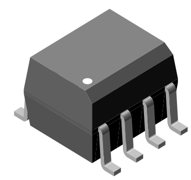
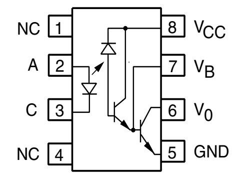
High Speed Optocoupler, 100 kBd, Low Input Current, High Gain

Features

- Industry Standard SOIC-8 Surface Mountable Package
- High Current Transfer Ratio, 800 %
- Low Input Current, 0.5 mA
- High Output Current, 60 mA
- Isolation Test Voltage, 3000 V_{RMS}
- TTL Compatible Output, V_{OL} = 0.1 V
- Adjustable Bandwidth-Access to Base
- Lead-free component





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- Component in accordance to RoHS 2002/95/EC and WEEE 2002/96/EC

Agency Approvals

- UL1577, File No. E52744 System Code H or J, Double Protection
- DIN EN 60747-5-2 (VDE0884)
  DIN EN 60747-5-5 pending
  Available with Option 1
- CSA 93751

Applications

Logic Ground Isolation -TTL/TTL, TTL/CMOS, CMOS/CMOS, CMOS/TTL

EIA RS 232C Line Receiver

Low Input Current Line Receiver Long Lines, Party Lines

Telephone Ring Detector

117 VAC Line Voltage Status Indication - Low Input Power Dissipation

Low Power Systems - Ground Isolation

Description

Very high current ratio together with 3000 V_{RMS} isolation are achieved by coupling an LED with an integrated high gain photo detector in a SOIC-8 package. Separate pins for the photo diode and output stage enable TTL compatible saturation voltages with high speed operation. Photodarlington operation is achieved by tying the V_{CC} and V_O terminals together. Access to the base terminal allows adjustment to the gain bandwidth.

The SFH6318T is ideal for TTL applications since the 300 % minimum current transfer ratio with an LED current of 1.6 mA enables operation with one unit load-in and one unit load-out with a 2.2 kΩ pull-up resistor.

The SFH6319T is best suited for low power logic applications involving CMOS and low power TTL. A 400 % current transfer ratio with only 0.5 mA of LED current is guaranteed from 0 °C to 70 °C.

Caution:
Due to the small geometries of this device, it should be handled with Electrostatic Discharge (ESD) precautions. Proper grounding would prevent damage further and/or degradation which may be induced by ESD.

Order Information

Part	Remarks
SFH6318T	CTR 1600 (300 - 2600) %, SOIC-8
SFH6319T	CTR 2000 (400 - 3500) %, SOIC-8

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

Note Product available only on tape and reel

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	Part	Symbol	Value	Unit
Reverse input voltage			V_R	3.0	V
Supply and output voltage	V_{CC} (pin 8-5), V_O (pin 6-5)	SFH6318T	V_{CC}, V_O	- 0.5 to 7.0	V
		SFH6319T	V_{CC}, V_O	- 0.5 to 18	V
Input power dissipation			P_{diss}	35	mW
Derate linearly above				50	°C
Free air temperature				0.7	mW/°C
Average input current			$I_{F(AVG)}$	20	mA
Peak input current	50 % duty cycle-1.0 ms pulse width		I_{FRM}	40	mA
Peak transient input current	$t_p \leq 1.0\ \mu s$, 300 pps		I_{FSM}	1.0	A

Output

Parameter	Test condition	Symbol	Value	Unit
Output current (pin 6)		I_O	60	mA
Emitter-base reverse current (pin 5-7)			0.5	V
Output power dissipation		P_{diss}	150	mW
Derate linearly from 25 °C			2.0	mW/°C

Coupler

Parameter	Test condition	Symbol	Value	Unit
Storage temperature		T_{stg}	- 55 to + 125	°C
Lead soldering temperature	t = 10 s	T_{sld}	260	°C
Junction temperature		T_j	100	°C
Ambient temperature range		T_{amb}	- 55 to + 100	°C
Isolation test voltage between emitter and detector (refer to climate DIN 40046, part 2, Nov. 74)		V_{ISO}	3000	V_{RMS}
Pollution degree (DIN VDE 0110)			2	
Creepage distance			≥ 4.0	mm
Clearance			≥ 4.0	mm
Comparative tracking index per DIN IEC 112/VDE 0303, part 1			175	
Isolation resistance	V_{IO} = 500 V, T_{amb} = 25 °C	R_{IO}	$\geq 10^{12}$	Ω
	V_{IO} = 500 V, T_{amb} = 100 °C	R_{IO}	$\geq 10^{11}$	Ω

Electrical Characteristics

T_{amb} = 25 °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

T_{amb} = 0 °C to 70 °C. Typical values are specified at T_{amb} = 25 °C.

Parameter	Test condition	Part	Symbol	Min	Typ.	Max	Unit
Input forward voltage	I_F = 1.6 mA		V_F		1.4	1.7	V
Temperature coefficient, forward voltage	I_F = 1.6 mA		$\Delta V_F / \Delta T_{amb}$		- 1.8		mV/°C

Output

T_{amb} = 0 °C to 70 °C. Typical values are specified at T_{amb} = 25 °C.

