

**DESCRIPTION**

The CNW135, CNW136 and CNW4502 are fast-switching optocouplers, consisting of an AlGaAs LED optically coupled to a high speed photodetector transistor in a wide 8-pin dual-in-line (DIL) plastic envelope.

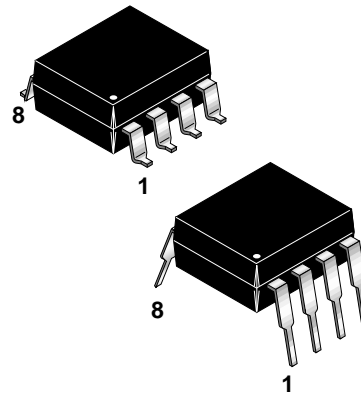
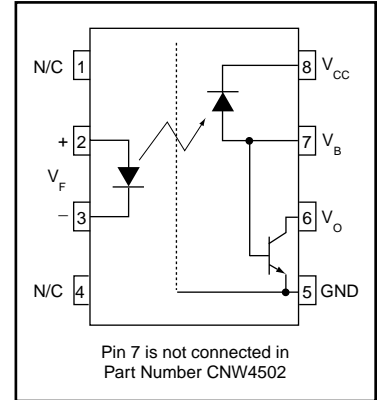
The CNW4502 provides the same electrical switching and isolation performances as the CNW136, and increased ESD protection due to a non-connected base.

**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
- 11 MHz bandwidth
- Short propagation delay times
- TTL compatible
- Low saturation voltage
- High transient immunity
- High degree of AC and DC insulation (5000 V (RMS) and 7070 V (DC)) in accordance with UL 1577 and IEC/BSI specifications
- Maximum permissible voltage of 8000 V (peak) and maximum operating isolation voltage of 1000 V (RMS) in accordance with VDE 00884
- UL recognize (File #E90700)

**APPLICATIONS**

- Video signal isolation
- Feedback element in SMPS
- Line receivers
- High-speed logic ground isolation
- Analog signal ground isolation
- Replace pulse transformers



<b>ABSOLUTE MAXIMUM RATINGS</b> (T <sub>A</sub> = 25°C unless otherwise specified)				
Parameters	Symbol	Device	Value	Units
<b>TOTAL DEVICE</b>				
Storage Temperature	T <sub>STG</sub>	All	-55 to +150	°C
Operating Temperature	T <sub>OPR</sub>	All	-55 to +85	°C
Lead Solder Temperature	T <sub>SOL</sub>	All	260 for 10 sec	°C
<b>EMITTER</b>				
Continuous Reverse Voltage (DC)	V <sub>R</sub>	All	5	V
Continuous Forward Current	I <sub>F</sub>	All	100	mA
Forward Current - Peak (t <sub>p</sub> = 1 μs, f = 300 Hz)	I <sub>F(pk)</sub>	All	1	A
Total Power Dissipation up to 70°C Ambient	P <sub>D</sub>	All	250	mW
<b>DETECTOR</b>				
DC Collector Current	I <sub>C</sub>	All	10	mA
Supply Voltage (pins 8 & 5)	V <sub>CC</sub>	All	-0.5 to 30	V
Collector to Emitter Voltage (pins 6 & 5)	V <sub>CEO</sub>	All	-0.5 to 20	V
Emitter to Base Voltage (pins 7 & 5)	V <sub>EBO</sub>	CNW135, CNW136	5	V
Total Power Dissipation up to 70°C	P <sub>D</sub>	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
<b>EMITTER</b> Forward Voltage	$I_F = 16\text{ mA}$	$V_F$	All	1.25	1.6	1.7	V
	$I_F = 16\text{ mA}, T_A = 0\text{ to }70^\circ\text{C}$		All	1.2		1.8	
Input Reverse Voltage	$V_R = 5\text{ V}$	$I_R$	All			10	$\mu\text{A}$
	$V_R = 5\text{ V}, T_A = 0\text{ to }70^\circ\text{C}$		All			100	
Diode Capacitance	$V_D = 0, f = 1\text{ MHz}$	$C_d$	All		200		pF
<b>DETECTOR</b> Collector-Emitter Breakdown Voltage	$I_C = 1.0\text{ mA}$	$BV_{CEO}$	All	20			V
Emitter-Base Breakdown Voltage	$I_C = 0.1\text{ mA}$	$BV_{EBO}$	CNW135, CNW136	5			V
Logic High Output Current	$I_F = 0\text{ mA}, V_O = V_{CC} = 5.5\text{ V}$	$I_{OH}$	All		0.005	0.5	$\mu\text{A}$
	$I_F = 0\text{ mA}, V_O = V_{CC} = 15\text{ V}$				0.01	1	
	$I_F = 0\text{ mA}, V_O = V_{CC} = 5.5\text{ V}, T_A = 0\text{ to }70^\circ\text{C}$					50	
Logic High Supply Current	$I_F = 0\text{ mA}, I_O = 0, V_{CC} = 15\text{ V}$	$I_{CCH}$	All		0.001	1	$\mu\text{A}$
	$I_F = 0\text{ mA}, I_O = 0, V_{CC} = 15\text{ V}, T_A = 0\text{ to }70^\circ\text{C}$					2	
Logic Low Supply Current	$I_F = 16\text{ mA}, I_O = 0, V_{CC} = 15\text{ V}$	$I_{CCL}$	All		80	200	$\mu\text{A}$

