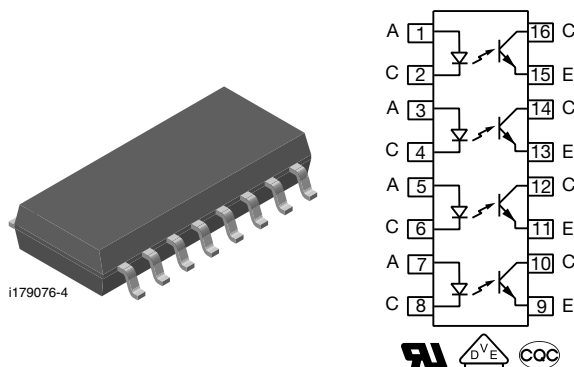


Optocoupler, Phototransistor Output, Quad Channel, SSOP-16, Half Pitch Mini-Flat Package



FEATURES

- SSOP (shrink small outline package)
- Isolation test voltage, 3750 V_{RMS}
- High collector emitter voltage, V_{CEO} = 70 V
- Low saturation voltage
- Fast switching times
- Temperature stable
- Low coupling capacitance
- End stackable, 0.050" (1.27 mm) spacing
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912



LINKS TO ADDITIONAL RESOURCES



DESCRIPTION

The SFH6916 has a GaAs infrared emitter, which is optically coupled to a silicon planar phototransistor detector, and is incorporated in a 16 pin 50 mil lead pitch miniflat package. It features a high current transfer ratio, low coupling capacitance, and high isolation voltage.

The coupling devices are designed for signal transmission between two electrically separated circuits.

AGENCY APPROVALS

- [UL](#)
- [cUL](#)
- [DIN EN 60747-5-5 \(VDE 0884-5\)](#), available with option 1
- [BSI](#)
- [CQC GB4943.1-2011](#)
- [CQC GB8898-2011](#) (suitable for installation altitude below 2000 m)
- [FIMKO](#)

ORDERING INFORMATION

S F H 6 9 1 6 - X 0 0 1 T												SSOP-16 	
PART NUMBER								VDE OPTION			TAPE AND REEL		
AGENCY CERTIFIED / PACKAGE							CTR (%)						
UL, cUL, BSI, CQC, FIMKO							50 to 300						
SSOP-16, quad channel							SFH6916T ⁽¹⁾						
UL, cUL, BSI, CQC, FIMKO, VDE (option 1)							50 to 300						
SSOP-16, quad channel							SFH6916-X001						

Notes

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



ABSOLUTE MAXIMUM RATINGS ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified)				
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
INPUT				
Reverse voltage		V_R	6	V
DC forward current		I_F	50	mA
Surge forward current	$t_p \leq 10\text{ }\mu\text{s}$	I_{FSM}	1.5	A
Total power dissipation		P_{diss}	80	mW
OUTPUT				
Collector emitter voltage		V_{CEO}	70	V
Emitter collector voltage		V_{ECO}	7	V
Collector current		I_C	50	mA
	$t_p = 1.0\text{ ms}$	I_C	100	mA
Total power dissipation per channel		P_{diss}	150	mW
COUPLER				
Storage temperature range		T_{stg}	-55 to +125	$^{\circ}\text{C}$
Ambient temperature range		T_{amb}	-55 to +100	$^{\circ}\text{C}$
Junction temperature		T_j	125	$^{\circ}\text{C}$
Soldering temperature ⁽¹⁾	Max. 10 s dip soldering distance to seating plane $\geq 1.5\text{ mm}$		260	$^{\circ}\text{C}$
Total power dissipation		P_{tot}	250	mW

