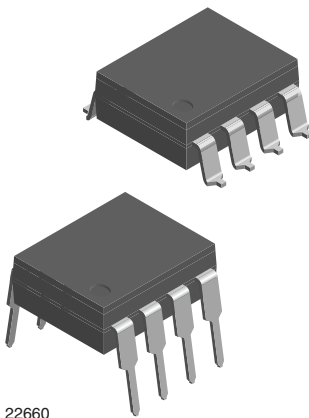
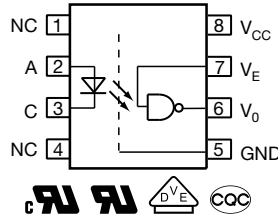


Widebody, High Isolation, High Speed Optocoupler, 10 MBd



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



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

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.

- [UL](#)
- [cUL](#)
- [DIN EN 60747-5-5 \(VDE 0884-5\)](#)
- [CQC GB4943.1](#)
- [CQC GB8898](#)

LINKS TO ADDITIONAL RESOURCES

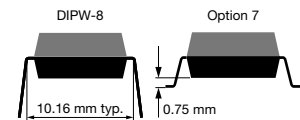
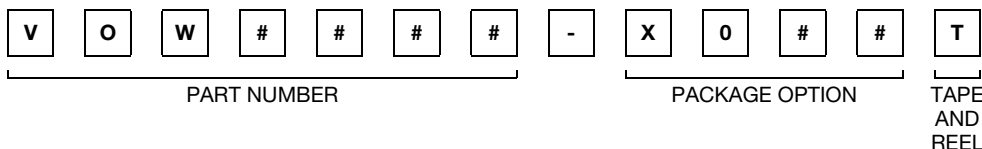


DESCRIPTION

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.

ORDERING INFORMATION



AGENCY CERTIFIED / PACKAGE	CMR (kV/μs)	
	10	25
UL, cUL, VDE		
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
INPUT				
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
OUTPUT				
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
COUPLER				
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 ⁽¹⁾			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 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	μA
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	Ω
Fanout	$R_L = 1 \text{ k}\Omega$	N		5	-

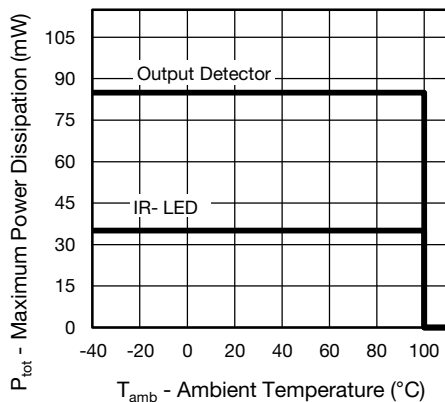


Fig. 1 - Dissipated Power vs. Ambient Temperature



ELECTRICAL CHARACTERISTICS						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
INPUT						
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	μA
Input capacitance	$f = 1 \text{ MHz}, V_F = 0 \text{ V}$	C_I	-	38	-	pF
OUTPUT						
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	μA
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.

