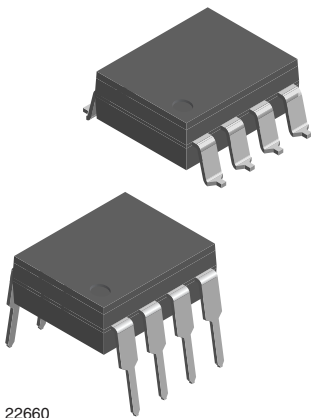
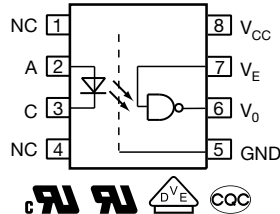


# Widebody, High Isolation, High Speed Optocoupler, 10 MBd



22660



## FEATURES

- External creepage > 10 mm
- Reinforced isolation
- Internal shield for very high input to output noise isolation
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**  
**GREEN**  
(5-2008)

## APPLICATIONS

- Solar inverters
- Industrial motor drives
- Welding equipment
- Isolated industrial communication
- Ground loop elimination
- Noise isolation of sensitive circuits

## DESCRIPTION

Both 10 MBd widebody optocouplers consist of a GaAlAs infrared emitting diode, optically coupled with an integrated photo detector. The detector incorporating an integral Faraday shield provides a high level of noise isolation, required by high power switching applications.

Vishay's 10 MBd widebody couplers feature a high level of isolation distance, exhibiting an external creepage distance of > 10 mm. This makes these parts ideal for applications with working voltages exceeding 1000 V.

## AGENCY APPROVALS

The safety application model number covering all products in this datasheet is VOW137. This model number should be used when consulting safety agency documents.

- UL1577
- cUL
- DIN EN 60747-5-5 (VDE 0884)
- CQC

ORDERING INFORMATION															
<table border="1" style="display: inline-table; margin-right: 10px;"> <tr><td>V</td><td>O</td><td>W</td><td>#</td><td>#</td><td>#</td><td>#</td></tr> </table>	V	O	W	#	#	#	#	<table border="1" style="display: inline-table; margin-right: 10px;"> <tr><td>X</td><td>0</td><td>#</td><td>#</td></tr> </table>	X	0	#	#	<table border="1" style="display: inline-table; margin-right: 10px;"> <tr><td>T</td></tr> </table>	T	
V	O	W	#	#	#	#									
X	0	#	#												
T															
PART NUMBER	PACKAGE OPTION	TAPE AND REEL													
AGENCY CERTIFIED/PACKAGE	CMR (kV/μs)														
<b>VDE, UL, cUL</b>	<b>10</b>	<b>25</b>													
DIP-8, 400 mil, widebody	VOW137-X001	VOW2611-X001													
SMD-8, 400 mil, option 7, widebody	VOW137-X017T	VOW2611-X017T													

TRUTH TABLE		
LED	ENABLE	OUTPUT
On	H	L
Off	H	H
On	L	H
Off	L	H
On	NC	L
Off	NC	H



ABSOLUTE MAXIMUM RATINGS				
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
<b>INPUT</b>				
Average forward current		$I_F$	20	mA
Reverse input voltage		$V_R$	5	V
Enable input voltage		$V_E$	$V_{CC} + 0.5 V$	V
Enable input current		$I_E$	5	mA
Surge current	$t = 100 \mu s$	$I_{FSM}$	200	mA
Input junction temperature		$T_{J max.}$	125	°C
Output power dissipation		$P_{diss}$	35	mW
<b>OUTPUT</b>				
Supply voltage	1 min maximum	$V_{CC}$	7	V
Output current		$I_O$	50	mA
Output voltage		$V_O$	7	V
Output junction temperature		$T_{J max.}$	125	°C
Output power dissipation		$P_{diss}$	85	mW
<b>COUPLER</b>				
Isolation voltage	$t = 1 \text{ min}$	$V_{ISO}$	5300	$V_{RMS}$
Storage temperature		$T_{stg}$	-55 to +150	°C
Operating temperature		$T_{amb}$	-40 to +100	°C
Lead solder temperature	for 10 s		260	°C
Solder reflow temperature <sup>(1)</sup>			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.
- <sup>(1)</sup> Refer to reflow profile for soldering conditions for surface mounted devices (SMDW). Refer to wave profile for soldering conditions for through hole devices (DIPW).

RECOMMENDED OPERATING CONDITIONS					
PARAMETER	TEST CONDITION	SYMBOL	MIN.	MAX.	UNIT
Operating temperature		$T_{amb}$	-40	100	°C
Supply voltage		$V_{CC}$	4.5	5.5	V
Input current low level		$I_{FL}$	0	250	$\mu A$
Input current high level		$I_{FH}$	5	15	mA
Logic high enable voltage		$V_{EH}$	2	$V_{CC}$	V
Logic low enable voltage		$V_{EL}$	0	0.8	V
Output pull up resistor		$R_L$	330	4K	$\Omega$
Fanout	$R_L = 1 \text{ k}\Omega$	N		5	-

