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 mA, V_O=0.4 V, V_{CC}=4.5 V, T_A=25°C: ≥19%**
- **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_{CM}=1500 V**
- **Isolation Test Voltage: 5300 V_{RMS}**
- **VDE 0884 Available with Option 1**
- **UL Approval, File #E52744**

APPLICATIONS

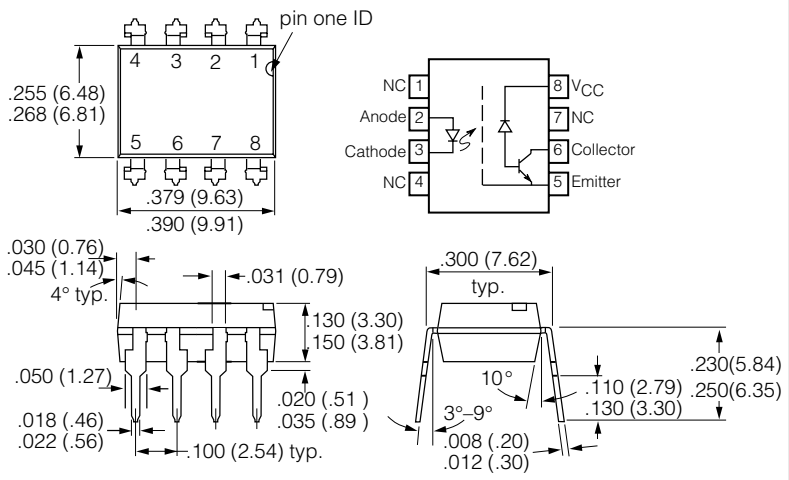
- **Data Communications**
- **IGBT Drivers**
- **Programmable Controllers**

DESCRIPTION

The SFH6345 is an optocoupler with a 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.

Dimensions in Inches (mm)



Absolute Maximum Ratings

Emitter (GaAlAs)

Reverse Voltage ..... 3 V
DC Forward Current ..... 25 mA
Surge Forward Current (t_p≤1 µs, 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 ..... ≥7 mm
Clearance ..... ≥7 mm
Comparative Tracking Index
per DIN IEC 112/VDE0303, part 1 ..... ≥175
Isolation Resistance
V_{IO}=500 V, T_A=25°C, R_{ISOL} ..... ≥10^{12} Ω
V_{IO}=500 V, T_A=100°C, R_{ISOL} ..... ≥10^{11} Ω
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 ≥1.5 mm

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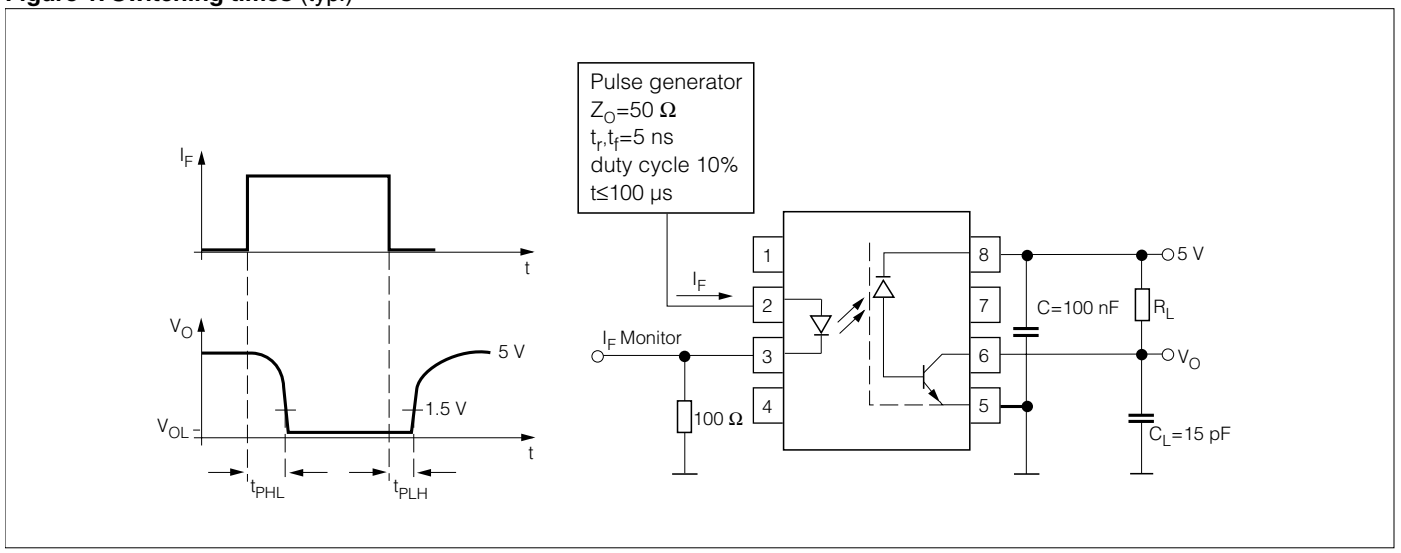
Characteristics (T_A=0° to 70°C, unless otherwise specified, typical values T_A=25°C)

