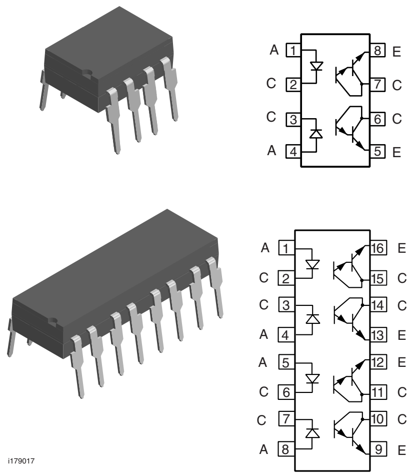
Optocoupler, Photodarlington Output, High Gain (Dual, Quad Channel)



FEATURES

- Isolation test voltage, 5300 V_{RMS}
- High isolation resistance, $10^{11}\Omega$ typical
- Low coupling capacitance
- Standard plastic DIP package
- Lead (Pb)-free component
- Component in accordance to RoHS 2002/95/EC and WEEE 2002/96/EC

Pb-free
e3
RoHS
COMPLIANT

AGENCY APPROVALS

- UL1577, file no. E52744 system code H or J, double protection
- DIN EN 60747-5-5 (VDE 0884) available with option 1
- BSI IEC 60950; IEC 60065

DESCRIPTION

The ILD32, ILQ32 are optically coupled isolators with a gallium arsenide infrared LED and a silicon photodarlington sensor. Switching can be achieved while maintaining a high degree of isolation between driving and load circuits.

These optocouplers can be used to replace reed and mercury relays with advantages of long life, high speed switching and elimination of magnetic fields.

ORDER INFORMATION	
PART	**REMARKS**
ILD32	CTR > 500 %, DIP-8
ILQ32	CTR > 500 %, DIP-16
ILD32-X006	CTR > 500 %, DIP-8 400 mil (option 6)
ILD32-X007	CTR > 500 %, SMD-8 (option 7)
ILD32-X009	CTR > 500 %, SMD-8 (option 9)
ILQ32-X007	CTR > 500 %, SMD-8 (option 7)
ILQ32-X009	CTR > 500 %, SMD-8 (option 9)

Note

For additional information on the available options refer to option information.

ABSOLUTE MAXIMUM RATINGS (1)					
PARAMETER	**TEST CONDITION**	**PART**	**SYMBOL**	**VALUE**	**UNIT**
INPUT					
Peak reverse voltage			V_R	3.	V
Forward continuous current			I_F	60	mA
Power dissipation			P_{diss}	100	mW
Derate linearly from 25°C				1.33	mW/°C
OUTPUT					
Collector emitter breakdown voltage			BV_{CEO}	30	V
Collector (load) current			I_C	125	mA
Power dissipation			P_{diss}	150	mW
Derate linearly from 25°C				2	mW/°C

ABSOLUTE MAXIMUM RATINGS [1]					
PARAMETER	**TEST CONDITION**	**PART**	**SYMBOL**	**VALUE**	**UNIT**
COUPLER					
Isolation test voltage between emitter and detector	t = 1.0 s		V_{ISO}	5300	V_{RMS}
Creepage distance				≥ 7	mm
Clearance distance				≥ 7	mm
Comparative tracking index per DIN IEC 112/VDE 0303, part 1			CTI	≥ 175	
Isolation resistance	V_{IO} = 500 V, T_{amb} = 25 °C		R_{IO}	10^{12}	Ω
	V_{IO} = 500 V, T_{amb} = 100 °C		R_{IO}	10^{11}	Ω
Total dissipation		ILD32	P_{tot}	400	mW
		ILQ32	P_{tot}	500	mW
Derate linearly from 25 °C		ILD32		5.33	mW/°C
		ILQ32		6.67	mW/°C
Storage temperature			T_{stg}	- 55 to + 150	°C
Operating temperature			T_{amb}	- 55 to + 100	°C
Lead soldering time at 260 °C				10	s

