



THE DATASHEET OF CNW138



DESCRIPTION

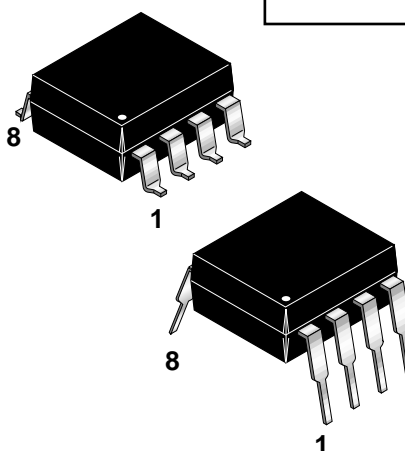
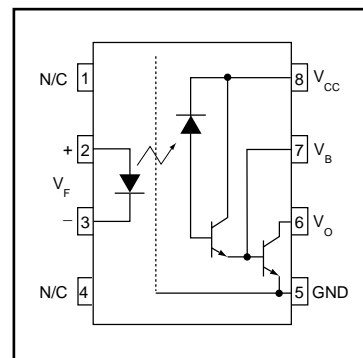
The CNW138 and CNW139 are high isolation voltage optocouplers, comprising an infrared emitting AlGaAs diode, optically coupled to a high gain split Darlington photodetector in an 8-pin wide body dual-in-line package (DIP).

FEATURES

- Wide body DIL encapsulation, with a pin distance of 10.16 mm
- Minimum clearance of 9.6 mm and minimum creepage of 10 mm
- High current transfer ratio
- Short propagation delay times
- TTL compatible
- Low saturation voltage
- High transient immunity
- Maximum permissible voltage of 8000 V (peak) and maximum operating isolation voltage of 1000 V (RMS) in accordance with VDE 00884
- UL recognized (File # E90700)

APPLICATIONS

- Line receivers
- Logic families ground isolation
- Low power systems
- Line voltage status indicator.



ABSOLUTE MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$ unless otherwise specified)				
Parameters	Symbol	Device	Value	Units
TOTAL DEVICE				
Storage Temperature	T_{STG}	All	-55 to +150	$^\circ\text{C}$
Operating Temperature	T_{OPR}	All	-55 to +85	$^\circ\text{C}$
Lead Solder Temperature	T_{SOL}	All	260 for 10 sec	$^\circ\text{C}$
EMITTER				
Continuous Forward Current (DC)	I_F	All	100	mA
Reverse Voltage (DC)	V_R	All	5	V
Forward Current - Peak (1 μs pulse, $f = 300$ Hz)	$I_F(pk)$	All	1	A
LED Power Dissipation (up to $T_A = 70^\circ\text{C}$)	P_D	All	250	mW
DETECTOR				
Collector Current (DC)	I_C	All	60	mA
Output Voltage (pins 6 & 5)	V_O	CNW138	-0.5 to 7	V
		CNW139	-0.5 to 18	
Supply Voltage (pins 8 & 5)	V_{CC}	CNW138	-0.5 to 7	V
		CNW139	-0.5 to 18	
Emitter-Base Voltage (pins 7 & 5)	V_{EBO}	All	5	V
Total Power Dissipation (up to $T_A = 70^\circ\text{C}$)	P_D	All	100	mW

ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ Unless otherwise specified)							
INDIVIDUAL COMPONENT CHARACTERISTICS							
Parameter	Test Conditions	Symbol	Device	Min	Typ*	Max	Unit
EMITTER Forward Voltage	$I_F = 1.6\text{ mA}$	V_F	All	1.25	1.5	1.7	V
	$I_F = 1.6\text{ mA}, T_A = 0\text{ to }70^\circ\text{C}$			1.1		1.8	
Input Reverse Current	$V_R = 5\text{ V}$	I_R	All			10	μA
	$V_R = 5\text{ V}, T_A = 0\text{ to }70^\circ\text{C}$					100	
Diode Capacitance	$V_D = 0, f = 1\text{ MHz}$	C_d	All		200		pF
DETECTOR							
Collector-Emitter Breakdown Voltage	$I_C = 1\text{ mA}$	BV_{CEO}	CNW138	7			V
			CNW139	18			
Emitter-Base Breakdown Voltage	$I_C = 0.1\text{ mA}$	BV_{EBO}	All	0.5			V
Logic High Output Current	$I_F = 0, V_O = V_{CC} = 7\text{ V}, T_A = 0\text{ to }70^\circ\text{C}$	I_{OH}	CNW138		0.05	250	μA
	$I_F = 0, V_O = V_{CC} = 18\text{ V}, T_A = 0\text{ to }70^\circ\text{C}$		CNW139		0.1	100	
Logic High Supply Current	$I_F = 0, I_O = 0, V_{CC} = 18\text{ V}, T_A = 0\text{ to }70^\circ\text{C}$	I_{CCH}	All		0.01	1	μA
Logic Low Supply Current	$I_F = 1.6\text{ mA}, I_O = 0, V_{CC} = 18\text{ V}, T_A = 0\text{ to }70^\circ\text{C}$	I_{CCL}	All		0.5	2	mA

ISOLATION CHARACTERISTICS							
Characteristic	Test Conditions	Symbol	Min	Typ*	Max	Units	
Isolation Capacitance	$V_{I-O} = 0\text{ V}, f = 1\text{ MHz}$	C_{ISO}		0.4	0.6	pF	
Isolation Resistance	$V_{I-O} = \pm 500\text{ V (DC)}$	R_{ISO}	10^{12}	10^{13}		Ω	
Input-Output Isolation Voltage	T = 1 min. (Peak value)	V_{ISO}	7070			V	
	T = 1 min. (RMS value)		5000				
Maximum Operating Isolation Voltage	RMS value	V_{IORM}	1000			V	

TRANSFER CHARACTERISTICS ($T_A = 25^\circ\text{C}$ Unless otherwise specified)							
Parameter	Test Conditions	Symbol	Device	Min	Typ*	Max	Unit
TOTAL DEVICE Current Transfer Ratio	$I_F = 1.6\text{ mA}, V_O = 0.4\text{ V}, V_{CC} = 4.5\text{ V}, T_A = 0\text{ to }70^\circ\text{C}, \text{DC}$	CTR	CNW138	300			%
			CNW139	500			
	$I_F = 0.5\text{ mA}, V_O = 0.4\text{ V}, V_{CC} = 4.5\text{ V}, T_A = 0\text{ to }70^\circ\text{C}, \text{DC}$		CNW139	400			
Logic Low Output Voltage	$I_F = 1.6\text{ mA}, I_C = 4.8\text{ mA}, V_{CC} = 4.5\text{ V}, T_A = 0\text{ to }70^\circ\text{C}$	V_{OL}	CNW138			0.4	V
	$I_F = 1.6\text{ mA}, I_C = 8\text{ mA}, V_{CC} = 4.5\text{ V}, T_A = 0\text{ to }70^\circ\text{C}$		CNW139			0.4	
	$I_F = 5\text{ mA}, I_C = 15\text{ mA}, V_{CC} = 4.5\text{ V}, T_A = 0\text{ to }70^\circ\text{C}$					0.4	
	$I_F = 12\text{ mA}, I_C = 24\text{ mA}, V_{CC} = 4.5\text{ V}, T_A = 0\text{ to }70^\circ\text{C}$					0.4	

