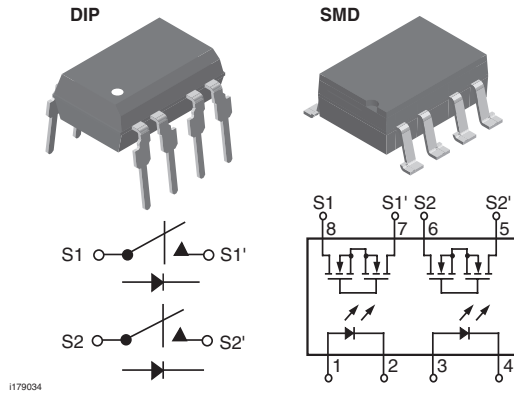


Dual 1 Form A Solid State Relay (Low Capacitance)



1179034

DESCRIPTION

These dual SSRs (LH1544, dual 1 form A) are SPST normally open switches which can replace electromechanical relays in many applications. The relays provide a low-capacitance, high-voltage switch contact with high off-resistance and low switch-offset voltage. These characteristics, combined with high-speed actuation, result in an SSR which is ideal for small signal and DC instrumentation applications.

The relays are constructed by using a GaAlAs LED for actuation control and an integrated monolithic die for the switch output. The die is comprised of a photodiode array, switch-control circuitry, and low-capacitance MOSFET switches.

FEATURES

- Dual channel, LH1541 type
- Low capacitance switch (5.0 pF)
- Isolation test voltage 5300 V_{RMS}
- Extremely high off-resistance
- Load voltage 200 V
- Clean bounce free switching
- Low power consumption
- High reliability monolithic detector
- Lead (Pb)-free component
- Component in accordance to RoHS 2002/95/EC and WEEE 2002/96/EC



RoHS
COMPLIANT

APPLICATIONS

- Instrumentation
 - Thermocouple switching
 - Analog multiplexing
- Reed relay replacement
- Programmable logic controllers
- Data acquisition
- Test equipment

AGENCY APPROVALS

- UL1577: file no. E52744 system code H or J, double protection
- CSA: certification no. 093751
- BSI/BABT: certification no. 7980
- DIN EN: 60747-5-5 (VDE 0884)
- FIMKO: approval

ORDER INFORMATION		
PART	REMARKS	PACKAGE
LH1544AAC	Tubes	SMD-8
LH1544ACTR	Tape and reel	SMD-8
LH1544AB	Tubes	DIP-8

ABSOLUTE MAXIMUM RATINGS ⁽¹⁾				
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
SSR				
LED continuous forward current		I_F	50	mA
LED reverse voltage	$I_R \leq 10 \mu\text{A}$	V_R	8.0	V
DC or peak AC load voltage	$I_L \leq 50 \mu\text{A}$	V_L	200	V
Continuous DC load current, one pole operating		I_L	55	mA
Continuous DC load current, two poles operating		I_L	40	mA
Peak load current (single shot)	$t = 100 \text{ ms}$	I_p	100	mA
Ambient temperature range		T_{amb}	- 40 to + 85	°C
Storage temperature range		T_{stg}	- 40 to + 150	°C
Pin soldering temperature ⁽²⁾	$t = 10 \text{ s max.}$	T_{slid}	260	°C
Input to output isolation voltage		V_{ISO}	5300	V_{RMS}
Pole-to-pole isolation voltage (S1 to S2) ⁽³⁾	dry air, dust free, at sea level		1600	V
Output power dissipation (continuous)		P_{diss}	600	mW

Notes

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

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.

(2) Refer to reflow profile for soldering conditions for surface mounted devices (SMD). Refer to wave profile for soldering conditions for through hole devices (DIP).

(3) Breakdown occurs between the output pins external to the package.

