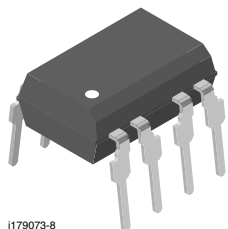
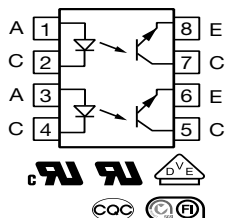




## Optocoupler, Phototransistor Output, Dual Channel



I179073-8



### FEATURES

- Dual version of SFH610 series
- Isolation rated voltage 4420 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
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)

RoHS  
COMPLIANT

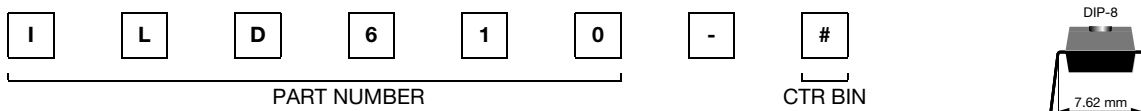
### DESCRIPTION

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 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.

### AGENCY APPROVALS

- [UL 1577](#)
- [cUL](#)
- [DIN EN 60747-5-5 \(VDE 0884\)](#), available with option 1
- [CQC](#)
- [FIMKO](#)

### ORDERING INFORMATION



#### AGENCY CERTIFIED / PACKAGE

UL, cUL, CQC, FIMKO	40 to 80	100 to 200
DIP-8	ILD610-1	ILD610-3

#### Note

- Additional options may be possible, please contact sales office

### ABSOLUTE MAXIMUM RATINGS (T<sub>amb</sub> = 25 °C, unless otherwise specified)

PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
<b>INPUT</b>				
Reverse voltage		V <sub>R</sub>	6.0	V
Surge forward current	t ≤ 1.0 ms	I <sub>FSM</sub>	1.5	A
Power dissipation		P <sub>diss</sub>	100	mW
Derate linearly from 25 °C			1.3	mW/°C
Forward continuous current		I <sub>F</sub>	60	mA
<b>OUTPUT</b>				
Collector emitter voltage		V <sub>CEO</sub>	70	V
Collector current		I <sub>C</sub>	50	mA
	t ≤ 1.0 ms	I <sub>C</sub>	100	mA
Power dissipation		P <sub>diss</sub>	150	mW
Derate linearly from 25 °C			2.0	mW/°C
<b>COUPLER</b>				
Storage temperature		T <sub>stg</sub>	-55 to +150	°C
Operating temperature		T <sub>amb</sub>	-55 to +100	°C
Junction temperature		T <sub>j</sub>	100	°C
Lead soldering time at 260 °C			10	s

#### Note

- Stresses in excess of the absolute maximum ratings can cause permanent damage to the device. Functional operation of the device is not implied at these or any other conditions in excess of those given in the operational sections of this document. Exposure to absolute maximum ratings for extended periods of the time can adversely affect reliability.



ELECTRICAL CHARACTERISTICS (T <sub>amb</sub> = 25 °C, unless otherwise specified)							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
<b>INPUT</b>							
Forward voltage	I <sub>F</sub> = 60 mA		V <sub>F</sub>	-	1.25	1.65	V
Reverse current	V <sub>R</sub> = 6.0 V		I <sub>R</sub>	-	0.01	10	μA
Capacitance	V <sub>R</sub> = 0 V, f = 1.0 MHz		C <sub>O</sub>	-	25	-	pF
<b>OUTPUT</b>							
Collector emitter breakdown voltage	I <sub>C</sub> = 10 mA, I <sub>E</sub> = 10 μA		BV <sub>CEO</sub>	70	90	-	V
			BV <sub>CEO</sub>	6.0	7.0	-	V
Collector emitter dark current	V <sub>CE</sub> = 10 V		I <sub>CEO</sub>	-	2.0	50	nA
Collector emitter capacitance	V <sub>CE</sub> = 5.0 V, f = 1.0 MHz		C <sub>CE</sub>	-	7.0	-	pF
Collector emitter leakage current	V <sub>CE</sub> = 10 V	ILD610-1	I <sub>CEO</sub>	-	2.0	50	nA
		ILD610-3	I <sub>CEO</sub>	-	5.0	100	nA
<b>COUPLER</b>							
Collector emitter saturation voltage	I <sub>F</sub> = 10 mA, I <sub>C</sub> = 2.5 mA		V <sub>CEsat</sub>	-	0.25	0.40	V
Coupling capacitance			C <sub>C</sub>	-	0.35	-	pF

