


# SIEMENS

# ILD610 SERIES DUAL PHOTOTRANSISTOR OPTOCOUPLER

## FEATURES

- **Dual Version of SFH610 Series**
- **High Current Transfer Ratios**  
 ILD610-1, 40-80%  
 ILD610-2, 63-125%  
 ILD610-3, 100-200%  
 ILD610-4, 160-320%
- **Isolation Test Voltage, 5300 V<sub>RMS</sub>**
- **V<sub>CEsat</sub> 0.25 (≤0.4) V at I<sub>F</sub>=10 mA, I<sub>C</sub>=2.5 mA**
- **V<sub>CEO</sub>=70 V**
- **Underwriters Lab File #E52744**
-  **VDE #0884 Available with Option 11**

## DESCRIPTION

The ILD610 Series is a dual channel optocoupler series for high density applications. Each channel consists of an optically coupled pair with a Gallium Arsenide infrared LED and a silicon NPN phototransistor. Signal information, including a DC level, can be transmitted by the device while maintaining a high degree of electrical isolation between input and output. The ILD610 Series is the dual version of SFH610 Series and uses a repetitive pin-out configuration instead of the more common alternating pin-out used in most dual couplers.

## Maximum Ratings (Each Channel)

### Emitter

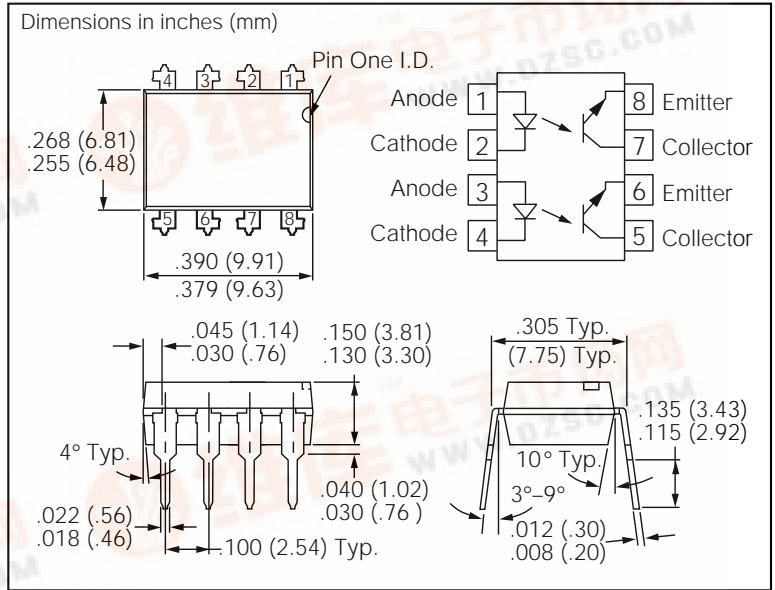
Reverse Voltage ..... 6 V  
 Surge Forward Current (t ≤10 ms)..... 1.5 A  
 Total Power Dissipation ..... 100 mW  
 Derate Linearly from 25°C ..... 1.3 mW/°C  
 DC Forward Current ..... 60 mA

### Detector

Collector-Emitter Voltage ..... 70 V  
 Collector Current ..... 50 mA  
 Collector Current (t ≤1 ms) ..... 100 mA  
 Total Power Dissipation ..... 150 mW  
 Derate Linearly from 25°C ..... 2.0 mW/°C

### Package

Isolation Test Voltage (t=1 sec.) ..... 5300 VAC<sub>RMS</sub>  
 Isolation Resistance  
     V<sub>IO</sub>=500 V, T<sub>A</sub>=25°C ..... ≥10<sup>12</sup> Ω  
     V<sub>IO</sub>=500 V, T<sub>A</sub>=100°C ..... ≥10<sup>11</sup> Ω  
 Storage Temperature ..... -55°C to +150°C  
 Operating Temperature ..... -55°C to +100°C  
 Junction Temperature ..... 100°C  
 Lead Soldering Time at 260°C ..... 10 sec.



