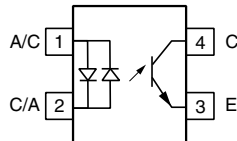
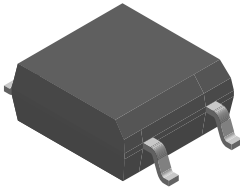


## Optocoupler, Phototransistor Output, SOP-4, AC Input, Mini-Flat Package



1179066

### 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.

### FEATURES

- SOP (small outline package)
- Isolation test voltage, 3750 V<sub>RMS</sub> (1.0 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
- Lead (Pb)-free component
- Component in accordance to RoHS 2002/95/EC and WEEE 2002/96/EC



**RoHS**  
COMPLIANT

### APPLICATIONS

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

### AGENCY APPROVALS

- UL1577, file no. E52744 system code U
- FIMKO
- DIN EN 60747-5-5 available with option 1

### ORDER INFORMATION

PART	REMARKS
SFH691AT	CTR 50 to 300 %, SMD-4

#### Note

The SFH691AT is available only on tape and reel.

### ABSOLUTE MAXIMUM RATINGS (1)

PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
<b>INPUT</b>				
DC forward current		I <sub>F</sub>	50	mA
Surge forward current	t <sub>p</sub> ≤ 10 μs	I <sub>FSM</sub>	2.5	A
Total power dissipation		P <sub>diss</sub>	80	mW
<b>OUTPUT</b>				
Collector emitter voltage		V <sub>CE</sub>	70	V
Emitter collector voltage		V <sub>EC</sub>	7.0	V
Collector current		I <sub>C</sub>	50	mA
	t <sub>p</sub> ≤ 1.0 ms	I <sub>C</sub>	100	mA
Total power dissipation		P <sub>diss</sub>	150	mW



Optocoupler, Phototransistor Output, Vishay Semiconductors  
SOP-4,  
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ABSOLUTE MAXIMUM RATINGS <sup>(1)</sup>				
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
<b>COUPLER</b>				
Isolation test voltage between emitter and detector	1.0 s	$V_{ISO}$	3750	$V_{RMS}$
Isolation resistance	$V_{IO} = 500\text{ V}, T_{amb} = 25\text{ °C}$	$R_{IO}$	$\geq 10^{12}$	$\Omega$
	$V_{IO} = 500\text{ V}, T_{amb} = 100\text{ °C}$	$R_{IO}$	$\geq 10^{11}$	$\Omega$
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>(2)</sup>	max. 10 s dip soldering distance to seating plane $\geq 1.5\text{ mm}$	$T_{sld}$	260	$^{\circ}\text{C}$

**Notes**

<sup>(1)</sup>  $T_{amb} = 25\text{ °C}$ , unless otherwise specified.

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>(2)</sup> Refer to reflow profile for soldering conditions for surface mounted devices.

ELECTRICAL CHARACTERISTICS						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
<b>INPUT</b>						
Forward voltage	$I_F \pm 5.0\text{ mA}$	$V_F$		1.15	1.4	V
Capacitance	$V_R = 0\text{ V}, f = 1.0\text{ MHz}$	$C_O$		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	$V_{CE} = 5.0\text{ V}, f = 1.0\text{ MHz}$	$C_{CE}$		5.0		pF
Thermal resistance		$R_{thja}$		500		$^{\circ}\text{C/W}$
<b>COUPLER</b>						
Collector emitter saturation voltage	$I_F = 10\text{ mA}, I_C = 2.0\text{ mA}$	$V_{CEsat}$		0.1	0.3	V
Coupling capacitance	$f = 1.0\text{ MHz}$	$C_C$		0.4		pF

**Note**

$T_{amb} = 25\text{ °C}$ , unless otherwise specified.

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
Current transfer ratio	$I_F = \pm 5.0\text{ mA}, V_{CE} = 5.0\text{ V}$	CTR	50	120	300	%
CTR1/CTR2	$CTR1 = I_{C1}/I_{F1}, CTR2 = I_{C2}/I_{F2}$		0.3		3.0	

SWITCHING CHARACTERISTICS						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Rise time	$I_C = 5.0\text{ mA}, V_{CC} = 5.0\text{ V}, R_L = 100\ \Omega$	$t_r$			3.0	$\mu\text{s}$
Fall time	$I_C = 5.0\text{ mA}, V_{CC} = 5.0\text{ V}, R_L = 100\ \Omega$	$t_f$			4.0	$\mu\text{s}$
Turn-on time	$I_C = 5.0\text{ mA}, V_{CC} = 5.0\text{ V}, R_L = 100\ \Omega$	$t_{on}$			5.0	$\mu\text{s}$
Turn-off time	$I_C = 5.0\text{ mA}, V_{CC} = 5.0\text{ V}, R_L = 100\ \Omega$	$t_{off}$			3.0	$\mu\text{s}$