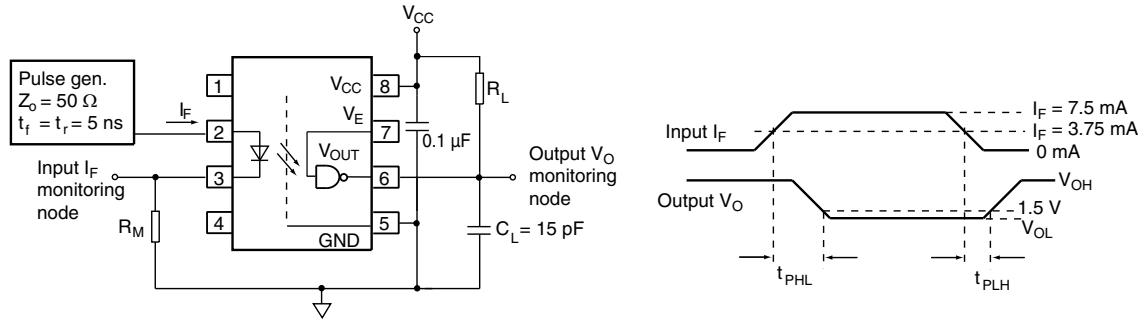


Fig. 2 - Test Circuit for t_{PLH} , t_{PHL} , t_r and t_f

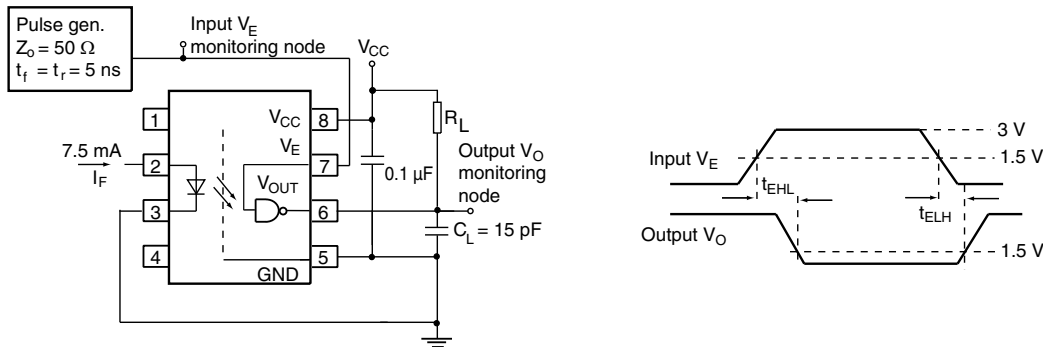


Fig. 3 - Test Circuit for t_{EHL} and t_{ELH}

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/ μs
	$ 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/ μs
	$ 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/ μs
	$ 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/ μs

Notes

- (2) 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 $T_{amb} = 25 \text{ }^\circ\text{C}$, $V_{CC} = 5 \text{ V}$.
- (3) 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.
- (4) With pulling V_E to logic high state will improve the CMR performance.
- (5) VOW137 CMTI test circuit refer to Fig. 4
- (6) VOW2611 CMTI test circuit refer to Fig. 5

