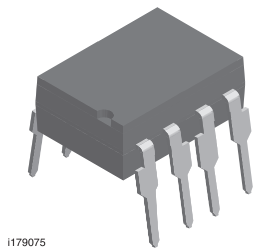
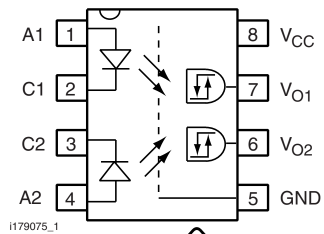
High Speed Optocoupler, Dual, 5 MBd





FEATURES

- Data rate 5 MBits/s (2.5 MBit/s over temperature)
- Buffer
- Isolation test voltage, 5300 V_{RMS}
- TTL, LSTTL and CMOS compatible
- Internal shield for very high common mode transient immunity
- Wide supply voltage range (4.5 V to 15 V)
- Low input current (1.6 mA to 5 mA)
- Specified from 0 °C to 85 °C
- Compliant to RoHS Directive to 2002/95/EC and in accordance WEEE 2002/96/EC

DESCRIPTION

The dual channel 5 Mb/s SFH6731 and SFH6732 high speed optocoupler consists of a GaAlAs infrared emitting diode, optically coupled with an integrated photo detector. The detector incorporates a Schmitt-Trigger stage for improved noise immunity. A Faraday shield provides a common mode transient immunity of 1000 V/µs at V_{CM} = 50 V for SFH6731 and 500 V/µs at V_{CM} = 300 V for SFH6732.
The SFH6731 and SFH6732 uses an industry standard DIP-8 package. With standard lead bending, creepage distance and clearance of ≥ 7 mm with lead bending options 6, 7 and 9 ≥ 8 mm are achieved.

AGENCY APPROVALS

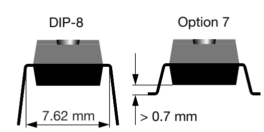
- UL1577, file no. E52744 system code H, double protection
- DIN EN 60747-5-5 (VDE 0884) available with option 1

APPLICATIONS

- Industrial control
- Replace pulse transformers
- Routine logic interfacing
- Motion/power control
- High speed line receiver
- Microprocessor system interfaces
- Computer peripheral interfaces

ORDERING INFORMATION

S	F	H	6	7	3	#	-	X	0	#	#	T
PART NUMBER								PACKAGE OPTION				TAPE AND REEL



AGENCY CERTIFIED/PACKAGE	CMR (kV/µs)	CMR (kV/µs)
UL	**1**	**5**
DIP-8	SFH6731	SFH6732
SMD-8, option 7	-	SFH6732-X007T
VDE, UL	**1**	**5**
SMD-8, option 7	SFH6731-X017T	-

TRUTH TABLE (positive logic)

PARTS	IR DIODE	OUTPUT
SFH6731	On	H
	Off	L
SFH6732	On	H
	Off	L

ABSOLUTE MAXIMUM RATINGS (T_{amb} = 25 °C, unless otherwise specified)				
PARAMETER	**TEST CONDITION**	**SYMBOL**	**VALUE**	**UNIT**
INPUT				
Reverse voltage		V_R	3	V
DC Forward current		I_F	10	mA
Surge forward current	$t_p \leq 1$ µs, 300 pulses/s	I_{FSM}	1	A
Power dissipation		P_{diss}	20	mW
OUTPUT				
Supply voltage		V_{CC}	- 0.5 to + 15	V
Output voltage		V_O	- 0.5 to + 15	V
Average output current		I_O	25	mA
Power dissipation		P_{diss}	100	mW
COUPLER				
Storage temperature range		T_{stg}	- 55 to + 125	°C
Ambient temperature range		T_{amb}	- 40 to + 85	°C
Lead soldering temperature	t = 10 s	T_s	260	°C
Isolation test voltage	t = 1 s	V_{ISO}	5300	V_{RMS}
Pollution degree			2	
Creepage distance and clearance	Standard lead bending		7	mm
	Option 6, 7, 9		8	mm
Comparative tracking index per DIN IEC 112/VDE 0303, part 1		CTI	175	
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 (1) (T_{amb} = 25 °C, unless otherwise specified)						
PARAMETER	**TEST CONDITION**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
INPUT (2)						
Forward voltage	I_F = 5 mA	V_F		1.6	1.75	V
		V_F			1.8	V
Input current hysteresis	V_{CC} = 5 V, $I_{HYS} = I_{Fon} - I_{Foff}$			01		mA
Reverse current	V_R = 3 V	I_R		0.5	10	µA
Capacitance	V_R = 0 V, f = 1MHz	C_O		60		pF
Thermal resistance		R_{thja}		700		K/W
OUTPUT						
Logic low output voltage	I_{OL} = 6.4 mA	V_{OL}			0.5	V
Logic high output voltage	I_{OH} = - 2.6 mA, $V_{OH} = V_{CC}$ - 1.8 V (3)	V_{OH}	2.4	(3)		V
Output leakage current ($V_{OUT} > V_{CC}$)	V_O = 5.5 V, V_{CC} = 4.5 V, I_F = 5 mA	I_{OHH}		0.5	100	µA
	V_O = 15 V, V_{CC} = 4.5 V, I_F = 5 mA	I_{OHH}		1	500	µA
Logic low supply current	V_{CC} = 5.5 V, I_F = 0 A	I_{CCL}		3.7	6	mA
	V_{CC} = 15 V, I_F = 0 A	I_{CCL}		4.1	6.5	mA
Logic high supply current	V_{CC} = 5.5 V, I_F = 5 mA	I_{CCH}		3.4	4	mA
	V_{CC} = 15 V, I_F = 5 mA	I_{CCH}		3.7	5	mA
Logic low short circuit output current	$V_O = V_{CC}$ = 5.5 V, I_F = 0 A	I_{OSL}	25			mA
	$V_O = V_{CC}$ = 15 V, I_F = 0 A	I_{OSL}	40			mA

ELECTRICAL CHARACTERISTICS [1] (T_{amb} = 25 °C, unless otherwise specified)						
PARAMETER	**TEST CONDITION**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
OUTPUT						
Logic high short circuit output current	V_{CC} = 5.5 V, V_O = 0 V, I_F = 5 mA	I_{OSH}			- 10	mA
	V_{CC} = 15 V, V_O = 0 V, I_F = 5 mA	I_{OSH}			- 25	mA
Thermal resistance				300		K/W
COUPLER						
Capacitance (input to output)	f = 1 MHz, pins 1 to 4 and 5 to 8 shorted together	C_{IO}		0.6		pF

Notes

(1) 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.

