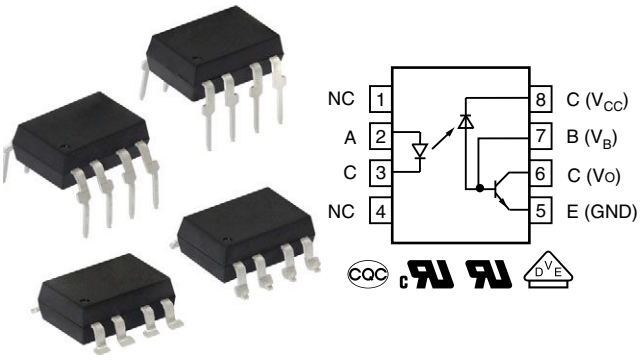
High Speed Optocoupler, 1 MBd, Transistor Output



FEATURES

- Isolation test voltage 5300 V_{RMS}
- TTL compatible
- High bit rates: 1 MBit/s
- High common mode interference immunity
- Bandwidth 2 MHz
- Open collector output
- External base wiring possible
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

Pb-free

e3

RoHS COMPLIANT

LINKS TO ADDITIONAL RESOURCES

Related Documents | Design Tools | 3D Models | Footprints | Schematics | SPICE Models

AGENCY APPROVALS

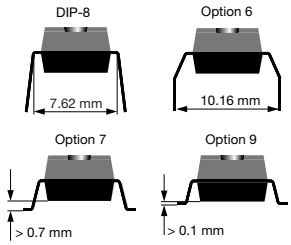
- UL
- cUL
- DIN EN 60747-5-5 (VDE 0884-5), available with option 1
- CQC

DESCRIPTION

The SFH6135 and SFH6136 optocouplers feature a high signal transmission rate and a high isolation resistance. They have a GaAlAs infrared emitting diode, optically coupled with an integrated photo detector which consists of a photo diode and a high-speed transistor in a DIP-8 plastic package. Signals can be transmitted between two electrically separated circuits up to frequencies of 2 MHz. The potential difference between the circuits to be coupled should not exceed the maximum permissible reference voltages.

ORDERING INFORMATION

S	F	H	6	1	3	#	-	X	0	#	#	T
PART NUMBER								PACKAGE OPTION				TAPE AND REEL



AGENCY CERTIFIED / PACKAGE	CTR (%)	
UL, cUL, CQC	≥ **7**	≥ **19**
DIP-8	SFH6135	SFH6136
SMD-8, option 9	-	SFH6136-X009T
UL, cUL, CQC, VDE (option 1)	≥ **7**	≥ **19**
DIP-8	-	SFH6136-X001
DIP-8, 400 mil, option 6	-	SFH6136-X016
SMD-8, option 7	-	SFH6136-X017T (1)

Notes

- Additional options may be possible, please contact sales office

(1) Also available in tubes; do not add T to end

For technical questions, contact: optocoupleranswers@vishay.com

THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE. THE PRODUCTS DESCRIBED HEREIN AND THIS DOCUMENT ARE SUBJECT TO SPECIFIC DISCLAIMERS, SET FORTH AT www.vishay.com/doc?91000

ABSOLUTE MAXIMUM RATINGS (T_{amb} = 25 °C, unless otherwise specified)				
PARAMETER	**TEST CONDITION**	**SYMBOL**	**VALUE**	**UNIT**
INPUT				
Reverse voltage		V_R	3	V
Forward current		I_F	25	mA
Peak forward current	t = 1 ms, duty cycle 50 %	I_{FM}	50	mA
Maximum surge forward current	t ≤ 1 µs, 300 pulses/s	I_{FSM}	1	A
Thermal resistance		R_{thja}	700	K/W
Power dissipation		P_{diss}	45	mW
OUTPUT				
Supply voltage		V_S	-0.5 to 30	V
Output voltage		V_O	-0.5 to 25	V
Emitter base voltage		V_{EBO}	5	V
Output current		I_O	8	mA
Maximum output current		I_O	16	mA
Base current		I_B	5	mA
Thermal resistance		R_{thja}	300	K/W
Power dissipation	T_{amb} = 70 °C	P_{diss}	100	mW
COUPLER				
Isolation test voltage		V_{ISO}	5300	V_{RMS}
Pollution degree (DIN VDE 0110)			2	
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
Storage temperature range		T_{stg}	-55 to +125	°C
Ambient temperature range		T_{amb}	-55 to +100	°C
Soldering temperature (1)	Max. ≤ 10 s, dip soldering ≥ 0.5 mm distance 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 wave profile for soldering conditions for through hole devices

ELECTRICAL CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)							
PARAMETER	**TEST CONDITION**	**PART**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
INPUT							
Forward voltage	I_F = 16 mA		V_F	-	1.6	1.9	V
Breakdown voltage	I_R = 10 µA		V_{BR}	3	-	-	V
Reverse current	V_R = 3 V		I_R	-	0.5	10	µA
Capacitance	V_R = 0 V, f = 1 MHz		C_O	-	125	-	pF
Temperature coefficient of forward voltage	I_F = 16 mA		$\Delta V_F/\Delta T_{amb}$	-	1.7	-	mV/°C
OUTPUT							
Logic low supply current	I_F = 16 mA, V_O = open, V_{CC} = 15 V		I_{CCL}	-	150	-	µA
Logic high supply current	I_F = 0 V, V_O = open, V_{CC} = 15 V		I_{CCH}	-	0.01	1	µA
Output voltage, output low	I_F = 16 mA, V_{CC} = 4.5 V, I_O = 1.1 mA	SFH6135	V_{OL}	-	0.1	0.4	V
	I_F = 16 mA, V_{CC} = 4.5 V, I_O = 2.4 mA	SFH6136	V_{OL}	-	0.1	0.4	V
Output current, output high	I_F = 0 mA, V_O = V_{CC} = 5.5 V		I_{OH}	-	3	500	nA
	I_F = 0 mA, V_O = V_{CC} =15 V		I_{OH}	-	0.01	1	µA

