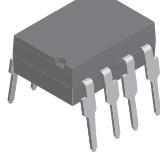
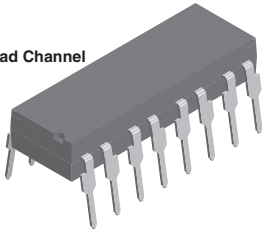


Optocoupler, Phototransistor Output (Dual, Quad Channel)

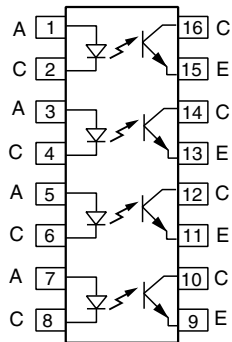
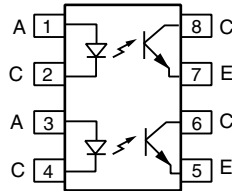
Dual Channel



Quad Channel



i179012-1



i179052-2



FEATURES

- Identical channel to channel footprint
- 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 from double molded package, 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
- CSA 93751
- BSI IEC 60950; IEC 60065
- DIN EN 60747-5-2 (VDE0884)/DIN EN 60747-5-5 pending, available with option 1

DESCRIPTION

The ILD615, ILQ615 are multi-channel phototransistor optocouplers that use GaAs IRLED emitters and high gain NPN phototransistors. These devices are constructed using over/under leadframe optical coupling and double molded insulation technology resulting a withstand test voltage of 7500 V_{ACPEAK} and a working voltage of 1700 V_{RMS}.

The binned min./max. and linear CTR characteristics make these devices well suited for DC or AC voltage detection. Eliminating the phototransistor base connection provides added electrical noise immunity from the transients found in many industrial control environments.

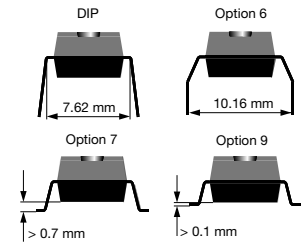
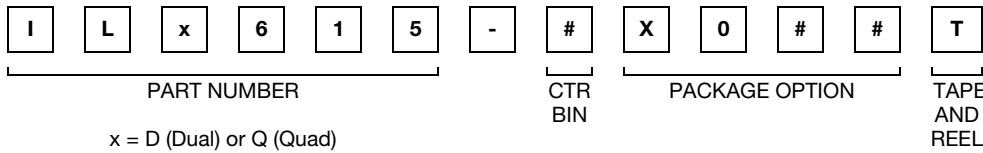
Because of guaranteed maximum non-saturated and saturated switching characteristics, the ILD615, ILQ615 can be used in medium speed data I/O and control systems. The binned min./max. CTR specification allow easy worst case interface calculations for both level detection and switching applications. Interfacing with a CMOS logic is enhanced by the guaranteed CTR at I_F = 1 mA.

ILD615, ILQ615



Vishay Semiconductors Optocoupler, Phototransistor Output
(Dual, Quad Channel)

ORDERING INFORMATION



AGENCY CERTIFIED/PACKAGE	DUAL CHANNEL				QUAD CHANNEL			
	CTR (%)							
	10 mA							
UL, CSA, BSI, VDE	40 to 80	63 to 125	100 to 200	160 to 320	40 to 80	63 to 125	100 to 200	160 to 320
DIP-8	ILD615-1	ILD615-2	ILD615-3	ILD615-4	-	-	-	-
DIP-8, 400 mil, option 6	-	-	-	ILD615-4X006	-	-	-	-
SMD-8, option 7	ILD615-1X007T	-	-	-	-	-	-	-
SMD-8, option 9	ILD615-1X009	ILD615-2X009T ⁽¹⁾	ILD615-3X009T	ILD615-4X009T ⁽¹⁾	-	-	-	-
DIP-16	-	-	-	-	ILQ615-1	ILQ615-2	ILQ615-3	ILQ615-4
SMD-16, option 7	-	-	-	-	-	ILQ615-2X007	ILQ615-3X007T ⁽¹⁾	ILQ615-4X007
SMD-16, option 9	-	-	-	-	ILQ615-1X009	-	ILQ615-3X009T ⁽¹⁾	ILQ615-4X009T ⁽¹⁾
VDE	40 to 80	63 to 125	100 to 200	160 to 320	40 to 80	63 to 125	100 to 200	160 to 320
DIP-8	-	ILD615-2X001	-	ILD615-4X001	-	-	-	-
DIP-8, 400 mil, option 6	-	ILD615-2X016	ILD615-3X016	ILD615-4X016	-	-	-	-
SMD-8, option 7	-	-	ILD615-3X017T ⁽¹⁾	-	-	-	-	-
DIP-16	-	-	-	-	-	-	ILQ615-3X001	ILQ615-4X001
DIP-16, 400 mil, option 6	-	-	-	-	-	-	ILQ615-3X016	-
SMD-16, option 7	-	-	-	-	-	ILQ615-2X017	-	-

Notes

- Also available in tubes; do not add T to end.
- Additional options may be possible, please contact sales office.

ABSOLUTE MAXIMUM RATINGS (T_{amb} = 25 °C, unless otherwise specified)

PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
INPUT				
Reverse voltage		V _R	6	V
Forward current		I _F	60	mA
Surge current		I _{FSM}	1.5	A
Power dissipation		P _{diss}	100	mW
Derate linearly from 25 °C			1.33	mW/°C
OUTPUT				
Collector emitter breakdown voltage		BV _{CEO}	70	V
Emitter collector breakdown voltage		BV _{ECO}	7	V
Collector current		I _C	50	mA
	t < 1 ms	I _C	100	mA
Power dissipation		P _{diss}	150	mW
Derate linearly from 25 °C			2	mW/°C



ABSOLUTE MAXIMUM RATINGS ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified)				
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
COUPLER				
Storage temperature		T_{stg}	- 55 to + 150	$^{\circ}\text{C}$
Operating temperature		T_{amb}	- 55 to + 100	$^{\circ}\text{C}$
Junction temperature		T_j	100	$^{\circ}\text{C}$
Soldering temperature ⁽¹⁾	2 mm distance from case bottom	T_{sld}	260	$^{\circ}\text{C}$
Package power dissipation ILD615			400	mW
Derate linearly from 25 $^{\circ}\text{C}$			5.33	mW/ $^{\circ}\text{C}$
Package power dissipation ILQ615			500	mW
Derate linearly from 25 $^{\circ}\text{C}$			6.67	mW/ $^{\circ}\text{C}$
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
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

