



**HIGH SPEED OPTICALLY
COUPLED ISOLATOR
PHOTOTRANSISTOR OUTPUT**

APPROVALS

- UL recognised, File No. E91231

DESCRIPTION

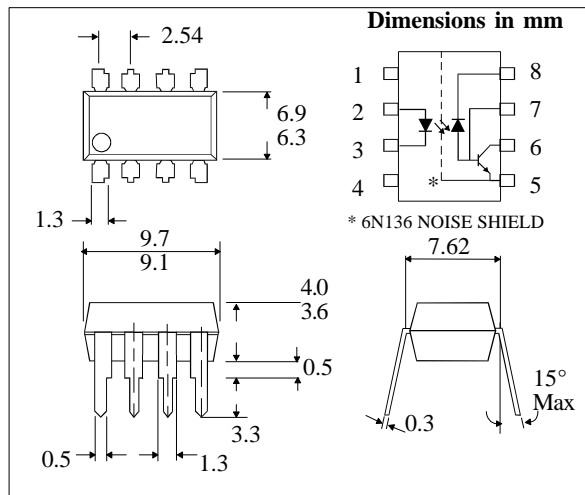
These diode-transistor optocouplers use a light emitting diode and an integrated photon detector to provide 2500Volts_{RMS} electrical isolation between input and output. Seperate connection for the photodiode bias and output transistor collector improve the speed up to a hundred times that of a conventional photo-transistor coupler by reducing the base-collector capacitance.

FEATURES

- High speed - 1 Mbits/s
- High Common Mode Transient Immunity 1000V/μs
- TTL Compatible
- 2 MHz Bandwidth
- Open Collector Output
- 2500V_{RMS} Withstand Test Voltage, 1 Min
- 6N136 has improved noise shield which gives superior common mode rejection
- Options :-
10mm lead spread - add G after part no.
Surface mount - add SM after part no.
Tape&reel - add SMT&R after part no.
- All electrical parameters 100% tested
- Custom electrical selections available

APPLICATIONS

- Line receivers
- Pulse transformer replacement
- Wide bandwidth analog coupling
- Output interface to CMOS-LSTTL-TTL



**ABSOLUTE MAXIMUM RATINGS
(25°C unless otherwise specified)**

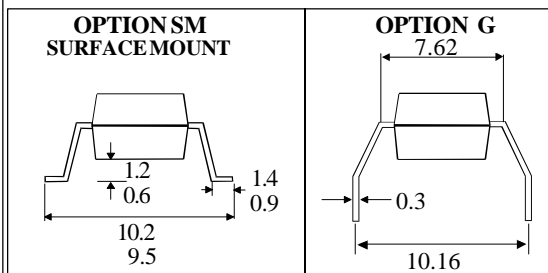
Storage Temperature _____ -55°C to + 125°C
 Operating Temperature _____ -55°C to + 100°C
 Lead Soldering Temperature
 (1/16 inch (1.6mm) from case for 10 secs) 260°C

INPUT DIODE

Average Forward Current _____ 25mA (1)
 Peak Forward Current _____ 50mA (2)
 (50% duty cycle, 1ms pulse width)
 Peak Transient Current _____ 1.0A
 (equal to or less than 1μs P.W., 300 pps)
 Reverse Voltage _____ 5V
 Power Dissipation _____ 45mW(3)

DETECTOR

Average Output Current _____ 8mA
 Peak Output Current _____ 16mA
 Supply and Output Voltage _____ -0.5 to +15V
 Base Current _____ 5mA
 Power Dissipation _____ 100mW(4)



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ELECTRICAL CHARACTERISTICS (T_A = 0°C to 70°C Unless otherwise noted)

PARAMETER	SYM	DEVICE	MIN	TYP*	MAX	UNITS	TEST CONDITION
Current Transfer Ratio (note 5)	CTR	6N135	7	18		%	I _F = 16mA, V _O = 0.4V V _{CC} = 4.5V, T _A = 25°C
		6N136	19	24		%	
Logic Low Output Voltage	V _{OL}	6N135		0.1	0.4	V	I _F = 16mA, I _O = 1.1mA V _{CC} = 4.5V, T _A = 25°C
		6N136		0.1	0.4	V	
Logic High Output Current	I _{OH}			3	500	nA	I _F = 0mA, T _A = 25°C V _O = V _{CC} = 5.5V I _F = 0mA, T _A = 25°C V _O = V _{CC} = 15V I _F = 0mA V _O = V _{CC} = 15V
				0.01	1	μA	
						50	
Logic Low Supply Current	I _{CCL}				40	μA	I _F = 16mA, V _O = open V _{CC} = 15V
Logic High Supply Current	I _{CCH}			0.02	1	μA	I _F = 0mA, V _O = open V _{CC} = 15V, T _A = 25°C I _F = 0mA, V _O = open V _{CC} = 15V
					2	μA	
Input Forward Voltage	V _F			1.5	1.7	V	I _F = 16mA, T _A = 25°C
Temperature Coefficient of Forward Voltage	$\frac{\Delta V_F}{\Delta T_A}$			-1.6		mV/°C	I _F = 16mA
Input Reverse Voltage	V _R		5			V	I _R = 10μA, T _A = 25°C
Input Capacitance	C _{IN}			60		pF	f = 1MHz, V _F = 0
Input-output Isolation Voltage	V _{ISO}		2500	5000		V _{RMS}	R.H. equal to or less than 50%, t = 1min. T _A = 25°C
Resistance (Input to Output)	R _{IO}			10 ¹²		Ω	V _{IO} = 500V dc (note 6)
Capacitance (Input to Output)	C _{IO}			0.6		pF	f = 1MHz (note 6)
Transistor DC Current Gain	H _{FE}			150			V _O = 5V, I _O = 3mA

