

Optocoupler, Phototransistor Output, AC Input (Dual, Quad Channel)

Features

- Identical Channel to Channel Footprint
- ILD620 Crosses to TLP620-2
- ILQ620 Crosses to TLP620-4
- High Collector-Emitter Voltage, $BV_{CEO} = 70\text{ V}$
- Dual and Quad Packages Feature:
 - Reduced Board Space
 - Lower Pin and Parts Count
 - Better Channel to Channel CTR Match
 - Improved Common Mode Rejection
- Isolation Test Voltage 5300 V_{RMS}

Agency Approvals

- UL File #E52744 System Code H or J
- CSA 93751
- DIN EN 60747-5-2(VDE0884)
DIN EN 60747-5-5 pending
Available with Option 1
- BSI IEC60950 IEC60965

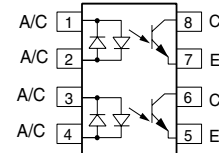
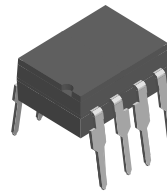
Description

The ILD620/ ILQ620 and ILD620GB/ ILQ620GB are multi-channel input phototransistor optocouplers that use inverse parallel GaAs IRLED emitter and high

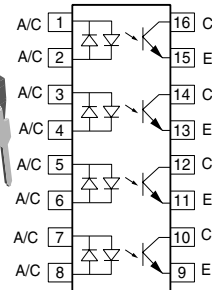
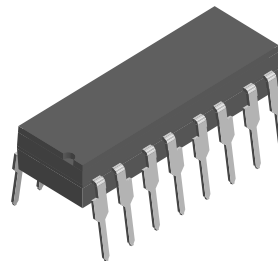
gain NPN silicon phototransistors per channel. These devices are constructed using over/under leadframe optical coupling and double molded insulation resulting in a withstand test voltage of 5300 V_{RMS} .

The LED parameters and the linear CTR characteristics make these devices well suited for AC voltage detection. the ILD/Q620GB with its low I_F guaranteed CTR_{CEsat} minimizes power dissipation of the AC voltage detection network that is placed in series with the LEDs. Eliminating the phototransistor base connection provides added electrical noise immunity from the transients found in many industrial control environments.

Dual Channel



Quad Channel



1179053

Order Information

Part	Remarks
ILD620	CTR > 50 %, DIP-8
ILD620GB	CTR > 100 %, DIP-8
ILQ620	CTR > 50 %, DIP-16
ILQ620GB	CTR > 100 %, DIP-16
ILD620-X007	CTR > 50 %, SMD-8 (option 7)
ILD620-X009	CTR > 50 %, SMD-8 (option 9)
ILD620GB-X009	CTR > 100 %, SMD-8 (option 9)
ILQ620-X009	CTR > 50 %, SMD-16 (option 9)
ILQ620GB-X009	CTR > 100 %, SMD-16 (option 9)

For additional information on the available options refer to Option Information.

Absolute Maximum Ratings

$T_{amb} = 25\text{ }^{\circ}\text{C}$, 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 Rating for extended periods of the time can adversely affect reliability.

Input

Parameter	Test condition	Symbol	Value	Unit
Forward current		I_F	± 60	mA
Surge current		I_{FSM}	± 1.5	A
Power dissipation		P_{diss}	100	mW
Derate linearly from 25 °C			1.3	mW/°C

Output

Parameter	Test condition	Symbol	Value	Unit
Collector-emitter breakdown voltage		BV_{CEO}	70	V
Collector current		I_C	50	mA
	$t < 1.0\text{ sec.}$	I_C	100	mA
Power dissipation		P_{diss}	150	mW
Derate from 25 °C			2.0	mW/°C

Coupler

Parameter	Test condition	Part	Symbol	Value	Unit
Isolation test voltage	$t = 1.0\text{ sec.}$		V_{ISO}	5300	V_{RMS}
Package dissipation		ILD620		400	mW
		ILD620GB		400	mW
Derate from 25 °C				5.33	mW/°C
Package dissipation		ILQ620		500	mW
		ILQ620GB		500	mW
Derate from 25 °C				6.67	mW/°C
Creepage				≥ 7.0	mm
Clearance				≥ 7.0	mm
Isolation resistance	$V_{IO} = 500\text{ V}, T_{amb} = 25\text{ }^{\circ}\text{C}$		R_{IO}	$\geq 10^{12}$	Ω
	$V_{IO} = 500\text{ V}, T_{amb} = 100\text{ }^{\circ}\text{C}$		R_{IO}	$\geq 10^{11}$	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	2.0 mm from case bottom		T_{sld}	260	°C



Electrical Characteristics

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.

