

**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:**

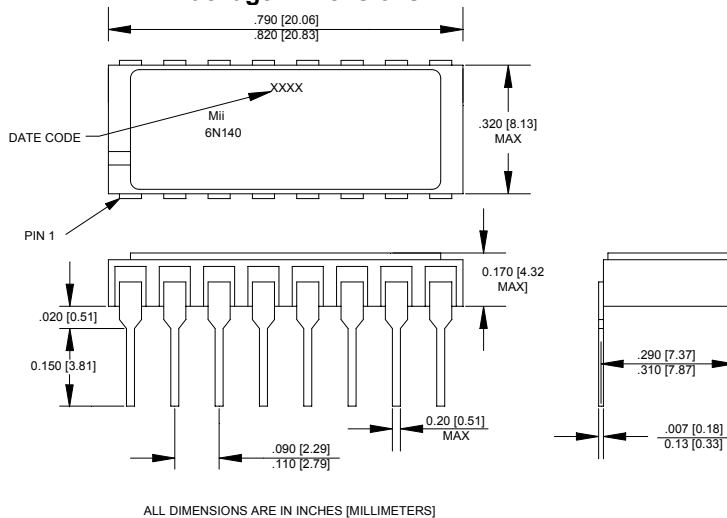
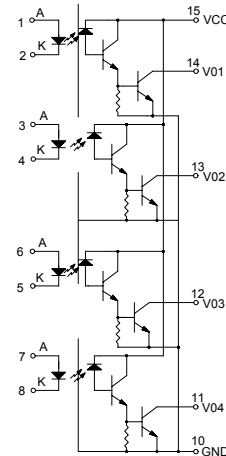
- Military and Space
- High reliability systems
- Voltage Level Shifting
- Isolated Receiver Input
- Communication systems

**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 <sub>O</sub> (each channel) .....	40mA
Output Power Dissipation (each channel) .....	(see Note 2) 50mW
Supply Voltage - V <sub>CC</sub> .....	(see Note 1) -0.5 to 20V
Output Voltage - V <sub>O</sub> (each channel).....	(see Note 1) -0.5 to 20V

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

1. Derate I<sub>F</sub> 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<sub>OH</sub> over temperature is developed by keeping V<sub>CC</sub> 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<sub>a</sub> = -55°C to 125°C unless otherwise specified.

PARAMETER	SYMBOL	MIN	TYP	MAX	UNITS	TEST CONDITIONS	NOTE
Current Transfer Ratio	CTR	300	1000		%	I <sub>F</sub> = 0.5mA, V <sub>O</sub> = 0.4V, V <sub>CC</sub> = 4.5V	1,2
		300	750		%	I <sub>F</sub> = 1.6mA, V <sub>O</sub> = 0.4V, V <sub>CC</sub> = 4.5V	1,2
		200	400		%	I <sub>F</sub> = 5.0mA, V <sub>O</sub> = 0.4V, V <sub>CC</sub> = 4.5V	1,2
Logic Low Output Voltage	V <sub>OL</sub>		0.1	0.4	V	I <sub>F</sub> = 0.5mA, I <sub>OL</sub> = 1.5mA, V <sub>CC</sub> = 4.5V	1
			0.2	0.4	V	I <sub>F</sub> = 5.0mA, I <sub>OL</sub> = 10mA, V <sub>CC</sub> = 4.5V	
Logic High Output Current	I <sub>OH</sub>		.005	250	μA	I <sub>F</sub> = 2μA, V <sub>O</sub> = V <sub>CC</sub> = 18V	1,3
High Level Output Current	I <sub>CCH</sub>		.010	40	μA	I <sub>F1</sub> =I <sub>F2</sub> =I <sub>F3</sub> =I <sub>F4</sub> = 0mA, V <sub>CC</sub> = 18V	
Low Level Supply Current	I <sub>CCL</sub>		2	4	mA	I <sub>F1</sub> = I <sub>F2</sub> = I <sub>F3</sub> = I <sub>F4</sub> =1.6mA, V <sub>CC</sub> = 18V	
Input Forward Voltage	V <sub>F</sub>		1.4	1.8	V	I <sub>F</sub> = 1.6mA	1
Input Reverse Breakdown Voltage	BV <sub>R</sub>	5			V	I <sub>R</sub> = 10μA	1
Input-Output Insulation Leakage Current	I <sub>I-O</sub>			1.0	μA	V <sub>I-O</sub> = 1500Vdc, Relative Humidity = 45% t <sub>A</sub> = 25°C, t = 5s	4
Propagation Delay Time To High Output Level	t <sub>PLH</sub>		5	60	μs	I <sub>F</sub> = 0.5mA, V <sub>CC</sub> = 5.0V, R <sub>L</sub> = 4.7kΩ	
			4	30	μs	I <sub>F</sub> = 5mA, V <sub>CC</sub> = 5.0V, R <sub>L</sub> = 680kΩ	
Propagation Delay Time To Low Output Level	t <sub>PHL</sub>		8	100	μs	I <sub>F</sub> = 0.5mA, V <sub>CC</sub> = 5.0V, R <sub>L</sub> = 4.7kΩ	
			2	10	μs	I <sub>F</sub> = 5mA, V <sub>CC</sub> = 5.0V, R <sub>L</sub> = 680kΩ	