For technical questions, contact: optocoupleranswers@vishay.com
THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE. THE PRODUCTS DESCRIBED HEREIN AND THIS DOCUMENT ARE SUBJECT TO SPECIFIC DISCLAIMERS, SET FORTH AT www.vishay.com/doc?91000

ELECTRICAL CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)							
PARAMETER	**TEST CONDITION**	**PART**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
COUPLER							
Capacitance (input to output)	f = 1 MHz		C_{IO}	-	0.6	-	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							
PARAMETER	**TEST CONDITION**	**PART**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
Current transfer ratio	I_F = 16 mA, V_O = 0.4 V, V_{CC} = 4.5 V	SFH6135	CTR	7	16	-	%
		SFH6136	CTR	19	35	-	%
	I_F = 16 mA, V_O = 0.5 V, V_{CC} = 4.5 V	SFH6135	CTR	5	-	-	%
		SFH6136	CTR	15	-	-	%

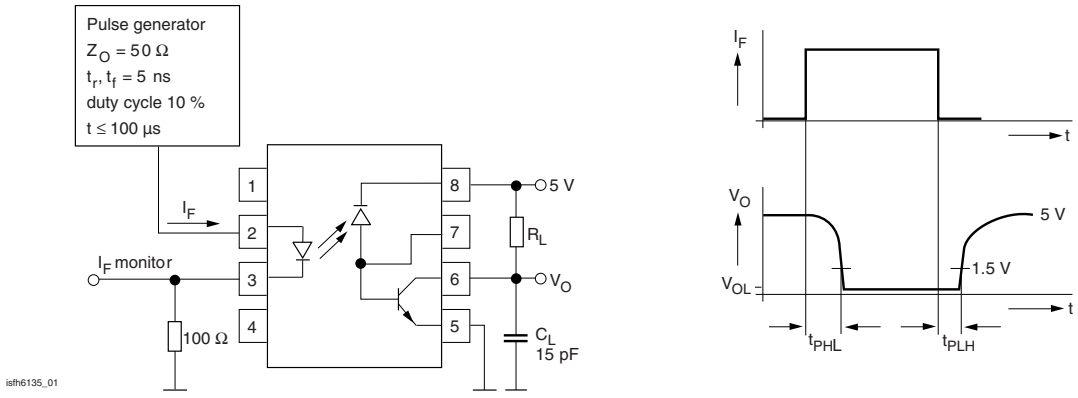


Fig. 1 - Schematics

SWITCHING CHARACTERISTICS							
PARAMETER	**TEST CONDITION**	**PART**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
High to low	I_F = 16 mA, V_{CC} = 5 V, R_L = 4.1 kΩ	SFH6135	t_{PHL}	-	0.3	1.5	µs
	I_F = 16 mA, V_{CC} = 5 V, R_L = 1.9 kΩ	SFH6136	t_{PHL}	-	0.2	0.8	µs
Low to high	I_F = 16 mA, V_{CC} = 5 V, R_L = 4.1 kΩ	SFH6135	t_{PLH}	-	0.3	1.5	µs
	I_F = 16 mA, V_{CC} = 5 V, R_L = 1.9 kΩ	SFH6136	t_{PLH}	-	0.2	0.8	µs

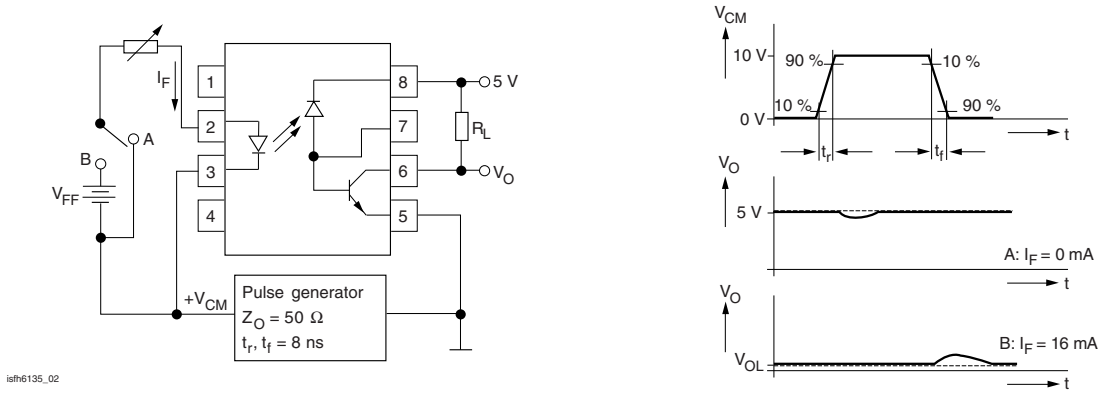


Fig. 2 - Common Mode Interference Immunity

For technical questions, contact: optocoupleranswers@vishay.com

THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE. THE PRODUCTS DESCRIBED HEREIN AND THIS DOCUMENT ARE SUBJECT TO SPECIFIC DISCLAIMERS, SET FORTH AT www.vishay.com/doc?91000

COMMON MODE TRANSIENT IMMUNITY							
PARAMETER	**TEST CONDITION**	**PART**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
High	V_{CM} = 10 V_{P-P}, V_{CC} = 5 V, I_F = 0 mA, R_L = 4.1 kΩ	SFH6135	CM_H	-	1000	-	V/µs
	V_{CM} = 10 V_{P-P}, V_{CC} = 5 V, I_F = 0 mA, R_L = 1.9 kΩ	SFH6136	CM_H	-	1000	-	V/µs
Low	V_{CM} = 10 V_{P-P}, V_{CC} = 5 V, I_F = 0 mA, R_L = 4.1 kΩ	SFH6135	CM_L	-	1000	-	V/µs
	V_{CM} = 10 V_{P-P}, V_{CC} = 5 V, I_F = 0 mA, R_L = 1.9 kΩ	SFH6136	CM_L	-	1000	-	V/µs