**TRANSFER CHARACTERISTICS** ( $T_A = 25^\circ\text{C}$  Unless otherwise specified)

Parameter	Test Conditions	Symbol	Device	Min	Typ*	Max	Unit
<b>TOTAL DEVICE</b> Current Transfer Ratio	$I_F = 16\text{ mA}, V_O = 0.4\text{ V}, V_{CC} = 4.5\text{ V}, T_A = 0\text{ to }25^\circ\text{C}, \text{DC}$	CTR	CNW135	7			%
			CNW136/4502	19			
	$I_F = 16\text{ mA}, V_O = 0.4\text{ V}, V_{CC} = 4.5\text{ V}, T_A = 0\text{ to }70^\circ\text{C}, \text{DC}$		CNW135	5			
			CNW136/4502	15			
Logic Low Output Voltage	$I_F = 16\text{ mA}, I_C = 1.1\text{ mA}, V_{CC} = 4.5\text{ V}$	$V_{OL}$	CNW135			0.4	V
	$I_F = 16\text{ mA}, I_C = 3\text{ mA}, V_{CC} = 4.5\text{ V}$		CNW136/4502			0.4	
	$I_F = 16\text{ mA}, I_C = 0.8\text{ mA}, V_{CC} = 4.5\text{ V}, T_A = 0\text{ to }25^\circ\text{C}$		CNW135			0.5	
	$I_F = 16\text{ mA}, I_C = 2.4\text{ mA}, V_{CC} = 4.5\text{ V}, T_A = 0\text{ to }70^\circ\text{C}$		CNW136/4502			0.5	
Bandwidth		B	All		11		MHz

**SWITCHING CHARACTERISTICS** (see Fig. 9) ( $T_A = 25^\circ\text{C}$  Unless otherwise specified)

Parameter	Test Conditions	Symbol	Device	Min	Typ*	Max	Unit
Propagation delay time to logic low at output	$R_L = 4.1\text{ k}\Omega, I_F = 16\text{ mA}, V_{CC} = 5\text{ V}$	$T_{PHL}$	CNW135		0.5	1.5	$\mu\text{s}$
	$R_L = 4.1\text{ k}\Omega, I_F = 16\text{ mA}, V_{CC} = 5\text{ V}, 0\text{ to }70^\circ\text{C}$					2.0	
	$R_L = 1.9\text{ k}\Omega, I_F = 16\text{ mA}, V_{CC} = 5\text{ V}$		CNW136/4502		0.55	0.8	
	$R_L = 1.9\text{ k}\Omega, I_F = 16\text{ mA}, V_{CC} = 5\text{ V}, 0\text{ to }70^\circ\text{C}$					1.0	
Propagation delay time to logic high at output	$R_L = 4.1\text{ k}\Omega, I_F = 16\text{ mA}, V_{CC} = 5\text{ V}$	$T_{PLH}$	CNW135		0.7	1.5	$\mu\text{s}$
	$R_L = 4.1\text{ k}\Omega, I_F = 16\text{ mA}, V_{CC} = 5\text{ V}, 0\text{ to }70^\circ\text{C}$					2.0	
	$R_L = 1.9\text{ k}\Omega, I_F = 16\text{ mA}, V_{CC} = 5\text{ V}$		CNW136/4502		0.35	0.8	
	$R_L = 1.9\text{ k}\Omega, I_F = 16\text{ mA}, V_{CC} = 5\text{ V}, 0\text{ to }70^\circ\text{C}$					1.0	