**Note**

- Minimum and maximum values are testing requirements. Typical values are characteristics of the device and are the result of engineering evaluation. Typical values are for information only and are not part of the testing requirements.

CURRENT TRANSFER RATIO (T <sub>amb</sub> = 25 °C, unless otherwise specified)							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
I <sub>C</sub> /I <sub>F</sub> <sup>(1)</sup>	I <sub>F</sub> = 10 mA, V <sub>CE</sub> = 5.0 V	ILD610-1	CTR	40	-	80	%
		ILD610-3	CTR	100	-	200	%
	I <sub>F</sub> = 1.0 mA, V <sub>CE</sub> = 5.0 V <sup>^</sup>	ILD610-1	CTR	13	-	-	%
		ILD610-3	CTR	34	-	-	%

**Note**

- <sup>(1)</sup> CTR will match within a ratio of 1.7:1

SWITCHING CHARACTERISTICS (T <sub>amb</sub> = 25 °C, unless otherwise specified)							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
<b>NON-SATURATED</b>							
Rise time	V <sub>CC</sub> = 5.0 V, R <sub>L</sub> = 75 Ω, I <sub>F</sub> = 10 mA	ILD610-1	t <sub>r</sub>	-	2.0	-	μs
		ILD610-3			2.9		
Fall time	V <sub>CC</sub> = 5.0 V, R <sub>L</sub> = 75 Ω, I <sub>F</sub> = 10 mA	ILD610-1	t <sub>f</sub>	-	2.0	-	μs
		ILD610-3			3.1		
Turn-on time	V <sub>CC</sub> = 5.0 V, R <sub>L</sub> = 75 Ω, I <sub>F</sub> = 10 mA	ILD610-1	t <sub>on</sub>	-	3.0	-	μs
		ILD610-3			3.6		
Turn-off time	V <sub>CC</sub> = 5.0 V, R <sub>L</sub> = 75 Ω, I <sub>F</sub> = 10 mA	ILD610-1	t <sub>off</sub>	-	2.9	-	μs
		ILD610-3			3.7		
<b>SATURATED</b>							
Rise time	V <sub>CC</sub> = 5.0 V, R <sub>L</sub> = 1.0 kΩ, I <sub>F</sub> = 20 mA	ILD610-1	t <sub>r</sub>	-	2.0	-	μs
	V <sub>CC</sub> = 5.0 V, R <sub>L</sub> = 1.0 kΩ, I <sub>F</sub> = 10 mA	ILD610-3			2.8		
Fall time	V <sub>CC</sub> = 5.0 V, R <sub>L</sub> = 1.0 kΩ, I <sub>F</sub> = 20 mA	ILD610-1	t <sub>f</sub>	-	11	-	μs
	V <sub>CC</sub> = 5.0 V, R <sub>L</sub> = 1.0 kΩ, I <sub>F</sub> = 10 mA	ILD610-3			14		
Turn-on time	V <sub>CC</sub> = 5.0 V, R <sub>L</sub> = 1.0 kΩ, I <sub>F</sub> = 20 mA	ILD610-1	t <sub>on</sub>	-	3.0	-	μs
	V <sub>CC</sub> = 5.0 V, R <sub>L</sub> = 1.0 kΩ, I <sub>F</sub> = 10 mA	ILD610-3			4.3		
Turn-off time	V <sub>CC</sub> = 5.0 V, R <sub>L</sub> = 1.0 kΩ, I <sub>F</sub> = 20 mA	ILD610-1	t <sub>off</sub>	-	18	-	μs
	V <sub>CC</sub> = 5.0 V, R <sub>L</sub> = 1.0 kΩ, I <sub>F</sub> = 10 mA	ILD610-3			25		