Parameter	Test condition	Symbol	Min	Typ.	Max	Unit
Logic low output voltage, see note 2	I_F = 1.6 mA, I_O = 4.8 mA, V_{CC} = 4.5 V	V_{OL}		0.1	0.4	V
	I_F = 1.6 mA, I_O = 8.0 mA, V_{CC} = 4.5 V	V_{OL}		0.1	0.4	V
	I_F = 5.0 mA, I_O = 15 mA, V_{CC} = 4.5 V	V_{OL}		0.15	0.4	V
	I_F = 12 mA, I_O = 24 mA, V_{CC} = 4.5 V	V_{OL}		0.25	0.4	V
Logic high output current, see note 2	I_F = 0 mA, V_O = V_{CC} = 7.0 V	I_{IO}		0.1	250	µA
	I_F = 0 mA, V_O = V_{CC} = 18 V	I_{IO}		0.05	100	µA
Logic low supply current, see note 2	I_F = 1.6 mA, V_O = OPEN, V_{CC} = 18 V	I_{CCL}		0.2	1.5	mA
Logic high supply current, see note 2	I_F = 0 mA, V_O = OPEN, V_{CC} = 18 V	I_{CCH}		0.01	10	µA

Coupler

T_{amb} = 0 °C to 70 °C. Typical values are specified at T_{amb} = 25 °C.

Parameter	Test condition	Symbol	Min	Typ.	Max	Unit
Capacitance (input-output) (see note 3)	f = 1.0 MHz	C_{IO}		0.6		pF
Input capacitance	f = 1.0 MHz, V_F = 0	C_{IN}		25		pF
Resistance (input-output), see note 3	V_{IO} = 500 VDC, T_{amb} = 25 °C	R_{IO}		10^{12}		Ω
	V_{IO} = 500 VDC, T_{amb} = 100 °C	R_{IO}		10^{11}		Ω

Current Transfer Ratio

T_{amb} = 0 °C to 70 °C. Typical values are specified at T_{amb} = 25 °C.

Parameter	Test condition	Part	Symbol	Min	Typ.	Max	Unit
Current Transfer Ratio See notes 1 and 2	I_F = 1.6 mA, V_O = 0.4 V, V_{CC} = 4.5 V	SFH6318T	CTR	300	1600	2600	%
	I_F = 0.5 mA, V_O = 0.4 V, V_{CC} = 4.5 V	SFH6319T	CTR	400	2000	3500	%
	I_F = 1.6 mA, V_O = 0.4 V, V_{CC} = 4.5 V	SFH6319T	CTR	500	1600	2600	%

Switching Characteristics

T_{amb} = 25 °C

Parameter	Test condition	Part	Symbol	Min	Typ.	Max	Unit
Propagation delay time to logic low at output	I_F = 1.6 mA, R_L = 2.2 kΩ	SFH6318T	t_{PHL}		2.0	10	µs
Propagation delay time to logic low at output, see notes 2 and 4	I_F = 0.5 mA, R_L = 4.7 kΩ	SFH6319T	t_{PHL}		6.0	25	µs
Propagation delay time to logic low at output	I_F = 12 mA, R_L = 270 Ω	SFH6319T	t_{PHL}		0.6	1.0	µs
Propagation delay time to logic high at output	I_F = 1.6 mA, R_L = 2.2 kΩ	SFH6318T	t_{PLH}		2.0	35	µs
Propagation delay time to logic high at output, see notes 2 and 4	I_F = 0.5 mA, R_L = 4.7 kΩ	SFH6319T	t_{PLH}		4.0	60	µs
Propagation delay time to logic high at output	I_F = 12 mA, R_L = 270 Ω	SFH6319T	t_{PLH}		1.5	7.0	µs

Common Mode Transient Immunity

Parameter	Test condition	Symbol	Min	Typ.	Max	Unit
Common mode transient immunity at logic high level output, see notes 5 and 6	I_F = 0 mA, R_L = 2.2 kΩ, V_{CM} = 10 V_{P-P}	$\mid CM_H \mid$		1K		V/µs
Common mode transient immunity at logic low level output, see notes 5 and 6	I_F = 1.6 mA, R_L = 2.2 kΩ, V_{CM} = 10 V_{P-P}	$\mid CM_L \mid$		1K		V/µs

1. DC current transfer ratio is defined as the ratio of output collector current, I_O, to the forward LED input current, I_F times 100 %

2. Pin 7 open.

3. Device considered a two-terminal device: pins 1, 2, 3 and 4 shorted together and pins 5, 6, 7 and 8 shorted together.

4. Using a resistor between pin 5 and 7 will decrease gain and delay time.

5. Common mode transient immunity in logic high level is the maximum tolerable (positive) dV_{cm}/dt on the leading edge of the common mode pulse, V_{CM}, to assure that the output will remain in a logic high state (i.e. V_O > 2.0 V) common mode transient immunity in logic low level is the maximum tolerable (negative) dV_{cm}/dt on the trailing edge of the common mode pulse signal, V_{CM}, to assure that the output will remain in a logic low state (i.e.V_O < 0.8 V).

