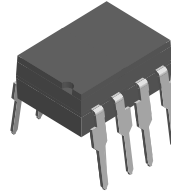


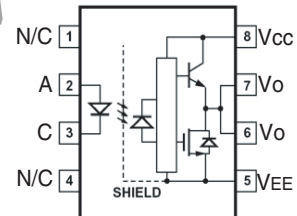
## 0.5 A Output Current IGBT & MOSFET Driver

### Features

- 0.5 A Minimum Peak Output Current
- 20 kV/ $\mu$ s Minimum Common Mode Rejection (CMR) at  $V_{cm} = 1500$  V
- 1.0 V Maximum Low Level Output Voltage ( $V_{OL}$ ) Eliminates Need for Negative Gate Drive
- $I_{CC} = 5$  mA Maximum Supply Current
- Under Voltage Lock-Out with Hysteresis
- Wide Operating  $V_{CC}$  Range: 15 to 30 V
- 0.5 ms Maximum Propagation Delay
- Industrial Temperature Range: - 40 °C to 100 °C



18236



### Agency Approvals

- UL - File
- CSA - Certification
- DIN EN 60747-5-5 (VDE 0884):2003-01 Available with Option 1

### Applications

Isolated IGBT/MOSFET Gate Driver  
 AC and Brushless DC Motor Drives  
 Industrial Inverters  
 Switch Mode Power Supplies (SMPS)  
 Uninterruptible Power Supplies (UPS)

### Description

The SFH6650 consists of a LED optically coupled to an integrated circuit with a power output stage. This optocoupler is ideally suited for driving power IGBTs and MOSFETs used in motor control inverter applications. The high operating voltage range of the output stage provides the drive voltages required by gate controlled devices. The voltage and current supplied by this optocoupler makes it ideally suited for directly driving IGBTs with ratings up to 1200 V/ 50 A. For IGBTs with higher ratings, the SFH6650 can be used to drive a discrete power stage which drives the IGBT gate.

### Order Information

Part	Remarks
SFH6650	8-pin DIP, Tubes

### Absolute Maximum Ratings

$T_{amb} = 25$  °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
Average input current		$I_{F(AVG)}$	25	mA
Peak transient input current	< 1 ms pulse width, 300 pps	$I_{F(TRAN)}$	$V_{DD1} + 0.51$	A
Reverse input voltage		$V_R$	5	V

### Output

Parameter	Test condition	Symbol	Value	Unit
High peak output current		$I_{OH(PEAK)}$	0.6	A
Low peak output current		$I_{OL(PEAK)}$	0.6	A
Supply voltage		$(V_{CC} - V_{EE})$	0 to + 35	V
Output voltage		$V_{O(PEAK)}$	0 to + $V_{CC}$	V
Output power dissipation		$P_{diss}$	250	mW

### Optocoupler

Parameter	Test condition	Symbol	Value	Unit
Storage temperature range		$T_S$	-55 to + 125	°C
Ambient operating temperature range		$T_A$	-40 to + 85	°C
Total power dissipation		$P_{tot}$	295	mW
Lead solder temperature	for 10 sec., 1.6 mm below seating plane		260	°C

### Electrical Characteristics, $T_{amb} = 25\text{ °C}$

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

Parameter	Test condition	Symbol	Min	Typ.	Max	Unit
High level output current	$V_O = (V_{CC} - 4\text{ V})$	$I_{OH}$	0.1	0.4		A
	$V_O = (V_{CC} - 15\text{ V})$	$I_{OH}$	0.5			A
Low level output current	$V_O = (V_{EE} + 2.5\text{ V})$	$I_{OL}$	0.1	0.6		A
	$V_O = (V_{EE} + 15\text{ V})$	$I_{OL}$	0.5			A
High level output voltage	$I_O = -100\text{ mA}$	$V_{OH}$	$V_{CC} - 4$	$V_{CC} - 3$		V
Low level output voltage	$I_O = 100\text{ mA}$	$V_{OL}$		0.4	1.0	V
High level supply current	Output open, $I_F = 7\text{ to }16\text{ mA}$	$I_{CCH}$		2.5	5.0	mA
Low level supply current	Output open, $V_F = -3.0\text{ to }+0.8\text{ V}$	$I_{CCL}$		2.7	5.0	mA
Threshold input current low to high	$I_O = 0\text{ mA}$ , $V_O > 5\text{ V}$	$I_{FLH}$		2.2	5.0	mA
Threshold input voltage high to low		$V_{FHL}$	0.8			V
Input forward voltage	$I_F = 10\text{ mA}$	$V_F$	1.2	1.5	1.8	V
Temperature coefficient of forward voltage	$I_F = 10\text{ mA}$	$\Delta V_F / \Delta T_A$		-1.6		mV/°C
Input reverse breakdown voltage	$I_R = 10\text{ }\mu\text{A}$	$BV_R$	5			V
Input capacitance	$F = 1\text{ MHz}$ , $V_F = 0\text{ V}$	$C_{IN}$		70		pF
UVLO threshold	$V_O \geq 5\text{ V}$	$V_{UVLO+}$	12.3		12.5	V
	$I_F = 10\text{ mA}$	$V_{UVLO-}$	10.8		11.0	V
UVLO hysteresis		$UVLO_{HYS}$		1.5		V

