

DESCRIPTION

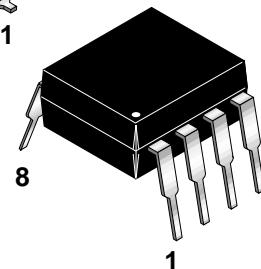
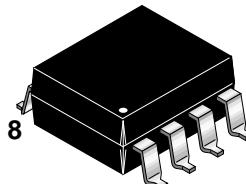
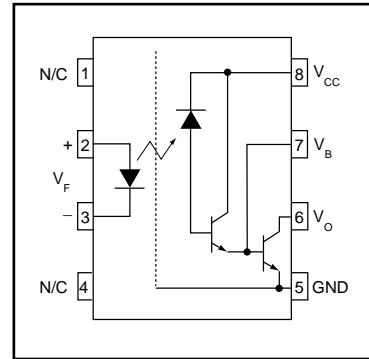
The CNW138 and CNW139 are high isolation voltage optocouplers, comprising an infrared emitting AlGaAs diode, optically coupled to a high gain split Darlington photodetector in an 8-pin wide body dual-in-line package (DIP).

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	°C
Operating Temperature	T_{OPR}	All	-55 to +85	°C
Lead Solder Temperature	T_{SOL}	All	260 for 10 sec	°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)	$I_F(\text{pk})$	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 CNW139	-0.5 to 7 -0.5 to 18	V
Supply Voltage (pins 8 & 5)	V_{CC}	CNW138 CNW139	-0.5 to 7 -0.5 to 18	V
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	$T = 1 \text{ min. (Peak value)}$	V_{ISO}	7070			V
	$T = 1 \text{ min. (RMS value)}$		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			%
	$I_F = 0.5 \text{ mA}, V_O = 0.4 \text{ V}, V_{CC} = 4.5 \text{ V}, T_A = 0 \text{ to } 70^\circ\text{C}, \text{DC}$		$CNW139$	500			
			$CNW139$	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	$R_L = 2.2 \text{ k}\Omega, I_F = 0, V_{CC} = 5 \text{ V}, V_{CM} = 10 \text{ V}_{(\text{p-p})}$	CMH	All	0.5			$\text{kV}/\mu\text{s}$
Common mode transient immunity at logic low	$R_L = 2.2 \text{ k}\Omega, I_F = 1.6 \text{ mA}, V_{CC} = 5 \text{ V}, V_{CM} = 10 \text{ V}_{(\text{p-p})}$	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. $R_{CC} (\text{k}\Omega) = 1 \text{ V}/0.15 \text{ I}_F (\text{mA})$, to protect the photodetector against high surge currents.