Notes

(1) T_{amb} = 25 °C, unless otherwise specified
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						
PARAMETER	**TEST CONDITION**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
INPUT						
Forward voltage	I_F = 10 mA	V_F		1.25	1.5	V
Reverse current	V_R = 3 V	I_R		0.1	100	pF
Capacitance	V_R = 0 V	C_O		25		pF
OUTPUT						
Collector emitter breakdown voltage	I_C = 100 µA, I_F = 0 A	BV_{CEO}	30			V
Breakdown voltage emitter collector	I_E = 100 µA	BC_{ECO}	5	10		V
Collector emitter leakage current	V_{CE} = 10 V, I_F = 0 A	I_{CEO}		1	100	nA
COUPLER						
Collector emitter	I_C = 2 mA, I_F = 8 mA	V_{CEsat}			1.0	V
Capacitance (input to output)		C_{IO}		0.5		pF

Note

T_{amb} = 25 °C, unless otherwise specified
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						
PARAMETER	**TEST CONDITION**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
Current transfer ratio	I_F = 10 mA, V_{CE} = 10 V	CTR	500			%

SWITCHING CHARACTERISTICS						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Turn-on time	V_{CC} = 10 V, I_F = 5 mA, R_L = 100 Ω	t_{on}		15		µs
Turn-off time	V_{CC} = 10 V, I_F = 5 mA, R_L = 100 Ω	t_{off}		30		µs

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}			10 000			V
V_{IORM}			890			V
P_{SO}					400	mW
I_{SI}					275	mA
T_{SI}					175	°C
Creepage distance	standard DIP-8		7			mm
Clearance distance	standard DIP-8		7			mm
Creepage distance	400 mil DIP-8		8			mm
Clearance distance	400 mil DIP-8		8			mm
Insulation thickness, reinforced rated	per IEC 60950 2.10.5.1		0.4			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 °C, unless otherwise specified

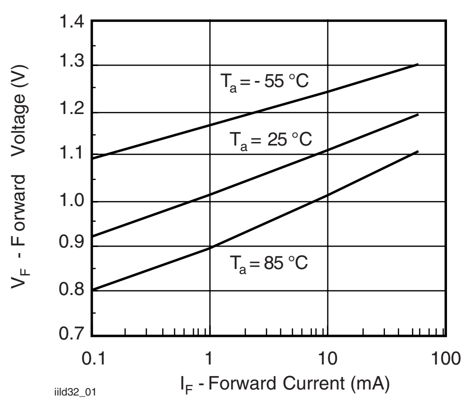


Fig. 1 - Forward Voltage vs. Forward Current

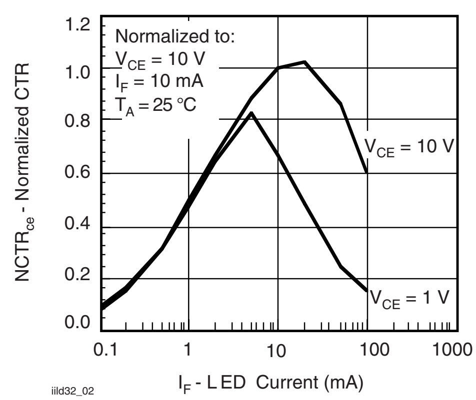


Fig. 2 - Normalized Non-saturated and Saturated CTR_{CE} vs. LED Current

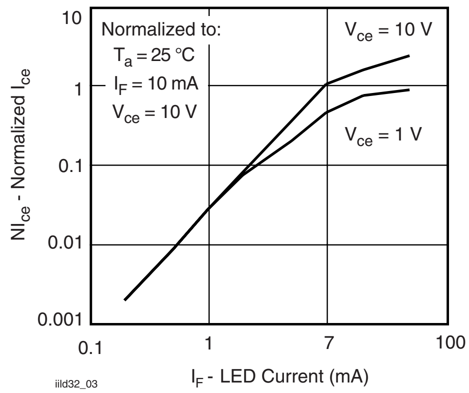


Fig. 3 - Normalized Non-Saturated and Saturated Collector Emitter Current vs. LED Current

