      |
| Comparative tracking index                              |                        | CTI    | 175   |           | 399  |      |
| $V_{IOTM}$                                              |                        |        | 10000 |           |      | V    |
| $V_{IORM}$                                              |                        |        | 890   |           |      | V    |
| $P_{SO}$                                                |                        |        |       |           | 400  | mW   |
| $I_{SI}$                                                |                        |        |       |           | 275  | mA   |
| $T_{SI}$                                                |                        |        |       |           | 175  | °C   |
| Creepage distance                                       | standard DIP-4         |        | 7     |           |      | mm   |
| Clearance distance                                      | standard DIP-4         |        | 7     |           |      | mm   |
| Creepage distance                                       | 400 mil DIP-4          |        | 8     |           |      | mm   |
| Clearance distance                                      | 400 mil DIP-4          |        | 8     |           |      | mm   |
| Insulation thickness,<br>reinforced rated               | per IEC 60950 2.10.5.1 |        | 0.4   |           |      | mm   |

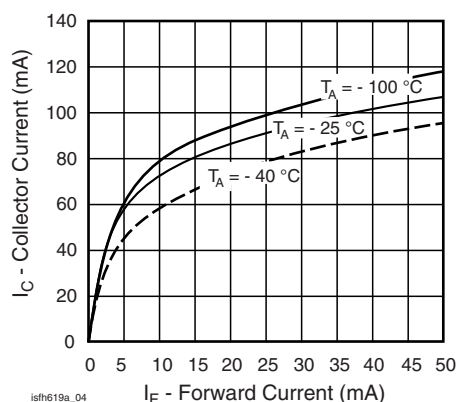
**Note**

- As per IEC 60747-5-2, § 7.4.3.8.1, this optocoupler is suitable for “safe electrical insulation” only within the safety ratings. Compliance with the safety ratings shall be ensured by means of protective circuits.

**TYPICAL CHARACTERISTICS** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)


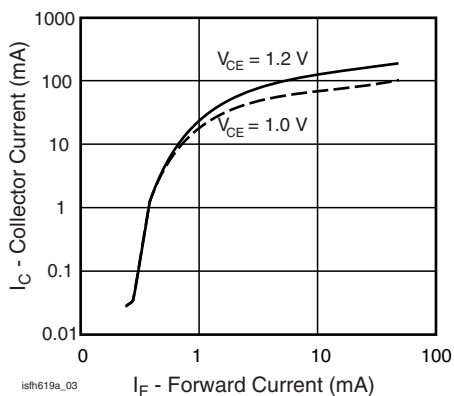
isfh619a\_01

Fig. 1 - Switching Waveform and Switching Schematic



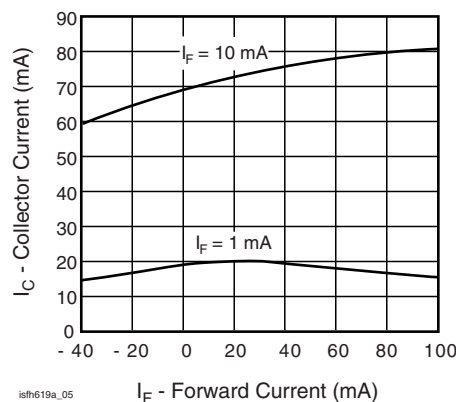
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Fig. 3 - Collector Current vs. Forward Current



isfh619a\_03

Fig. 2 - Collector Current (mA) vs. Forward Current (mA)



isfh619a\_05

Fig. 4 - Collector Current vs. Ambient Temperature

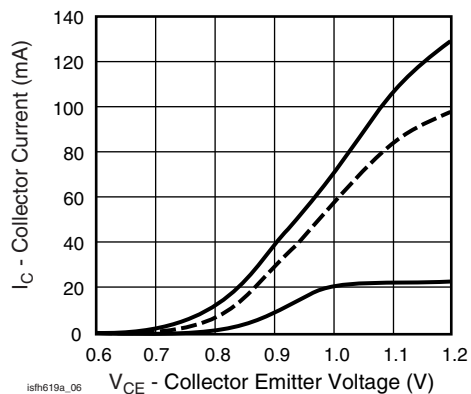


Fig. 5 - Collector Current vs. Collector Emitter Voltage

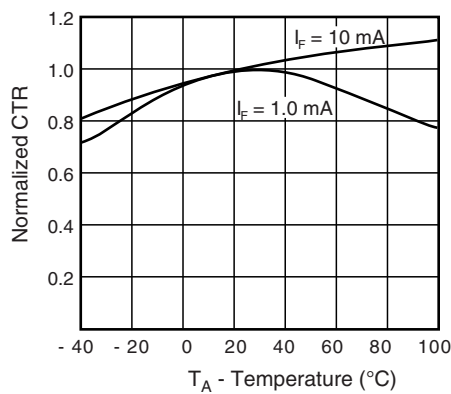


Fig. 8 - Normalized CTR vs. Temperature

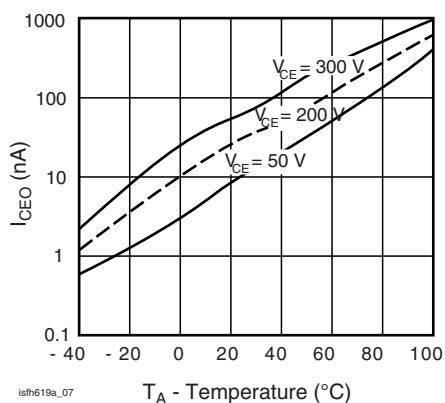


Fig. 6 - Collector Emitter Dark Current vs. Collector Emitter Voltage over Temperature