Input

Parameter	Test condition	Symbol	Min	Typ.	Max	Unit
Forward voltage	I _F = ± 10 mA	V _F	1.0	1.15	1.3	V
Forward current	V _R = ± 0.7 V	I _F		2.5	20	μA
Capacitance	V _F = 0 V, f = 1.0 MHz	C _O		25		pF
Thermal resistance, junction to lead		R _{THJL}		750		K/W

Output

Parameter	Test condition	Symbol	Min	Typ.	Max	Unit
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
	T _A = 85 °C, V _{CE} = 24 V	I _{CEO}		2.0	50	μA
Thermal resistance, junction to lead		R _{THJL}		500		K/W

Coupler

Parameter	Test condition	Part	Symbol	Min	Typ.	Max	Unit
Off-state collector current	V _F = ± 0.7 V, V _{CE} = 24 V		I _{CE(OFF)}		1.0	10	μA
Collector-emitter saturation voltage	I _F = ± 8.0 mA, I _{CE} = 2.4 mA	ILD620	V _{CEsat}			0.4	V
		ILQ620	V _{CEsat}			0.4	V
	I _F = ± 1.0 mA, I _{CE} = 0.2 mA	ILD620GB	V _{CEsat}			0.4	V
		ILQ620GB	V _{CEsat}			0.4	V

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		CTR _X /CTR _Y	1 to 1		3 to 1	
CTR symmetry	I _{CE} (I _F = - 5.0 mA)/ I _{CE} (I _F = + 5.0 mA)		I _{CE} (RATIO)	0.5		2.0	
Current Transfer Ratio (collector-emitter saturated)	I _F = ± 1.0 mA, V _{CE} = 0.4 V	ILD620	CTR _{CEsat}		60		%
		ILQ620	CTR _{CEsat}		60		%
Current Transfer Ratio (collector-emitter)	I _F = ± 5.0 mA, V _{CE} = 5.0 V	ILD620	CTR _{CE}	50	80	600	%
		ILQ620	CTR _{CE}	50	80	600	%
Current Transfer Ratio (collector-emitter saturated)	I _F = ± 1.0 mA, V _{CE} = 0.4 V	ILD620GB	CTR _{CEsat}	30			%
		ILQ620GB	CTR _{CEsat}	30			%
Current Transfer Ratio (collector-emitter)	I _F = ± 5.0 mA, V _{CE} = 5.0 V	ILD620GB	CTR _{CE}	100	200	600	%
		ILQ620GB	CTR _{CE}	100	200	600	%

Switching Characteristics

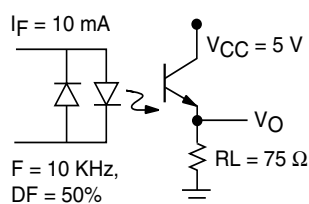
Non-saturated

Parameter	Test condition	Symbol	Min	Typ.	Max	Unit
On time	$I_F = \pm 10 \text{ mA}$, $V_{CC} = 5.0 \text{ V}$, $R_L = 75 \Omega$, 50 % of V_{PP}	t_{on}		3.0		μs
Rise time	$I_F = \pm 10 \text{ mA}$, $V_{CC} = 5.0 \text{ V}$, $R_L = 75 \Omega$, 50 % of V_{PP}	t_r		20		μs
Off time	$I_F = \pm 10 \text{ mA}$, $V_{CC} = 5.0 \text{ V}$, $R_L = 75 \Omega$, 50 % of V_{PP}	t_{off}		2.3		μs
Fall time	$I_F = \pm 10 \text{ mA}$, $V_{CC} = 5.0 \text{ V}$, $R_L = 75 \Omega$, 50 % of V_{PP}	t_f		2.0		μs
Propagation H-L	$I_F = \pm 10 \text{ mA}$, $V_{CC} = 5.0 \text{ V}$, $R_L = 75 \Omega$, 50 % of V_{PP}	t_{PHL}		1.1		μs
Propagation L-H	$I_F = \pm 10 \text{ mA}$, $V_{CC} = 5.0 \text{ V}$, $R_L = 75 \Omega$, 50 % of V_{PP}	t_{PLH}		2.5		μs