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

ELECTRICAL CHARACTERISTICS ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified)						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
INPUT						
Forward voltage	$I_F = 5\text{ mA}$	V_F	-	1.15	1.4	V
Reverse current	$V_R = 6\text{ V}$	I_R	-	0.01	10	μA
Capacitance	C_O	C_O	-	8	-	pF
OUTPUT						
Collector emitter leakage current	$V_{CE} = 20\text{ V}$	I_{CEO}	-		100	nA
Collector emitter capacitance	$V_{CE} = 5\text{ V}$, $f = 1\text{ MHz}$	C_{CE}	-	6.0	-	pF
COUPLER						
Collector emitter saturation voltage	$I_F = 20\text{ mA}$, $I_C = 1\text{ mA}$	V_{CEsat}	-	0.1	0.4	V
Coupling capacitance	$f = 1\text{ MHz}$	C_C	-	1	-	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 ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified)						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Current transfer ratio	$I_F = 5\text{ mA}$, $V_{CC} = 5\text{ V}$	CTR	50	-	300	%

SWITCHING CHARACTERISTICS ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified)						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
NON-SATURATED						
Rise time	$I_C = 2\text{ mA}$, $V_{CC} = 5\text{ V}$, $R_L = 100\text{ }\Omega$	t_r	-	5.5	-	μs
Fall time	$I_C = 2\text{ mA}$, $V_{CC} = 5\text{ V}$, $R_L = 100\text{ }\Omega$	t_f	-	7	-	μs
Turn-on time	$I_C = 2\text{ mA}$, $V_{CC} = 5\text{ V}$, $R_L = 100\text{ }\Omega$	t_{on}	-	9.5	-	μs
Turn-off time	$I_C = 2\text{ mA}$, $V_{CC} = 5\text{ V}$, $R_L = 100\text{ }\Omega$	t_{off}	-	8.5	-	μs
SATURATED						
Turn-on time	$I_F = 10\text{ mA}$, $V_{CC} = 5\text{ V}$, $R_L = 1\text{ k}\Omega$	t_{on}	-	3	-	μs
Turn-off time	$I_F = 10\text{ mA}$, $V_{CC} = 5\text{ V}$, $R_L = 1\text{ k}\Omega$	t_{off}	-	20	-	μs

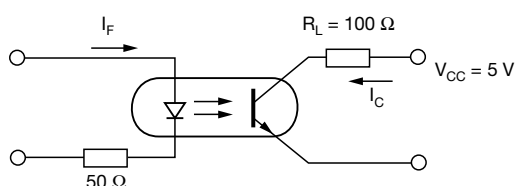


Fig. 1 - Switching Operation (without saturation)

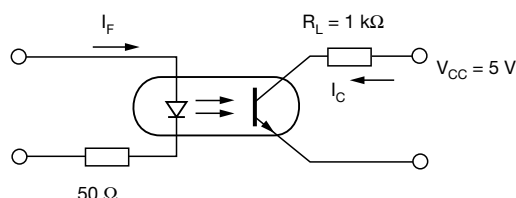


Fig. 2 - Switching Operation (with saturation)

SAFETY AND INSULATION RATINGS				
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
Climatic classification	According to IEC 68 part 1		55 / 100 / 21	
Comparative tracking index		CTI	175	
Maximum rated withstanding isolation voltage	According to UL1577, $t = 1\text{ min}$	V_{ISO}	3750	V_{RMS}
Maximum transient isolation voltage	According to DIN EN 60747-5-5	V_{IOTM}	6000	V_{peak}
Maximum repetitive peak isolation voltage	According to DIN EN 60747-5-5	V_{IORM}	707	V_{peak}
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
Output safety power		P_{SO}	350	mW
Input safety current		I_{SI}	200	mA
Safety temperature		T_S	175	$^{\circ}\text{C}$
Creepage distance			≥ 5	mm
Clearance distance			≥ 5	mm
Insulation thickness		DTI	≥ 0.4	mm

Note

- As per IEC 60747-5-5, § 7.4.3.8.2, 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