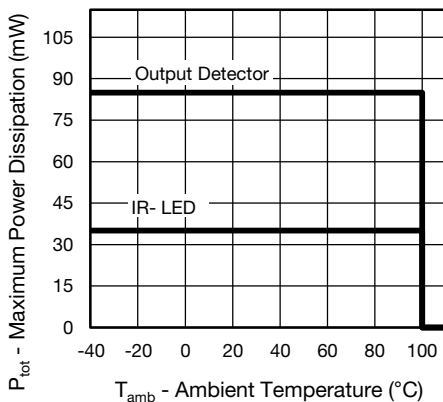


Fig. 1 - Dissipated Power vs. Ambient Temperature



ELECTRICAL CHARACTERISTICS						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
<b>INPUT</b>						
Input forward voltage	$I_F = 10 \text{ mA}$	$V_F$	1.1	1.4	1.7	V
Reverse current	$V_R = 5 \text{ V}$	$I_R$		0.01	10	$\mu\text{A}$
Input capacitance	$f = 1 \text{ MHz}, V_F = 0 \text{ V}$	$C_I$		38		pF
<b>OUTPUT</b>						
High level supply current	$V_E = 0.5 \text{ V}, I_F = 0 \text{ mA}$	$I_{CCH}$		4.3	10	mA
	$V_E = V_{CC}, I_F = 0 \text{ mA}$	$I_{CCH}$		3.3		mA
Low level supply current	$V_E = 0.5 \text{ V}, I_F = 10 \text{ mA}$	$I_{CCL}$		4.3	13	mA
	$V_E = V_{CC}, I_F = 10 \text{ mA}$	$I_{CCL}$		3.3	6	mA
High level output current	$V_E = 2 \text{ V}, V_O = 5.5 \text{ V}, I_F = 250 \mu\text{A}$	$I_{OH}$		0.02	10	$\mu\text{A}$
Low level output voltage	$V_E = 2 \text{ V}, I_F = 5 \text{ mA}, I_{OL} \text{ (sinking)} = 13 \text{ mA}$	$V_{OL}$		0.2	0.6	V
Input threshold current	$V_E = 2 \text{ V}, V_O = 0.6 \text{ V}, I_{OL} \text{ (sinking)} = 13 \text{ mA}$	$I_{TH}$		2.4	5	mA
Input-output capacitance	$f = 1 \text{ MHz}, T_{amb} = 25 \text{ }^\circ\text{C}$	$C_{IO}$		0.9		pF
High level enable current	$V_E = 2 \text{ V}$	$I_{EH}$		-0.6	-1.6	mA
Low level enable current	$V_E = 0.5 \text{ V}$	$I_{EL}$		-0.8	-1.6	mA
High level enable voltage		$V_{EH}$	2			V
Low level enable voltage		$V_{EL}$			0.8	V

**Notes**

- Over recommended temperature ( $T_{amb} = -40 \text{ }^\circ\text{C}$  to  $+100 \text{ }^\circ\text{C}$ ),  $V_{CC} = 5 \text{ V}$ ,  $I_F = 7.5 \text{ mA}$  unless otherwise specified. All typicals at  $T_{amb} = 25 \text{ }^\circ\text{C}$ ,  $V_{CC} = 5 \text{ V}$ .
- 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.

SWITCHING CHARACTERISTICS						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Propagation delay time to high output level	$R_L = 350 \Omega, C_L = 15 \text{ pF}$	$t_{PLH}$	20	49	100	ns
Propagation delay time to low output level	$R_L = 350 \Omega, C_L = 15 \text{ pF}$	$t_{PHL}$	25	46	100	ns
Pulse width distortion	$R_L = 350 \Omega, C_L = 15 \text{ pF}$	$ t_{PHL} - t_{PLH} $		3.1	40	ns
Propagation delay skew	$R_L = 350 \Omega, C_L = 15 \text{ pF}$	$t_{PSK}$		16	40	ns
Output rise time (10 % to 90 %)	$R_L = 350 \Omega, C_L = 15 \text{ pF}$	$t_r$		14		ns
Output fall time (90 % to 10 %)	$R_L = 350 \Omega, C_L = 15 \text{ pF}$	$t_f$		7		ns
Propagation delay time of enable from $V_{EH}$ to $V_{EL}$	$R_L = 350 \Omega, C_L = 15 \text{ pF}, V_{EL} = 0 \text{ V}, V_{EH} = 3 \text{ V}$	$t_{ELH}$		11		ns
Propagation delay time of enable from $V_{EL}$ to $V_{EH}$	$R_L = 350 \Omega, C_L = 15 \text{ pF}, V_{EL} = 0 \text{ V}, V_{EH} = 3 \text{ V}$	$t_{EHL}$		9		ns

**Notes**

- Over recommended temperature ( $T_{amb} = -40 \text{ }^\circ\text{C}$  to  $+100 \text{ }^\circ\text{C}$ ),  $V_{CC} = 5 \text{ V}$ ,  $I_F = 7.5 \text{ mA}$  unless otherwise specified. All typicals at  $T_{amb} = 25 \text{ }^\circ\text{C}$ ,  $V_{CC} = 5 \text{ V}$ .
- 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.

