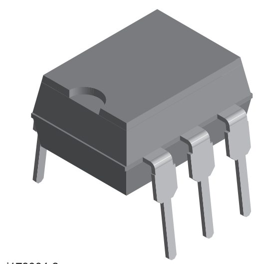
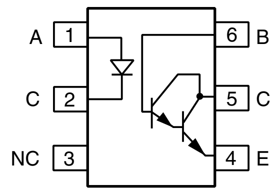
Optocoupler, Photodarlington Output, High Gain, with Base Connection



i179004-3



i179005_2

FEATURES

- Isolation test voltage, 5300 V_{RMS}
- Coupling capacitance, 0.5 pF
- Fast rise time, 10 µs
- Fast fall time, 35 µs
- Compliant to RoHS Directive 2002/95/EC and in accordance to WEEE 2002/96/EC

Pb-free
e3
RoHS COMPLIANT

AGENCY APPROVALS

- UL1577, file no. E52744 system code H, double protection
- CSA 93751
- BSI IEC 60950; IEC 60065

DESCRIPTION

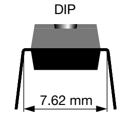
The MCA231 is a industry standard optocoupler, consisting of a gallium arsenide infrared LED and a silicon photodarlington. These optocouplers are constructed with a high voltage insulation packaging process which offers 7.5 kV withstand test capability.

ORDERING INFORMATION

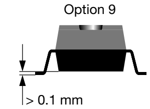
M	C	A	2	3	1	-	X	0	0	9	T

PART NUMBER (MCA231) — PACKAGE OPTION (X009) — TAPE AND REEL (T)

DIP



Option 9



AGENCY CERTIFIED/PACKAGE	CTR (%)
	10 mA
UL, BSI, VDE	**> 200**
DIP-6	MCA231
SMD-6, option 9	MCA231-X009T (1)

Note

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

(1) Also available in tubes, do not put T on the end.

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

PARAMETER	TEST CONDITION	PART	SYMBOL	VALUE	UNIT
INPUT					
Reverse voltage			V_R	6	V
Forward continuous current			I_F	60	mA
Power dissipation			P_{diss}	135	mW
Derate linearly from 25 °C				1.8	mW/°C
OUTPUT					
Collector emitter breakdown voltage		MCA231	BV_{CEO}	30	V
Emitter collector breakdown voltage			BV_{ECO}	7	V
Collector base breakdown voltage		MCA231	BV_{CBO}	30	V
Power dissipation			P_{diss}	210	mW
Derate linearly from 25 °C				2.8	mW/°C

ABSOLUTE MAXIMUM RATINGS (T_{amb} = 25 °C, unless otherwise specified)					
PARAMETER	**TEST CONDITION**	**PART**	**SYMBOL**	**VALUE**	**UNIT**
COUPLER					
Total package dissipation (LED plus detector)			P_{tot}	260	mW
Derate linearly from 25 °C				3.5	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
Isolation test voltage			V_{ISO}	5300	V_{RMS}
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

Note

- 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 (T_{amb} = 25 °C, unless otherwise specified)							
PARAMETER	**TEST CONDITION**	**PART**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
INPUT							
Forward voltage	I_F = 50 mA		V_F		1.1	1.5	V
Reverse current	V_R = 3 V		I_R			10	µA
Junction capacitance	V_R = 3 V		C_j		50		pF
OUTPUT							
Collector emitter breakdown voltage	I_C = 100 µA, I_F = 0 mA	MCA231	BV_{CEO}	30			V
Emitter collector breakdown voltage	I_E = 10 µA, I_F = 0 mA		BV_{ECO}	7			V
Collector base breakdown voltage	I_C = 10 µA, I_F = 0 mA	MCA231	BV_{CBO}	30			V
Collector emitter leakage current			I_{CEO}			100	nA
COUPLER							
Collector emitter saturation voltage	I_C = 2 mA, I_F = 16 mA		V_{CEsat}			0.8	V
	I_C = I_F = 50 mA		V_{CEsat}			1	V
	I_C = 2 mA, I_F = 1 mA		V_{CEsat}			1	V
	I_C = 10 mA, I_F = 5 mA		V_{CEsat}			1	V
	I_C = 50 mA, I_F = 10 mA		V_{CEsat}			1.2	V
Capacitance (input to output)			C_{IO}		0.5		pF

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 °C, unless otherwise specified)						
PARAMETER	**TEST CONDITION**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
DC current transfer ratio	V_{CE} = 5 V, I_F = 10 mA	CTR_{DC}	200			%

SWITCHING CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)						
PARAMETER	**TEST CONDITION**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
Switching times	R_L = 100 Ω, V_{CE} = 10 V	t_{on}		10		µs
		t_{off}		30		µs