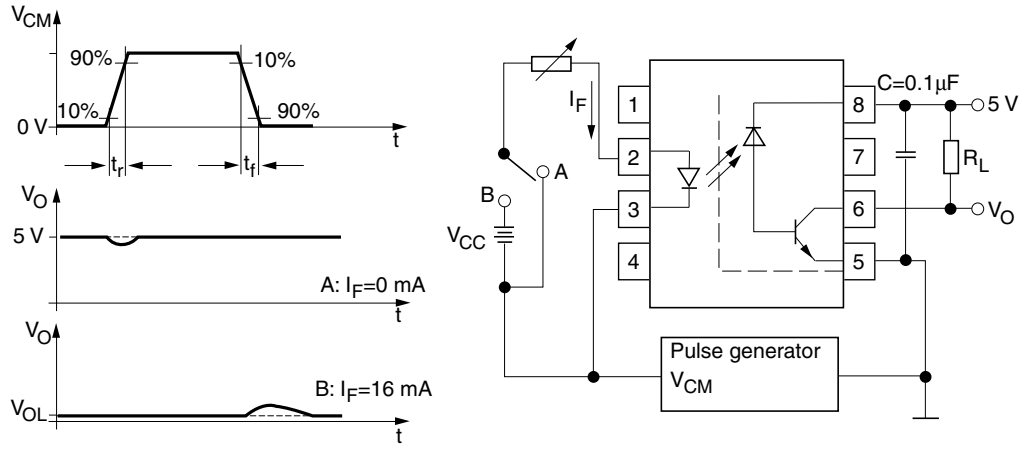
Description	Symbol	Min.	Typ.	Max.	Unit	Condition
Emitter (IR GaAlAs)						
Forward Voltage	V_F	—	1.6	1.9	V	I_F=16 mA
Reverse Current	I_R	—	0.5	10	µA	V_R=3 V
Capacitance	C_0	—	75	—	pF	V_R=0 V, f=1 MHz
Thermal Resistance	R_{thJA}	—	700	—	K/W	—
Detector (Si Photodiode + Transistor)						
Supply Current,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

Figure 1. Switching times (typ.)



Description	Symbol	Min.	Typ.	Max.	Unit
Propagation Delay Time (High–Low) I_F=16 mA, V_{CC}=5 V, R_L=1.9 kΩ, T_A=25°C	t_{PHL}	—	0.3	0.8	µs
Propagation Delay Time (Low–High) I_F=16 mA, V_{CC}=5 V, R_L=1.9 kΩ, T_A=25°C	t_{PLH}	—	0.3	0.8	µs

Figure 2. Common mode transient immunity



Description	Symbol	Min.	Typ.	Max.	Unit
Common Mode Transient Immunity (High) I_F=0, V_{CM}=1500 V_{P-P}, R_L=1.9 kΩ, V_{CC}=5 V, T_A=25°C	l CM_Hl	15	30	—	kV/µs
Common Mode Transient Immunity (Low) I_F=16 mA, V_{CM}=1500 V_{P-P}, R_L=1.9 kΩ, V_{CC}=5 V, T_A=25°C	l CM_Ll	15	30	—	kV/µs