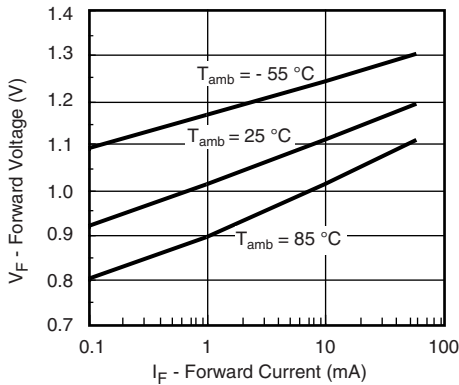


SAFETY AND INSULATION RATINGS				
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
Climatic classification	According to IEC 68 part 1		55 / 100 / 21	
Comparative tracking index		CTI	175	
Maximum rated withstanding isolation voltage	t = 1 min	$V_{ISO}$	4420	$V_{RMS}$
Maximum transient isolation voltage		$V_{IOTM}$	10 000	$V_{peak}$
Maximum repetitive peak isolation voltage		$V_{IORM}$	890	$V_{peak}$
Isolation resistance	$V_{IO} = 500\text{ V}, T_{amb} = 25\text{ }^{\circ}\text{C}$	$R_{IO}$	$\geq 10^{12}$	$\Omega$
	$V_{IO} = 500\text{ V}, T_{amb} = 100\text{ }^{\circ}\text{C}$	$R_{IO}$	$\geq 10^{11}$	$\Omega$
Output safety power		$P_{SO}$	400	mW
Input safety current		$I_{SI}$	275	mA
Safety temperature		$T_S$	175	$^{\circ}\text{C}$
Creepage distance			$\geq 7$	mm
Clearance distance			$\geq 7$	mm
Insulation thickness		DTI	$\geq 0.4$	mm

**Note**

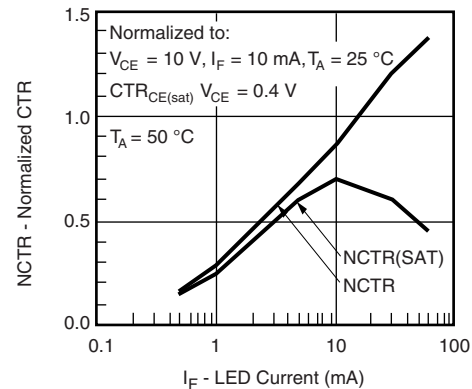
- As per IEC 60747-5-5, § 7.4.3.8.2, this optocoupler is suitable for “safe electrical insulation” only within the safety ratings. Compliance with the safety ratings shall be ensured by means of protective circuits.