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

**TRANSIENT IMMUNITY** (see Fig. 10)

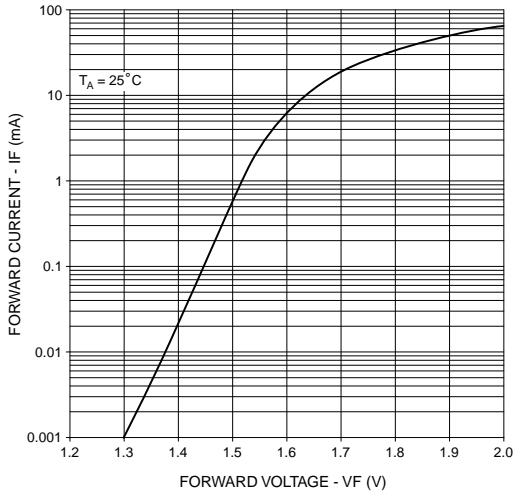
Parameter	Test Conditions	Symbol	Device	Min	Typ*	Max	Unit
Common mode transient immunity at logic high	$R_L = 4.1\text{ k}\Omega, I_F = 0, V_{CC} = 5\text{ V}, V_{CM} = 10\text{ V}_{(p-p)}$	$ CM_H $	CNW135	1			kV/ $\mu$ s
	$R_L = 1.9\text{ k}\Omega, I_F = 0, V_{CC} = 5\text{ V}, V_{CM} = 10\text{ V}_{(p-p)}$		CNW136/4502	1			
Common mode transient immunity at logic low	$R_L = 4.1\text{ k}\Omega, I_F = 16\text{ mA}, V_{CC} = 5\text{ V}, V_{CM} = 10\text{ V}_{(p-p)}$	$ CM_L $	CNW135	-1			kV/ $\mu$ s
	$R_L = 1.9\text{ k}\Omega, I_F = 16\text{ mA}, V_{CC} = 5\text{ V}, V_{CM} = 10\text{ V}_{(p-p)}$		CNW136/4502	-1			
Common mode rejection ratio	$R_L = 1\text{ k}\Omega, I_C = 6\text{ mA}, f = 10\text{ kHz}, V_{CC} = 10\text{ V}$	CMRR	All		-80		dB

**ISOLATION CHARACTERISTICS**

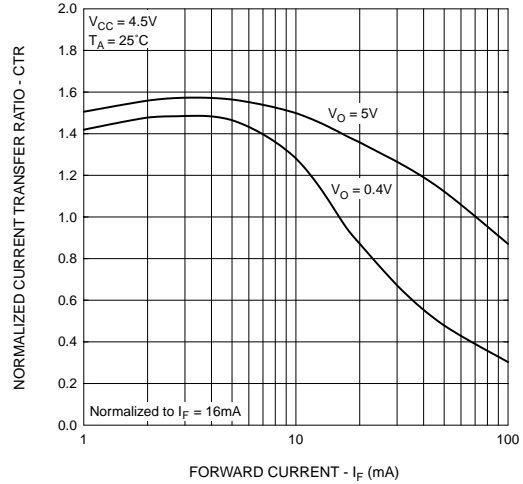
Characteristic	Test Conditions	Symbol	Min	Typ*	Max	Units
Maximum Operating Isolation Voltage	RH = 50%, t = 1 min., 25°C	$V_{ISO}$	5000			$V_{RMS}$
Isolation Resistance	$V_{I-O} = 500\text{ V/DC}, 25^\circ\text{C}$	$R_{ISO}$	$10^{12}$	$10^{13}$		$\Omega$
Isolation Capacitance	$V_{I-O} = 0\text{ V}, f = 1\text{ MHz}$	$C_{ISO}$		0.4	0.6	pF