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)

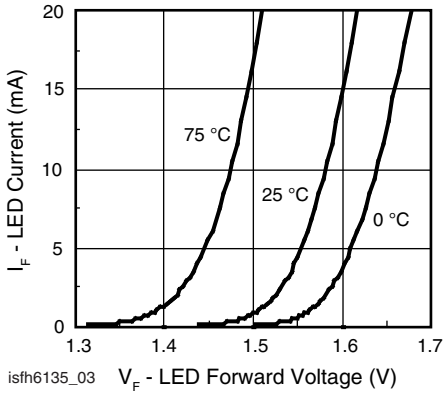


Fig. 3 - LED Forward Current vs. Forward Voltage

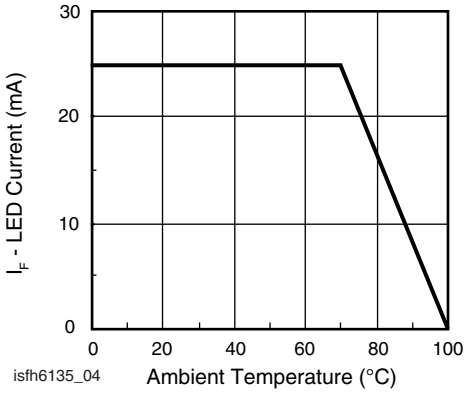


Fig. 4 - Permissible Forward LED Current vs. Temperature

For technical questions, contact: optocoupleranswers@vishay.com
THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE. THE PRODUCTS DESCRIBED HEREIN AND THIS DOCUMENT ARE SUBJECT TO SPECIFIC DISCLAIMERS, SET FORTH AT www.vishay.com/doc?91000

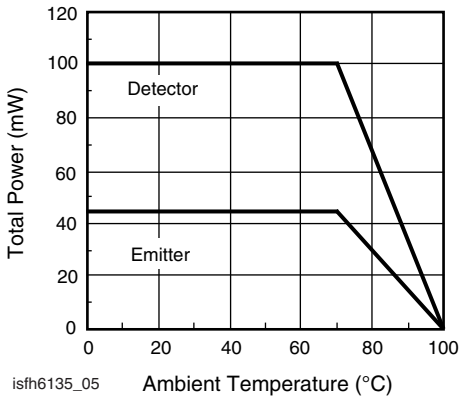


Fig. 5 - Permissible Power Dissipation vs. Temperature

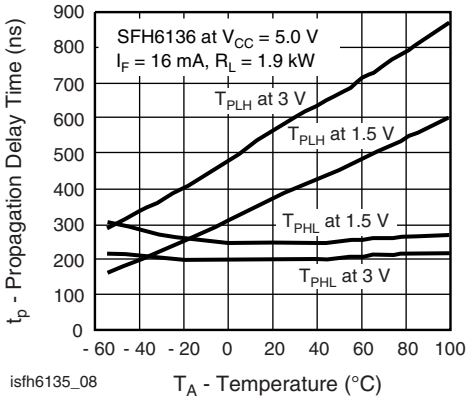


Fig. 8 - Propagation Delay vs. Ambient Temperature - SFH6136

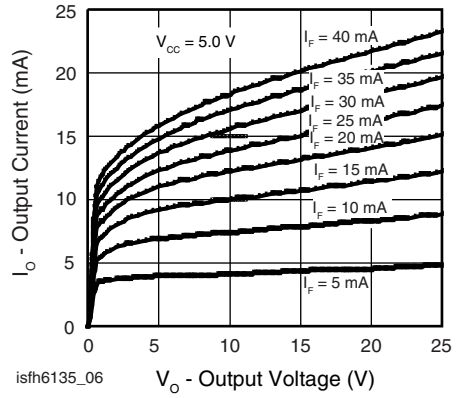


Fig. 6 - Output Current vs. Output Voltage

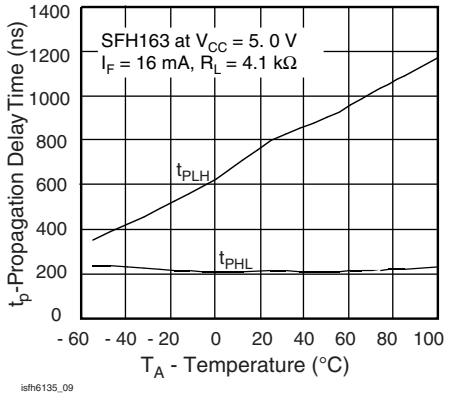


Fig. 9 - Propagation Delay vs. Ambient Temperature - SFH6135

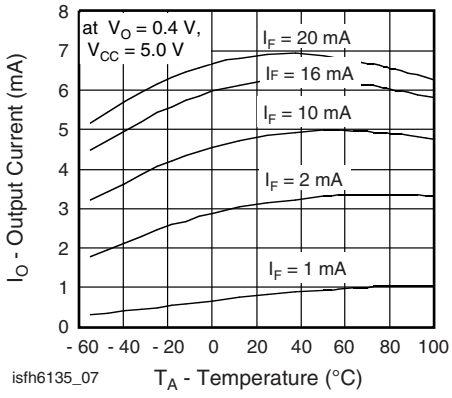


Fig. 7 - Output Current vs. Temperature

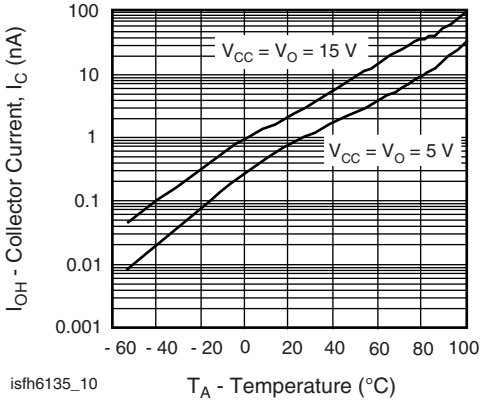


Fig. 10 - Logic High Output Current vs. Temperature

For technical questions, contact: optocoupleranswers@vishay.com
THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE. THE PRODUCTS DESCRIBED HEREIN AND THIS DOCUMENT ARE SUBJECT TO SPECIFIC DISCLAIMERS, SET FORTH AT www.vishay.com/doc?91000