## Electrical Characteristics (T<sub>A</sub>=25°C)

	Symbol	Typ.	Unit	Condition
<b>Emitter</b>				
Forward Voltage	V <sub>F</sub>	1.25 (≤1.65)	V	I <sub>F</sub> =60mA
Reverse Current	I <sub>R</sub>	0.01 (≤10)	μA	V <sub>R</sub> =6V
Capacitance	C <sub>O</sub>	25	pF	V <sub>R</sub> =0 V, f=1 MHz
<b>Detector</b>				
Breakdown Voltage Collector-Emitter Emitter-Collector	BV <sub>CEO</sub> BV <sub>CEO</sub>	90 (≥70) 7.0 (≥6.0)	V V	I <sub>C</sub> =10 μA I <sub>E</sub> =10 μA
Collector-Emitter Dark Current	I <sub>CEO</sub>	2 (≤50)	nA	V <sub>CE</sub> =10 V
Capacitance	C <sub>CE</sub>	7	pF	V <sub>CE</sub> =5 V, f=1 MHz
<b>Package</b>				
Collector-Emitter Saturation Voltage	V <sub>CEsat</sub>	0.25 (≤0.40)	V	I <sub>F</sub> =10 mA, I <sub>C</sub> =2.5 mA
Coupling Capacitance	C <sub>C</sub>	0.35	pF	

	-1	-2	-3	-4	
CTR <sup>1</sup> , I <sub>F</sub> = 10 mA, V <sub>CE</sub> = 5 V	40-80	63-125	100-200	160-320	%
CTR <sup>1</sup> , I <sub>F</sub> = 1 mA, V <sub>CE</sub> = 5 V	13 min.	22 min.	34 min.	56 min.	%
I <sub>CEO</sub> (V <sub>CE</sub> = 10 V)	2 (≤50)	2 (≤50)	5 (≤100)	5 (≤100)	nA

CTR will match within a ratio of 1.7:1

### Switching Characteristics

Linear Operation (without saturation) I<sub>F</sub> = 10 mA, V<sub>CC</sub> = 5 V, R<sub>C</sub> = 75 Ω, Typical

		-1	-2	-3	-4	
Turn on time	t <sub>on</sub>	3.0	3.2	3.6	4.1	μs
Rise time	t <sub>r</sub>	2.0	2.5	2.9	3.3	μs
Turn off time	t <sub>off</sub>	2.3	2.9	3.4	3.7	μs
Fall time	t <sub>f</sub>	2.0	2.6	3.1	3.5	μs

Switching Operation (with saturation) V<sub>CC</sub> = 5 V, R<sub>C</sub> = 1 Ω, Typical

		-1 I <sub>F</sub> = 20 mA	-2 I <sub>F</sub> = 10 mA	-3 I <sub>F</sub> = 10 mA	-4 I <sub>F</sub> = 5 mA	
Turn on time	t <sub>on</sub>	3.0	4.3	4.6	6.0	μs
Rise time	t <sub>r</sub>	2.0	2.8	3.3	4.6	μs
Turn off time	t <sub>off</sub>	18	2.9	3.4	25	μs
Fall time	t <sub>f</sub>	11	2.6	3.1	15	μs

Figure 1. Forward voltage versus forward current

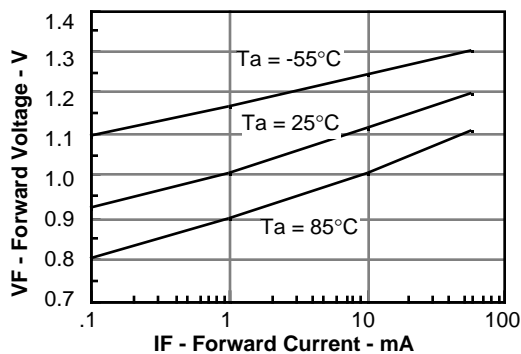


Figure 2. Normalized non-saturated and saturated CTR at T<sub>A</sub> = 25°C versus LED current

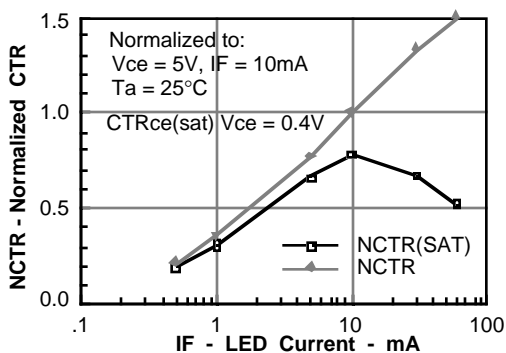


Figure 3. Normalized non-saturated and saturated CTR at T<sub>A</sub> = 50°C versus LED current

