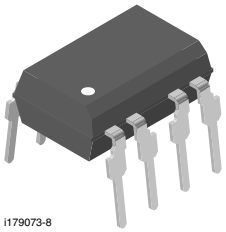
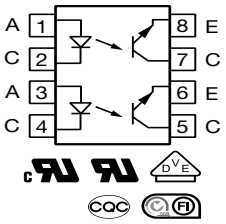
Optocoupler, Phototransistor Output, Dual Channel





FEATURES

- Dual version of SFH610 series
- Isolation rated voltage 4420 V_{RMS}
- V_{CEsat} 0.25 (≤ 0.4) V at I_F = 10 mA, I_C = 2.5 mA
- V_{CEO} = 70 V
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

Pb-free

e3

RoHS COMPLIANT

DESCRIPTION

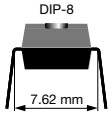
The ILD610 series is a dual channel optocoupler series for high density applications. Each channel consists of an optically coupled pair with a gallium arsenide infrared LED and silicon NPN phototransistor. Signal information, including a DC level, can be transmitted by the device while maintaining a 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

I	L	D	6	1	0	-	#
PART NUMBER							CTR BIN



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_{amb} = 25 °C, unless otherwise specified)

PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
INPUT				
Reverse voltage		V_R	6.0	V
Surge forward current	t ≤ 1.0 ms	I_{FSM}	1.5	A
Power dissipation		P_{diss}	100	mW
Derate linearly from 25 °C			1.3	mW/°C
Forward continuous current		I_F	60	mA
OUTPUT				
Collector emitter voltage		V_{CEO}	70	V
Collector current		I_C	50	mA
	t ≤ 1.0 ms	I_C	100	mA
Power dissipation		P_{diss}	150	mW
Derate linearly from 25 °C			2.0	mW/°C
COUPLER				
Storage temperature		T_{stg}	-55 to +150	°C
Operating temperature		T_{amb}	-55 to +100	°C
Junction temperature		T_j	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.

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ELECTRICAL CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)							
PARAMETER	**TEST CONDITION**	**PART**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
INPUT							
Forward voltage	I_F = 60 mA		V_F	-	1.25	1.65	V
Reverse current	V_R = 6.0 V		I_R	-	0.01	10	µA
Capacitance	V_R = 0 V, f = 1.0 MHz		C_O	-	25	-	pF
OUTPUT							
Collector emitter breakdown voltage	I_C = 10 mA, I_E = 10 µA		BV_{CEO}	70	90	-	V
			BV_{CEO}	6.0	7.0	-	V
Collector emitter dark current	V_{CE} = 10 V		I_{CEO}	-	2.0	50	nA
Collector emitter capacitance	V_{CE} = 5.0 V, f = 1.0 MHz		C_{CE}	-	7.0	-	pF
Collector emitter leakage current	V_{CE} = 10 V	ILD610-1	I_{CEO}	-	2.0	50	nA
		ILD610-3	I_{CEO}	-	5.0	100	nA
COUPLER							
Collector emitter saturation voltage	I_F = 10 mA, I_C = 2.5 mA		V_{CEsat}	-	0.25	0.40	V
Coupling capacitance			C_C	-	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_{amb} = 25 °C, unless otherwise specified)							
PARAMETER	**TEST CONDITION**	**PART**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
I_C/I_F (1)	I_F = 10 mA, V_{CE} = 5.0 V	ILD610-1	CTR	40	-	80	%
		ILD610-3	CTR	100	-	200	%
	I_F = 1.0 mA, V_{CE} = 5.0 V^	ILD610-1	CTR	13	-	-	%
		ILD610-3	CTR	34	-	-	%