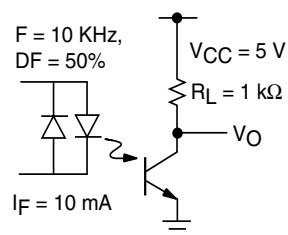
Saturated

Parameter	Test condition	Symbol	Min	Typ.	Max	Unit
On time	$I_F = \pm 10 \text{ mA}$, $V_{CC} = 5.0 \text{ V}$, $R_L = 1.0 \text{ K}\Omega$, $V_{TH} = 1.5 \text{ V}$	t_{on}		4.3		μs
Rise time	$I_F = \pm 10 \text{ mA}$, $V_{CC} = 5.0 \text{ V}$, $R_L = 1.0 \text{ K}\Omega$, $V_{TH} = 1.5 \text{ V}$	t_r		2.8		μs
Off time	$I_F = \pm 10 \text{ mA}$, $V_{CC} = 5.0 \text{ V}$, $R_L = 1.0 \text{ K}\Omega$, $V_{TH} = 1.5 \text{ V}$	t_{off}		2.5		μs
Fall time	$I_F = \pm 10 \text{ mA}$, $V_{CC} = 5.0 \text{ V}$, $R_L = 1.0 \text{ K}\Omega$, $V_{TH} = 1.5 \text{ V}$	t_f		11		μs
Propagation H-L	$I_F = \pm 10 \text{ mA}$, $V_{CC} = 5.0 \text{ V}$, $R_L = 1.0 \text{ K}\Omega$, $V_{TH} = 1.5 \text{ V}$	t_{PHL}		2.6		μs
Propagation L-H	$I_F = \pm 10 \text{ mA}$, $V_{CC} = 5.0 \text{ V}$, $R_L = 1.0 \text{ K}\Omega$, $V_{TH} = 1.5 \text{ V}$	t_{PLH}		7.2		μs

Typical Characteristics ($T_{amb} = 25 \text{ }^\circ\text{C}$ unless otherwise specified)