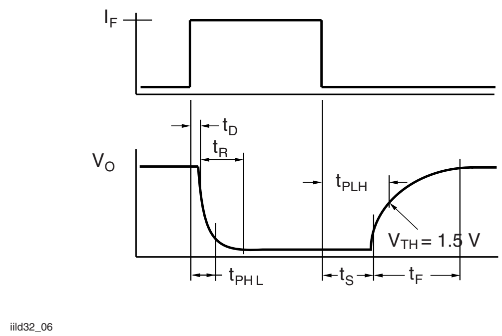


Fig. 6 - Switching Timing

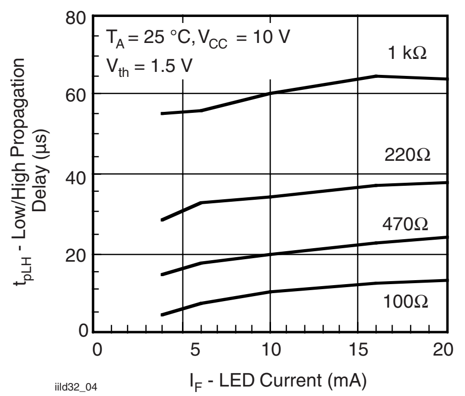


Fig. 4 - Low to High Propagation Delay vs. Collector Load Resistance and LED Current

