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FAIRCHILD
SEMICONDUCTOR®

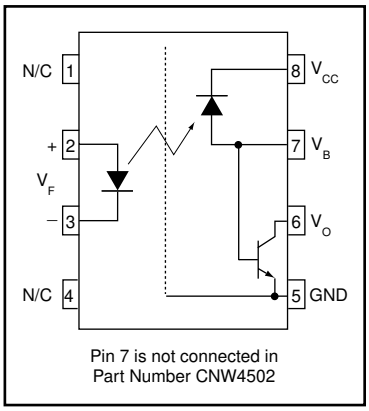
8-PIN WIDE BODY, HIGH-SPEED OPTOCOUPLERS

CNW135 CNW136 CNW4502

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.

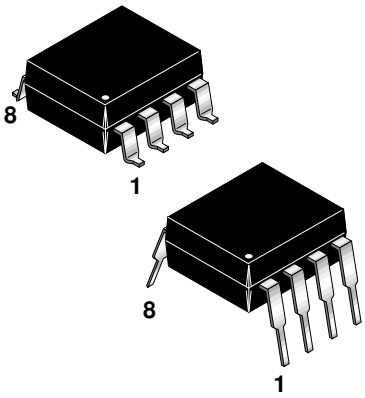
The CNW4502 provides the same electrical switching and isolation performances as the CNW136, and increased ESD protection due to a non-connected base.



Pin 7 is not connected in Part Number CNW4502

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

ABSOLUTE MAXIMUM RATINGS (T_A = 25°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 Reverse Voltage (DC)	V_R	All	5	V
Continuous Forward Current	I_F	All	100	mA
Forward Current - Peak (t_p = 1 µs, f = 300 Hz)	I_F(pk)	All	1	A
Total Power Dissipation up to 70°C Ambient	P_D	All	250	mW
DETECTOR DC Collector Current	I_C	All	10	mA
Supply Voltage (pins 8 & 5)	V_{CC}	All	-0.5 to 30	V
Collector to Emitter Voltage (pins 6 & 5)	V_{CEO}	All	-0.5 to 20	V
Emitter to Base Voltage (pins 7 & 5)	V_{EBO}	CNW135, CNW136	5	V
Total Power Dissipation up to 70°C	P_D	All	100	mW

ELECTRICAL CHARACTERISTICS (T_A = 25°C Unless otherwise specified)

INDIVIDUAL COMPONENT CHARACTERISTICS

Parameter	Test Conditions	Symbol	Device	Min	Typ*	Max	Unit
EMITTER	I_F = 16 mA	V_F	All	1.25	1.6	1.7	V
Forward Voltage	I_F = 16 mA, T_A = 0 to 70°C		All	1.2		1.8	
Input Reverse Voltage	V_R = 5 V	I_R	All			10	µA
	V_R = 5 V, T_A = 0 to 70°C		All			100	
Diode Capacitance	V_D =0, f = 1MHz	C_d	All		200		pF
DETECTOR							
Collector-Emitter Breakdown Voltage	I_C = 1.0 mA	BV_{CEO}	All	20			V
Emitter-Base Breakdown Voltage	I_C = 0.1 mA	BV_{EBO}	CNW135, CNW136	5			V
Logic High Output Current	I_F = 0 mA, V_O = V_{CC} = 5.5 V	I_{OH}	All		0.005	0.5	µA
	I_F = 0 mA, V_O = V_{CC} = 15 V				0.01	1	
	I_F = 0 mA, V_O = V_{CC} = 5.5 V, T_A = 0 to 70°C					50	
Logic High Supply Current	I_F = 0 mA, I_O = O, V_{CC} = 15 V	I_{CCH}	All		0.001	1	µA
	I_F = 0 mA, I_O = O, V_{CC} = 15 V, T_A = 0 to 70°C					2	
Logic Low Supply Current	I_F = 16 mA, I_O = O, V_{CC} = 15 V	I_{CCL}	All		80	200	µA

TRANSFER CHARACTERISTICS (T_A = 25°C Unless otherwise specified)