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

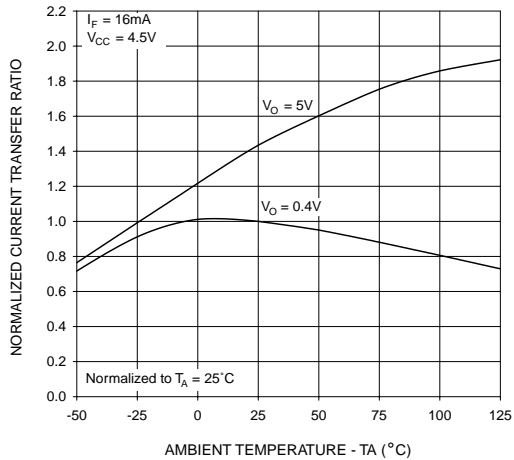
**Fig. 1 LED Forward Current vs. Forward Voltage**



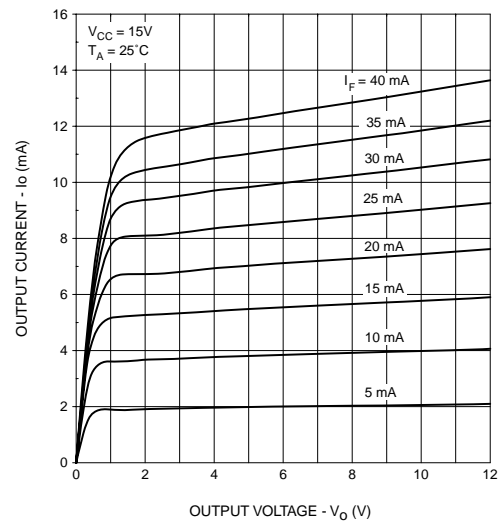
**Fig. 2 Normalized CTR vs. Forward Current**



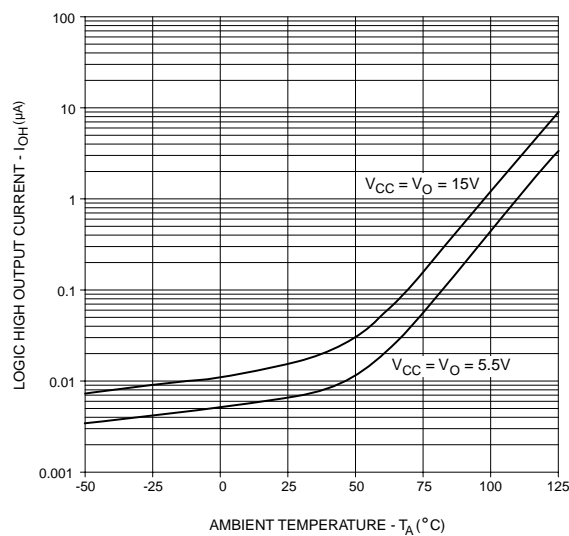
**Fig. 3 Normalized CTR vs. Ambient Temperature**



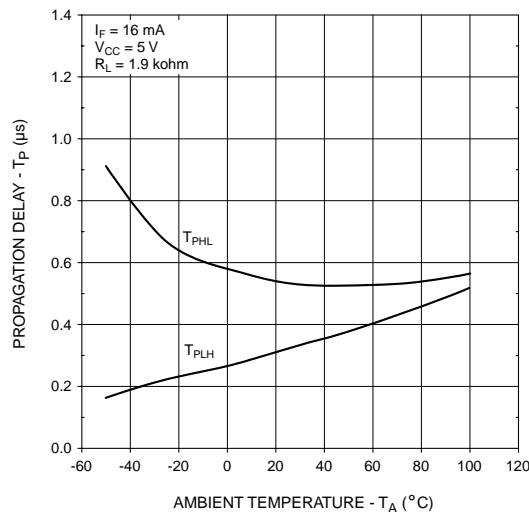
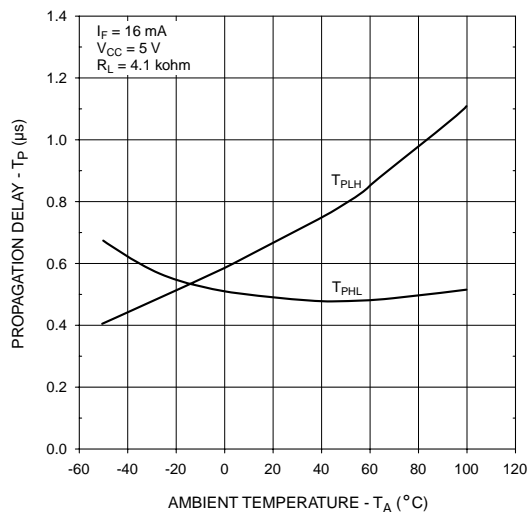
**Fig. 4 Output Current vs. Output Voltage**



