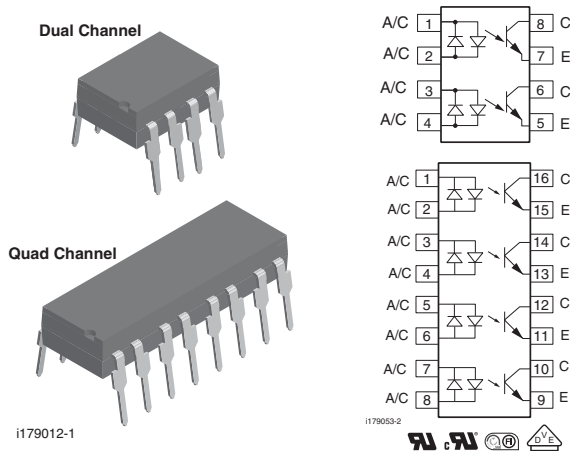


Optocoupler, Phototransistor Output, AC Input (Dual, Quad Channel)



DESCRIPTION

The ILD620, ILQ620, ILD620GB, and 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 ILD620GB and ILQ620GB with its low I_F guaranteed CTR_{CEsat} minimizes power dissipation of the A_C 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.

FEATURES

- Identical channel to channel footprint
- ILD620 crosses to TLP620-2
- ILQ620 crosses to TLP620-4
- High collector emitter voltage, BV_{CEO} = 70 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}
- Compliant to RoHS Directive 2002/95/EC and in accordance to WEEE 2002/96/EC

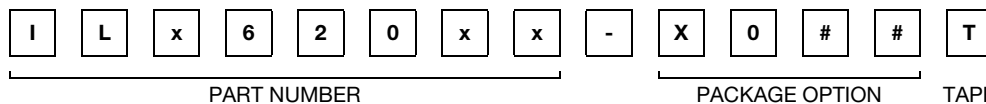


RoHS
COMPLIANT

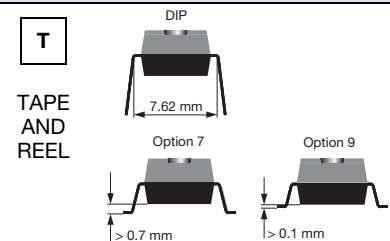
AGENCY APPROVALS

- UL1577, file no. E52744 system code H, double protection
- cUL tested to CSA 22.2 bulletin 5A
- DIN EN 60747-5-2 (VDE 0884)/DIN EN 60747-5-5 pending available with option 1
- FIMKO

ORDERING INFORMATION



x = D (Dual) or Q (Quad)



AGENCY CERTIFIED/PACKAGE	DUAL CHANNEL		QUAD CHANNEL	
	CTR (%)			
UL, cUL, FIMKO	50 to 600	100 to 600	50 to 600	100 to 600
DIP-8	ILD620	ILD620GB	-	-
SMD-8, option 7	ILD620-X007T ⁽¹⁾	-	-	-
SMD-8, option 9	ILD620-X009T ⁽¹⁾	ILD620GB-X009T ⁽¹⁾	-	-
DIP-16	-	-	ILQ620	ILQ620GB
SMD-16, option 7	-	-	ILQ620-X007	-
SMD-16, option 9	-	-	ILQ620-X009T ⁽¹⁾	ILQ620GB-X009T ⁽¹⁾
VDE, UL, cUL, FIMKO	50 to 600	100 to 600	50 to 600	100 to 600
DIP-16	-	-	ILQ620-X001	-
SMD-16, option 9	-	-	ILQ620-X019T ⁽¹⁾	-

Notes

- Additional options may be possible, please contact sales office.
- (1) Also available in tubes, do not put T on the end.



ABSOLUTE MAXIMUM RATINGS ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified)					
PARAMETER	TEST CONDITION	PART	SYMBOL	VALUE	UNIT
INPUT					
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					
Collector emitter breakdown voltage			BV_{CEO}	70	V
Collector current			I_C	50	mA
	$t < 1\text{ s}$		I_C	100	mA
Power dissipation			P_{diss}	150	mW
Derate from 25 °C				2	mW/°C
COUPLER					
Isolation test voltage	$t = 1\text{ s}$		V_{ISO}	5300	V_{RMS}
Isolation voltage			V_{IORM}	890	V_P
Total power dissipation			P_{tot}	250	mW
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 distance				≥ 7	mm
Clearance distance				≥ 7	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 ⁽¹⁾	2 mm from case bottom		T_{sld}	260	°C

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.
- ⁽¹⁾ 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 ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified)							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
INPUT							
Forward voltage	$I_F = \pm 10\text{ mA}$		V_F	1	1.15	1.3	V
Forward current	$V_R = \pm 0.7\text{ V}$		I_F		2.5	20	μA
Capacitance	$V_F = 0\text{ V}, f = 1\text{ MHz}$		C_O		25		pF
Thermal resistance, junction to lead			R_{thJL}		750		K/W
OUTPUT							
Collector emitter capacitance	$V_{CE} = 5\text{ V}, f = 1\text{ MHz}$		C_{CE}		6.8		pF
Collector emitter leakage current	$V_{CE} = 24\text{ V}$		I_{CEO}		10	100	nA
	$T_A = 85\text{ }^{\circ}\text{C}, V_{CE} = 24\text{ V}$		I_{CEO}		2	50	μA
Thermal resistance, junction to lead			R_{thJL}		500		K/W



ELECTRICAL CHARACTERISTICS ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified)							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
COUPLER							
Off-state collector current	$V_F = \pm 0.7\text{ V}$, $V_{CE} = 24\text{ V}$		I_{CEoff}		1	10	μA
Collector emitter saturation voltage	$I_F = \pm 8\text{ mA}$, $I_{CE} = 2.4\text{ mA}$	ILD620	V_{CEsat}			0.4	V
		ILQ620	V_{CEsat}			0.4	V
	$I_F = \pm 1\text{ mA}$, $I_{CE} = 0.2\text{ mA}$	ILD620GB	V_{CEsat}			0.4	V
		ILQ620GB	V_{CEsat}			0.4	V

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.