6. In applications where dv/dt may exceed 50,000 V/µs (such as state discharge) a series resistor, R_{CC} should be included to protect I_C from destructively high surge currents. The recommended value is Refer to Figure 2.
$R_{CC} \cong [(IV)/0.15\ I_F\ (mA)]$ kΩ.

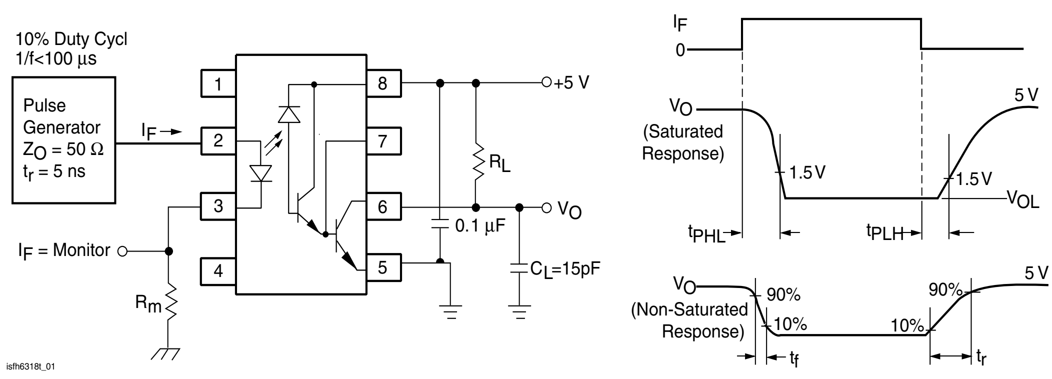


Figure 1. Switching Test Circuit

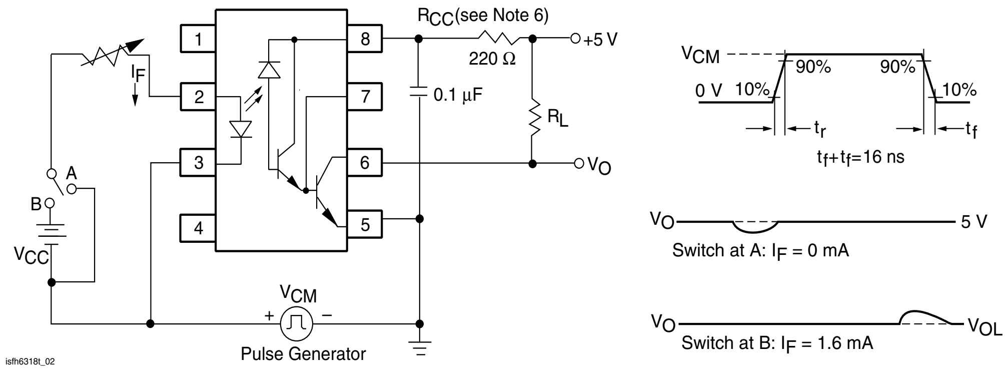
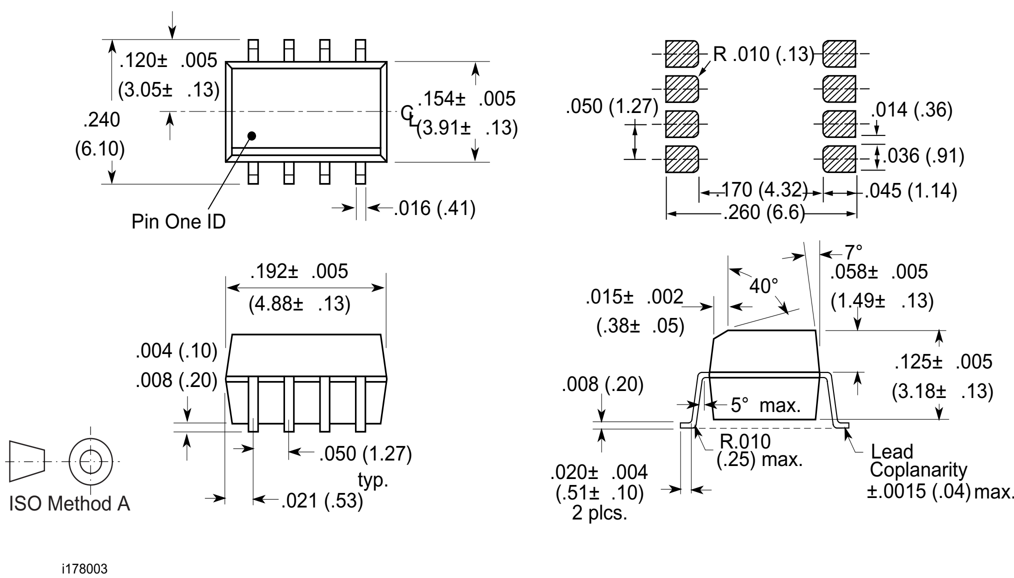


Figure 2. Test Circuit for Transient Immunity and Typical Waveforms

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 operatingsystems 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.

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