TYPICAL CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)

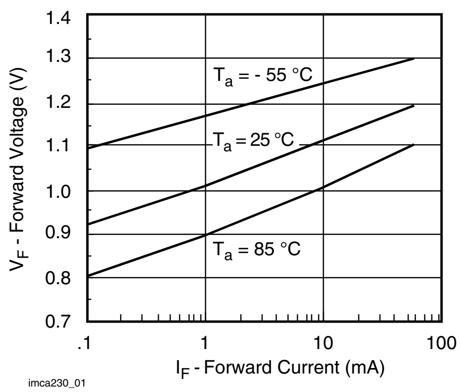


Fig. 1 - Forward Voltage vs. Forward Current

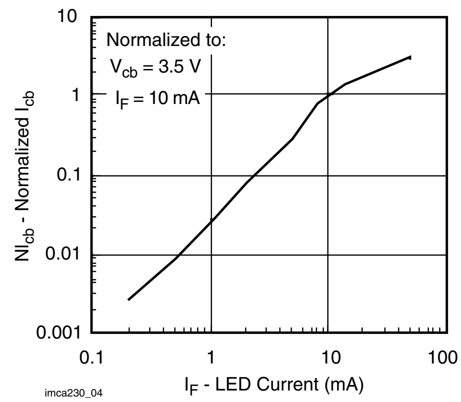


Fig. 4 - Normalized Collector Base Photocurrent vs. LED Current

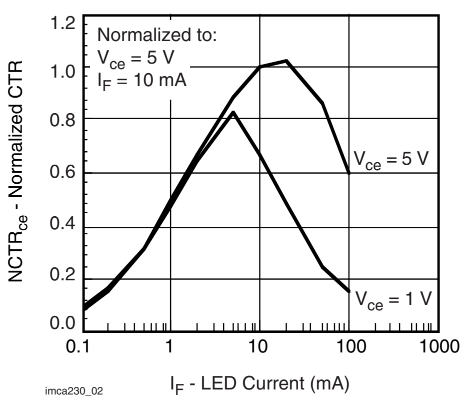


Fig. 2 - Normalized Non-Saturated and Saturated CTR vs. LED Current

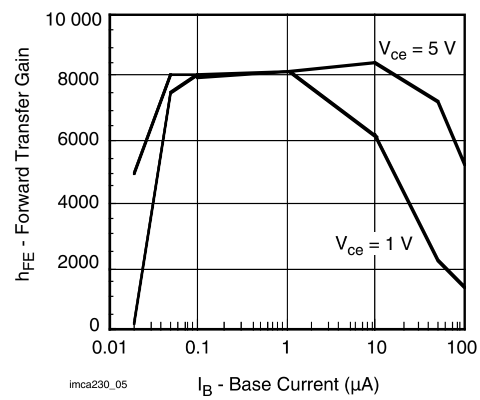


Fig. 5 - Non Saturated and Saturated h_{FE} vs. Base Current

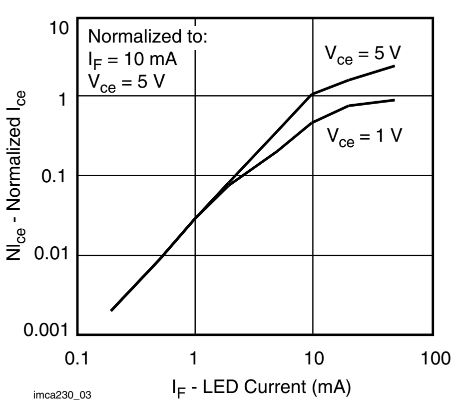


Fig. 3 - Normalized Non-Saturated and Saturated Collector Emitter Current vs. LED Current

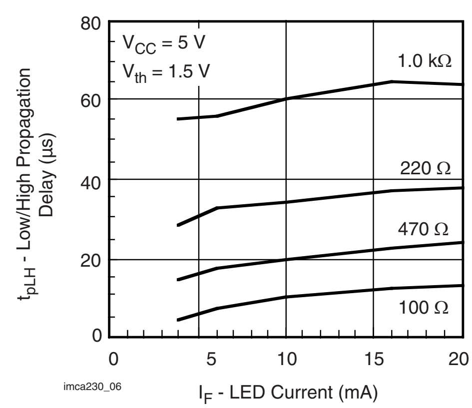


Fig. 6 - Low to High Propagation Delay vs. Collector Load Resistance and LED Current