CURRENT TRANSFER RATIO ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified)							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
Channel/channel CTR match	$I_F = \pm 5\text{ mA}$, $V_{CE} = 5\text{ V}$		CTR _X /CTR _Y	1 to 1		3 to 1	
CTR symmetry	$I_{CE} (I_F = -5\text{ mA})/I_{CE} (I_F = +5\text{ mA})$		$I_{CE(RATIO)}$	0.5		2	
Current transfer ratio (collector emitter saturated)	$I_F = \pm 1\text{ mA}$, $V_{CE} = 0.4\text{ V}$	ILD620	CTR _{CEsat}		60		%
		ILQ620	CTR _{CEsat}		60		%
Current transfer ratio (collector emitter)	$I_F = \pm 5\text{ mA}$, $V_{CE} = 5\text{ V}$	ILD620	CTR _{CE}	50	80	600	%
		ILQ620	CTR _{CE}	50	80	600	%
Current transfer ratio (collector emitter saturated)	$I_F = \pm 1\text{ mA}$, $V_{CE} = 0.4\text{ V}$	ILD620GB	CTR _{CEsat}	30			%
		ILQ620GB	CTR _{CEsat}	30			%
Current transfer ratio (collector emitter)	$I_F = \pm 5\text{ mA}$, $V_{CE} = 5\text{ V}$	ILD620GB	CTR _{CEsat}	100	200	600	%
		ILQ620GB	CTR _{CEsat}	100	200	600	%

SAFETY AND INSULATION RATED PARAMETERS							
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT	
Partial discharge test voltage - routine test	100 %, $t_{test} = 1\text{ s}$	V_{pd}	1.669			kV	
Partial discharge test voltage - lot test (sample test)	$t_{Tr} = 60\text{ s}$, $t_{test} = 10\text{ s}$, (see figure 2)	V_{IOTM}	10			kV	
		V_{pd}	1.424			kV	
Insulation resistance	$V_{IO} = 500\text{ V}$	R_{IO}	10^{12}			Ω	
	$V_{IO} = 500\text{ V}$, $T_{amb} = 100\text{ }^{\circ}\text{C}$	R_{IO}	10^{11}			Ω	
	$V_{IO} = 500\text{ V}$, $T_{amb} = 150\text{ }^{\circ}\text{C}$ (construction test only)	R_{IO}	10^9			Ω	
Forward current		I_{si}			275	mA	
Power dissipation		P_{SO}			400	mW	
Rated impulse voltage		V_{IOTM}			10	kV	
Safety temperature		T_{si}			175	$^{\circ}\text{C}$	

Note

- According to DIN EN 60747-5-2 (VDE 0884) (see figure 2). This optocoupler is suitable for safe electrical isolation only within the safety ratings. Compliance with the safety ratings shall be ensured by means of suitable protective circuits.

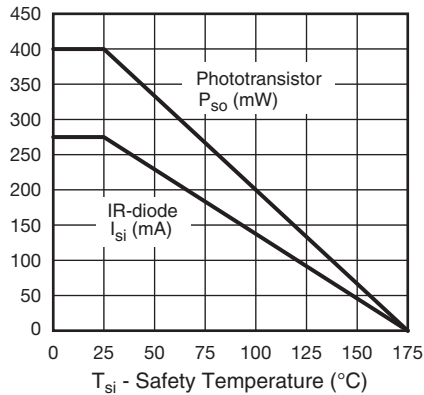


Fig. 1 - Derating Diagram

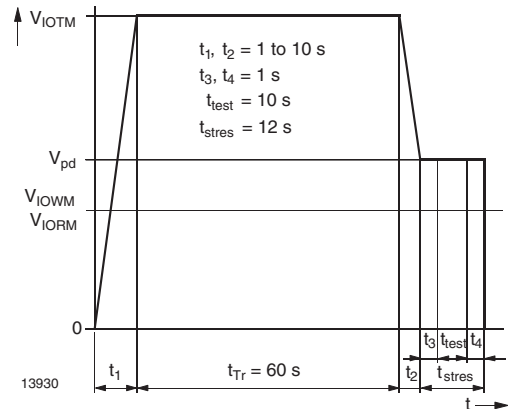


Fig. 2 - Test Pulse Diagram for Sample Test According to DIN EN 60747-5-2 (VDE 0884); IEC 60747-5-5

SWITCHING CHARACTERISTICS ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified)						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
NON-SATURATED						
On time	$I_F = \pm 10\text{ mA}$, $V_{CC} = 5\text{ V}$, $R_L = 75\text{ }\Omega$, 50 % of V_{PP}	t_{on}		3		μs
Rise time	$I_F = \pm 10\text{ mA}$, $V_{CC} = 5\text{ V}$, $R_L = 75\text{ }\Omega$, 50 % of V_{PP}	t_r		20		μs
Off time	$I_F = \pm 10\text{ mA}$, $V_{CC} = 5\text{ V}$, $R_L = 75\text{ }\Omega$, 50 % of V_{PP}	t_{off}		2.3		μs
Fall time	$I_F = \pm 10\text{ mA}$, $V_{CC} = 5\text{ V}$, $R_L = 75\text{ }\Omega$, 50 % of V_{PP}	t_f		2		μs
Propagation H to L	$I_F = \pm 10\text{ mA}$, $V_{CC} = 5\text{ V}$, $R_L = 75\text{ }\Omega$, 50 % of V_{PP}	t_{PHL}		1.1		μs
Propagation L to H	$I_F = \pm 10\text{ mA}$, $V_{CC} = 5\text{ V}$, $R_L = 75\text{ }\Omega$, 50 % of V_{PP}	t_{PLH}		2.5		μs
SATURATED						
On time	$I_F = \pm 10\text{ mA}$, $V_{CC} = 5\text{ V}$, $R_L = 1\text{ k}\Omega$, $V_{TH} = 1.5\text{ V}$,	t_{on}		4.3		μs
Rise time	$I_F = \pm 10\text{ mA}$, $V_{CC} = 5\text{ V}$, $R_L = 1\text{ k}\Omega$, $V_{TH} = 1.5\text{ V}$,	t_r		2.8		μs
Off time	$I_F = \pm 10\text{ mA}$, $V_{CC} = 5\text{ V}$, $R_L = 1\text{ k}\Omega$, $V_{TH} = 1.5\text{ V}$,	t_{off}		2.5		μs
Fall time	$I_F = \pm 10\text{ mA}$, $V_{CC} = 5\text{ V}$, $R_L = 1\text{ k}\Omega$, $V_{TH} = 1.5\text{ V}$,	t_f		11		μs
Propagation H to L	$I_F = \pm 10\text{ mA}$, $V_{CC} = 5\text{ V}$, $R_L = 1\text{ k}\Omega$, $V_{TH} = 1.5\text{ V}$,	t_{PHL}		2.6		μs
Propagation L to H	$I_F = \pm 10\text{ mA}$, $V_{CC} = 5\text{ V}$, $R_L = 1\text{ k}\Omega$, $V_{TH} = 1.5\text{ V}$,	t_{PLH}		7.2		μs