Note

(1) CTR will match within a ratio of 1.7:1

SWITCHING CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)							
PARAMETER	**TEST CONDITION**	**PART**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
NON-SATURATED							
Rise time	V_{CC} = 5.0 V, R_L = 75 Ω, I_F = 10 mA	ILD610-1	t_r	-	2.0	-	µs
		ILD610-3			2.9		
Fall time	V_{CC} = 5.0 V, R_L = 75 Ω, I_F = 10 mA	ILD610-1	t_f	-	2.0	-	µs
		ILD610-3			3.1		
Turn-on time	V_{CC} = 5.0 V, R_L = 75 Ω, I_F = 10 mA	ILD610-1	t_{on}	-	3.0	-	µs
		ILD610-3			3.6		
Turn-off time	V_{CC} = 5.0 V, R_L = 75 Ω, I_F = 10 mA	ILD610-1	t_{off}	-	2.9	-	µs
		ILD610-3			3.7		
SATURATED							
Rise time	V_{CC} = 5.0 V, R_L = 1.0 kΩ, I_F = 20 mA	ILD610-1	t_r	-	2.0	-	µs
	V_{CC} = 5.0 V, R_L = 1.0 kΩ, I_F = 10 mA	ILD610-3			2.8		
Fall time	V_{CC} = 5.0 V, R_L = 1.0 kΩ, I_F = 20 mA	ILD610-1	t_f		11		µs
	V_{CC} = 5.0 V, R_L = 1.0 kΩ, I_F = 10 mA	ILD610-3			14		
Turn-on time	V_{CC} = 5.0 V, R_L = 1.0 kΩ, I_F = 20 mA	ILD610-1	t_{on}		3.0		µs
	V_{CC} = 5.0 V, R_L = 1.0 kΩ, I_F = 10 mA	ILD610-3			4.3		
Turn-off time	V_{CC} = 5.0 V, R_L = 1.0 kΩ, I_F = 20 mA	ILD610-1	t_{off}		18		µs
	V_{CC} = 5.0 V, R_L = 1.0 kΩ, I_F = 10 mA	ILD610-3			25		

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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 V, T_{amb} = 25 °C	R_{IO}	$\geq 10^{12}$	Ω
	V_{IO} = 500 V, T_{amb} = 100 °C	R_{IO}	$\geq 10^{11}$	Ω
Output safety power		P_{SO}	400	mW
Input safety current		I_{SI}	275	mA
Safety temperature		T_S	175	°C
Creepage distance			≥ 7	mm
Clearance distance			≥ 7	mm
Insulation thickness		DTI	≥ 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 °C, unless otherwise specified)