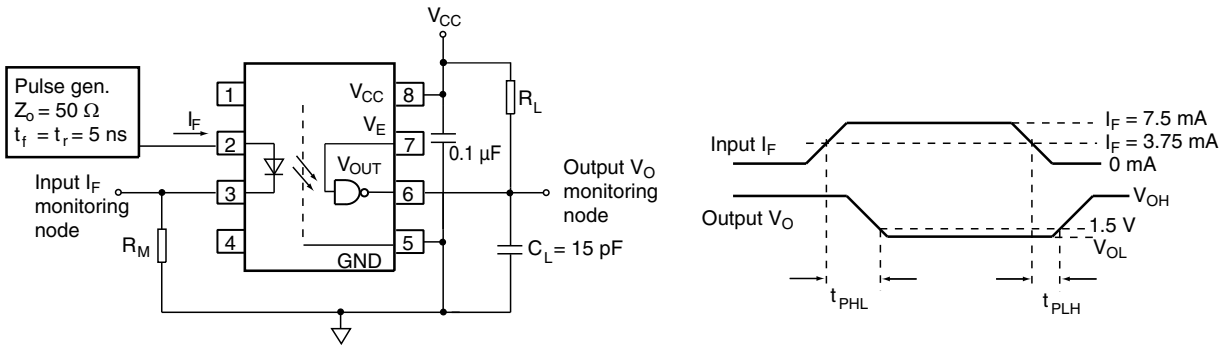


Fig. 2 - Test Circuit for  $t_{PLH}$ ,  $t_{PHL}$ ,  $t_r$  and  $t_f$

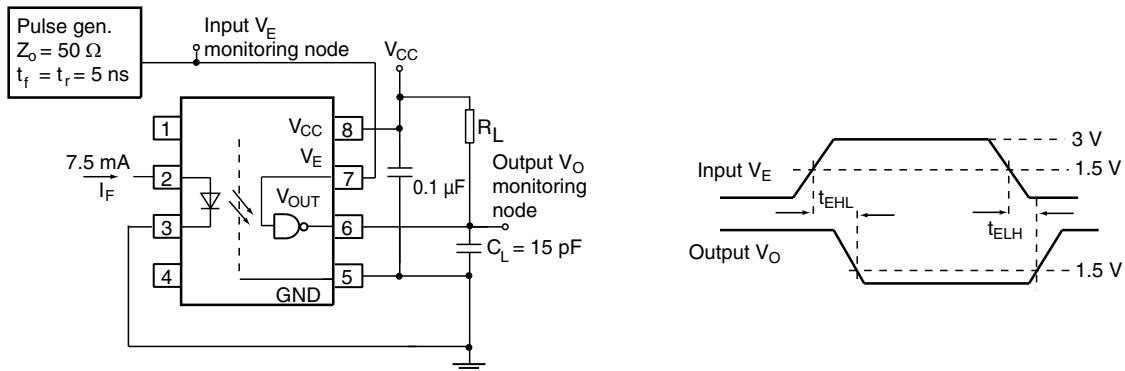


Fig. 3 - Test Circuit for  $t_{EHL}$  and  $t_{ELH}$

COMMON MODE TRANSIENT IMMUNITY							
PARAMETER	TEST CONDITION	DEVICE	SYMBOL	MIN.	TYP.	MAX.	UNIT
Common mode transient immunity	$ V_{CM}  = 1 \text{ kV}$ , $V_{CC} = 5 \text{ V}$ , $I_F = 0 \text{ mA}$ (1)(2)(3)(4)	VOW137	$ CM_H $	10 000			V/ $\mu\text{s}$
	$ V_{CM}  = 1 \text{ kV}$ , $V_{CC} = 5 \text{ V}$ , $I_F = 0 \text{ mA}$ (1)(2)(5)	VOW2611	$ CM_H $	25 000	40 000		V/ $\mu\text{s}$
	$ V_{CM}  = 1 \text{ kV}$ , $V_{CC} = 5 \text{ V}$ , $I_F = 7.5 \text{ mA}$ (1)(2)(3)(4)	VOW137	$ CM_L $	10 000			V/ $\mu\text{s}$
	$ V_{CM}  = 1 \text{ kV}$ , $V_{CC} = 5 \text{ V}$ , $I_F = 7.5 \text{ mA}$ (1)(2)(5)	VOW2611	$ CM_L $	25 000	40 000		V/ $\mu\text{s}$

**Notes**

- (1) Over recommended temperature ( $T_{amb} = -40 \text{ }^\circ\text{C}$  to  $+100 \text{ }^\circ\text{C}$ ),  $V_{CC} = 5 \text{ V}$ ,  $I_F = 7.5 \text{ mA}$  unless otherwise specified. All typicals at  $T_{amb} = 25 \text{ }^\circ\text{C}$ ,  $V_{CC} = 5 \text{ V}$ .
- (2) 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.
- (3) With pulling  $V_E$  to logic high state will improve the CMR performance.
- (4) VOW137 CMTI test circuit refer to figure 4.
- (5) VOW2611 CMTI test circuit refer to figure 5.

