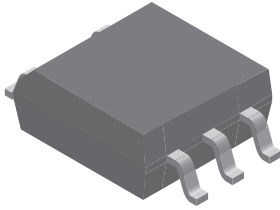
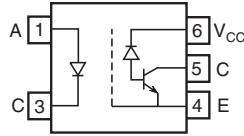




## Analog High Speed Coupler, High Noise Immunity, 1 MBd, SOP-5 Package



20409-1



20409-2



### DESCRIPTION

The VOM452T and VOM453T, high speed optocouplers, each consists of a GaAlAs infrared emitting diode, optically coupled with an integrated photo detector and a high speed transistor. The photo detector is junction isolated from the transistor to reduce miller capacitance effects. The open collector output function allows circuit designers to adjust the load conditions when interfacing with different logic systems such as TTL, CMOS, etc.

Because the VOM452T and VOM453T have a Faraday shield on the detector chip, it can also reject and minimize high input to output common mode transient voltages. There is no base connection, further reducing the potential electrical noise entering the package.

The VOM452T and VOM453T are packaged in industry standard SOP-5 packages and are suitable for surface mounting.

This an ideal solution for Industrial communication bus isolation, as well as isolated drive circuit applications such as IPM (intelligent power module) drivers.

### FEATURES

- Surface mountable
- Industry standard SOP-5 footprint
- Compatible with infrared vapor phase reflow and wave soldering processes
- Isolation test voltage, 3750 V<sub>RMS</sub>
- Very high common mode transient immunity: 15 000 V/μs at V<sub>CM</sub> = 1500 V guaranteed (VOM453T)
- High speed: 1 MBd
- TTL compatible
- Open collector output
- Material categorization: For definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



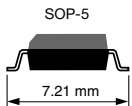
RoHS COMPLIANT

### APPLICATIONS

- Fieldbus communication and control
- Logic ground isolation
- Analog signal ground isolation
- Replace pulse transformers
- IPM (intelligent power module) drivers

### AGENCY APPROVALS

- UL1577, file no. E52744
- cUL - file no. E52744, equivalent to CSA bulletin 5A

ORDERING INFORMATION							
V	O	M	4	5	#	T	
PART NUMBER							
AGENCY CERTIFIED/PACKAGE		CMTI (kV/μs)					
UL, cUL		≥ 1		≥ 15			
SOP-5		VOM452T		VOM453T			

### Notes

- For additional information on the available options refer to option information.
- The product is available only on tape and reel.



<b>ABSOLUTE MAXIMUM RATINGS</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)				
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
<b>INPUT</b>				
Reverse voltage		$V_R$	3	V
DC forward current		$I_F$	25	mA
Surge forward current	$t_p \leq 1\text{ }\mu\text{s}$ , 300 pulses/s	$I_{FSM}$	1	A
Power dissipation	$T_{amb} \leq 70\text{ }^{\circ}\text{C}$	$P_{diss}$	45	mW
<b>OUTPUT</b>				
Supply voltage		$V_S$	- 0.5 to 30	V
Output voltage		$V_O$	- 0.5 to 25	V
Output current		$I_O$	8	mA
Power dissipation	$T_{amb} \leq 70\text{ }^{\circ}\text{C}$	$P_{diss}$	100	mW
<b>COUPLER</b>				
Isolation test voltage between emitter and detector (refer to climate DIN 40046, part 2, Nov. 74)	$t = 1\text{ s}$	$V_{ISO}$	3750	$V_{RMS}$
Pollution degree (DIN VDE 0110)			2	
Creepage distance			$\geq 5$	mm
Clearance distance			$\geq 5$	mm
Comparative tracking index per DIN IEC 112/VDE 0303, part 1			175	
Isolation resistance	$V_{IO} = 500\text{ V}$ , $T_{amb} = 25\text{ }^{\circ}\text{C}$ , $R_{ISOL}^{(1)}$	$R_{IO}$	$\geq 10^{12}$	$\Omega$
	$V_{IO} = 500\text{ V}$ , $T_{amb} = 100\text{ }^{\circ}\text{C}$ , $R_{ISOL}^{(1)}$	$R_{IO}$	$\geq 10^{11}$	$\Omega$
Storage temperature range		$T_{stg}$	- 55 to + 125	$^{\circ}\text{C}$
Ambient temperature range		$T_{amb}$	- 55 to + 100	$^{\circ}\text{C}$
Junction temperature		$T_j$	100	$^{\circ}\text{C}$
Soldering temperature <sup>(2)</sup>	$t < 10\text{ s max.}$		260	$^{\circ}\text{C}$

