

66012**FOUR CHANNEL, HERMETICALLY SEALED, LOW-INPUT
CURRENT, 6N140 OPTOCOUPLER****Mii****OPTOELECTRONIC PRODUCTS
DIVISION****Features:**

- DSCC Approved 8302401EX
- High current transfer ratio: 1000% typical
- 1500 Vdc isolation test voltage
- Low input current requirement: 0.5mA

Applications:

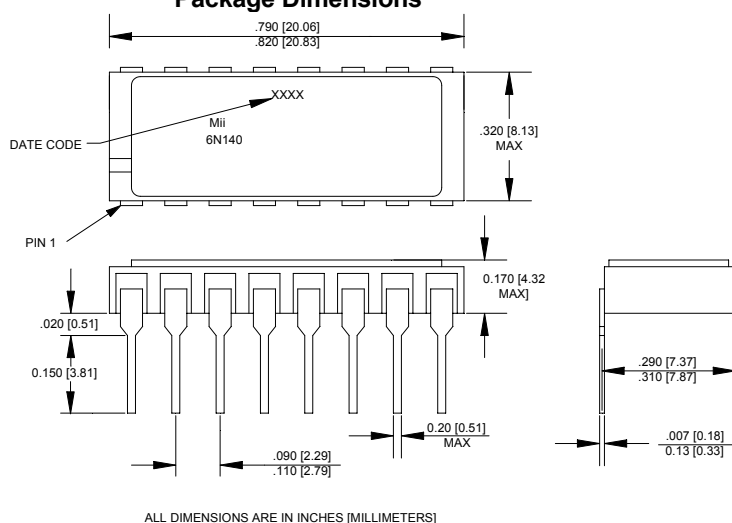
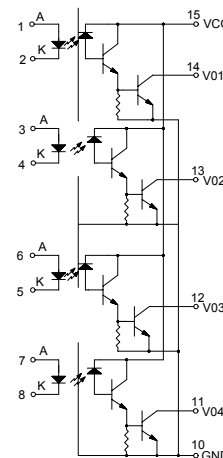
- Military and Space
- High reliability systems
- Voltage Level Shifting
- Isolated Receiver Input
- Communication systems

DESCRIPTION

The **66012** optocoupler contains four infrared LEDs optically coupled to four corresponding high gain photon detectors. This unique quad optocoupler provides high CTR and low leakage currents over the full military temperature range (-55° to +125°C). The 66012 is a 16 pin dual-in-line, hermetically sealed package and is available in standard and MIL-PRF-38534 screened versions or tested to customer specifications.

ABSOLUTE MAXIMUM RATINGS

Storage Temperature.....	-65°C to +150°C
Operating Free-Air Temperature Range	-55°C to +125°C
Lead Solder Temperature.....	260°C for 10s (1.6mm below seating plane)
Peak Forward Input Current (each channel)	20mA (1ms duration)
Average Forward Input Current	(see Note 3) 10mA
Reverse Input Voltage	5V
Output Current - I_O (each channel)	40mA
Output Power Dissipation (each channel)	(see Note 2) 50mW
Supply Voltage - V_{CC}	(see Note 1) -0.5 to 20V
Output Voltage - V_O (each channel).....	(see Note 1) -0.5 to 20V

Package Dimensions**Schematic Diagram****Notes:**

1. Derate I_F at 0.05 mA/°C above 25°C.
2. Collector output power plus one fourth of the total supply power is total output power. Derate at 0.46mW/°C above 25°C.
3. The lowest total I_{OH} over temperature is developed by keeping V_{CC} as low as possible, but greater than 2 volts. The negative voltage at the detector side should be applied to Pin 10.

ELECTRICAL CHARACTERISTICS $T_a = -55^{\circ}\text{C}$ to 125°C unless otherwise specified.

PARAMETER	SYMBOL	MIN	TYP	MAX	UNITS	TEST CONDITIONS	NOTE
Current Transfer Ratio	CTR	300	1000		%	$I_F = 0.5\text{mA}$, $V_O = 0.4\text{V}$, $V_{CC} = 4.5\text{V}$	1,2
		300	750		%	$I_F = 1.6\text{mA}$, $V_O = 0.4\text{V}$, $V_{CC} = 4.5\text{V}$	1,2
		200	400		%	$I_F = 5.0\text{mA}$, $V_O = 0.4\text{V}$, $V_{CC} = 4.5\text{V}$	1,2
Logic Low Output Voltage	V_{OL}		0.1	0.4	V	$I_F = 0.5\text{mA}$, $I_{OL} = 1.5\text{mA}$, $V_{CC} = 4.5\text{V}$	1
			0.2	0.4	V	$I_F = 5.0\text{mA}$, $I_{OL} = 10\text{mA}$, $V_{CC} = 4.5\text{V}$	
Logic High Output Current	I_{OH}		.005	250	μA	$I_F = 2\mu\text{A}$, $V_O = V_{CC} = 18\text{V}$	1,3
High Level Output Current	I_{CCH}		.010	40	μA	$I_{F1} = I_{F2} = I_{F3} = I_{F4} = 0\text{mA}$, $V_{CC} = 18\text{V}$	
Low Level Supply Current	I_{CCL}		2	4	mA	$I_{F1} = I_{F2} = I_{F3} = I_{F4} = 1.6\text{mA}$, $V_{CC} = 18\text{V}$	
Input Forward Voltage	V_F		1.4	1.8	V	$I_F = 1.6\text{mA}$	1
Input Reverse Breakdown Voltage	BV_R	5			V	$I_R = 10\mu\text{A}$	1
Input-Output Insulation Leakage Current	I_{I-O}			1.0	μA	$V_{I-O} = 1500\text{Vdc}$, Relative Humidity = 45% $t_A = 25^{\circ}\text{C}$, $t = 5\text{s}$	4
Propagation Delay Time To High Output Level	t_{PLH}		5	60	μs	$I_F = 0.5\text{mA}$, $V_{CC} = 5.0\text{V}$, $R_L = 4.7\text{k}\Omega$	
			4	30	μs	$I_F = 5\text{mA}$, $V_{CC} = 5.0\text{V}$, $R_L = 680\text{k}\Omega$	
Propagation Delay Time To Low Output Level	t_{PHL}		8	100	μs	$I_F = 0.5\text{mA}$, $V_{CC} = 5.0\text{V}$, $R_L = 4.7\text{k}\Omega$	
			2	10	μs	$I_F = 5\text{mA}$, $V_{CC} = 5.0\text{V}$, $R_L = 680\text{k}\Omega$	

