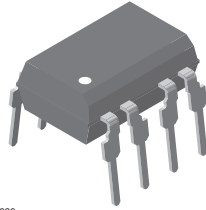
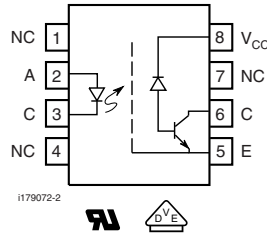


# High Speed Optocoupler, 1 Mbd, 15 kV/μs CMR, Transistor Output



i179026



i179072-2



## FEATURES

- Direct replacement for HCPL 4503
- High-speed optocoupler without base connection
- Isolation test voltage: 5300 V<sub>RMS</sub>
- GaAlAs emitter
- Integrated detector with photo diode and transistor
- High data transmission rate: 1 MBit/s
- TTL compatible
- Open collector output
- Good CTR linearity relative to forward current
- Field effect stable
- Low coupling capacitance
- Very high common mode transient immunity dV/dt: ≥ 15 kV/μs at V<sub>CM</sub> = 1500 V
- Compliant to RoHS Directive 2002/95/EC and in accordance to WEEE 2002/96/EC


**RoHS**  
COMPLIANT

## DESCRIPTION

The SFH6345 is an optocoupler with a GaAlAs infrared emitting diode, optically coupled to an integrated photo detector consisting of a photo diode and a high speed transistor in a DIP-8 plastic package. The device is similar to the 6N135 but has an additional faraday shield on the detector which enhances the input-output dV/dt immunity. Signals can be transmitted between two electrically separated circuits up to frequencies of 2 MHz. The potential difference between the circuits to be coupled should not exceed the maximum permissible reference voltages.

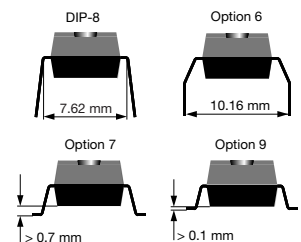
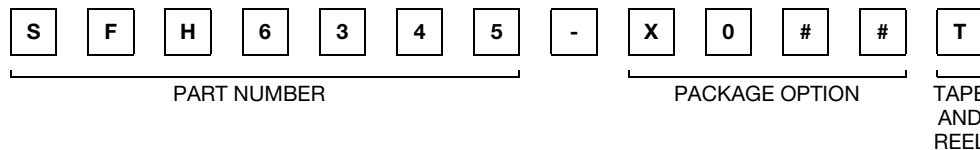
## AGENCY APPROVALS

- UL1577, file no. E52744 system code H or J, double protection
- DIN EN 60747-5-5 (VDE 0884)

## APPLICATIONS

- Data communications
- IGBT drivers
- Programmable controllers

## ORDERING INFORMATION



AGENCY CERTIFIED/PACKAGE	
<b>UL</b>	
DIP-8	SFH6345
SMD-8, option 7	SFH6345-X007T <sup>(1)</sup>
SMD-8, option 9	SFH6345-X009T <sup>(1)</sup>
<b>VDE, UL</b>	
DIP-8	SFH6345-X001
DIP-8, 400 mil, option 6	SFH6345-X016
SMD-8, option 7	SFH6345-X017T <sup>(1)</sup>
SMD-8, option 9	SFH6345-X019T <sup>(1)</sup>

### Note

<sup>(1)</sup> Also available in tubes; do not add T to end

ABSOLUTE MAXIMUM RATINGS ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)				
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
<b>INPUT</b>				
Reverse voltage		$V_R$	3	V
DC forward current		$I_F$	25	mA
Surge forward current	$t_p = 1\text{ }\mu\text{s}$ , 300 pulses/s	$I_{FSM}$	1	A
Power dissipation		$P_{diss}$	45	mW
<b>OUTPUT</b>				
Supply voltage		$V_S$	- 0.5 to 30	V
Output voltage		$V_O$	- 0.5 to 25	V
Output current		$I_O$	8	mA
Power dissipation		$P_{diss}$	100	mW
<b>COUPLER</b>				
Isolation test voltage between emitter and detector		$V_{ISO}$	5300	$V_{RMS}$
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 (1)	max. 10 s, max. dip soldering; distance to seating plane $\geq 1.5\text{ mm}$	$T_{sld}$	260	$^{\circ}\text{C}$

**Notes**

- 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.

