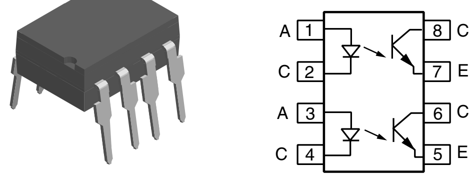
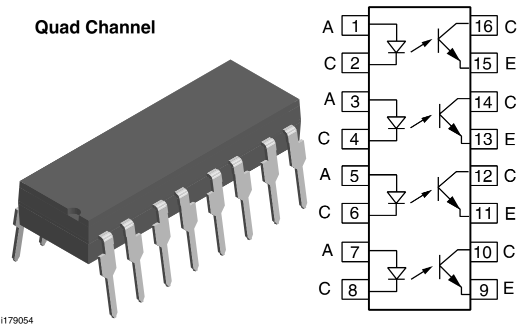
Optocoupler, Phototransistor Output (Dual, Quad Channel)

Dual Channel



Quad Channel



i179054

FEATURES

- Alternate source to TLP621-2/-4 and TLP621GB-2/-4
- High collector emitter voltage, BV_{CEO} = 70 V
- Dual and quad packages feature:
  - Lower pin and parts count
  - Better channel to channel CTR match
  - Improved common mode rejection
- Isolation test voltage, 5300 V_{RMS}
- 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 60747-5-2 (VDE 0884)/DIN EN 60747-5-5 pending available with option 1
- BSI IEC 60950; IEC 60065
- FIMKO

DESCRIPTION

The ILD621/ILQ621 and ILD621GB/ILQ621GB are multi-channel phototransistor optocouplers that use GaAs IRLED emitters and high gain NPN silicon phototransistors. These devices are constructed using double molded insulation technology. This assembly process offers a withstand test voltage of 7500 VDC.

The ILD621/ILQ621GB is well suited for CMOS interfacing given the CTR_{CEsat} of 30 % minimum at I_F of 1.0 mA. High gain linear operation is guaranteed by a minimum CTR_{CE} of 100 % at 5.0 mA. The ILD/Q621 has a guaranteed CTR_{CE} 50 % minimum at 5.0 mA. The transparent ion shield insures stable DC gain in applications such as power supply feedback circuits, where constant DC V_{IO} voltages are present.

ORDER INFORMATION	
PART	REMARKS
ILD621	CTR > 50 %, dual, DIP-8
ILD621GB	CTR > 100 %, dual, DIP-8
ILQ621	CTR > 50 %, quad, DIP-16
ILQ621GB	CTR > 100 %, quad, DIP-16
ILD621-X006	CTR > 50 %, dual, DIP-8 400 mil

ORDER INFORMATION	
PART	**REMARKS**
ILD621-X007	CTR > 50 %, dual, SMD-8 (option 7)
ILD621-X009	CTR > 50 %, dual, SMD-8 (option 9)
ILD621GB-X007	CTR > 100 %, dual, SMD-8 (option 7)
ILQ621-X006	CTR > 50 %, quad, DIP-16 400 mil
ILQ621-X007	CTR > 50 %, quad, SMD-16 (option 7)
ILQ621-X009	CTR > 50 %, quad, SMD-16 (option 9)
ILQ621GB-X006	CTR > 100 %, quad, DIP-16 400 mil
ILQ621GB-X007	CTR > 100 %, quad, SMD-16 (option 7)
ILQ621GB-X009	CTR > 100 %, quad, SMD-16 (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					
Reverse voltage			V_R	6.0	V
Forward current			I_F	60	mA
Surge current			I_{FSM}	1.5	A
Power dissipation			P_{diss}	100	mW
Derate from 25 °C				1.33	mW/°C
OUTPUT					
Collector emitter reverse voltage			V_{ECO}	70	V
Collector current			I_C	50	mA
	t < 1.0 ms		I_C	100	mA
Power dissipation			P_{diss}	150	mW
Derate from 25 °C				- 2.0	mW/°C
COUPLER					
Isolation test voltage	t = 1.0 s		V_{ISO}	5300	V_{RMS}
Package dissipation		ILD621		400	mW
		ILD621GB		400	mW
Derate from 25 °C				5.33	mW/°C
Package dissipation		ILQ621		500	mW
		ILQ621GB		500	mW
Derate from 25 °C				6.67	mW/°C
Creepage distance				≥ 7.0	mm
Clearance distance				≥ 7.0	mm
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
Storage temperature			T_{stg}	- 55 to + 150	°C
Operating temperature			T_{amb}	- 55 to + 100	°C
Junction temperature			T_j	100	°C
Soldering temperature (2)	2.0 mm from case bottom		T_{sld}	260	°C

