

# SIEMENS

# SFH6345 HIGH SPEED 5.3 kV OPTOCOUPLER

## FEATURES

- Direct Replacement for HCPL4503
- High Speed Optocoupler without Base Connection
- GaAlAs Emitter
- Integrated Detector with Photodiode and Transistor
- High Data Transmission Rate: 1 MBit/s
- TTL Compatible
- Open Collector Output
- CTR at  $I_F=16\text{ mA}$ ,  $V_O=0.4\text{ V}$ ,  $V_{CC}=4.5\text{ V}$ ,  $T_A=25^\circ\text{C}$ :  $\geq 19\%$
- Good CTR Linearity Relative to Forward Current
- Field Effect Stable
- Low Coupling Capacitance
- Very High Common Mode Transient Immunity  
 $dV/dt: \geq 15\text{ kV}/\mu\text{s}$  at  $V_{CM}=1500\text{ V}$
- Insulation Test Voltage: 5300 VAC<sub>PK</sub>
-  VDE 0884 Available with Option 1
- UL Approval, File #E52744

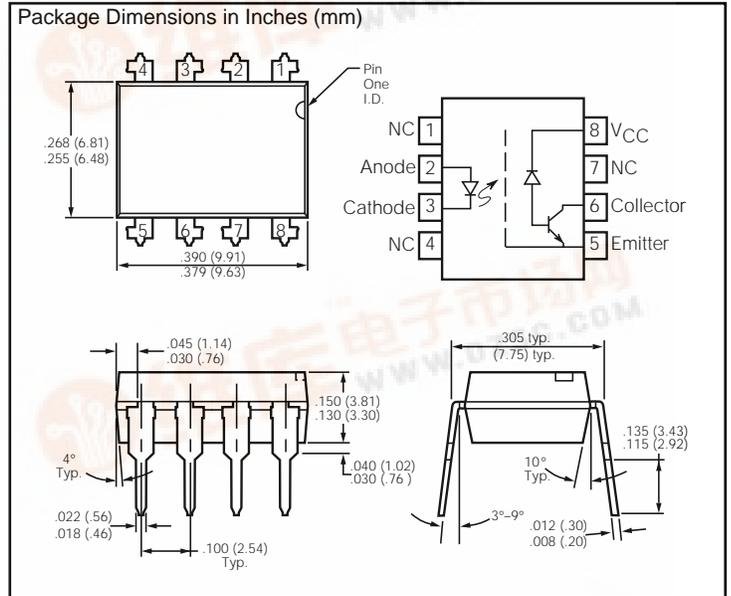
## APPLICATIONS

- Data Communications
- IGBT Drivers
- Programmable Controllers

## DESCRIPTION

The SFH6345 is an optocoupler with a GaAlAs infrared emitting diode, optically coupled to an integrated photodetector consisting of a photodiode 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.



## Absolute Maximum Ratings

### Emitter (GaAlAs)

Reverse Voltage.....	3 V
DC Forward Current .....	25 mA
Surge Forward Current.....	1 A
$t_p \leq 1\ \mu\text{s}$ , 300 pulses/sec.	
Total Power Dissipation.....	45 mW

### Detector (Si Photodiode + Transistor)

Supply Voltage.....	-0.5 to 30 V
Output Voltage .....	-0.5 to $\geq 25\text{ V}$
Output Current.....	8 mA
Total Power Dissipation.....	100 mW

### Package Insulation

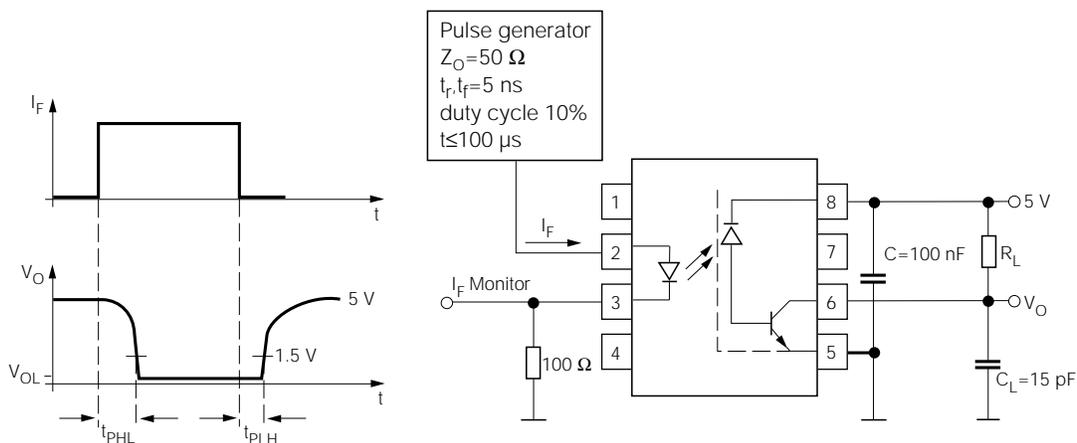
Isolation Test Voltage	
between emitter and detector .....	5300 VAC <sub>PK</sub>
(refer to climate DIN 40046, part 2, Nov. 74)	
Creepage .....	$\geq 7\text{ mm min.}$
Clearance .....	$\geq 7\text{ mm min.}$
Comparative Tracking Index	
per DIN IEC 112/VDE0303, part 1 .....	$\geq 175$
Isolation Resistance	
$V_{IO}=500\text{ V}$ , $T_A=25^\circ\text{C}$ , $R_{ISOL}$ .....	$\geq 10^{12}\ \Omega$
$V_{IO}=500\text{ V}$ , $T_A=100^\circ\text{C}$ , $R_{ISOL}$ .....	$\geq 10^{11}\ \Omega$
Storage Temperature Range .....	-55 to +150°C
Ambient Temperature Range .....	-55 to +100°C
Junction Temperature .....	100°C
Soldering Temperature ( $t=10\text{ sec. max.}$ ).....	260°C
Dip soldering: distance to seating plane $\geq 1.5\text{ mm}$	



