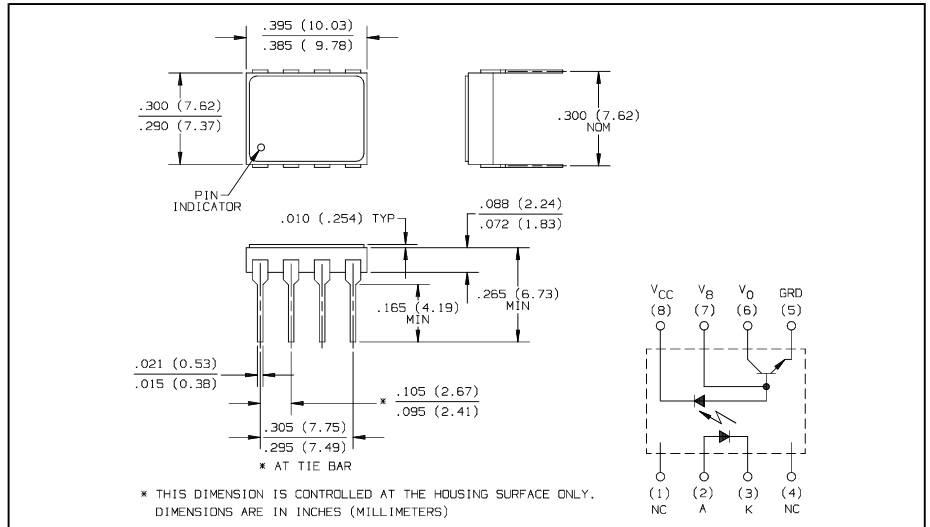
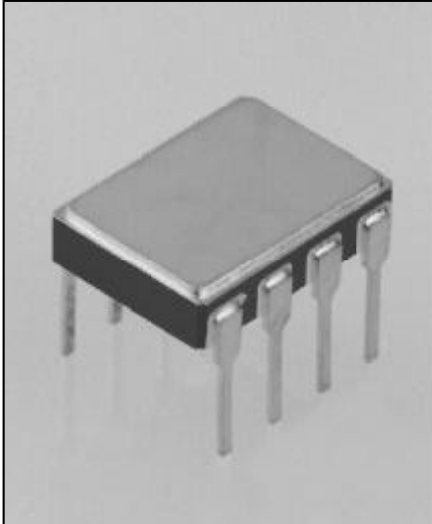


# High Speed Optocouplers

## Types HDC135, HDC136, HDC135B, HDC136B



### Features

- High speed
- TTL compatible
- High common mode transient immunity
- Wide bandwidth
- Open collector output

### Description

Optek's HDC135 and HDC136 are high speed optocouplers, consisting of IR emitters and integrated photodetectors in hermetic side brazed dual-in-line 8 pin packages. Electrical characteristics are similar to the 6N135 and 6N136 optocouplers but with full military temperature range operation.

The HDC135B and HDC136B are high reliability optocouplers with 100% processing and Group Testing patterned after MIL-STD-883 Method 5004 and 5005 for class B.

Typical screening and lot acceptance tests are provided on page 13-4.

Minimum orders will apply to processed devices.

### Absolute Maximum Ratings (No derating required up to 70° C)

Storage Temperature Range	-55° C to +150° C
Operating Temperature Range	-55° C to +125° C
Lead Soldering Temperature [1/16 inch (1.6 mm) from case for 10 seconds]	260° C
Average Input Current - $I_F$	25 mA <sup>(1)</sup>
Peak Output Current - $I_F$ (50% duty cycle, 1 ms pulse width)	50 mA <sup>(2)</sup>
Peak Transient Input Current - $I_F$ ( $\leq 1 \mu s$ pulse width, 300 pps)	1.0 A
Reverse Input Voltage - $V_R$	5.0 V
Input Power Dissipation	45 mW <sup>(3)</sup>
Average Output Current - $I_O$	8.0 mA
Peak Output Current	16.0 mA
Emitter-Base Reverse Voltage	5.0 V
Supply and Output Voltage - $V_{CC}, V_O$	-0.5 V to 15 V
Base Current - $I_B$	5.0 mA
Output Power Dissipation	100 mW <sup>(4)</sup>

**Caution:** This component is susceptible to damage from electrostatic discharge. Normal static prevention procedures should be used in handling.

#### Notes:

- (1) Derate linearly above 70° C free-air temperature at a rate of 0.45 mA/° C.
- (2) Derate linearly above 70° C free-air temperature at a rate of 0.9 mA/° C.
- (3) Derate linearly above 70° C free-air temperature at a rate of 0.8 mW/° C.
- (4) Derate linearly above 70° C free-air temperature at a rate of 1.8 mW/° C.
- (5)  $CM_H$  is the maximum allowable dV/dt on the leading edge of a common mode pulse to assure that the output will not switch from high to low.
- (6)  $CM_L$  is the maximum negative dV/dt allowable on the trailing edge of a common mode pulse to assure that the output will not switch from low to high.
- (7) Test conditions represents 1 TTL unit load with 5.6 k $\Omega$  pull-up resistor.
- (8) Test conditions represents 1 LSTTL unit load with a 6.1 k $\Omega$  pull-up resistor.
- (9) Device considered a two-terminal device: pins 2 and 3 shorted together and pins 5, 6, 7 and 8 shorted together.