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.

(2) Refer to reflow profile for soldering conditions for surface mounted devices (SMD). Refer to wave profile for soldering conditions for through hole devices (DIP).

ELECTRICAL CHARACTERISTICS

PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
INPUT							
Forward voltage	I_F = 10 mA		V_F	1.0	1.15	1.3	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		40		pF
Thermal resistance, junction to lead			R_{THJL}		750		K/W
OUTPUT							
Collector emitter capacitance	V_{CE} = 5.0 V, f = 1.0 MHz		C_{CE}		6.8		pF
Collector emitter leakage current	V_{CE} = 24 V		I_{CEO}		10	100	nA
			I_{CEO}		20	50	µA
Thermal resistance, junction to lead			R_{THJL}		500		K/W
COUPLER							
Capacitance (input to output)	V_{IO} = 0 V, f = 1.0 MHz		C_{IO}	0.8			pF
Insulation resistance	V_{IO} = 500 V			10^{12}			Ω
Channel to channel insulation				500			VAC
Collector emitter saturation voltage	I_F = 8.0 mA, I_{CE} = 2.4 mA	ILD621	V_{CEsat}			0.4	V
		ILQ621					
	I_F = 1.0 mA, I_{CE} = 0.2 mA	ILD621GB	V_{CEsat}			0.4	V
		ILQ621GB					

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	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
Channel/channel CTR match	I_F = 5.0 mA, V_{CE} = 5.0 V		CTRX/ CTRY	1 to 1		3 to 1	%
Current transfer ratio (collector emitter saturated)	I_F = 1.0 mA, V_{CE} = 0.4 V	ILD621	CTR_{CEsat}		60		%
		ILQ621	CTR_{CEsat}		60		%
		ILD621GB	CTR_{CEsat}	30			%
		ILQ621GB	CTR_{CEsat}	30			%
Current transfer ratio (collector emitter)	I_F = 5.0 mA, V_{CE} = 5.0 V	ILD621	CTR_{CE}	50	80	600	%
		ILQ621	CTR_{CE}	50	80	600	%
		ILD621GB	CTR_{CE}	100	200	600	%
		ILQ621GB	CTR_{CE}	100	200	600	%

SWITCHING CHARACTERISTICS

PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
NON-SATURATED						
On time	I_F = ± 10 mA, V_{CC} = 5.0 V, R_L = 75 Ω, 50 % of V_{PP}	t_{on}		3.0		µs
Rise time	I_F = ± 10 mA, V_{CC} = 5.0 V, R_L = 75 Ω, 50 % of V_{PP}	t_r		2.0		µs
Off time	I_F = ± 10 mA, V_{CC} = 5.0 V, R_L = 75 Ω, 50 % of V_{PP}	t_{off}		2.3		µs
Fall time	I_F = ± 10 mA, V_{CC} = 5.0 V, R_L = 75 Ω, 50 % of V_{PP}	t_f		2.0		µs
Propagation H to L	I_F = ± 10 mA, V_{CC} = 5.0 V, R_L = 75 Ω, 50 % of V_{PP}	t_{PHL}		1.1		µs
Propagation L to H	I_F = ± 10 mA, V_{CC} = 5.0 V, R_L = 75 Ω, 50 % of V_{PP}	t_{PLH}		2.5		µs