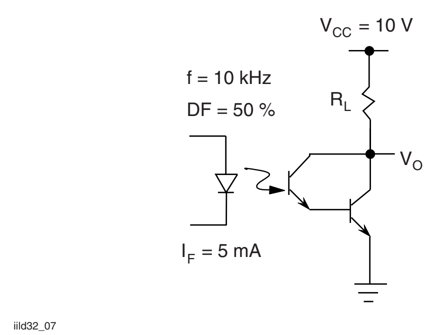


Fig. 7 - Switching Schematic

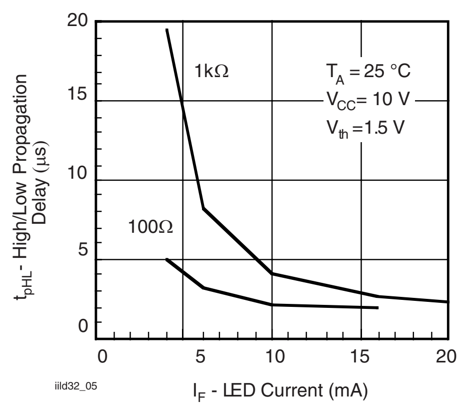
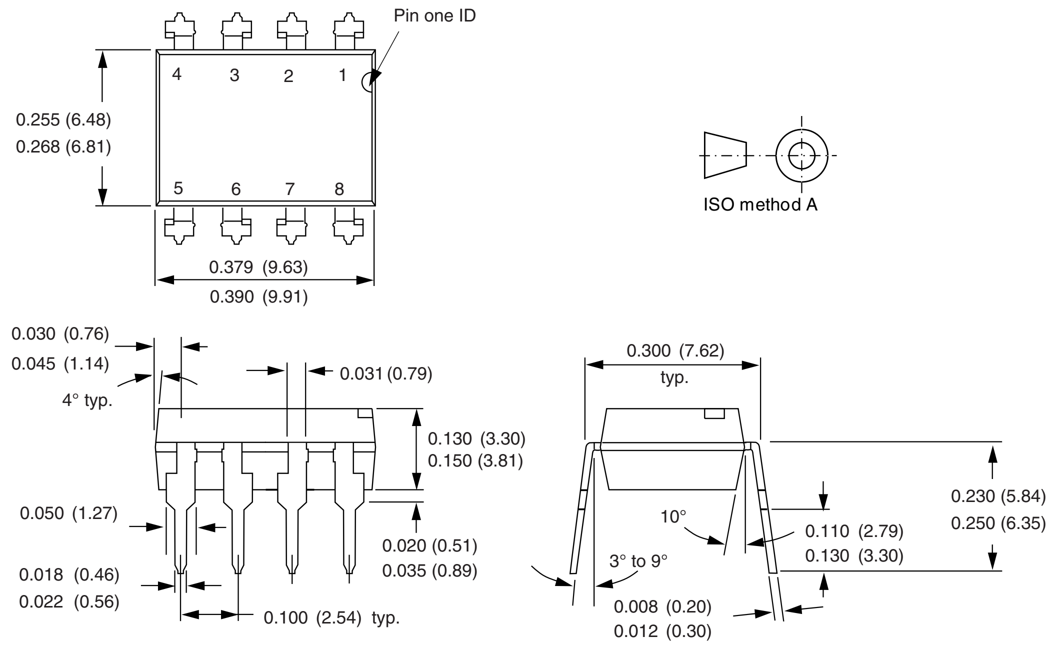
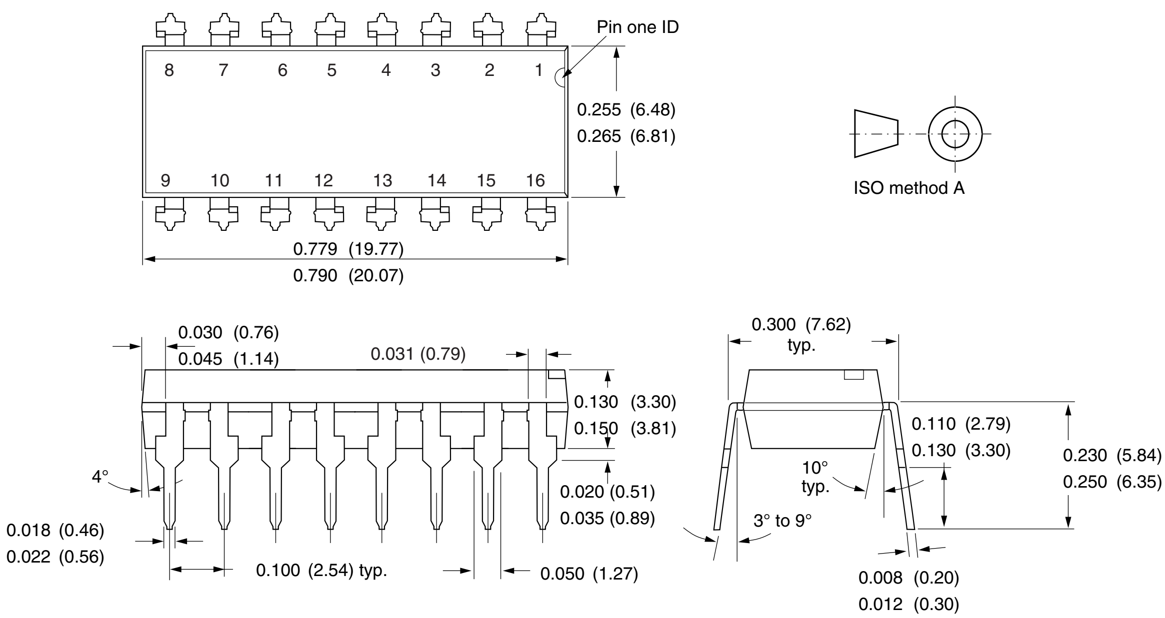


Fig. 5 - High to low Propagation Delay vs. Collector Load Resistance and LED Current

