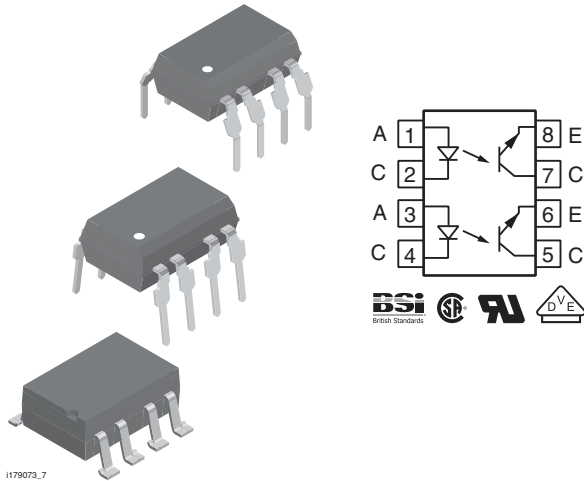


# Optocoupler, Phototransistor Output, Dual Channel



H179073\_7

## FEATURES

- Dual version of SFH610 series
- 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
- Compliant to RoHS Directive 2002/95/EC and in accordance to WEEE 2002/96/EC


**RoHS**  
COMPLIANT

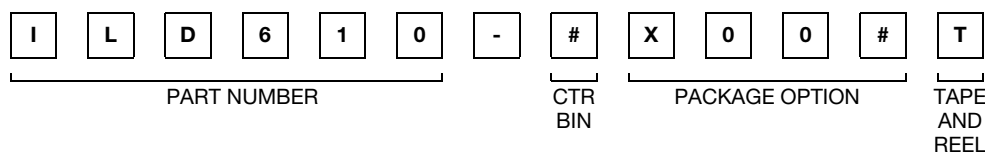
## AGENCY APPROVALS

- UL1577, file no. E52744 system code H or J, double protection
- DIN EN 60747-5-5 (VDE 0884)/DIN EN 60747-5-5 pending
- CSA 93751
- BSI IEC 60950; IEC 60065

## 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.

## ORDERING INFORMATION



AGENCY CERTIFIED/PACKAGE	CTR (%)			
	40 to 80	63 to 125	100 to 200	160 to 320
UL, CSA, BSI	40 to 80	63 to 125	100 to 200	160 to 320
DIP-8	ILD610-1	-	ILD610-3	-
DIP-8, 400 mil, option 6	-	-	ILD610-3X006	-
SMD-8, option 7	-	ILD610-2X007T	-	-
SMD-8, option 9	-	-	ILD610-3X009	ILD610-4X009

### Note

- Additional options may be possible, please contact sales office.

## Vishay Semiconductors Optocoupler, Phototransistor Output, Dual Channel

<b>ABSOLUTE MAXIMUM RATINGS</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)				
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
<b>INPUT</b>				
Reverse voltage		$V_R$	6.0	V
Surge forward current	$t \leq 1.0\text{ ms}$	$I_{FSM}$	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
<b>OUTPUT</b>				
Collector emitter voltage		$V_{CE}$	70	V
Collector current		$I_C$	50	mA
	$t \leq 1.0\text{ ms}$	$I_C$	100	mA
Power dissipation		$P_{diss}$	150	mW
Derate linearly from 25 °C			2.0	mW/°C
<b>COUPLER</b>				
Isolation test voltage	$t = 1.0\text{ s}$	$V_{ISO}$	5300	$V_{RMS}$
Isolation resistance	$V_{IO} = 500\text{ V}, T_{amb} = 25\text{ }^{\circ}\text{C}$	$R_{IO}$	$\geq 10^{12}$	$\Omega$
	$V_{IO} = 500\text{ V}, T_{amb} = 100\text{ }^{\circ}\text{C}$	$R_{IO}$	$\geq 10^{11}$	$\Omega$
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.

