

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

### Features

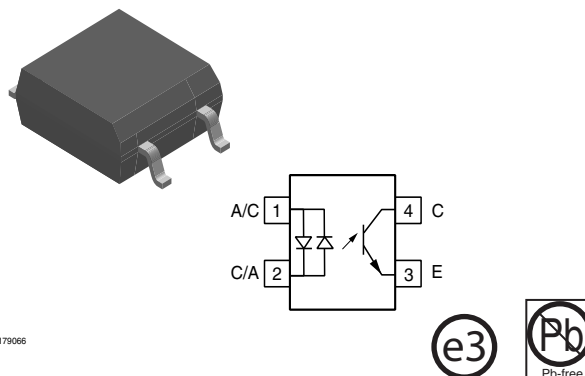
- SOP (Small Outline Package)
- Isolation Test Voltage, 3750 V<sub>RMS</sub> (1.0 s)
- High Collector-Emitter Breakdown Voltage, V<sub>CEO</sub> = 70 V
- Bidirectional AC Input
- Low Saturation Voltage
- Fast Switching Times
- Temperature Stable
- Low Coupling Capacitance
- End-Stackable, .100 " (2.54 mm) Spacing
- Lead-free component
- Component in accordance to RoHS 2002/95/EC and WEEE 2002/96/EC

### Agency Approvals

- UL1577, File No. E52744 System Code U
- FIMKO

### Applications

High density mounting or space sensitive PCBs  
PLCs  
Telecommunications



### 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.

### Order Information

Part	Remarks
SFH691AT	CTR 50 - 300 %, SMD-4

For additional information on the available options refer to Option Information.

The SFH691AT is available only on tape and reel.

### Absolute Maximum Ratings

T<sub>amb</sub> = 25 °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 Rating for extended periods of the time can adversely affect reliability.

### Input

Parameter	Test condition	Symbol	Value	Unit
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
Power dissipation		P <sub>diss</sub>	80	mW

## Output

Parameter	Test condition	Symbol	Value	Unit
Collector-emitter voltage		$V_{CE}$	70	V
Emitter-collector voltage		$V_{EC}$	7.0	V
Collector current		$I_C$	50	mA
	$t_p \leq 1.0 \text{ ms}$	$I_C$	100	mA
Power dissipation		$P_{diss}$	150	mW

## Coupler

Parameter	Test condition	Symbol	Value	Unit
Isolation test voltage between emitter and detector, (1.0 s)		$V_{ISO}$	3750	$V_{RMS}$
Creepage			$\geq 5.0$	mm
Clearance			$\geq 5.5$	mm
Comparative tracking index per DIN IEC 112/VDEO 303, part 1			$\geq 175$	
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	max. 10 s. dip soldering distance to seating plane $\geq 1.5 \text{ mm}$	$T_{sld}$	260	$^{\circ}\text{C}$

## Electrical Characteristics

$T_{amb} = 25 \text{ }^{\circ}\text{C}$ , 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.

## Input

Parameter	Test condition	Symbol	Min	Typ.	Max	Unit
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		$^{\circ}\text{C/W}$

## Output

Parameter	Test condition	Symbol	Min	Typ.	Max	Unit
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		$^{\circ}\text{C/W}$

## Coupler

Parameter	Test condition	Symbol	Min	Typ.	Max	Unit
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

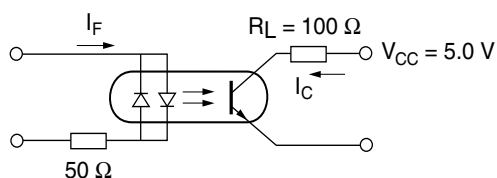
## Current Transfer Ratio

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	$I_F = 5.0 \text{ mA}$ , $V_{CC} = 5.0 \text{ V}$ , $R_L = 100 \Omega$	$t_r$			3.0	$\mu\text{s}$
Fall time	$I_F = 5.0 \text{ mA}$ , $V_{CC} = 5.0 \text{ V}$ , $R_L = 100 \Omega$	$t_f$			4.0	$\mu\text{s}$
Turn-on time	$I_F = 5.0 \text{ mA}$ , $V_{CC} = 5.0 \text{ V}$ , $R_L = 100 \Omega$	$t_{on}$			5.0	$\mu\text{s}$
Turn-off time	$I_F = 5.0 \text{ mA}$ , $V_{CC} = 5.0 \text{ V}$ , $R_L = 100 \Omega$	$t_{off}$			3.0	$\mu\text{s}$

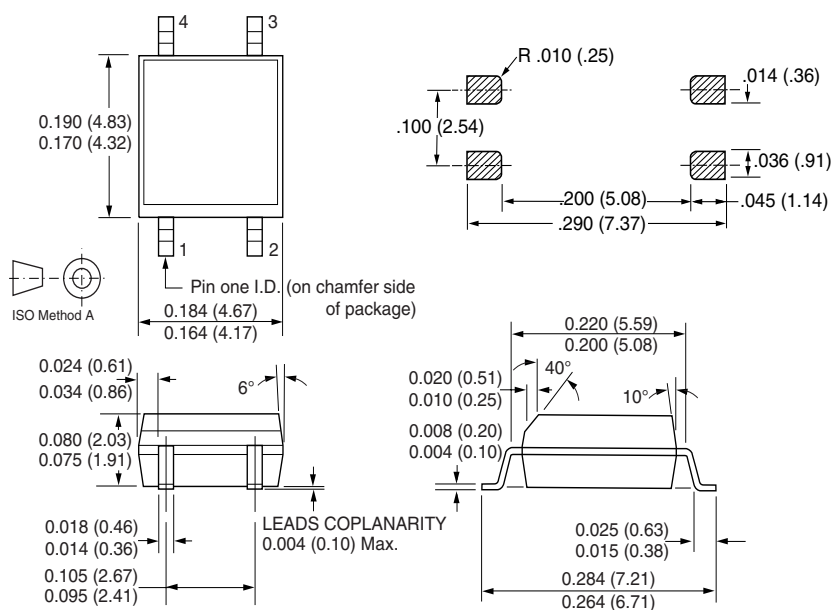
## Typical Characteristics ( $T_{amb} = 25^\circ\text{C}$ unless otherwise specified)



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Figure 1. Linear Operation ( without Saturation)

## Package Dimensions in Inches (mm)



i178038



## **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  
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