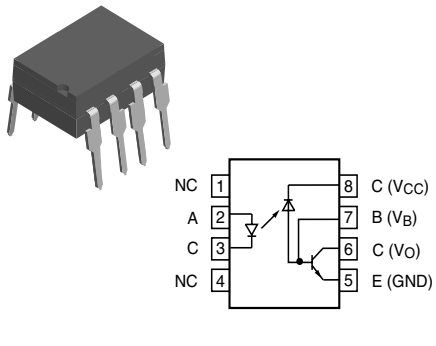
High Speed Optocoupler, 1 MBd, Transistor Output

Features

- Isolation Test Voltage: 5300 V_{RMS}
- TTL Compatible
- High Bit Rates: 1.0 Mbit/s
- High Common-mode Interference Immunity
- Bandwidth 2.0 MHz
- Open-collector Output
- External Base Wiring Possible



Agency Approvals

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

Description

The SFH6135 and SFH6136 optocouplers feature a high signal transmission rate and a high isolation resistance. They have a GaAlAs infrared emitting diode, optically coupled with an integrated photo detector which consists of a photo diode and a high-speed transistor in a DIP-8 plastic package.

Signals can be transmitted between two electrically separated circuits up to frequencies of 2.0 MHz. The potential difference between the circuits to be coupled should not exceed the maximum permissible reference voltages.

Order Information

Part	Remarks
SFH6135	CTR ≥ 7.0 %, DIP-8
SFH6136	CTR ≥ 19 %, DIP-8

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

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
Reverse voltage		V_R	3.0	V
Forward current		I_F	25	mA
Peak forward current	t = 1.0 ms, duty cycle 50 %	I_{FM}	50	mA
Maximum surge forward current	t ≤ 1.0 µs, 300 pulses/s	I_{FSM}	1.0	A
Thermal resistance		R_{thja}	700	K/W
Power dissipation		P_{diss}	45	mW

Output

Parameter	Test condition	Symbol	Value	Unit
Supply voltage		V_S	- 0.5 to 30	V
Output voltage		V_O	- 0.5 to 25	V
Emitter-base voltage		V_{EBO}	5.0	V
Output current		I_O	8.0	mA
Maximum output current		I_O	16	mA
Base current		I_B	5.0	mA
Thermal resistance		R_{thja}	300	K/W
Power dissipation	T_{amb} = 70 °C	P_{diss}	100	mW

Coupler

Parameter	Test condition	Symbol	Value	Unit
Isolation test voltage		V_{ISO}	5300	V_{RMS}
Pollution degree (DIN VDE 0110)			2	
Creepage			≥ 7.0	mm
Clearance			≥ 7.0	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}	≥ 10^{12}	Ω
	V_{IO} = 500 V, T_{amb} = 100 °C	R_{IO}	≥ 10^{11}	Ω
Storage temperature range		T_{stg}	- 55 to + 125	°C
Ambient temperature range		T_{amb}	- 55 to + 100	°C
Soldering temperature	max. ≤10 s, dip soldering ≥ 0.5 mm distance from case bottom	T_{sld}	260	°C

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

Parameter	Test condition	Symbol	Min	Typ.	Max	Unit
Forward voltage	I_F = 16 mA	V_F		1.6	1.9	V
Breakdown voltage	I_R = 10 µA	V_{BR}	3.0			V
Reverse current	V_R = 3.0 V	I_R		0.5	10	µA
Capacitance	V_R = 0 V, f = 1.0 MHz	C_O		125		pF
Temperature coefficient of forward voltage	I_F = 16 mA	$\Delta V_F/\Delta T_{amb}$		1.7		mV/°C