SWITCHING CHARACTERISTICS						
PARAMETER	**TEST CONDITION**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
SATURATED						
On time	I_F = ± 10 mA, V_{CC} = 5.0 V, R_L = 1 kΩ, V_{TH} = 1.5 V	t_{on}		4.3		µs
Rise time	I_F = ± 10 mA, V_{CC} = 5.0 V, R_L = 1 kΩ, V_{TH} = 1.5 V	t_r		2.8		µs
Off time	I_F = ± 10 mA, V_{CC} = 5.0 V, R_L = 1 kΩ, V_{TH} = 1.5 V	t_{off}		2.5		µs
Fall time	I_F = ± 10 mA, V_{CC} = 5.0 V, R_L = 1 kΩ, V_{TH} = 1.5 V	t_f		11		µs
Propagation H to L	I_F = ± 10 mA, V_{CC} = 5.0 V, R_L = 1 kΩ, V_{TH} = 1.5 V	t_{PHL}		2.6		µs
Propagation L to H	I_F = ± 10 mA, V_{CC} = 5.0 V, R_L = 1 kΩ, V_{TH} = 1.5 V	t_{PLH}		7.2		µs

COMMON MODE TRANSIENT IMMUNITY						
PARAMETER	**TEST CONDITION**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
Common mode rejection, output high	V_{CM} = 50 V_{P-P}, R_L = 1.0 kΩ, I_F = 0 mA	CM_H		5000		V/µs
Common mode rejection, output low	V_{CM} = 50 V_{P-P}, R_L = 1.0 kΩ, I_F = 10 mA	CM_L		5000		V/µs