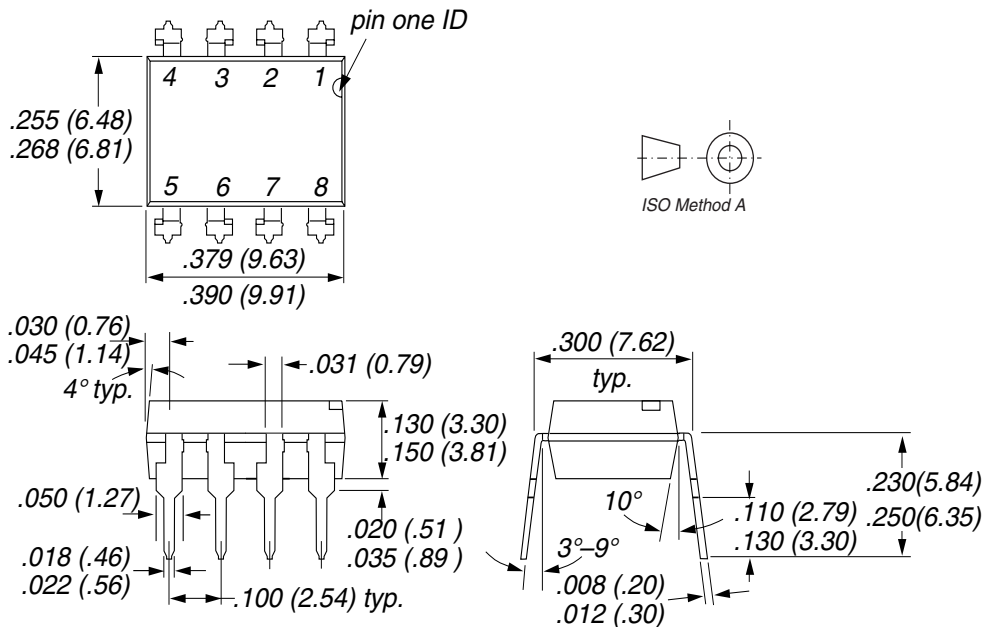
### Switching Characteristics

Parameter	Test condition	Symbol	Min	Typ.	Max	Unit
Propagation delay time to logic low output	$R_g = 47 \Omega$ , $C_g = 3 \text{ nF}$ , $f = 10 \text{ kHz}$ , Duty Cycle = 50 %	$t_{PHL}$	0.1	0.3	0.5	$\mu\text{s}$
Propagation delay time to logic high output	$R_g = 47 \Omega$ , $C_g = 3 \text{ nF}$ , $f = 10 \text{ kHz}$ , Duty Cycle = 50 %	$t_{PLH}$	0.1	0.3	0.5	$\mu\text{s}$
Pulse width distortion	$R_g = 47 \Omega$ , $C_g = 3 \text{ nF}$ , $f = 10 \text{ kHz}$ , Duty Cycle = 50 %	PWD			0.3	$\mu\text{s}$
Propagation delay difference between any two parts	$R_g = 47 \Omega$ , $C_g = 3 \text{ nF}$ , $f = 10 \text{ kHz}$ , Duty Cycle = 50 %	PDD ( $t_{PHL} - t_{PLH}$ )	- 0.35		0.35	$\mu\text{s}$
Rise time	$R_g = 47 \Omega$ , $C_g = 3 \text{ nF}$ , $f = 10 \text{ kHz}$ , Duty Cycle = 50 %	$t_r$		0.1		$\mu\text{s}$
Fall time	$R_g = 47 \Omega$ , $C_g = 3 \text{ nF}$ , $f = 10 \text{ kHz}$ , Duty Cycle = 50 %	$t_f$		0.1		$\mu\text{s}$
UVLO turn on delay	$V_O > 5 \text{ V}$ , $I_F = 10 \text{ mA}$	$T_{UVLO-ON}$		0.8		$\mu\text{s}$
UVLO turn off delay	$V_O < 5 \text{ V}$ , $I_F = 10 \text{ mA}$	$T_{UVLO-OFF}$		0.6		$\mu\text{s}$

### Common Mode Transient Immunity

Parameter	Test condition	Symbol	Min	Typ.	Max	Unit
Common mode transient immunity at logic high output	$T_A = 25 \text{ }^\circ\text{C}$ , $I_F = 10 \text{ to } 16 \text{ mA}$ , $V_{CM} = 1500 \text{ V}$ , $V_{CC} = 30 \text{ V}$	$ CMH $	15	30		$\text{KV}/\mu\text{s}$
Common mode transient immunity at logic low output	$T_A = 25 \text{ }^\circ\text{C}$ , $V_{CM} = 1500 \text{ V}$ , $V_{CC} = 30 \text{ V}$ , $V_F = 0 \text{ V}$	$ CML $	15	30		$\text{KV}/\mu\text{s}$

### Package Dimensions in Inches (mm)



### 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.

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