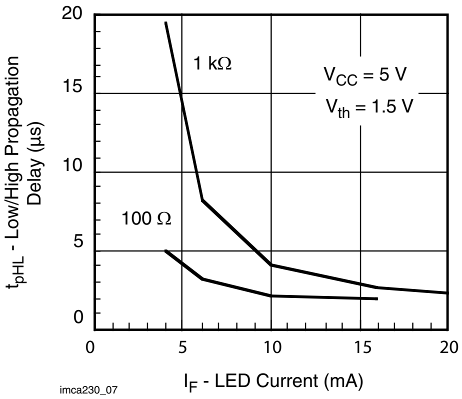


Fig. 7 - High to low Propagation Delay vs. Collector Load Resistance and LED Current

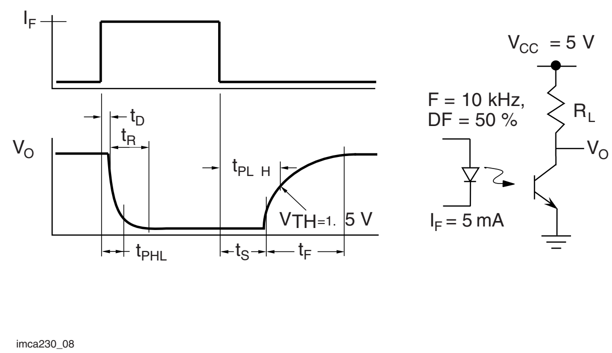
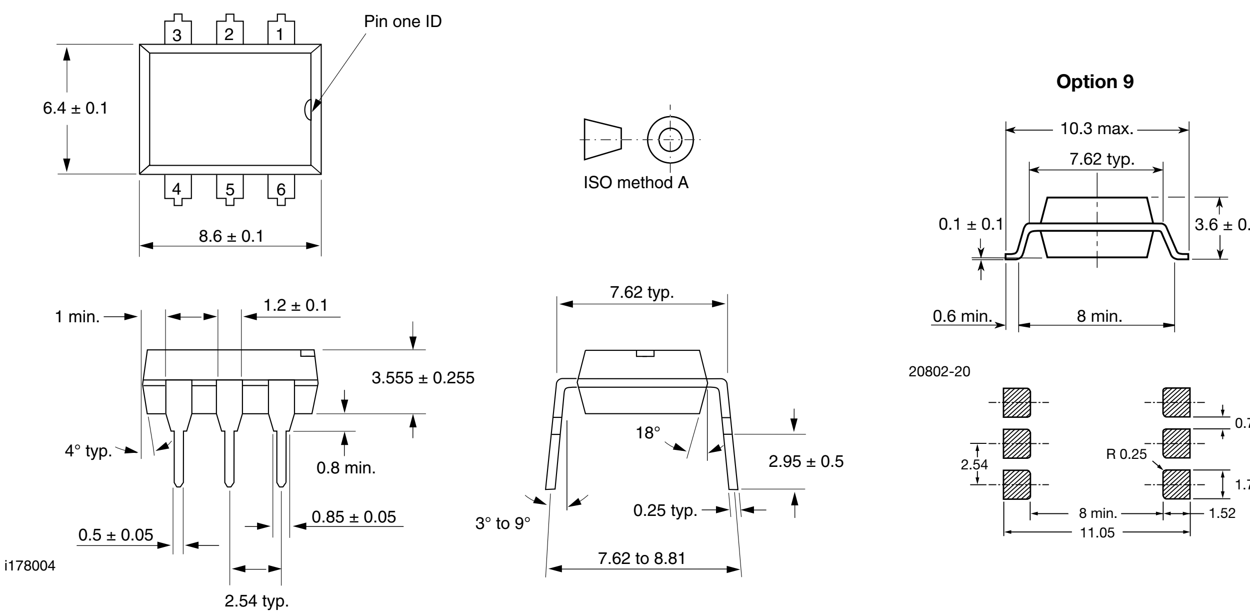
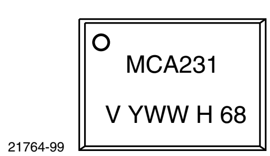