Figure 3. LED forward current vs. forward voltage

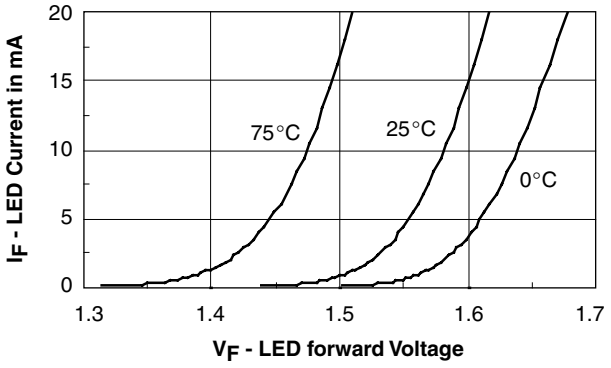


Figure 4. Permissible forward LED current vs. temperature

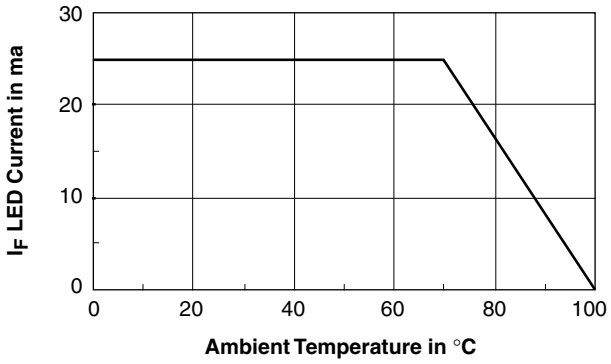


Figure 5. Permissible power dissipation vs. temperature

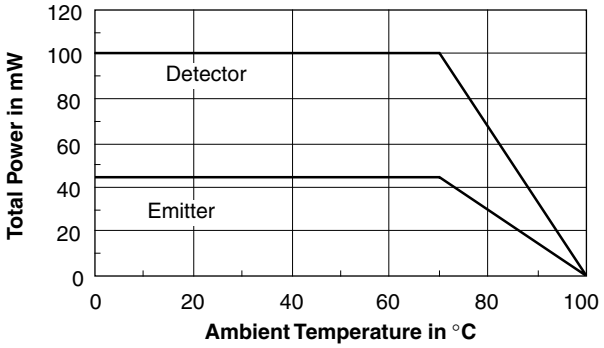


Figure 6. Output Current vs. Output Voltage
(T_A=25°C, V_{CC}=5.0 V)

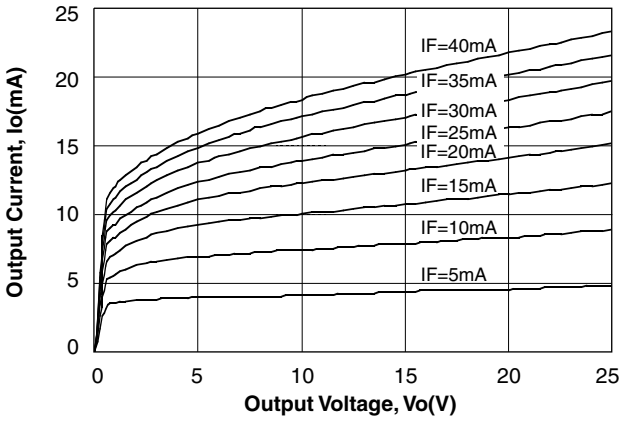


Figure 7. Output Current vs. Temperature
@ V_O=0.4 V, V_{CC}=5.0

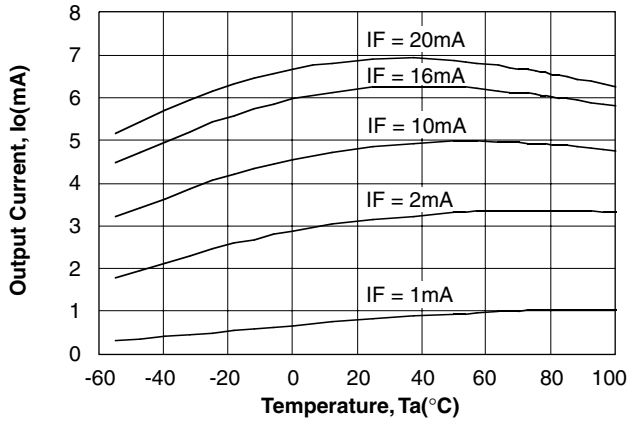


Figure 8. Propagation Delay vs. Temperature
@ V_{CC}=5.0 V, I_F=16 mA, R_L=1.9 kΩ

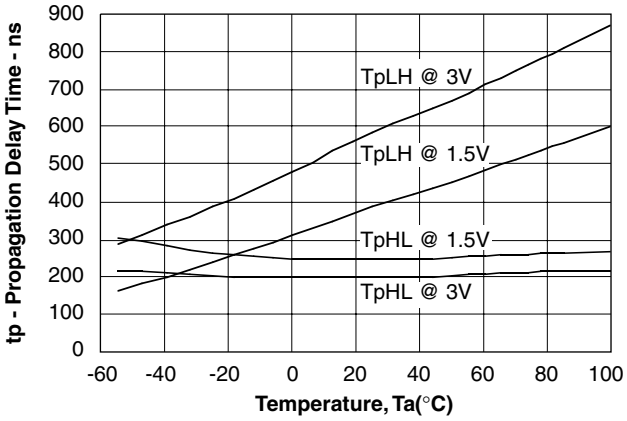


Figure 9. Logic High Output Current vs. Temperature

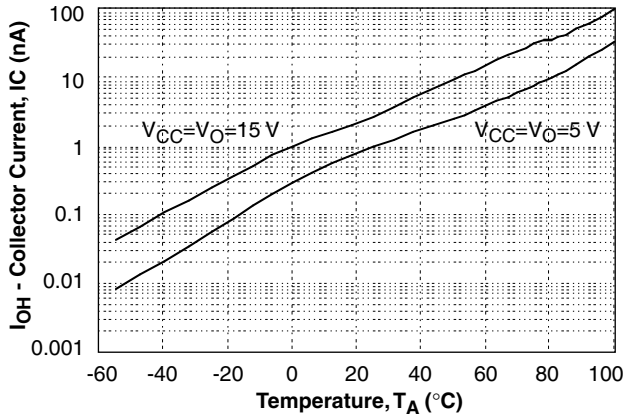


Figure 10. Small Signal Current Transfer Ratio vs. Quiescent Input Current (V_{CC}=5.0 V, R_L=100 Ω)