


### FEATURES

- Direct Replacement for HCPL4503
- High Speed Optocoupler without Base Connection
- GaAIAs Emitter
- Integrated Detector with Photodiode and Transistor
- High Data Transmission Rate: 1 MBit/s
- TTL Compatible
- Open Collector Output
- CTR at  $I_F=16$  mA,  $V_O=0.4$  V,  $V_{CC}=4.5$  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  $dV/dt: \geq 15$  kV/ $\mu\text{s}$  at  $V_{CM}=1500$  V
- Isolation Test Voltage: 5300  $V_{RMS}$
-  VDE 0884 Available with Option 1
- UL Approval, File #E52744

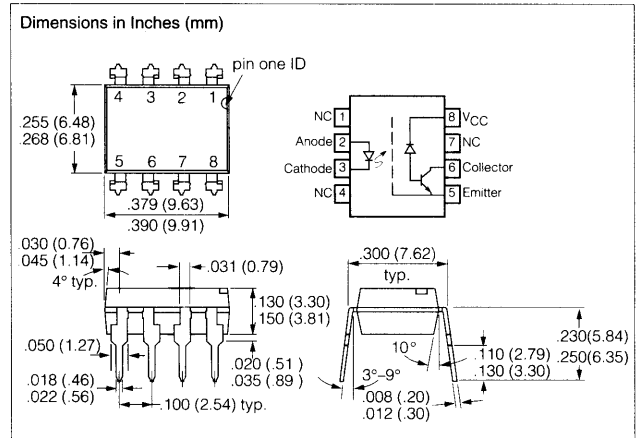
### APPLICATIONS

- Data Communications
- IGBT Drivers
- Programmable Controllers

### DESCRIPTION

The SFH6345 is an optocoupler with a GaAIAs 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 (GaAIAs)

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

#### Detector (Si Photodiode + Transistor)

Supply Voltage .....	-0.5 to 30 V
Output Voltage .....	-0.5V to 25 V
Output Current .....	8 mA
Total Power Dissipation .....	100 mW

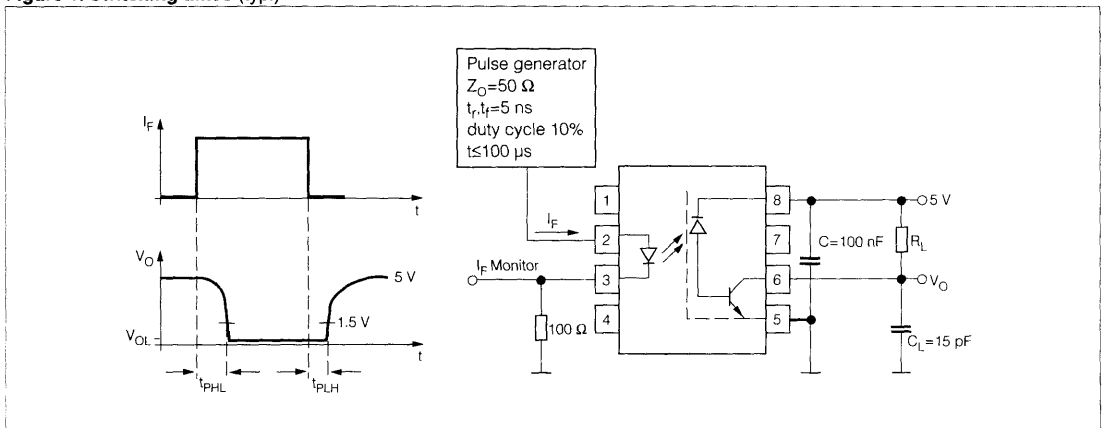
#### Package Insulation

Isolation Test Voltage	between emitter and detector .....	5300 $V_{RMS}$
	(refer to climate DIN 40046, part 2, Nov. 74)	
Creepage .....		$\geq 7$ mm
Clearance .....		$\geq 7$ mm
Comparative Tracking Index	per DIN IEC 112/VDE0303, part 1 .....	$\geq 175$
Isolation Resistance	$V_{IO}=500$ V, $T_A=25^\circ\text{C}$ , $R_{ISOL}$ .....	$\geq 10^{12} \Omega$
	$V_{IO}=500$ 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 ( $t=10$ sec. max.) .....		260°C
	Dip soldering: distance to seating plane $\geq 1.5$ mm	