ELECTRICAL CHARACTERISTICS						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
INPUT						
LED forward current, switch turn-on	$I_L = 100 \text{ mA}, t = 10 \text{ ms}$	I_{Fon}		0.9	2.0	mA
LED forward current, switch turn-off	$V_L = \pm 150 \text{ V}$	I_{Foff}	0.2	0.8		mA
LED forward voltage	$I_F = 5.0 \text{ mA}$	V_F	1.1	1.19	1.45	V
OUTPUT						
On-resistance	$I_F = 5.0 \text{ mA}, I_L = 50 \text{ mA}$	R_{ON}	70	110	160	Ω
Off-resistance	$I_F = 0 \text{ mA}, V_L = \pm 100 \text{ V}$	R_{OFF}	0.5	10 000		$\text{G}\Omega$
Off-state leakage current	$I_F = 0 \text{ mA}, V_L = \pm 100 \text{ V}$	I_O		0.01	200	nA
	$I_F = 0 \text{ mA}, V_L = \pm 200 \text{ V}$	I_O			1.0	μA
Output capacitance	$I_F = 0 \text{ mA}, V_L = 1.0 \text{ V}$	C_O		0		pF
Output capacitance pin 4 to 6	$I_F = 0 \text{ mA}, V_L = 50 \text{ V}$	C_O		0.5		pF
Pole-to-pole Capacitance (S1 to S2)	$I_F = 5.0 \text{ mA}$			0.5		pF
Switch offset	$I_F = 5.0 \text{ mA}$	V_{OS}		0.1		V
TRANSFER						
Capacitance (input to output)	$V_{\text{ISO}} = 1.0 \text{ V}$	C_{IO}		1.1		pF
Turn-on time	$I_F = 5.0 \text{ mA}, I_L = 50 \text{ mA}$	t_{on}		0.24	0.5	ms
Turn-off time	$I_F = 5.0 \text{ mA}, I_L = 50 \text{ mA}$	t_{off}		0.13	0.5	ms

Note

$T_{\text{amb}} = 25 \text{ }^\circ\text{C}$, unless otherwise specified.

Minimum and maximum values are testing 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.

Footnotes

The following information refers to the SSR recommended operation conditions:

- Both relays on with equal load currents. For single relay operation, refer to the LH1541 recommended operating conditions graph.



