

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_{RMS}
- V_{CEsat} 0.25 (≤ 0.4) V
at $I_F=10$ mA, $I_C=2.5$ mA
- $V_{CEO}=70$ V
- Underwriters Lab File #E52744
- VDE #0884 Available with Option 1

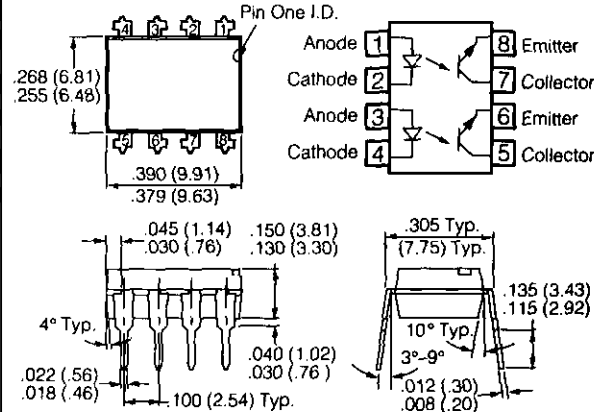
DESCRIPTION

The ILD610 Series is a dual channel opto-coupler 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 ($t \leq 10$ μ s)	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 ($t \leq 1$ 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 _{RMS}
Isolation Resistance	
$V_{IO}=500$ V, $T_A=25^\circ\text{C}$	$\geq 10^{12} \Omega$
$V_{IO}=500$ V, $T_A=100^\circ\text{C}$	$\geq 10^{11} \Omega$
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.

Package Dimensions in Inches (mm)



Electrical Characteristics ($T_A=25^\circ\text{C}$)

	Symbol	Typ.	Unit	Condition
Emitter				
Forward Voltage	V_F	1.25 (≤ 1.65)	V	$I_F=60$ mA
Reverse Current	I_R	0.01 (≤ 10)	μ A	$V_R=6$ V
Capacitance	C_O	25	pF	$V_R=0$ V, $f=1$ MHz
Detector				
Breakdown Voltage				
Collector-Emitter	BV_{CEO}	90 (≥ 70)	V	$I_C=10$ μ A
Emitter-Collector	BV_{ECO}	7.0 (≥ 6.0)	V	$I_E=10$ μ A
Collector-Emitter Dark Current	I_{CEO}	2 (≤ 50)	nA	$V_{CE}=10$ V
Capacitance	C_{CE}	7	pF	$V_{CE}=5$ V, $f=1$ MHz
Package				
Collector-Emitter Saturation Voltage				
Voltage	V_{CEsat}	0.25 (< 0.40)	V	$I_F=10$ mA, $I_C=2.5$ mA
Coupling Capacitance	C_C	0.35	pF	

Optocouplers
(Optoisolators)

5

	-1	-2	-3	-4	
CTR ¹ , I _F = 10 mA, V _{CE} = 5 V	40-80	63-125	100-200	160-320	%
CTR ¹ , I _F = 1 mA, V _{CE} = 5 V	13 min.	22 min.	34 min.	56 min.	%
I _{CEO} (V _{CE} = 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_F = 10 mA, V_{CC} = 5 V, R_C = 75 Ω, Typical

		-1	-2	-3	-4	
Turn on time	t _{on}	3.0	3.2	3.6	4.1	μs
Rise time	t _r	2.0	2.5	2.9	3.3	μs
Turn off time	t _{off}	2.3	2.9	3.4	3.7	μs
Fall time	t _f	2.0	2.6	3.1	3.5	μs

Switching Operation (with saturation) V_{CC} = 5 V, R_C = 1 KΩ, Typical

		-1 I _F = 20 mA	-2 I _F = 10 mA	-3 I _F = 10 mA	-4 I _F = 5 mA	
Turn on time	t _{on}	3.0	4.3	4.6	6.0	μs
Rise time	t _r	2.0	2.8	3.3	4.6	μs
Turn off time	t _{off}	18	2.9	3.4	25	μs
Fall time	t _f	11	2.6	3.1	15	μs

Figure 1. Forward voltage versus forward current

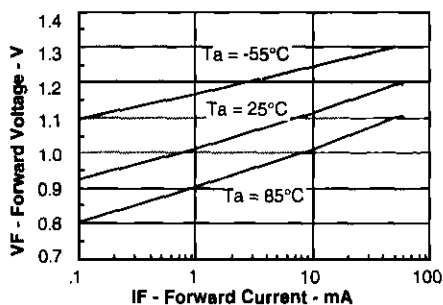


Figure 2. Normalized non-saturated and saturated CTR at T_A = 25°C versus LED current