(2) 0 °C ≤ T_{amb} ≤ 85 °C; 4.5 V ≤ V_{CC} ≤ 15 V; 1.6 mA ≤ I_{Fon} ≤ 5 mA; 2 ≤ V_{EH} ≤ 15 V; 0 ≤ V_{EL} ≤ 0.8 V; 0 mA ≤ I_{Foff} ≤ 0.1 mA.
Typical values: T_{amb} = 25 °C; V_{CC} = 5 V; I_{Fon} = 3 mA unless otherwise specified.

(3) Output short circuit time ≤ 10 ms.

SWITCHING CHARACTERISTICS [1]						
PARAMETER	**TEST CONDITION**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
Propagation delay time to logic low output level	without peaking capacitor	t_{PHL}		120		ns
	with peaking capacitor	t_{PHL}		115	300	ns
	without peaking capacitor	t_{PLH}		125		ns
	with peaking capacitor	t_{PLH}		90	300	ns
Output rise time	10 % to 90 %	t_r		40		ns
Output fall time	90 % to 10 %	t_f		10		ns

Note

(1) 0 °C ≤ T_{amb} ≤ 85 °C; 4.5 V ≤ V_{CC} ≤ 15 V; 1.6 mA ≤ I_{Fon} ≤ 5 mA; 0 mA ≤ I_{Foff} ≤ 0.1 mA. Typical values: T_{amb} = 25 ° C; V_{CC} = 5 V; I_{Fon} = 3 mA unless otherwise specified.

RECOMMENDED OPERATING CONDITIONS [1]						
PARAMETER	**TEST CONDITION**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
Supply voltage		V_{CC}	4.5		15	V
Forward input current		I_{Fon}	1.6 [2]		5	mA
		I_{Foff}			0.1	mA
Operating temperature		T_A	0		85	°C

Notes

(1) A 0.1 µF bypass capacitor connected between pins 5 and 8 must be used.

(2) We recommend using a 2.2 mA to permit at least 20 % CTR degradation guard band.

COMMON MODE TRANSIENT IMMUNITY [1]							
PARAMETER	**TEST CONDITION**	**PART**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
Logic high common mode transient immunity [2]	$\lvert V_{CM} \rvert$ = 50 V, I_F = 1.6 mA	SFH6731	$\lvert CM_H \rvert$	1000			V/µs
	$\lvert V_{CM} \rvert$ = 300 V, I_F = 1.6 mA	SFH6732	$\lvert CM_H \rvert$	5000			V/µs
Logic low common mode transient immunity [2]	$\lvert V_{CM} \rvert$ = 50 V, I_F = 0 mA	SFH6731	$\lvert CM_L \rvert$	1000			V/µs
	$\lvert V_{CM} \rvert$ = 1000 V, I_F = 0 mA	SFH6732	$\lvert CM_L \rvert$	10 000			V/µs

Notes

(1) T_{amb} = 25 °C, V_{CC} = 5 V [2]

(2) CMH is the maximum slew rate of a common mode voltage VCM at which the output voltage remains at logic high level (V_O > 2 V). CML is the maximum slew rate of a common mode voltage VCM at which the output voltage remains at logic low level (V_O < 0.8 V).

SAFETY AND INSULATION RATINGS						
PARAMETER	**TEST CONDITION**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
Climatic classification (according to IEC 68 part 1)				55/100/21		
Comparative tracking index		CTI	175		399	
V_{IOTM}			8000			V
V_{IORM}			890			V
P_{SO}					500	mW
I_{SI}					300	mA
T_{SI}					175	°C
Creepage distance	Standard DIP-8		7			mm
Clearance distance	Standard DIP-8		7			mm
Creepage distance	400 mil DIP-8		8			mm
Clearance distance	400 mil DIP-8		8			mm

Note

- As per IEC 60747-5-5, § 7.4.3.8.1, this optocoupler is suitable for “safe electrical insulation” only within the safety ratings. Compliance with the safety ratings shall be ensured by means of protective circuits.