TYPICAL CHARACTERISTICS

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

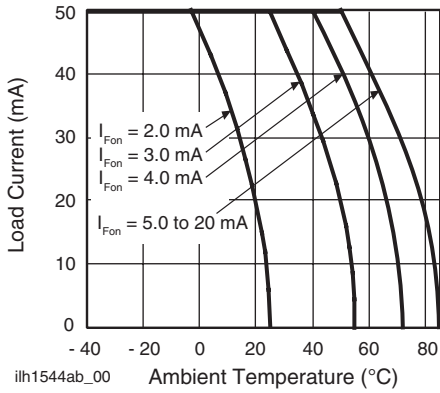


Fig. 1 - Recommended Operating Conditions

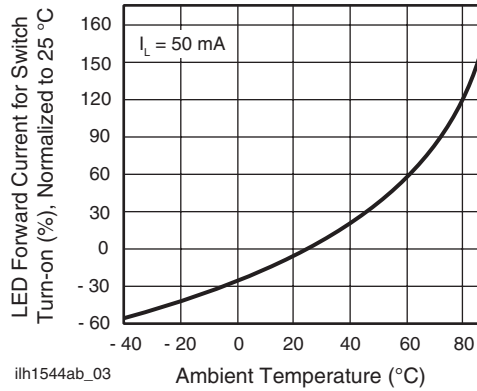


Fig. 4 - LED Current for Switch Turn-on vs. Temperature

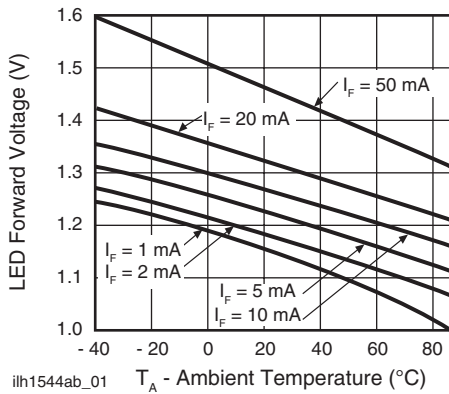


Fig. 2 - LED Voltage vs. Temperature

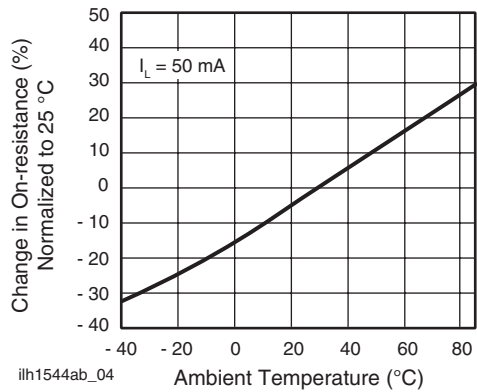


Fig. 5 - On-resistance vs. Temperature

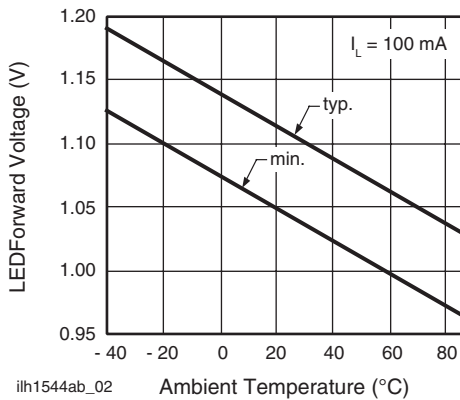


Fig. 3 - LED Dropout Voltage vs. Temperature

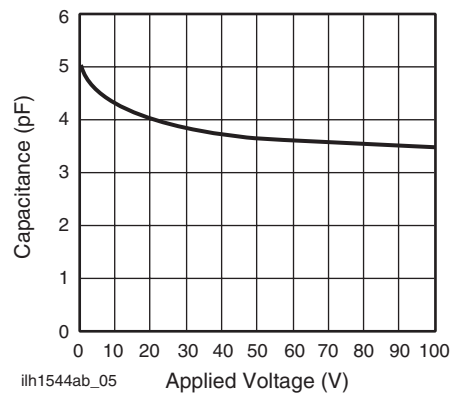


Fig. 6 - Switch Capacitance vs. Applied Voltage

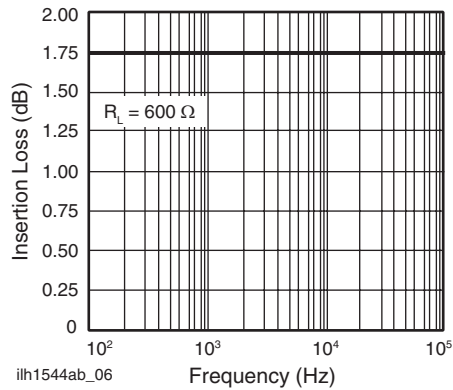


Fig. 7 - Insertion Loss vs. Frequency

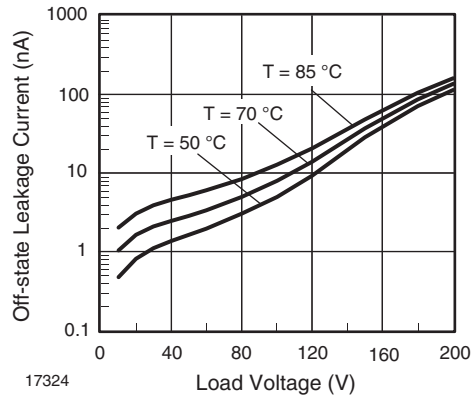


