SIEMENS

SFH6135
SFH6136

HIGH-SPEED 5.3 kV TRIOS® OPTOCOUPLER

FEATURES

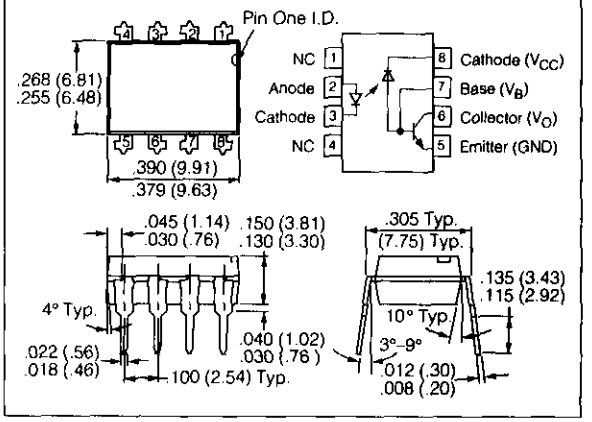
- **Isolation Test Voltage: 5300 VAC_{RMS}**
- **TTL Compatible**
- **High Bit Rates: 1 Mbit/s**
- **High Common-Mode Interference Immunity**
- **Bandwidth 2 MHz**
- **Open-Collector Output**
- **External Base Wiring Possible**
- **Field-Effect Stable by TRIOS (TRansparent IOn Shield)**
- **Underwriters Lab File #52744**
- **VDE 0884 Available with Option 1**

DESCRIPTION

The SFH6135 and SFH6136 optocouplers feature a high signal transmission rate and a high isolation resistance. They have a GaAlAs infrared emitting diode, optically coupled with an integrated photodetector which consists of a photodiode and a high-speed transistor in a DIP-8 plastic package.

Signals can be transmitted between two electrically separated circuits up to frequencies of 2 MHz. The potential difference between the circuits to be coupled is not allowed to exceed the maximum permissible reference voltages.

Package Dimensions in Inches (mm)



Maximum Ratings

Emitter

Reverse Voltage	3 V
Forward Current	25 mA
Peak Forward Current (t = 1 ms, duty cycle 50%)	50 mA
Maximum Surge Forward Current (t ≤ 1 µs, 300 pulses/s)	1 A
Thermal Resistance	700 K/W
Total Power Dissipation (T_A≤70°C)	45 mW

Detector

Supply Voltage	-0.5 to 15 V
Output Voltage	-0.5 to 15 V
Emitter-Base Voltage	5 V
Output Current	8 mA
Maximum Output Current	16 mA
Base Current	5 mA
Thermal Resistance	300 K/W
Total Power Dissipation (T_A≤70°C)	100 mW

Package

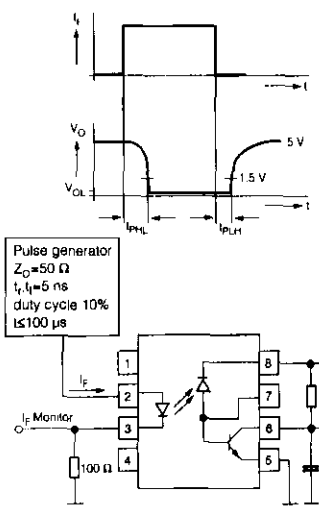
Isolation Test Voltage	5300 VAC_{RMS}
Pollution Degree (DIN VDE 0110)	2
Creepage	≥7 mm
Clearance	≥7 mm
Comparative Tracking Index per DIN IEC112/VDE 0303 part 1	175
Isolation Resistance	
V_{IO}=500 V, T_A = 25°C	≥10^{12} Ω
V_{IO}=500 V, T_A = 100°C	≥10^{11} Ω
Storage Temperature Range	-55°C to +125°C
Ambient Temperature Range	-55°C to +100°C
Soldering Temperature (max. ≤10 s. dip soldering ≥0.5 mm distance from case bottom)	260°C

Characteristics

(T_A=0 to 70°C unless otherwise specified)