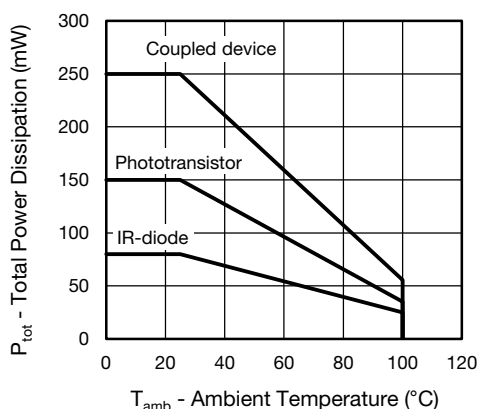
TYPICAL CHARACTERISTICS ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified)


Fig. 3 - Total Power Dissipation vs. Ambient Temperature

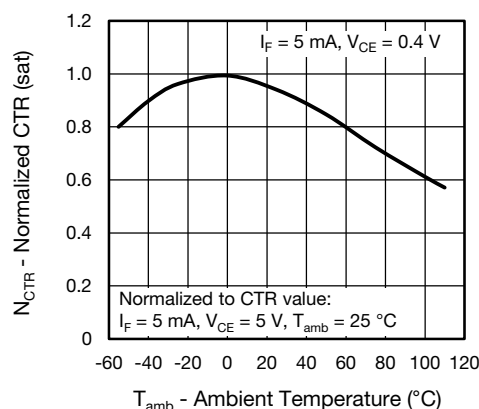


Fig. 6 - Normalized Current Transfer Ratio (saturated) vs. Ambient Temperature

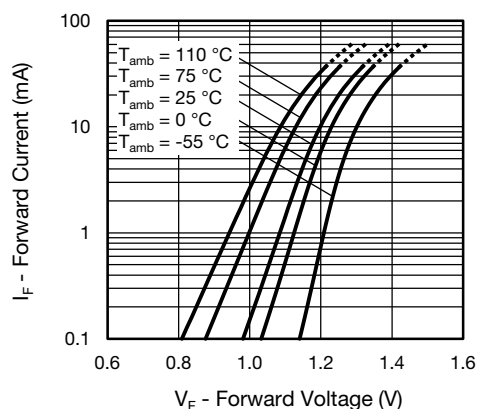


Fig. 4 - Forward Voltage vs. Forward Current

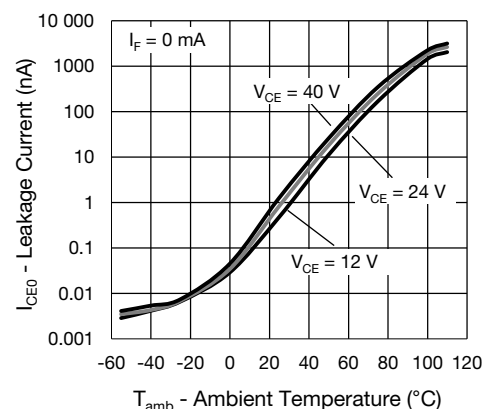


Fig. 7 - Collector Dark Current vs. Ambient Temperature

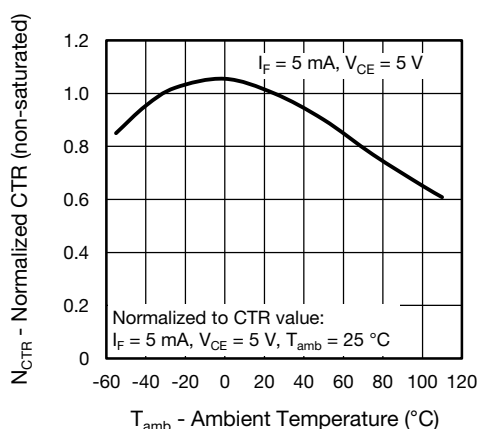


Fig. 5 - Normalized Current Transfer Ratio (non-saturated) vs. Ambient Temperature

