


### 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  $I_F=16 \text{ mA}$ ,  $V_O=0.4 \text{ V}$ ,  $V_{CC}=4.5 \text{ V}$ ,  $T_A=25^\circ\text{C}$ :  $\geq 19\%$
- 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

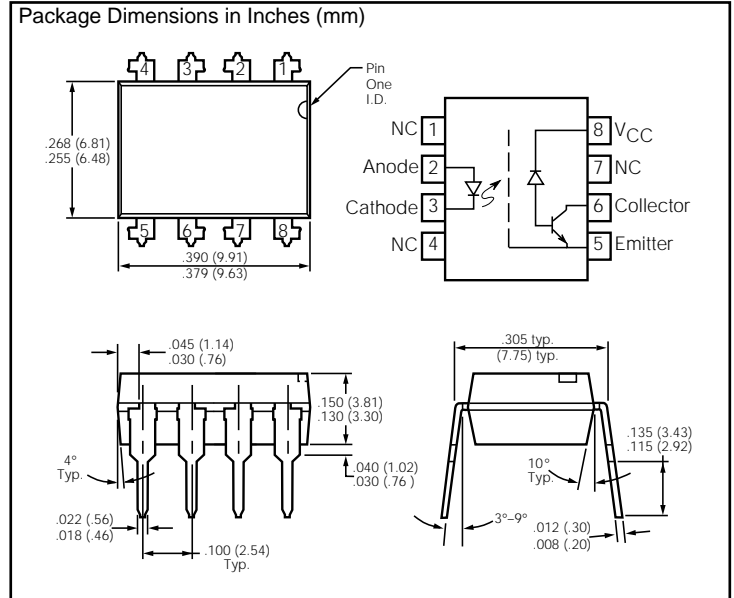
### APPLICATIONS

- Data Communications
- IGBT Drivers
- Programmable Controllers

### DESCRIPTION

The SFH6345 is an optocoupler with a 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.....                 | 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                      |

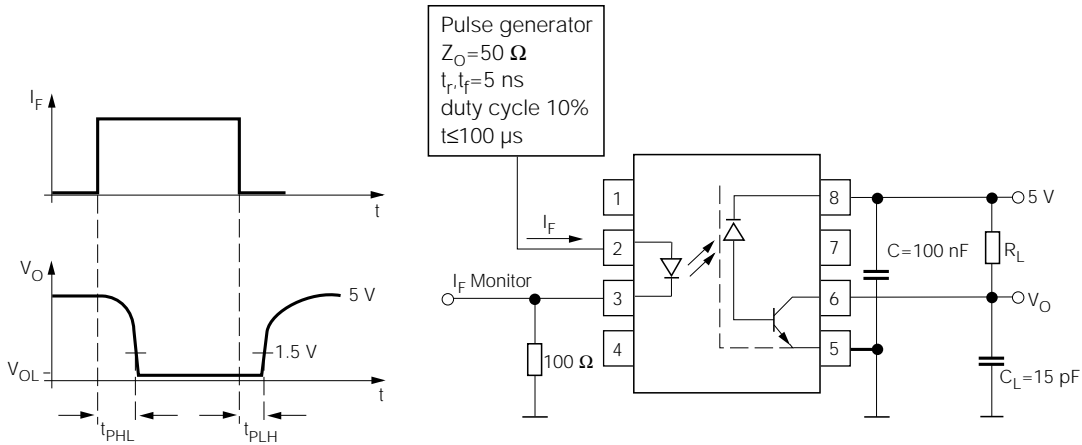
#### Package Insulation

|   |                          |
|---|--------------------------|
| 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  $T_A=25^\circ\text{C}$ )