<b>ELECTRICAL CHARACTERISTICS</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
<b>INPUT</b>							
Forward voltage	$I_F = 60\text{ mA}$		$V_F$		1.25	1.65	V
Reverse current	$V_R = 6.0\text{ V}$		$I_R$		0.01	10	$\mu\text{A}$
Capacitance	$V_R = 0\text{ V}, f = 1.0\text{ MHz}$		$C_O$		25		pF
<b>OUTPUT</b>							
Collector emitter breakdown voltage	$I_C = 10\text{ mA}, I_E = 10\text{ }\mu\text{A}$		$BV_{CEO}$	70	90		V
			$BV_{CEO}$	6.0	7.0		V
Collector emitter dark current	$V_{CE} = 10\text{ V}$		$I_{CEO}$		2.0	50	nA
Collector emitter capacitance	$V_{CE} = 5.0\text{ V}, f = 1.0\text{ MHz}$		$C_{CE}$		7.0		pF
Collector emitter leakage current	$V_{CE} = 10\text{ V}$	ILD610-1	$I_{CEO}$		2.0	50	nA
		ILD610-2	$I_{CEO}$		2.0	50	nA
		ILD610-3	$I_{CEO}$		5.0	100	nA
		ILD610-4	$I_{CEO}$		5.0	100	nA
<b>COUPLER</b>							
Collector emitter saturation voltage	$I_F = 10\text{ mA}, I_C = 2.5\text{ mA}$		$V_{CEsat}$		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.



Optocoupler, Phototransistor Output, Dual Channel Vishay Semiconductors

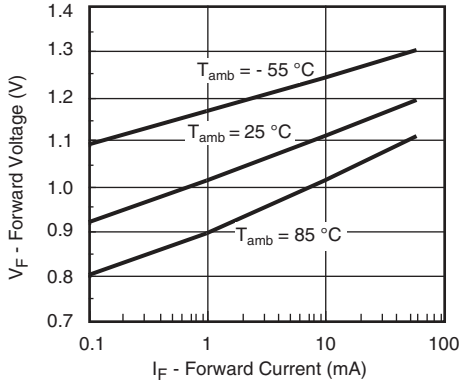
CURRENT TRANSFER RATIO ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
CTR <sup>(1)</sup>	$I_F = 10\text{ mA}$ , $V_{CE} = 5.0\text{ V}$	ILD610-1	CTR	40		80	%
		ILD610-2	CTR	63		125	%
		ILD610-3	CTR	100		200	%
		ILD610-4	CTR	160		320	%
	$I_F = 1.0\text{ mA}$ , $V_{CE} = 5.0\text{ V}$	ILD610-1	CTR	13			%
		ILD610-2	CTR	22			%
		ILD610-3	CTR	34			%
		ILD610-4	CTR	56			%