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

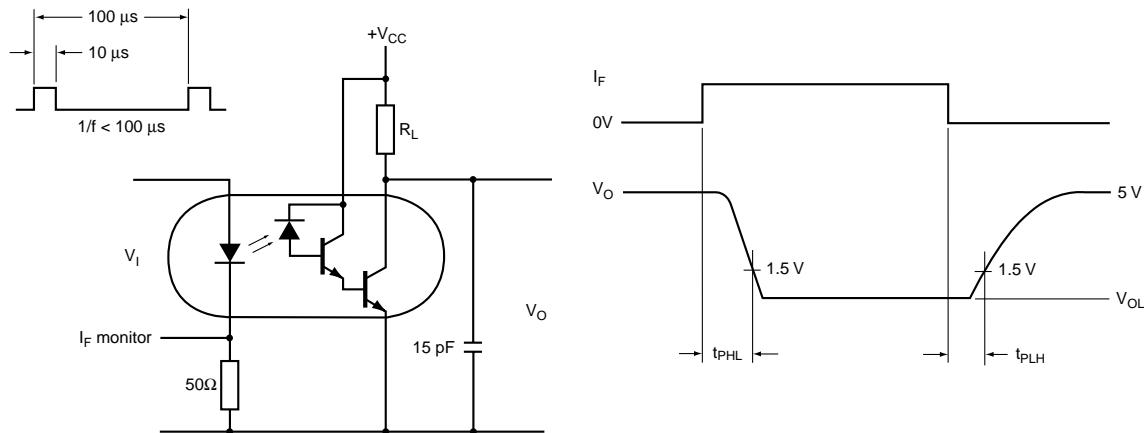


Fig. 1 Switching Times Test Circuit and Waveforms

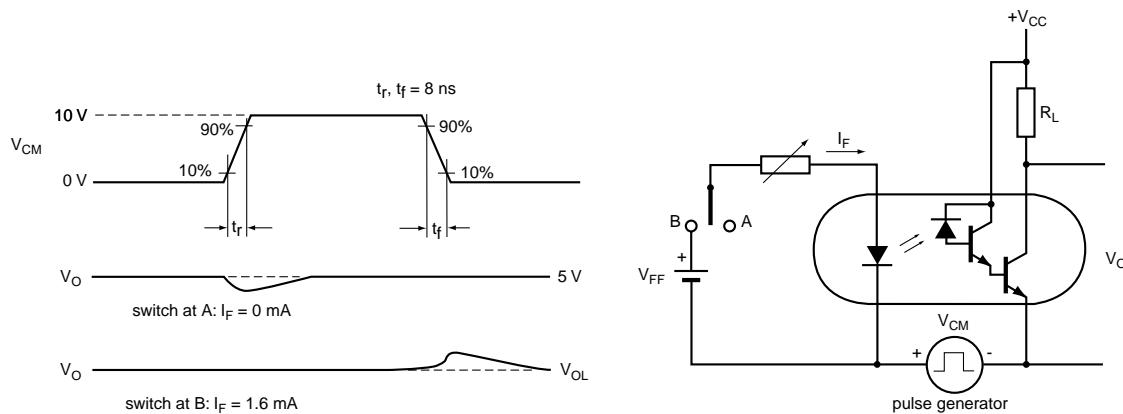


Fig. 2 Transient Immunity Test Circuit and Waveforms

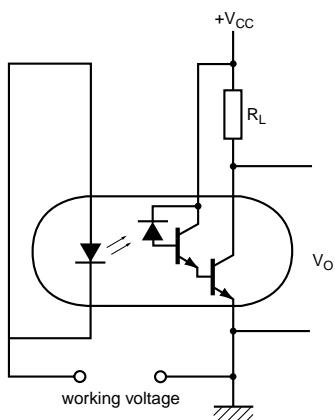


Fig. 3 Logic Output Current Test Circuit

Fig. 4 LED Forward Current vs. Forward Voltage