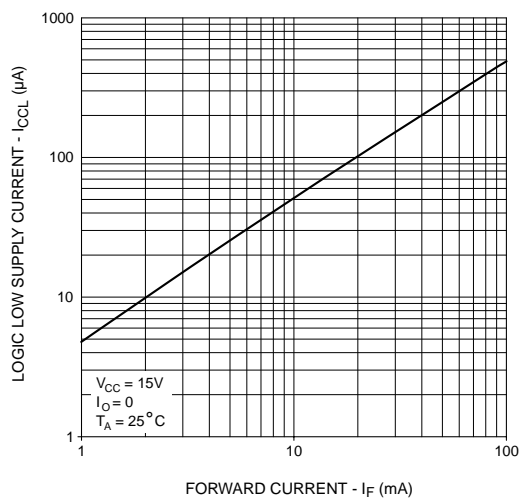
**Fig. 5 Logic High Output Current vs. Ambient Temperature**



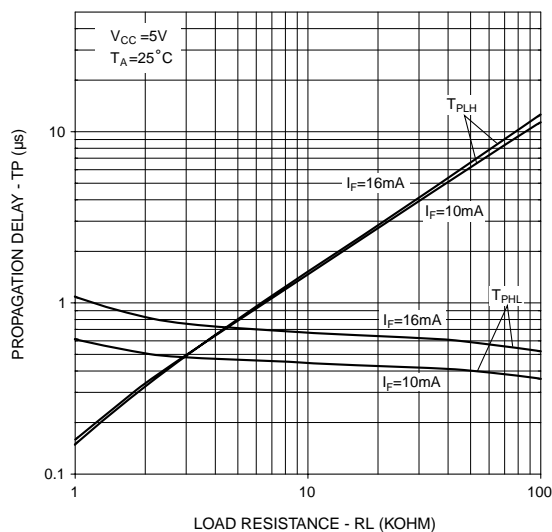
**Fig. 6 Propagation Delay vs. Ambient Temperature**