* Typical values at $T_A = 25^\circ\text{C}$

SWITCHING CHARACTERISTICS ($T_A = 25^\circ\text{C}$ Unless otherwise specified)							
Parameter	Test Conditions	Symbol	Device	Min	Typ*	Max	Unit
Propagation delay time to logic low at output (Fig. 1)	$R_L = 2.2\text{ k}\Omega, I_F = 1.6\text{ mA}, V_{CC} = 5\text{ V}$	T_{PHL}	All		1.5	10	μs
	$R_L = 2.2\text{ k}\Omega, I_F = 1.6\text{ mA}, V_{CC} = 5\text{ V}, 0\text{ to }70^\circ\text{C}$					11	
	$R_L = 4.7\text{ k}\Omega, I_F = 0.5\text{ mA}, V_{CC} = 5\text{ V}$				4	25	
	$R_L = 4.7\text{ k}\Omega, I_F = 0.5\text{ mA}, V_{CC} = 5\text{ V}, 0\text{ to }70^\circ\text{C}$					30	
	$R_L = 270\ \Omega, I_F = 12\text{ mA}, V_{CC} = 5\text{ V}$				0.5	1	
	$R_L = 270\ \Omega, I_F = 12\text{ mA}, V_{CC} = 5\text{ V}, 0\text{ to }70^\circ\text{C}$					1.1	
Propagation delay time to logic high at output (Fig. 1)	$R_L = 2.2\text{ k}\Omega, I_F = 1.6\text{ mA}, V_{CC} = 5\text{ V}$	T_{PLH}	All		10	35	μs
	$R_L = 2.2\text{ k}\Omega, I_F = 1.6\text{ mA}, V_{CC} = 5\text{ V}, 0\text{ to }70^\circ\text{C}$					70	
	$R_L = 4.7\text{ k}\Omega, I_F = 0.5\text{ mA}, V_{CC} = 5\text{ V}$				20	60	
	$R_L = 4.7\text{ k}\Omega, I_F = 0.5\text{ mA}, V_{CC} = 5\text{ V}, 0\text{ to }70^\circ\text{C}$					115	
	$R_L = 270\ \Omega, I_F = 12\text{ mA}, V_{CC} = 5\text{ V}$				2.0	7	
	$R_L = 270\ \Omega, I_F = 12\text{ mA}, V_{CC} = 5\text{ V}, 0\text{ to }70^\circ\text{C}$					11	

TRANSIENT IMMUNITY (see Fig. 2 and note 1)							
Parameter	Test Conditions	Symbol	Device	Min	Typ*	Max	Unit
Common mode transient immunity at logic high	$R_L = 2.2\text{ k}\Omega, I_F = 0, V_{CC} = 5\text{ V}, V_{CM} = 10\text{ V}_{(p-p)}$	CMH	All	0.5			$\text{kV}/\mu\text{s}$
Common mode transient immunity at logic low	$R_L = 2.2\text{ k}\Omega, I_F = 1.6\text{ mA}, V_{CC} = 5\text{ V}, V_{CM} = 10\text{ V}_{(p-p)}$	CML	All	-0.5			$\text{kV}/\mu\text{s}$
Common mode rejection ratio	$R_L = 100\ \Omega, I_C = 45\text{ mA}, f = 10\text{ kHz}, V_{CC} = 10\text{ V}$	CMRR	All		-65		dB

Note

1. R_{CC} ($\text{k}\Omega$) = $1\text{ V}/0.15\text{ I}_F$ (mA), to protect the photodetector against high surge currents.