Fig. 8 - Switching Timing Waveform and Schematic

PACKAGE DIMENSIONS in millimeters



PACKAGE MARKING

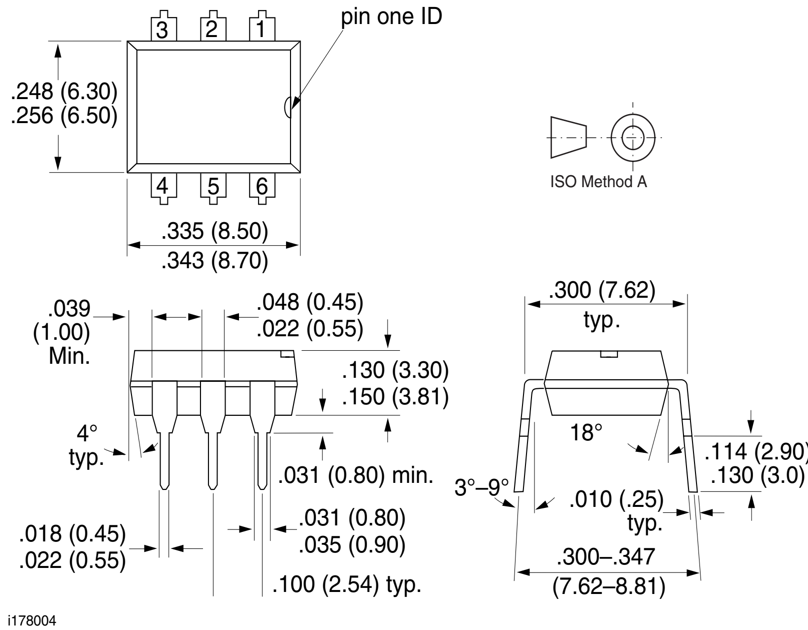


Note

- Tape and reel suffix (T) is not part of the package marking.

DIP-6A

Package Dimensions in Inches (mm)



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 operatingsystems 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.

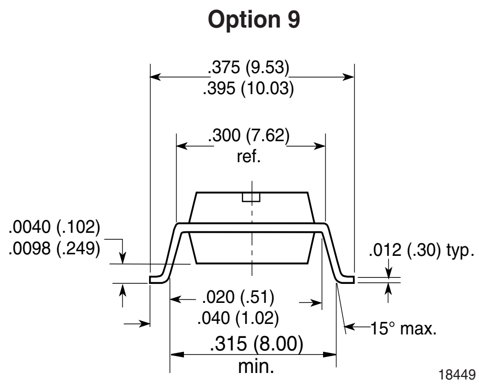
Vishay Semiconductor GmbH has been able to use its policy of continuous improvements to eliminate the use of ODSs listed in the following documents.

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
Telephone: 49 (0)7131 67 2831, Fax number: 49 (0)7131 67 2423

Option 9


Option 9
.375 (9.53)
.395 (10.03)
.300 (7.62)
ref.
.0040 (.102)
.0098 (.249)
.012 (.30) typ.
.020 (.51)
.040 (1.02)
15° max.
.315 (8.00)
min.
18449

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 operatingsystems 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
Telephone: 49 (0)7131 67 2831, Fax number: 49 (0)7131 67 2423