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	SYMBOL	MIN.	TYP.	MAX.	UNIT
INPUT						
Forward voltage	$I_F = 10\text{ mA}$	V_F	1	1.15	1.3	V
Breakdown voltage	$I_R = 10\text{ }\mu\text{A}$	V_{BR}	6	30		V
Reverse current	$V_R = 6\text{ V}$	I_R		0.01	10	μA
Capacitance	$V_R = 0\text{ V}, f = 1\text{ MHz}$	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, -1, -2	$V_{CE} = 10\text{ V}$	I_{CEO}		2	50	nA
Collector emitter leakage current, -3, -4	$V_{CE} = 10\text{ V}$	I_{CEO}		5	100	nA
Collector emitter breakdown voltage	$I_{CE} = 0.5\text{ mA}$	BV_{CEO}	70			V
Emitter collector breakdown voltage	$I_E = 0.1\text{ mA}$	BV_{ECO}	7			V
Thermal resistance, junction to lead		R_{THJL}		500		K/W
PACKAGE TRANSFER CHARACTERISTICS						
Channel/channel CTR match	$I_F = 10\text{ mA}, V_{CE} = 5\text{ V}$	CTR _X /CTR _Y	1 to 1		2 to 1	
COUPLER						
Capacitance (input to output)	$V_{IO} = 0\text{ V}, f = 1\text{ MHz}$	C_{IO}		0.8		pF
Insulation resistance	$V_{IO} = 500\text{ V}, T_A = 25\text{ }^{\circ}\text{C}$	R_S	10^{12}	10^{14}		Ω
Channel to channel isolation			500			VAC

Note

- Minimum and maximum values are 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 ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified)							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
Current transfer ratio (collector emitter saturated)	$I_F = 10\text{ mA}$, $V_{CE} = 0.4\text{ V}$	ILD615-1	CTR_{CEsat}		25		%
		ILQ615-1					
		ILD615-2	CTR_{CEsat}				
		ILQ615-2					
		ILD615-3	CTR_{CEsat}				
		ILQ615-3					
		ILD615-4	CTR_{CEsat}				
		ILQ615-4					
Current transfer ratio (collector emitter)	$I_F = 1\text{ mA}$, $V_{CE} = 5\text{ V}$	ILD615-1	CTR_{CE}	13	30		%
		ILQ615-1					
		ILD615-2	CTR_{CE}				
		ILQ615-2					
		ILD615-3	CTR_{CE}				
		ILQ615-3					
		ILD615-4	CTR_{CE}				
		ILQ615-4					
	$I_F = 10\text{ mA}$, $V_{CE} = 5\text{ V}$	ILD615-1	CTR_{CE}	40	60	80	%
		ILQ615-1					
		ILD615-2	CTR_{CE}				
		ILQ615-2					
		ILD615-3	CTR_{CE}				
		ILQ615-3					
ILD615-4	CTR_{CE}						
ILQ615-4							

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
	$V_{IO} = 500\text{ V}$, $T_{amb} = 175\text{ }^{\circ}\text{C}$ (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 (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.

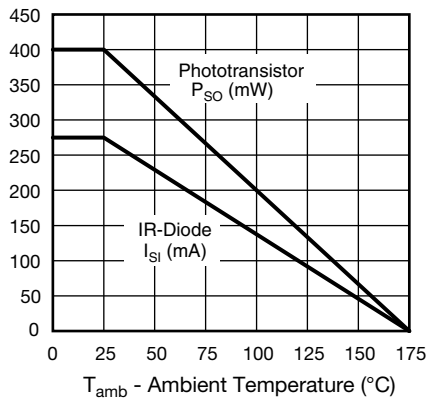
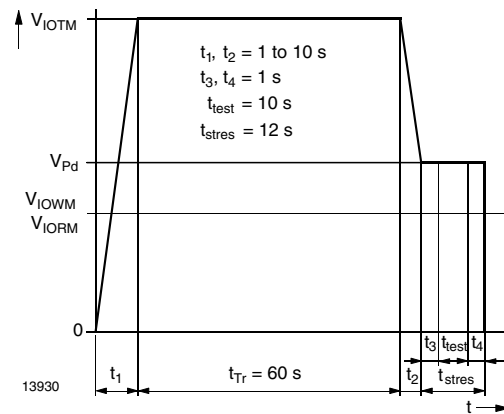
**Optocoupler, Phototransistor Output Vishay Semiconductors
(Dual, Quad Channel)**


Fig. 1 - Derating Diagram


 Fig. 2 - Test Pulse Diagram for Sample Test according to
DIN EN 60747-5-2 (VDE0884); IEC60747-5-5

SWITCHING CHARACTERISTICS ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified)							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
NON-SATURATED							
Current	$V_{CC} = 5\text{ V}$, $R_L = 75\text{ }\Omega$, 50 % of V_{PP}		I_F		10		mA
Turn-on time	$V_{CC} = 5\text{ V}$, $R_L = 75\text{ }\Omega$, 50 % of V_{PP}		t_{on}		3		μs
Rise time	$V_{CC} = 5\text{ V}$, $R_L = 75\text{ }\Omega$, 50 % of V_{PP}		t_r		2		μs
Turn-off time	$V_{CC} = 5\text{ V}$, $R_L = 75\text{ }\Omega$, 50 % of V_{PP}		t_{off}		2.3		μs
Fall time	$V_{CC} = 5\text{ V}$, $R_L = 75\text{ }\Omega$, 50 % of V_{PP}		t_f		2		μs
Propagation H to L	$V_{CC} = 5\text{ V}$, $R_L = 75\text{ }\Omega$, 50 % of V_{PP}		t_{PHL}		1.1		μs
Propagation L to H	$V_{CC} = 5\text{ V}$, $R_L = 75\text{ }\Omega$, 50 % of V_{PP}		t_{PLH}		2.5		μs
SATURATED							
Current	$V_{CC} = 5\text{ V}$, $R_L = 1\text{ k}\Omega$, $V_{TH} = 1.5\text{ V}$	ILD615-1	I_F		20		mA
		ILQ615-1					
		ILD615-2	I_F		10		mA
		ILQ615-2					
		ILD615-3	I_F		10		mA
		ILQ615-3					
ILD615-4	I_F		5		mA		
ILQ615-4							
Turn-on time	$V_{CC} = 5\text{ V}$, $R_L = 1\text{ k}\Omega$, $V_{TH} = 1.5\text{ V}$	ILD615-1	t_{on}		3		μs
		ILQ615-1					
		ILD615-2	t_{on}		4.3		μs
		ILQ615-2					
		ILD615-3	t_{on}		4.3		μs
		ILQ615-3					
ILD615-4	t_{on}		6		μs		
ILQ615-4							

ILD615, ILQ615

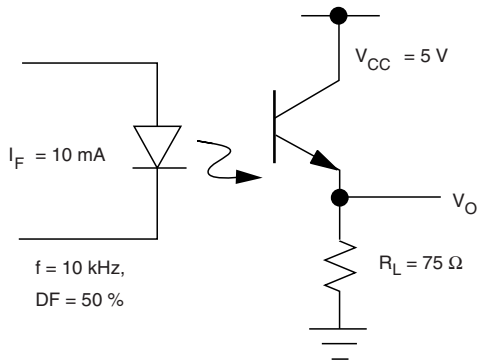


Vishay Semiconductors Optocoupler, Phototransistor Output
(Dual, Quad Channel)