Output

Parameter	Test condition	Part	Symbol	Min	Typ.	Max	Unit
Logic low supply current	I_F = 16 mA, V_O open, V_{CC} = 15 V		I_{CCL}		150		µA
Logic high supply current	I_F = 0 mA, V_O open, V_{CC} = 15 V		I_{CCH}		0.01	1.0	µA
Output voltage, output low	I_F = 16 mA, V_{CC} = 4.5 V, I_O = 1.1 mA	SFH6135	V_{OL}		0.1	0.4	V
	I_F = 16 mA, V_{CC} = 4.5 V, I_O = 2.4 mA	SFH6136	V_{OL}		0.1	0.4	V
Output current, output high	I_F = 0 mA, V_O = V_{CC} = 5.5 V		I_{OH}		3.0	500	nA
	I_F = 0 mA, V_O = V_{CC} = 15 V		I_{OH}		0.01	1.0	µA

Coupler

Parameter	Test condition	Symbol	Min	Typ.	Max	Unit
Capacitance (input-output)	f = 1.0 MHz	C_{IO}		0.6		pF

Current Transfer Ratio

Parameter	Test condition	Part	Symbol	Min	Typ.	Max	Unit
Current Transfer Ratio	I_F = 16 mA, V_O = 0.4 V, V_{CC} = 4.5 V	SFH6135	CTR	7	16		%
		SFH6136	CTR	19	35		%
	I_F = 16 mA, V_O = 0.5 V, V_{CC} = 4.5 V	SFH6135	CTR	5			%
		SFH6136	CTR	15			%

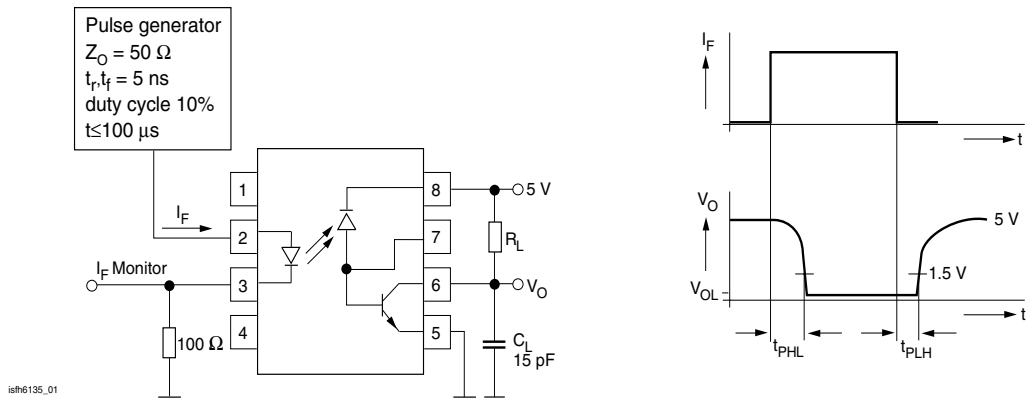


Fig. 1 Schematics

Switching Characteristics

Delay Time

Parameter	Test condition	Part	Symbol	Min	Typ.	Max	Unit
High-low	I_F = 16 mA, V_{CC} = 5.0 V, R_L = 4.1 kΩ	SFH6135	t_{PHL}		0.3	1.5	µs
	I_F = 16 mA, V_{CC} = 5.0 V, R_L = 1.9 kΩ	SFH6136	t_{PHL}		0.2	0.8	µs
Low-high	I_F = 16 mA, V_{CC} = 5.0 V, R_L = 4.1 kΩ	SFH6135	t_{PLH}		0.3	1.5	µs
	I_F = 16 mA, V_{CC} = 5.0 V, R_L = 1.9 kΩ	SFH6136	t_{PLH}		0.2	0.8	µs