Footprints

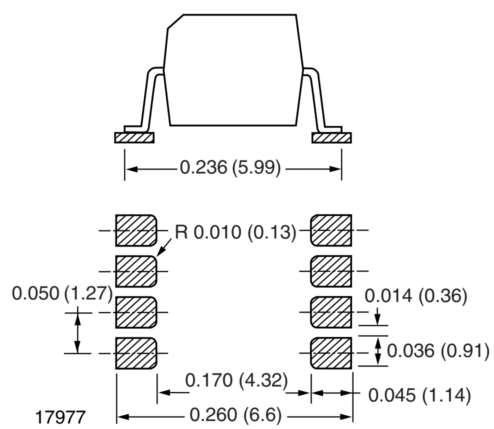


Fig. 1 - SO8A and DSO8A SMD

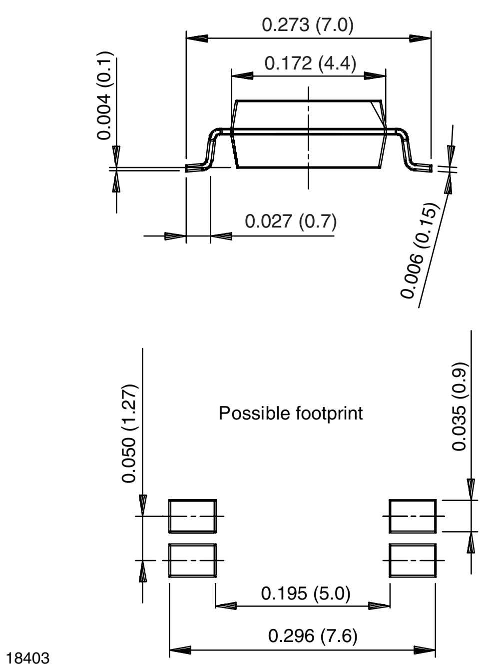


Fig. 2 - SOP-4, Miniflat

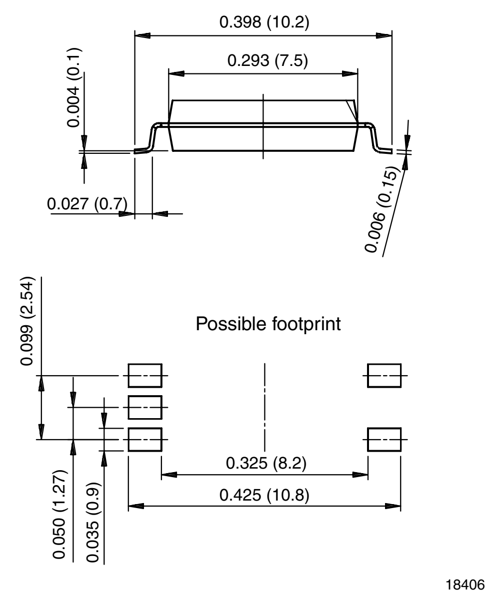


Fig. 3 - SOP-6, 5 Pin Wide Body

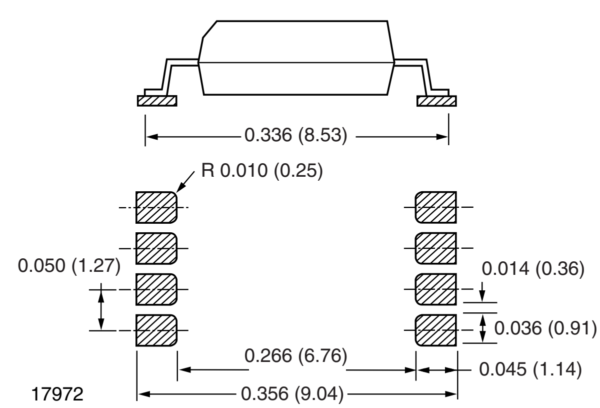


Fig. 4 - 8 Pin PCMCIA

Footprints

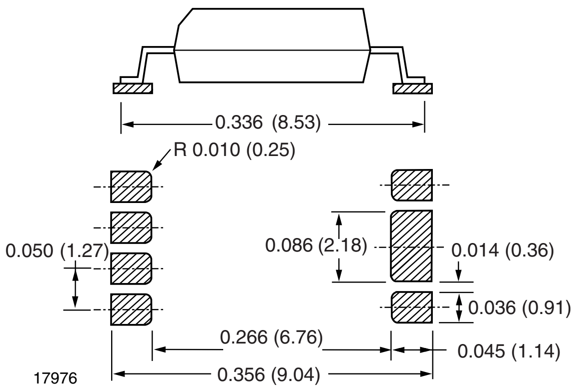


Fig. 5 - 8 Pin PCMCIA, Heat Sink

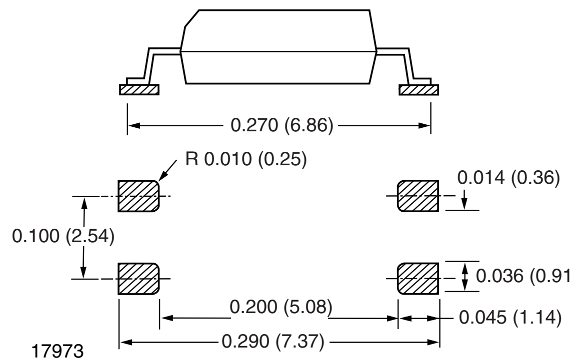


Fig. 8 - 4 Pin Mini-Flat

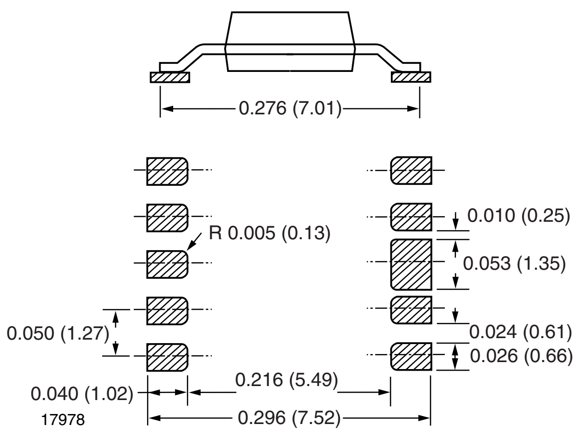


Fig. 6 - Mini Coupler

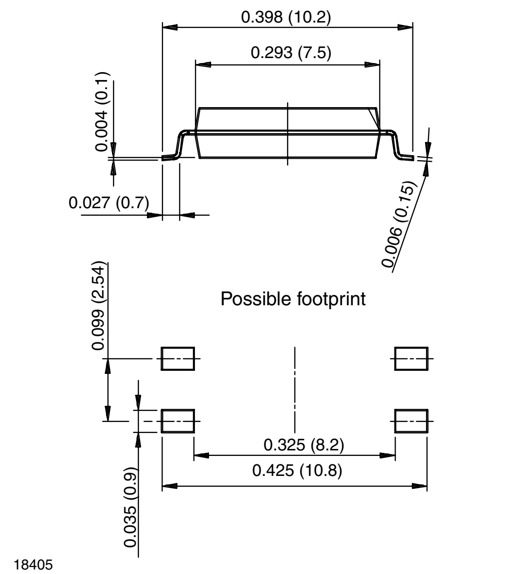


Fig. 9 - SOP-6, 4 Pin Wide Body

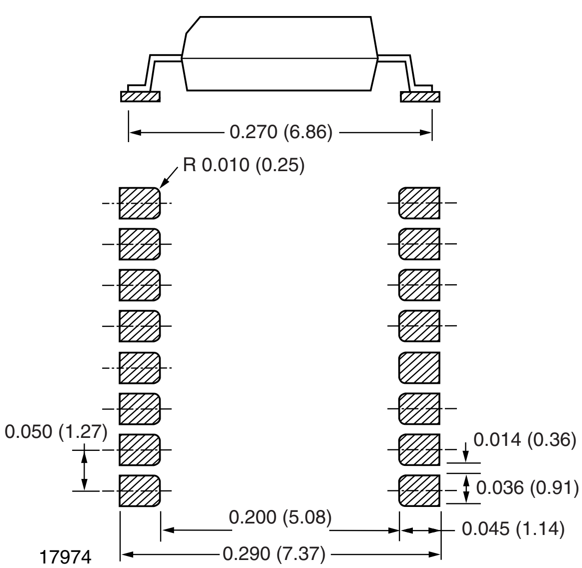


Fig. 7 - SOP-16

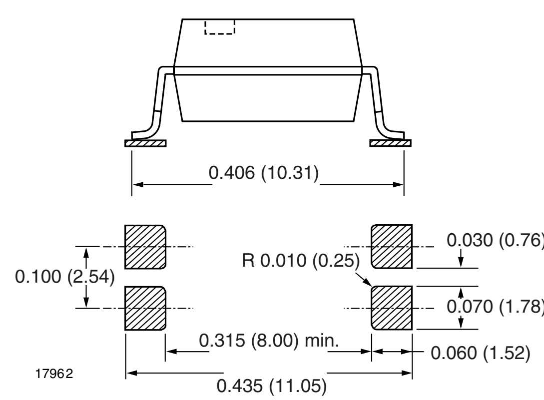


Fig. 10 - 4 Pin SMD Option 7

For technical questions, please contact: optocoupler.answers@vishay.com

