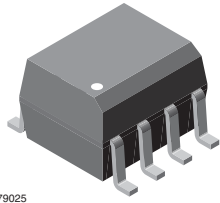
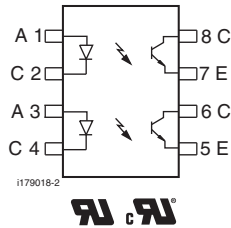




## Optocoupler, Phototransistor Output, Dual Channel, SOIC-8 Package



i179025



### FEATURES

- Two channel coupler
- SOIC-8 surface mountable package
- Standard lead spacing of 0.05"
- Available only on tape and reel option (conforms to EIA standard 481-2)
- Isolation test voltage, 4000 V<sub>RMS</sub>
- Compatible with dual wave, vapor phase and IR reflow soldering
- Compliant to RoHS Directive 2002/95/EC and in accordance to WEEE 2002/96/EC



RoHS COMPLIANT

### DESCRIPTION

The ILD205T, ILD206T, ILD207T, ILD211T, ILD213T, ILD217T are optically coupled pairs 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 ILD205T, ILD206T, ILD207T, ILD211T, ILD213T, ILD217T come in a standard SOIC-8 small outline package for surface mounting which makes it ideally suited for high density applications with limited space. In addition to eliminating through-holes requirements, this package conforms to standards for surface mounted devices.

A specified minimum and maximum CTR allows a narrow tolerance in the electrical design of the adjacent circuits. The high BV<sub>CEO</sub> of 70 V gives a higher safety margin compared to the industry standard of 30 V.

### AGENCY APPROVALS

- UL1577, file no. E52744 system code Y
- cUL - file no. E52744, equivalent to CSA bulletin 5A

ORDERING INFORMATION						
I	L	D	2	#	#	T
PART NUMBER						
AGENCY CERTIFIED/PACKAGE	CTR (%)					
	10 mA				1 mA	
UL, cUL	40 to 80	63 to 125	100 to 200	≥ 20	≥ 100	≥ 100
SOIC-8	ILD205T	ILD206T	ILD207T	ILD211T	ILD213T	ILD217T

ABSOLUTE MAXIMUM RATINGS (T <sub>amb</sub> = 25 °C, unless otherwise specified)				
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
<b>INPUT</b>				
Peak reverse voltage		V <sub>R</sub>	6	V
Peak pulsed current	1 μs, 300 pps		1	A
Continuous forward current per channel		I <sub>F</sub>	30	mA
Power dissipation		P <sub>diss</sub>	50	mW



ABSOLUTE MAXIMUM RATINGS (T <sub>amb</sub> = 25 °C, unless otherwise specified)				
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
<b>OUTPUT</b>				
Collector emitter breakdown voltage		BV <sub>CEO</sub>	70	V
Emitter collector breakdown voltage		BV <sub>ECO</sub>	7	V
Power dissipation per channel		P <sub>diss</sub>	125	mW
<b>COUPLER</b>				
Isolation test voltage	t = 1 s	V <sub>ISO</sub>	4000	V <sub>RMS</sub>
Total package dissipation ambient (2 LEDs and 2 detectors, 2 channels)		P <sub>tot</sub>	350	mW
Storage temperature		T <sub>stg</sub>	- 55 to + 150	°C
Operating temperature		T <sub>amb</sub>	- 55 to + 100	°C
Soldering time from 260 °C <sup>(1)</sup>		T <sub>slt</sub>	10	s

**Notes**

- 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.
- <sup>(1)</sup> Refer to reflow profile for soldering conditions for surface mounted devices.

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> = 10 mA		V <sub>F</sub>		1.2	1.55	V
Reverse current	V <sub>R</sub> = 6 V		I <sub>R</sub>		0.1	100	µA
Capacitance	V <sub>R</sub> = 0 V		C <sub>O</sub>		25		pF
<b>OUTPUT</b>							
Collector emitter breakdown voltage	I <sub>C</sub> = 10 µA		BV <sub>CEO</sub>	70			V
Emitter collector breakdown voltage	I <sub>E</sub> = 10 µA		BV <sub>ECO</sub>	7			V
Collector emitter leakage current	V <sub>CE</sub> = 10 V, I <sub>F</sub> = 0 A		I <sub>CEO</sub>		5	50	nA
Collector emitter capacitance	V <sub>CE</sub> = 0 V		C <sub>CE</sub>		10		pF
<b>COUPLER</b>							
Collector emitter saturation voltage	I <sub>F</sub> = 10 mA, I <sub>C</sub> = 2.5 mA		V <sub>CEsat</sub>			0.4	V
Capacitance (input to output)			C <sub>IO</sub>		0.5		pF
Resistance (input to output)			R <sub>IO</sub>		100		GΩ