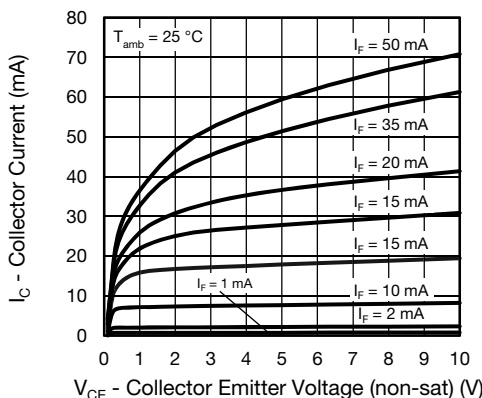


Fig. 8 - Collector Current vs. Collector Emitter Voltage (non-saturated)

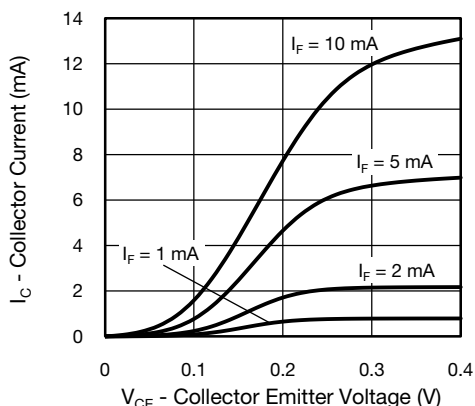


Fig. 9 - Collector Current vs. Collector Emitter Voltage (saturated)

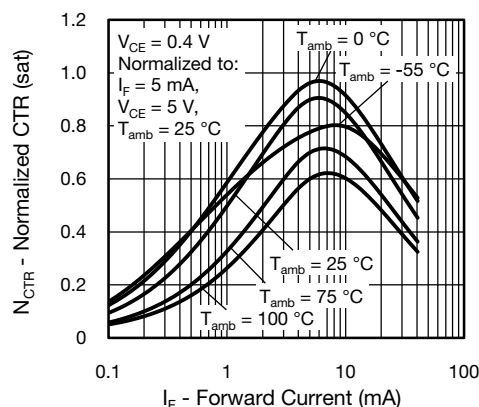


Fig. 12 - Normalized CTR (saturated) vs. Forward Current

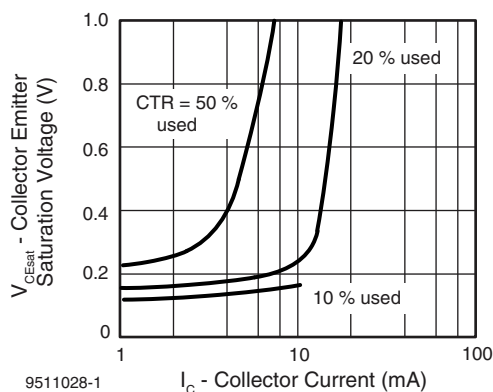


Fig. 10 - Collector Emitter Saturated Voltage vs. Collector Current

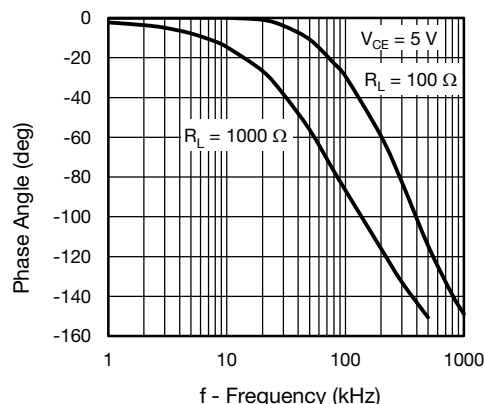
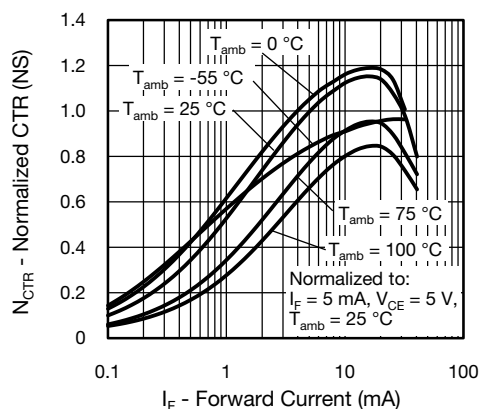
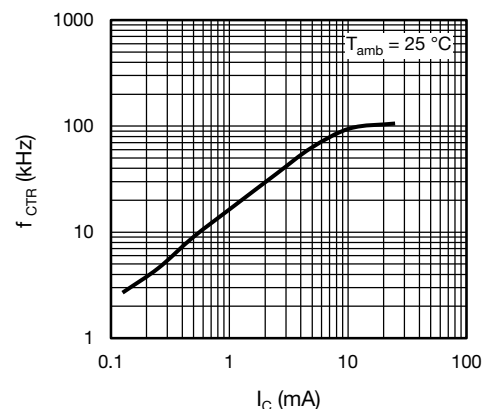