TYPICAL CHARACTERISTICS $T_a = 25^{\circ}\text{C}$, $V_{CC} = 5\text{V}$ Each Channel

PARAMETER	SYMBOL	MIN	TYP	MAX	UNITS	TEST CONDITIONS	NOTE
Input Capacitance	C_{IN}		60		pF	$V_F = 0$, $f = \text{MHz}$, $t_a = 25^{\circ}\text{C}$	1
Capacitance (Input-Output)	C_{I-O}		1.5		pF	$f = 1\text{MHz}$, $t_a = 25^{\circ}\text{C}$	1, 5
Input Diode Temperature Coefficient	$\frac{\Delta V_F}{\Delta T_A}$		-1.8		mV/ $^{\circ}\text{C}$	$I_F = 1.6\text{mA}$	1
Resistance (Input-Output)	R_{I-O}		10^{12}		Ω	$V_{I-O} = 500\text{V}$, $t_a = 25^{\circ}\text{C}$	1, 5
Resistance (Input-Input)	R_{I-I}		10^{12}		Ω	$V_{I-I} = 500\text{V}$, $t_a = 25^{\circ}\text{C}$	6
Input-Input Insulation Leakage Current	I_{I-I}		0.5		nA	Relative Humidity = 45% $V_{I-I} = 500\text{V}$, $t = 5\text{s}$	6
Common Mode Transient immunity at High Output Level	CM_H	500	1000		V/ μs	$V_{CM} = 50\text{V}_{P-P}$, $V_{CC} = 5.0\text{V}$, $R_L = 1.5\text{k}\Omega$, $I_F = 0\text{mA}$	7,9
Common Mode Transient Immunity at Low Output Level	CM_L	500	1000		V/ μs	$V_{CM} = 50\text{V}_{P-P}$, $V_{CC} = 5.0\text{V}$, $R_L = 1.5\text{k}\Omega$, $I_F = 1.6\text{mA}$	8,9

NOTES:

- Each channel.
- CURRENT TRANSFER RATIO is defined as the ratio of output collector current, I_O , to the forward LED input current, I_F , times 100%.
- $I_F = 2\mu\text{A}$ for channel under test. For all other channels, $I_F = 10\text{mA}$.
- Device considered a two-terminal device. Pins 1-6 and 16 are shorted together and pins 7-14 are shorted together.
- Measured between each input pair shorted together.
- Measured between adjacent pairs shorted together, i.e. between pins 1 and 2 shorted together and pins 3 and 4 shorted together, etc.
- CM_H is the maximum tolerable common mode transient to assure that the output will remain in a high logic state (ie. $V_O > 0.0\text{V}$).
- CM_L is the maximum tolerable common mode transient to assure that the output will remain in a low logic state (ie. $V_O < 0.8\text{V}$).
- In applications where dv/dt may exceed 50,000 V/ μs (such as static discharge) a series resistor, R_{CC} , should be included to protect the detector IC's from destructively high surge currents. The recommended value is $R_{CC} = \frac{1\text{V}}{0.6I_F} = \text{k}\Omega$

RECOMMENDED OPERATING CONDITIONS:

PARAMETER	SYMBOL	MIN	MAX	UNITS
Input Current, Low Level	I_{FL}	0	2	μA
Input Current, High Level	I_{FH}	0.5	5	mA
Supply Voltage	V_{CC}	2.0	18	V

SELECTION GUIDE

PART NUMBER	PART DESCRIPTION
66012-001	DSCC Dwg 8302401EX Quad Channel Optocoupler
66012-002	Quad Channel optocoupler, commercial, tested over full military temperature range (-55°C to $+125^{\circ}\text{C}$)
66012-003	Quad Channel optocoupler, commercial (0° to $+70^{\circ}\text{C}$)
66012-004	Quad Channel optocoupler, commercial (-40°C to $+85^{\circ}\text{C}$)