* Typical values at $T_A = 25^\circ\text{C}$

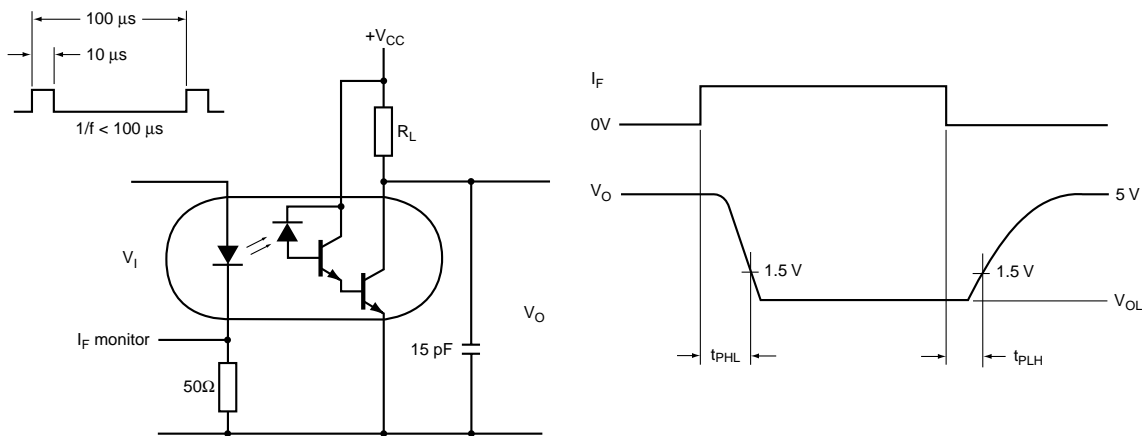


Fig. 1 Switching Times Test Circuit and Waveforms

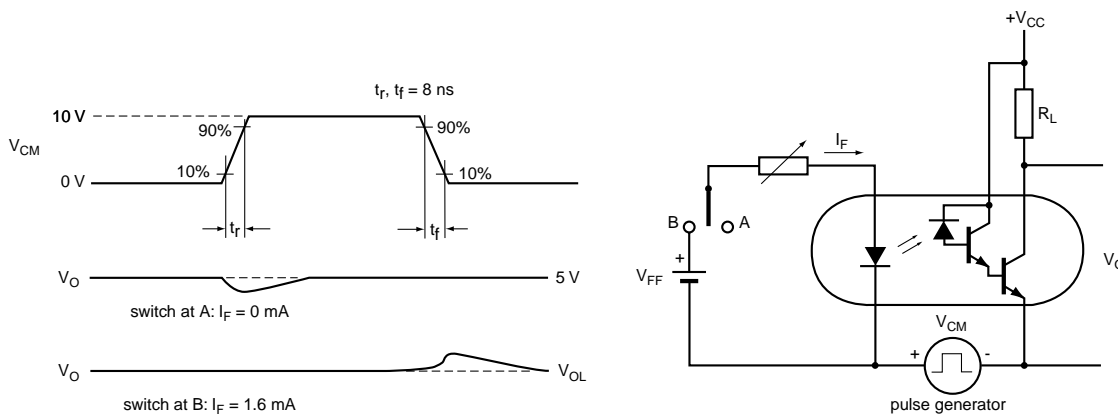


Fig. 2 Transient Immunity Test Circuit and Waveforms

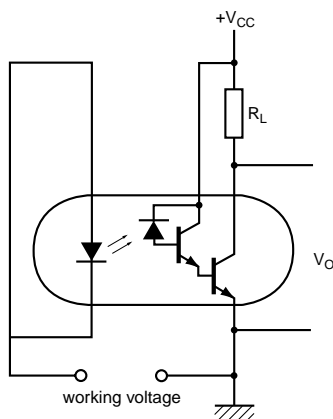


Fig. 3 Logic Output Current Test Circuit

Fig. 4 LED Forward Current vs. Forward Voltage