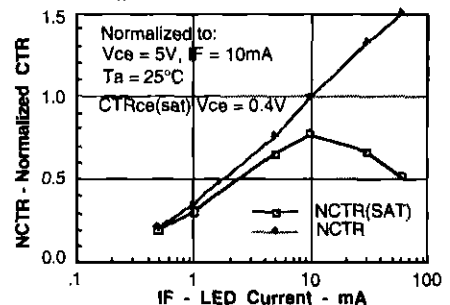


Figure 3. Normalized non-saturated and saturated CTR at T_A = 50°C versus LED current

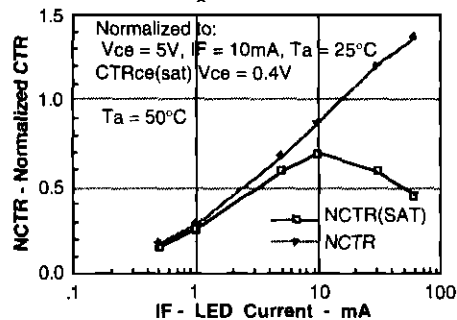


Figure 4. Normalized non-saturated and saturated CTR at T_A = 70°C versus LED current

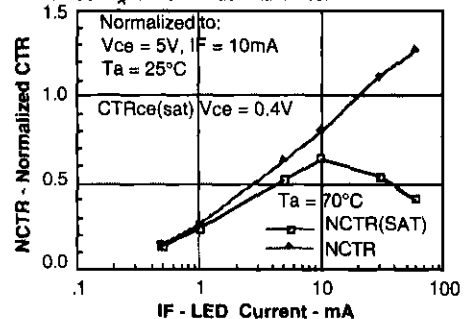


Figure 5. Normalized non-saturated and saturated CTR at $T_A = 85^\circ\text{C}$ versus LED current

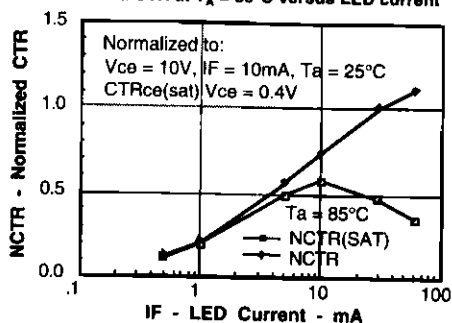


Figure 7. Collector-emitter leakage current versus temperature

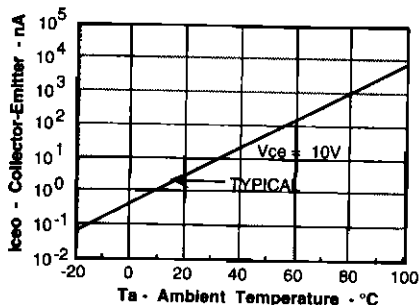


Figure 9. Switching timing

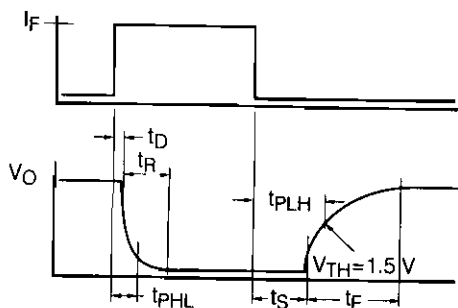


Figure 11. Saturated switching time test waveform and schematic

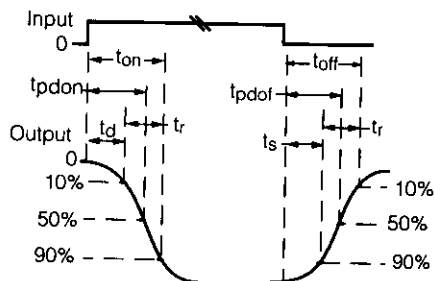


Figure 6. Collector-emitter current versus temperature and LED current

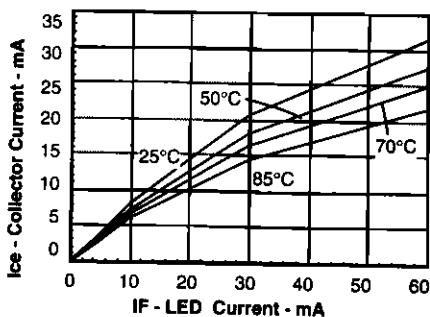


Figure 8. Propagation delay versus collector load resistor

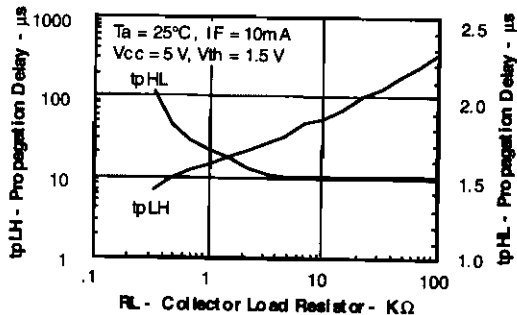


Figure 10. Non-saturated switching schematic