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

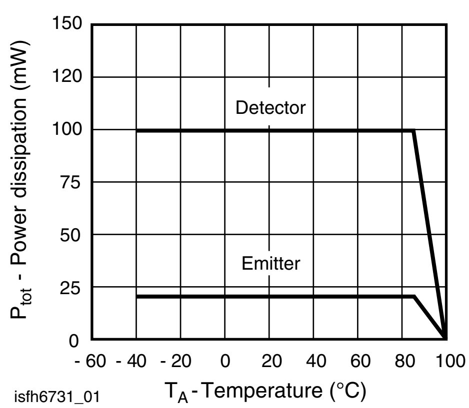


Fig. 1 - Permissible Total Power Dissipation vs. Temperature

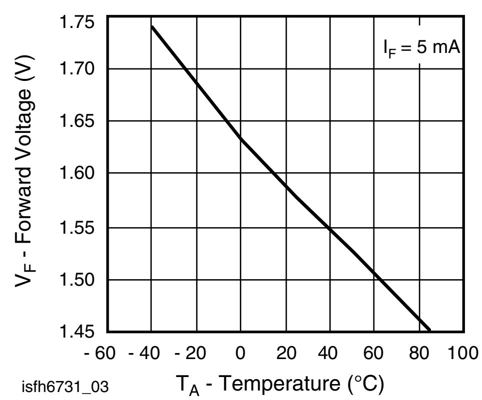


Fig. 3 - Typical Forward Input Voltage vs. Temperature

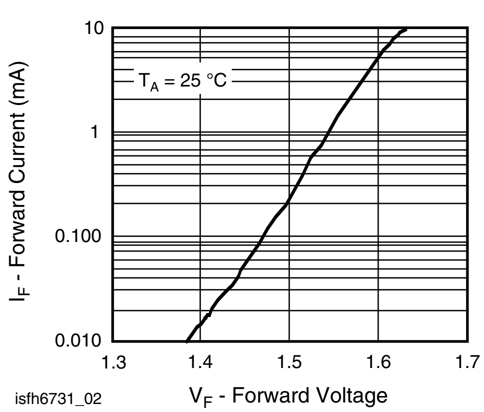


Fig. 2 - Typical Input Diode Forward Current vs. Forward Voltage

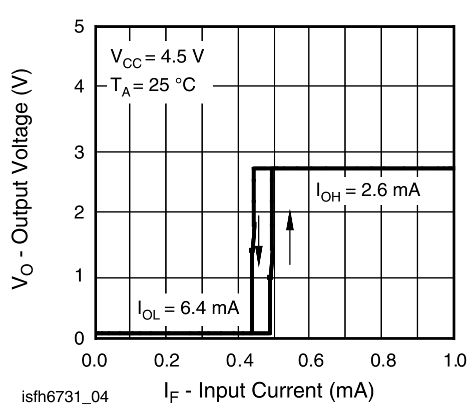


Fig. 4 - Typical Output Voltage vs. Forward Input Current

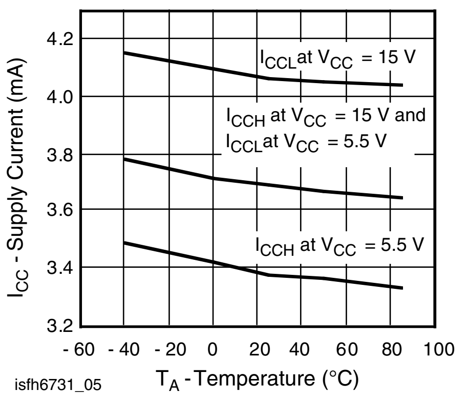


Fig. 5 - Typical Supply Current vs. Temperature

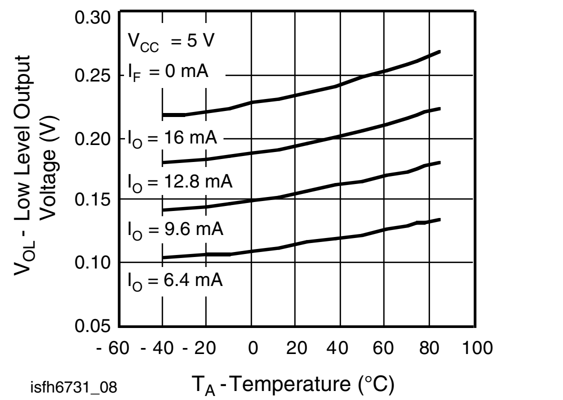


Fig. 8 - Typical Low Level Output Voltage vs. Temperature

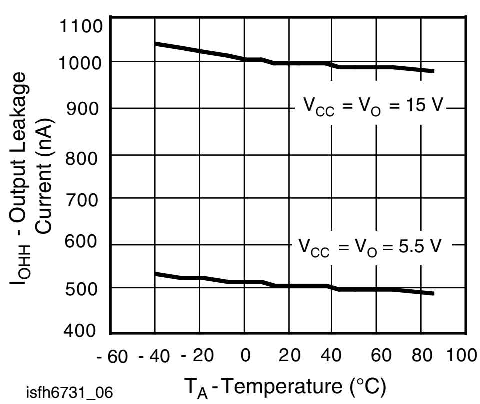


Fig. 6 - Typical Output Leakage Current vs. Temperature

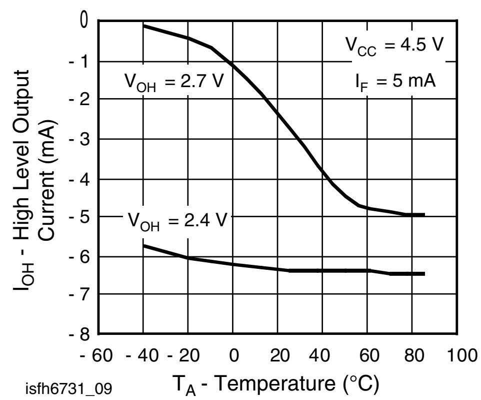


Fig. 9 - Typical High Level Output Current vs. Temperature

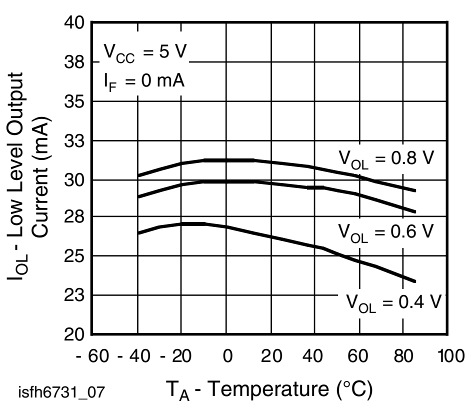


Fig. 7 - Typical Low Level Output Current vs. Temperature