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

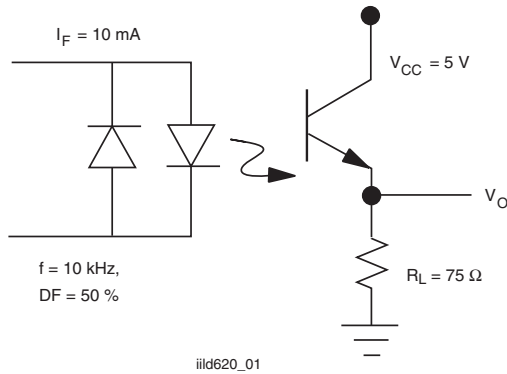


Fig. 3 - Non-Saturated Switching Timing

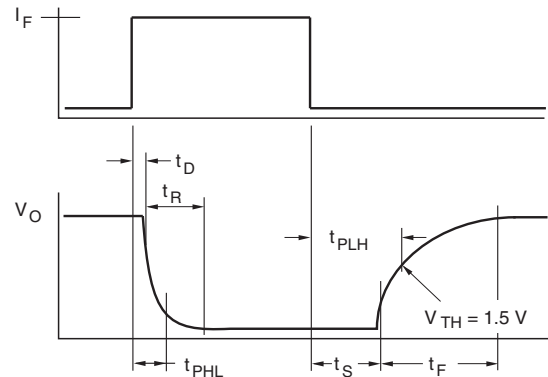


Fig. 6 - Saturated Switching Timing

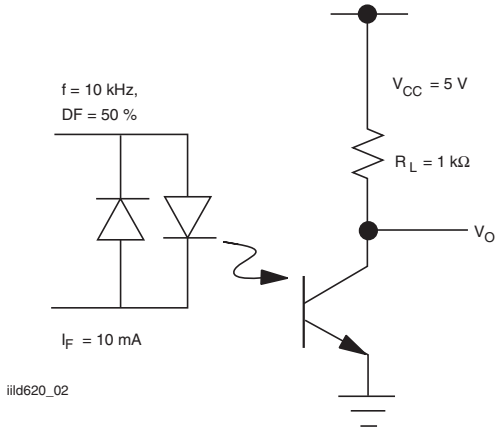


Fig. 4 - Saturated Switching Timing

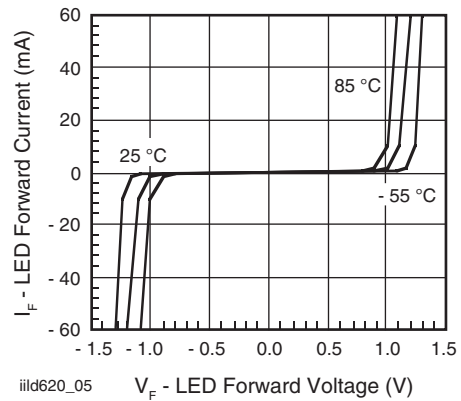


Fig. 7 - LED Forward Current vs. Forward Voltage

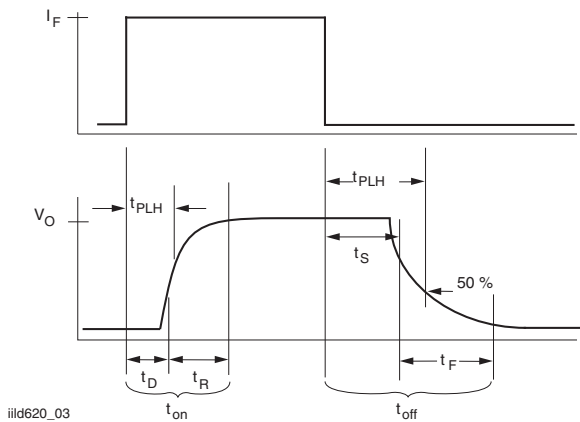


Fig. 5 - Non-Saturated Switching Timing

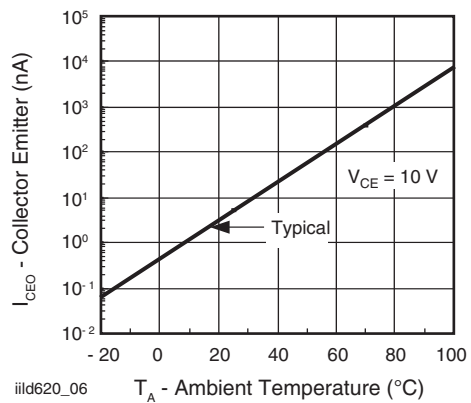


Fig. 8 - Collector Emitter Leakage vs. Temperature

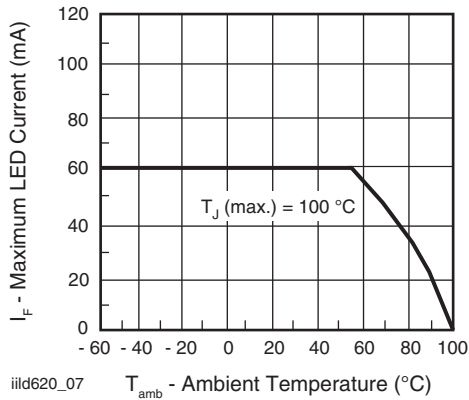


Fig. 9 - Maximum LED Current vs. Ambient Temperature

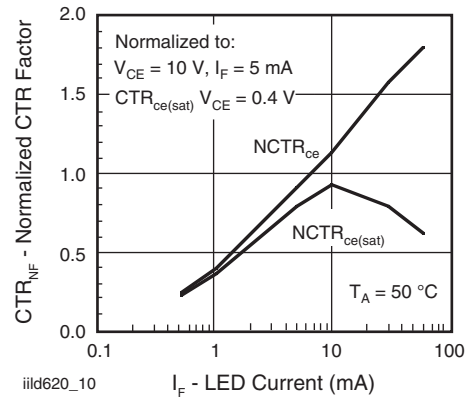


Fig. 12 - Normalization Factor for Non-Saturated and Saturated CTR vs. I_F