ild620_01



ild620_02

Fig. 1 Non-saturated Switching Timing

Fig. 2 Saturated Switching Timing

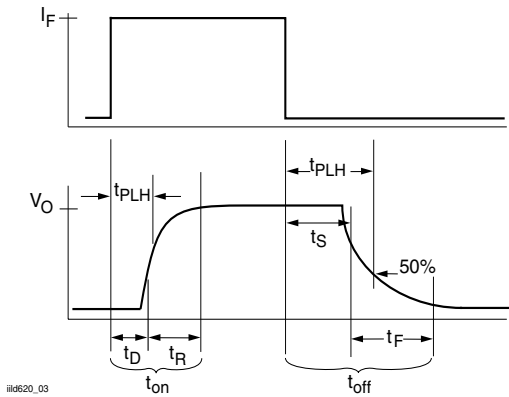


Fig. 3 Non-saturated Switching Timing

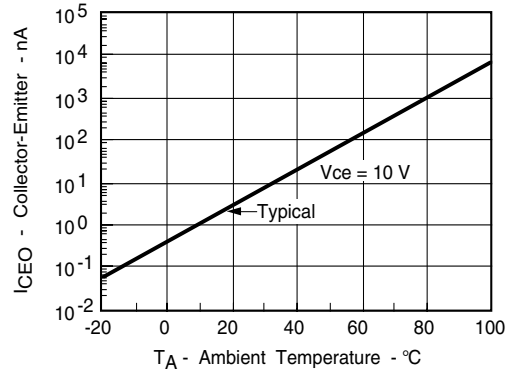


Fig. 6 Collector-Emitter Leakage vs. Temperature

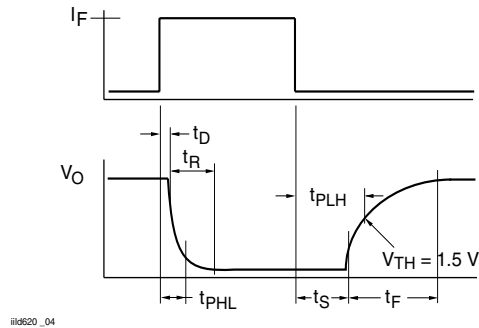


Fig. 4 Saturated Switching Timing

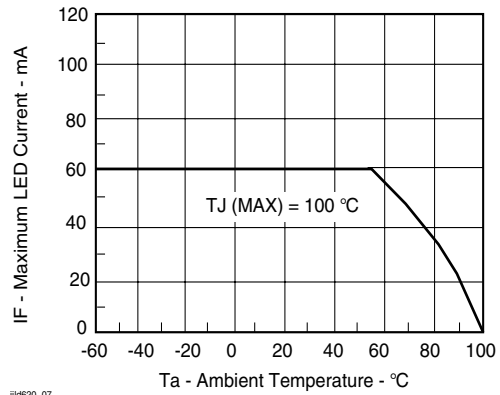


Fig. 7 Maximum LED Current vs. Ambient Temperature

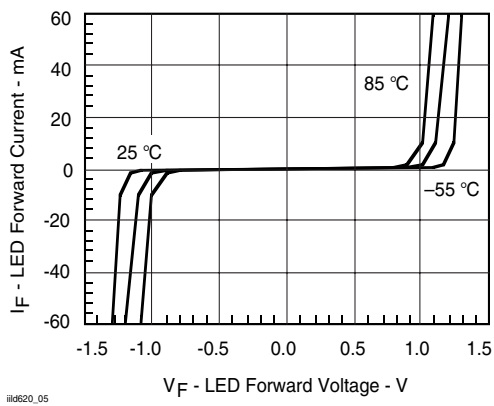


Fig. 5 LED Forward Current vs. Forward Voltage

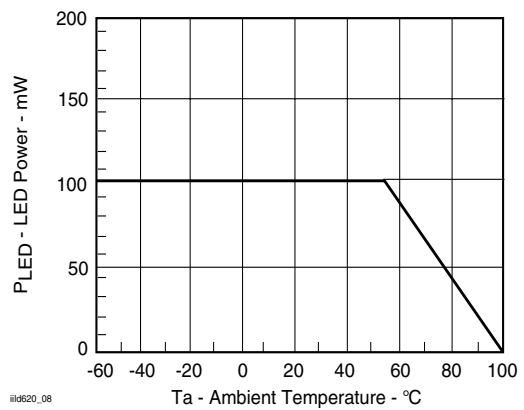
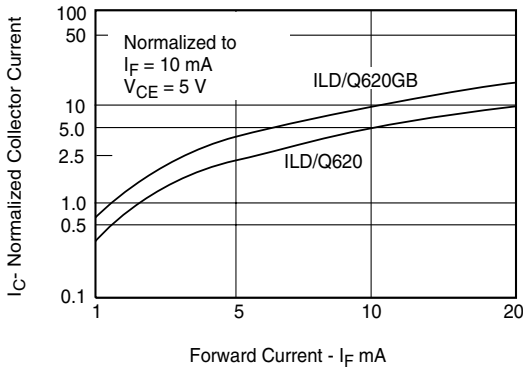
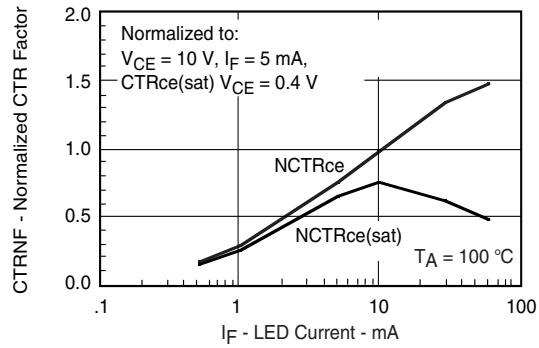


Fig. 8 Maximum LED Power Dissipation



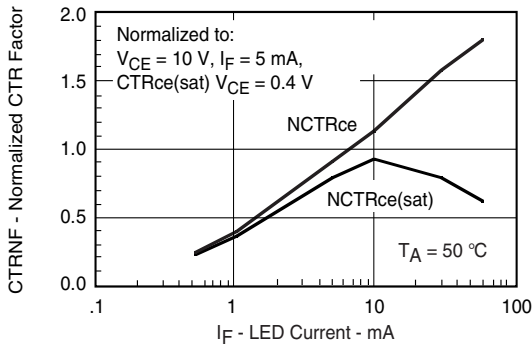
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Fig. 9 Collector Current vs. Diode Forward Current