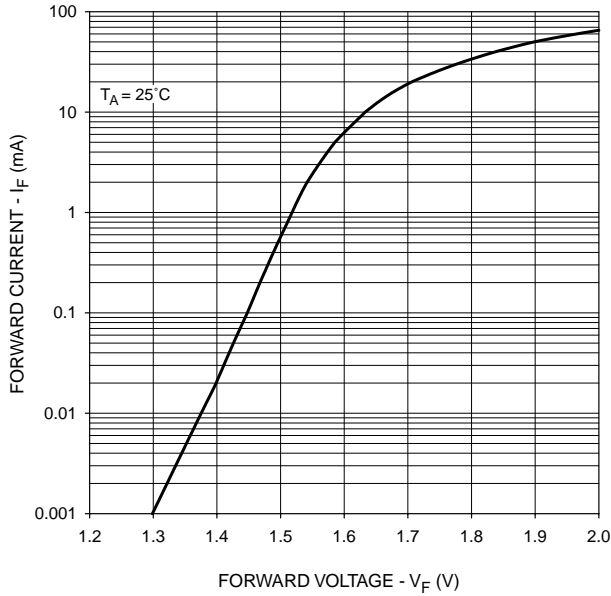


Fig. 5 Normalized Current Transfer Ratio vs. Forward Current

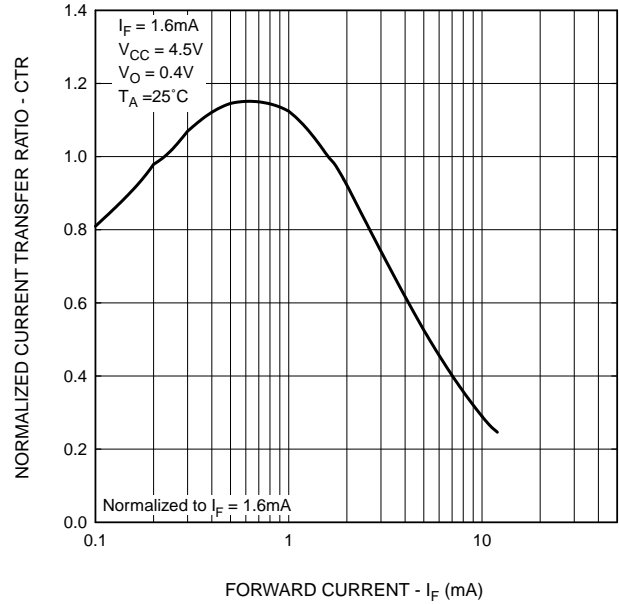


Fig. 6 Normalized Current Transfer Ratio vs. Ambient Temperature

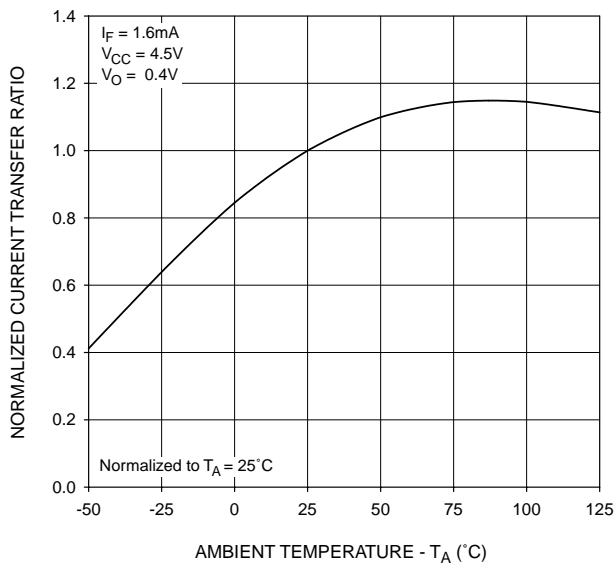


Fig. 7 Logic Low Supply Current vs. Forward Current

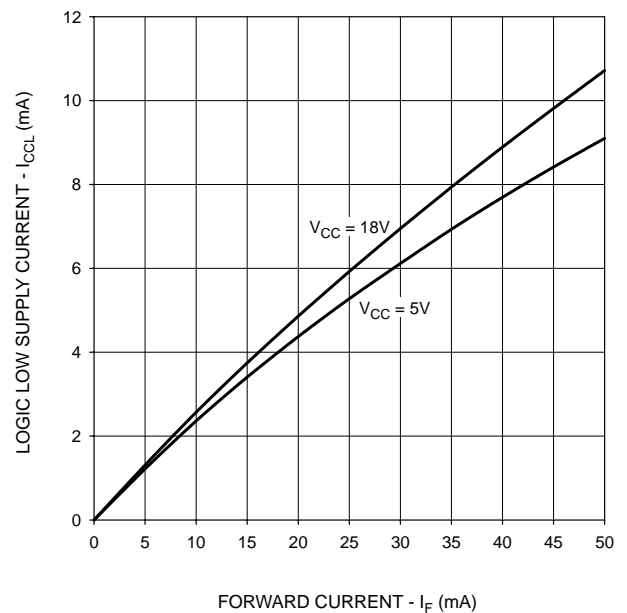


Fig. 8 Logic High Output Current vs. Ambient Temperature