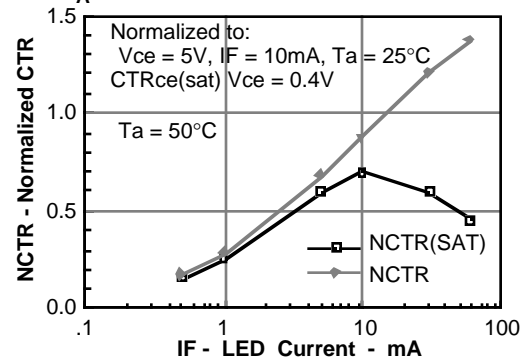
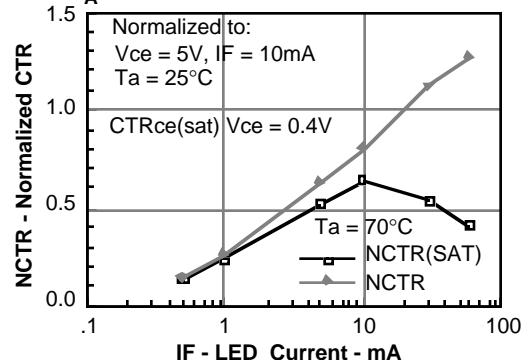
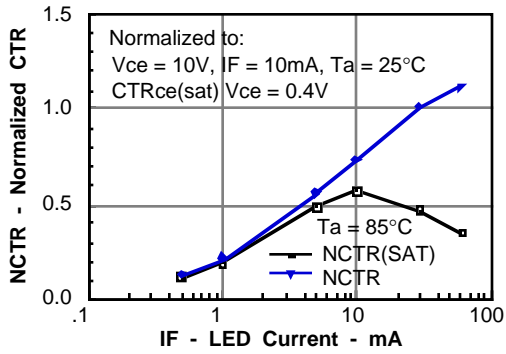


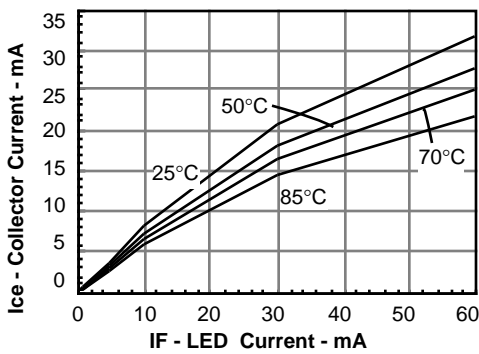
Figure 4. Normalized non-saturated and saturated CTR at T<sub>A</sub> = 70°C versus LED current



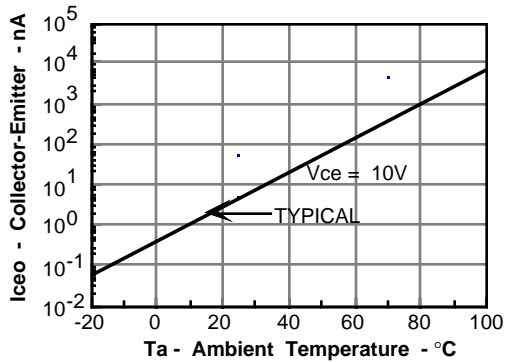
**Figure 5. Normalized non-saturated and saturated CTR at  $T_A=85^\circ\text{C}$  versus LED current**



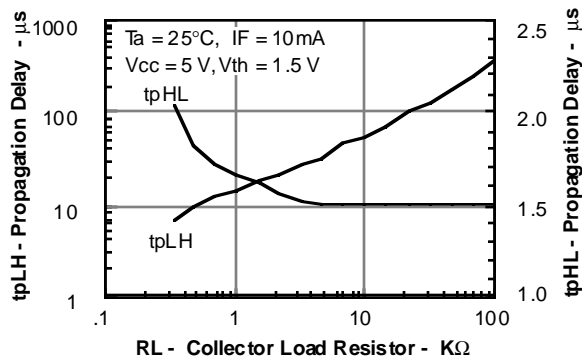
**Figure 6. Collector-emitter current versus temperature and LED current**



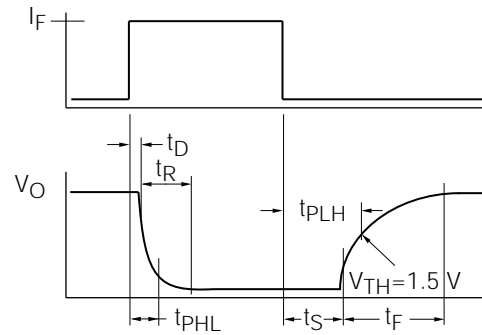
**Figure 7. Collector-emitter leakage current versus temperature**



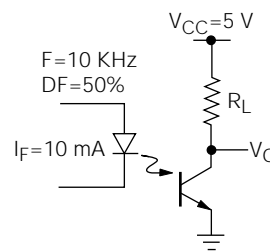
**Figure 8. Propagation delay versus collector load resistor**



**Figure 9. Switching timing**



**Figure 10. Non-saturated switching schematic**



**Figure 11. Saturated switching time test waveform**