SWITCHING CHARACTERISTICS ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified)							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
SATURATED							
Rise time	$V_{CC} = 5\text{ V}$, $R_L = 1\text{ k}\Omega$, $V_{TH} = 1.5\text{ V}$	ILD615-1	t_r		2		μs
		ILQ615-1					
		ILD615-2	t_r		2.8		μs
		ILQ615-2					
		ILD615-3	t_r		2.8		μs
		ILQ615-3					
ILD615-4	t_r		4.6		μs		
ILQ615-4							
Turn-off time	$V_{CC} = 5\text{ V}$, $R_L = 1\text{ k}\Omega$, $V_{TH} = 1.5\text{ V}$	ILD615-1	t_{off}		18		μs
		ILQ615-1					
		ILD615-2	t_{off}		25		μs
		ILQ615-2					
		ILD615-3	t_{off}		25		μs
		ILQ615-3					
ILD615-4	t_{off}		25		μs		
ILQ615-4							
Fall time	$V_{CC} = 5\text{ V}$, $R_L = 1\text{ k}\Omega$, $V_{TH} = 1.5\text{ V}$	ILD615-1	t_f		11		μs
		ILQ615-1					
		ILD615-2	t_f		14		μs
		ILQ615-2					
		ILD615-3	t_f		14		μs
		ILQ615-3					
ILD615-4	t_f		15		μs		
ILQ615-4							
Propagation H to L	$V_{CC} = 5\text{ V}$, $R_L = 1\text{ k}\Omega$, $V_{TH} = 1.5\text{ V}$	ILD615-1	t_{PHL}		1.6		μs
		ILQ615-1					
		ILD615-2	t_{PHL}		2.6		μs
		ILQ615-2					
		ILD615-3	t_{PHL}		2.6		μs
		ILQ615-3					
ILD615-4	t_{PHL}		5.4		μs		
ILQ615-4							
Propagation L to H	$V_{CC} = 5\text{ V}$, $R_L = 1\text{ k}\Omega$, $V_{TH} = 1.5\text{ V}$	ILD615-1	t_{PLH}		8.6		μs
		ILQ615-1					
		ILD615-2	t_{PLH}		7.2		μs
		ILQ615-2					
		ILD615-3	t_{PLH}		7.2		μs
		ILQ615-3					
ILD615-4	t_{PLH}		7.4		μs		
ILQ615-4							

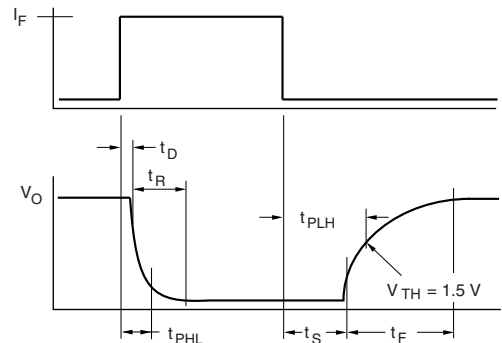
COMMON MODE TRANSIENT IMMUNITY ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified)							
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT	
Common mode rejection output high	$V_{CM} = 50\text{ V}_{P-P}$, $R_L = 1\text{ k}\Omega$, $I_F = 0\text{ mA}$	CM_H		5000		$\text{V}/\mu\text{s}$	
Common mode rejection output low	$V_{CM} = 50\text{ V}_{P-P}$, $R_L = 1\text{ k}\Omega$, $I_F = 0\text{ mA}$	CM_L		5000		$\text{V}/\mu\text{s}$	
Common mode coupling capacitance		C_{CM}		0.01		pF	

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



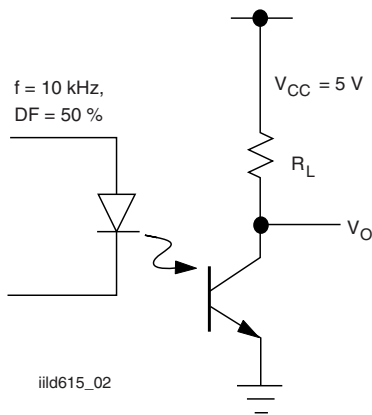
iiild615_01

Fig. 3 - Non-Saturated Switching Timing



iiild615_04

Fig. 6 - Saturated Switching Timing



iiild615_02

Fig. 4 - Saturated Switching Timing

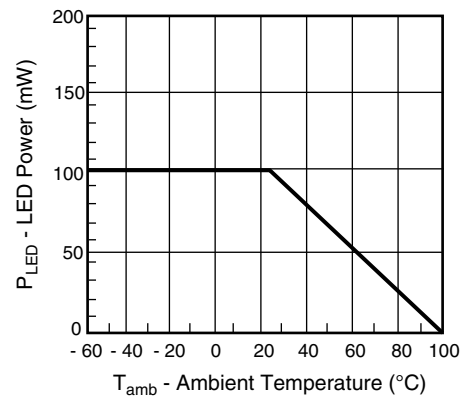
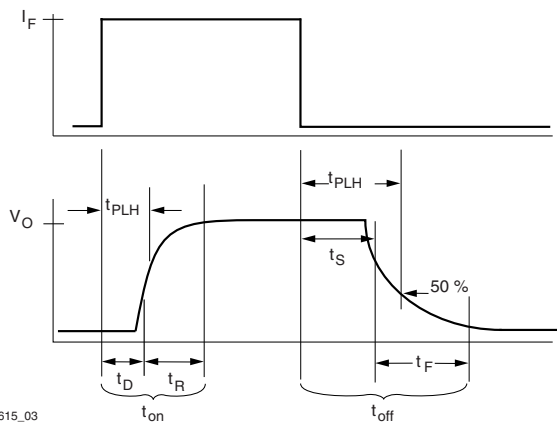
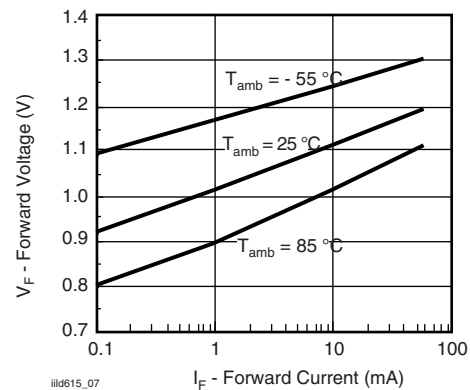