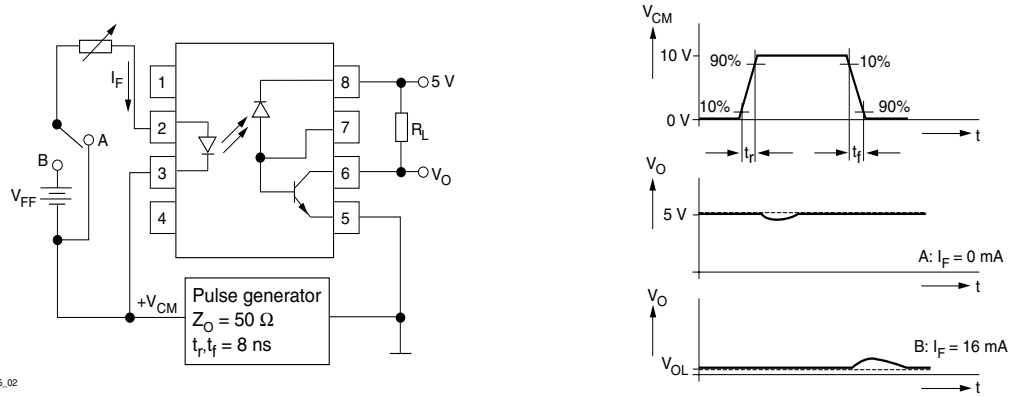


Fig. 2 Common-Mode Interference Immunity

Common Mode Transient Immunity

Parameter	Test condition	Part	Symbol	Min	Typ.	Max	Unit
High	V_{CM} = 10 V_{P-P}, V_{CC} = 5.0 V, I_F = 0 mA, R_L = 4.1 kΩ	SFH6135	CM_H		1000		V/µs
	V_{CM}= 10 V_{P-P}, V_{CC} = 5.0 V, I_F = 0 mA, R_L = 1.9 kΩ	SFH6136	CM_H		1000		V/µs
Low	V_{CM} = 10 V_{P-P}, V_{CC} = 5.0 V, I_F = 0 mA, R_L = 4.1 kΩ	SFH6135	CM_L		1000		V/µs
	V_{CM} = 10 V_{P-P}, V_{CC} = 5.0 V, I_F = 0 mA, R_L = 1.9 kΩ	SFH6136	CM_L		1000		V/µs

Typical Characteristics (T_{amb} = 25 °C unless otherwise specified)

