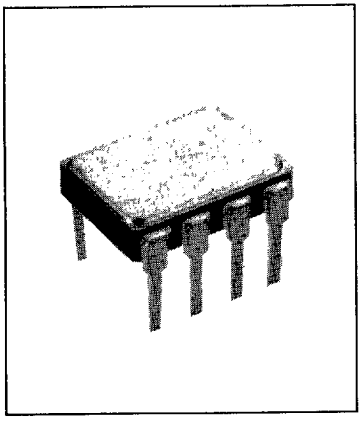
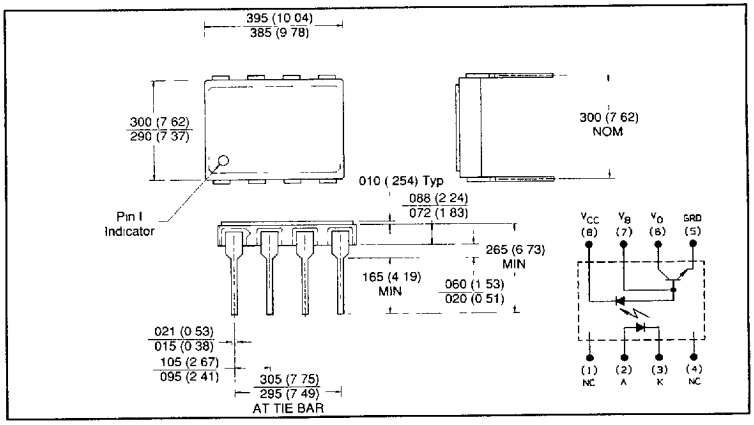
High Speed Optocouplers
Types HDC135, HDC136, HDC135TXV, HDC136TXV





Features

- High speed - 1 megabit/second
- 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 HDC135TXV and HDC136TXV are high reliability optocouplers with 100% processing and Group Testing patterned after MIL-STD-883 Method 5008.

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

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

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 0.45mA/°C.
(2) Derate linearly above 70°C free-air temperature at a rate of 0.9mA/°C.
(3) Derate linearly above 70°C free-air temperature at a rate of 0.8mW/°C.
(4) Derate linearly above 70°C free-air temperature at a rate of 1.8mW/°C.
(5) CMH 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) CML 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 kΩ pull-up resistor.
(8) Test conditions represents 1 LSTTL unit load with a 6.1 kΩ pull-up resistor.
(9) Device considered a two-terminal device: pins 1, 2, 3 and 4 shorted together and pins 5, 6, 7 and 8 shorted together.

Types HDC135, HDC136, HDC135TXV, HDC136TXV

Electrical Characteristics (Over recommended temperature T_A = -55°C to 125°C, unless otherwise noted)

SYMBOL	PARAMETER		MIN	TYP*	MAX	UNITS	TEST CONDITIONS
CTR	Current Transfer Ratio	HDC135	7.0	19.0		%	I_F = 16.0mA, V_O = 0.40V,
		HDC136	19.0	25.0		%	V_{CC} = 4.5V, T_A = 25°C
		HDC135	5.0	15.0		%	I_F = 16.0mA, V_O = 0.50V
		HDC136	15.0	23.0		%	V_{CC} = 4.5V
V_{OL}	Logic Low Output Voltage	HDC135		0.100	0.40	V	I_F = 16.0mA, I_O = 1.10mA, V_{CC} = 4.5V
		HDC136		0.100	0.40	V	I_F = 16.0mA, I_O = 2.4mA, V_{CC} = 4.5V
I_{OH}	Logic High Output Current			3.0	500	nA	I_F = 0mA, V_O = V_{CC} = 5.5V, T_A = 25°C
				0.010	1.00	µA	I_F = 0mA, V_O = V_{CC} = 15.0V, T_A = 25°C
					50	µA	I_F = 0mA, V_O = V_{CC} = 15.0V
I_{CCL}	Logic Low Supply Current			40		µA	I_F = 16.0mA, V_O = Open, V_{CC} = 15.0V
I_{CCH}	Logic High Supply Current			0.020	1.00	µA	I_F = 0mA, V_O = open, V_{CC} = 15.0V, T_A = 25°C
					2.0	µA	I_F = 0mA, V_O = Open, V_{CC} = 15.0V
V_F	Input Forward Voltage			1.50	1.70	V	I_F = 16.0mA, T_A = 25°C
$\frac{\Delta V_F}{\Delta T_A}$	Temperature Coefficient of Forward Voltage			-1.80		mV/°C	I_F = 16.0mA
BV_R	Input Reverse Breakdown Voltage		5.0			V	I_R = 10.0µA, T_A = 25°C
C_{IN}	Input Capacitance			42		pF	f = 1.00MHz, V_F = 0
I_{IO}	Input-Output Insulation Leakage Current				1.00	µA	45% Relative Humidity, t = 5.0 sec, V_{IO} = 1000Vdc, T_A = 25°C (Note 9)
R_{IO}	Input-Output Resistance			10^{12}		Ω	V_{IO} = 500 Vdc (Note 9)
C_{IO}	Input-Output Capacitance			0.50		pF	f = 1.00MHz (Note 9)
h_{FE}	Transistor DC Current Gain			150		—	V_O = 5.0V, I_O = 3.0mA

Switching Specifications (T_A = 25°C) V_{CC} = 5.0V, I_F = 16.0mA unless otherwise noted

t_{PHL}	Propagation Delay Time	HDC135		0.50	1.50	µs	R_L = 4.1kΩ (Note 8)
	to Logic Low at Output	HDC136		0.20	0.80	µs	R_L = 1.90kΩ (Note 7)
t_{PLH}	Propagation Delay Time	HDC135		0.40	1.50	µs	R_L = 4.1kΩ (Note 8)
	to Logic High at Output	HDC156		0.30	0.80	µs	R_L = 1.90kΩ (Note 7)
CM_H	Common Mode Transient Immunity at Logic High Level Output	HDC135		1000		V/µs	I_F = 0mA, V_{CM} = 10.0Vp-p, R_L = 4.1kΩ (Notes 6,8)
		HDC136		1000		V/µs	I_F = 0mA, V_{CM} = 10.0Vp-p, R_L = 1.90kΩ (Notes 6, 7)
CM_L	Common Mode Transient Immunity at Logic Low Level Output	HDC135		-1000		V/µs	V_{CM} =10.0Vp-p, R_L =4.1kΩ, (Notes 5, 8)
		HDC136		-1000		V/µs	V_{CM} =10.0Vp-p, R_L =1.90kΩ, (Notes 5, 7)

*All typicals at T_A = 25°C and V_{CC} = 5.0V, unless otherwise noted.

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