Fig. 7 - Maximum LED Power Dissipation



iiild615_03

Fig. 5 - Non-Saturated Switching Timing



iiild615_07

Fig. 8 - Forward Voltage vs. Forward Current

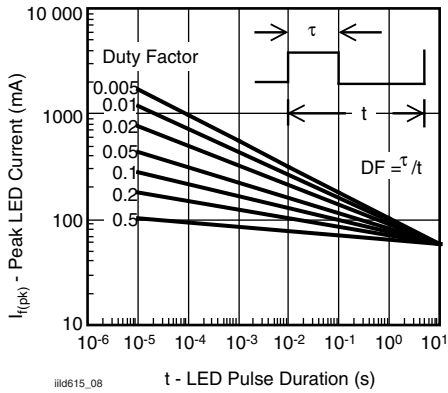


Fig. 9 - Peak LED Current vs. Pulse Duration, τ

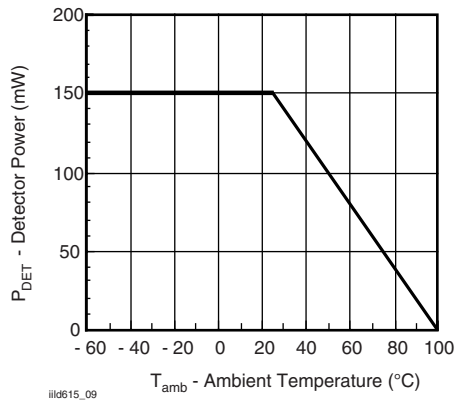


Fig. 10 - Maximum Detector Power Dissipation

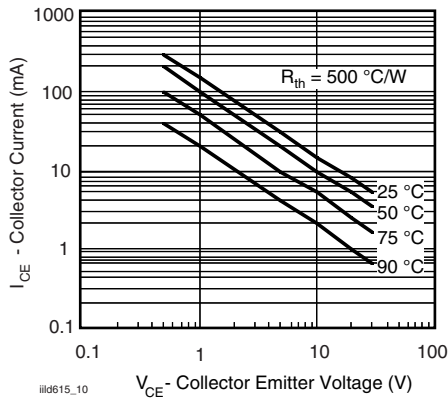


Fig. 11 - Maximum Collector Current vs. Collector Voltage

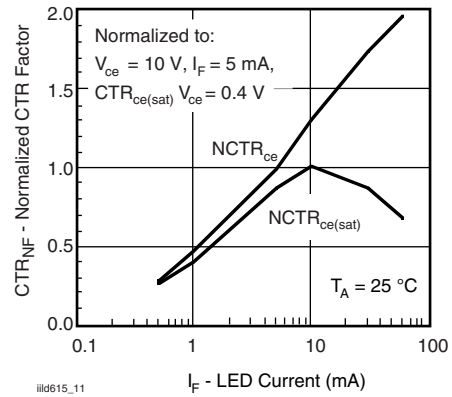


Fig. 12 - Normalization Factor for Non-Saturated and Saturated CTR vs. I_F

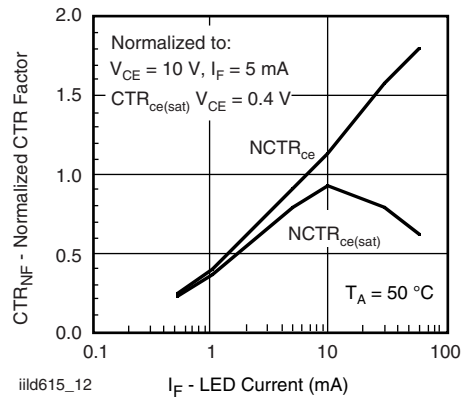


Fig. 13 - Normalization Factor for Non-Saturated and Saturated CTR vs. I_F

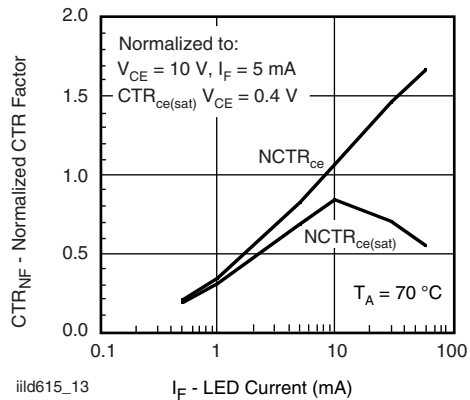


Fig. 14 - Normalization Factor for Non-Saturated and Saturated CTR vs. I_F

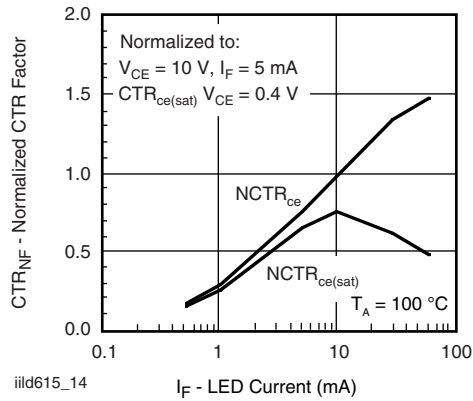


Fig. 15 - Normalization Factor for Non-Saturated and Saturated CTR vs. I_F

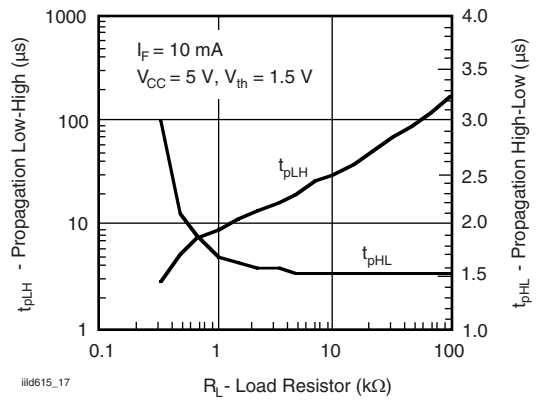


Fig. 18 - -1, Propagation Delay vs. Collector Load Resistor

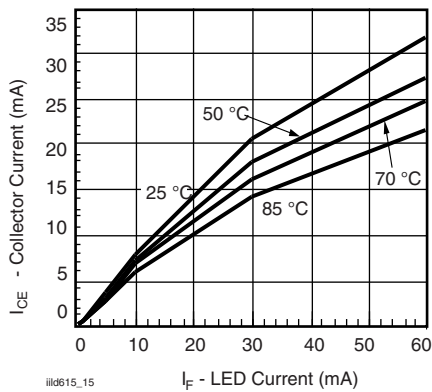


Fig. 16 - Collector Emitter Current vs. Temperature and LED Current

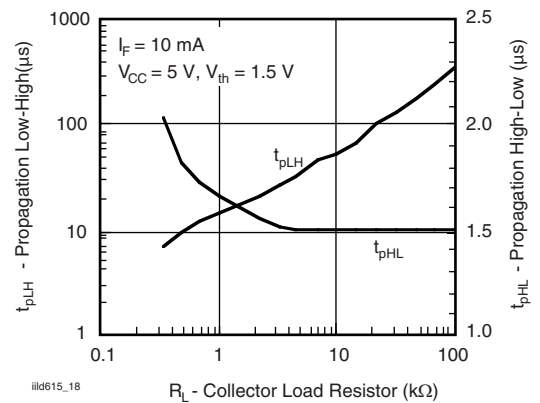