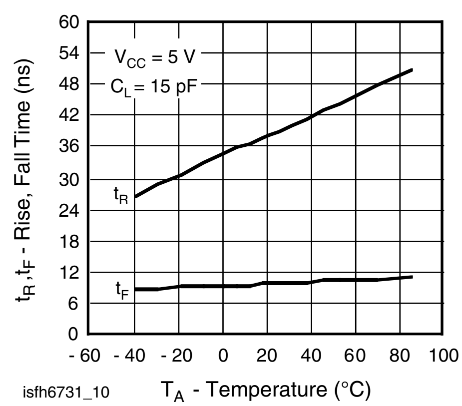


Fig. 10 - Rise and Fall Time vs. Ambient Temperature

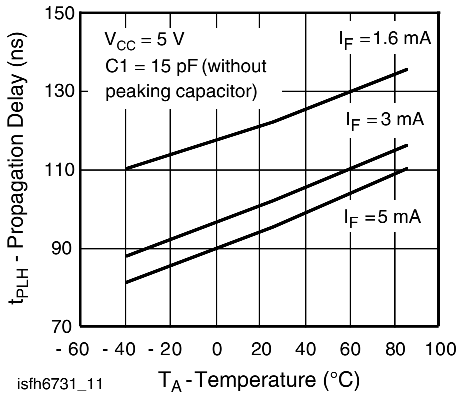


Fig. 11 - Typical Propagation Delays to Logic High vs. Temperature

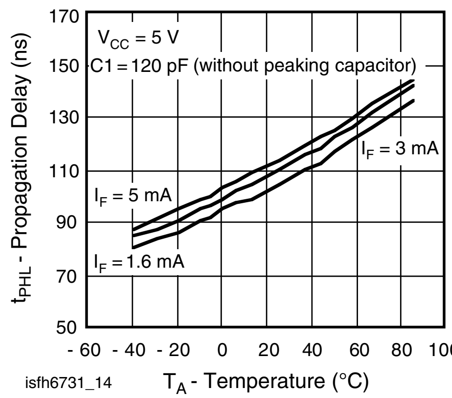


Fig. 14 - Typical Propagation Delays to Logic Low vs.Temperature

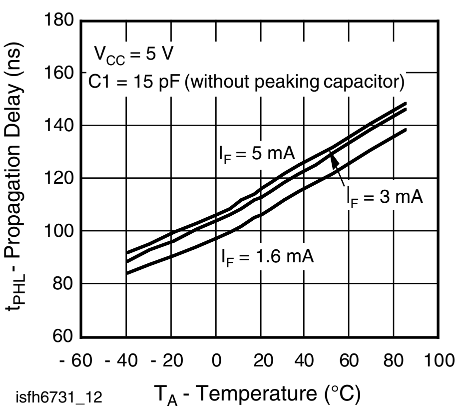


Fig. 12 - Typical Propagation Delays to Logic Low vs.Temperature

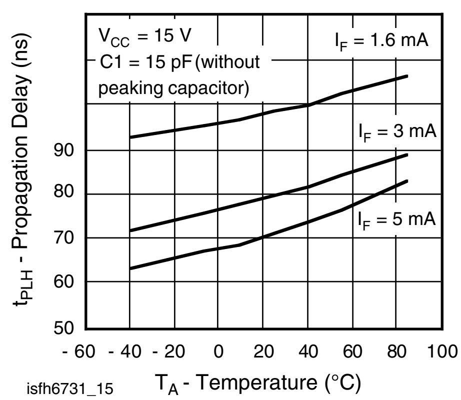


Fig. 15 - Typical Propagation Delays to Logic High vs. Temperature

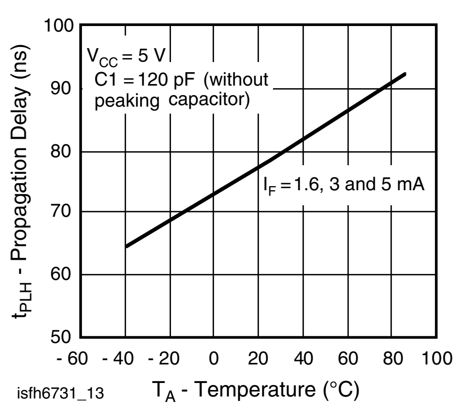


Fig. 13 - Typical Propagation Delays to Logic High vs. Temperature

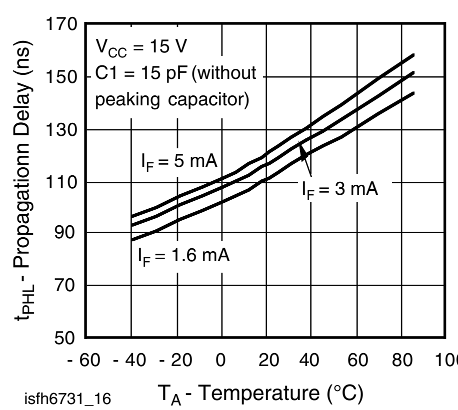


Fig. 16 - Typical Propagation Delays to Logic Low vs.Temperature

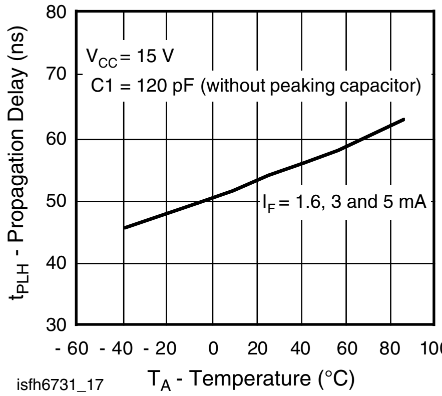


Fig. 17 - Typical Propagation Delays to Logic High vs. Temperature

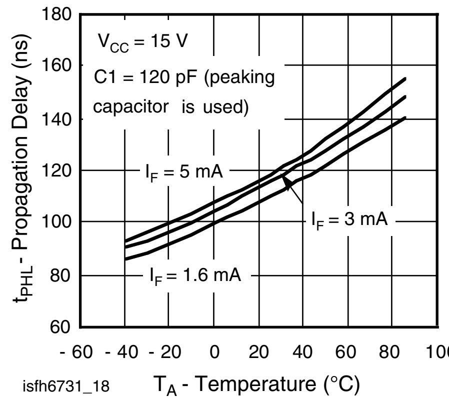
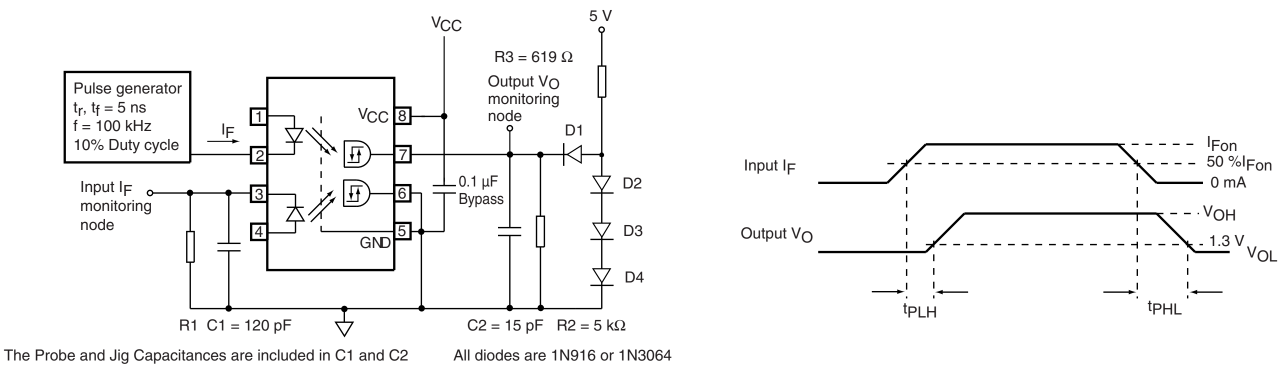