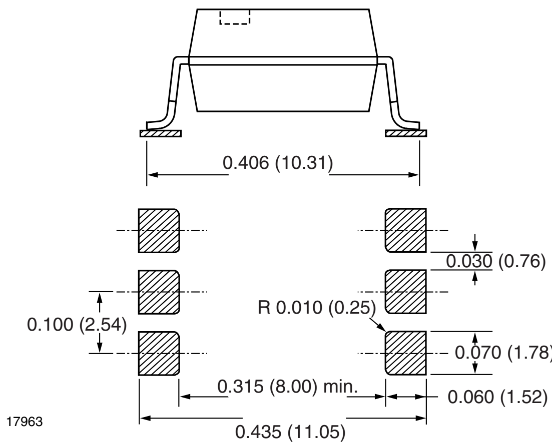


Fig. 11 - 6 Pin SMD Option 7

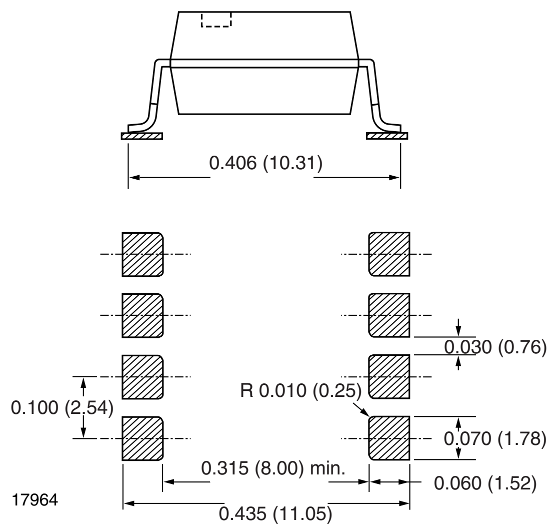


Fig. 12 - 8 Pin SMD Option 7

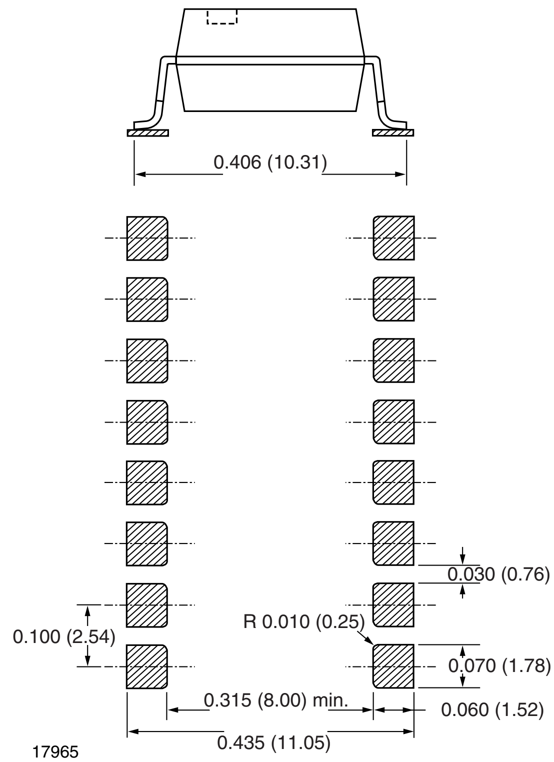


Fig. 13 - 16 Pin SMD Option 7

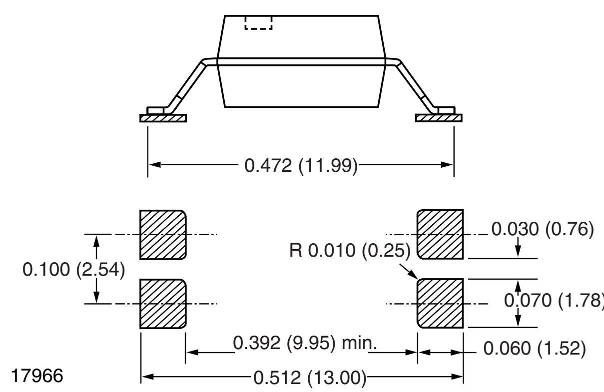


Fig. 14 - 4 Pin SMD Option 8

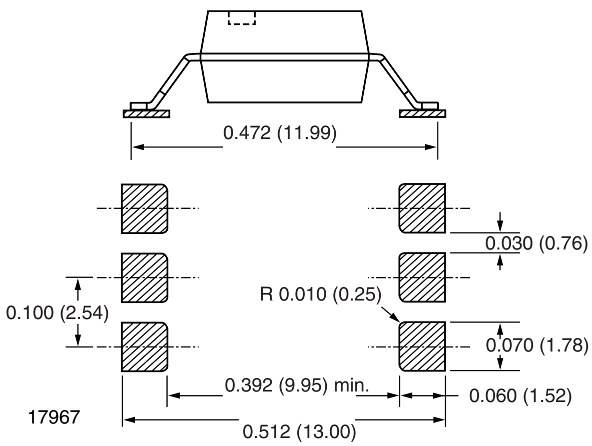


Fig. 15 - 6 Pin SMD Option 8

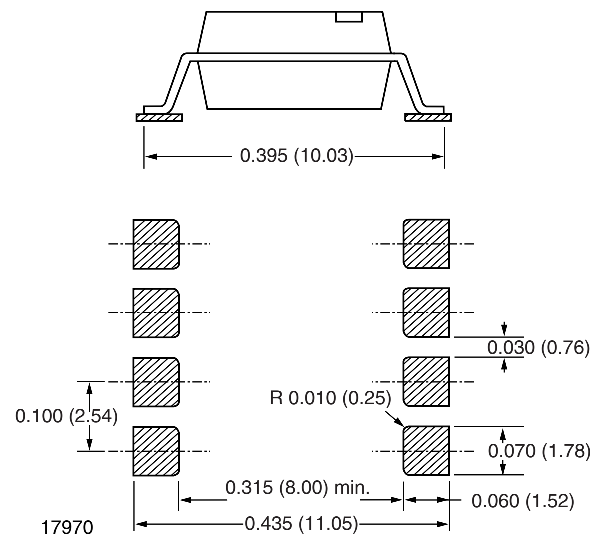


Fig. 18 - 8 Pin SMD Option 9

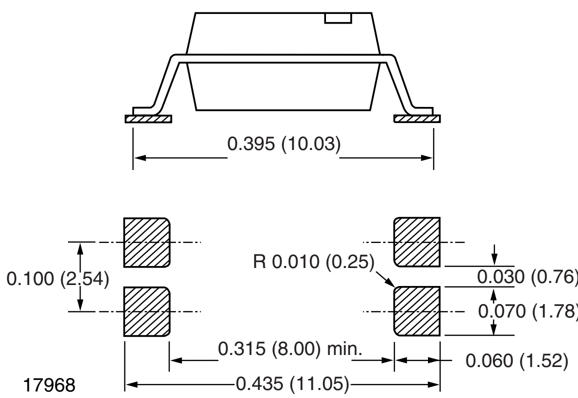


Fig. 16 - 4 Pin SMD Option 9

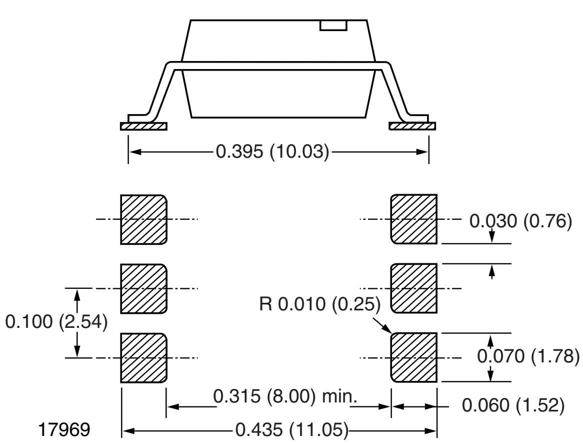


Fig. 17 - 6 Pin SMD Option 9

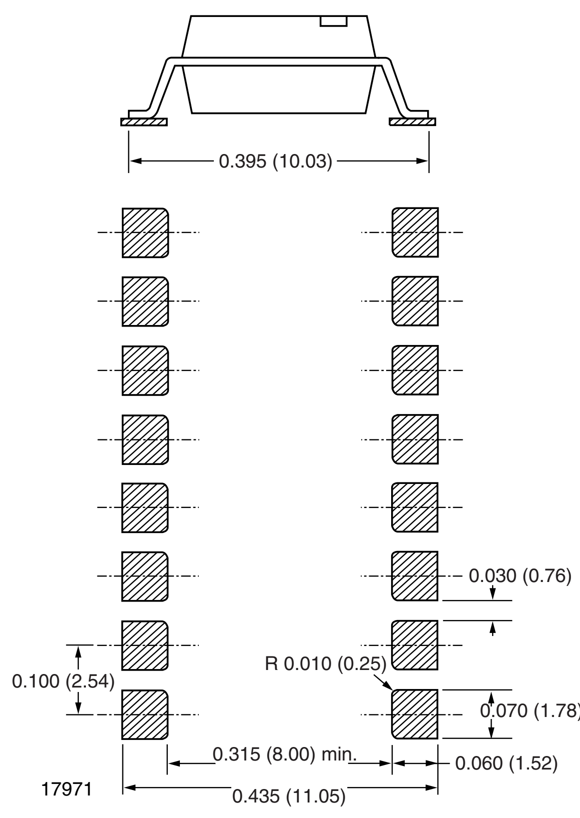


Fig. 19 - 16 Pin SMD Option 9

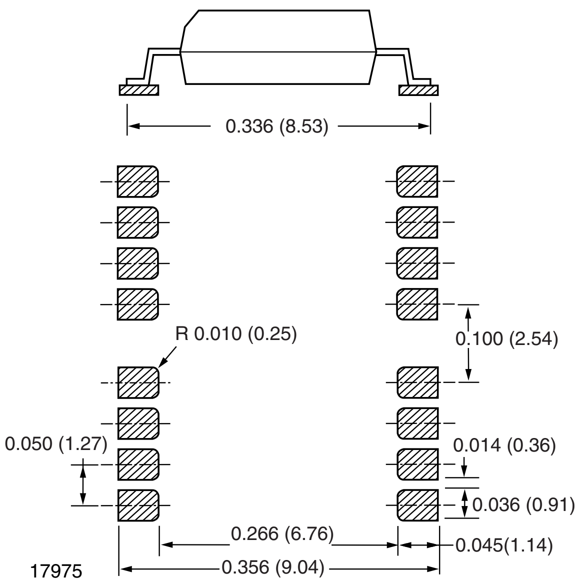


Fig. 20 - 16 Pin PCMCIA

Disclaimer

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, “Vishay”), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

Vishay makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Vishay disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Vishay’s knowledge of typical requirements that are often placed on Vishay products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer’s responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and/or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer’s technical experts. Product specifications do not expand or otherwise modify Vishay’s terms and conditions of purchase, including but not limited to the warranty expressed therein.

Except as expressly indicated in writing, Vishay products are not designed for use in medical, life-saving, or life-sustaining applications or for any other application in which the failure of the Vishay product could result in personal injury or death. Customers using or selling Vishay products not expressly indicated for use in such applications do so at their own risk and agree to fully indemnify and hold Vishay and its distributors harmless from and against any and all claims, liabilities, expenses and damages arising or resulting in connection with such use or sale, including attorneys fees, even if such claim alleges that Vishay or its distributor was negligent regarding the design or manufacture of the part. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay. Product names and markings noted herein may be trademarks of their respective owners.