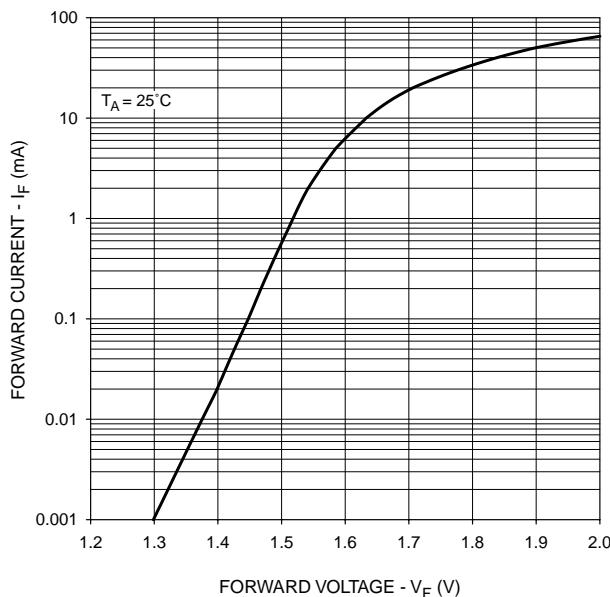


Fig. 5 Normalized Current Transfer Ratio vs. Forward Current

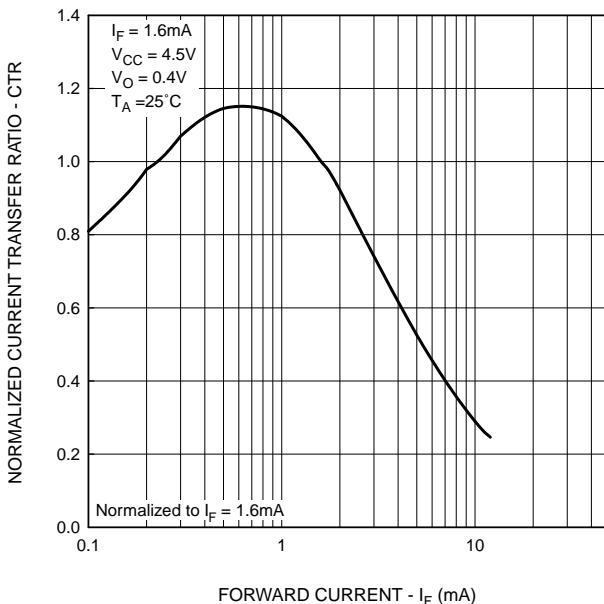


Fig. 6 Normalized Current Transfer Ratio vs. Ambient Temperature

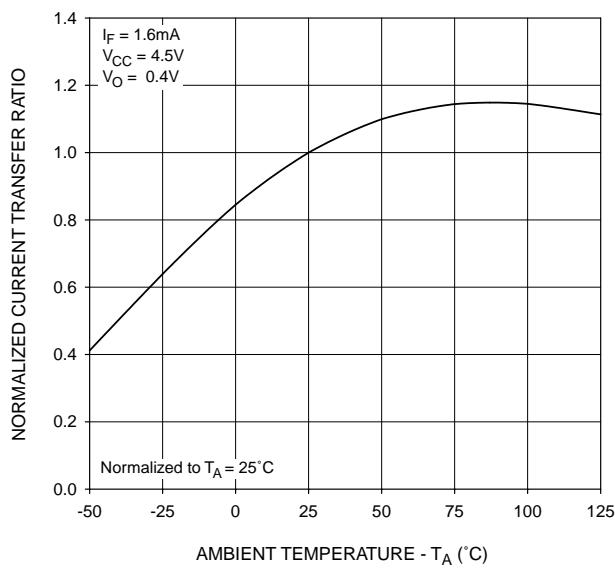


Fig. 7 Logic Low Supply Current vs. Forward Current

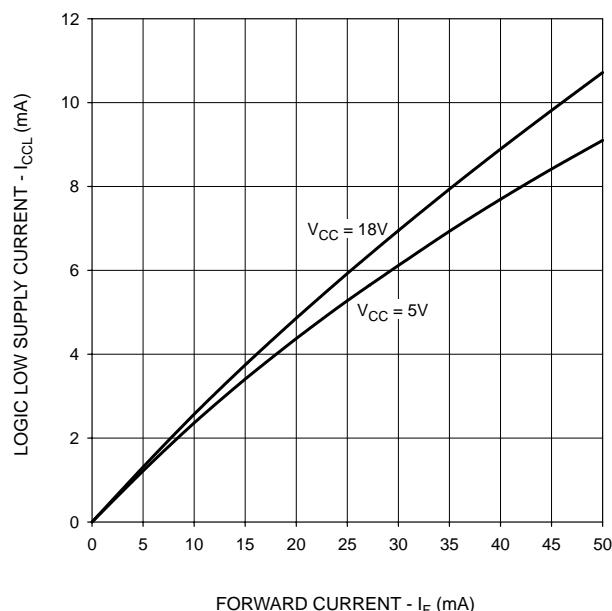


Fig. 8 Logic High Output Current vs. Ambient Temperature