Note

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

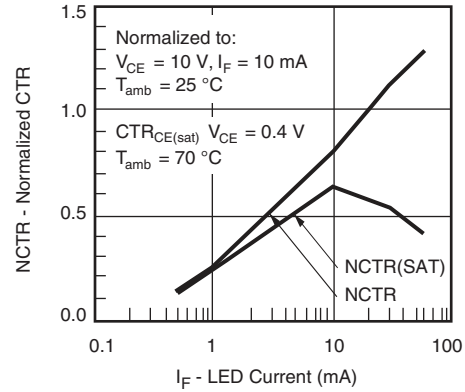
SWITCHING CHARACTERISTICS ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
<b>NON-SATURATED</b>							
Rise time	$V_{CC} = 5.0\text{ V}$ , $R_L = 75\text{ }\Omega$ , $I_F = 10\text{ mA}$	ILD610-1	$t_r$		2.0		$\mu\text{s}$
		ILD610-2			2.5		
		ILD610-3			2.9		
		ILD610-4			3.3		
Fall time	$V_{CC} = 5.0\text{ V}$ , $R_L = 75\text{ }\Omega$ , $I_F = 10\text{ mA}$	ILD610-1	$t_f$		2.0		$\mu\text{s}$
		ILD610-2			2.6		
		ILD610-3			3.1		
		ILD610-4			3.5		
Turn-on time	$V_{CC} = 5.0\text{ V}$ , $R_L = 75\text{ }\Omega$ , $I_F = 10\text{ mA}$	ILD610-1	$t_{on}$		3.0		$\mu\text{s}$
		ILD610-2			3.2		
		ILD610-3			3.6		
		ILD610-4			4.1		
Turn-off time	$V_{CC} = 5.0\text{ V}$ , $R_L = 75\text{ }\Omega$ , $I_F = 10\text{ mA}$	ILD610-1	$t_{off}$		2.9		$\mu\text{s}$
		ILD610-2			3.4		
		ILD610-3			3.7		
		ILD610-4			4.1		
<b>SATURATED</b>							
Rise time	$V_{CC} = 5.0\text{ V}$ , $R_L = 1.0\text{ k}\Omega$ , $I_F = 20\text{ mA}$	ILD610-1	$t_r$		2.0		$\mu\text{s}$
	$V_{CC} = 5.0\text{ V}$ , $R_L = 1.0\text{ k}\Omega$ , $I_F = 10\text{ mA}$	ILD610-2			2.8		
	$V_{CC} = 5.0\text{ V}$ , $R_L = 1.0\text{ k}\Omega$ , $I_F = 10\text{ mA}$	ILD610-3			2.8		
	$V_{CC} = 5.0\text{ V}$ , $R_L = 1.0\text{ k}\Omega$ , $I_F = 5\text{ mA}$	ILD610-4			4.6		
Fall time	$V_{CC} = 5.0\text{ V}$ , $R_L = 1.0\text{ k}\Omega$ , $I_F = 20\text{ mA}$	ILD610-1	$t_f$		11		$\mu\text{s}$
	$V_{CC} = 5.0\text{ V}$ , $R_L = 1.0\text{ k}\Omega$ , $I_F = 10\text{ mA}$	ILD610-2			14		
	$V_{CC} = 5.0\text{ V}$ , $R_L = 1.0\text{ k}\Omega$ , $I_F = 10\text{ mA}$	ILD610-3			14		
	$V_{CC} = 5.0\text{ V}$ , $R_L = 1.0\text{ k}\Omega$ , $I_F = 5\text{ mA}$	ILD610-4			15		
Turn-on time	$V_{CC} = 5.0\text{ V}$ , $R_L = 1.0\text{ k}\Omega$ , $I_F = 20\text{ mA}$	ILD610-1	$t_{on}$		3.0		$\mu\text{s}$
	$V_{CC} = 5.0\text{ V}$ , $R_L = 1.0\text{ k}\Omega$ , $I_F = 10\text{ mA}$	ILD610-2			4.3		
	$V_{CC} = 5.0\text{ V}$ , $R_L = 1.0\text{ k}\Omega$ , $I_F = 10\text{ mA}$	ILD610-3			4.3		
	$V_{CC} = 5.0\text{ V}$ , $R_L = 1.0\text{ k}\Omega$ , $I_F = 5\text{ mA}$	ILD610-4			6.0		
Turn-off time	$V_{CC} = 5.0\text{ V}$ , $R_L = 1.0\text{ k}\Omega$ , $I_F = 20\text{ mA}$	ILD610-1	$t_{off}$		18		$\mu\text{s}$
	$V_{CC} = 5.0\text{ V}$ , $R_L = 1.0\text{ k}\Omega$ , $I_F = 10\text{ mA}$	ILD610-2			25		
	$V_{CC} = 5.0\text{ V}$ , $R_L = 1.0\text{ k}\Omega$ , $I_F = 10\text{ mA}$	ILD610-3			25		
	$V_{CC} = 5.0\text{ V}$ , $R_L = 1.0\text{ k}\Omega$ , $I_F = 5\text{ mA}$	ILD610-4			25		

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



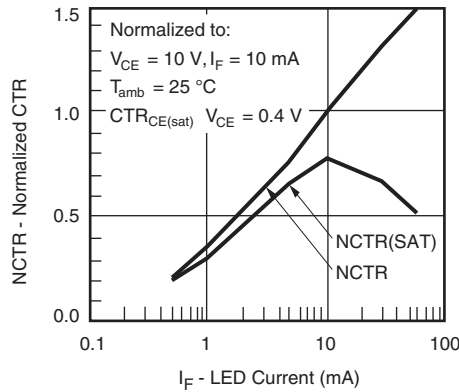
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Fig. 1 - Forward Voltage vs. Forward Current



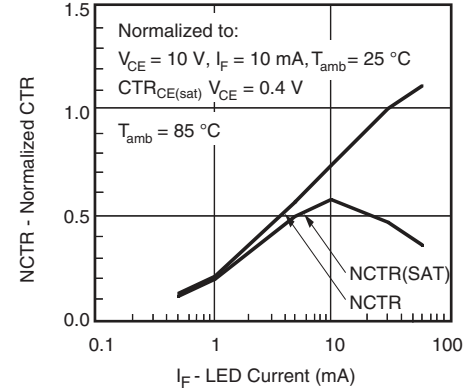
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Fig. 4 - Normalized Non-Saturated and Saturated CTR vs. LED Current



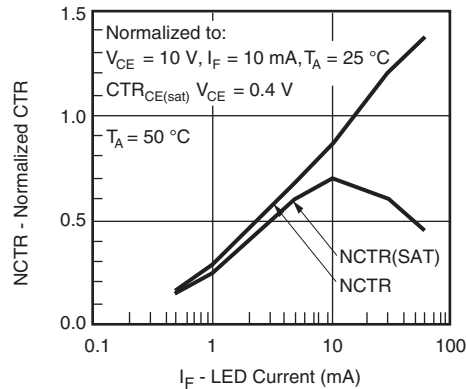
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Fig. 2 - Normalized Non-Saturated and Saturated CTR vs. LED Current