Fig. 18 - Typical Propagation Delays to Logic Low vs.Temperature



R1	2.15 kΩ	1.1 kΩ	681 Ω
IFon	1.6 mA	3 mA	5 mA

Fig. 19 - Test Circuit for t_{PLH}

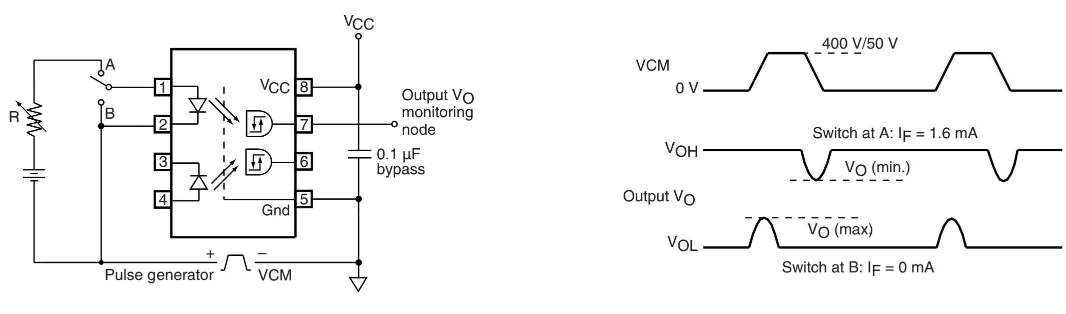
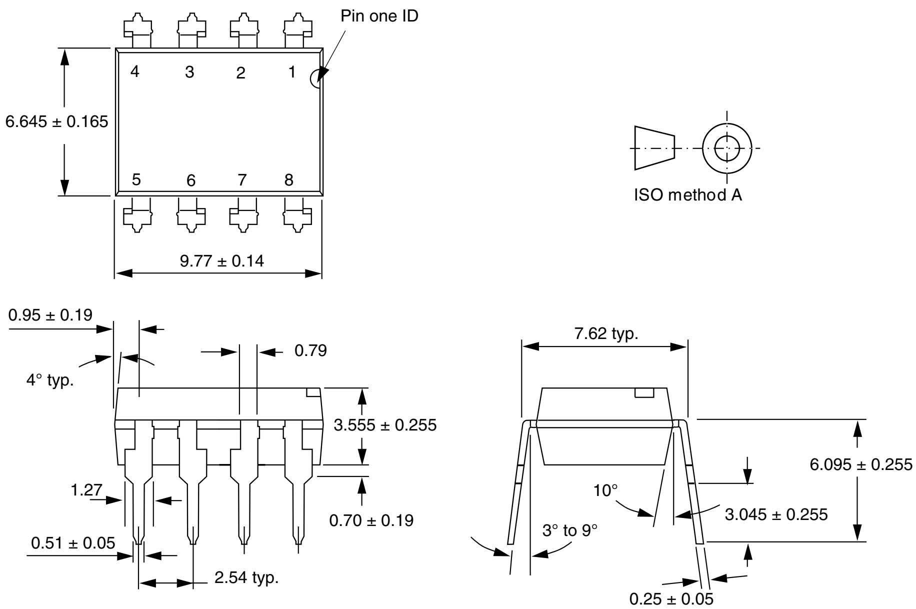


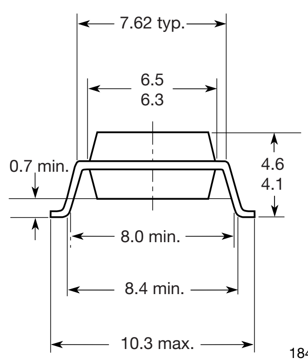
Fig. 20 - Test Circuit for Common Mode Transient Immunity and Typical Waveforms

PACKAGE DIMENSIONS in millimeters



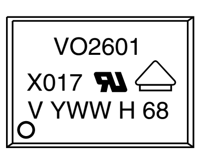
i178006

Option 7



18447

PACKAGE MARKING



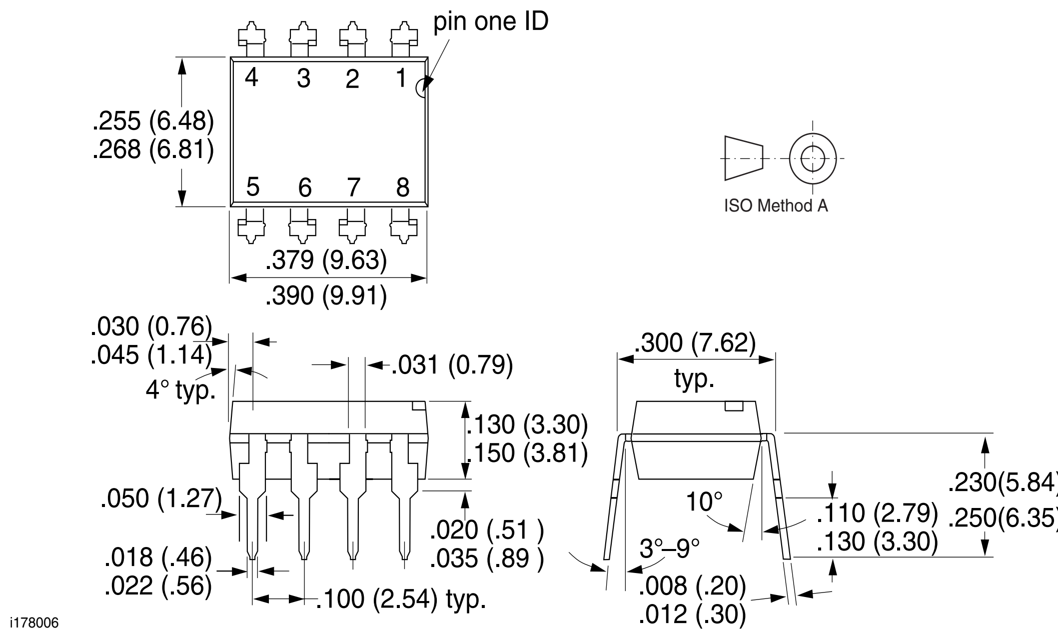
21764-45

Note

- Option 1 and VDE logos are only marked on option 1 parts.

DIP-8

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.

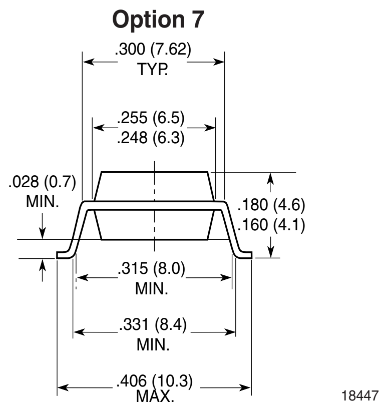
1. Annex A, B and list of transitional substances of the Montreal Protocol and the London Amendments respectively
2. Class I and II ozone depleting substances in the Clean Air Act Amendments of 1990 by the Environmental Protection Agency (EPA) in the USA
3. Council Decision 88/540/EEC and 91/690/EEC 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

Document Number 83241
Rev. 1.1, 09-Dec-03

Option 7


Option 7
.300 (7.62)
TYP.
.255 (6.5)
.248 (6.3)
.028 (0.7)
MIN.
.180 (4.6)
.160 (4.1)
.315 (8.0)
MIN.
.331 (8.4)
MIN.
.406 (10.3)
MAX.
18447