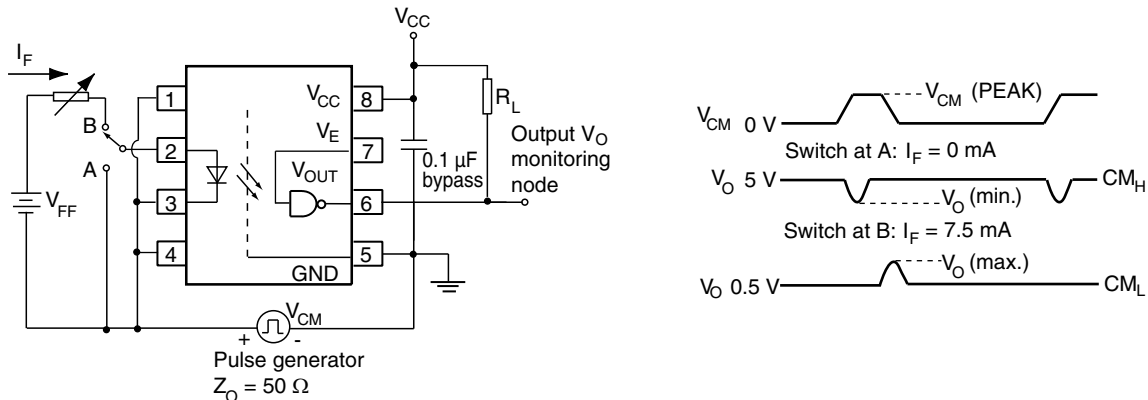


Fig. 4 - VOW137 Test Circuit for Common Mode Transient Immunity

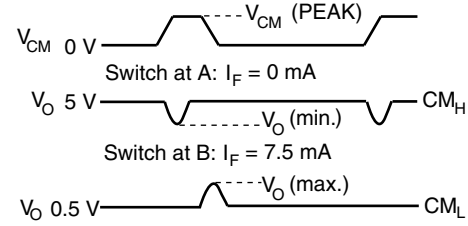
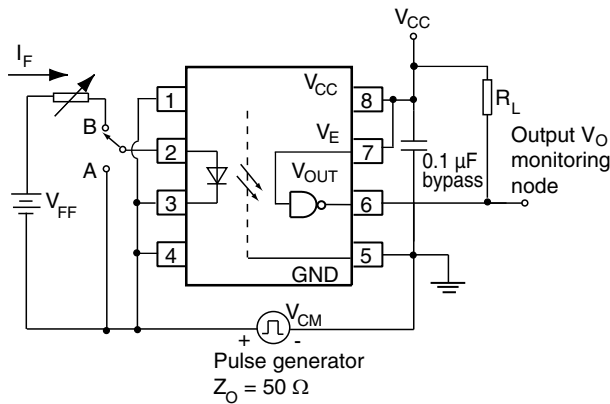


Fig. 5 - VOW2611 Test Circuit for Common Mode Transient Immunity

SAFETY AND INSULATION RATINGS					
PARAMETER		SYMBOL	VALUE	UNIT	
<b>MAXIMUM SAFETY RATINGS</b>					
Output safety power		$P_{SO}$	700	mW	
Input safety current		$I_{si}$	350	mA	
Safety temperature		$T_S$	150	°C	
Comparative tracking index		CTI	250		
<b>INSULATION RATED PARAMETERS</b>					
Maximum withstanding isolation voltage		$t = 1 \text{ min}$	$V_{ISO}$	5300	$V_{RMS}$
Maximum transient isolation voltage			$V_{IOTM}$	8000	$V_{peak}$
Maximum repetitive peak isolation voltage			$V_{IORM}$	1414	$V_{peak}$
Insulation resistance		$T_{amb} = 25 \text{ °C}, V_{DC} = 500 \text{ V}$	$R_{IO}$	$\geq 10^{12}$	$\Omega$
Isolation resistance		$T_{amb} = 100 \text{ °C}, V_{DC} = 500 \text{ V}$	$R_{IO}$	$\geq 10^{11}$	$\Omega$
Input to output test voltage, method b		$V_{IORM} \times 1.875 = V_{PR}$ , 100 % production test with $t_M = 1 \text{ s}$ , partial discharge $< 5 \text{ pC}$	$V_{PR}$	2651	$V_{peak}$
Input to output test voltage, method a		$V_{IORM} \times 1.6 = V_{PR}$ , 100 % production test with $t_M = 10 \text{ s}$ , partial discharge $< 5 \text{ pC}$	$V_{PR}$	2262	$V_{peak}$
Climatic classification (according to IEC 68 part 1)				55/100/21	
Environment (pollution degree in accordance to DIN VDE 0109)				2	
Clearance distance (DIP-8, widebody)				$\geq 10$	mm
Creepage distance (DIP-8, widebody)				$\geq 10$	mm
Insulation thickness			DTI	$\geq 0.4$	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)