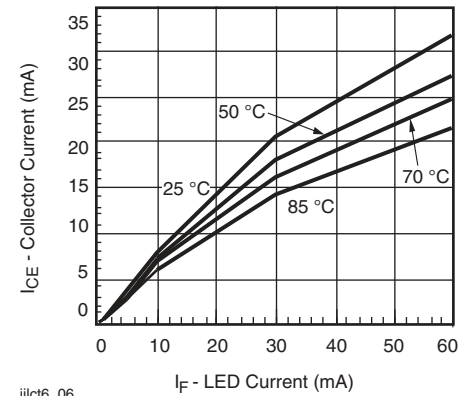
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Fig. 5 - Normalized Non-Saturated and Saturated CTR vs. LED Current



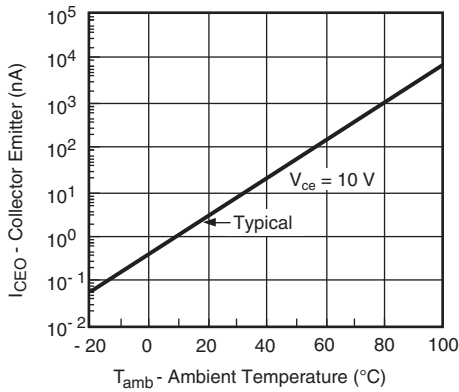
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Fig. 3 - Normalized Non-Saturated and Saturated CTR vs. LED Current



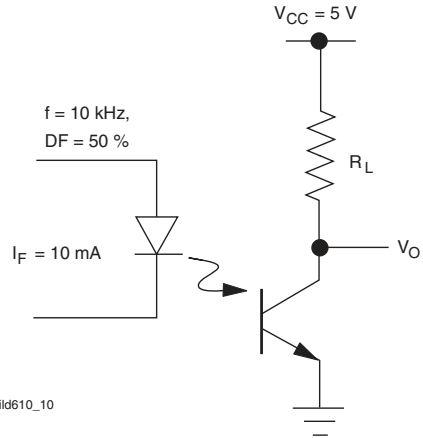
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Fig. 6 - Collector Emitter Current vs. Temperature and LED Current



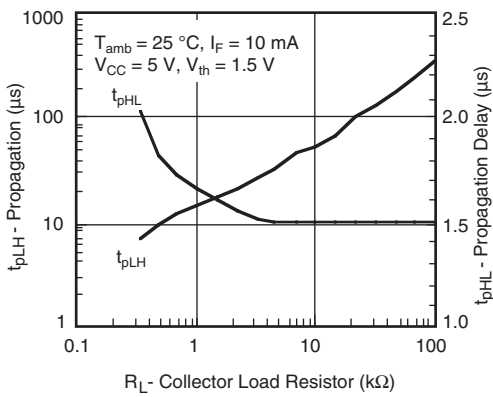
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Fig. 7 - Collector Emitter Leakage Current vs. Temperature



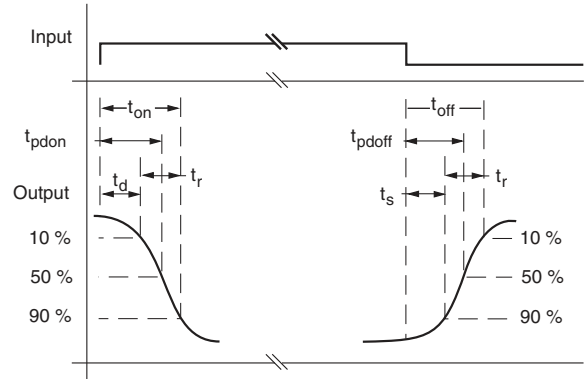
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Fig. 10 - Non-Saturated Switching Schematic



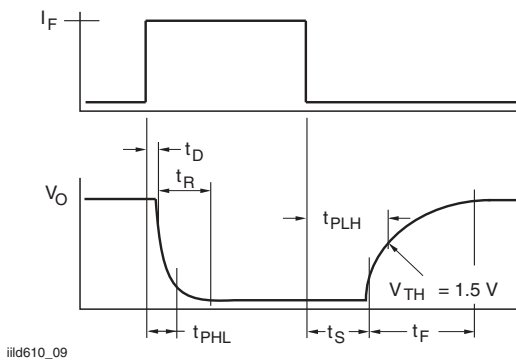
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Fig. 8 - Propagation Delay vs. Collector Load Resistor