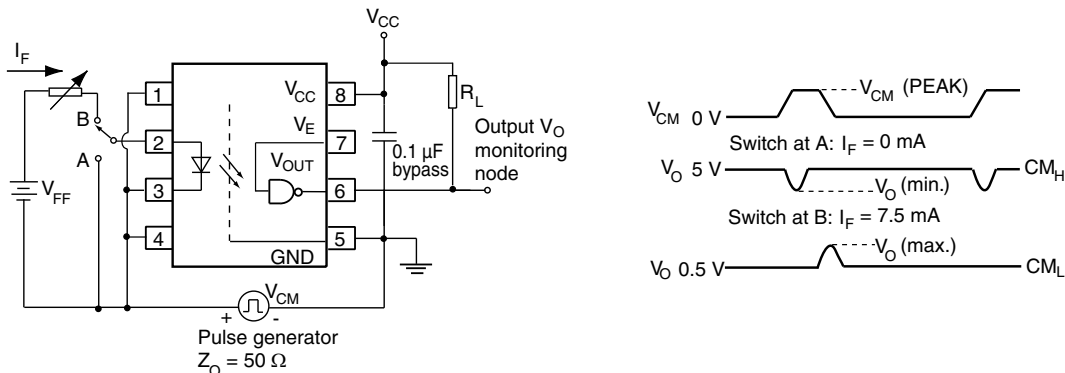


Fig. 4 - VOW137 Test Circuit for Common Mode Transient Immunity

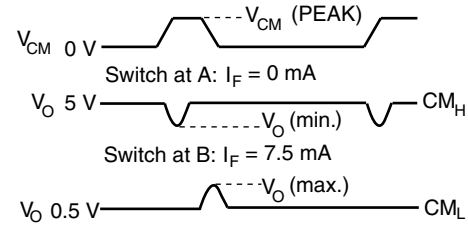
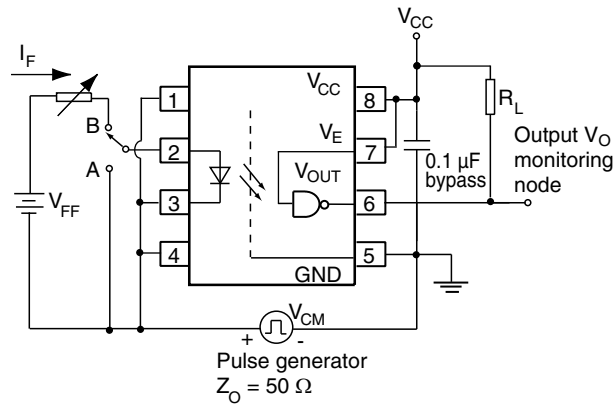


Fig. 5 - VOW2611 Test Circuit for Common Mode Transient Immunity

SAFETY AND INSULATION RATINGS				
PARAMETER		SYMBOL	VALUE	UNIT
MAXIMUM SAFETY RATINGS				
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	
INSULATION RATED PARAMETERS				
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}	$\geq 10^{12}$	Ω
Isolation resistance	$T_{amb} = 100 \text{ °C}, V_{DC} = 500 \text{ V}$	R_{IO}	$\geq 10^{11}$	Ω
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)			≥ 10	mm
Creepage distance (DIP-8, widebody)			≥ 10	mm
Insulation thickness		DTI	≥ 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)