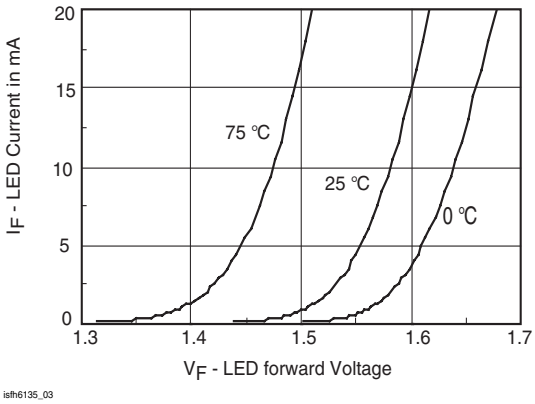


Fig. 3 LED Forward Current vs.Forward Voltage

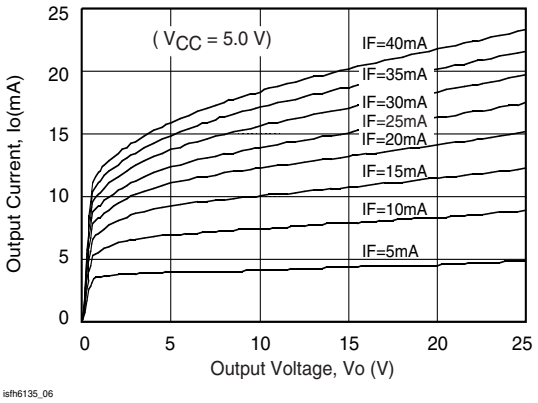


Fig. 6 Output Current vs. Output Voltage

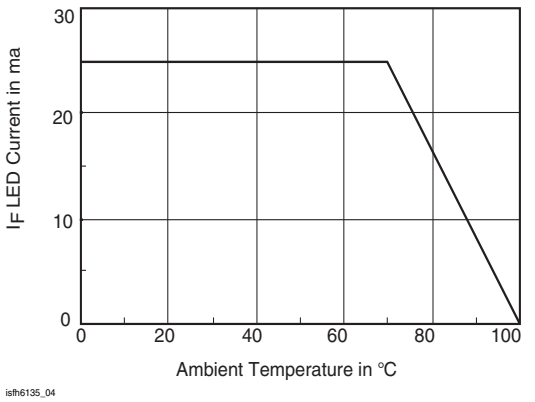


Fig. 4 Permissible Forward LED Current vs. Temperature

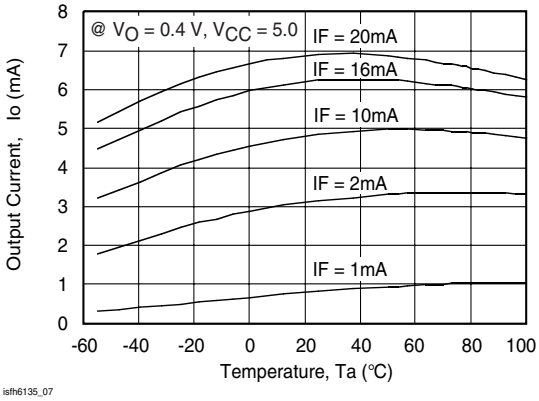


Fig. 7 Output Current vs. Temperature

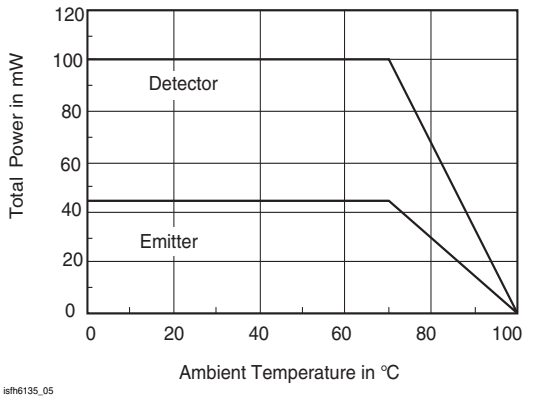


Fig. 5 Permissible Power Dissipation vs. Temperature

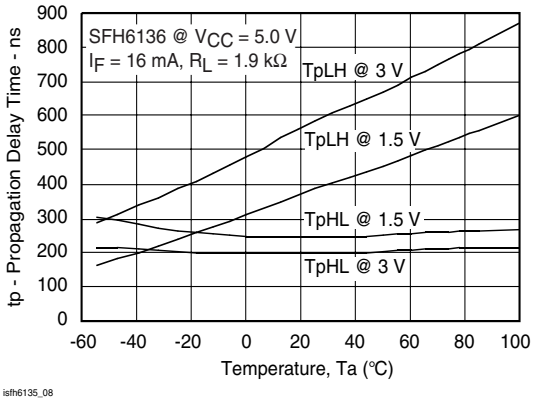


Fig. 8 Propagation Delay vs. Temperature-SFH6136