(1) Refer to reflow profile for soldering conditions for surface mounted devices (SMD). Refer to wave profile for soldering conditions for through hole devices (DIP)

ELECTRICAL CHARACTERISTICS ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)							
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT	
<b>INPUT (1)</b>							
Forward voltage	$I_F = 16\text{ mA}$	$V_F$		1.6	1.9	V	
Reverse current	$V_R = 3\text{ V}$	$I_R$		0.5	10	$\mu\text{A}$	
Capacitance	$V_R = 0\text{ V}$ , $f = 1\text{ MHz}$	$C_O$		75		pF	
Thermal resistance		$R_{thja}$		700		K/W	
<b>OUTPUT</b>							
Supply current, logic high	$I_F = 0\text{ V}$ , $V_O = \text{open}$ , $V_{CC} = 15\text{ V}$	$I_{CCH}$		0.01	1	$\mu\text{A}$	
		$I_{CCH}$		0.01	2	$\mu\text{A}$	
Output current, output high	$I_F = 0\text{ V}$ , $V_O = V_{CC} = 5.5\text{ V}$	$I_{OH}$		0.003	0.5	$\mu\text{A}$	
		$I_{OH}$	$I_F = 0\text{ V}$ , $V_O = V_{CC} = 15\text{ V}$		0.01	1	$\mu\text{A}$
						50	$\mu\text{A}$
Collector emitter capacitance	$V_{CE} = 5\text{ V}$ , $f = 1\text{ MHz}$	$C_{CE}$		3		pF	
Thermal resistance		$R_{thja}$		300		K/W	
<b>COUPLER</b>							
Coupling capacitance		$C_C$		0.6		pF	
Collector emitter saturation voltage	$I_F = 16\text{ mA}$ , $I_O = 2.4\text{ mA}$ , $V_{CC} = 4.5\text{ V}$	$V_{OL}$		0.1	0.4	V	
Logic low supply current	$I_F = 16\text{ mA}$ , $V_O = \text{open}$ , $V_{CC} = 15\text{ V}$	$I_{CCL}$		80	200	$\mu\text{A}$	

**Notes**

- 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.

(1)  $T_{amb} = 0\text{ }^{\circ}\text{C}$  to  $70\text{ }^{\circ}\text{C}$ , unless otherwise specified, typical values  $T_{amb} = 25\text{ }^{\circ}\text{C}$ .

CURRENT TRANSFER RATIO						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Current transfer ratio	$I_F = 16 \text{ mA}, V_O = 0.4 \text{ V}, V_{CC} = 4.5 \text{ V}$	$I_C/I_F$	19	30		%
	$I_F = 16 \text{ mA}, V_O = 0.5 \text{ V}, V_{CC} = 4.5 \text{ V}, T_{amb} = 0 \text{ }^\circ\text{C to } 70 \text{ }^\circ\text{C}$	$I_C/I_F$	15			%

SWITCHING CHARACTERISTICS						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Propagation delay time (high to low), see fig. 1	$I_F = 16 \text{ mA}, V_{CC} = 5 \text{ V}, R_L = 1.9 \text{ k}\Omega$	$t_{PHL}$		0.3	0.8	μs
Propagation delay time (low to high), see fig. 1	$I_F = 16 \text{ mA}, V_{CC} = 5 \text{ V}, R_L = 1.9 \text{ k}\Omega$	$t_{PLH}$		0.3	0.8	μs