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

SWITCHING CHARACTERISTICS (see Fig. 9) (T_A = 25°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 kΩ, I_F = 16 mA, V_{CC} = 5 V	T_{PHL}	CNW135		0.5	1.5	µs
	R_L = 4.1 kΩ, I_F = 16 mA, V_{CC} = 5 V, 0 to 70°C					2.0	
	R_L = 1.9 kΩ, I_F = 16 mA, V_{CC} = 5 V		CNW136/4502		0.55	0.8	
	R_L = 1.9 kΩ, I_F = 16 mA, V_{CC} = 5 V, 0 to 70°C					1.0	
Propagation delay time to logic high at output	R_L = 4.1 kΩ, I_F = 16 mA, V_{CC} = 5 V	T_{PLH}	CNW135		0.7	1.5	µs
	R_L = 4.1 kΩ, I_F = 16 mA, V_{CC} = 5 V, 0 to 70°C					2.0	
	R_L = 1.9 kΩ, I_F = 16 mA, V_{CC} = 5 V		CNW136/4502		0.35	0.8	
	R_L = 1.9 kΩ, I_F = 16 mA, V_{CC} = 5 V, 0 to 70°C					1.0	

* Typical values at T_A = 25°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 kΩ, I_F = 0, V_{CC} = 5 V, V_{CM} = 10 $V_{(p-p)}$	$\|CM_H\|$	CNW135	1			kV/µs
	R_L = 1.9 kΩ, I_F = 0, V_{CC} = 5 V, V_{CM} = 10 $V_{(p-p)}$		CNW136/4502	1			
Common mode transient immunity at logic low	R_L = 4.1 kΩ, I_F = 16 mA, V_{CC} = 5 V, V_{CM} = 10 $V_{(p-p)}$	$\|CM_L\|$	CNW135	-1			kV/µs
	R_L = 1.9 kΩ, I_F = 16 mA, V_{CC} = 5 V, V_{CM} = 10 $V_{(p-p)}$		CNW136/4502	-1			
Common mode rejection ratio	R_L = 1 kΩ, I_C = 6 mA, f = 10 kHz, V_{CC} = 10 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 V/DC, 25°C	R_{ISO}	10^{12}	10^{13}		Ω
Isolation Capacitance	V_{I-O} = 0V, f = 1 MHz	C_{ISO}		0.4	0.6	pF

