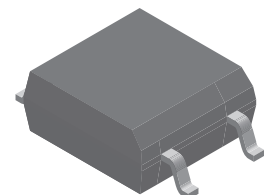
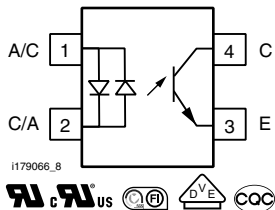




## Optocoupler, Phototransistor Output, SOP-4, AC Input, Mini-Flat Package



I179066



### FEATURES

- SOP (small outline package)
- Isolation test voltage, 3750 V<sub>RMS</sub> (1 s)
- High collector emitter breakdown voltage, V<sub>CEO</sub> = 70 V
- Bidirectional AC input
- Low saturation voltage
- Fast switching times
- Temperature stable
- Low coupling capacitance
- End stackable, 0.100" (2.54 mm) spacing
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**  
**GREEN**  
(5-2008)

### LINKS TO ADDITIONAL RESOURCES



### DESCRIPTION

The SFH691AT has a GaAs infrared emitting diode emitter, which is optically coupled to silicon planar phototransistor detector, and is incorporated in a 4 pin 100 mil lead pitch miniflat package. It features a high current transfer ratio, low coupling capacitance, and high isolation voltage.

The coupling devices are designed for signal transmission between two electrically separated circuits.

### APPLICATIONS

- High density mounting or space sensitive PCBs
- PLCs
- Telecommunication

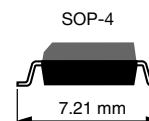
### AGENCY APPROVALS

- [UL](#)
- [cUL](#)
- DIN EN 60747-5-5 (VDE 0884), available with option 1
- [BSI](#)
- [CQC](#)
- [FIMKO](#)

### ORDERING INFORMATION



T  
TAPE  
AND  
REEL



| AGENCY CERTIFIED / PACKAGE | CTR (%)   |
|----------------------------|-----------|
| UL, cUL, BSI, CQC, FIMKO   | 50 to 300 |
| SOP-4                      | SFH691AT  |



| <b>ABSOLUTE MAXIMUM RATINGS</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified) |                                                                        |            |                |                    |
|--------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------|------------|----------------|--------------------|
| PARAMETER                                                                                              | TEST CONDITION                                                         | SYMBOL     | VALUE          | UNIT               |
| <b>INPUT</b>                                                                                           |                                                                        |            |                |                    |
| DC forward current                                                                                     |                                                                        | $I_F$      | $\pm 50$       | mA                 |
| Surge forward current                                                                                  | $t_p \leq 10\text{ }\mu\text{s}$                                       | $I_{FSM}$  | $\pm 2.5$      | A                  |
| Total power dissipation                                                                                |                                                                        | $P_{diss}$ | 80             | mW                 |
| <b>OUTPUT</b>                                                                                          |                                                                        |            |                |                    |
| Collector emitter voltage                                                                              |                                                                        | $V_{CEO}$  | 70             | V                  |
| Emitter collector voltage                                                                              |                                                                        | $V_{ECO}$  | 7              | V                  |
| Collector current                                                                                      |                                                                        | $I_C$      | 50             | mA                 |
|                                                                                                        | $t_p \leq 1\text{ ms}$                                                 | $I_C$      | 100            | mA                 |
| Total power dissipation                                                                                |                                                                        | $P_{diss}$ | 150            | mW                 |
| <b>COUPLER</b>                                                                                         |                                                                        |            |                |                    |
| Isolation test voltage between emitter and detector                                                    | 1 s                                                                    | $V_{ISO}$  | 3750           | $V_{RMS}$          |
| 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 range                                                                              |                                                                        | $T_{stg}$  | -55 to +150    | $^{\circ}\text{C}$ |
| Ambient temperature range                                                                              |                                                                        | $T_{amb}$  | -55 to +100    | $^{\circ}\text{C}$ |
| Junction temperature                                                                                   |                                                                        | $T_j$      | 100            | $^{\circ}\text{C}$ |
| Soldering temperature <sup>(1)</sup>                                                                   | Max. 10 s dip soldering distance to seating plane $\geq 1.5\text{ mm}$ | $T_{sld}$  | 260            | $^{\circ}\text{C}$ |