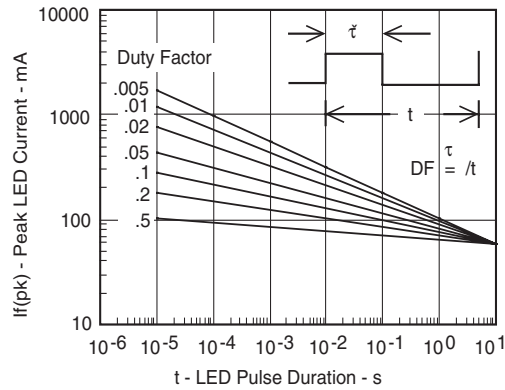
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Fig. 12 Normalization Factor for Non-saturated and Saturated CTR vs. I_F



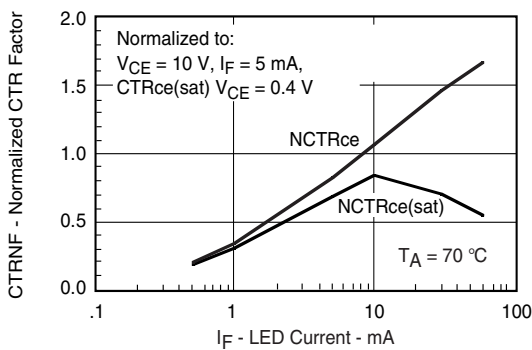
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Fig. 10 Normalization Factor for Non-saturated and Saturated CTR vs. I_F



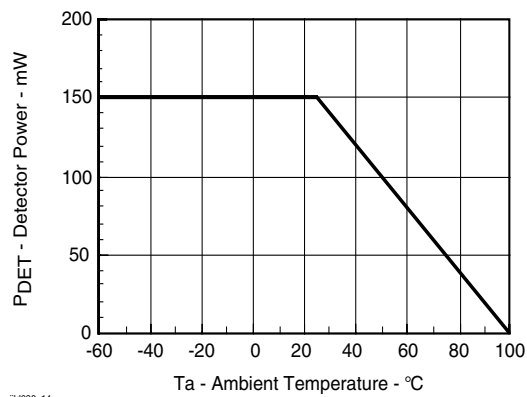
ild620_13

Fig. 13 Peak LED Current vs. Pulse Duration, Tau



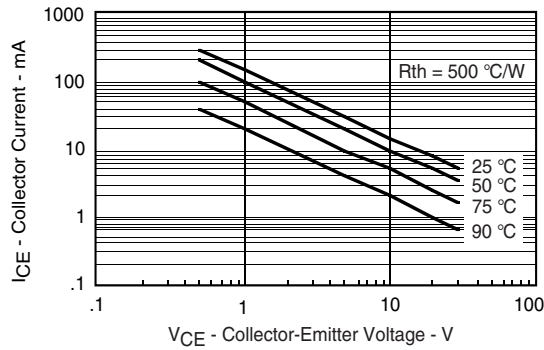
ild620_11

Fig. 11 Normalization Factor for Non-saturated and Saturated CTR vs. I_F



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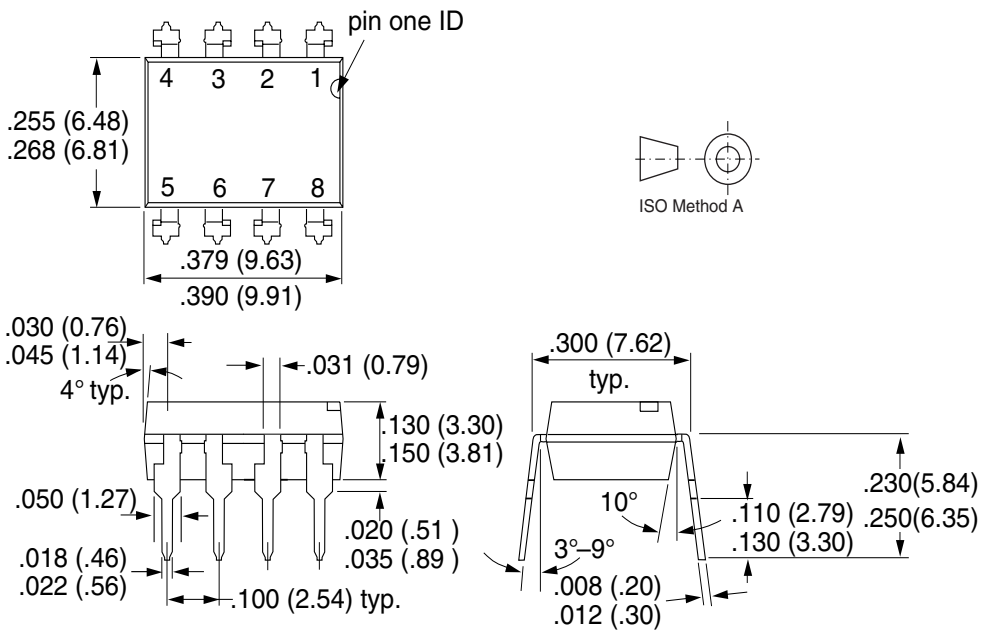
Fig. 14 Maximum Detector Power Dissipation