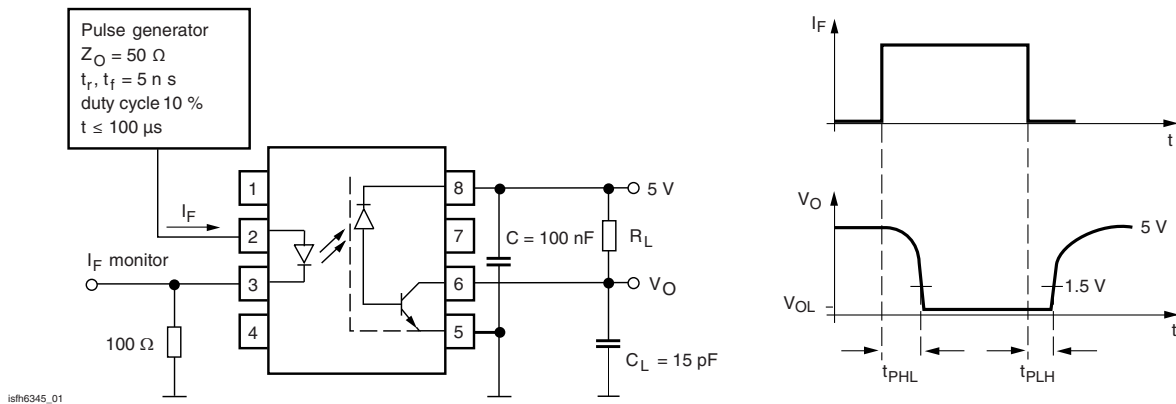


Fig. 1 - Switching Times (Typ.)

COMMON MODE TRANSIENT IMMUNITY						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Common mode transient immunity (high), see fig. 2	$I_O = 0 \text{ mA}, V_{CM} = 1500 \text{ V}_{P-P}, R_L = 1.9 \text{ k}\Omega, V_{CC} = 5 \text{ V}$	$ CM_H $	15	30		kV/μs
Common mode transient immunity (low), see fig. 2	$I_O = 16 \text{ mA}, V_{CM} = 1500 \text{ V}_{P-P}, R_L = 1.9 \text{ k}\Omega, V_{CC} = 5 \text{ V}$	$ CM_L $	15	30		kV/μs

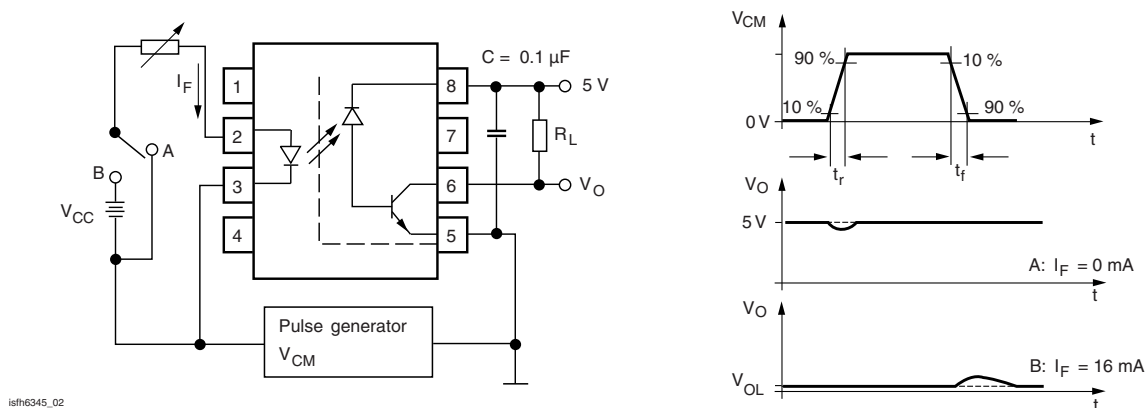


Fig. 2 - Common Mode Transient Immunity

SAFETY AND INSULATION RATINGS						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Climatic classification	IEC 68 part 1			55/100/21		
Comparative tracking index		CTI	175		399	
$V_{IOTM}$			8000			V
$V_{IORM}$			890			V
$P_{SO}$					500	mW
$I_{SI}$					300	mA
$T_{SI}$					175	$^{\circ}$ C
Creepage distance	Standard DIP-8		7			mm
Clearance distance	Standard DIP-8		7			mm
Creepage distance	400 mil DIP-8		8			mm
Clearance distance	400 mil DIP-8		8			mm

**Note**

- As per IEC 60747-5-5, §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** ( $T_{amb} = 25^{\circ}$ C, unless otherwise specified)