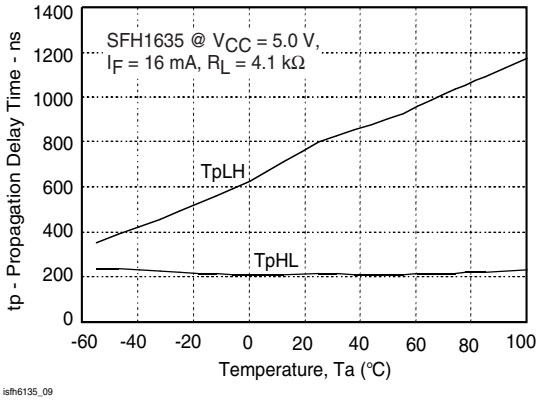


Fig. 9 Propagation Delay vs. Temperature-SFH6135

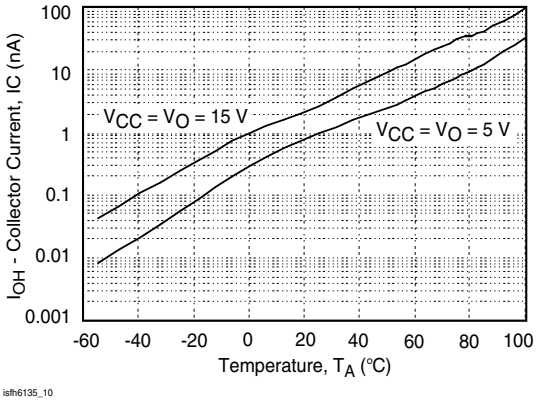


Fig. 10 Logic High Output Current vs.Temperature

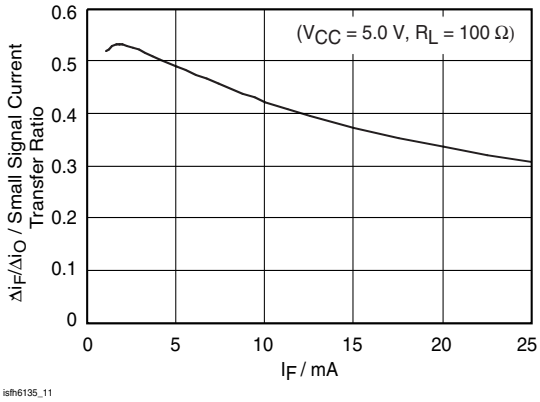
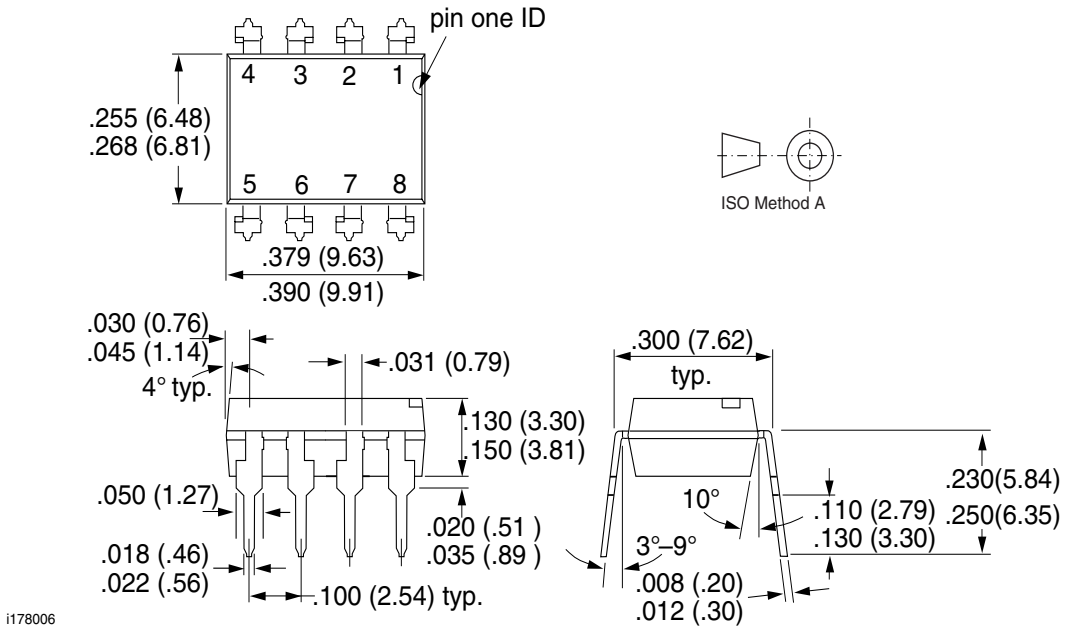


Fig. 11 Small Signal Current Transfer Ratio vs. Quiescent Input Current

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.

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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