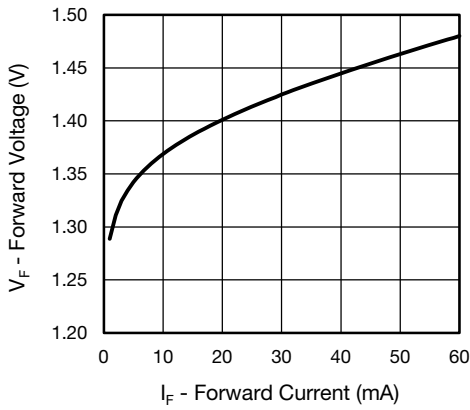


Fig. 6 - Forward Voltage vs. Forward Current

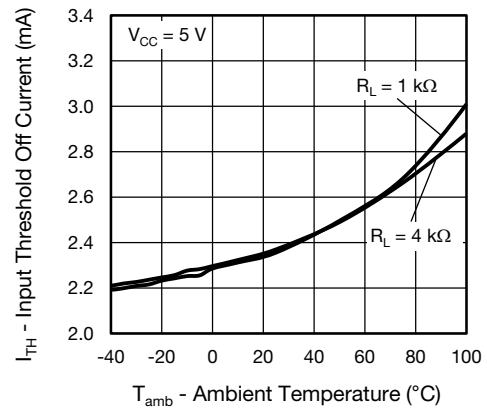


Fig. 9 - Input Threshold Off Current vs. Ambient Temperature

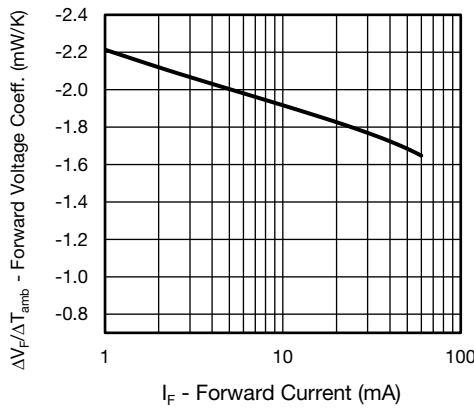


Fig. 7 - Forward Voltage Coefficient vs. Forward Current

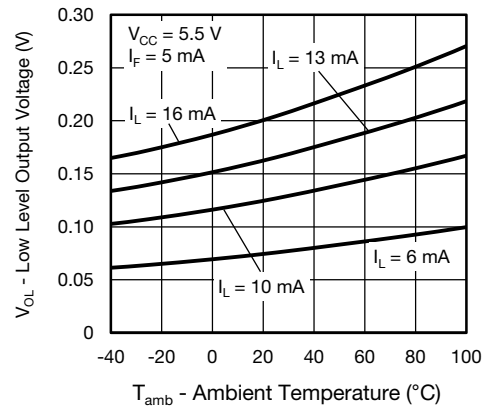


Fig. 10 - Low Level Output Voltage vs. Ambient Temperature

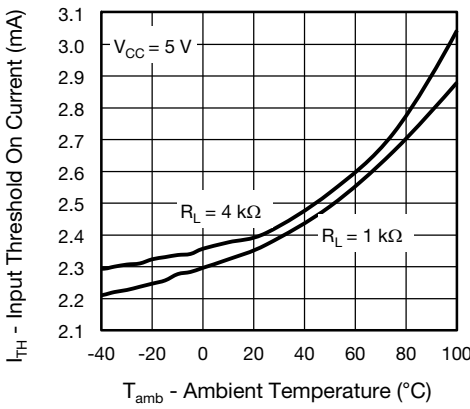


Fig. 8 - Input Threshold On Current vs. Ambient Temperature

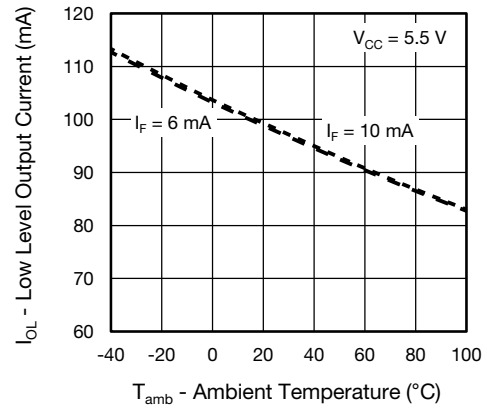


Fig. 11 - Low Level Output Current vs. Ambient Temperature



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

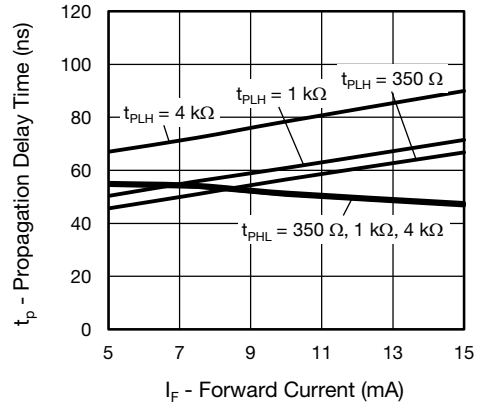


