

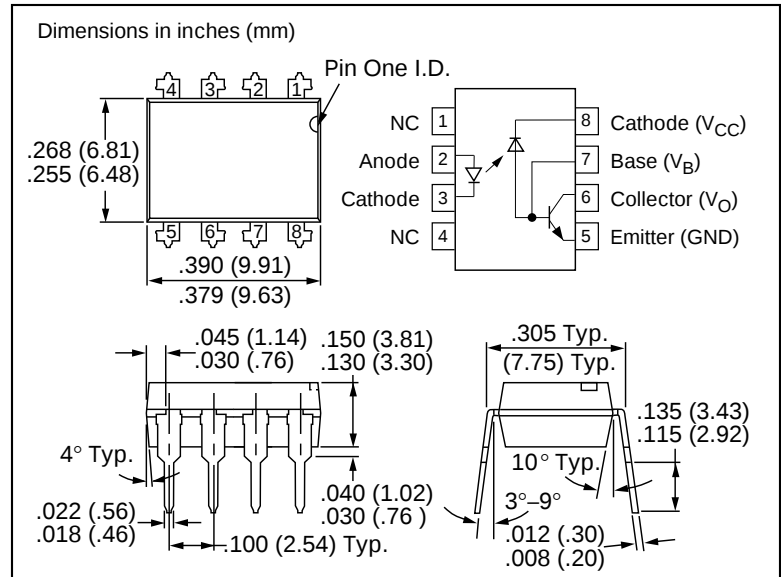
FEATURES

- 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 photo-detector 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.



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

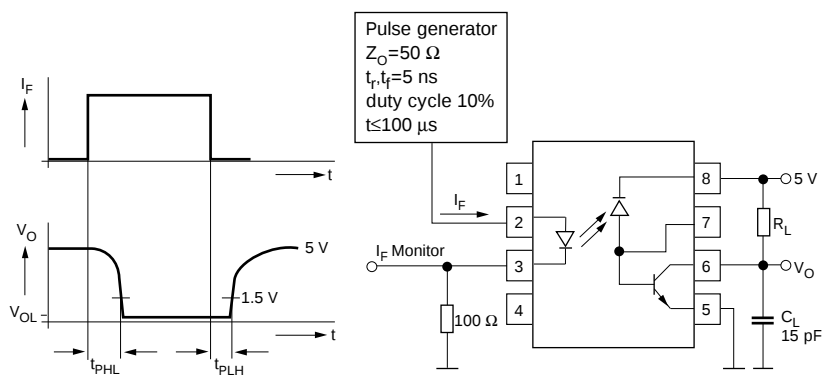
Supply Voltage.....	-0.5 to 15 V
Output Voltage.....	-0.5 to 15 V
Emitter-Base Voltage	5 V
Output Current.....	8 mA
Maximum Output Current	16 mA
Base Current.....	5 mA
Thermal Resistance	300 K/W
Total Power Dissipation (T _A ≤ 70°C).....	100 mW

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

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

Figure 1. Schematic



High - Low SFH6135 ($R_L=4.1\text{ k}\Omega$) SFH6136 ($R_L=1.9\text{ k}\Omega$)	t_{PHL} t_{PHL}	0.3 (≤ 1.5) 0.2 (≤ 0.8)	μs μs
Low - High SFH6135 ($R_L=4.1\text{ k}\Omega$) SFH6136 ($R_L=1.9\text{ k}\Omega$)	t_{PLH} t_{PLH}	0.3 (≤ 1.5) 0.2 (≤ 0.8)	μs μs

$$V_{CM}=10 \text{ VP-P}, V_{CC}=5 \text{ V}, T_A=25^\circ\text{C}$$

High ($I_F=0$ mA)			
SFH6135 ($R_L=4.1$ k Ω)	CM _H	1000	V/ μ S
SFH6136 ($R_L=1.9$ k Ω)	CM _H	1000	V/ μ S
Low ($I_F=16$ mA)			
SFH6135 ($R_L=4.1$ k Ω)	CM _L	1000	V/ μ S
SFH6136 ($R_L=1.9$ k Ω)	CM _L	1000	V/ μ S

The graph plots collector current I_C in milliamperes (mA) on the y-axis against collector voltage V_C in volts (V) on the x-axis. The y-axis ranges from 0 to 12 mA with major grid lines every 2 mA. The x-axis ranges from 0 to 16 V with major grid lines every 2 V. There are eight curves representing different gate-source voltages V_{GS} : 0V, -1.0V, -2.0V, -3.0V, -3.5V, -4.0V, -4.5V, and -5.0V. The curves for $V_{GS} = 0V$ and $-1.0V$ are solid lines, while the others are dashed. A label $I_{DS} = 40mA$ is placed near the top of the $V_{GS} = 0V$ curve. A circular logo with the number 9404 is in the bottom right corner.