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

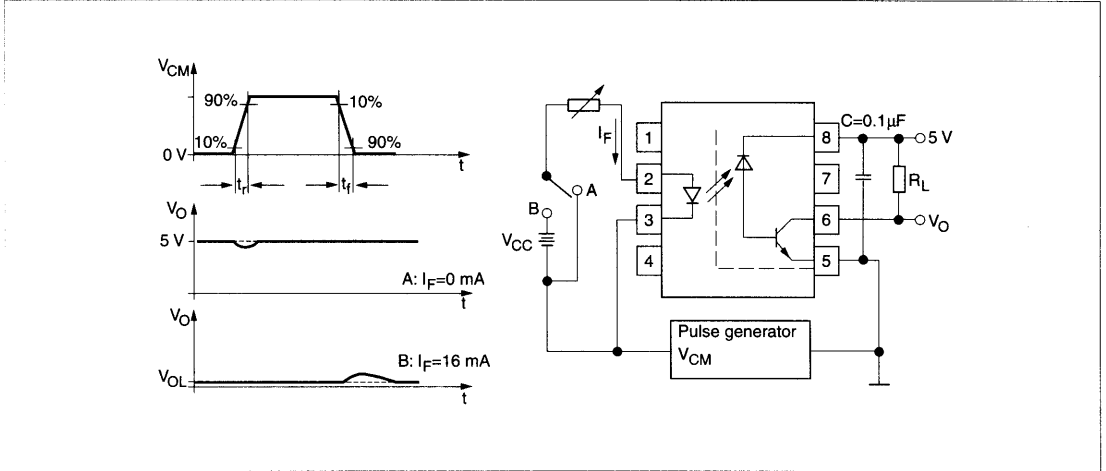
Description	Symbol	Min.	Typ.	Max.	Unit	Condition
<b>Emitter (IR GaAlAs)</b>						
Forward Voltage	$V_F$	—	1.6	1.9	V	$I_F=16\text{ mA}$
Reverse Current	$I_R$	—	0.5	10	$\mu\text{A}$	$V_R=3\text{ V}$
Capacitance	$C_0$	—	75	—	$\rho\text{F}$	$V_R=0\text{ V}$ , $f=1\text{ MHz}$
Thermal Resistance	$R_{thJA}$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

**Figure 1. Switching times (typ.)**



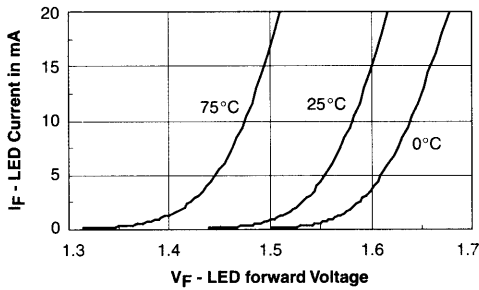
Description	Symbol	Min.	Typ.	Max.	Unit
Propagation Delay Time (High–Low) $I_F=16\text{ mA}$ , $V_{CC}=5\text{ V}$ , $R_L=1.9\text{ k}\Omega$ , $T_A=25^\circ\text{C}$	$t_{PHL}$	—	0.3	0.8	$\mu\text{s}$
Propagation Delay Time (Low–High) $I_F=16\text{ mA}$ , $V_{CC}=5\text{ V}$ , $R_L=1.9\text{ k}\Omega$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