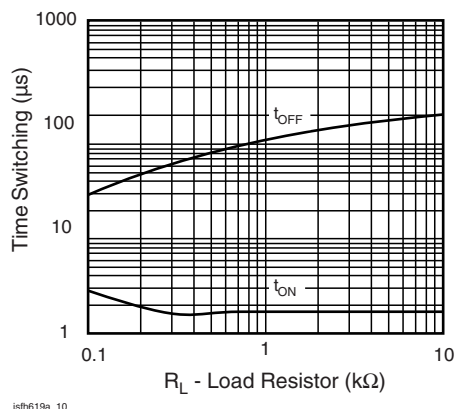


Fig. 9 - Switching Time vs. Load Resistor

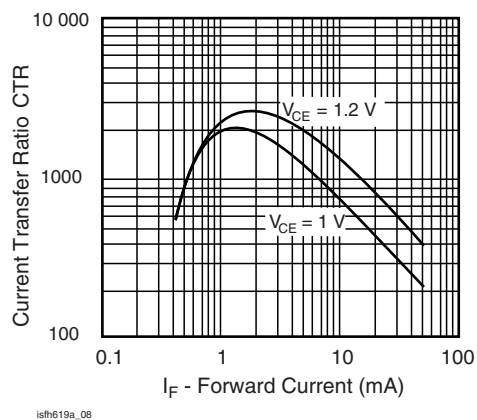
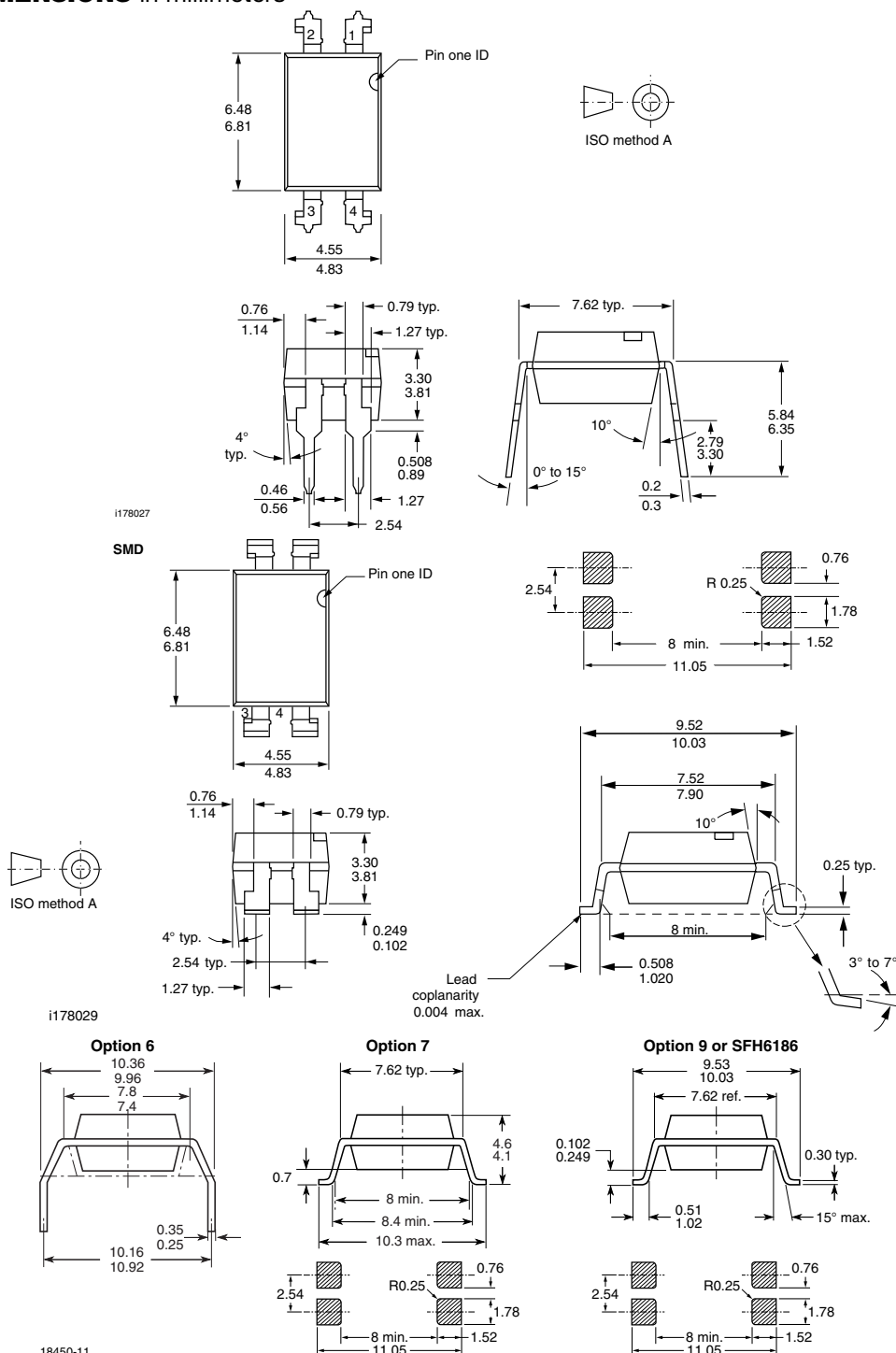
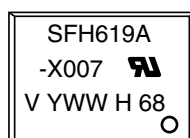


Fig. 7 - Current Transfer Ratio vs. Forward Current

**PACKAGE DIMENSIONS** in millimeters

**PACKAGE MARKING** (example)

**Notes**

- Only option 7 reflected in the package marking.
- Tape and reel suffix (T) is not part of the package marking.



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