**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

| <b>ELECTRICAL CHARACTERISTICS</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified) |                                                |             |      |      |      |                      |
|----------------------------------------------------------------------------------------------------------|------------------------------------------------|-------------|------|------|------|----------------------|
| PARAMETER                                                                                                | TEST CONDITION                                 | SYMBOL      | MIN. | TYP. | MAX. | UNIT                 |
| <b>INPUT</b>                                                                                             |                                                |             |      |      |      |                      |
| Forward voltage                                                                                          | $I_F = \pm 5\text{ mA}$                        | $V_F$       | -    | 1.15 | 1.4  | V                    |
| Capacitance                                                                                              | $V_R = 0\text{ V}$ , $f = 1\text{ MHz}$        | $C_O$       | -    | 29   | -    | pF                   |
| Thermal resistance                                                                                       |                                                | $R_{thja}$  | -    | 750  | -    | $^{\circ}\text{C/W}$ |
| <b>OUTPUT</b>                                                                                            |                                                |             |      |      |      |                      |
| Collector emitter leakage current                                                                        | $V_{CE} = 20\text{ V}$                         | $I_{CEO}$   | -    | -    | 100  | nA                   |
| Collector emitter capacitance                                                                            | $V_{CE} = 5\text{ V}$ , $f = 1\text{ MHz}$     | $C_{CE}$    | -    | 5    | -    | pF                   |
| Thermal resistance                                                                                       |                                                | $R_{thja}$  | -    | 500  | -    | $^{\circ}\text{C/W}$ |
| <b>COUPLER</b>                                                                                           |                                                |             |      |      |      |                      |
| Collector emitter saturation voltage                                                                     | $I_F = \pm 10\text{ mA}$ , $I_C = 2\text{ mA}$ | $V_{CEsat}$ | -    | 0.1  | 0.3  | V                    |
| Coupling capacitance                                                                                     | $f = 1\text{ MHz}$                             | $C_C$       | -    | 0.4  | -    | 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.

| <b>CURRENT TRANSFER RATIO</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified) |                                                 |        |      |      |      |      |
|------------------------------------------------------------------------------------------------------|-------------------------------------------------|--------|------|------|------|------|
| PARAMETER                                                                                            | TEST CONDITION                                  | SYMBOL | MIN. | TYP. | MAX. | UNIT |
| Current transfer ratio                                                                               | $I_F = \pm 5\text{ mA}$ , $V_{CE} = 5\text{ V}$ | CTR    | 50   | 120  | 300  | %    |
| CTR1/CTR2                                                                                            | $CTR1 = I_{C1}/I_{F1}$ , $CTR2 = I_{C2}/I_{F2}$ |        | 0.3  | -    | 3    |      |

| <b>SWITCHING CHARACTERISTICS</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified) |                                                                         |           |      |      |      |               |
|---------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------|-----------|------|------|------|---------------|
| PARAMETER                                                                                               | TEST CONDITION                                                          | SYMBOL    | MIN. | TYP. | MAX. | UNIT          |
| Rise time                                                                                               | $I_C = 5\text{ mA}$ , $V_{CC} = 5\text{ V}$ , $R_L = 100\text{ }\Omega$ | $t_r$     | -    | 3    | -    | $\mu\text{s}$ |
| Fall time                                                                                               | $I_C = 5\text{ mA}$ , $V_{CC} = 5\text{ V}$ , $R_L = 100\text{ }\Omega$ | $t_f$     | -    | 4    | -    | $\mu\text{s}$ |
| Turn-on time                                                                                            | $I_C = 5\text{ mA}$ , $V_{CC} = 5\text{ V}$ , $R_L = 100\text{ }\Omega$ | $t_{on}$  | -    | 5    | -    | $\mu\text{s}$ |
| Turn-off time                                                                                           | $I_C = 5\text{ mA}$ , $V_{CC} = 5\text{ V}$ , $R_L = 100\text{ }\Omega$ | $t_{off}$ | -    | 3    | -    | $\mu\text{s}$ |