Fig. 15 - Propagation Delay vs. Forward Current

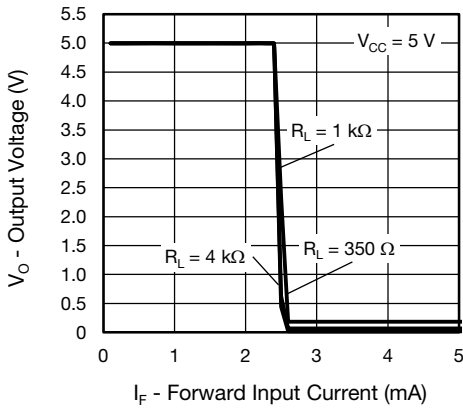


Fig. 13 - Output Voltage vs. Forward Current



Fig. 16 - Pulse Width Distortion vs. Ambient Temperature

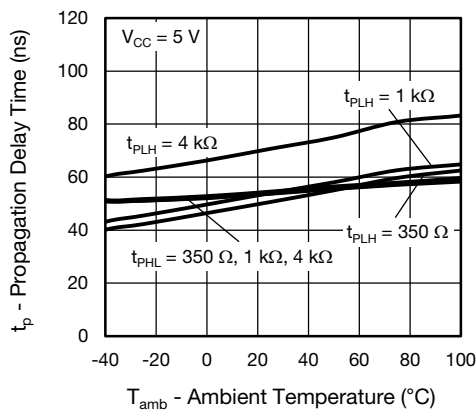


Fig. 14 - Propagation Delay vs. Ambient Temperature



Fig. 17 - Pulse Width Distortion vs. Forward Current

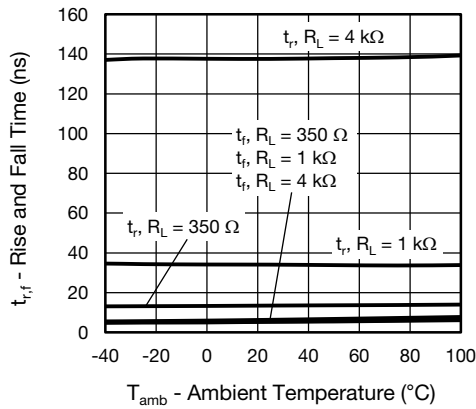


Fig. 18 - Rise and Fall Time vs. Ambient Temperature

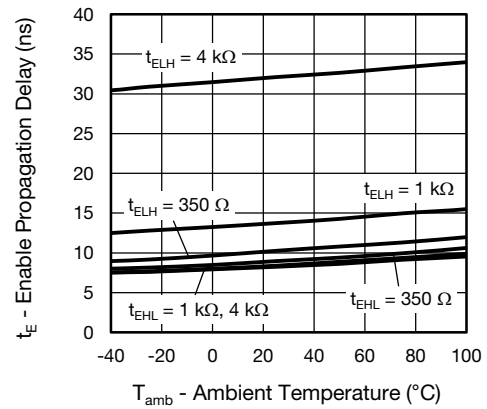


Fig. 20 - Enable Propagation Delay vs. Ambient Temperature

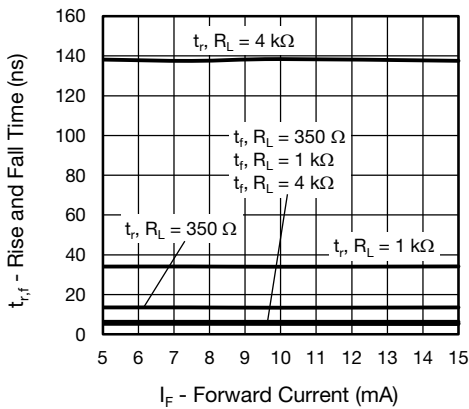


Fig. 19 - Rise and Fall Time vs. Forward Current

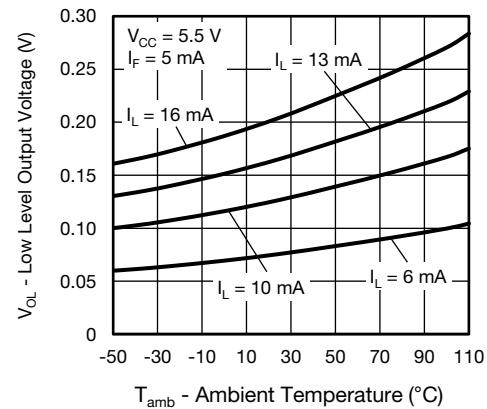
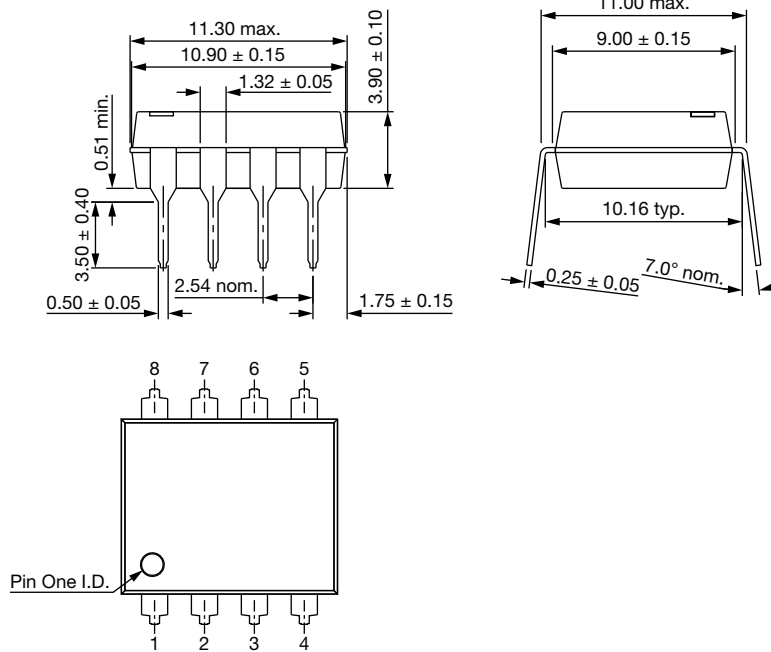