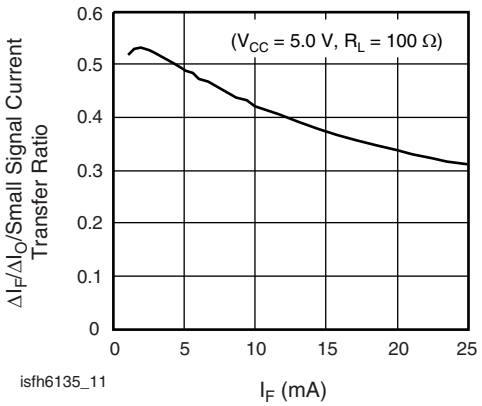
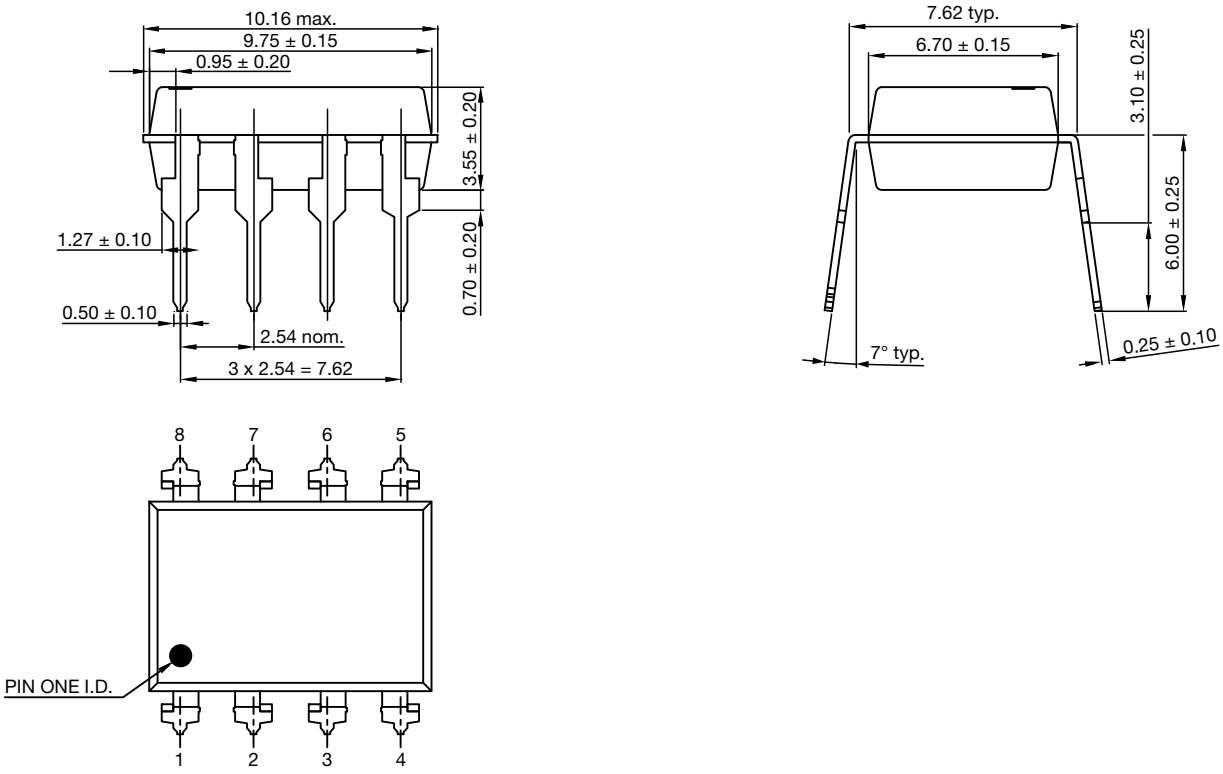