**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.

<sup>(1)</sup> Device considered a two-terminal device: pins 1, and 3 shorted together and pins 4, 5, and 6 shorted together.

<sup>(2)</sup> Refer to reflow profile for soldering conditions for surface mounted devices.



ELECTRICAL CHARACTERISTICS ( $T_{amb} = -40\text{ }^{\circ}\text{C}$ to $100\text{ }^{\circ}\text{C}$ , unless otherwise specified)							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
<b>INPUT</b>							
Input forward voltage	$I_F = 16\text{ mA}$		$V_F$		1.4	1.8	V
Input reverse current	$V_R = 3\text{ V}$		$I_R$		0.5	10	$\mu\text{A}$
Input capacitance	$f = 1\text{ MHz}$ , $V_F = 0\text{ V}$ , $T_{amb} = 25\text{ }^{\circ}\text{C}$		$C_{IN}$		75		pF
Temperature coefficient of forward voltage	$I_F = 16\text{ mA}$		$\Delta V_F / \Delta T_{amb}$		-1.7		mV/ $^{\circ}\text{C}$
<b>OUTPUT</b>							
Logic low supply current	$I_F = 16\text{ mA}$ , $V_O = \text{open}$ , $V_{CC} = 15\text{ V}$		$I_{CCL}$		200		$\mu\text{A}$
Logic high supply current	$I_F = 0\text{ mA}$ , $V_O = \text{open}$ , $V_{CC} = 15\text{ V}$ , $T_{amb} = 25\text{ }^{\circ}\text{C}$		$I_{CCH}$		0.001	1	$\mu\text{A}$
	$I_F = 0\text{ mA}$ , $V_O = \text{open}$ , $V_{CC} = 15\text{ V}$		$I_{CCH}$			2	$\mu\text{A}$
Logic low output voltage	$I_F = 16\text{ mA}$ , $V_{CC} = 4.5\text{ V}$ , $I_O = 3\text{ mA}$ , $T_{amb} = 25\text{ }^{\circ}\text{C}$		$V_{OL}$		0.15	0.4	V
	$I_F = 16\text{ mA}$ , $V_{CC} = 15\text{ V}$ , $I_O = 2.4\text{ mA}$		$V_{OL}$			0.5	V
Logic high output current	$I_F = 0\text{ mA}$ , $V_O = V_{CC} = 5.5\text{ V}$ , $T_{amb} = 25\text{ }^{\circ}\text{C}$		$I_{OH}$		0.003	0.5	$\mu\text{A}$
	$I_F = 0\text{ mA}$ , $V_O = V_{CC} = 15\text{ V}$ , $T_{amb} = 25\text{ }^{\circ}\text{C}$		$I_{OH}$		0.01	1	$\mu\text{A}$
	$I_F = 0\text{ mA}$ , $V_O = V_{CC} = 15\text{ V}$		$I_{OH}$			50	$\mu\text{A}$
<b>COUPLER</b>							
Capacitance (input-output) <sup>(1)</sup>	$f = 1\text{ MHz}$ , $T_{amb} = 25\text{ }^{\circ}\text{C}$		$C_{IO}$		0.4		pF

**Notes**

- 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. All typical values are measured at  $T_{amb} = 25\text{ }^{\circ}\text{C}$ .
- (1) A 0.1  $\mu\text{F}$  bypass capacitor connected between pins 4 and 6 is recommended.