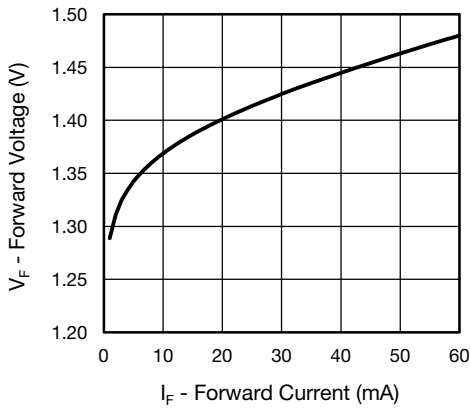


Fig. 6 - Forward Voltage vs. Forward Current

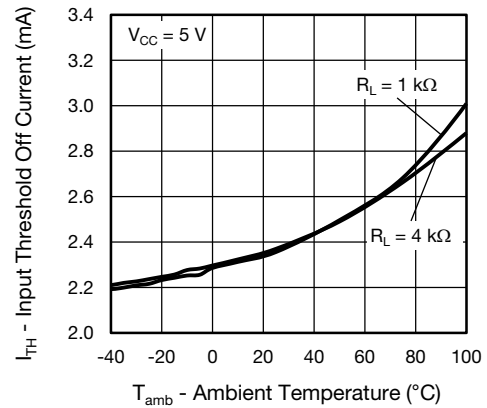


Fig. 9 - Input Threshold Off Current vs. Ambient Temperature

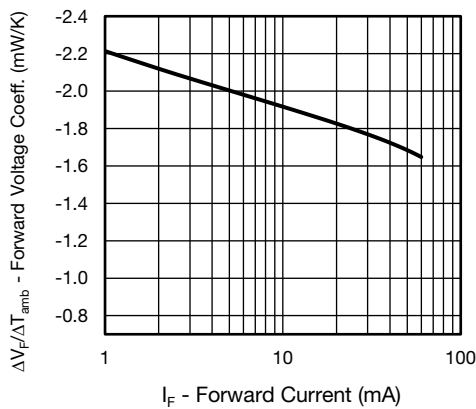


Fig. 7 - Forward Voltage Coefficient vs. Forward Current

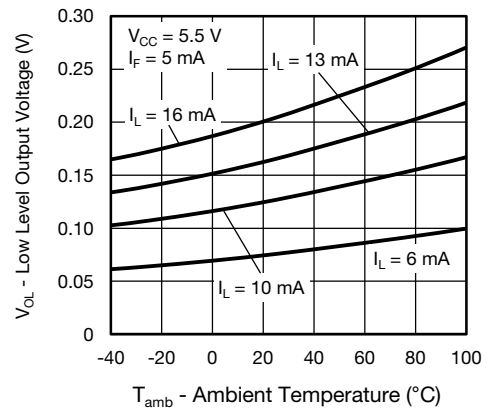


Fig. 10 - Low Level Output Voltage vs. Ambient Temperature

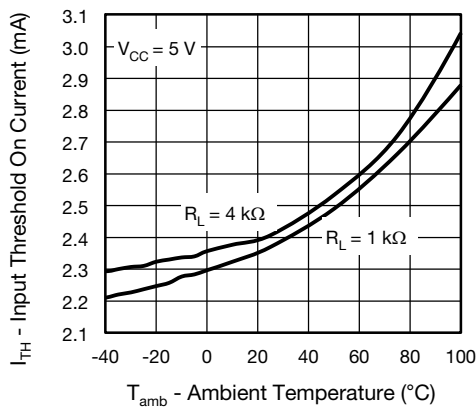


Fig. 8 - Input Threshold On Current vs. Ambient Temperature

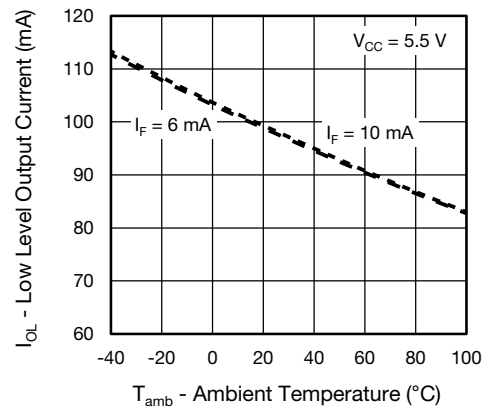


Fig. 11 - Low Level Output Current vs. Ambient Temperature