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

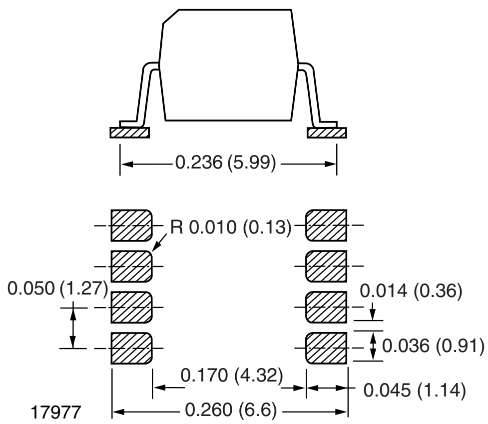


Fig. 1 - SO8A and DSO8A SMD

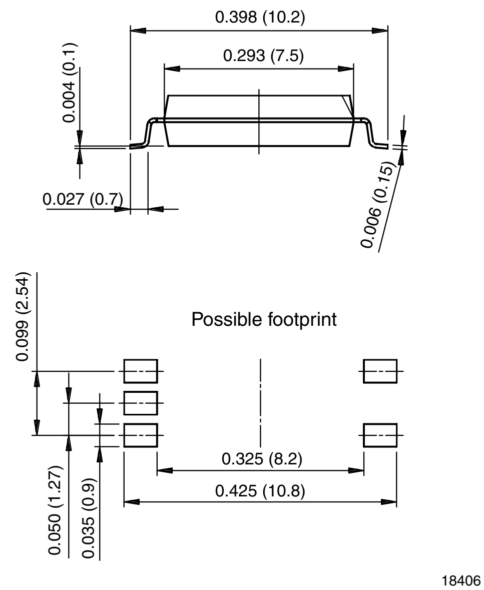


Fig. 3 - SOP-6, 5 Pin Wide Body

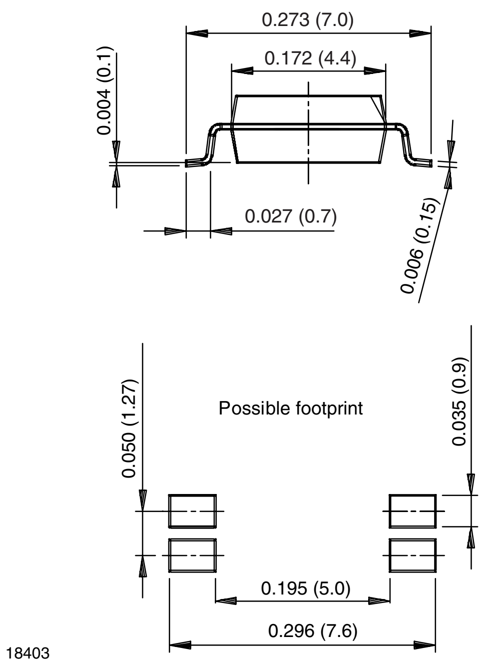


Fig. 2 - SOP-4, Miniflat

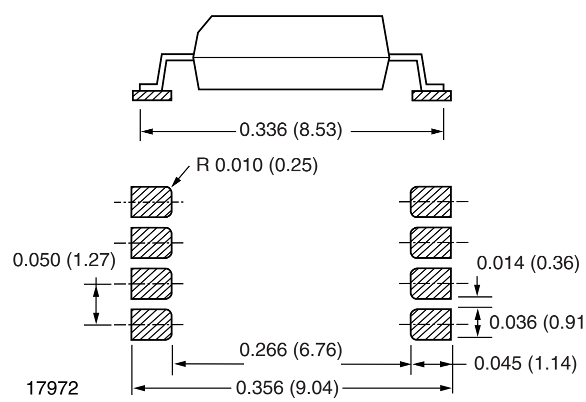


Fig. 4 - 8 Pin PCMCIA

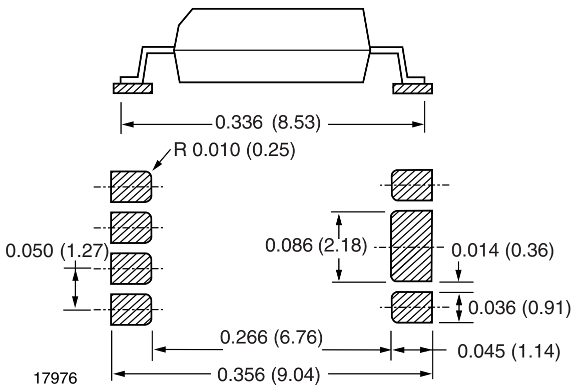


Fig. 5 - 8 Pin PCMCIA, Heat Sink

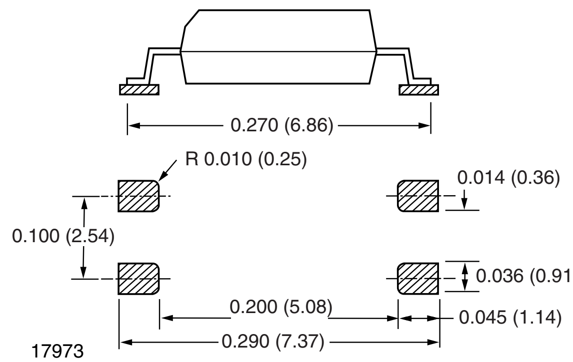


Fig. 8 - 4 Pin Mini-Flat

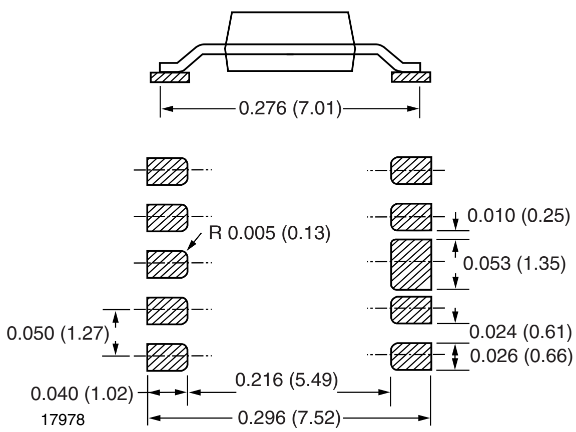