TYPICAL CHARACTERISTICS

T_{amb} = 25 °C, unless otherwise specified

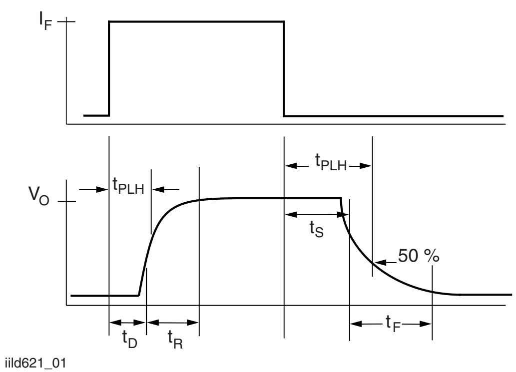


Fig. 1 - Non-Saturated Switching Timing

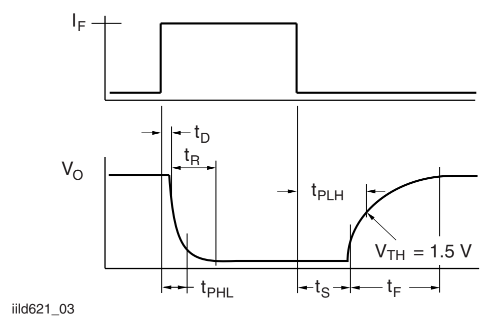


Fig. 3 - Saturated Switching Timing

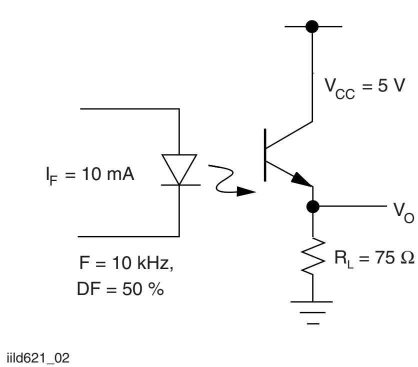


Fig. 2 - Non-Saturated Switching Timing

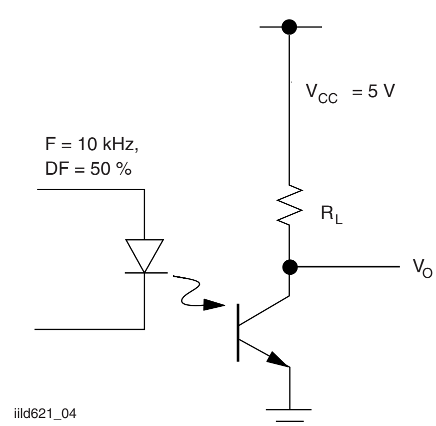


Fig. 4 - Saturated Switching Timing

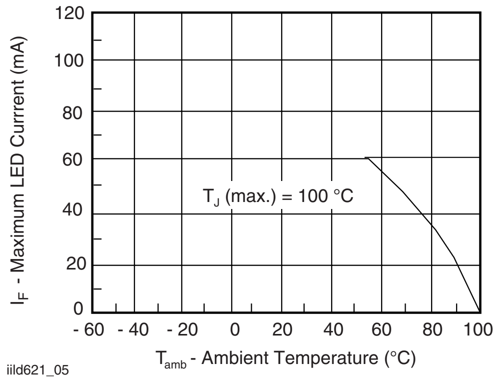


Fig. 5 - Maximum LED Current vs. Ambient Temperature

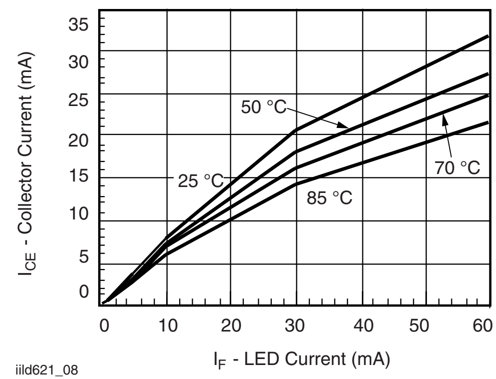