| <b>SAFETY AND INSULATION RATINGS</b> |                            |        |      |               |      |                    |
|--------------------------------------|----------------------------|--------|------|---------------|------|--------------------|
| PARAMETER                            | TEST CONDITION             | SYMBOL | MIN. | TYP.          | MAX. | UNIT               |
| Climatic classification              | According to IEC 68 part 1 |        | -    | 55 / 100 / 21 | -    |                    |
| Comparative tracking index           |                            | CTI    | 175  | -             | 399  |                    |
| $V_{IOTM}$                           |                            |        | 6000 | -             | -    | V                  |
| $V_{IORM}$                           |                            |        | 707  | -             | -    | V                  |
| $P_{SO}$                             |                            |        | -    | -             | 350  | mW                 |
| $I_{SI}$                             |                            |        | -    | -             | 150  | mA                 |
| $T_{SI}$                             |                            |        | -    | -             | 175  | $^{\circ}\text{C}$ |
| Creepage distance                    |                            |        | 5    | -             | -    | mm                 |
| Clearance distance                   |                            |        | 5    | -             | -    | mm                 |
| Insulation thickness                 |                            |        | 0.4  | -             | -    | mm                 |

**Note**

- As per IEC 60747-5-5, § 7.4.3.8.2, 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.

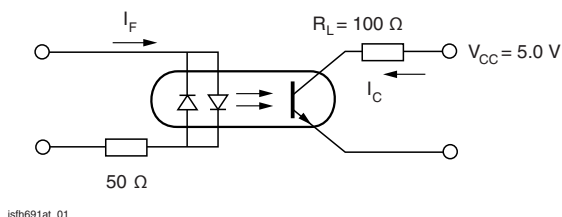
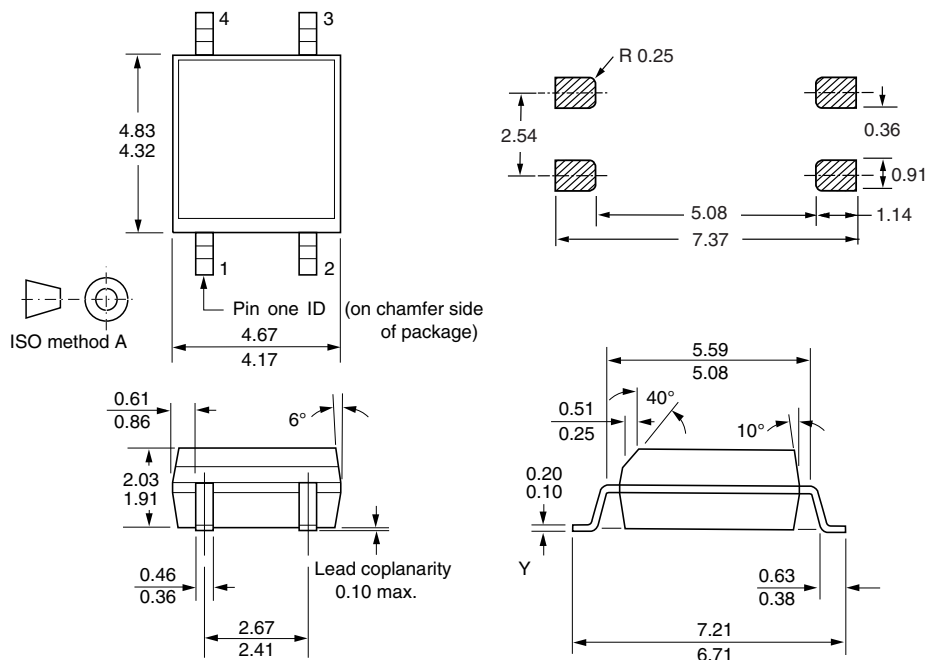
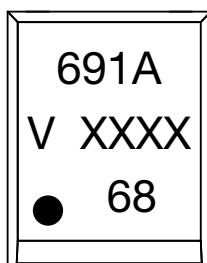
**TYPICAL CHARACTERISTICS** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)


Fig. 1 - Linear Operation (without Saturation)

**PACKAGE DIMENSIONS** in millimeters


i178038

**PACKAGE MARKING** (example)

**Notes**

- XXXX = LMC (lot marking code)
- Tape and reel suffix (T) is not part of the package marking



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