Emitter	Symbol		Unit	Condition
Forward Voltage	V_F	1.6 (≤1.9)	V	I_F=16 mA
Breakdown Voltage	V_{BR}	≥3	V	I_R=10 µA
Reverse Current	I_R	0.5 (≤10)	µA	V_R=3 V
Capacitance	C_0	125	pF	V_R=0 V, f=1 MHz
Temperature Coefficient of Forward Voltage	$\Delta V_F/\Delta T_A$	-1.7	mV/°C	I_F=16 mA
Detector				
Supply Current Logic Low	I_{CCL}	150	µA	I_F=16 mA, V_O open, V_{CC}=15 V
Supply Current Logic High	I_{CCH}	0.01 (≤1)	µA	I_F=0 mA, V_O open, V_{CC}=15 V
Output Voltage Output Low				I_F=16 mA, V_{CC}=4.5 V
SFH6135	V_{OL}	0.1 (≤0.4)	V	I_O=1.1 mA
SFH6136	V_{OL}	0.1 (≤0.4)	V	I_O=2.4 mA
Output Current Output High	I_{OH}	3 (≤500)	nA	I_F=0 mA, V_O=V_{CC}=5.5 V
Output Current Output High	I_{OH}	0.01 (≤1)	µA	I_F=0 mA V_O=V_{CC}=15 V
Current Gain	H_{FE}	150		V_O=5 V, I_O=3 mA
Package				
Coupling Capacitance Input-Output	C_{IO}	0.6	pF	f=1 MHz
Current Transfer Ratio				I_F=16 mA, V_O=0.4 V,
SFH6135	CTR	16 (≥7)	%	V_{CC}=4.5 V, T_A=25°C
SFH6136	CTR	35 (≥19)	%	
Current Transfer Ratio				I_F=16 mA, V_O=0.5 V,
SFH6135	CTR	≥5	%	V_{CC}=4.5 V
SFH6136	CTR	≥15	%	

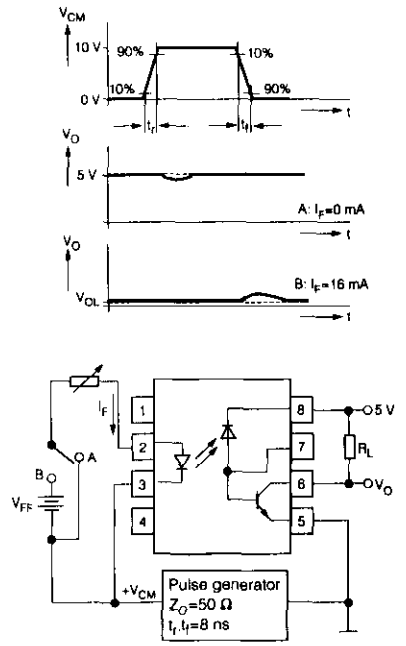
SWITCHING TIMES



Delay Time (I_F=16 mA, V_{CC}=5 V, T_A=25°C)

High - Low			
SFH6135 (R_L=4.1 kΩ)	t_{PHL}	0.3 (≤1.5)	µs
SFH6136 (R_L=1.9 kΩ)	t_{PHL}	0.2 (≤0.8)	µs
Low - High			
SFH6135 (R_L=4.1 kΩ)	t_{PLH}	0.3 (≤1.5)	µs
SFH6136 (R_L=1.9 kΩ)	t_{PLH}	0.2 (≤0.8)	µs

Common-mode interference immunity



Common Mode Interference Immunity

(V_{CM}=10 V_{P-P}, V_{CC}=5 V, T_A=25°C)

High (I_F=0 mA)			
SFH6135 (R_L=4.1 kΩ)	CM_H	1000	V/µs
SFH6136 (R_L=1.9 kΩ)	CM_H	1000	V/µs
Low (I_F=16 mA)			
SFH6135 (R_L=4.1 kΩ)	CM_L	1000	V/µs
SFH6136 (R_L=1.9 kΩ)	CM_L	1000	V/µs

Figure 1. Output characteristics–SFH6135
Output current versus output voltage
(T_A=25°C, V_{CC}=5 V)

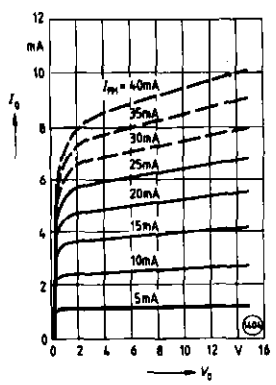


Figure 2. Output characteristics–SFH6136
Output current versus output voltage
(T_A=25°C, V_{CC}=5 V)