Fig. 12 - High Level Output Current vs. Ambient Temperature

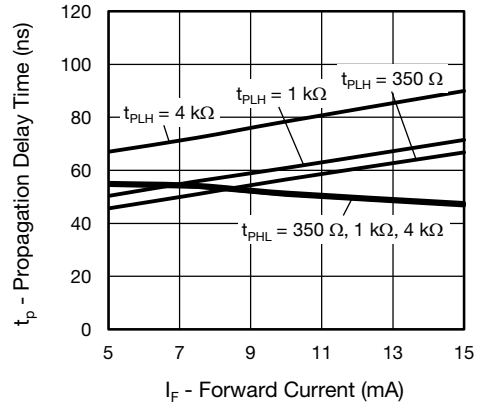


Fig. 15 - Propagation Delay vs. Forward Current

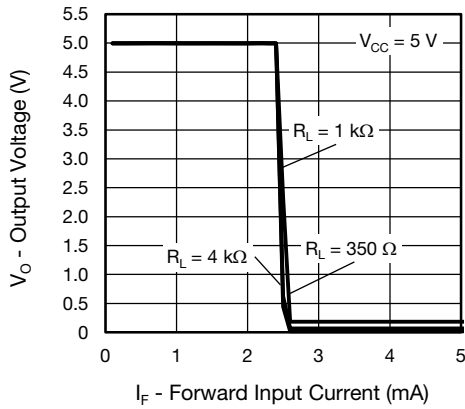


Fig. 13 - Output Voltage vs. Forward Current



Fig. 16 - Pulse Width Distortion vs. Ambient Temperature

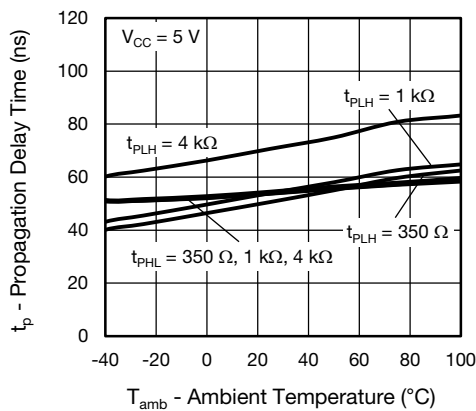


Fig. 14 - Propagation Delay vs. Ambient Temperature



Fig. 17 - Pulse Width Distortion vs. Forward Current

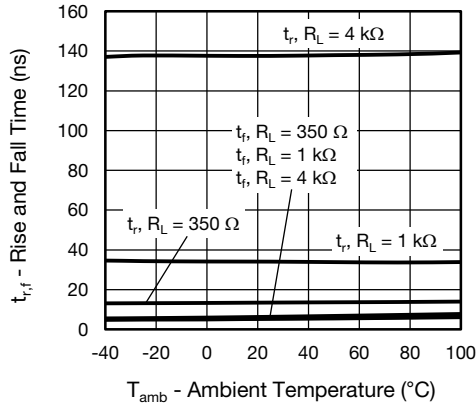


Fig. 18 - Rise and Fall Time vs. Ambient Temperature

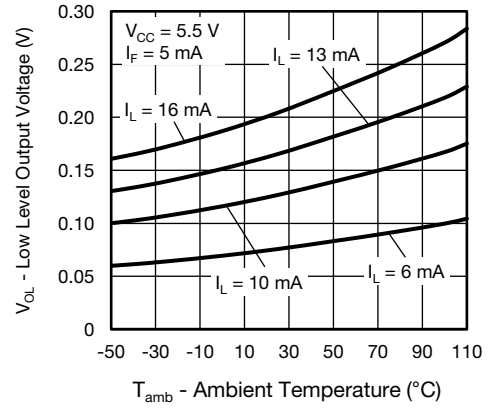