* All typicals at T_A = 25°C

SWITCHING SPECIFICATIONS AT $T_A = 25^\circ\text{C}$ ($V_{CC} = 5\text{V}$, $I_F = 16\text{mA}$ Unless otherwise noted)

PARAMETER	SYM	DEVICE	MIN	TYP	MAX	UNITS	TEST CONDITION
Propagation Delay Time To Logic Low at Output (fig 1)	t_{PHL}	6N135		0.5	1.5	μs	$R_L = 4.1\text{k}\Omega$, (note 9)
		6N136		0.2	0.8	μs	$R_L = 1.9\text{k}\Omega$, (note 8)
Propagation Delay Time To Logic High at Output (fig 1)	t_{PLH}	6N135		0.5	1.5	μs	$R_L = 4.1\text{k}\Omega$, (note 9)
		6N136		0.2	0.8	μs	$R_L = 1.9\text{k}\Omega$, (note 8)
Common Mode Transient Immunity at Logic High Level Output (fig 2)	CM_H	6N135		1000		$\text{V}/\mu\text{s}$	$I_F = 0\text{mA}$, $V_{CM} = 10\text{V}_{PP}$ $R_L = 4.1\text{k}\Omega$, (note 7,8,9)
		6N136		1000		$\text{V}/\mu\text{s}$	$I_F = 0\text{mA}$, $V_{CM} = 10\text{V}_{PP}$ $R_L = 1.9\text{k}\Omega$, (note 7,8,9)
Common Mode Transient Immunity at Logic Low Level Output (fig 2)	CM_L	6N135		-1000		$\text{V}/\mu\text{s}$	$V_{CM} = 10\text{V}_{PP}$ $R_L = 4.1\text{k}\Omega$, (note 7,8,9)
		6N136		-1000		$\text{V}/\mu\text{s}$	$V_{CM} = 10\text{V}_{PP}$ $R_L = 1.9\text{k}\Omega$, (note 7,8,9)
Bandwidth	BW			2		MHz	$R_L = 100\Omega$, (note 10)

NOTES:-

1. Derate linearly above 70°C free air temperature at a rate of $0.8 \text{ mA}/^\circ\text{C}$.
2. Derate linearly above 70°C free air temperature at a rate of $1.6 \text{ mA}/^\circ\text{C}$.
3. Derate linearly above 70°C free air temperature at a rate of $0.9 \text{ mW}/^\circ\text{C}$.
4. Derate linearly above 70°C free air temperature at a rate of $1.0 \text{ mW}/^\circ\text{C}$.
5. CURRENT TRANSFER RATIO is defined as the ratio of output collector current, I_O , to the forward LED input current, I_F times 100%.
6. Device considered a two-terminal device: pins 1,2,3, and 4 shorted together and pins 5,6,7 and 8 shorted together.
7. Common mode transient immunity in Logic High level is the maximum tolerable (positive) dV_{CM}/dt on the leading edge of the common mode pulse V_{CM} to assure that the output will remain in a Logic High state (i.e. $V_O > 2.0\text{V}$). Common mode transient immunity in Logic Low level is the maximum tolerable (negative) dV_{CM}/dt on the trailing edge of the common mode pulse signal, V_{CM} to assure that the output will remain in Logic Low state (i.e. $V_O < 0.8\text{V}$).
8. The $1.9\text{k}\Omega$ load represents 1 TTL unit load of 1.6mA and the $5.6\text{k}\Omega$ pull-up resistor.
9. The $4.1\text{k}\Omega$ load represents 1 LSTTL unit load of 0.36mA and the $6.1\text{k}\Omega$ pull-up resistor.
10. The frequency at which the a.c. output voltage is 3dB below the low frequency asymptote.

FIG.1 SWITCHING TEST CIRCUIT

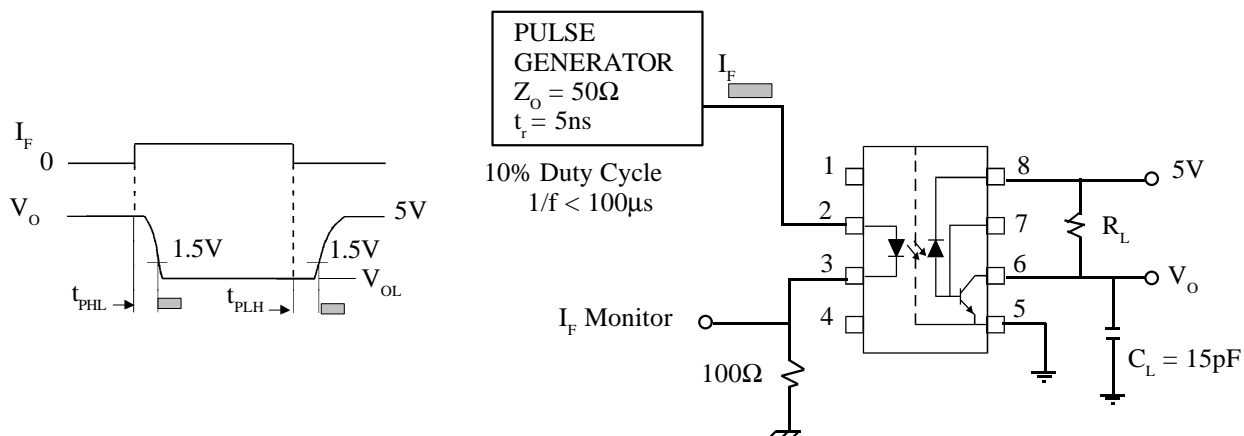


FIG. 2 TEST CIRCUIT FOR TRANSIENT IMMUNITY AND TYPICAL WAVEFORMS