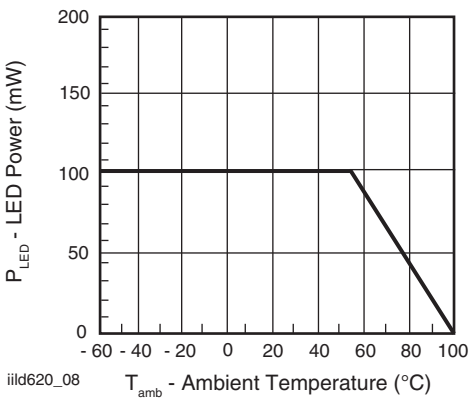


Fig. 10 - Maximum LED Power Dissipation

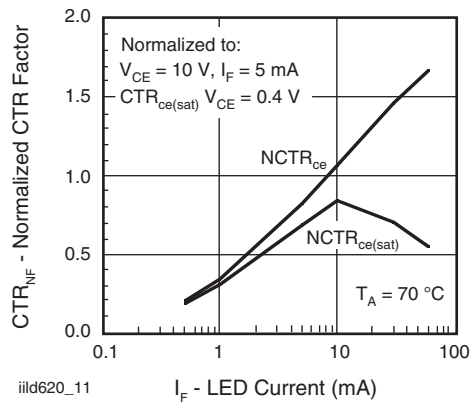


Fig. 13 - Normalization Factor for Non-Saturated and Saturated CTR vs. I_F

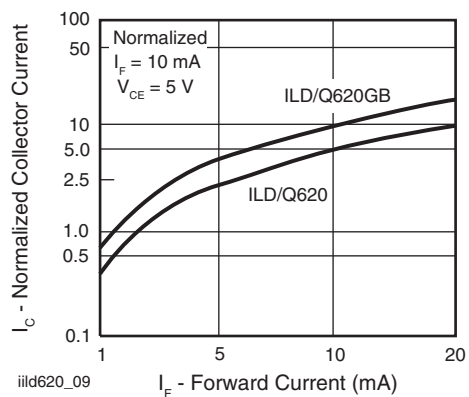


Fig. 11 - Collector Current vs. Diode Forward Current

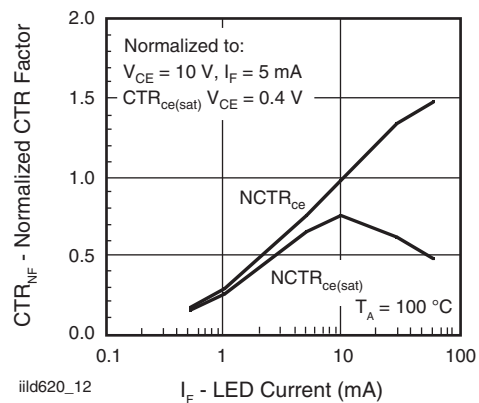


Fig. 14 - Normalization Factor for Non-Saturated and Saturated CTR vs. I_F

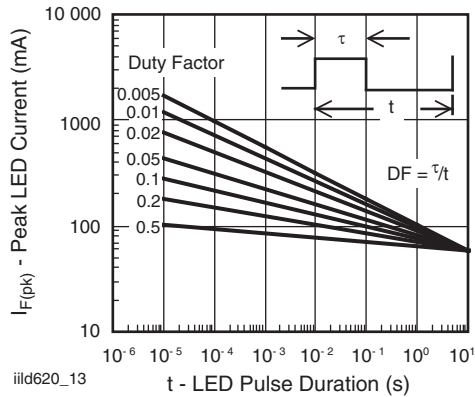


Fig. 15 - Peak LED Current vs. Pulse Duration, τ

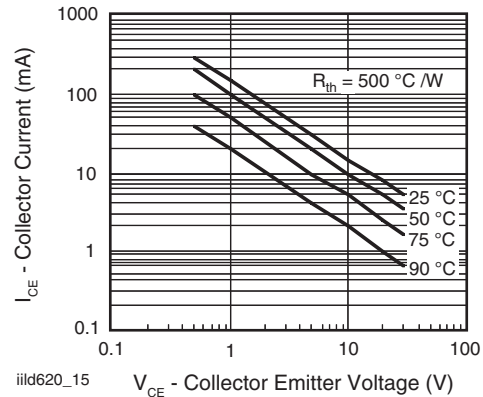


Fig. 17 - Maximum Collector Current vs. Collector Voltage

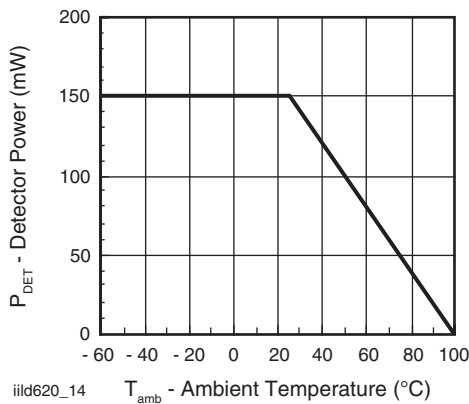
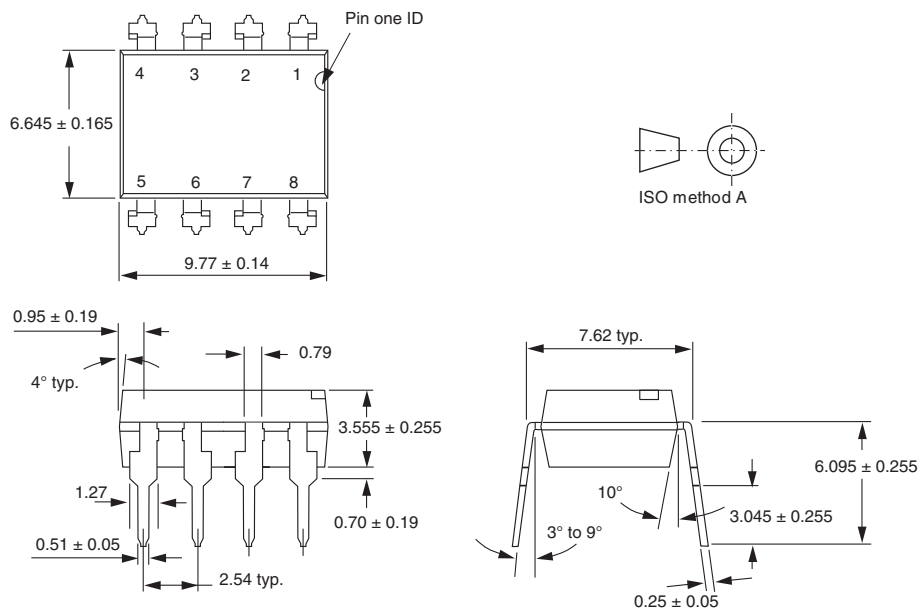
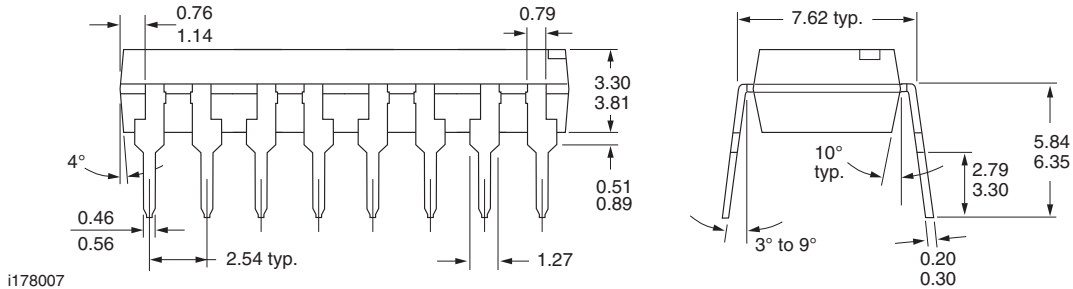
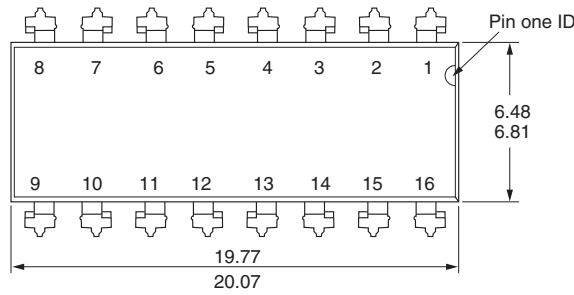