**TYPICAL CHARACTERISTICS** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)



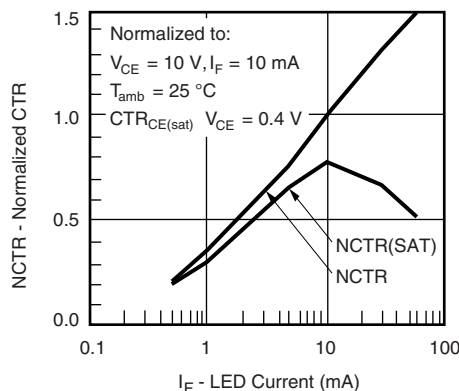
iiict6\_01

Fig. 1 - Forward Voltage vs. Forward Current



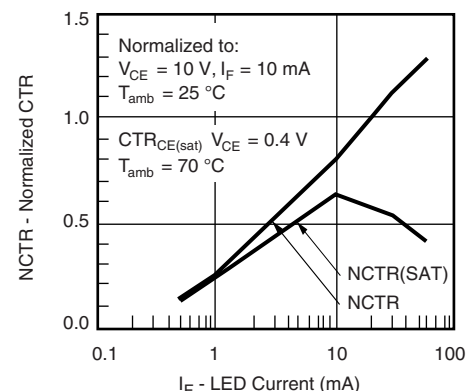
iiict6\_03

Fig. 3 - Normalized Non-Saturated and Saturated CTR vs. LED Current



iiict6\_02

Fig. 2 - Normalized Non-Saturated and Saturated CTR vs. LED Current



iiict6\_04

Fig. 4 - Normalized Non-Saturated and Saturated CTR vs. LED Current

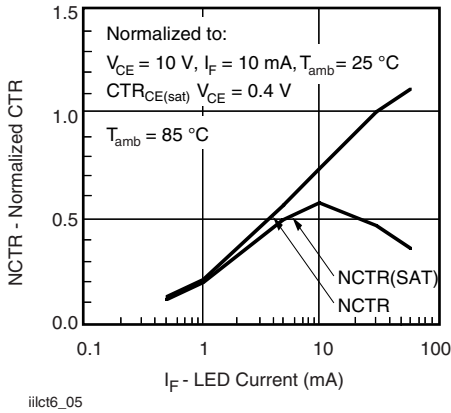


Fig. 5 - Normalized Non-Saturated and Saturated CTR vs. LED Current

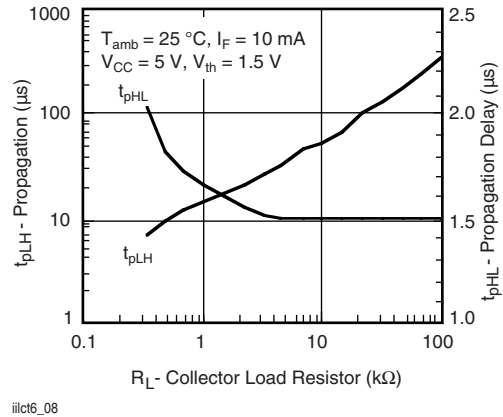


Fig. 8 - Propagation Delay vs. Collector Load Resistor

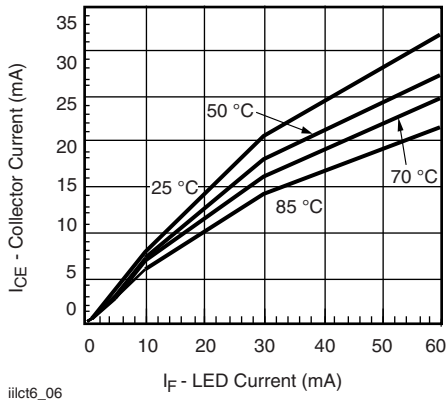