Fig. 6 - Mini Coupler

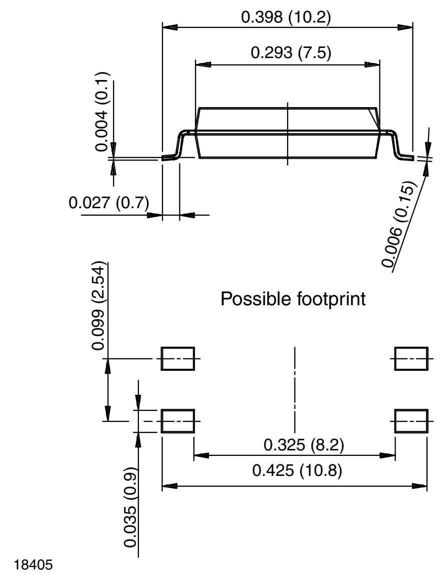


Fig. 9 - SOP-6, 4 Pin Wide Body

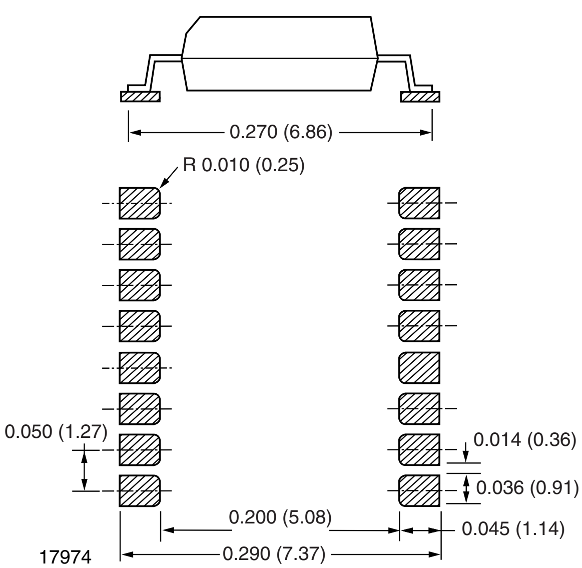


Fig. 7 - SOP-16

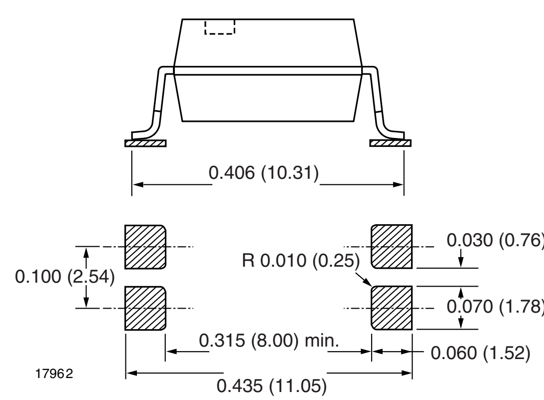


Fig. 10 - 4 Pin SMD Option 7

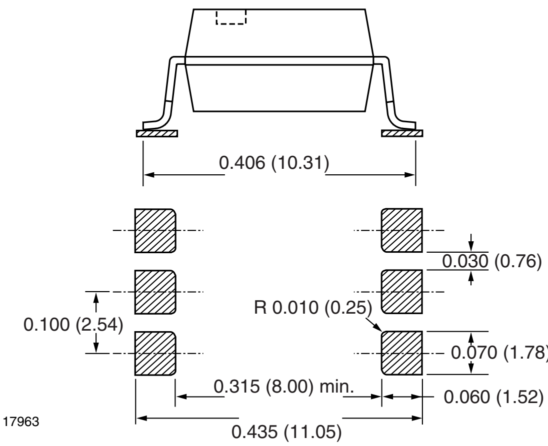


Fig. 11 - 6 Pin SMD Option 7

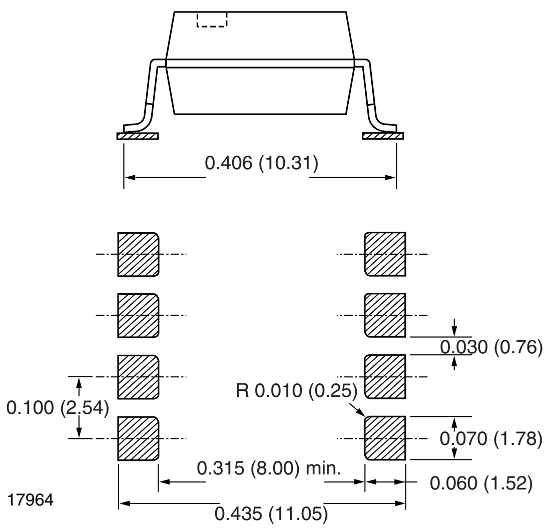


Fig. 12 - 8 Pin SMD Option 7

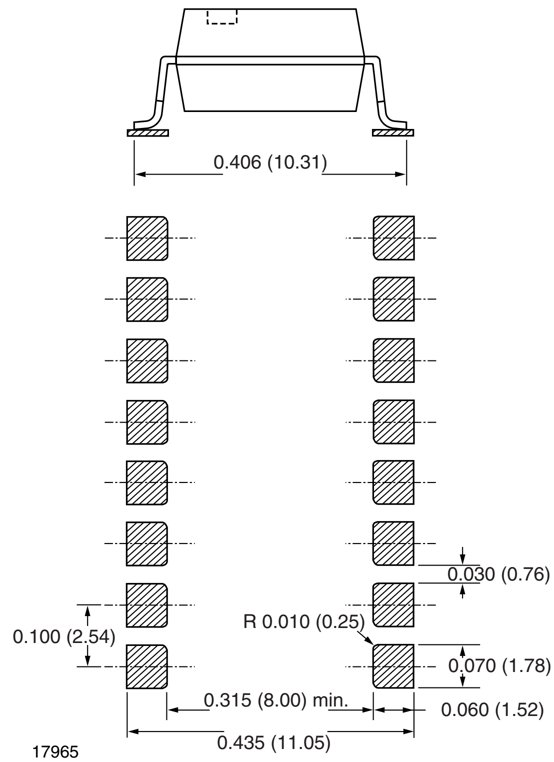


Fig. 13 - 16 Pin SMD Option 7

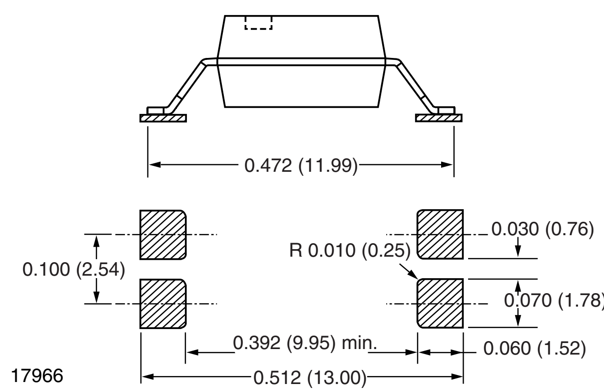