Fig. 21 - Low Level Output Voltage vs. Ambient Temperature

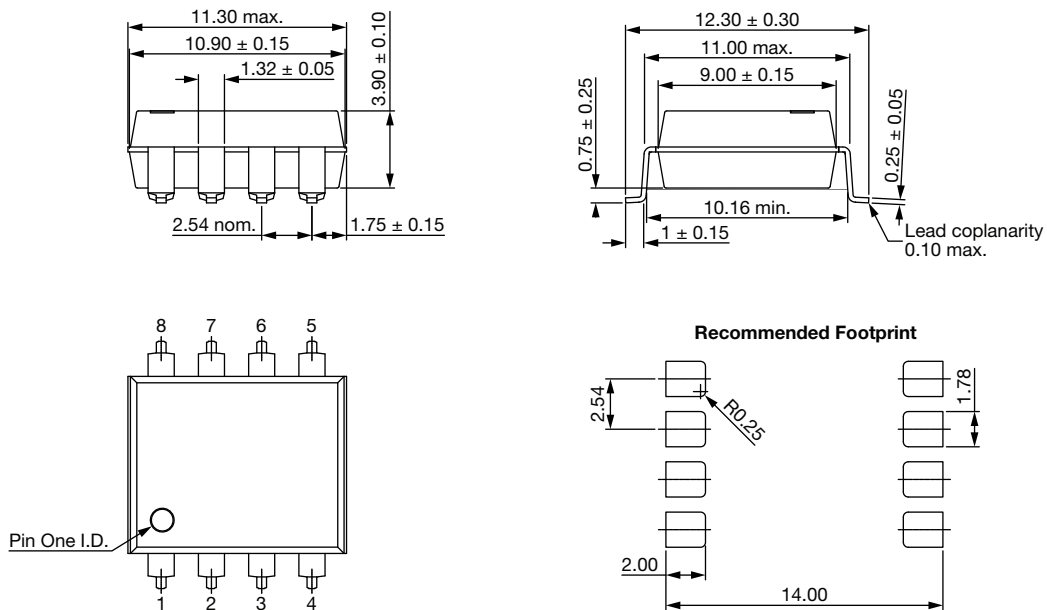


PACKAGE DIMENSIONS in millimeters

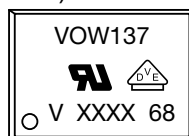
DIP-8, widebody



SMD-8, widebody, (Option 7)



PACKAGE MARKING (Example of VOW137-X017T)



Notes

- XXXX = LMC (lot marking code)
- Tape and reel suffix (T) is not part of the package marking

PACKING INFORMATION (Tape and Reel)