Fig. 13 - F_{CTR} vs. Phase Angle


Fig. 11 - Normalized CTR (non-saturated) vs. Forward Current


Fig. 14 - f_{CTR} vs. Collector Current

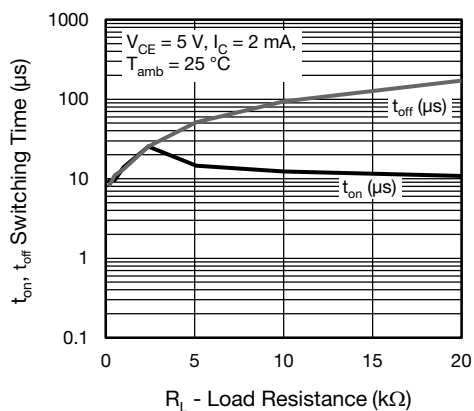
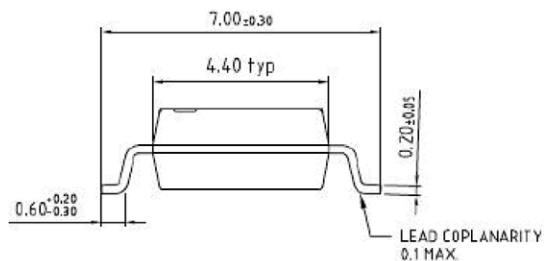
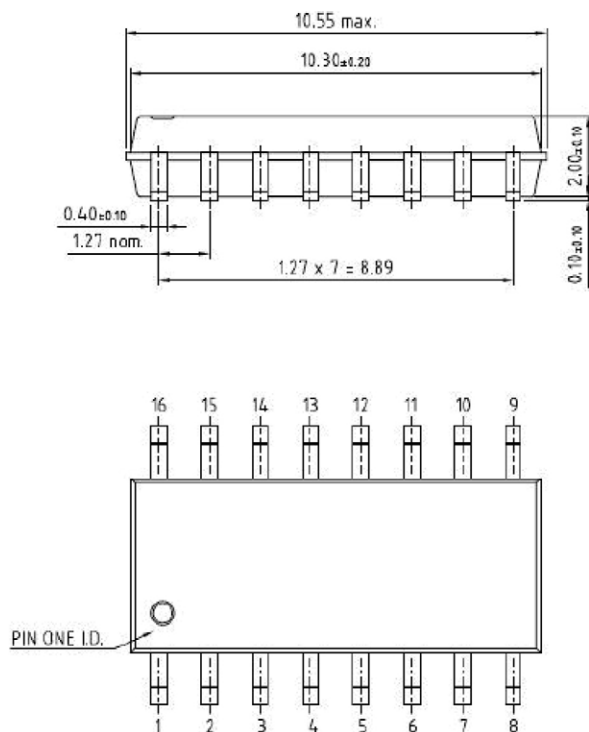
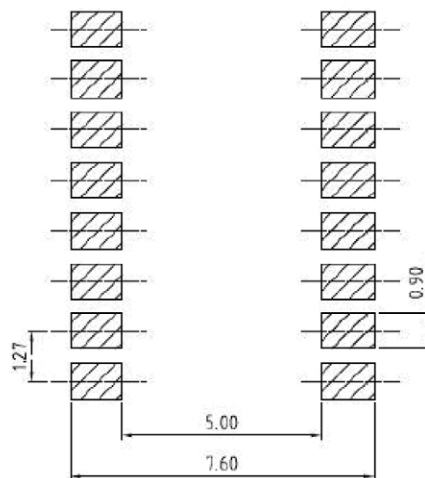