**Characteristics** ( $T_A=0^\circ$  to  $70^\circ\text{C}$ , unless otherwise specified, typical values  $T_A=25^\circ\text{C}$ )

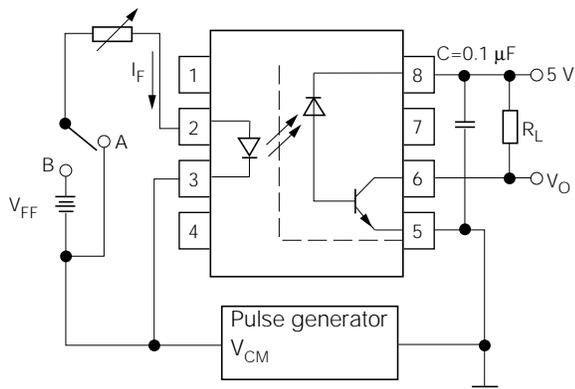
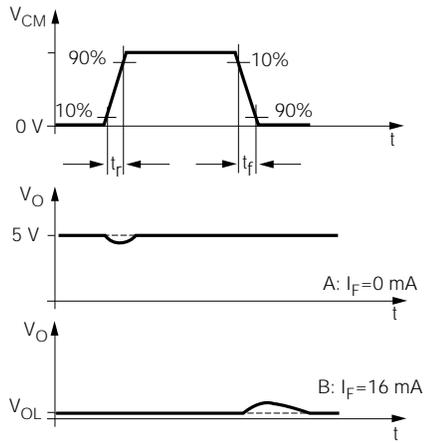
Description	Symbol	Min.	Typ.	Max.	Unit
<b>Emitter (IR GaAlAs)</b>					
Forward Voltage, $I_F=16\text{ mA}$	$V_F$		1.6	1.9	V
Reverse Current, $V_R=3\text{ V}$	$I_R$		0.5	10	$\mu\text{A}$
Capacitance, $V_R=0\text{ V}$ , $f=1\text{ MHz}$	$C_0$		75		pF
Thermal Resistance	$R_{thJA}$		700		$^\circ\text{K/W}$
<b>Detector (Si Photodiode + Transistor)</b>					
Supply Current, Logic High $I_F=0$ , $V_O$ (open), $V_{CC}=15\text{ V}$ , $T_A=25^\circ\text{C}$ $I_F=0$ , $V_O$ (open), $V_{CC}=15\text{ V}$	$I_{CCH}$		0.01	1 2	$\mu\text{A}$
Output Current, Output High $I_F=0$ , $V_O$ (open), $V_{CC}=5.5\text{ V}$ , $T_A=25^\circ\text{C}$ $I_F=0$ , $V_O$ (open), $V_{CC}=15\text{ V}$ , $T_A=25^\circ\text{C}$ $I_F=0$ , $V_O$ (open), $V_{CC}=15\text{ V}$	$I_{OH}$		.003 .01 —	0.5 1 50	$\mu\text{A}$
Capacitance, $V_{CE}=5\text{ V}$ , $f=1\text{ MHz}$	$C_{CE}$		3		pF
Thermal Resistance	$R_{thJA}$		300		$^\circ\text{K/W}$
<b>Package</b>					
Coupling Capacitance	$C_C$		0.6		pF
Coupling Transfer Ratio $I_F=16\text{ mA}$ , $V_O=0.4\text{ V}$ , $V_{CC}=4.5\text{ V}$ , $T_A=25^\circ\text{C}$ $I_F=16\text{ mA}$ , $V_O=0.5\text{ V}$ , $V_{CC}=4.5\text{ V}$	$I_C/I_F$	19 15	30 —		%
Collector Emitter Saturation Voltage $I_F=16\text{ mA}$ , $I_O=2.4\text{ mA}$ , $V_{CC}=4.5\text{ V}$ , $T_A=25^\circ\text{C}$	$V_{OL}$		0.1	0.4	V
Supply Current, Logic Low $I_F=16\text{ mA}$ , $V_O$ open, $V_{CC}=15\text{ V}$	$I_{CCL}$		80	200	$\mu\text{A}$

**Switching Times** (typ.)



Description	Symbol	Min.	Typ.	Max.	Unit
Propagation Delay Time (High–Low) $I_F=16\text{ mA}$ , $V_{CC}=5\text{ V}$ , $R_L=1.9\text{ k}\Omega$ , $T_A=25^\circ\text{C}$	$t_{PHL}$		0.3	0.8	$\mu\text{s}$
Propagation Delay Time (Low–High) $I_F=16\text{ mA}$ , $V_{CC}=5\text{ V}$ , $R_L=1.9\text{ k}\Omega$ , $T_A=25^\circ\text{C}$	$t_{PLH}$		0.3	0.8	$\mu\text{s}$

### Common Mode Transient Immunity



Description	Symbol	Min.	Typ.	Max.	Unit
Common Mode Transient Immunity (High) $I_F=0$ , $V_{CM}=1500$ V <sub>P-P</sub> , $R_L=1.9$ k $\Omega$ , $V_{CC}=5$ V, $T_A=25^\circ\text{C}$	$ CM_H $	15	30		kV/ $\mu\text{s}$
Common Mode Transient Immunity (Low) $I_F=16$ mA, $V_{CM}=1500$ V <sub>P-P</sub> , $R_L=1.9$ k $\Omega$ , $V_{CC}=5$ V, $T_A=25^\circ\text{C}$	$ CM_L $	15	30		kV/ $\mu\text{s}$