Fig. 11 - Small Signal Current Transfer Ratio vs. Quiescent Input Current

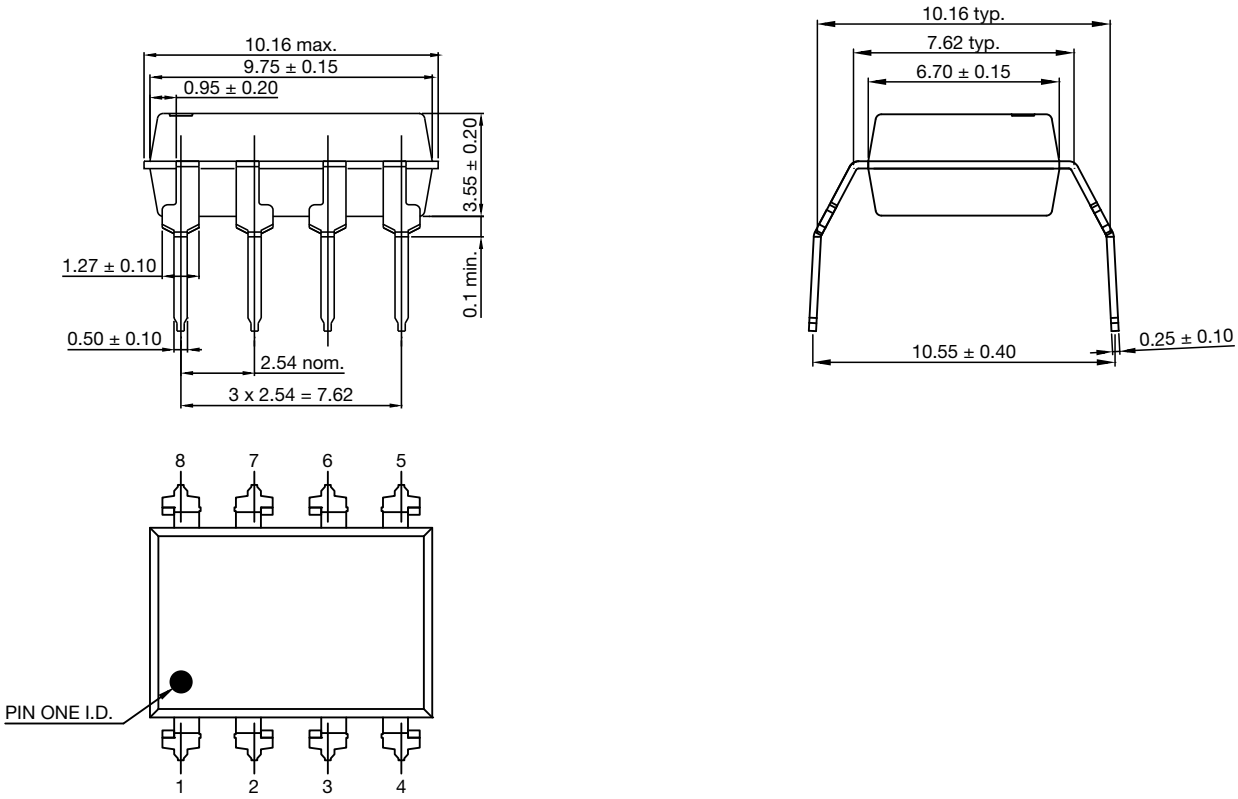
PACKAGE DIMENSIONS (in millimeters)

DIP-8

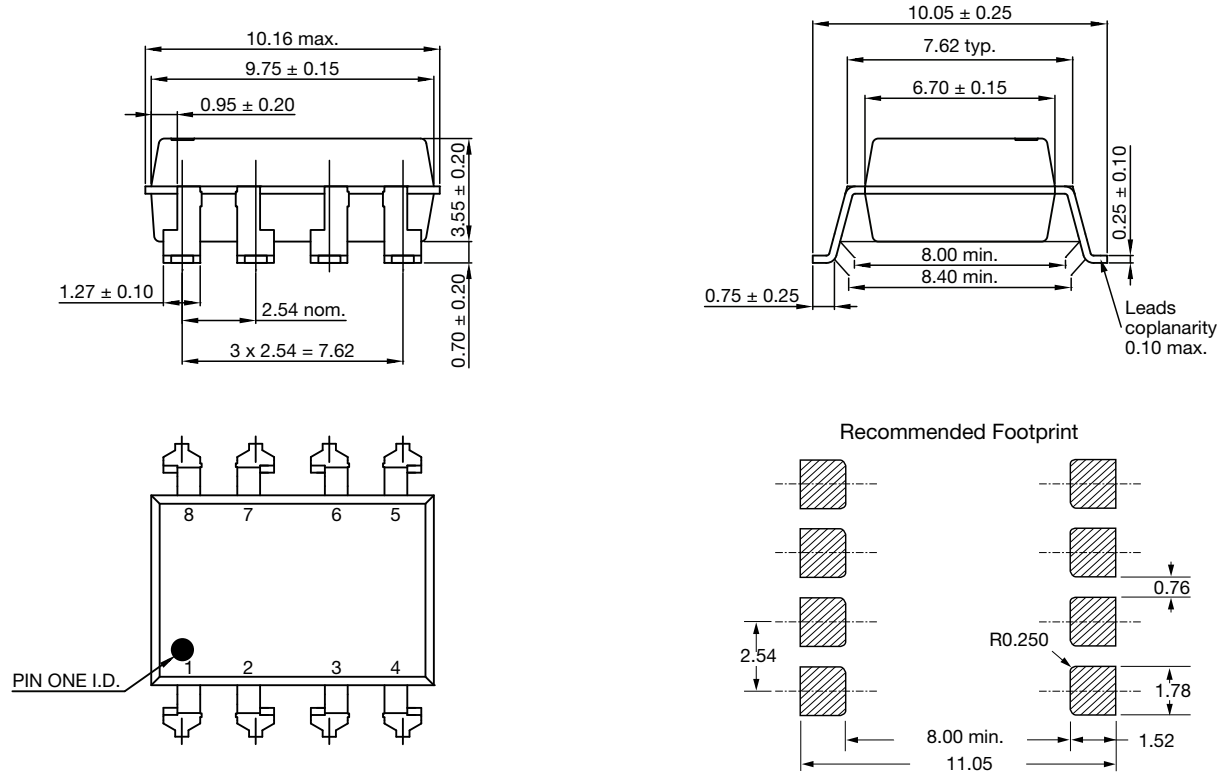


For technical questions, contact: optocoupleranswers@vishay.com
THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE. THE PRODUCTS DESCRIBED HEREIN AND THIS DOCUMENT ARE SUBJECT TO SPECIFIC DISCLAIMERS, SET FORTH AT www.vishay.com/doc?91000

DIP-8, 400 mil (option 6)