Fig. 14 - 4 Pin SMD Option 8

Footprints

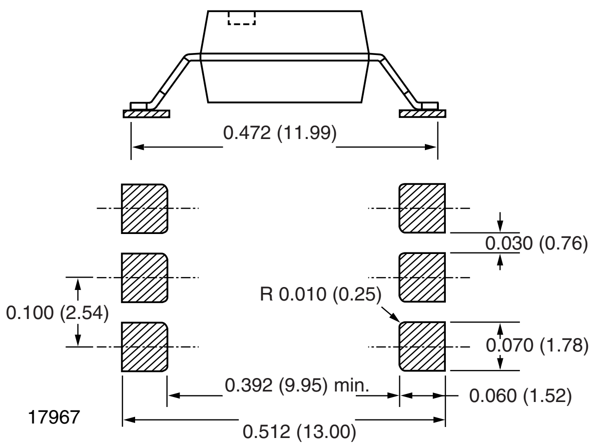


Fig. 15 - 6 Pin SMD Option 8

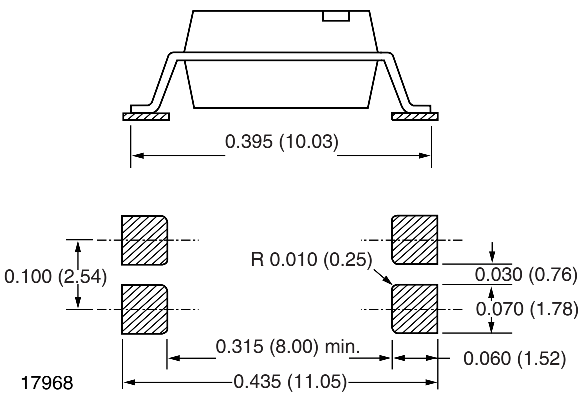


Fig. 16 - 4 Pin SMD Option 9

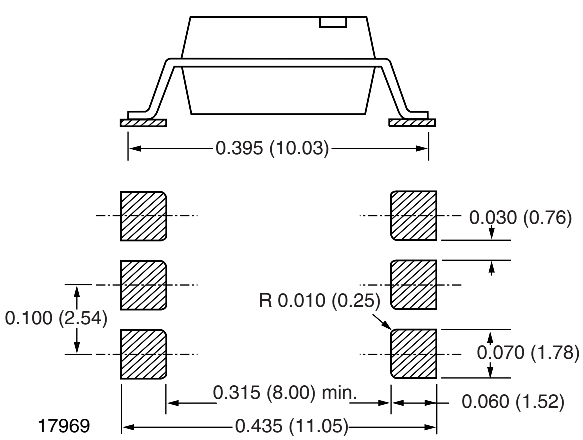


Fig. 17 - 6 Pin SMD Option 9

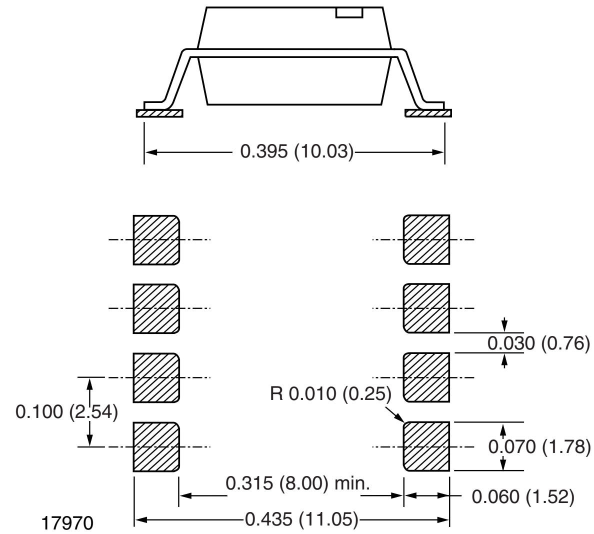


Fig. 18 - 8 Pin SMD Option 9

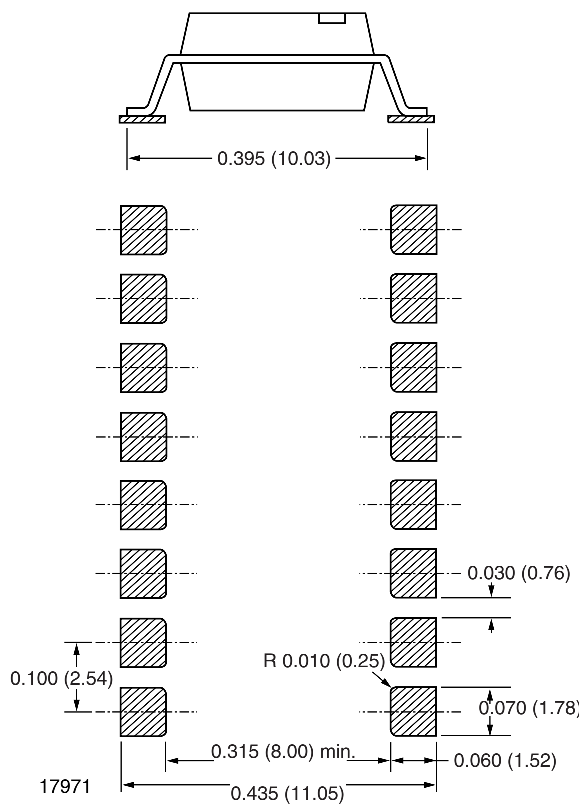


Fig. 19 - 16 Pin SMD Option 9

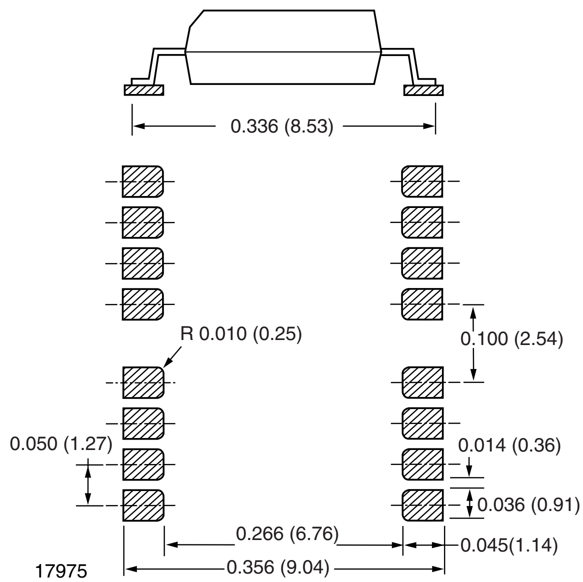


Fig. 20 - 16 Pin PCMCIA

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.