**Note**

- Minimum and maximum values were tested requirements. Typical values are characteristics of the device and are the result of engineering evaluations. 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
DC current transfer ratio	V <sub>CE</sub> = 5 V, I <sub>F</sub> = 10 mA	ILD205T	CTR <sub>DC</sub>	40		80	%
		ILD206T	CTR <sub>DC</sub>	63		125	%
		ILD207T	CTR <sub>DC</sub>	100		200	%
		ILD211T	CTR <sub>DC</sub>	20			%
		ILD213T	CTR <sub>DC</sub>	100			%
	V <sub>CE</sub> = 5 V, I <sub>F</sub> = 1 mA	ILD205T	CTR <sub>DC</sub>	13	30		%
		ILD206T	CTR <sub>DC</sub>	22	45		%
		ILD207T	CTR <sub>DC</sub>	34	70		%
		ILD217T	CTR <sub>DC</sub>	100	120		%

SWITCHING CHARACTERISTICS ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)						
PARAMETER	TEST CONDITION	SYMBOL	MIN	TYP.	MAX	UNIT
Delay time	$V_S = 5\text{ V}$ , $I_C = 2\text{ mA}$ , $R_L = 100\text{ }\Omega$ , (see figure 1)	$t_d$		3		$\mu\text{s}$
Rise time	$V_S = 5\text{ V}$ , $I_C = 2\text{ mA}$ , $R_L = 100\text{ }\Omega$ , (see figure 1)	$t_r$		3		$\mu\text{s}$
Fall time	$V_S = 5\text{ V}$ , $I_C = 2\text{ mA}$ , $R_L = 100\text{ }\Omega$ , (see figure 1)	$t_f$		4.7		$\mu\text{s}$
Storage time	$V_S = 5\text{ V}$ , $I_C = 2\text{ mA}$ , $R_L = 100\text{ }\Omega$ , (see figure 1)	$t_s$		0.3		$\mu\text{s}$
Turn-on time	$V_S = 5\text{ V}$ , $I_C = 2\text{ mA}$ , $R_L = 100\text{ }\Omega$ , (see figure 1)	$t_{on}$		6		$\mu\text{s}$
Turn-off time	$V_S = 5\text{ V}$ , $I_C = 2\text{ mA}$ , $R_L = 100\text{ }\Omega$ , (see figure 1)	$t_{off}$		5		$\mu\text{s}$
Turn-on time	$V_S = 5\text{ V}$ , $I_F = 10\text{ mA}$ , $R_L = 1\text{ k}\Omega$ , (see figure 2)	$t_{on}$		3		$\mu\text{s}$
Turn-off time	$V_S = 5\text{ V}$ , $I_F = 10\text{ mA}$ , $R_L = 1\text{ k}\Omega$ , (see figure 2)	$t_{off}$		10		$\mu\text{s}$



95 10804

Fig. 1 - Test Circuit, Non-Saturated Operation



Fig. 3 - Switching Times



95 10843

Fig. 2 - Test Circuit, Saturated Operation

SAFETY AND INSULATION RATINGS						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Climatic classification (according to IEC 68 part 1)				55/100/21		
Comparative tracking index		CTI	175		399	
$V_{IOTM}$			6000			V
$V_{IORM}$			560			V
$P_{SO}$					350	mW
$I_{SI}$					150	mA
$T_{SI}$					165	°C
Creepage distance			4			mm
Clearance distance			4			mm
Insulation thickness			0.2			mm

**Note**

- As per IEC 60747-5-2, §7.4.3.8.1, 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.

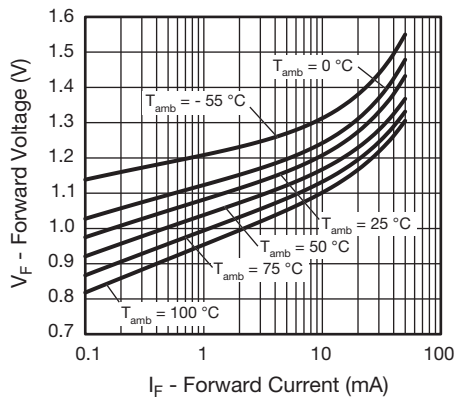
**TYPICAL CHARACTERISTICS** ( $T_{amb} = 25\text{ °C}$ , unless otherwise specified)


Fig. 4 - Forward Voltage vs. Forward Current

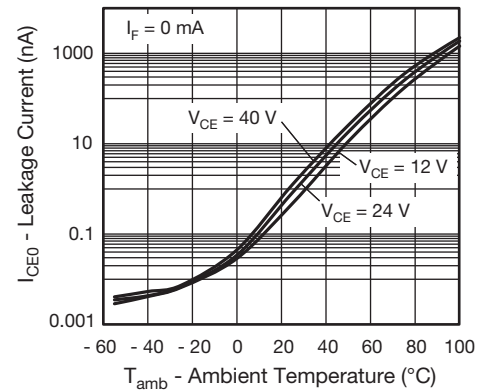


Fig. 6 - Leakage Current vs. Ambient Temperature

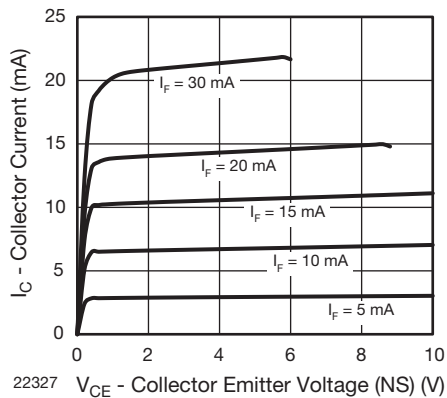


Fig. 5 - Collector Current vs. Collector Emitter Voltage (NS)