ild620_15

Fig. 15 Maximum Collector Current vs. Collector Voltage

Package Dimensions in Inches (mm)

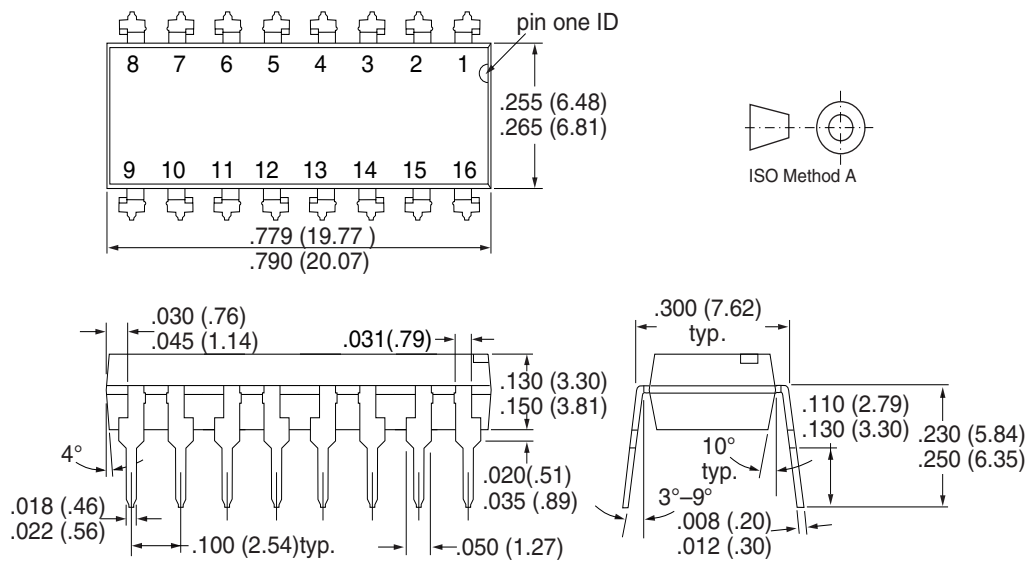


ILD620/ 620GB / ILQ620/ 620GB

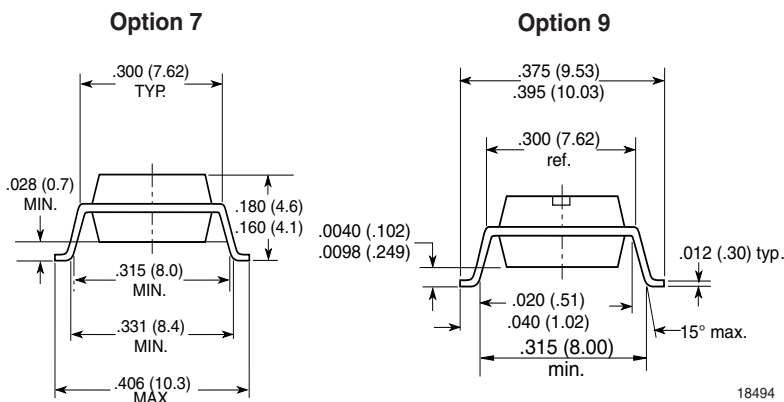


Vishay Semiconductors

Package Dimensions in Inches (mm)



i178007





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.

**We reserve the right to make changes to improve technical design
and may do so without further notice.**

Parameters can vary in different applications. All operating parameters must be validated for each customer application by the customer. Should the buyer use Vishay Semiconductors products for any unintended or unauthorized application, the buyer shall indemnify Vishay Semiconductors against all claims, costs, damages, and expenses, arising out of, directly or indirectly, any claim of personal damage, injury or death associated with such unintended or unauthorized use.

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