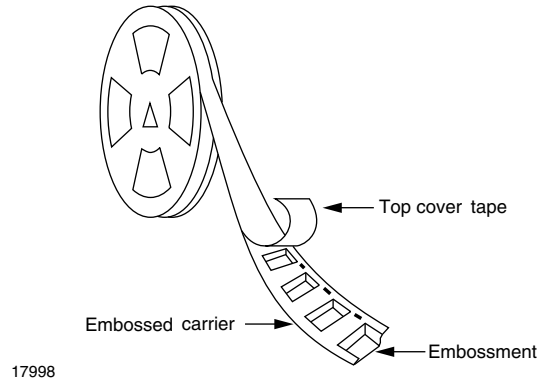
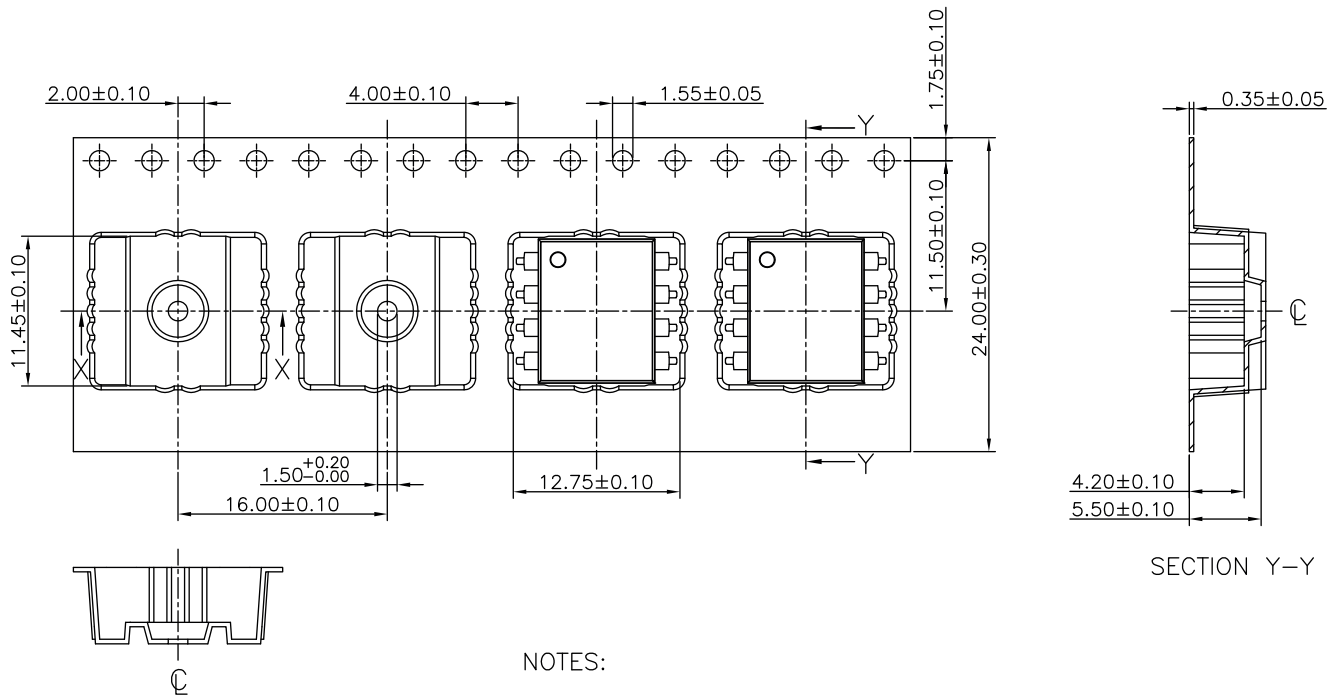


Fig. 22 - Tape and Reel Shipping Medium



NOTES:

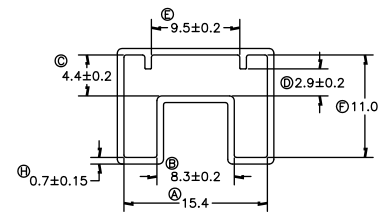
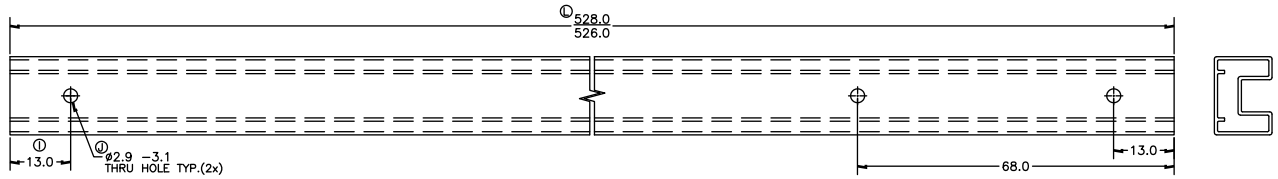
- 1) CUMULATIVE TOLERANCE OF 10 SPROCKET HOLES IS ±0.20.

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 ± 0.25 UNLESS OTHERWISE SPECIFIED.
2. ALL RADII AND ANGLES REFERENCE ONLY, UNLESS OTHERWISE SPECIFIED.



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