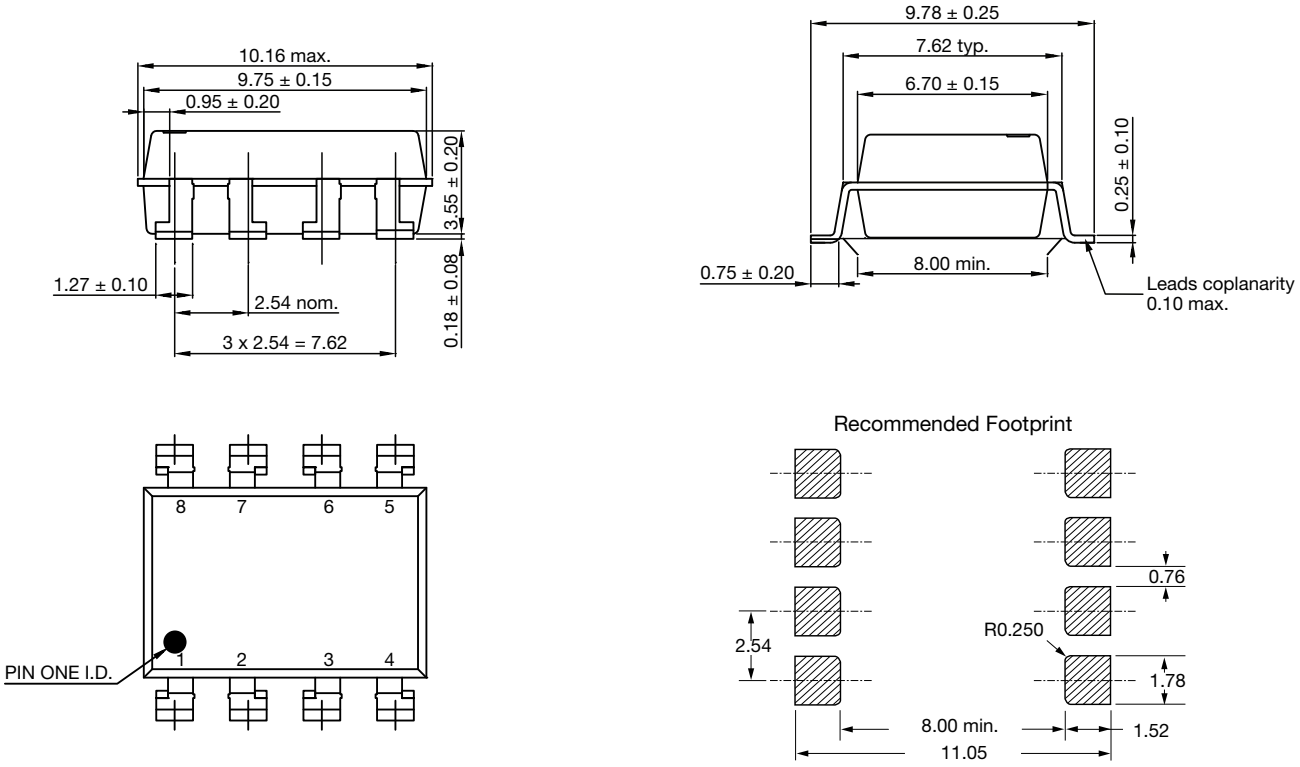


SMD-8 (option 7)



For technical questions, contact: optocoupleranswers@vishay.com
THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE. THE PRODUCTS DESCRIBED HEREIN AND THIS DOCUMENT ARE SUBJECT TO SPECIFIC DISCLAIMERS, SET FORTH AT www.vishay.com/doc?91000

SMD-8 (option 9)



PACKAGE MARKING

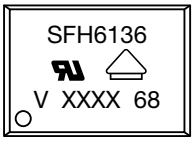


Fig. 12 - Example of SFH6136-X017T

Notes

- XXXX = LMC (lot marking code)
- VDE logo is only marked on option 1 parts
- Tape and reel suffix (T) is not part of the package marking

For technical questions, contact: optocoupleranswers@vishay.com
THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE. THE PRODUCTS DESCRIBED HEREIN AND THIS DOCUMENT ARE SUBJECT TO SPECIFIC DISCLAIMERS, SET FORTH AT www.vishay.com/doc?91000

PACKING INFORMATION (in millimeters)