Vishay Semiconductors Optocoupler, Phototransistor Output,  
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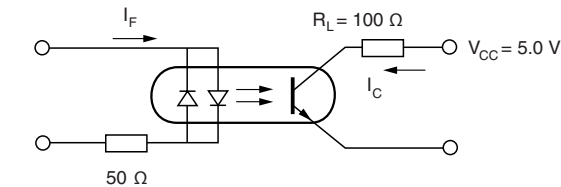
SAFETY AND INSULATION RATINGS						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Climatic classification (according to IEC 68 part 1)				55/100/21		
Comparative tracking index		CTI	175		399	
$V_{IOTM}$			6000			V
$V_{IORM}$			707			V
$P_{SO}$					350	mW
$I_{SI}$					150	mA
$T_{SI}$					175	°C
Creepage distance			5			mm
Clearance distance			5			mm
Insulation thickness			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**

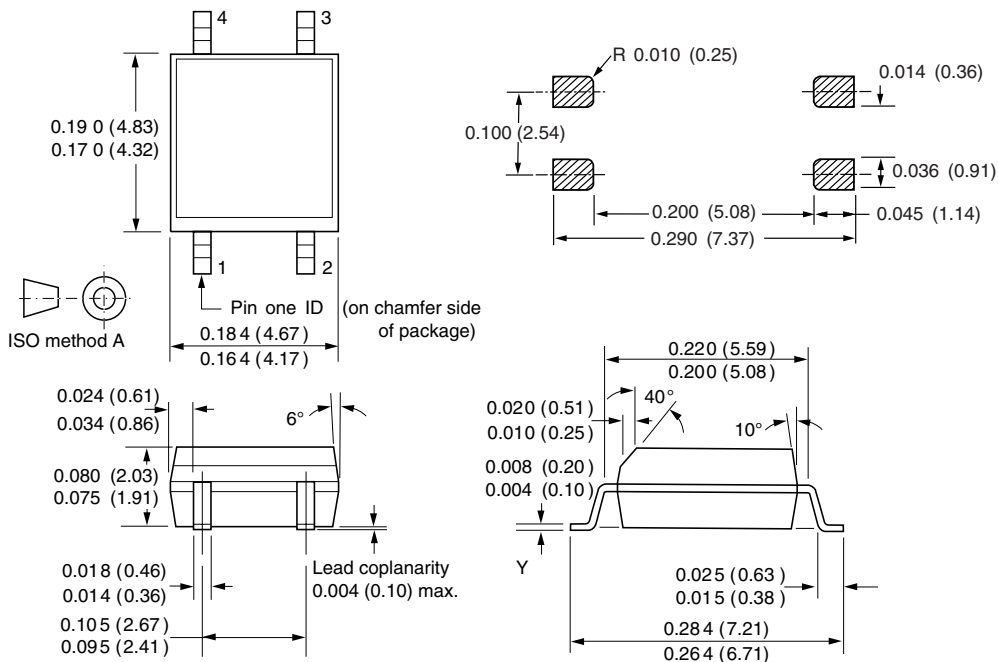
$T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified



isfh691at\_01

Fig. 1 - Linear Operation (without Saturation)

**PACKAGE DIMENSIONS** in inches (millimeters)



i178038



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**OZONE DEPLETING SUBSTANCES POLICY STATEMENT**

It is the policy of Vishay Semiconductor GmbH to

1. Meet all present and future national and international statutory requirements.
2. Regularly and continuously improve the performance of our products, processes, distribution and operating systems with respect to their impact on the health and safety of our employees and the public, as well as their impact on the environment.

It is particular concern to control or eliminate releases of those substances into the atmosphere which are known as ozone depleting substances (ODSs).

The Montreal Protocol (1987) and its London Amendments (1990) intend to severely restrict the use of ODSs and forbid their use within the next ten years. Various national and international initiatives are pressing for an earlier ban on these substances.

Vishay Semiconductor GmbH has been able to use its policy of continuous improvements to eliminate the use of ODSs listed in the following documents.

1. Annex A, B and list of transitional substances of the Montreal Protocol and the London Amendments respectively.
2. Class I and II ozone depleting substances in the Clean Air Act Amendments of 1990 by the Environmental Protection Agency (EPA) in the USA.
3. Council Decision 88/540/EEC and 91/690/EEC Annex A, B and C (transitional substances) respectively.

Vishay Semiconductor GmbH can certify that our semiconductors are not manufactured with ozone depleting substances and do not contain such substances.

We reserve the right to make changes to improve technical design  
and may do so without further notice.

Parameters can vary in different applications. All operating parameters must be validated for each customer application by the customer. Should the buyer use Vishay Semiconductors products for any unintended or unauthorized application, the buyer shall indemnify Vishay Semiconductors against all claims, costs, damages, and expenses, arising out of, directly or indirectly, any claim of personal damage, injury or death associated with such unintended or unauthorized use.

Vishay Semiconductor GmbH, P.O.B. 3535, D-74025 Heilbronn, Germany



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