Fig. 16 - Maximum Detector Power Dissipation

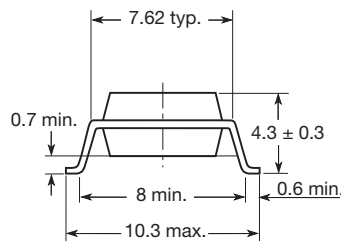
PACKAGE DIMENSIONS in millimeters



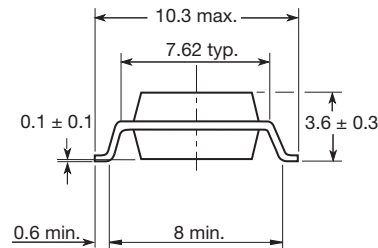


i178007

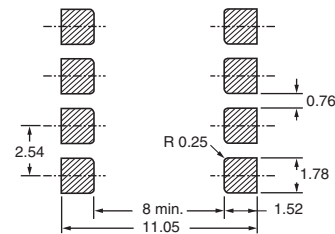
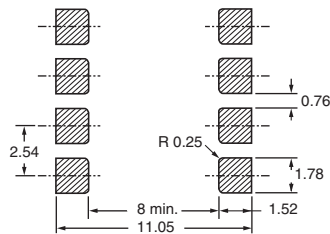
Option 7



Option 9



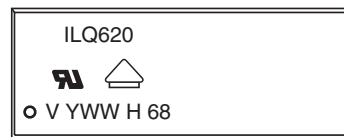
20802-16



PACKAGE MARKING (example)



21764-95



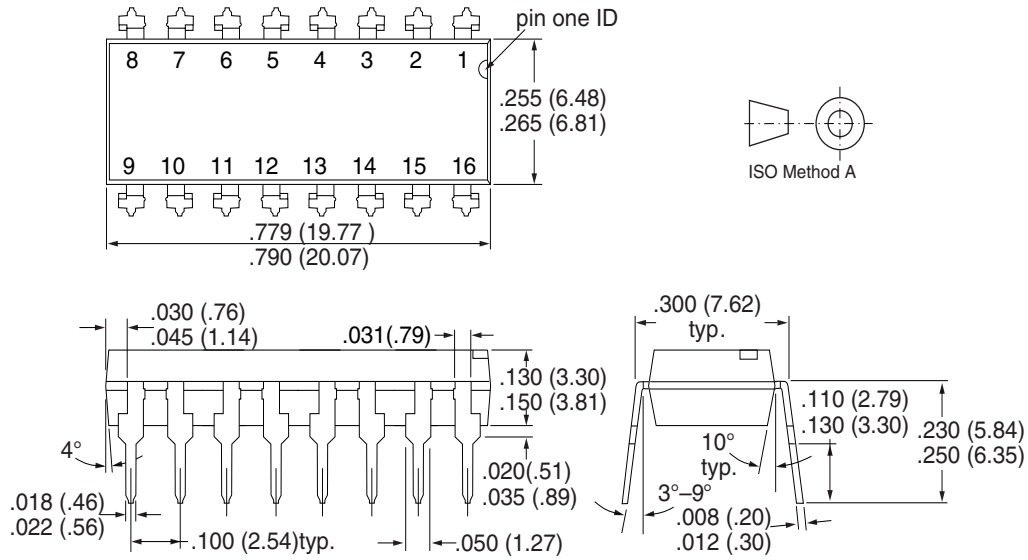
Notes

- Only option 1 and 7 reflected in the package marking.
- The VDE logo is only marked on option 1 parts.
- Tape and reel suffix (T) is not part of the package marking.



DIP-16

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.

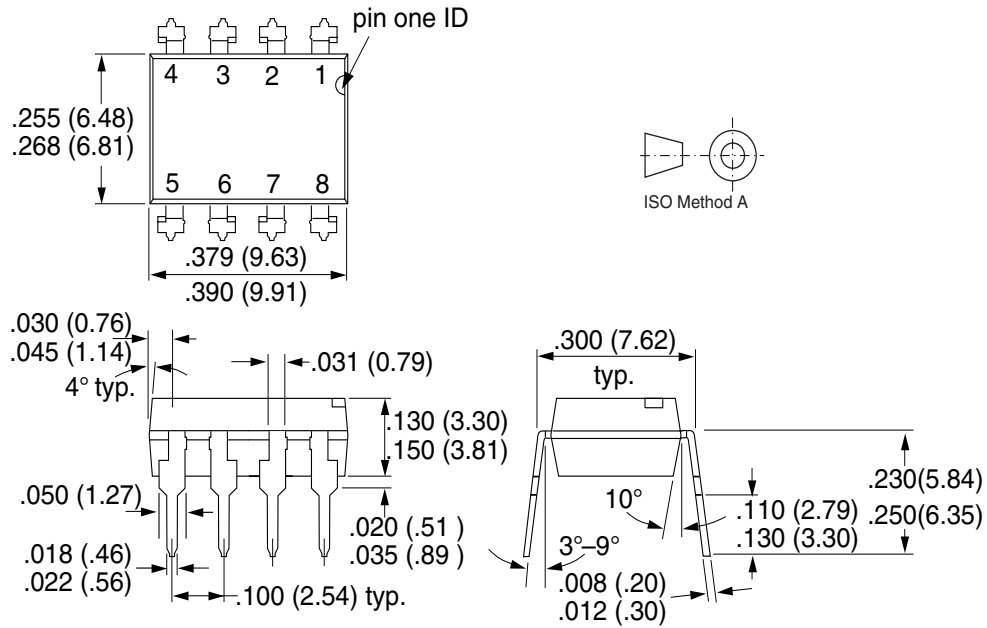
**We reserve the right to make changes to improve technical design
and may do so without further notice.**

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.