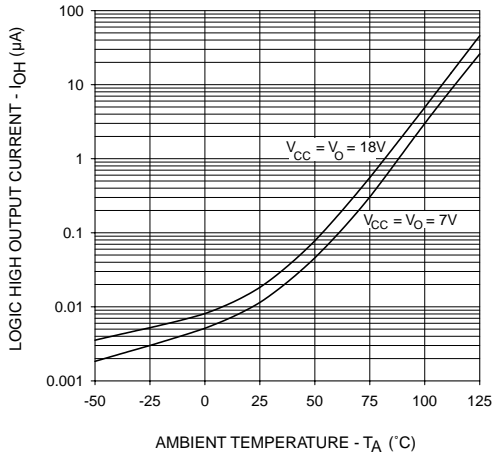


Fig. 9 Output Current vs. Output Voltage

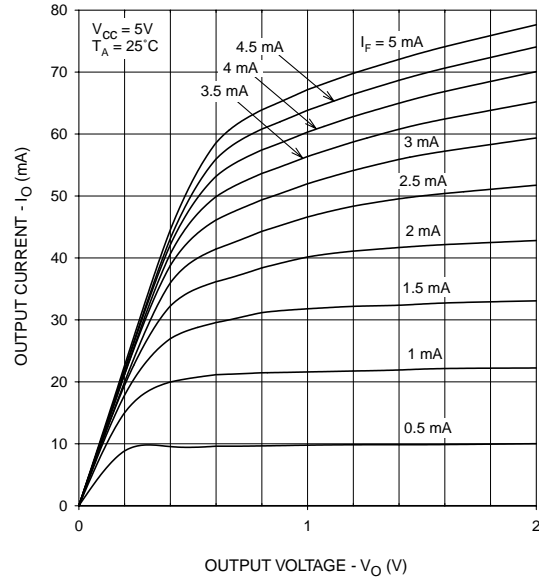


Fig. 10 Propagation Delay vs. Ambient Temperature

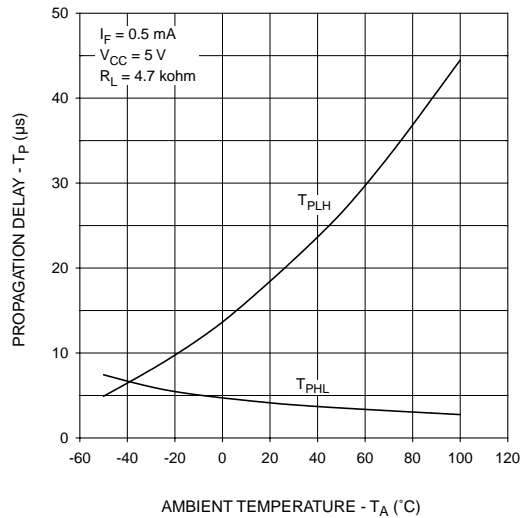


Fig. 11 Propagation Delay vs. Ambient Temperature

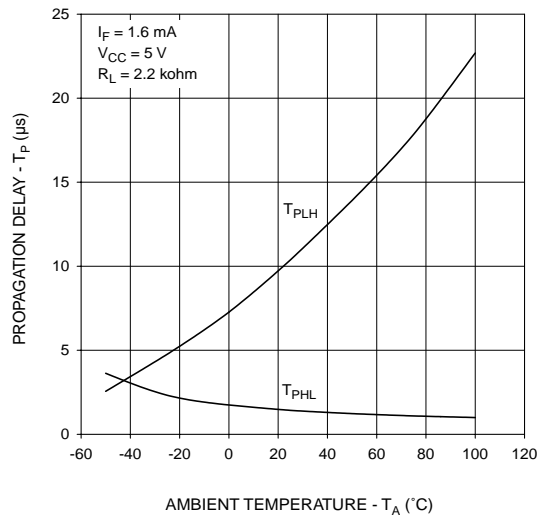
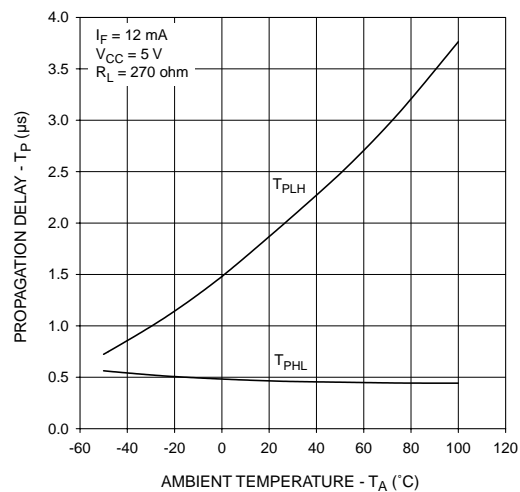
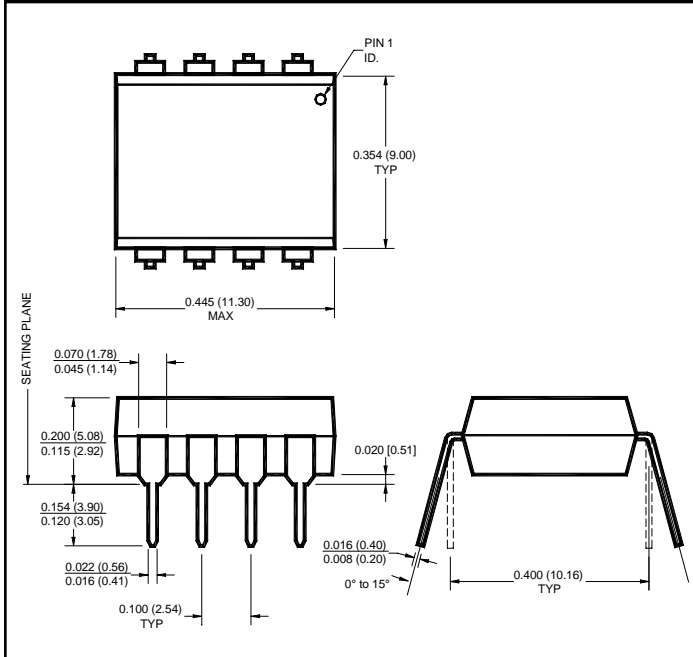