* Typical values at T_A = 25°C

Fig. 1 LED Forward Current vs. Forward Voltage

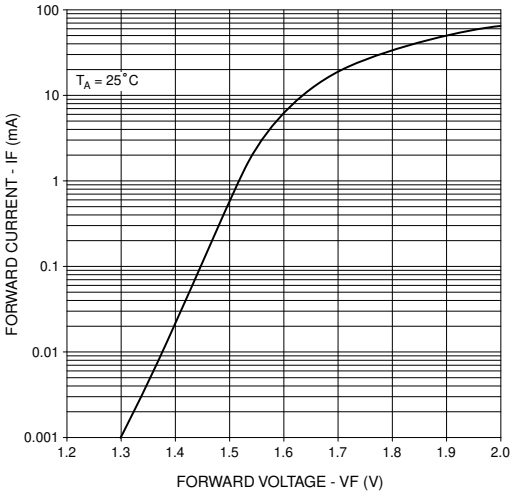


Fig. 2 Normalized CTR vs. Forward Current

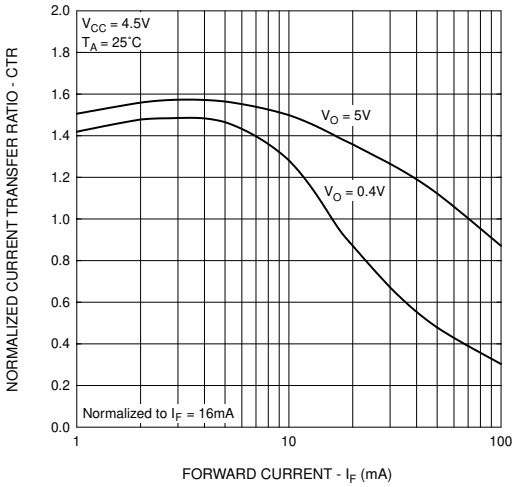


Fig. 3 Normalized CTR vs. Ambient Temperature

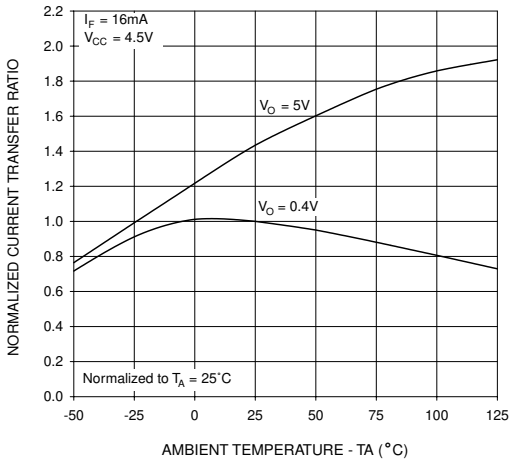


Fig. 4 Output Current vs. Output Voltage