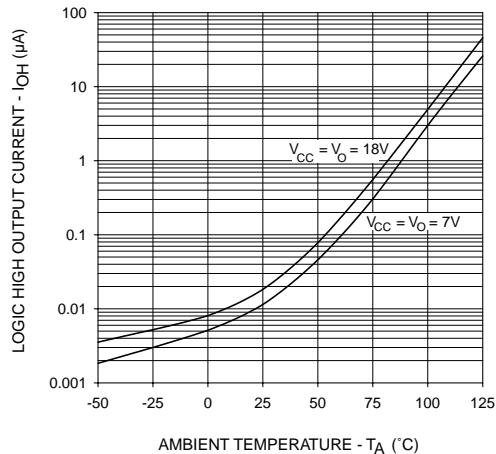


Fig. 10 Propagation Delay vs. Ambient Temperature

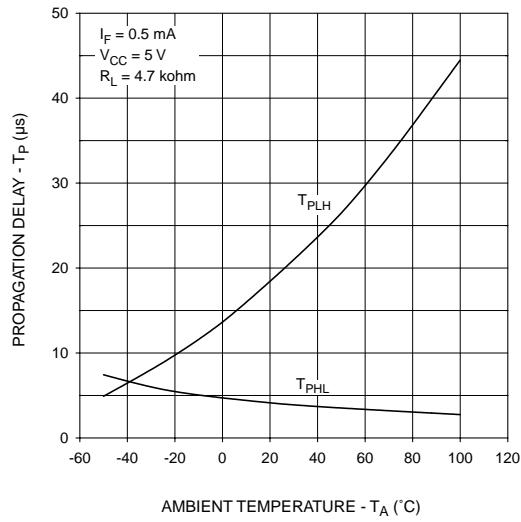


Fig. 12 Propagation Delay vs. Ambient Temperature

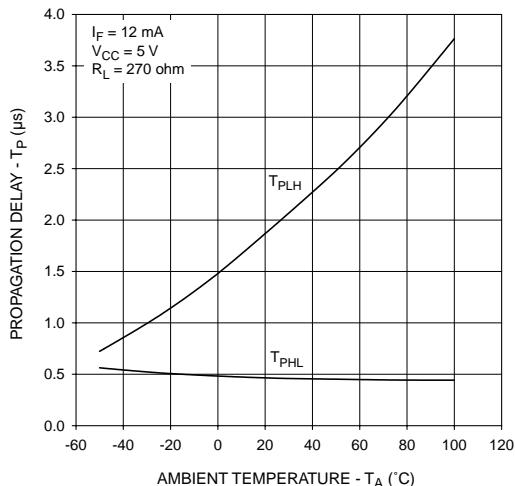


Fig. 9 Output Current vs. Output Voltage

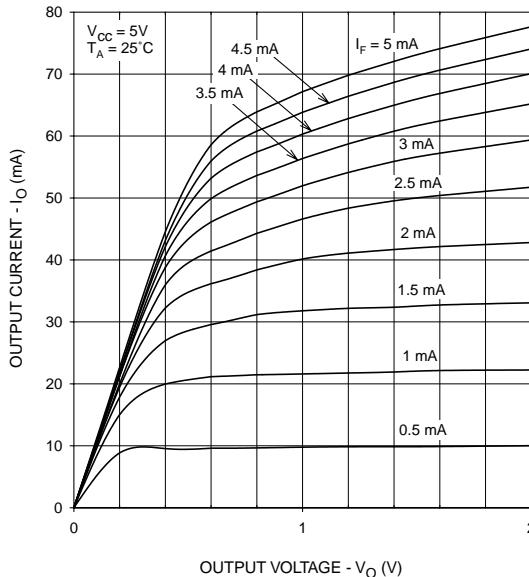
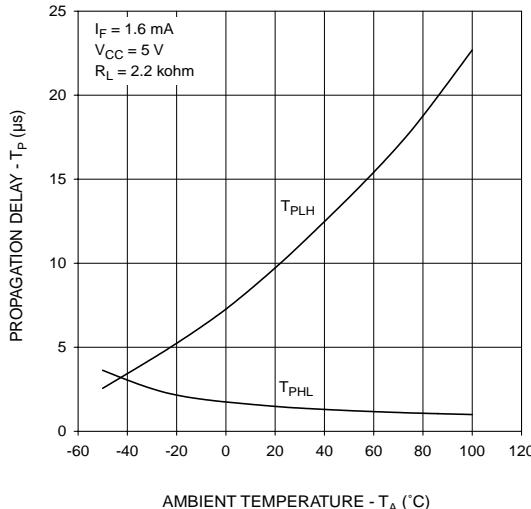