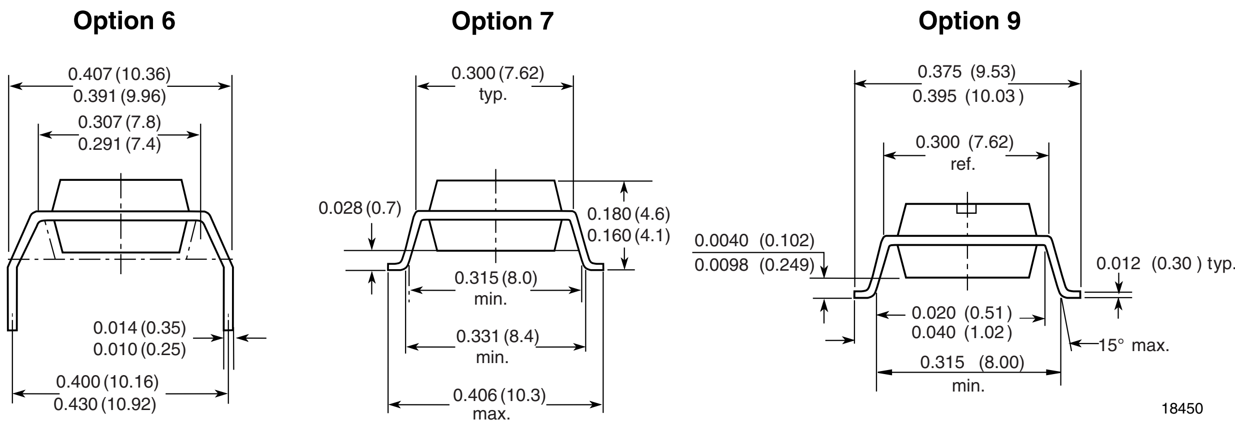
PACKAGE DIMENSIONS in Inches (millimeters)



i178006



i178007



Option 6
0.407 (10.36)
0.391 (9.96)
0.307 (7.8)
0.291 (7.4)
0.014 (0.35)
0.010 (0.25)
0.400 (10.16)
0.430 (10.92)
Option 7
0.300 (7.62)
typ.
0.028 (0.7)
0.180 (4.6)
0.160 (4.1)
0.315 (8.0)
min.
0.331 (8.4)
min.
0.406 (10.3)
max.
Option 9
0.375 (9.53)
0.395 (10.03)
0.300 (7.62)
ref.
0.0040 (0.102)
0.0098 (0.249)
0.012 (0.30) typ.
0.020 (0.51)
0.040 (1.02)
15° max.
0.315 (8.00)
min.
18450

OZONE DEPLETING SUBSTANCES POLICY STATEMENT

It is the policy of Vishay Semiconductor GmbH to

1. Meet all present and future national and international statutory requirements.
2. Regularly and continuously improve the performance of our products, processes, distribution and operating systems with respect to their impact on the health and safety of our employees and the public, as well as their impact on the environment.

It is particular concern to control or eliminate releases of those substances into the atmosphere which are known as ozone depleting substances (ODSs).

The Montreal Protocol (1987) and its London Amendments (1990) intend to severely restrict the use of ODSs and forbid their use within the next ten years. Various national and international initiatives are pressing for an earlier ban on these substances.

Vishay Semiconductor GmbH has been able to use its policy of continuous improvements to eliminate the use of ODSs listed in the following documents.

1. Annex A, B and list of transitional substances of the Montreal Protocol and the London Amendments respectively.
2. Class I and II ozone depleting substances in the Clean Air Act Amendments of 1990 by the Environmental Protection Agency (EPA) in the USA.
3. Council Decision 88/540/EEC and 91/690/EEC Annex A, B and C (transitional substances) respectively.

Vishay Semiconductor GmbH can certify that our semiconductors are not manufactured with ozone depleting substances and do not contain such substances.

Vishay Semiconductor GmbH, P.O.B. 3535, D-74025 Heilbronn, Germany

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