Fig. 6 - Collector Emitter Current vs. Temperature and LED Current

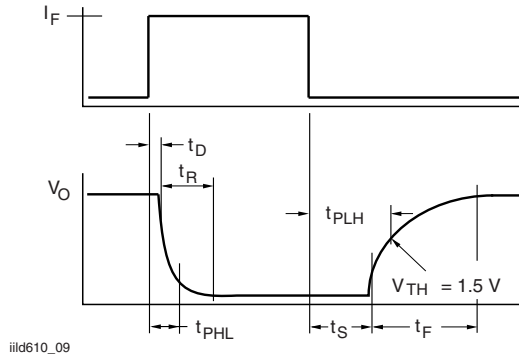


Fig. 9 - Switching Timing

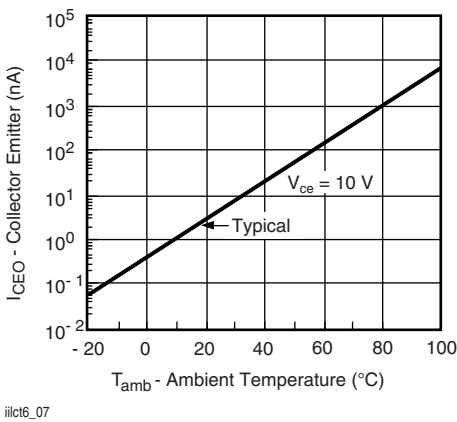


Fig. 7 - Collector Emitter Leakage Current vs. Temperature

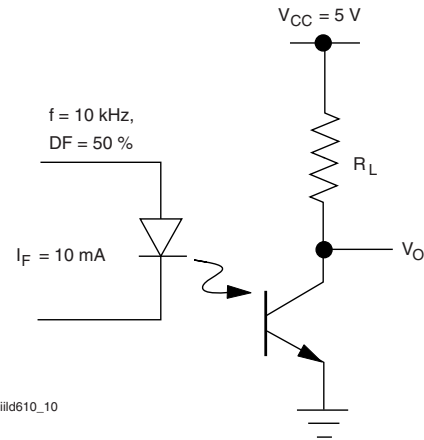
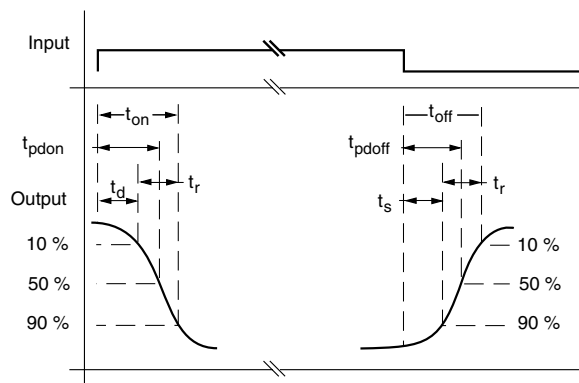


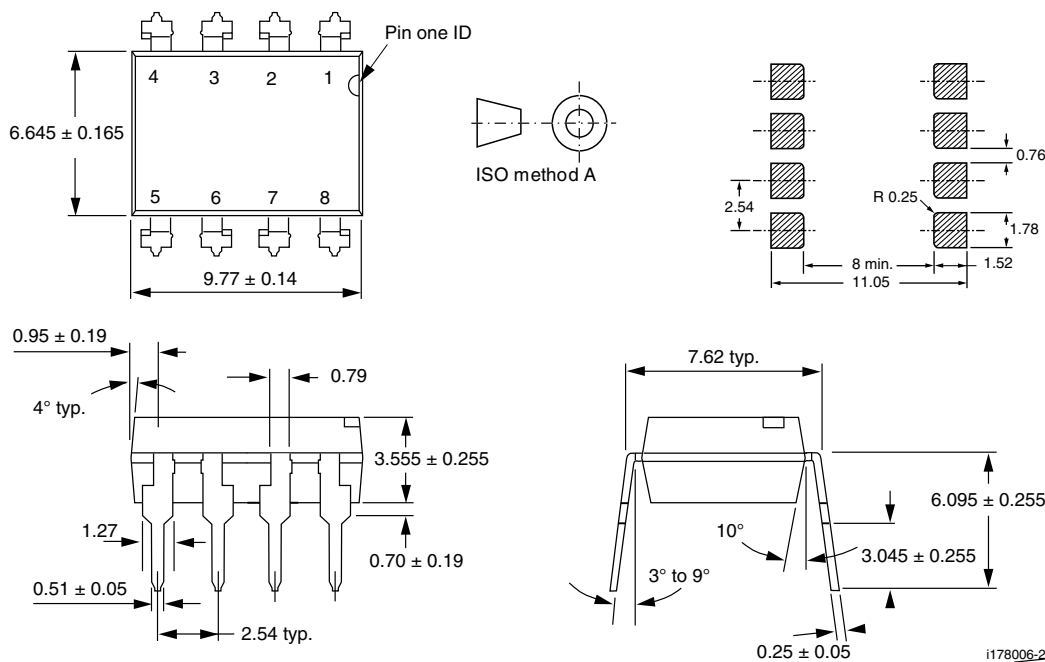
Fig. 10 - Non-Saturated Switching Schematic



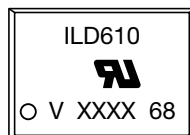
ild610\_11

Fig. 11 - Saturated Switching Time Test Waveform

**PACKAGE DIMENSIONS** in millimeters



**PACKAGE MARKING**



**Notes**

- XXXX = LMC (lot marking code)
- Option 1 is reflected in the package marking
- Tape and reel suffix (T) is not part of the package marking



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