Fig. 10 - Leakage Current vs. Applied Voltage at Elevated Temperatures

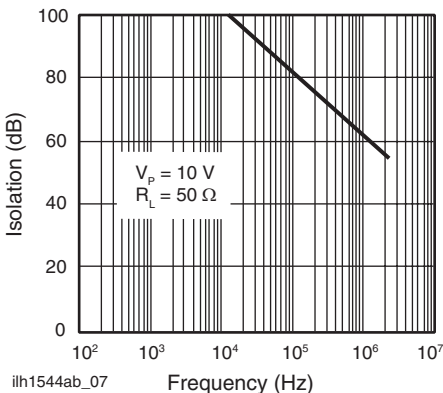


Fig. 8 - Output Isolation

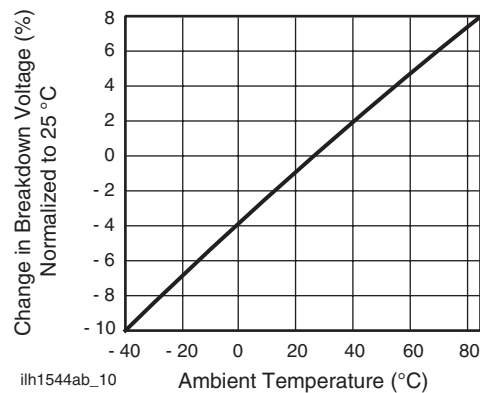


Fig. 11 - Switch Breakdown Voltage vs. Temperature

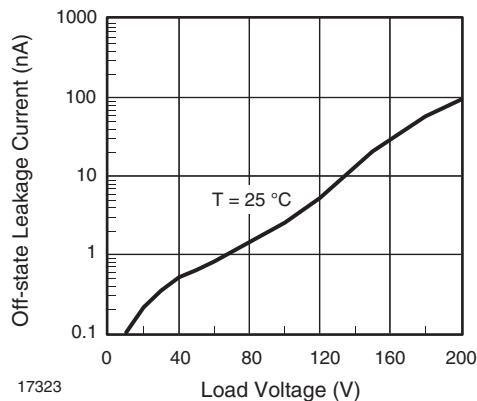


Fig. 9 - Leakage Current vs. Applied Voltage

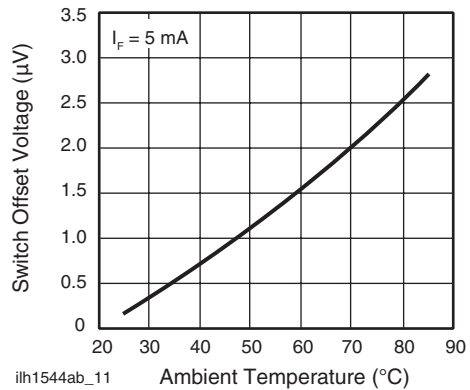


Fig. 12 - Switch Offset Voltage vs. Temperature



LH1544AAC/LH1544AACTR/LH1544AB

Dual 1 Form A Solid State Relay (Low Capacitance) Vishay Semiconductors

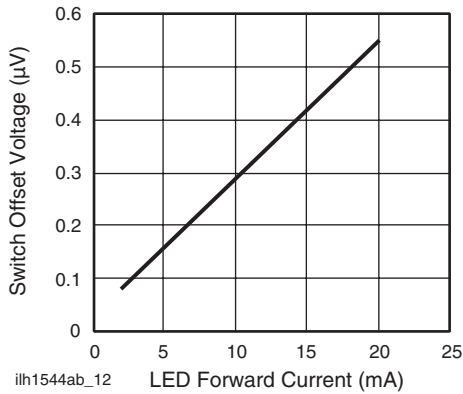


Fig. 13 - Switch Offset Voltage vs. LED Current

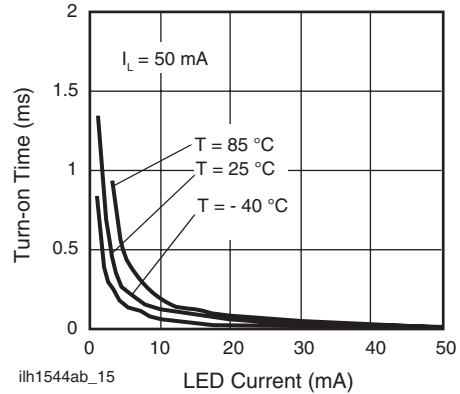


Fig. 16 - Turn-on Time vs. LED Current

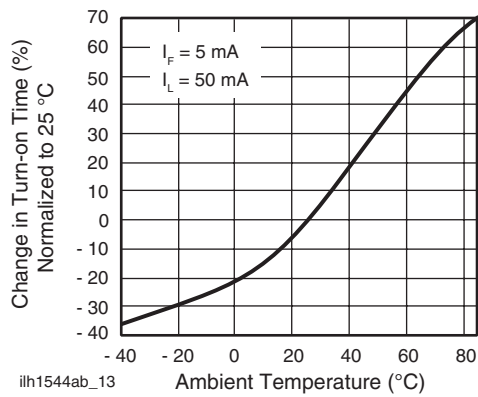


Fig. 14 - Turn-on Time vs. Temperature