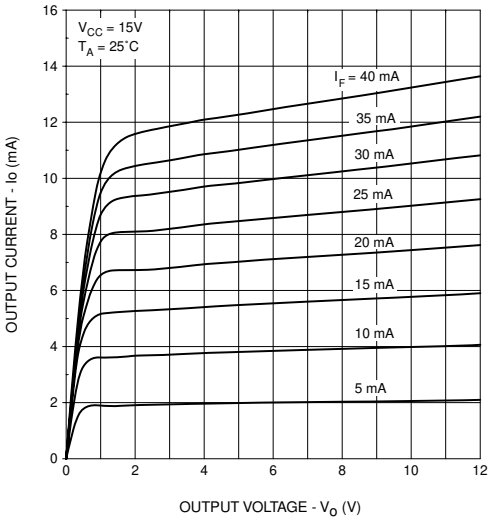


Fig. 5 Logic High Output Current vs. Ambient Temperature

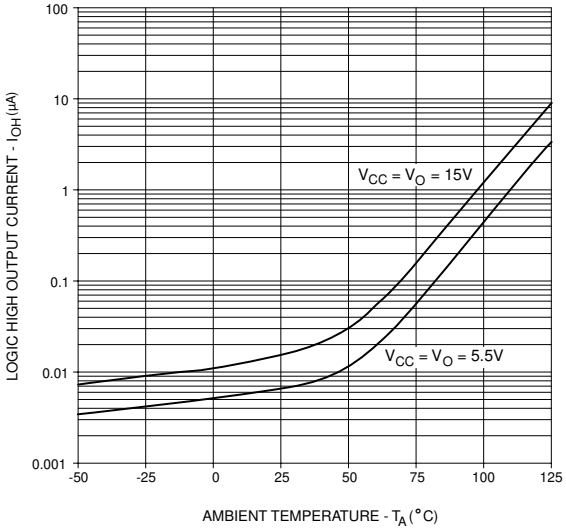


Fig. 6 Propagation Delay vs. Ambient Temperature

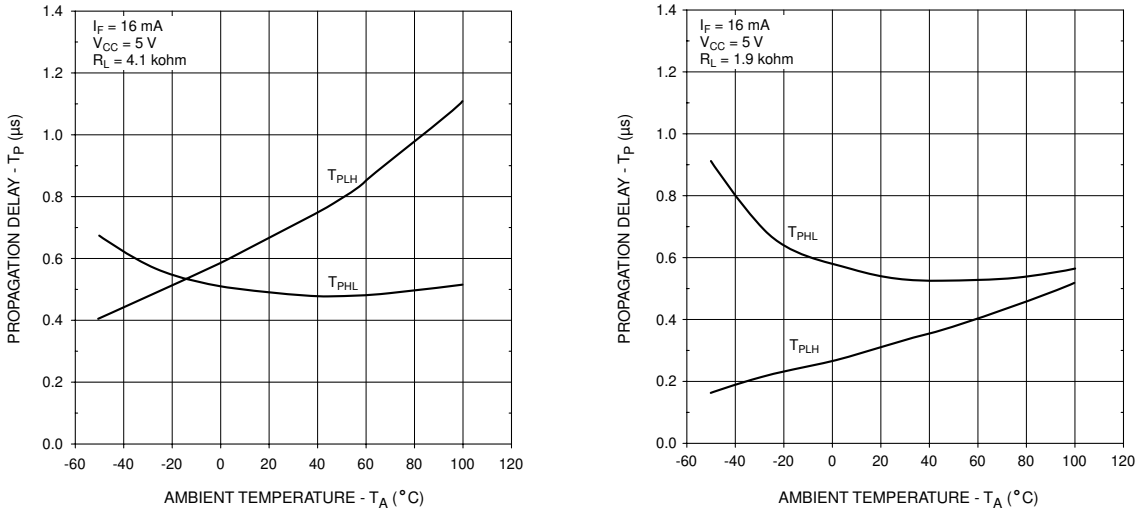


Fig. 7 Logic Low Supply Current vs. Forward Current

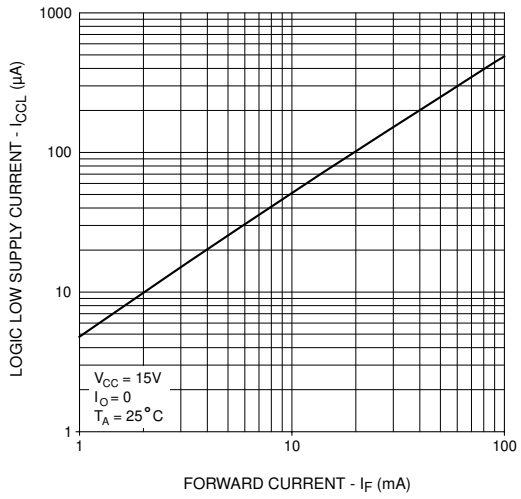
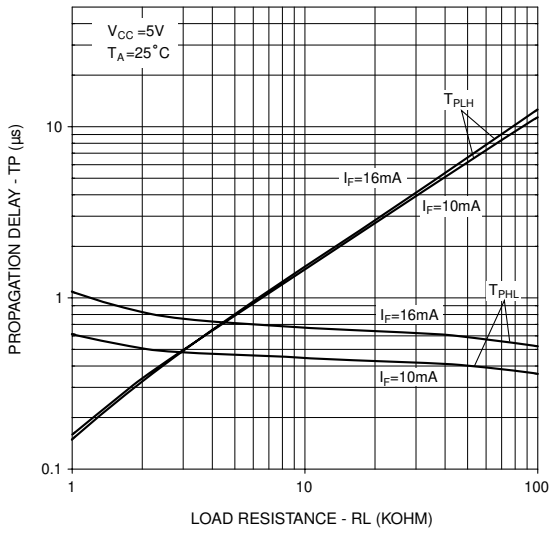