**Figure 2. 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/ $\mu\text{s}$

**Figure 3. LED forward current vs. forward voltage**



**Figure 4. Permissible forward LED current vs. temperature**

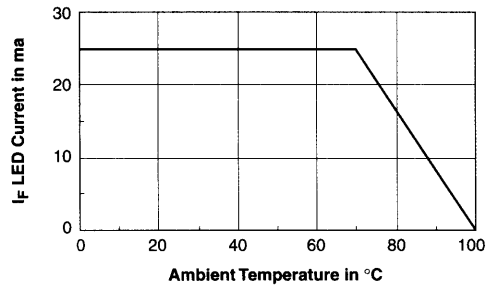


Figure 5. Permissible power dissipation vs. temperature

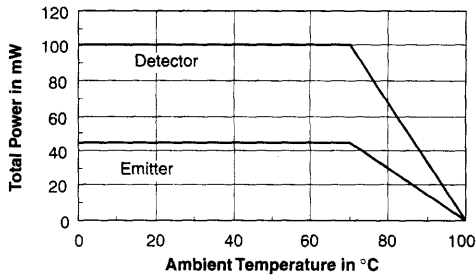


Figure 6. Output current vs. output voltage  
( $T_A=25^\circ\text{C}$ ,  $V_{CC}=5.0\text{ V}$ )

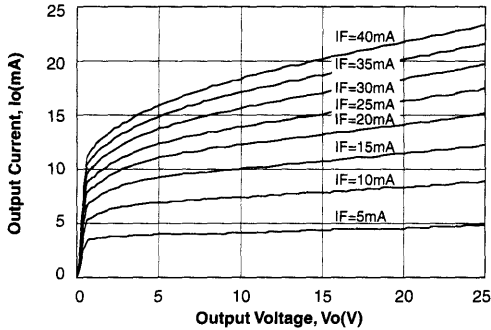


Figure 7. Output current vs. temperature  
@  $V_O=0.4\text{ V}$ ,  $V_{CC}=5.0$

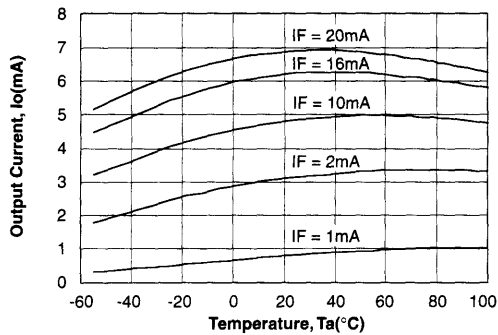


Figure 8. Propagation delay vs. temperature  
@  $V_{CC}=5.0\text{ V}$ ,  $I_F=16\text{ mA}$ ,  $R_L=1.9\text{ k}\Omega$

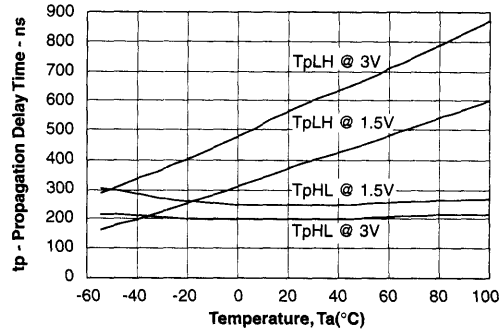


Figure 9. Logic high output current vs. temperature

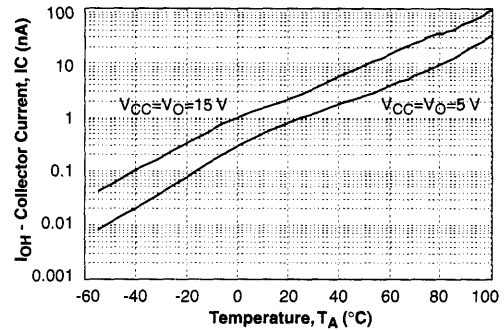


Figure 10. Small signal current transfer ratio vs. quiescent input current  
( $V_{CC}=5.0\text{ V}$ ,  $R_L=100\ \Omega$ )