Tube

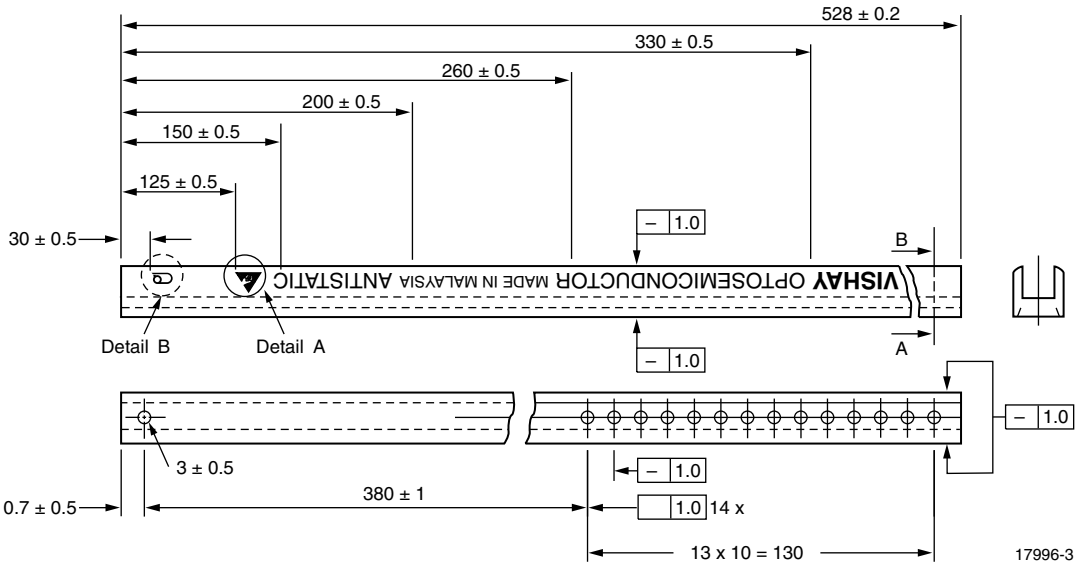


Fig. 13 - Shipping Tube Specifications for DIP-8 Packages

DEVICES PER TUBS			
TYPE	**UNITS/TUBE**	**TUBES/BOX**	**UNITS/BOX**
DIP-8	50	40	2000

DIP-8

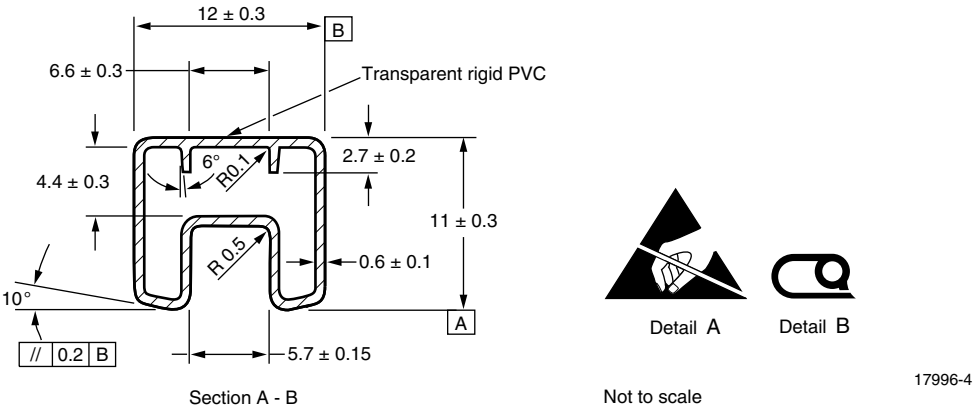


Fig. 14 - Tube Shipping Medium

For technical questions, contact: optocoupleranswers@vishay.com
THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE. THE PRODUCTS DESCRIBED HEREIN AND THIS DOCUMENT ARE SUBJECT TO SPECIFIC DISCLAIMERS, SET FORTH AT www.vishay.com/doc?91000

DIP-8, 400 mil (option 6)

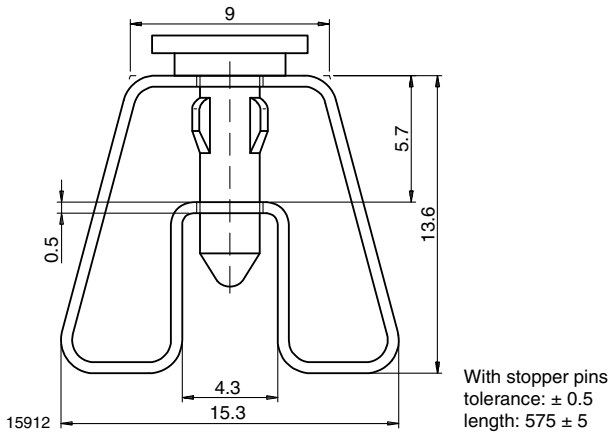


Fig. 15 - Tube Shipping Medium

Tape and Reel

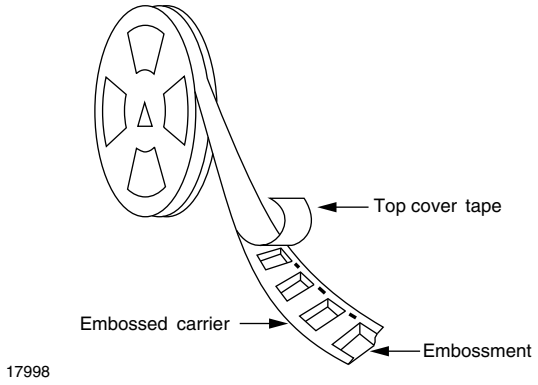


Fig. 16 - Tape and Reel Shipping Medium

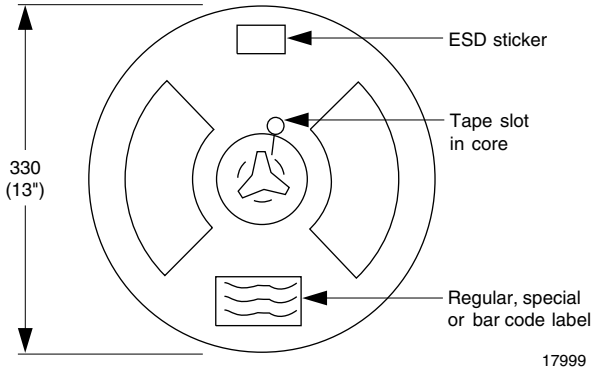


Fig. 17 - Tape and Reel Shipping Medium

SMD-8 (option 7)

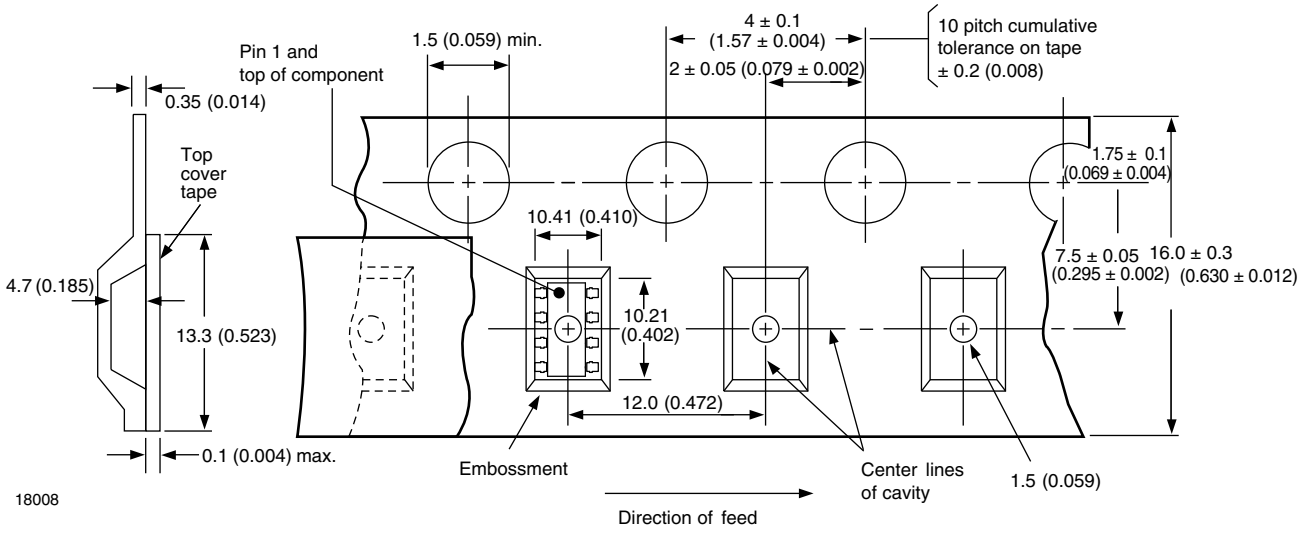


Fig. 18 - Tape and Reel Packing (1000 pieces on Reel)