Fig. 8 Propagation Delay vs. Load Resistance



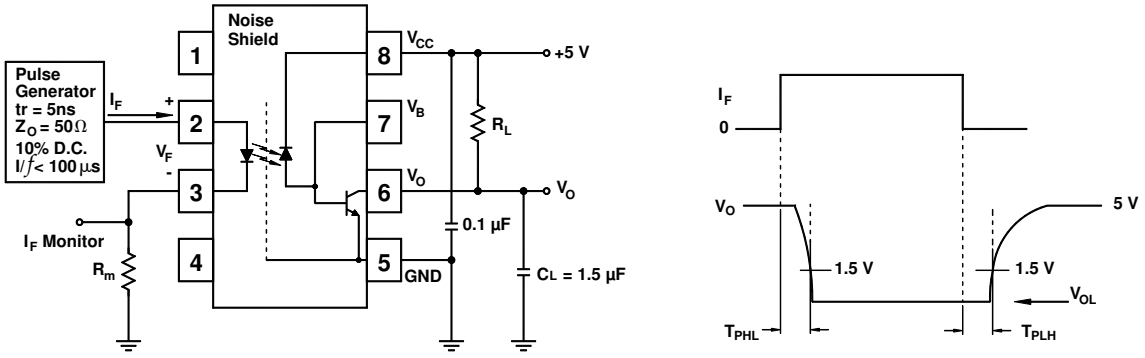


Fig.9 Switching Time Test Circuit

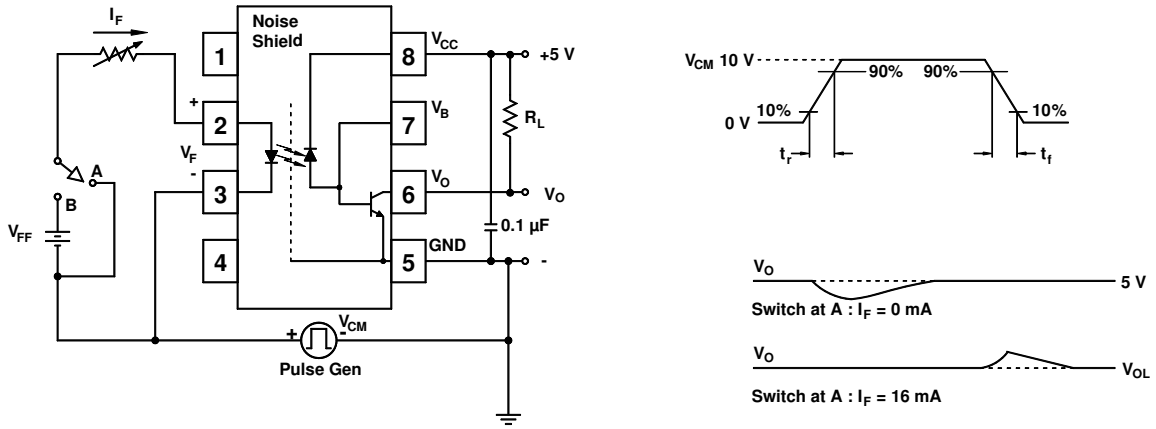
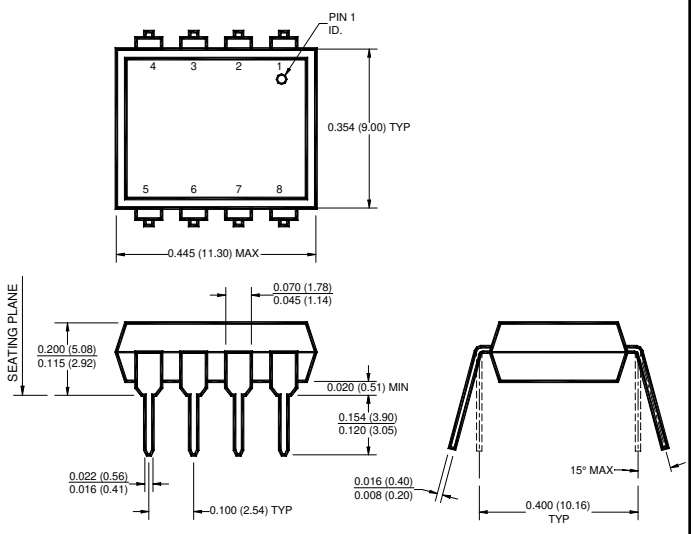
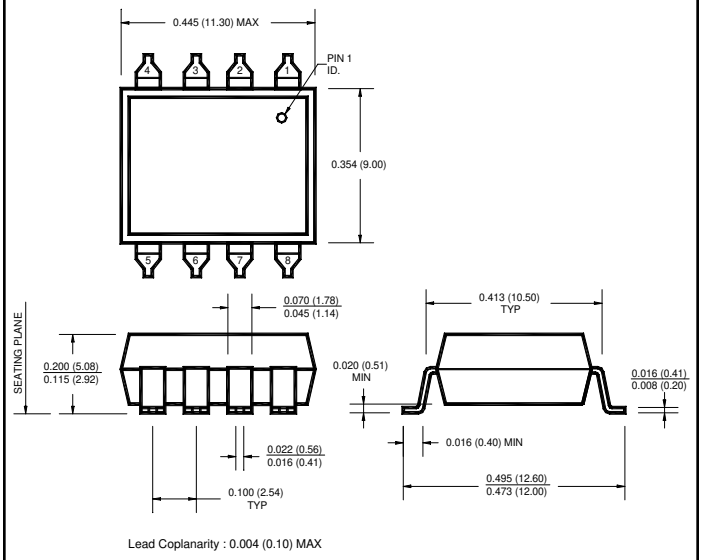


Fig.10 Common Mode Immunity Test Circuit

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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2. A critical component in any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.