CURRENT TRANSFER RATIO ( $T_{amb} = -40\text{ }^{\circ}\text{C}$ to $100\text{ }^{\circ}\text{C}$ , unless otherwise specified)						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Current transfer ratio <sup>(1)(2)</sup>	$V_O = 0.5\text{ V}$ , $I_F = 16\text{ mA}$ , $V_{CC} = 4.5\text{ V}$	CTR	15	30		%
	$V_O = 0.4\text{ V}$ , $I_F = 16\text{ mA}$ , $T_{amb} = 25\text{ }^{\circ}\text{C}$		20		50	

**Notes**

- (1) Current transfer ratio in percent equals the ratio of output collector current ( $I_O$ ) to the forward LED input current ( $I_F$ ) times 100.
- (2) A 0.1  $\mu\text{F}$  bypass capacitor connected between pins 4 and 6 is recommended. All typical values are measured at  $T_{amb} = 25\text{ }^{\circ}\text{C}$ .

SWITCHING CHARACTERISTICS ( $T_{amb} = -40\text{ }^{\circ}\text{C}$ to $100\text{ }^{\circ}\text{C}$ , unless otherwise specified)						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Propagation delay time to logic low at output (see fig. 1 and note 1)	$V_{CC} = 5\text{ V}$ , $I_F = 16\text{ mA}$ , $R_L = 1.9\text{ k}\Omega$	$t_{PHL}$		0.2	1	$\mu\text{s}$
Propagation delay time to logic high at output (see fig. 1 and note 1)	$V_{CC} = 5\text{ V}$ , $I_F = 16\text{ mA}$ , $R_L = 1.9\text{ k}\Omega$	$t_{PLH}$		0.5	1	$\mu\text{s}$

**Note**

- (1) The 1.9 k $\Omega$  load represents 1 TTL unit load of 1.6 mA and the 5.6 k $\Omega$  pull-up resistor. All typical values are measured at  $T_{amb} = 25\text{ }^{\circ}\text{C}$ .

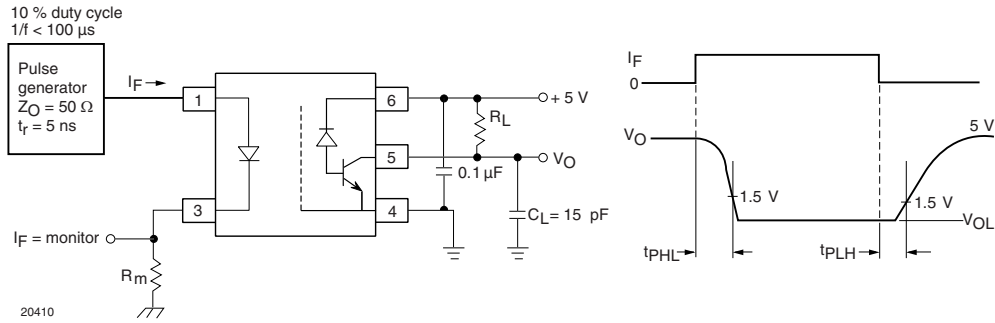


Fig. 1 - Test Circuit for Switching Times

COMMON MODE TRANSIENT IMMUNITY ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
Common mode transient immunity at logic high level output (see fig. 2 and notes 1, and 2)	$R_L = 1.9\text{ k}\Omega$ , $I_F = 0\text{ mA}$ , $V_{CM} = 10\text{ V}_{P-P}$	VOM452T	$ CM_H $	1			kV/ $\mu$ s
	$R_L = 1.9\text{ k}\Omega$ , $I_F = 0\text{ mA}$ , $V_{CM} = 1500\text{ V}_{P-P}$	VOM453T	$ CM_H $	15			kV/ $\mu$ s
Common mode transient immunity at logic low level output (see fig. 2 and notes 1, and 2)	$R_L = 1.9\text{ k}\Omega$ , $I_F = 16\text{ mA}$ , $V_{CM} = 10\text{ V}_{P-P}$	VOM452T	$ CM_L $	1			kV/ $\mu$ s
	$R_L = 1.9\text{ k}\Omega$ , $I_F = 16\text{ mA}$ , $V_{CM} = 1500\text{ V}_{P-P}$	VOM453T	$ CM_L $	15			kV/ $\mu$ s