Fig. 19 - -2, -3, Propagation Delay vs. Collector Load Resistor

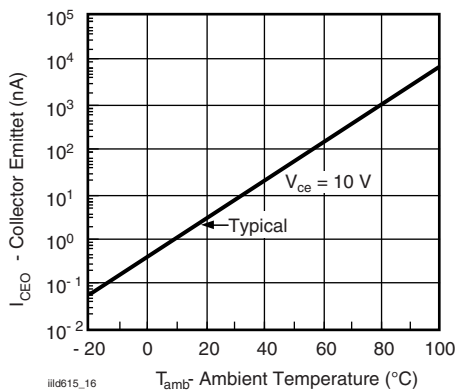


Fig. 17 - Collector Emitter Leakage vs. Temperature

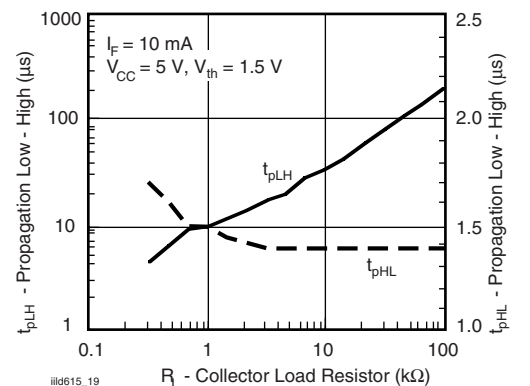


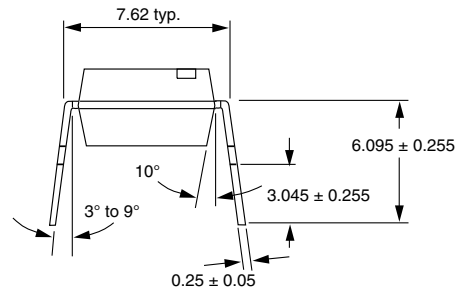
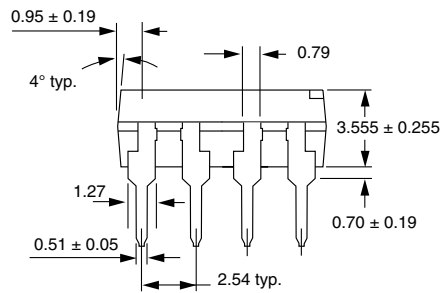
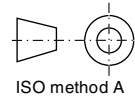
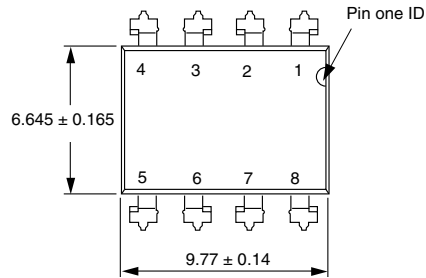
Fig. 20 - -4, Propagation Delay vs. Collector Load Resistor

ILD615, ILQ615

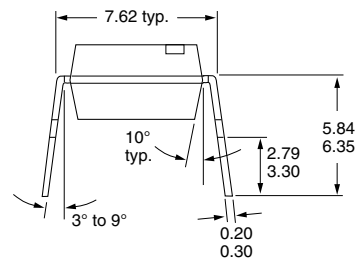
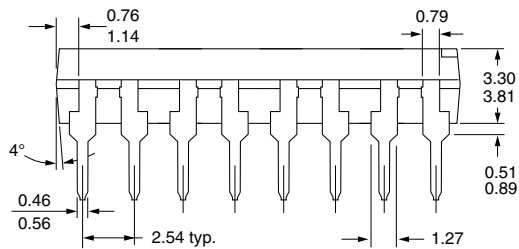
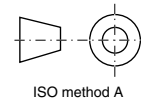
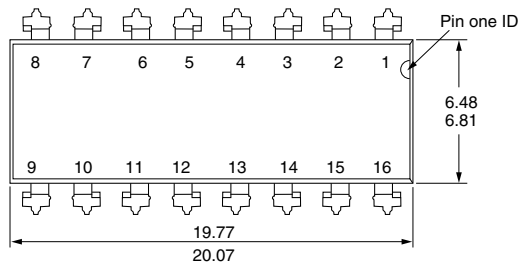


Vishay Semiconductors Optocoupler, Phototransistor Output
(Dual, Quad Channel)

PACKAGE DIMENSIONS in millimeters

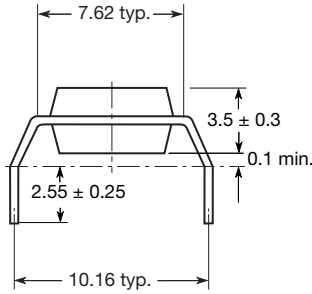


i178006

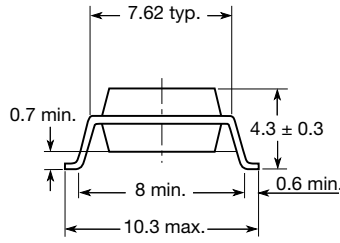


i178007

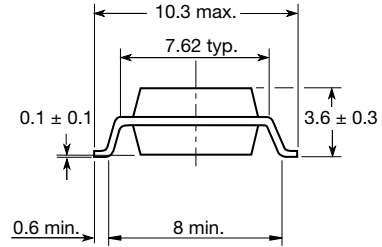
Option 6



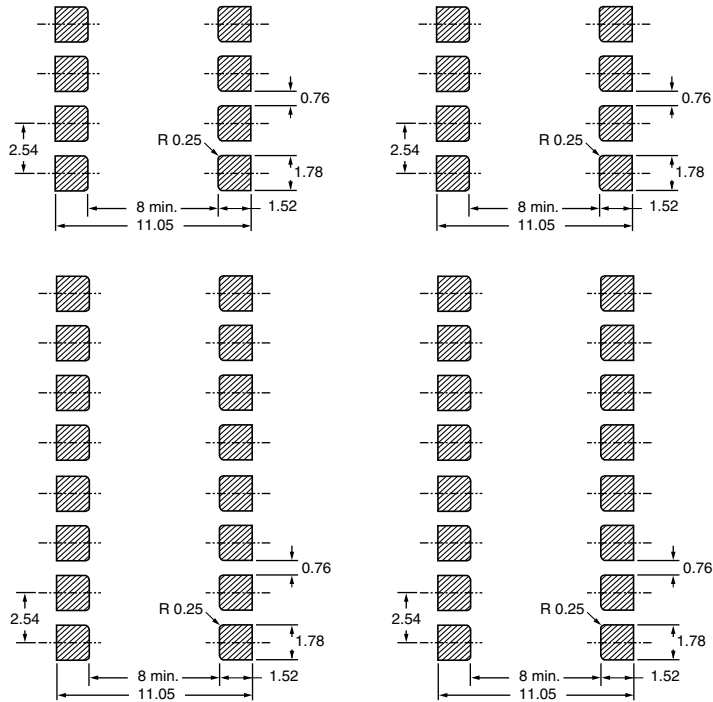
Option 7



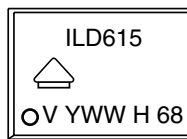
Option 9



20802-22



PACKAGE MARKING



21764-88

Notes

- Only options 1 and 7 reflected in the package marking.
- The VDE Logo is only marked on option1 parts.
- Tape and reel suffix (T) is not part of the package marking.