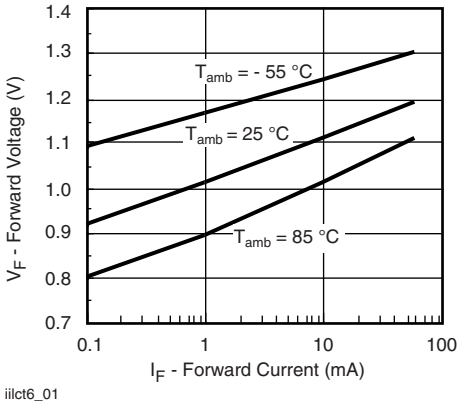

Fig. 1 - Forward Voltage vs. Forward Current

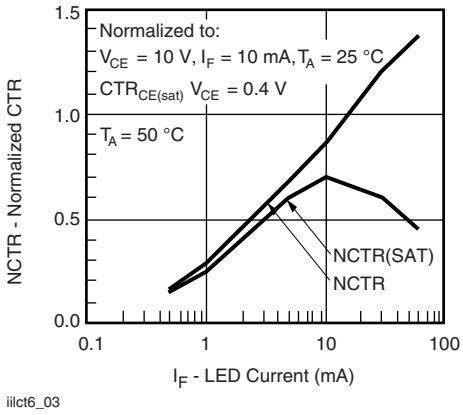

Fig. 3 - Normalized Non-Saturated and Saturated CTR vs. LED Current

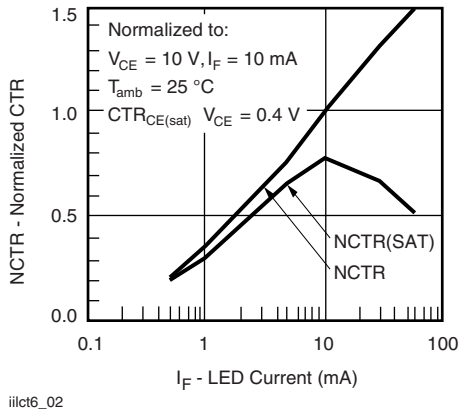

Fig. 2 - Normalized Non-Saturated and Saturated CTR vs. LED Current

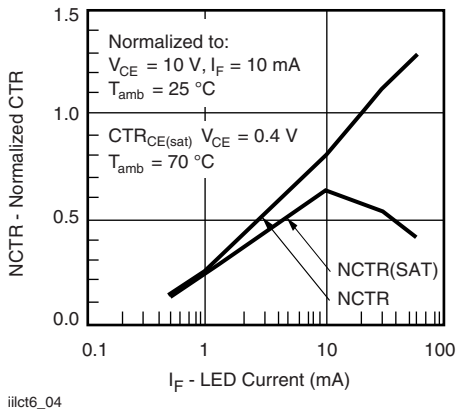

Fig. 4 - Normalized Non-Saturated and Saturated CTR vs. LED Current

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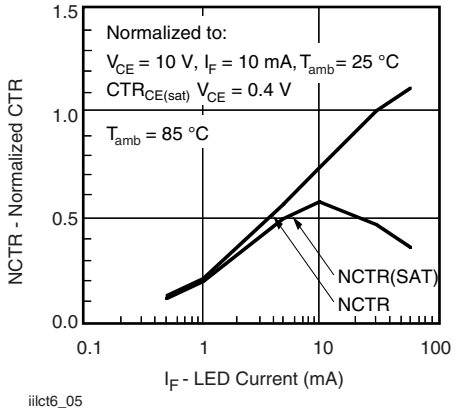