Fig. 21 - Low Level Output Voltage vs. Ambient Temperature

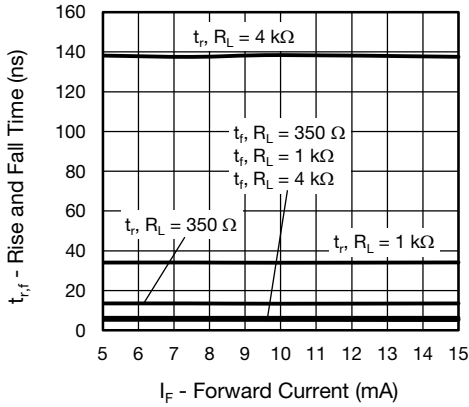


Fig. 19 - Rise and Fall Time vs. Forward Current

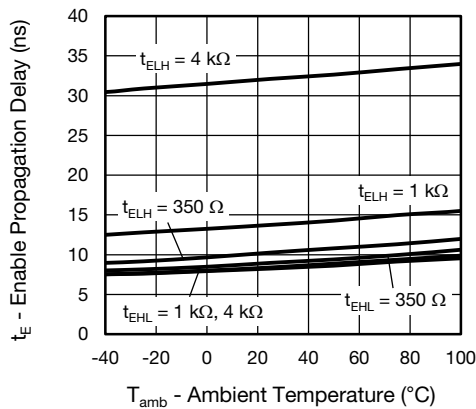


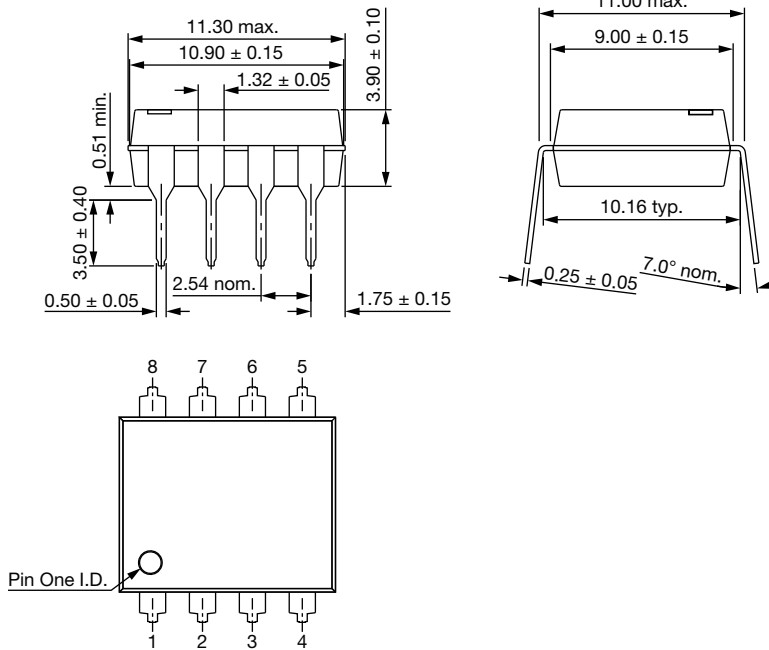
Fig. 20 - Enable Propagation Delay vs. Ambient Temperature



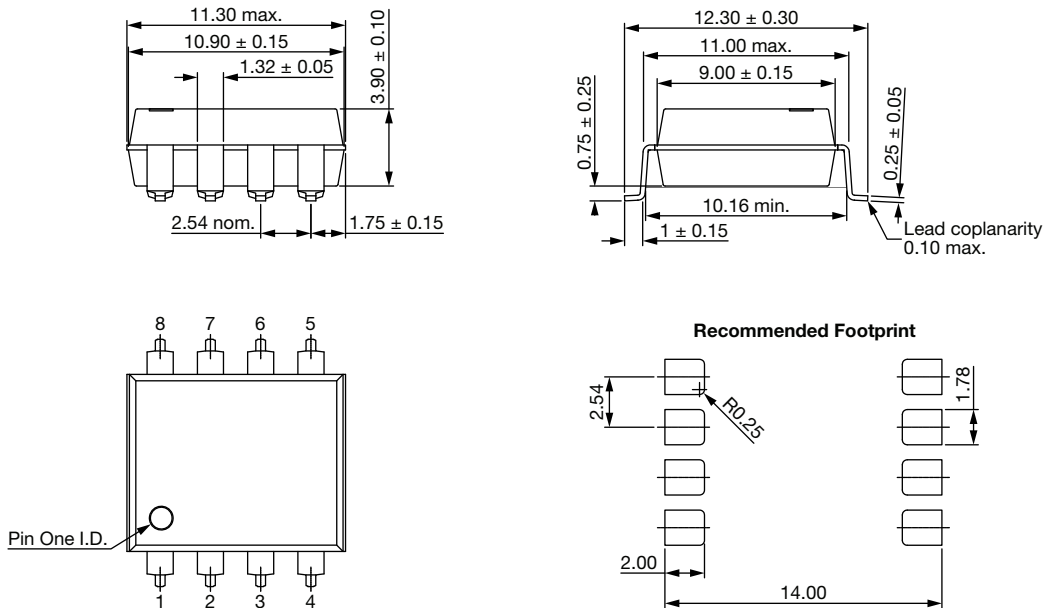


PACKAGE DIMENSIONS in millimeters

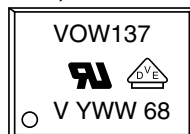
DIP-8, widebody



SMD-8, widebody, (Option 7)



PACKAGE MARKING (Example of VOW137-X017T)



Note

- Tape and reel suffix (T) is not part of the package marking.