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.

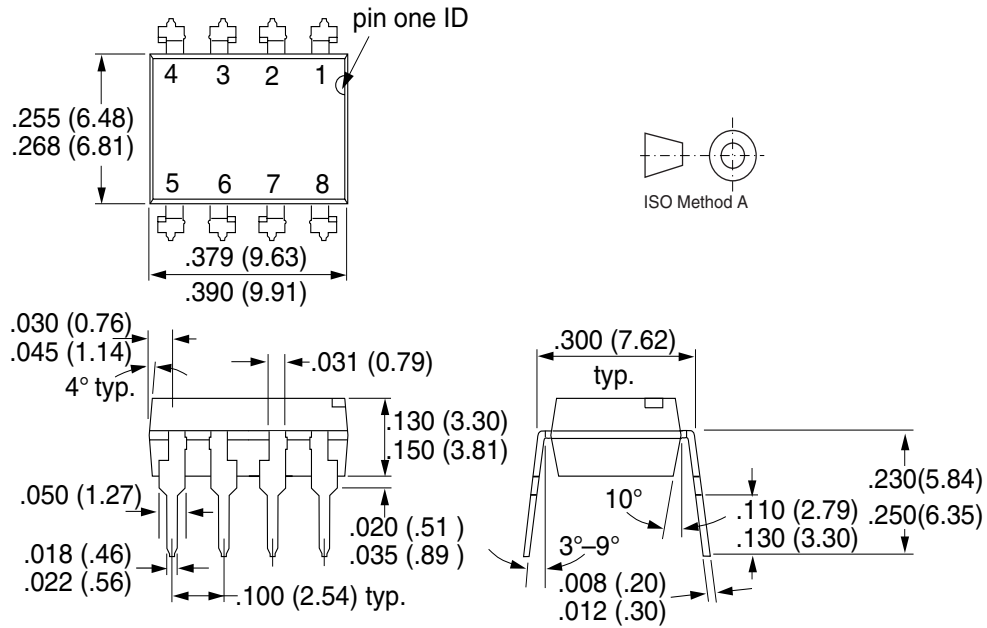
**We reserve the right to make changes to improve technical design
and may do so without further notice.**

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

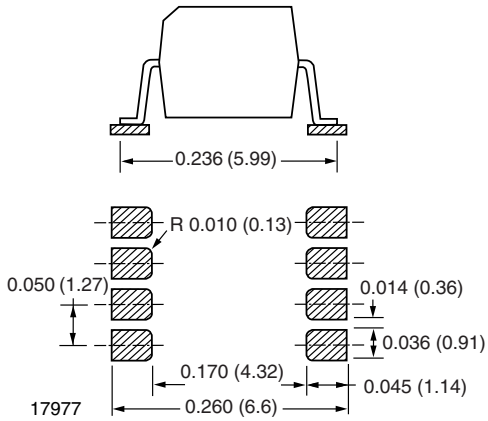
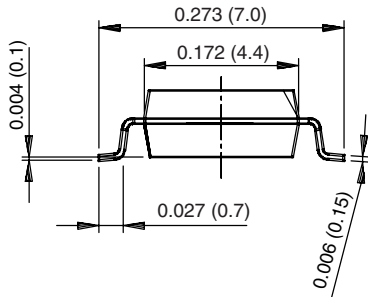
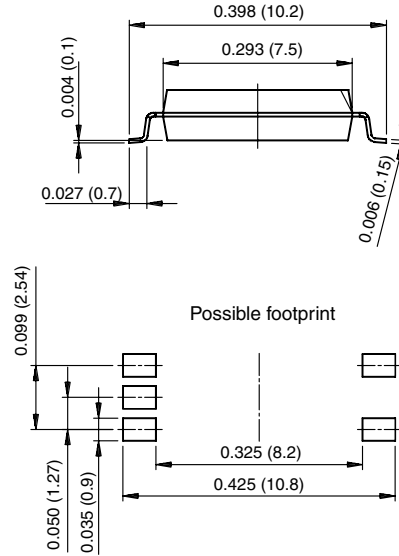


Fig. 1 - SO8A and DSO8A SMD



18403

Fig. 2 - SOP-4, Miniflat



18406

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

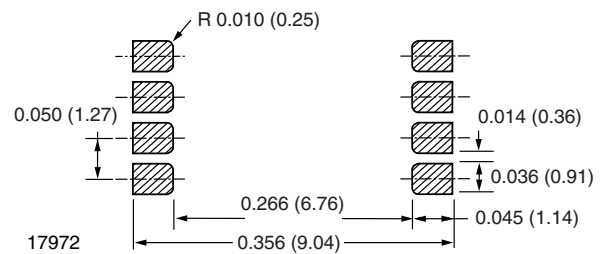
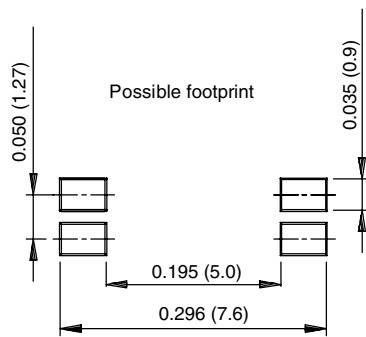