Vishay Semiconductor GmbH, P.O.B. 3535, D-74025 Heilbronn, Germany
Telephone: 49 (0)7131 67 2831, Fax number: 49 (0)7131 67 2423

DIP-8

Package Dimensions in Inches (mm)



i178006

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.

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Vishay Semiconductor GmbH, P.O.B. 3535, D-74025 Heilbronn, Germany
Telephone: 49 (0)7131 67 2831, Fax number: 49 (0)7131 67 2423

Footprints

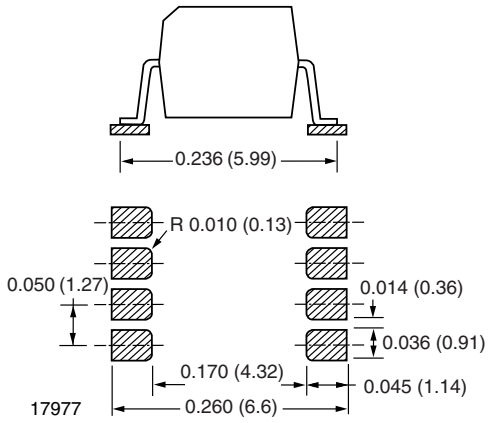


Fig. 1 - SO8A and DSO8A SMD

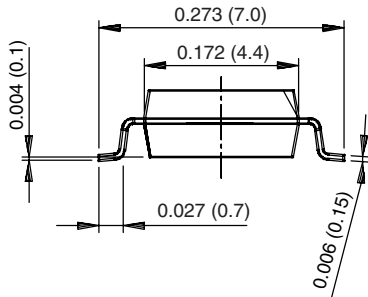


Fig. 2 - SOP-4, Miniflat

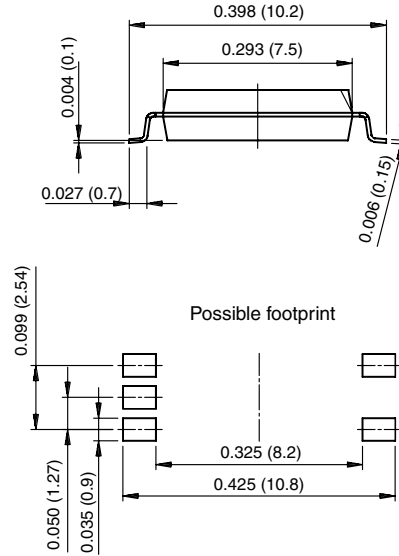


Fig. 3 - SOP-6, 5 Pin Wide Body

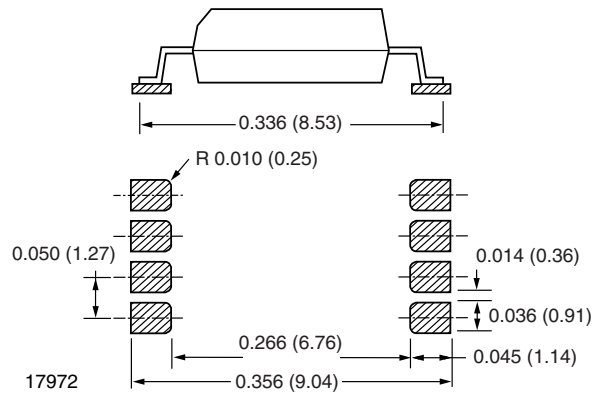
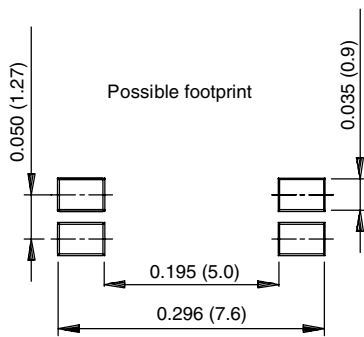