**Notes**

- (1) Common mode transient immunity in a logic high level is the maximum tolerable (positive)  $dV_{CM}/dt$  on the leading edge of the common mode pulse ( $V_{CM}$ ) to assure that the output will remain in a logic high state (i.e.,  $V_O > 2\text{ V}$ ). Common mode transient immunity in a logic low level is the maximum tolerable (negative)  $dV_{CM}/dt$  on the trailing edge of the common mode pulse signal ( $V_{CM}$ ) to assure that the output will remain in logic low state, i.e.,  $V_O > 0.8\text{ V}$ .
- (2) The  $1.9\text{ k}\Omega$  load represents 1 TTL unit load of  $1.6\text{ mA}$  and the  $5.6\text{ k}\Omega$  pull-up resistor.

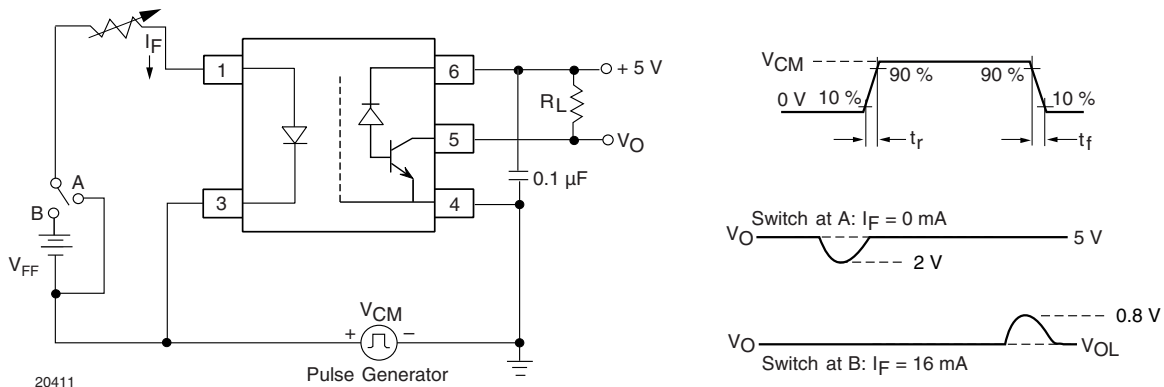


Fig. 2 - Test Circuit for Transient Immunity and Typical Waveforms



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	
Peak transient overvoltage		$V_{IOTM}$	6000			V
Peak insulation voltage		$V_{IORM}$	707			V
Safety rating - power output		$P_{SO}$			350	mW
Safety rating - input current		$I_{SI}$			150	mA
Safety rating - temperature		$T_{SI}$			175	°C
Creepage distance			5			mm
Clearance distance			5			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** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)