Fig. 4 - 8 Pin PCMCIA

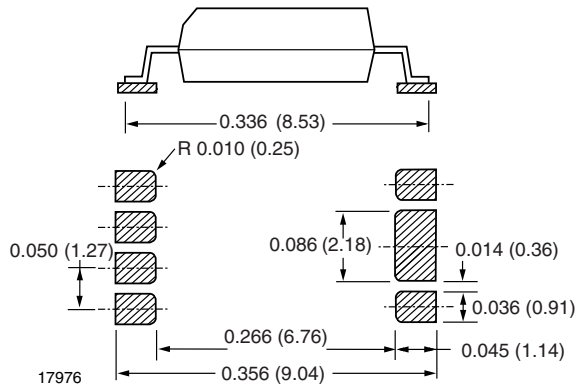


Fig. 5 - 8 Pin PCMCIA, Heat Sink

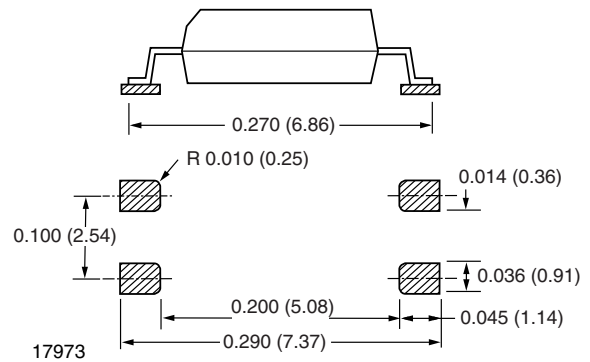


Fig. 8 - 4 Pin Mini-Flat

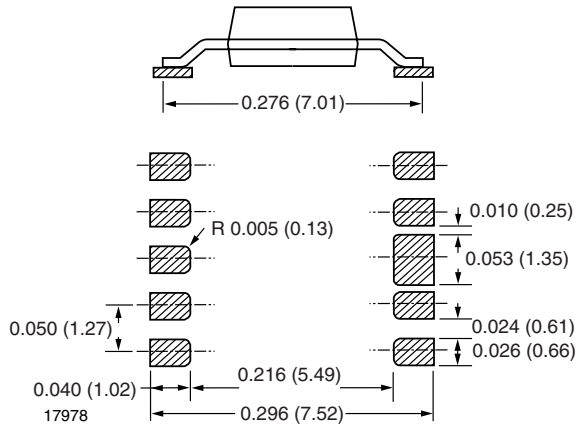


Fig. 6 - Mini Coupler

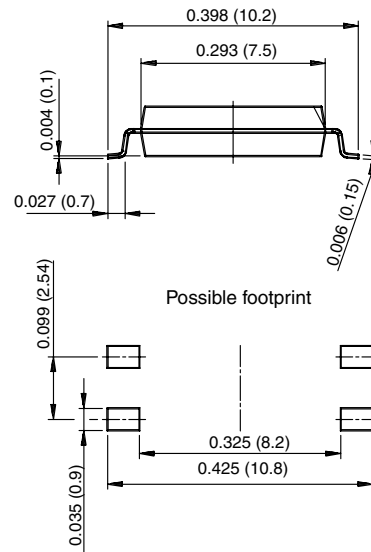


Fig. 9 - SOP-6, 4 Pin Wide Body

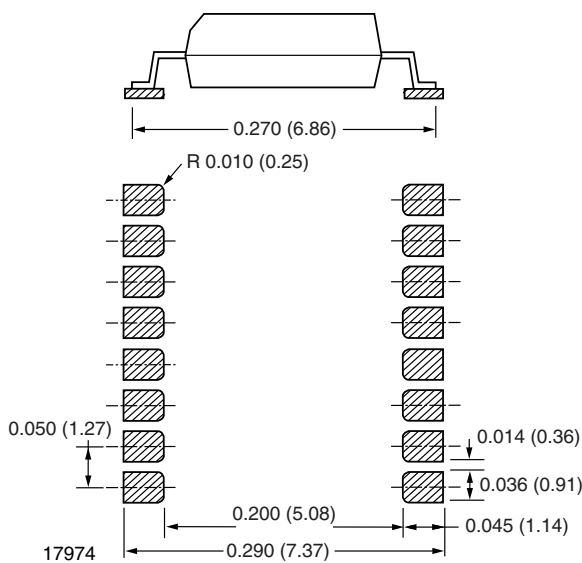


Fig. 7 - SOP-16

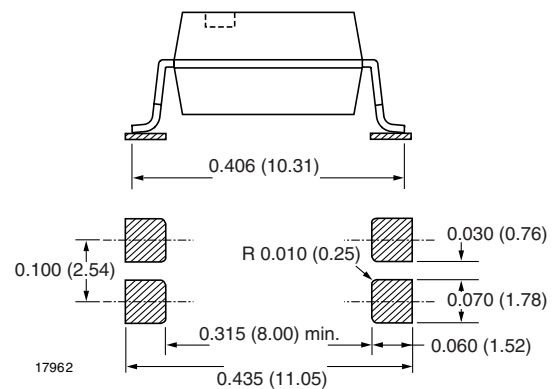


Fig. 10 - 4 Pin SMD Option 7

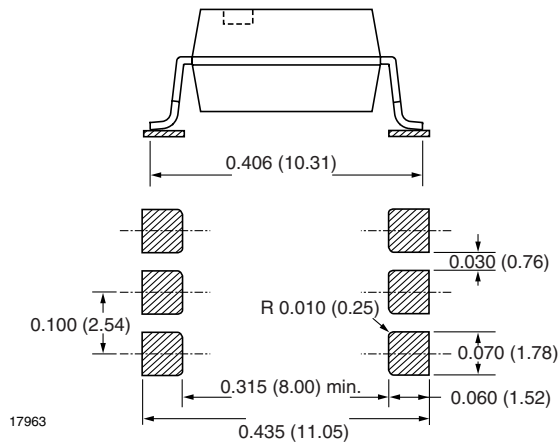


Fig. 11 - 6 Pin SMD Option 7

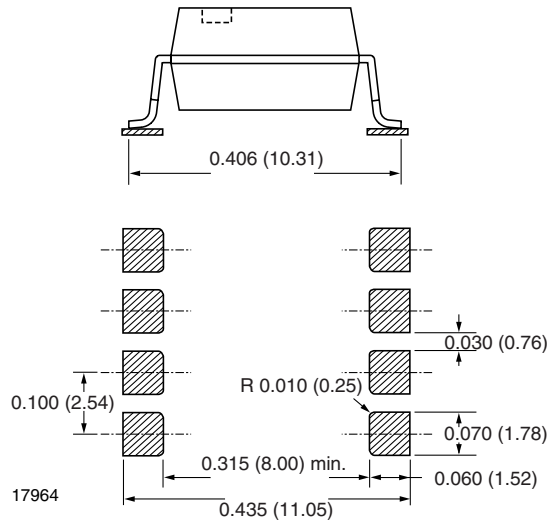


Fig. 12 - 8 Pin SMD Option 7

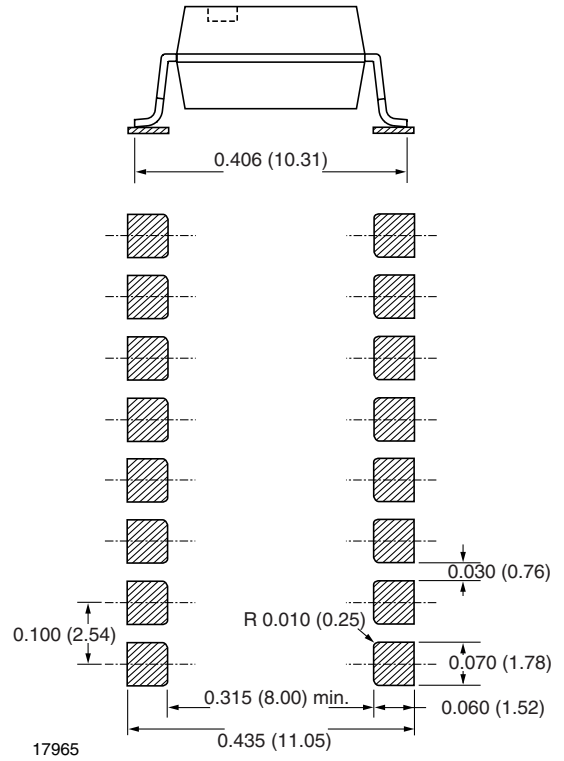