Fig. 4 - 8 Pin PCMCIA

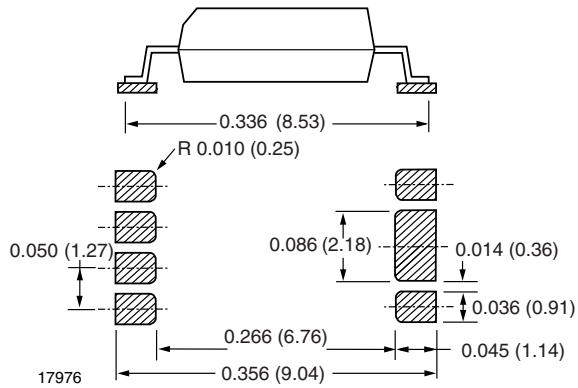


Fig. 5 - 8 Pin PCMCIA, Heat Sink

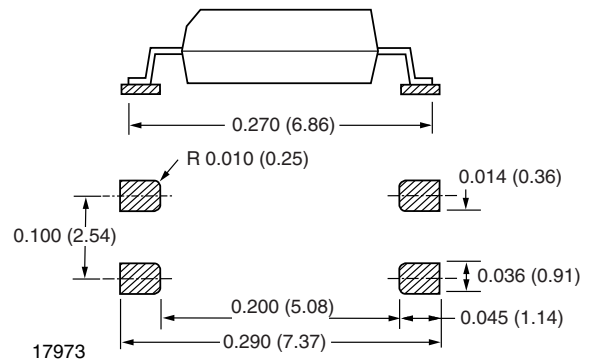


Fig. 8 - 4 Pin Mini-Flat

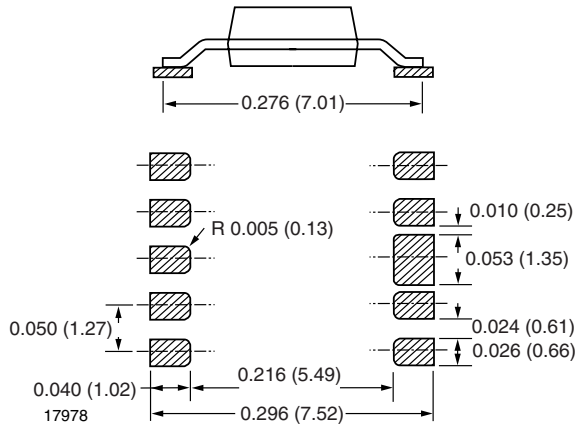


Fig. 6 - Mini Coupler

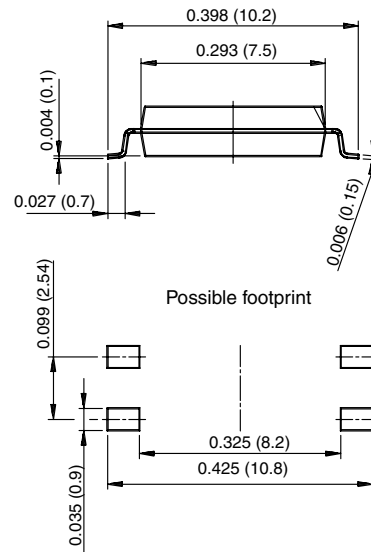


Fig. 9 - SOP-6, 4 Pin Wide Body

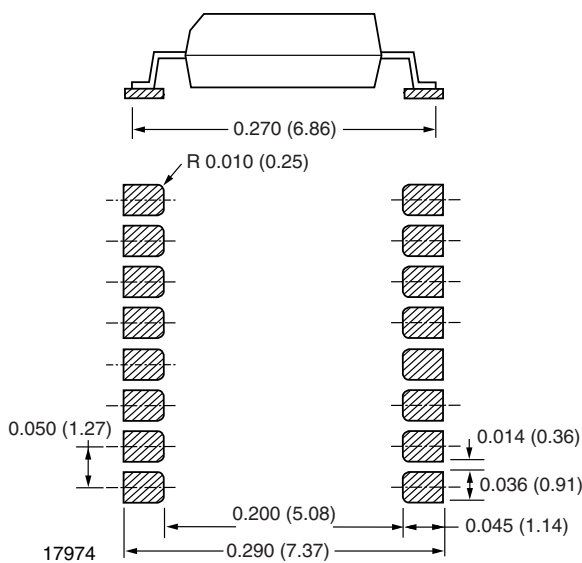


Fig. 7 - SOP-16

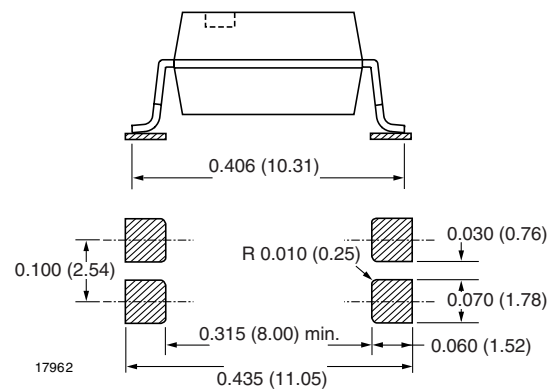


Fig. 10 - 4 Pin SMD Option 7

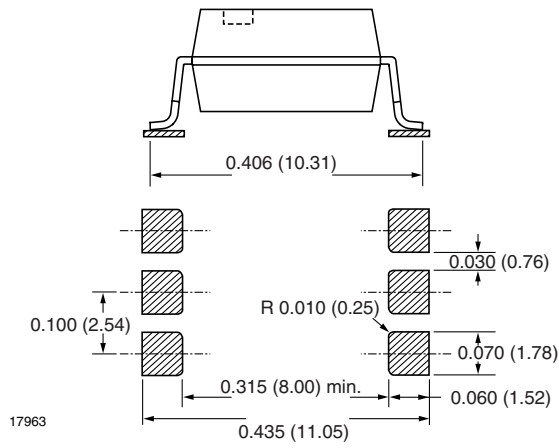


Fig. 11 - 6 Pin SMD Option 7

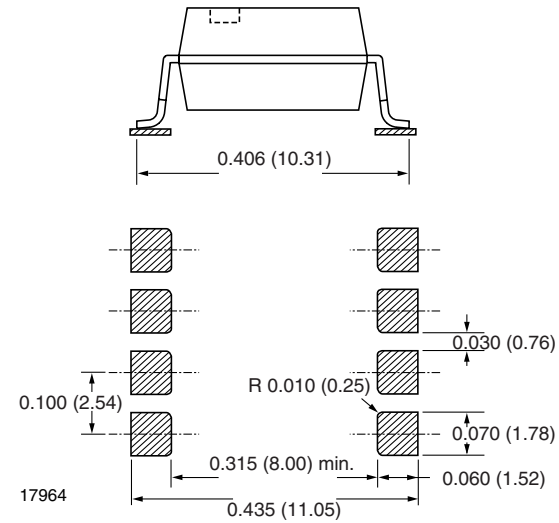


Fig. 12 - 8 Pin SMD Option 7

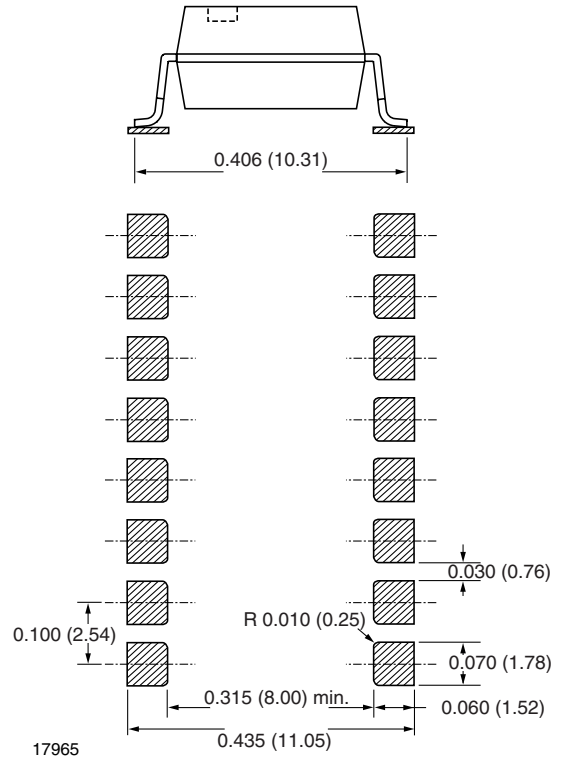