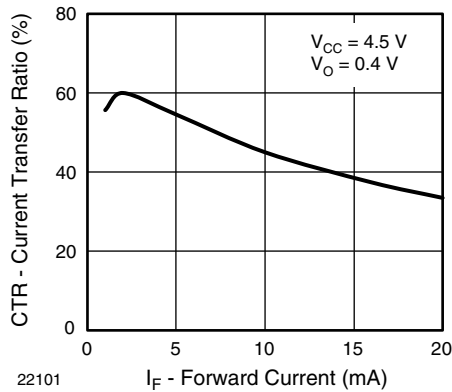


Fig. 3 - Current Transfer Ratio vs. Forward Current

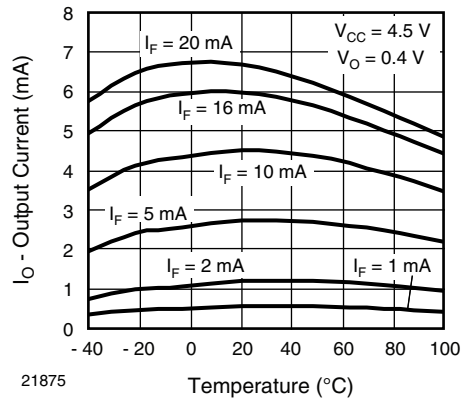


Fig. 5 - Output Current vs. Temperature

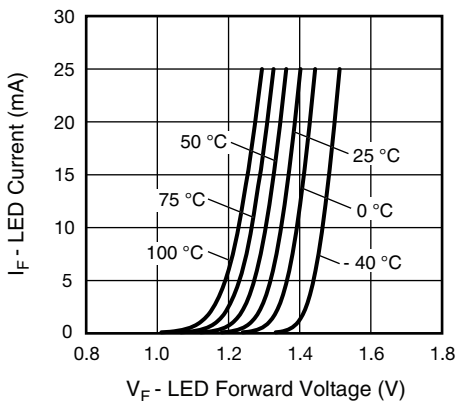


Fig. 4 - LED Current vs. LED Forward Voltage

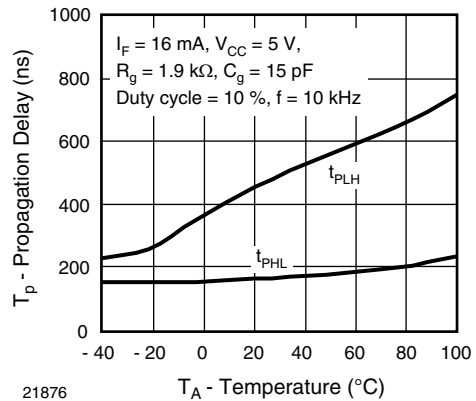


Fig. 6 - Propagation Delay vs. Temperature

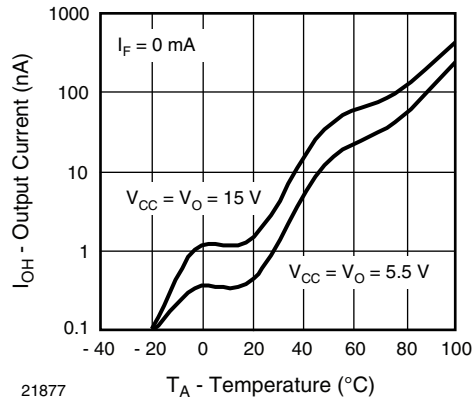


Fig. 7 - Logic High Output Current vs. Temperature

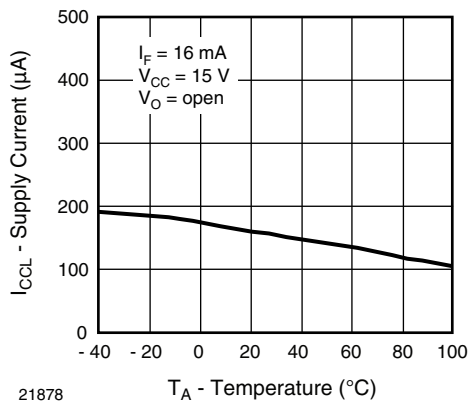


Fig. 8 - Supply Current vs. Temperature

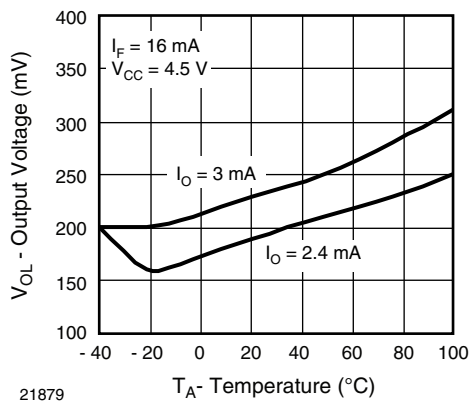
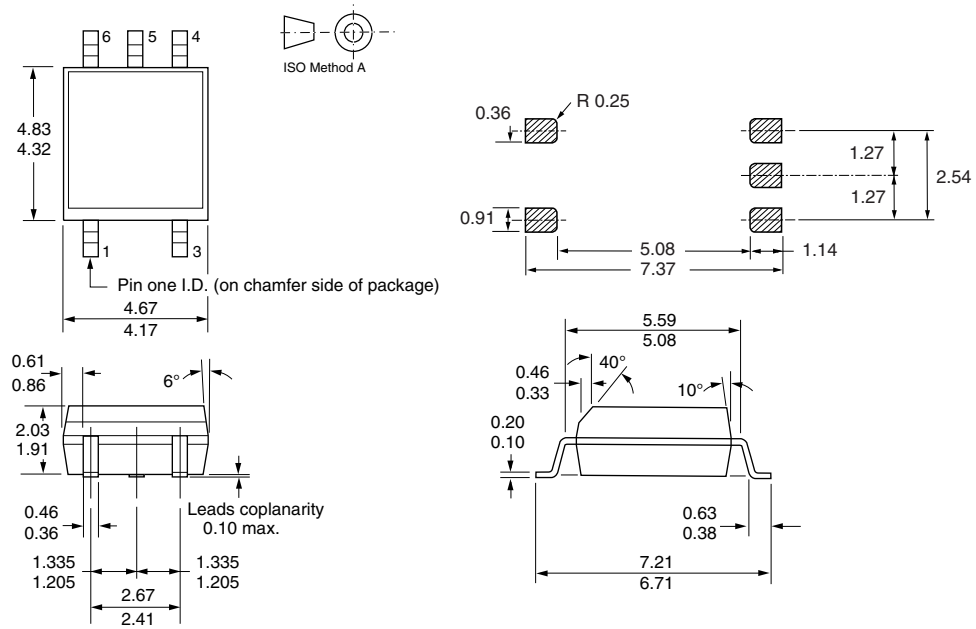


Fig. 9 - Logic Low Output Voltage vs. Temperature

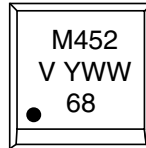


### PACKAGE DIMENSIONS in millimeters



20643

### PACKAGE MARKING (example)





## 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. 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.

## Material Category Policy

**Vishay Intertechnology, Inc. hereby certifies that all its products that are identified as RoHS-Compliant fulfill the definitions and restrictions defined under Directive 2011/65/EU of The European Parliament and of the Council of June 8, 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (EEE) - recast, unless otherwise specified as non-compliant.**

**Please note that some Vishay documentation may still make reference to RoHS Directive 2002/95/EC. We confirm that all the products identified as being compliant to Directive 2002/95/EC conform to Directive 2011/65/EU.**

**Vishay Intertechnology, Inc. hereby certifies that all its products that are identified as Halogen-Free follow Halogen-Free requirements as per JEDEC JS709A standards. Please note that some Vishay documentation may still make reference to the IEC 61249-2-21 definition. We confirm that all the products identified as being compliant to IEC 61249-2-21 conform to JEDEC JS709A standards.**





Компания «ЭлектроПласт» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Помимо этого, одним из направлений компании «ЭлектроПласт» является направление «Источники питания». Мы предлагаем Вам помощь Конструкторского отдела:

- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



#### Как с нами связаться

**Телефон:** 8 (812) 309 58 32 (многоканальный)

**Факс:** 8 (812) 320-02-42

**Электронная почта:** [org@eplast1.ru](mailto:org@eplast1.ru)

**Адрес:** 198099, г. Санкт-Петербург, ул. Калинина, дом 2, корпус 4, литера А.