**PACKING INFORMATION** (Tape and Reel)

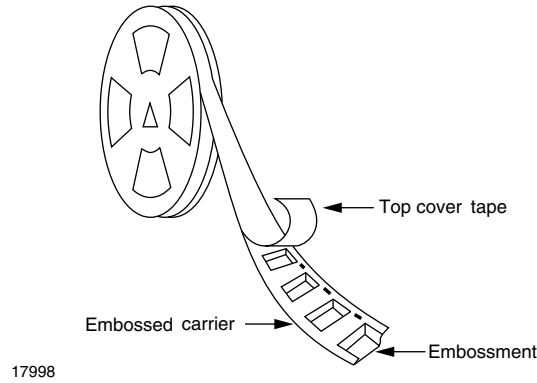
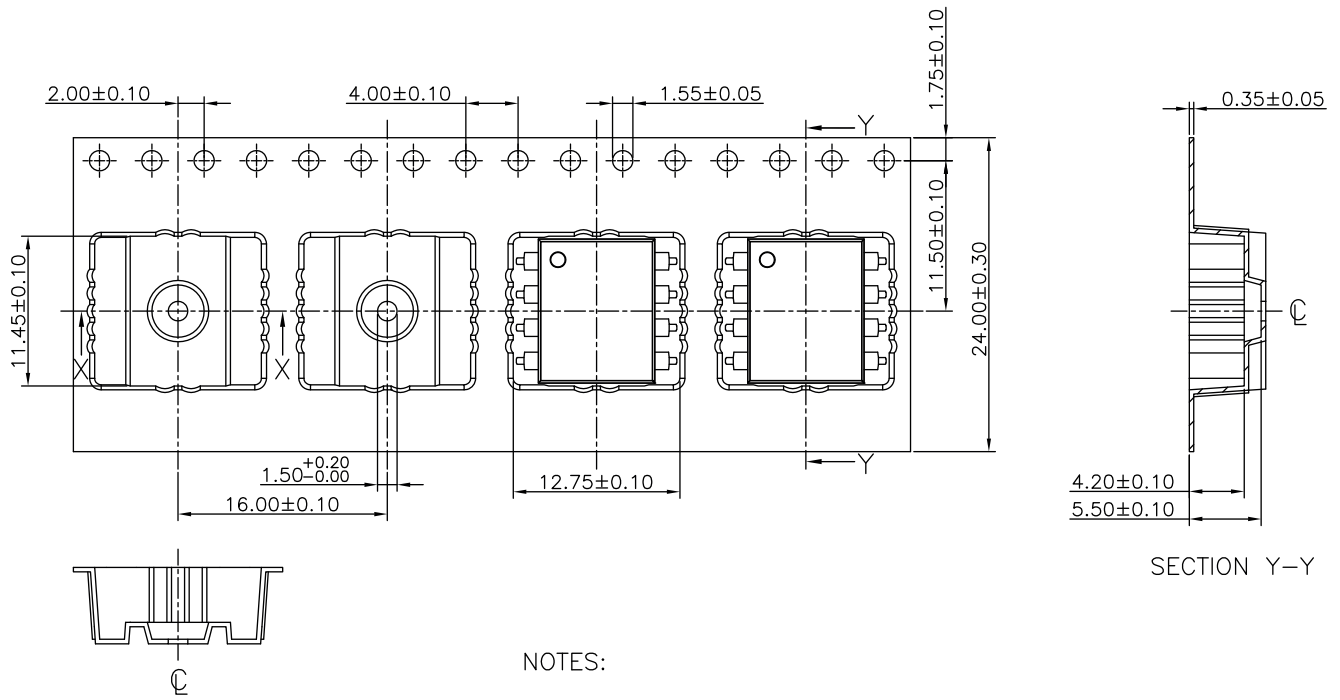


Fig. 22 - Tape and Reel Shipping Medium



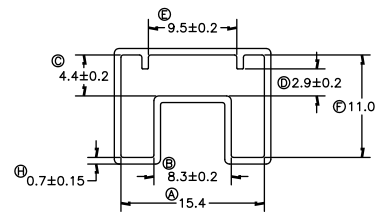
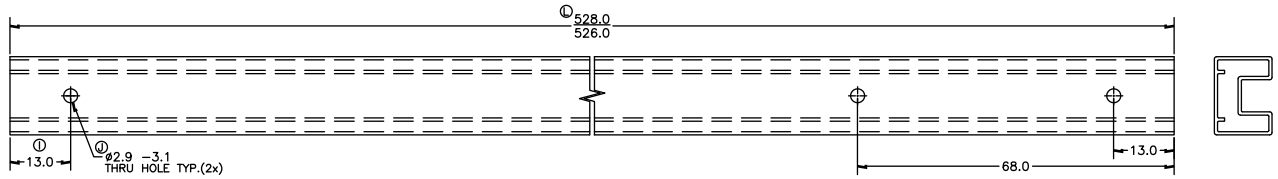
- NOTES:
- 1) CUMULATIVE TOLERANCE OF 10 SPROCKET HOLES IS  $\pm 0.20$ .

Fig. 23 - Tape and Reel Packing Option 7 (750 parts per reel)



PACKING INFORMATION (Tubes)

DEVICE PER TUBE			
TYPE	UNITS/TUBE	TUBE/BOX	UNITS/BOX
DIP-8, widebody	40	30	1200



TUBE COLOUR:	CLEAR
PRINT COLOUR:	-

1. ALL DIMENSIONS ARE IN MILLIMETERS, U.O.S.

1. ALL TUBE TOLERANCES TO BE  $\pm 0.25$  UNLESS OTHERWISE SPECIFIED.
2. ALL RADII AND ANGLES REFERENCE ONLY, UNLESS OTHERWISE SPECIFIED.



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## 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.**

## Данный компонент на территории Российской Федерации

### Вы можете приобрести в компании MosChip.

Для оперативного оформления запроса Вам необходимо перейти по данной ссылке:

<http://moschip.ru/get-element>

Вы можете разместить у нас заказ для любого Вашего проекта, будь то серийное производство или разработка единичного прибора.

В нашем ассортименте представлены ведущие мировые производители активных и пассивных электронных компонентов.

Нашей специализацией является поставка электронной компонентной базы двойного назначения, продукции таких производителей как XILINX, Intel (ex.ALTERA), Vicor, Microchip, Texas Instruments, Analog Devices, Mini-Circuits, Amphenol, Glenair.

Сотрудничество с глобальными дистрибьюторами электронных компонентов, предоставляет возможность заказывать и получать с международных складов практически любой перечень компонентов в оптимальные для Вас сроки.

На всех этапах разработки и производства наши партнеры могут получить квалифицированную поддержку опытных инженеров.

Система менеджмента качества компании отвечает требованиям в соответствии с ГОСТ Р ИСО 9001, ГОСТ РВ 0015-002 и ЭС РД 009

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