Fig. 13 - 16 Pin SMD Option 7

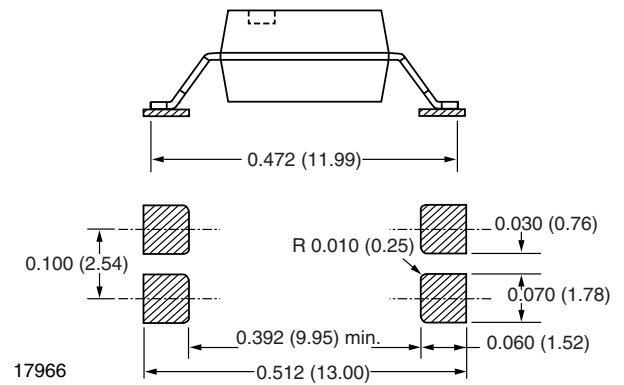


Fig. 14 - 4 Pin SMD Option 8

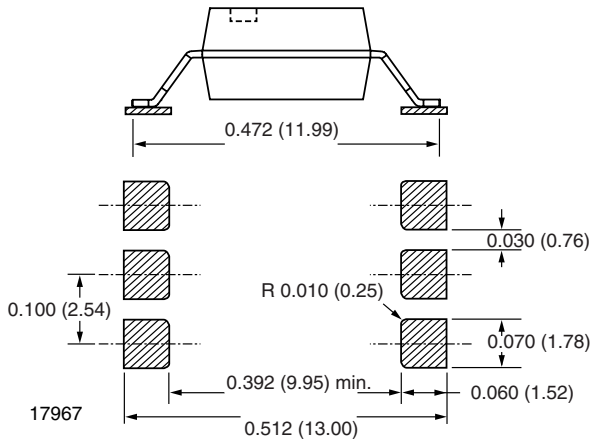


Fig. 15 - 6 Pin SMD Option 8

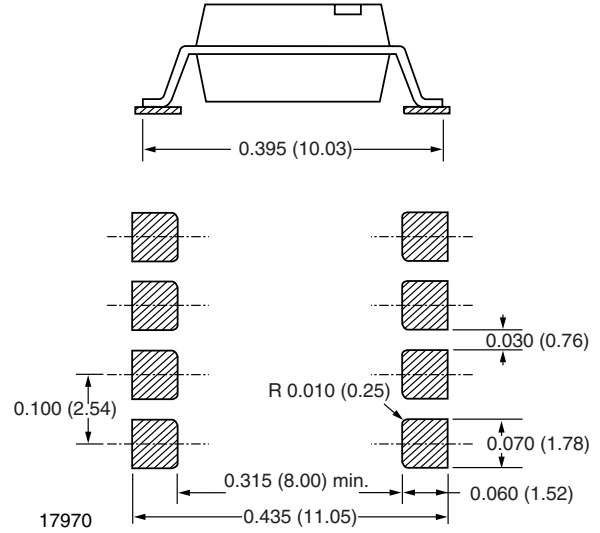


Fig. 18 - 8 Pin SMD Option 9

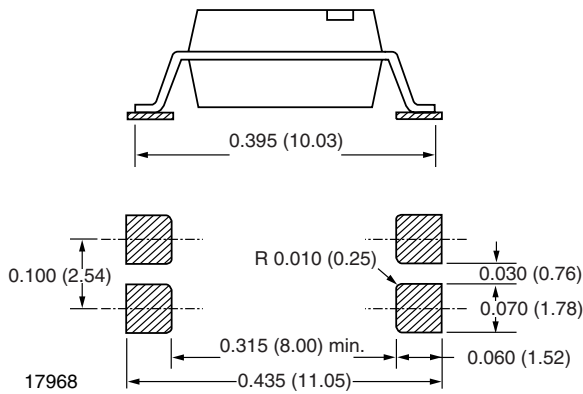


Fig. 16 - 4 Pin SMD Option 9

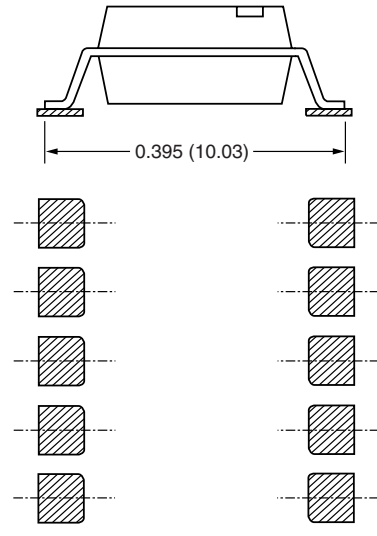


Fig. 19 - 16 Pin SMD Option 9

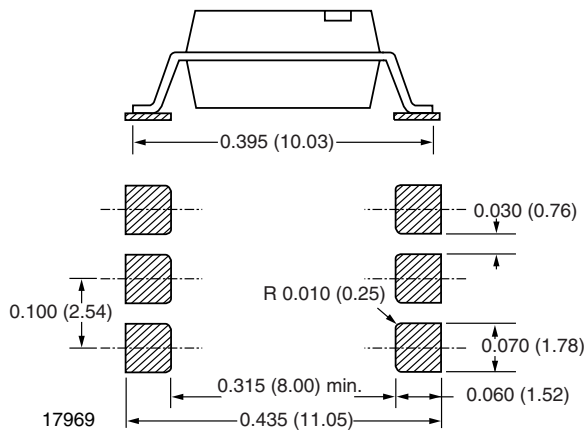


Fig. 17 - 6 Pin SMD Option 9

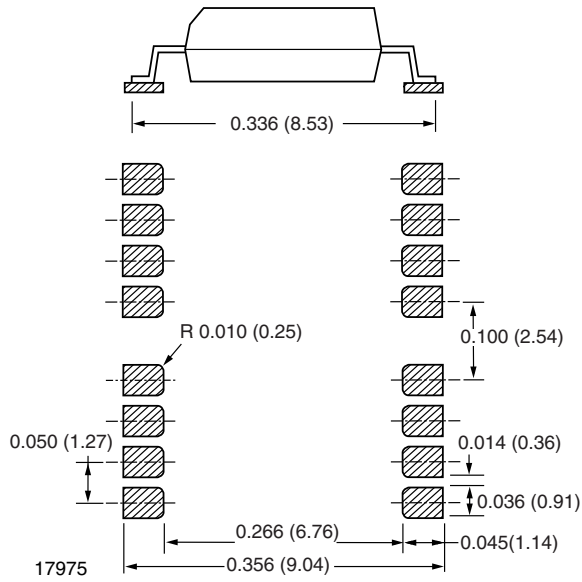


Fig. 20 - 16 Pin PCMCIA



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