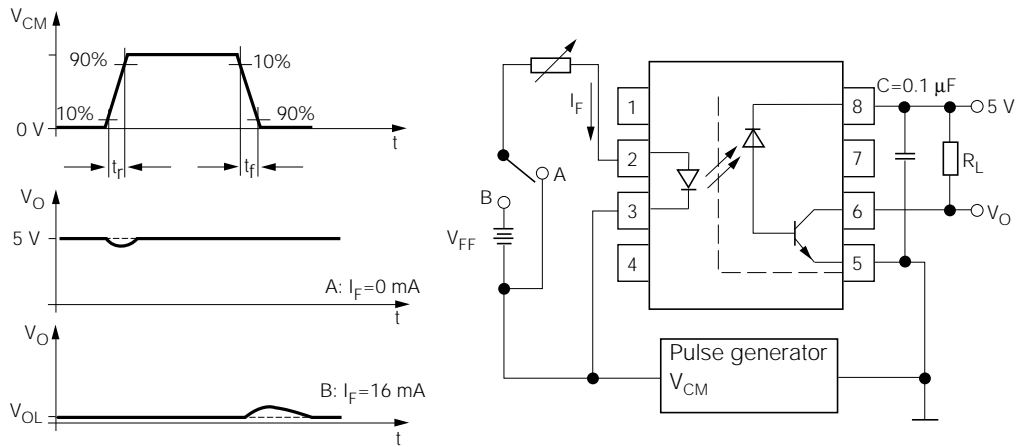
| Description  | Symbol     | Min.     | Typ.             | Max.           | Unit               |
|--|------------|----------|------------------|----------------|--------------------|
| <b>Emitter (IR GaAlAs)</b>   |            |          |                  |                |                    |
| Forward 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<br>$I_F=0$ , $V_O$ (open), $V_{CC}=15\text{ V}$ , $T_A=25^\circ\text{C}$<br>$I_F=0$ , $V_O$ (open), $V_{CC}=15\text{ V}$  | $I_{CCH}$  |          | 0.01             | 1<br>2         | $\mu\text{A}$      |
| Output Current, Output High<br>$I_F=0$ , $V_O$ (open), $V_{CC}=5.5\text{ V}$ , $T_A=25^\circ\text{C}$<br>$I_F=0$ , $V_O$ (open), $V_{CC}=15\text{ V}$ , $T_A=25^\circ\text{C}$<br>$I_F=0$ , $V_O$ (open), $V_{CC}=15\text{ V}$ | $I_{OH}$   |          | .003<br>.01<br>— | 0.5<br>1<br>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<br>$I_F=16\text{ mA}$ , $V_O=0.4\text{ V}$ , $V_{CC}=4.5\text{ V}$ , $T_A=25^\circ\text{C}$<br>$I_F=16\text{ mA}$ , $V_O=0.5\text{ V}$ , $V_{CC}=4.5\text{ V}$   | $I_C/I_F$  | 19<br>15 | 30<br>—          |                | %                  |
| Collector Emitter Saturation Voltage<br>$I_F=16\text{ mA}$ , $I_O=2.4\text{ mA}$ , $V_{CC}=4.5\text{ V}$ , $T_A=25^\circ\text{C}$  | $V_{OL}$   |          | 0.1              | 0.4            | V                  |
| Supply Current, Logic Low<br>$I_F=16\text{ mA}$ , $V_O$ 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)<br>$I_F=16\text{ mA}$ , $V_{CC}=5\text{ V}$ , $R_L=1.9\text{ k}\Omega$ , $T_A=25^\circ\text{C}$ | $t_{PHL}$ |      | 0.3  | 0.8  | $\mu\text{s}$ |
| Propagation Delay Time (Low–High)<br>$I_F=16\text{ mA}$ , $V_{CC}=5\text{ V}$ , $R_L=1.9\text{ k}\Omega$ , $T_A=25^\circ\text{C}$ | $t_{PLH}$ |      | 0.3  | 0.8  | $\mu\text{s}$ |

## Common Mode Transient Immunity



| Description   | Symbol   | Min. | Typ. | Max. | Unit        |
|---|----------|------|------|------|-------------|
| Common Mode Transient Immunity (High)<br>$I_F=0$ , $V_{CM}=1500$ 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/ $\mu$ s |
| Common Mode Transient Immunity (Low)<br>$I_F=16$ 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/ $\mu$ s |