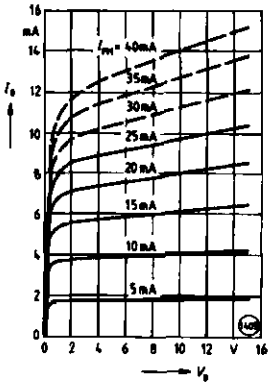


Figure 3. Permissible forward current of emitting diode versus ambient temperature

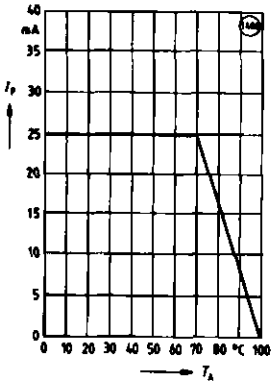


Figure 4. Permissible total power dissipation versus ambient temperature

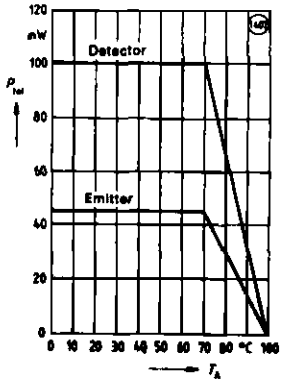


Figure 5. Forward current of emitting diode versus forward voltage (T_A=25°C)

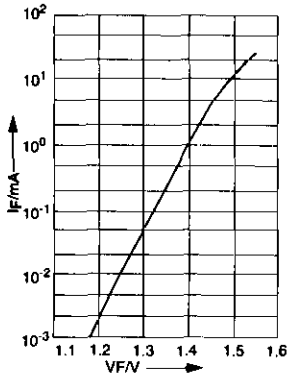


Figure 6. Small signal transfer ratio versus forward current
(V_{CC}=5 V, T_A=25°C)

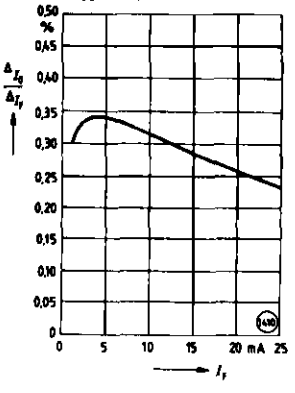


Figure 7. Current transfer ratio (normalized) versus ambient temperature (I_F=16 mA, V_O=0.4 V, V_{CC}=5 V, T_A=25°C)

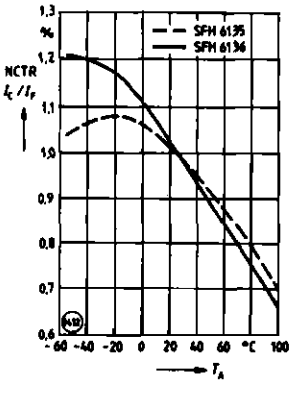


Figure 8. Output current (high) versus ambient temperature
(V_O=V_{CC}=5 V, I_F=0)

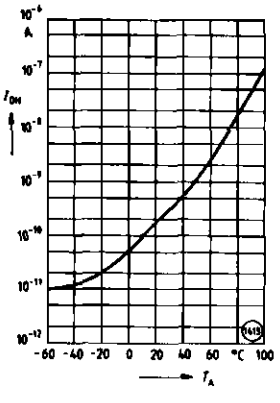


Figure 9. Delay times versus ambient temperature (I_F=16 mA, V_{CC}=5 V,
SFH6135: R_L=4.1 kΩ,
SFH6136: R_L=1.9 kΩ)

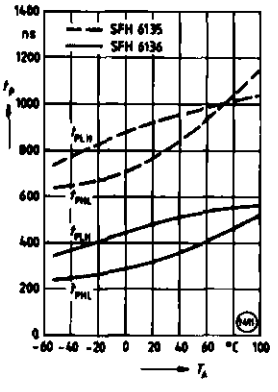
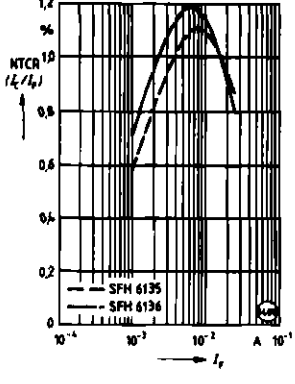


Figure 10. Current transfer ratio (normalized) versus forward current
(I_F=16 mA, V_O=0.4 V, V_{CC}=5 V, T_A=25°C)



Optocouplers (Optoisolators)

5