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Fig. 11 - Saturated Switching Time Test Waveform



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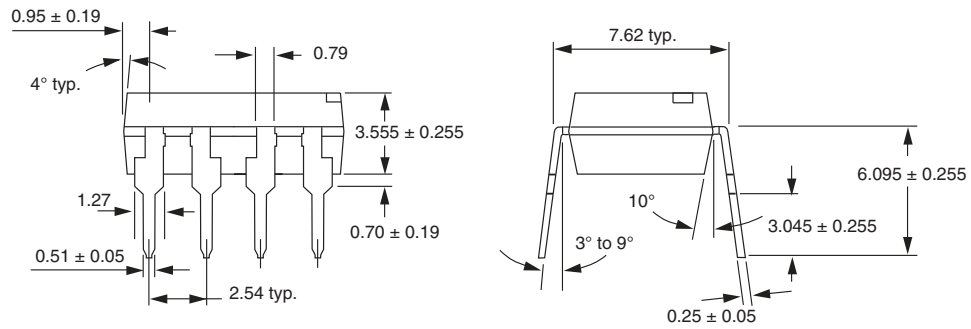
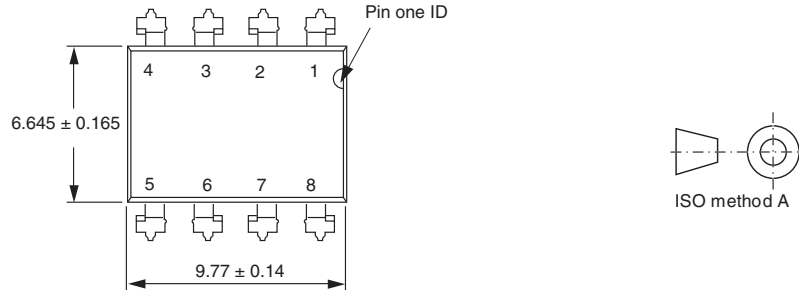
Fig. 9 - Switching Timing

# ILD610

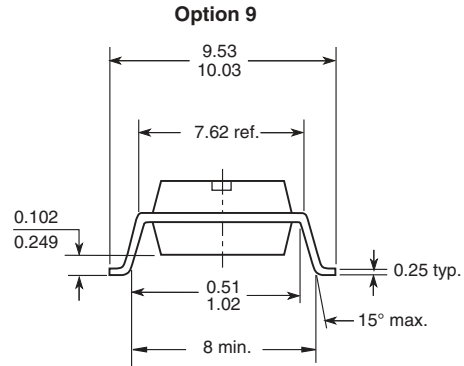
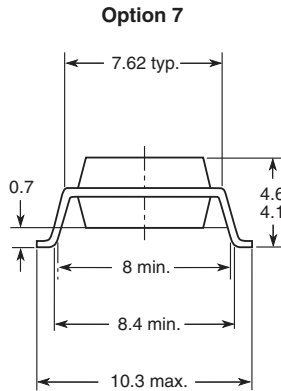
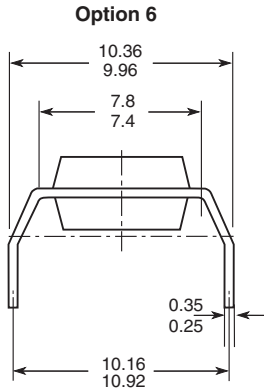


## Vishay Semiconductors Optocoupler, Phototransistor Output, Dual Channel

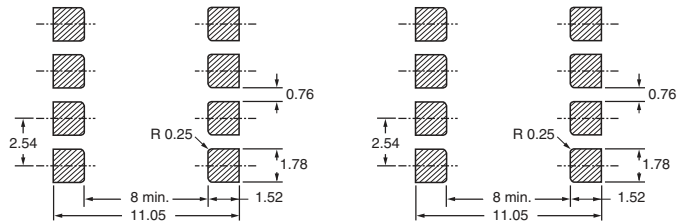
### PACKAGE DIMENSIONS in millimeters



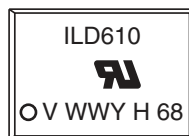
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18450-6



### PACKAGE MARKING



#### Notes

- Only option 1 and 7 reflected in the package marking
- Tape and reel suffix (T) is not part of the package marking



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