Fig. 15 - Switching Time vs. Load Resistance

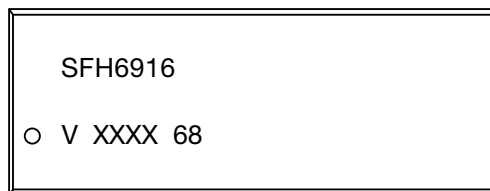
PACKAGE DIMENSIONS in millimeters



Possible footprint



PACKAGE MARKING



Note

- XXXX = LMC (lot marking code)

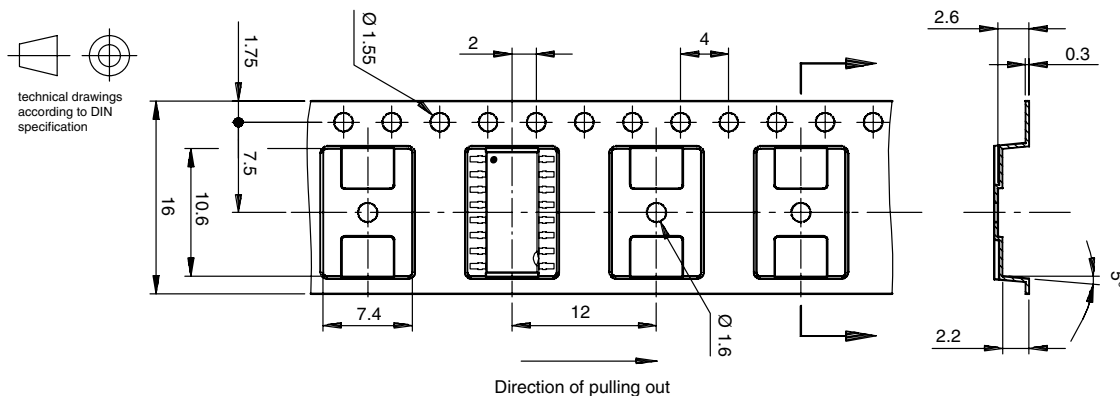
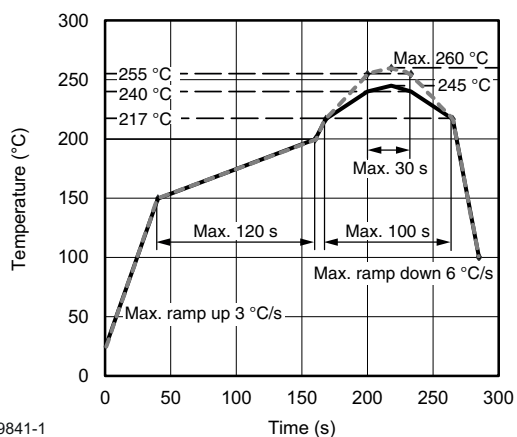
TAPE AND REEL PACKAGING in millimeters


Fig. 16 - 2000 pcs/reel

SOLDER PROFILE


19841-1

Fig. 17 - Lead (Pb)-free Reflow Solder Profile according to J-STD-020

HANDLING AND STORAGE CONDITIONS

ESD level: HBM class 2

Floor life: unlimited

Conditions: $T_{amb} < 30^{\circ}\text{C}$, $\text{RH} < 85\%$

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



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.

Vishay products are not designed for use in life-saving or life-sustaining applications or any application in which the failure of the Vishay product could result in personal injury or death unless specifically qualified in writing by Vishay. 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.