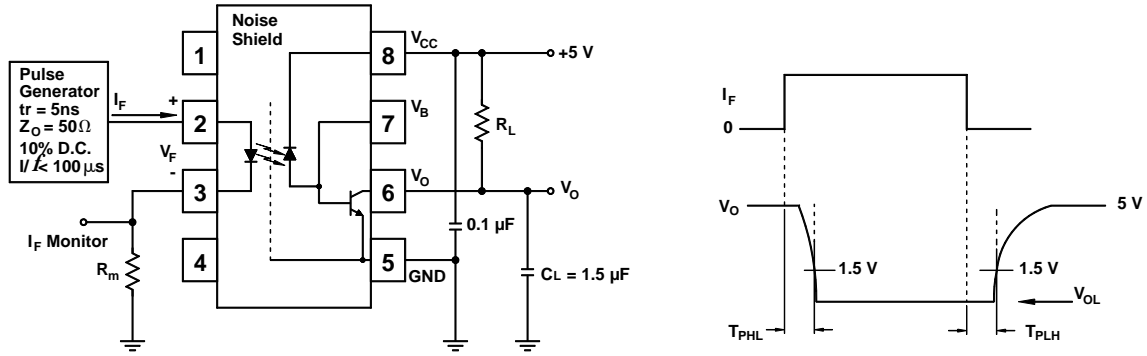


**Fig. 7 Logic Low Supply Current vs. Forward Current**

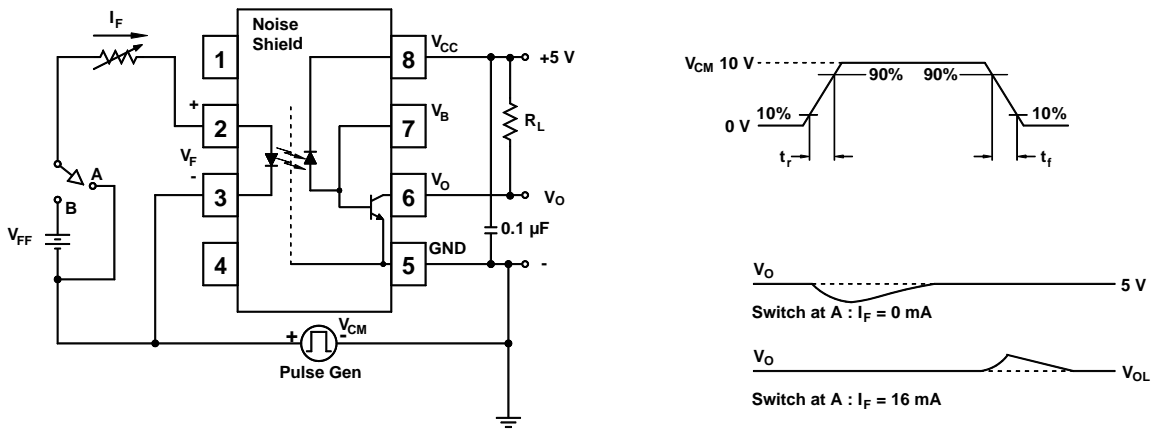


**Fig. 8 Propagation Delay vs. Load Resistance**



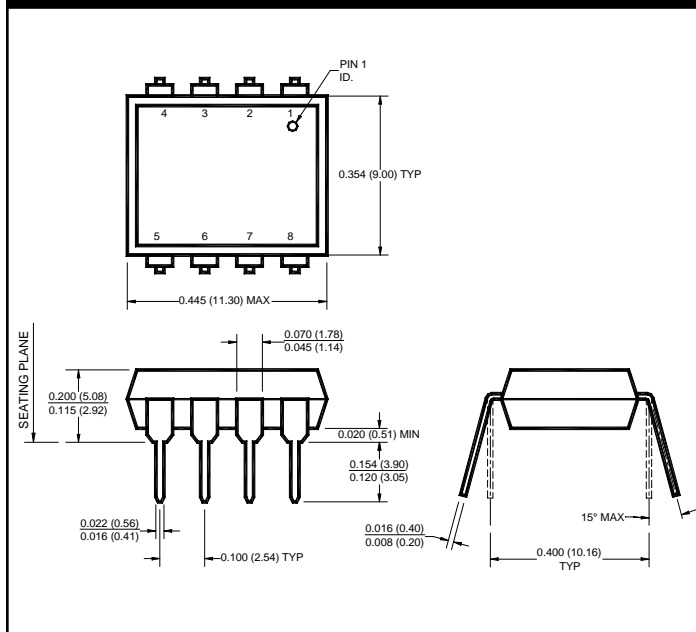


**Fig.9 Switching Time Test Circuit**

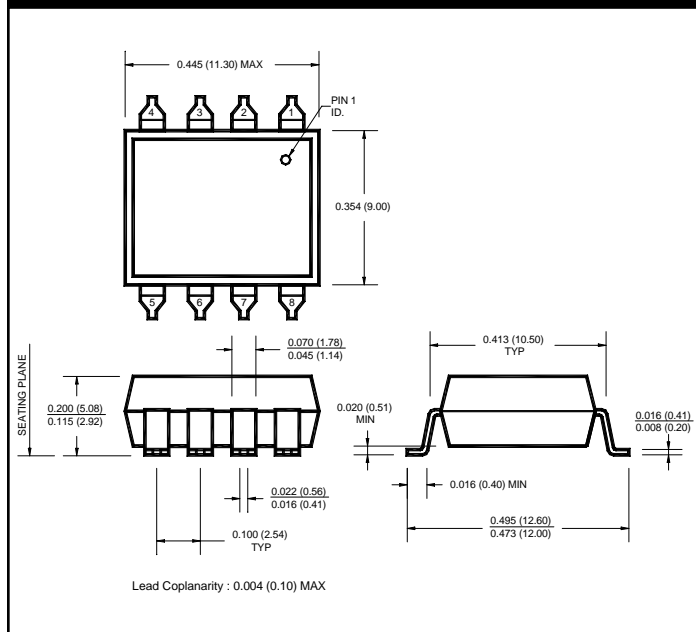


**Fig.10 Common Mode Immunity Test Circuit**

**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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