Figure 4. Output characteristics—SFH6136 Output current versus output voltage $T_A=25^\circ\text{C}$, $V_{CC}=5\text{ V}$

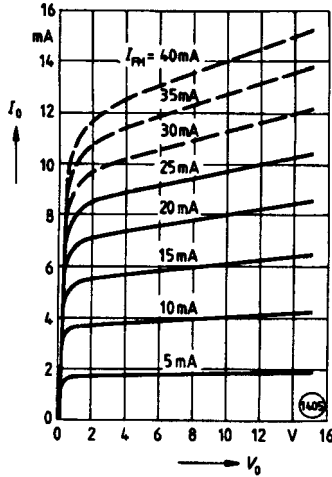


Figure 5. Permissible forward current of emitting diode versus ambient temperature

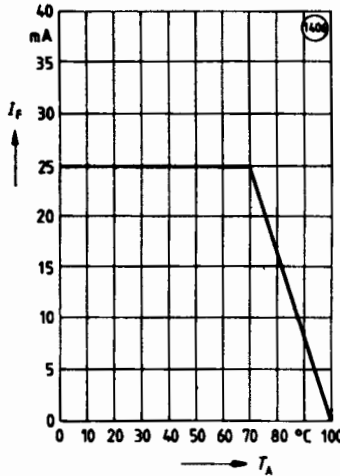


Figure 6. Permissible total power dissipation versus ambient temperature

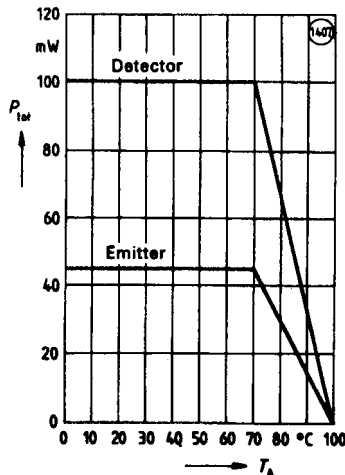


Figure 7. Forward current of emitting diode versus forward voltage $T_A=25^\circ\text{C}$

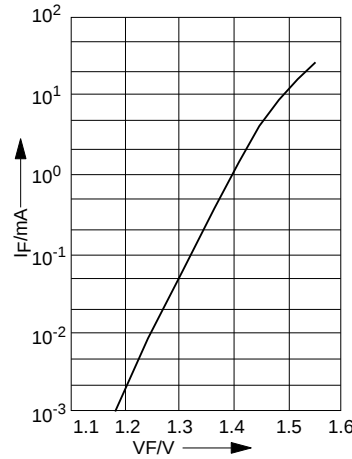


Figure 8. Small signal transfer ratio versus forward current $V_{CC}=5\text{ V}$, $T_A=25^\circ\text{C}$

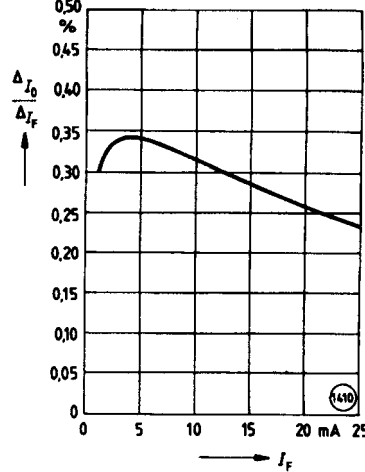


Figure 9. Current transfer ratio (normalized) versus ambient temp. $I_F=16\text{ mA}$, $V_O=0.4\text{ V}$, $V_{CC}=5\text{ V}$, $T_A=25^\circ\text{C}$

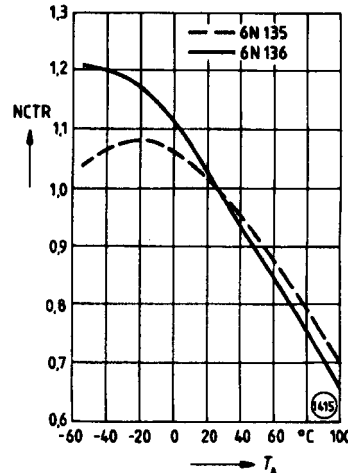


Figure 10. Output current (high) versus ambient temperature $V_O=V_{CC}=5\text{ V}$, $I_F=0$

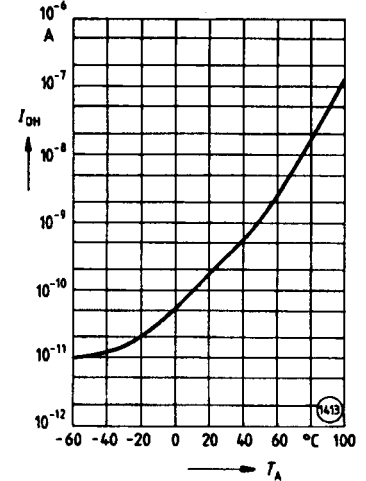


Figure 11. Delay times versus ambient temperature $I_F=16\text{ mA}$, $V_{CC}=5\text{ V}$, SFH6135: $R_L=4.1\text{ k}\Omega$, SFH6136: $R_L=1.9\text{ k}\Omega$

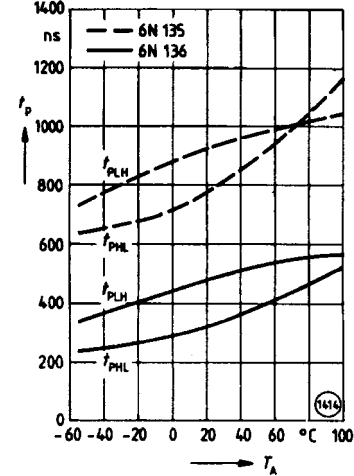


Figure 12. Current transfer ratio (normalized) versus forward current $I_F=16\text{ mA}$, $V_O=0.4\text{ V}$, $V_{CC}=5\text{ V}$, $T_A=25^\circ\text{C}$