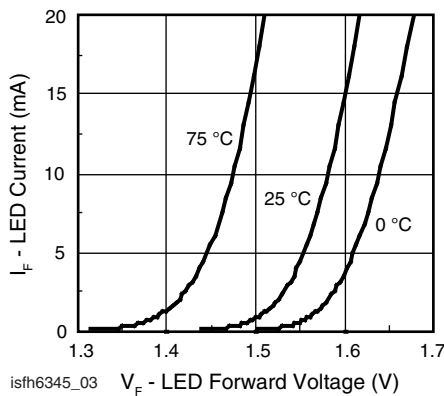


Fig. 3 - Logic High Output Current vs. Temperature

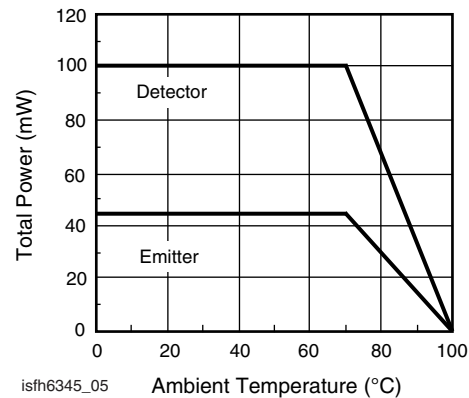


Fig. 5 - Permissible Power Dissipation vs. Temperature

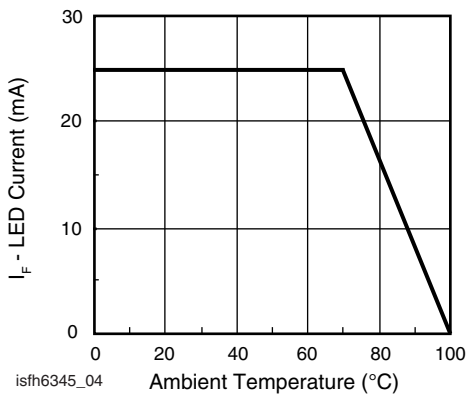


Fig. 4 - Permissible Forward LED Current vs. Temperature

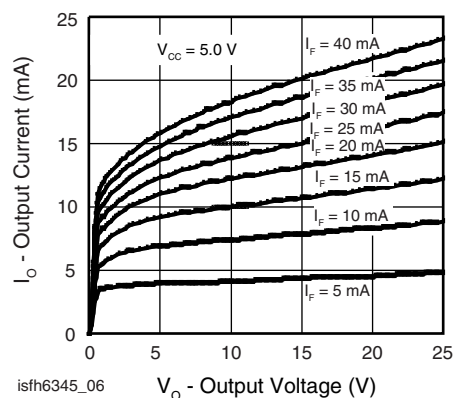


Fig. 6 - Output Current vs. Output Voltage

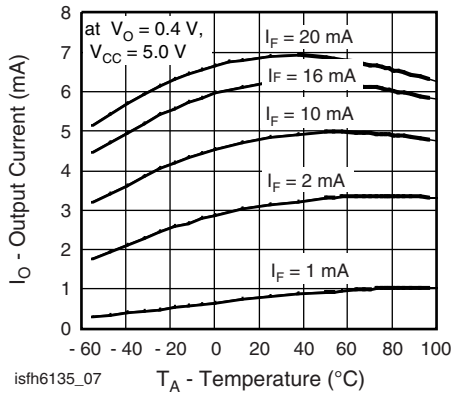


Fig. 1 - Output Current vs. Temperature

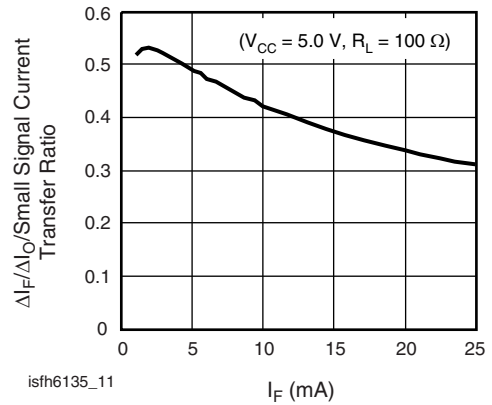


Fig. 9 - Small Signal Current Transfer Ratio vs. Input Current

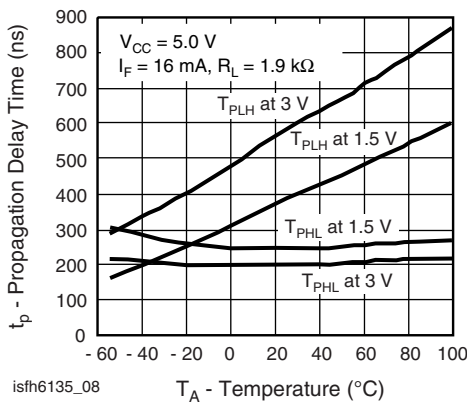