Fig. 13 - 16 Pin SMD Option 7

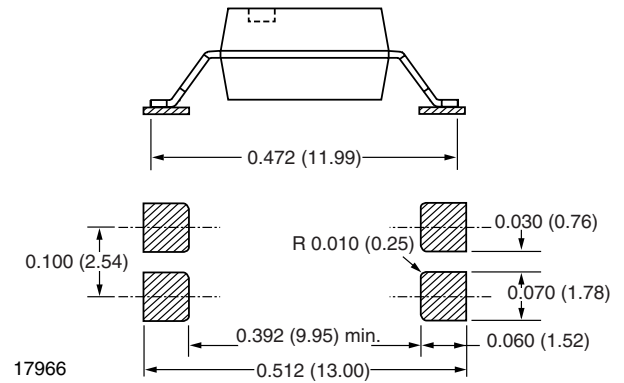


Fig. 14 - 4 Pin SMD Option 8

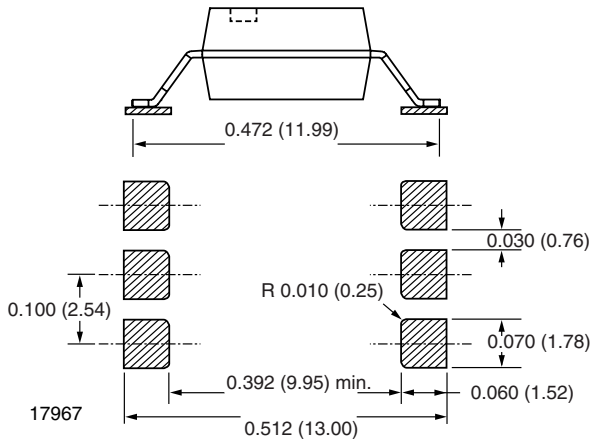


Fig. 15 - 6 Pin SMD Option 8

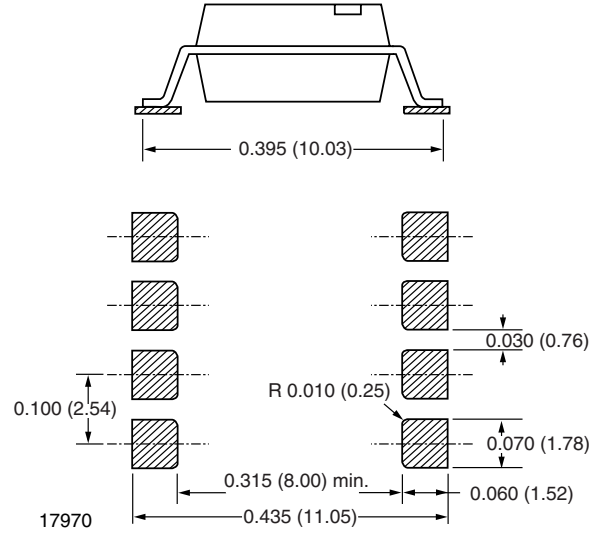


Fig. 18 - 8 Pin SMD Option 9

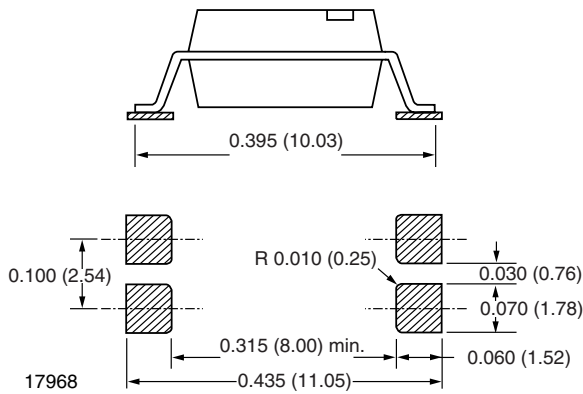


Fig. 16 - 4 Pin SMD Option 9

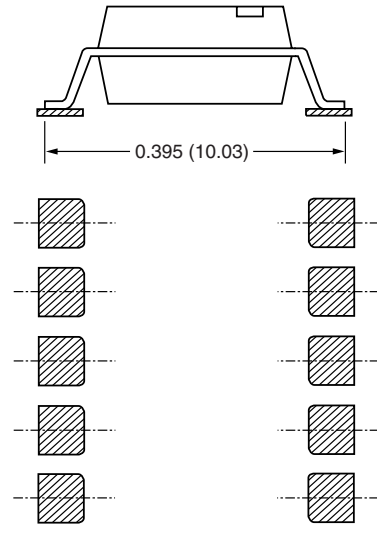


Fig. 19 - 16 Pin SMD Option 9

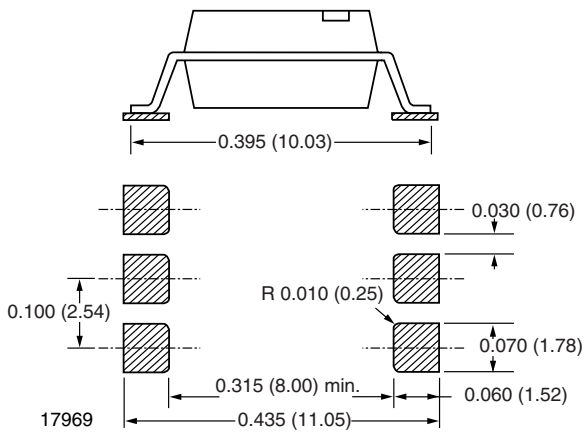


Fig. 17 - 6 Pin SMD Option 9

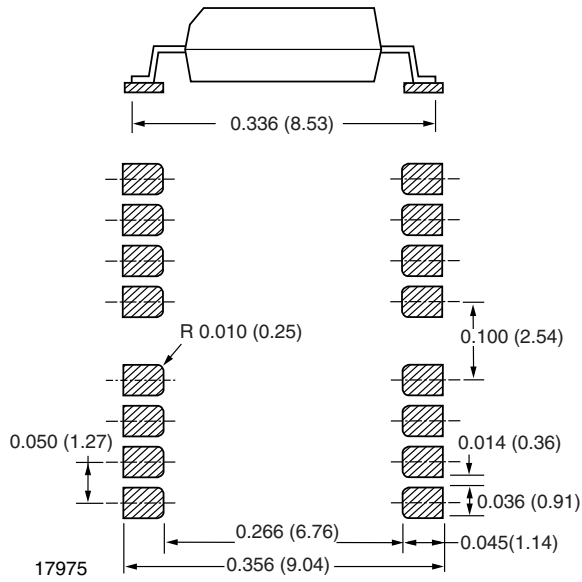


Fig. 20 - 16 Pin PCMCIA



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