Fig. 8 - Collector Emitter Current vs. Temperature and LED Current

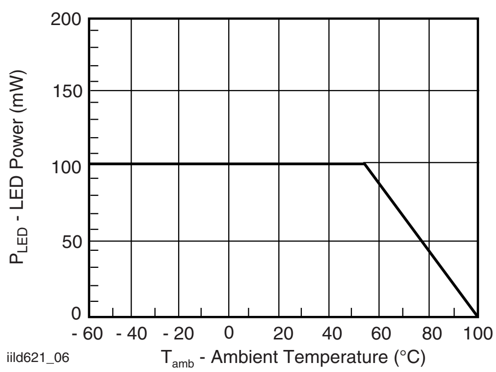


Fig. 6 - Maximum LED Power Dissipation

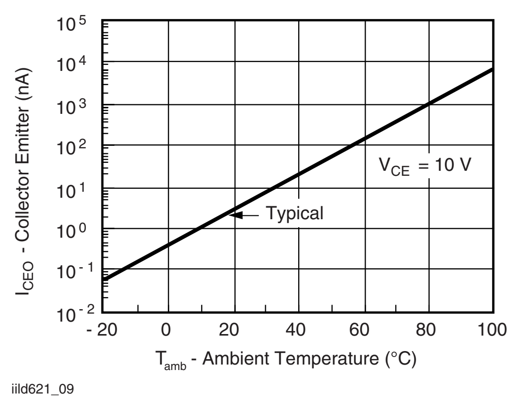


Fig. 9 - Collector Emitter Leakage vs. Temperature

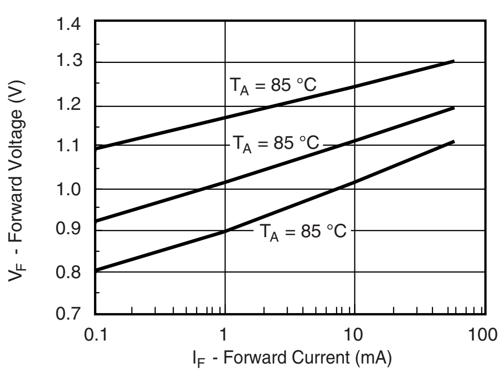


Fig. 7 - Forward Voltage vs. Forward Current

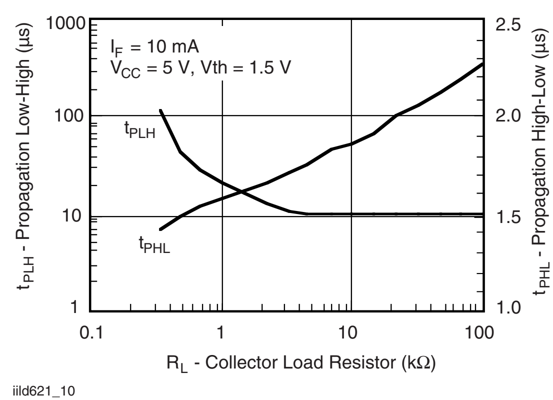


Fig. 10 - Propagation Delay vs. Collector Load Resistor

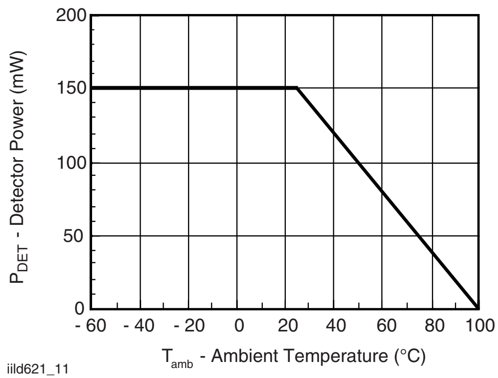


Fig. 11 - Maximum Detector Power Dissipation