Fig. 7 - Propagation Delay vs. Ambient Temperature

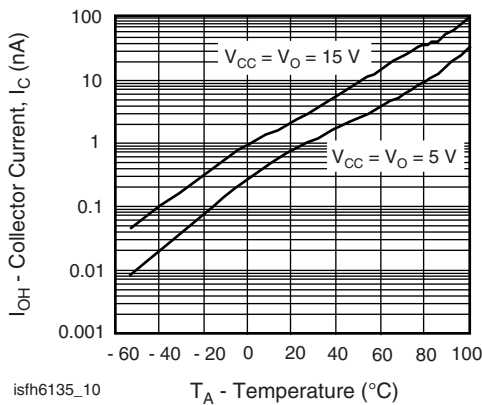


Fig. 8 - Logic High Output Current vs. Temperature

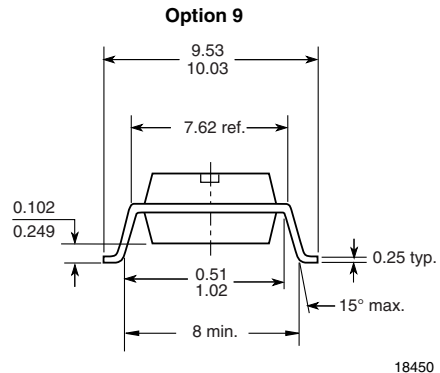
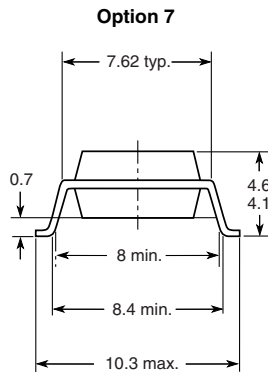
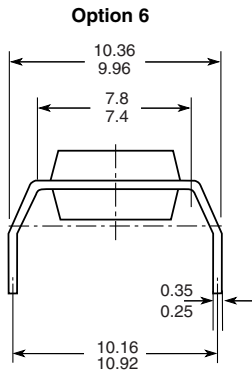
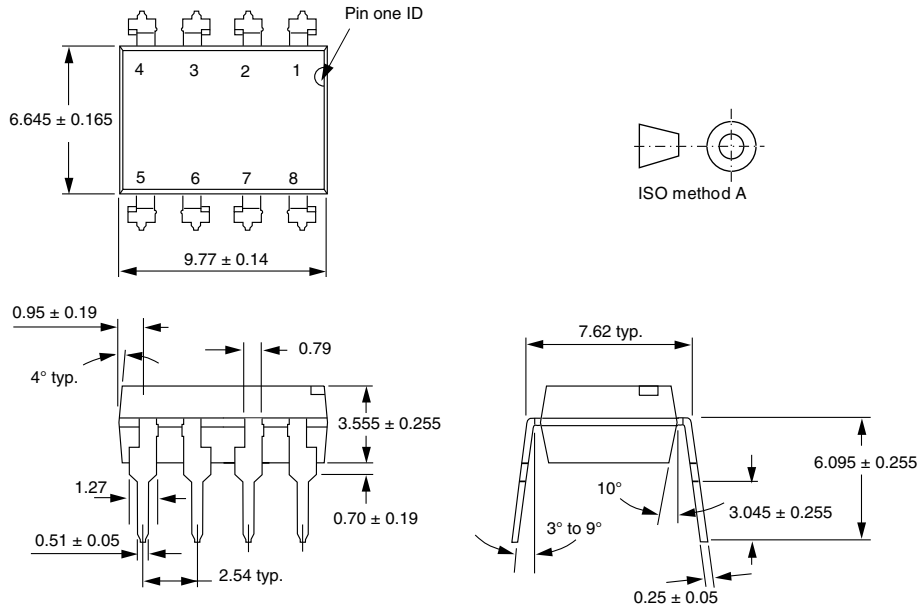
# SFH6345

Vishay Semiconductors

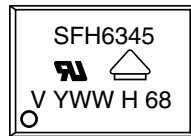
High Speed Optocoupler, 1 Mbd,  
15 kV/ $\mu$ s CMR, Transistor Output



## PACKAGE DIMENSIONS in millimeters



## PACKAGE MARKING





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