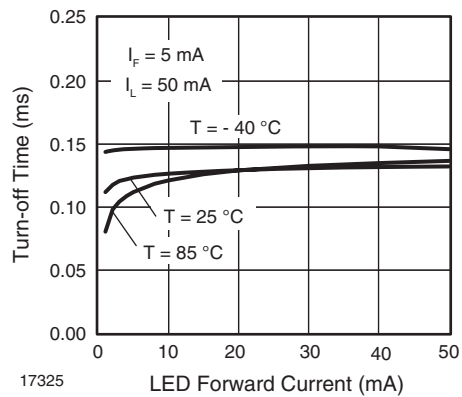


Fig. 17 - Turn-off Time vs. LED Current

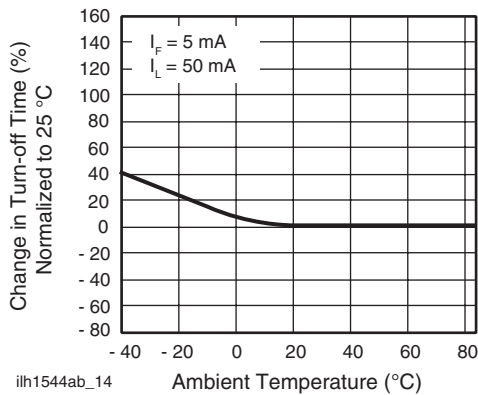


Fig. 15 - Turn-off Time vs. Temperature

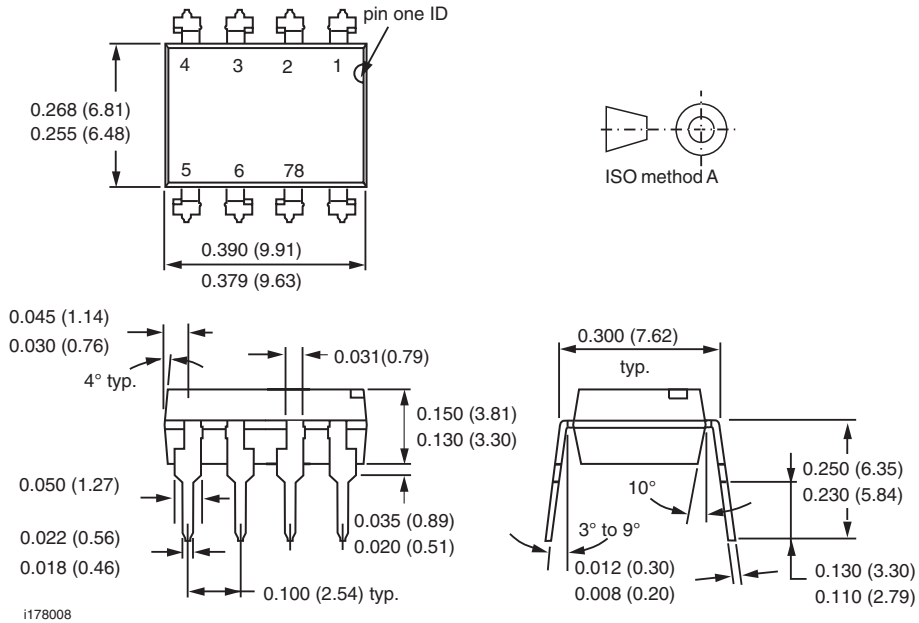
LH1544AAC/LH1544ACTR/LH1544AB



Vishay Semiconductors Dual 1 Form A Solid State Relay (Low Capacitance)

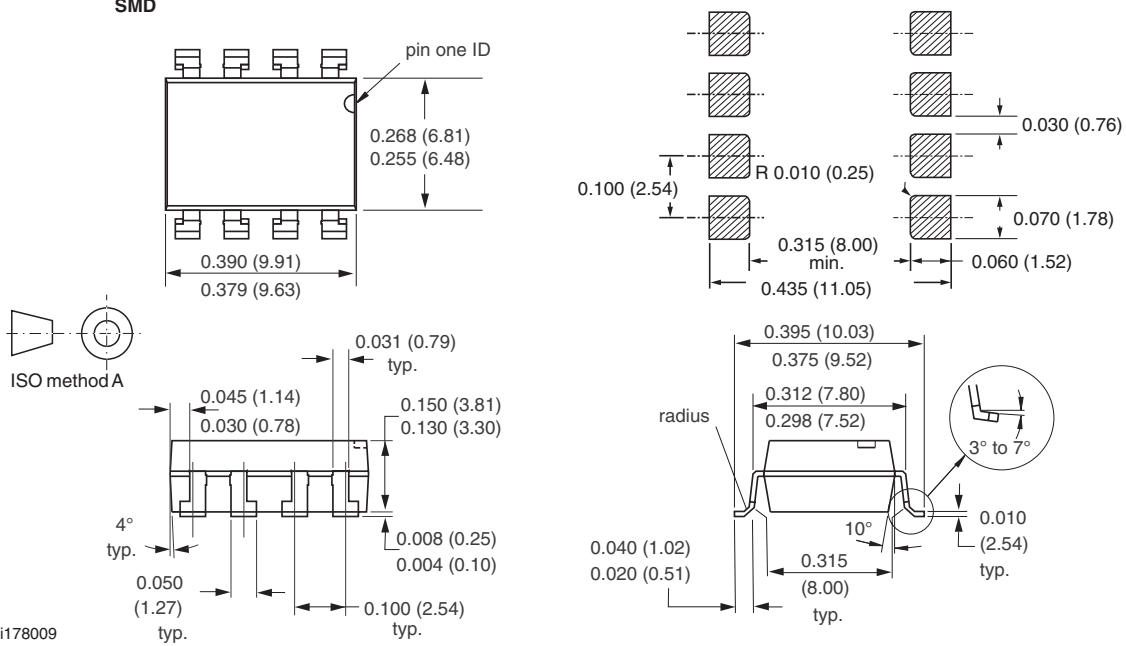
PACKAGE DIMENSIONS in inches (millimeters)

DIP



i178008

SMD



i178009



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



Disclaimer

All product specifications and data are subject to change without notice.

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 herein or in any other disclosure relating to any product.

Vishay disclaims any and all liability arising out of the use or application of any product described herein or of any information provided herein to the maximum extent permitted by law. The product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed therein, which apply to these products.

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.

The products shown herein are not designed for use in medical, life-saving, or life-sustaining applications unless otherwise expressly indicated. Customers using or selling Vishay products not expressly indicated for use in such applications do so entirely at their own risk and agree to fully indemnify Vishay for any damages arising or resulting from such use or sale. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

Product names and markings noted herein may be trademarks of their respective owners.