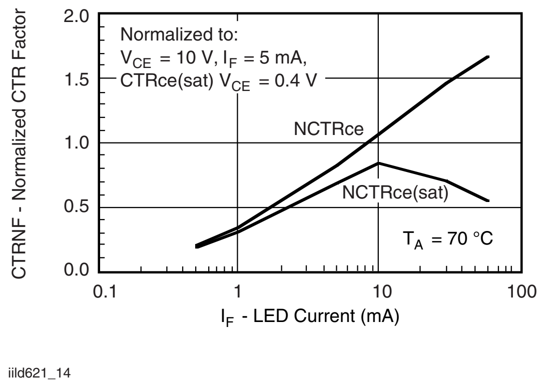


Fig. 14 - Normalization Factor for Non-Saturated and Saturated CTR vs. I_F

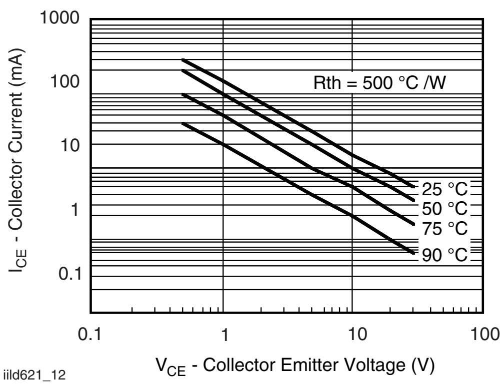


Fig. 12 - Maximum Collector Current vs. Collector Voltage

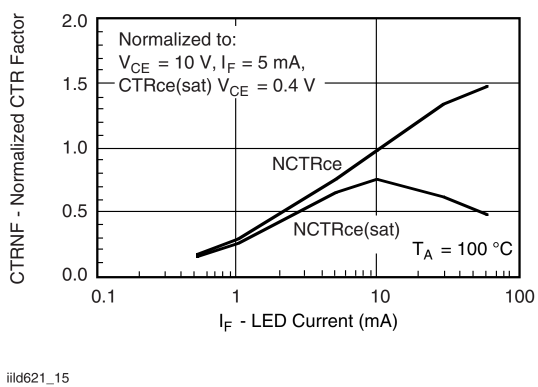


Fig. 15 - Normalization Factor for Non-Saturated and Saturated CTR vs. I_F

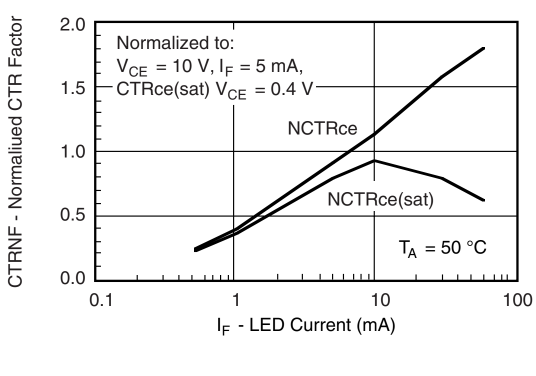
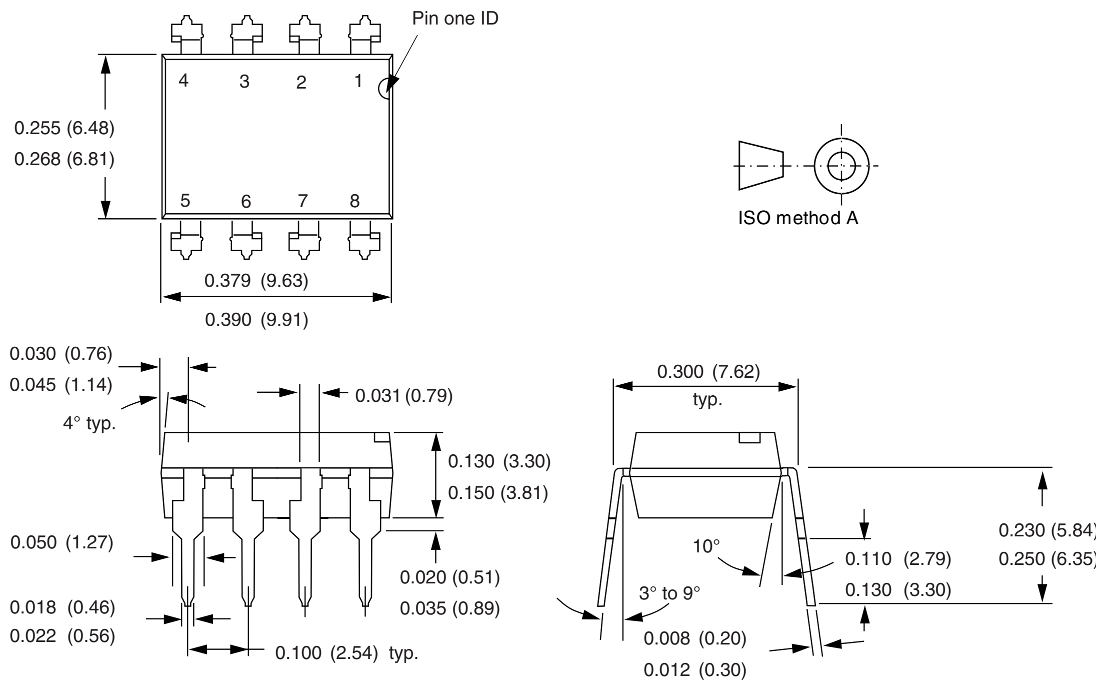


Fig. 13 - Normalization Factor for Non-Saturated and Saturated CTR vs. I_F

PACKAGE DIMENSIONS in inches (millimeters)