# Types HDC135, HDC136, HDC135B, HDC136B

Electrical Characteristics (Over recommended temperature  $T_A = -55^\circ\text{C}$  to  $+125^\circ\text{C}$ , unless otherwise noted)

SYMBOL	PARAMETER	MIN	TYP*	MAX	UNITS	TEST CONDITIONS
CTR	Current Transfer Ratio	HDC135	7.0	19.0		% $I_F = 16\text{ mA}, V_O = 0.40\text{ V},$ $V_{CC} = 4.5\text{ V}, T_A = 25^\circ\text{ C}$
		HDC136	19.0	25.0		%
VOL	Logic Low Output Voltage	HDC135	5.0	15.0		% $I_F = 16\text{ mA}, V_O = 0.50\text{ V},$ $V_{CC} = 4.5\text{ V}$
		HDC136	15.0	23.0		%
VOL	Logic Low Output Voltage	HDC135		0.100	0.40	V $I_F = 16\text{ mA}, I_O = 1.10\text{ mA},$ $V_{CC} = 4.5\text{ V}$
		HDC136		0.100	0.40	V $I_F = 16\text{ mA}, I_O = 2.4\text{ mA},$ $V_{CC} = 4.5\text{ V}$
IOH	Logic High Output Current			3.0	500	nA $I_F = 0\text{ mA}, V_O = V_{CC} = 5.5\text{ V},$ $T_A = 25^\circ\text{ C}$
				0.010	1.00	$\mu\text{A}$ $I_F = 0\text{ mA}, V_O = V_{CC} = 15\text{ V},$ $T_A = 25^\circ\text{ C}$
					50	$\mu\text{A}$ $I_F = 0\text{ mA}, V_O = V_{CC} = 15\text{ V}$
ICCL	Logic Low Supply Current		40		$\mu\text{A}$ $I_F = 16\text{ mA}, V_O = \text{open},$ $V_{CC} = 15\text{ V}$	
ICCH	Logic High Supply Current		0.020	1.00	$\mu\text{A}$ $I_F = 0\text{ mA}, V_O = \text{open},$ $V_{CC} = 15\text{ V}, T_A = 25^\circ\text{ C}$	
				2.0	$\mu\text{A}$ $I_F = 0\text{ mA}, V_O = \text{open},$ $V_{CC} = 15\text{ V}$	
VF	Input Forward Voltage		1.50	1.70	V $I_F = 16\text{ mA}, T_A = 25^\circ\text{ C}$	
$\frac{\Delta V_F}{\Delta T_A}$	Temperature Coefficient of Forward Voltage		-1.80		$\text{mV}/^\circ\text{C}$ $I_F = 16\text{ mA}$	
BVR	Input Reverse Breakdown Voltage	5.0			V $I_R = 10\text{ }\mu\text{A}, T_A = 25^\circ\text{ C}$	
CIN	Input Capacitance		42		pF $f = 1\text{ MHz}, V_F = 0$	
IIO	Input-Output Insulation Leakage Current			1.00	$\mu\text{A}$ 45% Relative Humidity, $t = 5\text{ sec}, V_{IO} = 1000\text{ Vdc},$ $T_A = 25^\circ\text{ C}$ (Note 9)	
RIO	Input-Output Resistance		$10^{12}$		$\Omega$ $V_{IO} = 500\text{ Vdc}$ (Note 9)	
CIO	Input-Output Capacitance		0.50		pF $f = 1\text{ MHz}$ (Note 9)	
hFE	Transistor DC Current Gain		150		— $V_O = 5\text{ V}, I_O = 3\text{ mA}$	
<b>Switching Specification</b> ( $T_A = 25^\circ\text{C}$ ) $V_{CC} = 5.0\text{ V}, I_F = 16.0\text{ mA}$ unless otherwise noted						
tPHL	Propagation Delay Time to Logic Low at Output	HDC135	0.50	1.50	$\mu\text{s}$	$R_L = 4.1\text{ k}\Omega$ (Note 8)
		HDC136	0.60	1.00	$\mu\text{s}$	$R_L = 1.90\text{ k}\Omega$ (Note 7)
tPLH	Propagation Delay Time to Logic High at Output	HDC135	0.40	1.50	$\mu\text{s}$	$R_L = 4.1\text{ k}\Omega$ (Note 8)
		HDC136	0.80	1.00	$\mu\text{s}$	$R_L = 1.90\text{ k}\Omega$ (Note 7)
CMH	Common Mode Transient Immunity at Logic High Level Output	HDC135	1000		V/ $\mu\text{s}$	$I_F = 0\text{ mA}, V_{CM} = 10\text{ Vp-p},$ $R_L = 4.1\text{ k}\Omega$ (Notes 6,8)
		HDC136	1000		V/ $\mu\text{s}$	$I_F = 0\text{ mA}, V_{CM} = 10\text{ Vp-p},$ $R_L = 1.90\text{ k}\Omega$ (Notes 6,7)
CML	Common Mode Transient Immunity at Logic Low Level Output	HDC135	-1000		V/ $\mu\text{s}$	$V_{CM} = 10\text{ Vp-p}, R_L = 4.1\text{ k}\Omega,$ (Notes 5,8)
		HDC136	-1000		V/ $\mu\text{s}$	$V_{CM} = 10\text{ Vp-p}, R_L = 1.90\text{ k}\Omega$ (Notes 5,7)

All typicals at  $T_A = 25^\circ\text{C}$  and  $V_{CC} = 5\text{ V}$ , unless otherwise noted

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COMPONENTS

Optek reserves the right to make changes at any time in order to improve design and to supply the best product possible.

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