Fig. 5 - Normalized Non-Saturated and Saturated CTR vs. LED Current

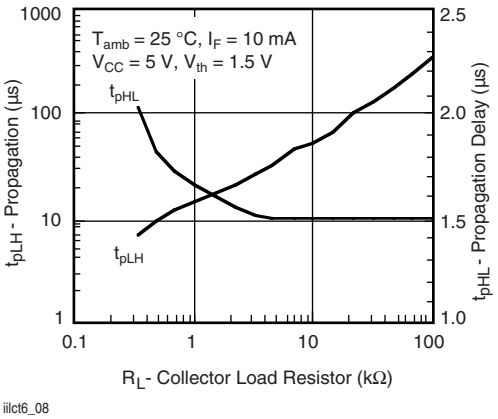

Fig. 8 - Propagation Delay vs. Collector Load Resistor

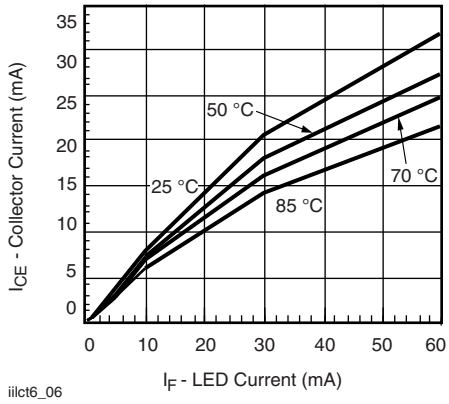

Fig. 6 - Collector Emitter Current vs. Temperature and LED Current

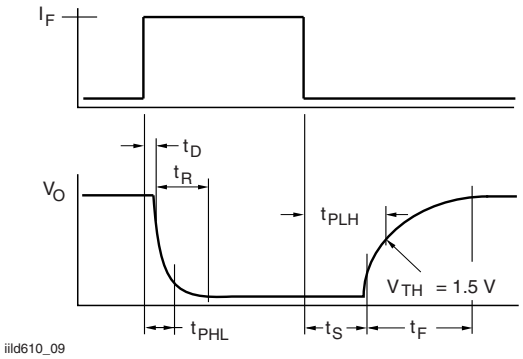

Fig. 9 - Switching Timing

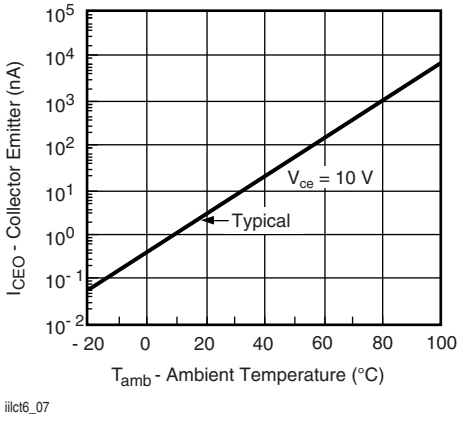

Fig. 7 - Collector Emitter Leakage Current vs.Temperature

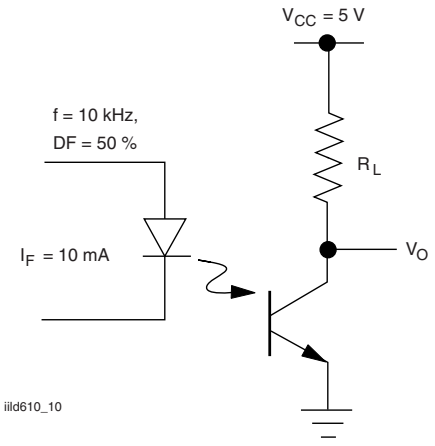

Fig. 10 - Non-Saturated Switching Schematic

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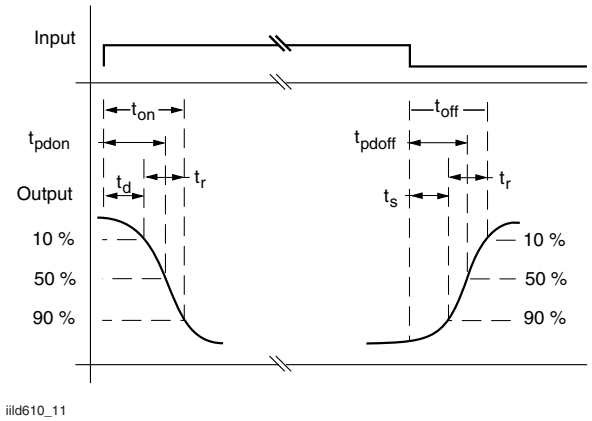
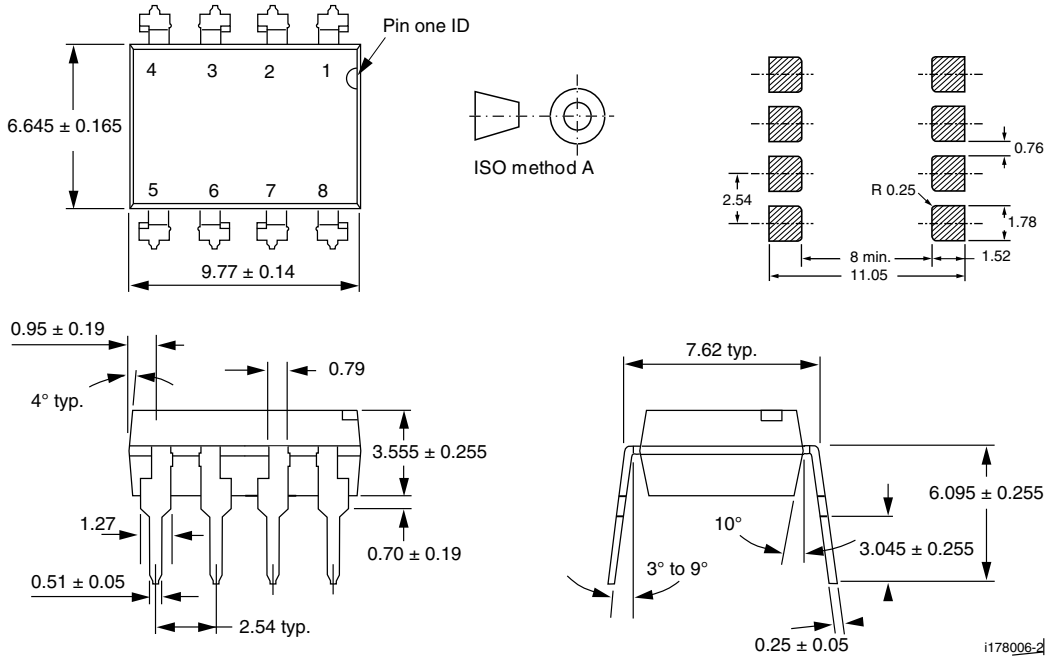
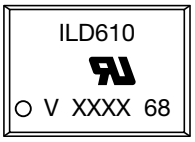


Fig. 11 - Saturated Switching Time Test Waveform

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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