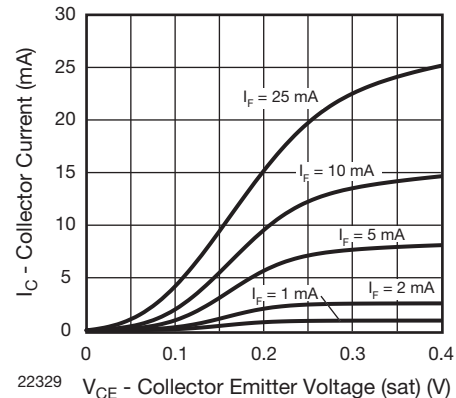


Fig. 7 - Collector Current vs. Collector Emitter Voltage (sat)



Fig. 8 - Normalized CTR (sat) vs. Ambient Temperature

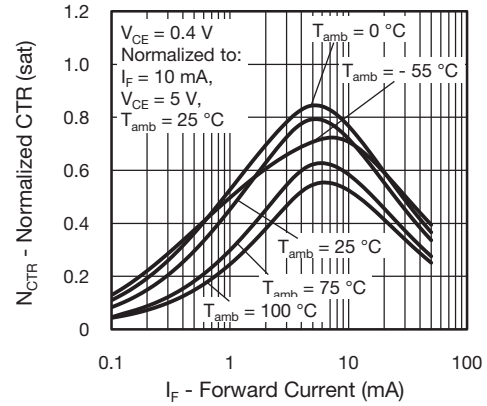


Fig. 11 - Normalized CTR (sat) vs. Forward Current

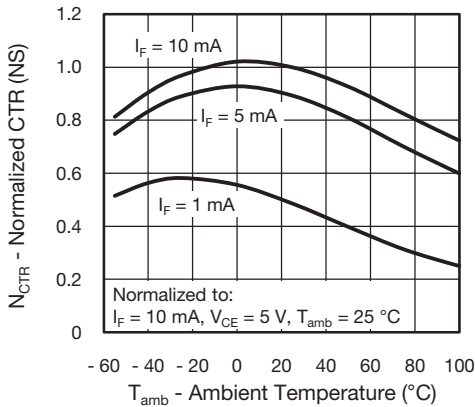


Fig. 9 - Normalized CTR (NS) vs. Ambient Temperature

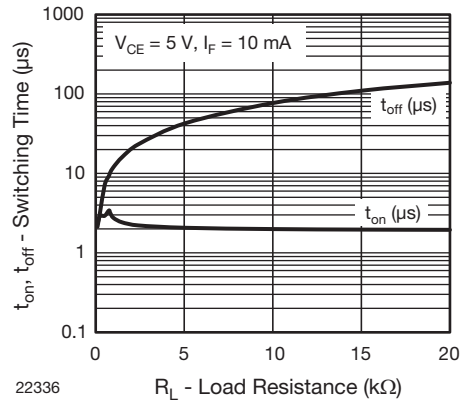


Fig. 12 - Switching Time vs. Load Resistance

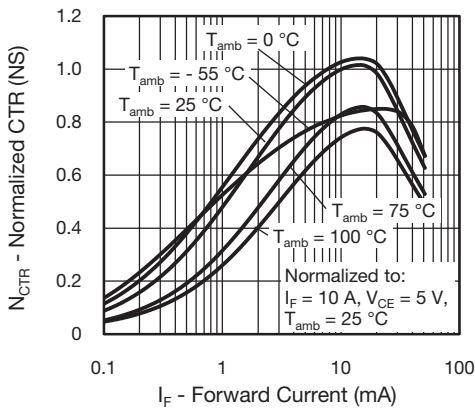


Fig. 10 - Normalized CTR (NS) vs. Forward Current

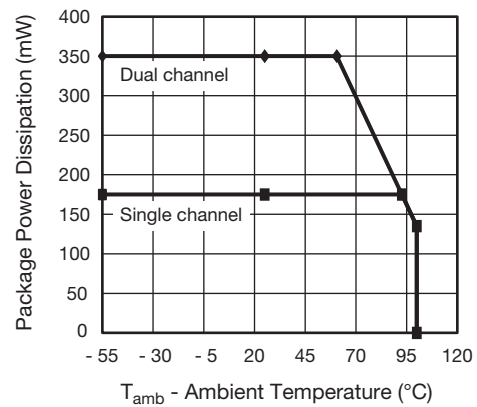


Fig. 13 - Power Dissipation vs. Ambient Temperature

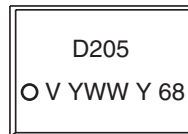


## PACKAGE DIMENSIONS in millimeters



i178020

## PACKAGE MARKING (example)



21764-105

### Note

- Tape and reel suffix (T) is not part of the package marking.



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