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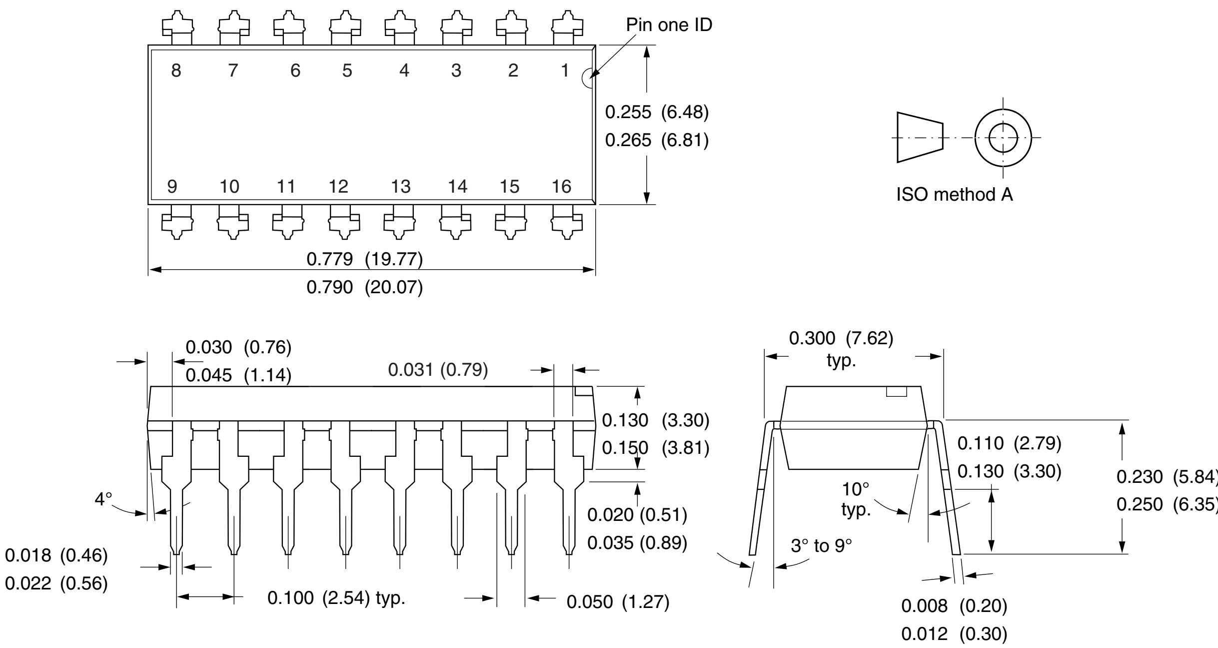

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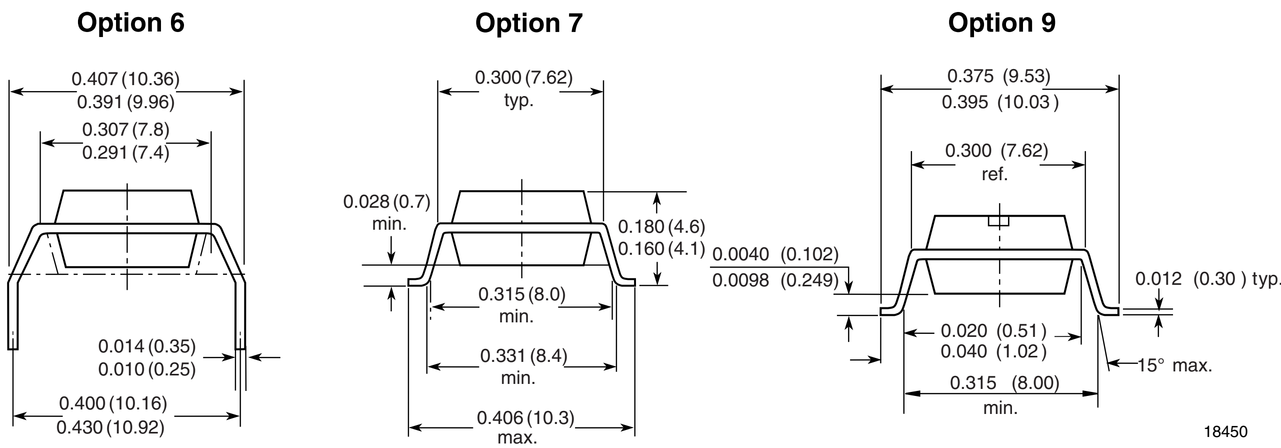
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0.391 (9.96)
0.307 (7.8)
0.291 (7.4)
0.014 (0.35)
0.010 (0.25)
0.400 (10.16)
0.430 (10.92)
Option 7
0.300 (7.62)
typ.
0.028 (0.7)
min.
0.180 (4.6)
0.160 (4.1)
0.315 (8.0)
min.
0.331 (8.4)
min.
0.406 (10.3)
max.
Option 9
0.375 (9.53)
0.395 (10.03)
0.300 (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

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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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