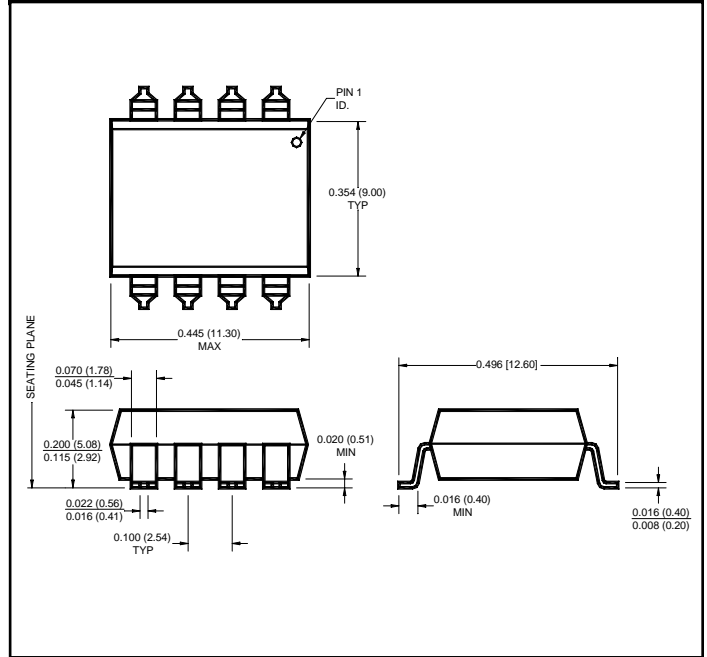
Fig. 12 Propagation Delay vs. Ambient Temperature



Package Dimensions (Through Hole)



Package Dimensions (Surface Mount)



NOTE

All dimensions are in inches (millimeters)

ORDERING INFORMATION

Option	Order Entry Identifier	Description
S	.S	Surface Mount Lead Bend
300	.300	VDE 0884

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