For technical questions, contact: optocoupleranswers@vishay.com
THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE. THE PRODUCTS DESCRIBED HEREIN AND THIS DOCUMENT ARE SUBJECT TO SPECIFIC DISCLAIMERS, SET FORTH AT www.vishay.com/doc?91000

SMD-8 (option 9)

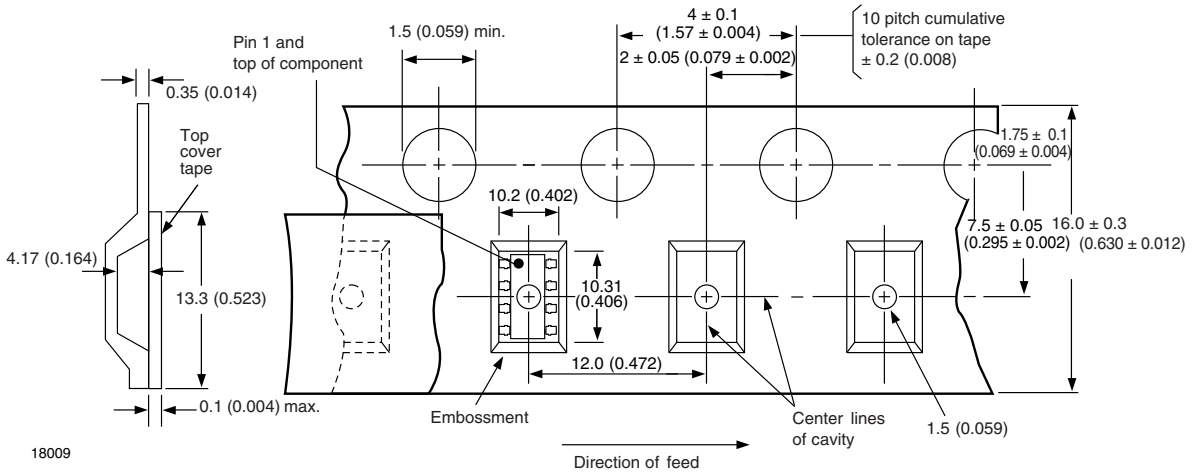


Fig. 19 - Tape and Reel Shipping Medium

SOLDER PROFILES

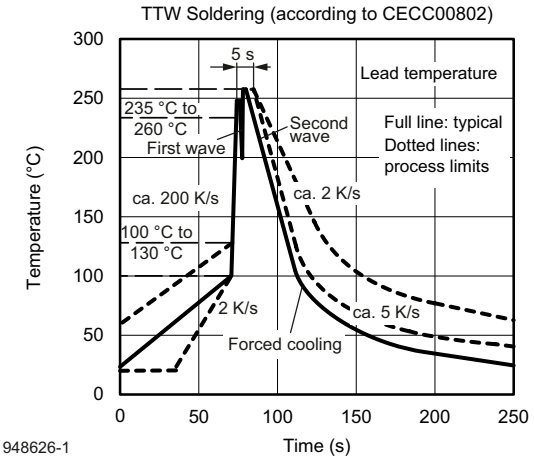


Fig. 20 - Wave Soldering Double Wave Profile According to J-STD-020 for DIP Devices

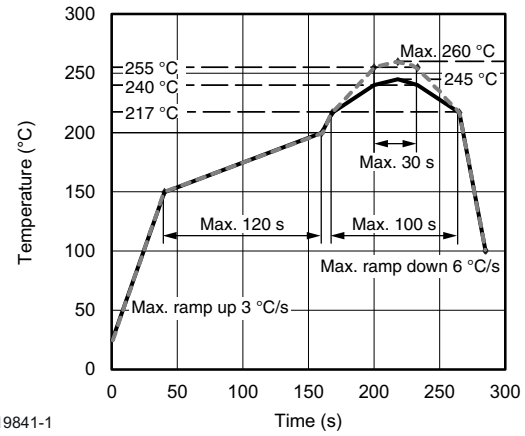


Fig. 21 - Lead (Pb)-free Reflow Solder Profile According to J-STD-020 for SMD Devices

HANDLING AND STORAGE CONDITIONS

ESD level: HBM class 2

Floor life: unlimited

Conditions: T_{amb} < 30 °C, RH < 85 %

Moisture sensitivity level 1, according to J-STD-020

For technical questions, contact: optocoupleranswers@vishay.com
THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE. THE PRODUCTS DESCRIBED HEREIN AND THIS DOCUMENT ARE SUBJECT TO SPECIFIC DISCLAIMERS, SET FORTH AT www.vishay.com/doc?91000

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.

Hyperlinks included in this datasheet may direct users to third-party websites. These links are provided as a convenience and for informational purposes only. Inclusion of these hyperlinks does not constitute an endorsement or an approval by Vishay of any of the products, services or opinions of the corporation, organization or individual associated with the third-party website. Vishay disclaims any and all liability and bears no responsibility for the accuracy, legality or content of the third-party website or for that of subsequent links.

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. 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.

© 2024 VISHAY INTERTECHNOLOGY, INC. ALL RIGHTS RESERVED