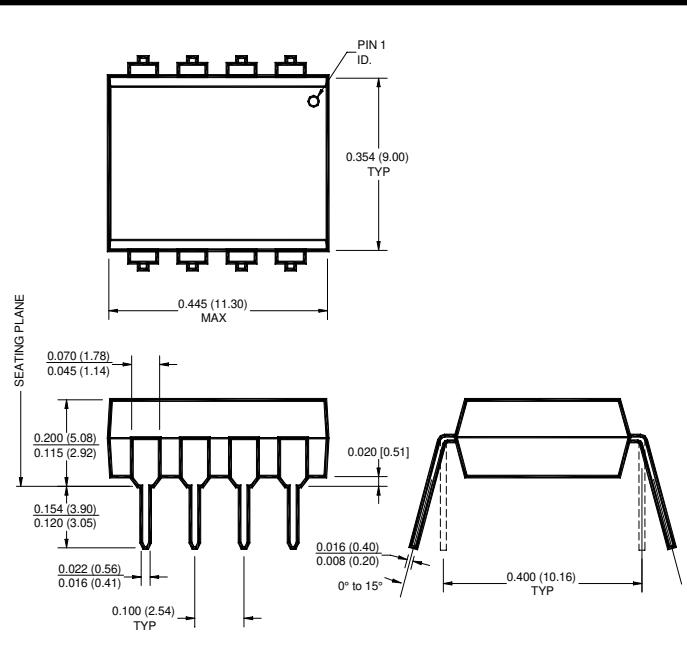


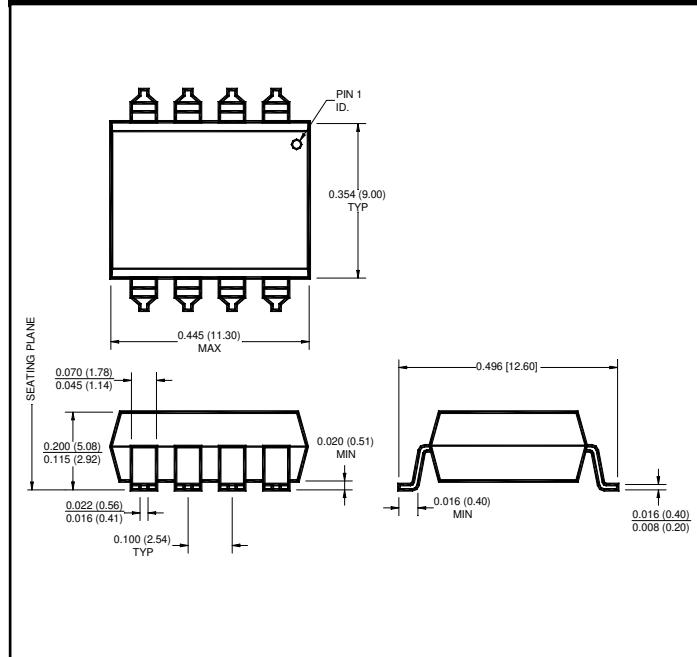
Fig. 11 Propagation Delay vs. Ambient Temperature



Package Dimensions (Through Hole)



Package Dimensions (Surface Mount)



NOTE

All dimensions are in inches (millimeters)

CNW138 CNW139**ORDERING INFORMATION**

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

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