**TYPICAL CHARACTERISTICS** T<sub>a</sub> = 25°C, V<sub>CC</sub> = 5V Each Channel

PARAMETER	SYMBOL	MIN	TYP	MAX	UNITS	TEST CONDITIONS	NOTE
Input Capacitance	C <sub>IN</sub>		60		pF	V <sub>F</sub> = 0, f = MHz, t <sub>a</sub> = 25°C	1
Capacitance (Input-Output)	C <sub>I-O</sub>		1.5		pF	f = 1MHz, t <sub>a</sub> = 25°C	1, 5
Input Diode Temperature Coefficient	$\frac{\Delta V_F}{\Delta T_A}$		-1.8		mV/°C	I <sub>F</sub> = 1.6mA	1
Resistance (Input-Output)	R <sub>I-O</sub>		10 <sup>12</sup>		Ω	V <sub>I-O</sub> = 500V, t <sub>a</sub> = 25°C	1, 5
Resistance (Input-Input)	R <sub>I-I</sub>		10 <sup>12</sup>		Ω	V <sub>I-I</sub> = 500V, t <sub>a</sub> = 25°C	6
Input-Input Insulation Leakage Current	I <sub>I-I</sub>		0.5		nA	Relative Humidity = 45% V <sub>I-I</sub> = 500V, t = 5s	6
Common Mode Transient immunity at High Output Level	CM <sub>H</sub>	500	1000		V/μs	V <sub>CM</sub> = 50V <sub>P-P</sub> , V <sub>CC</sub> = 5.0V, R <sub>L</sub> = 1.5kΩ, I <sub>F</sub> = 0mA	7,9
Common Mode Transient Immunity at Low Output Level	CM <sub>L</sub>	500	1000		V/μs	V <sub>CM</sub> = 50V <sub>P-P</sub> , V <sub>CC</sub> = 5.0V, R <sub>L</sub> = 1.5kΩ, I <sub>F</sub> = 1.6mA	8,9

**NOTES:**

- Each channel.
- CURRENT TRANSFER RATIO is defined as the ratio of output collector current, I<sub>O</sub>, to the forward LED input current, I<sub>F</sub>, times 100%.
- I<sub>F</sub> = 2μA for channel under test. For all other channels, I<sub>F</sub> = 10mA.
- 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<sub>H</sub> is the maximum tolerable common mode transient to assure that the output will remain in a high logic state (ie. V<sub>O</sub> > @.0V).
- CM<sub>L</sub> is the maximum tolerable common mode transient to assure that the output will remain in a low logic state (ie. V<sub>O</sub> < 0.8V).
- In applications where dv/dt may exceed 50,000 V/μs (such as static discharge) a series resistor, R<sub>CC</sub>, should be included to protect the detector IC's from destructively high surge currents. The recommended value is R<sub>CC</sub> =  $\frac{1V}{0.6I_F}$  = kΩ

**RECOMMENDED OPERATING CONDITIONS:**

PARAMETER	SYMBOL	MIN	MAX	UNITS
Input Current, Low Level	I <sub>FL</sub>	0	2	μA
Input Current, High Level	I <sub>FH</sub>	0.5	5	mA
Supply Voltage	V <sub>CC</sub>	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°C)
66012-003	Quad Channel optocoupler, commercial (0° to +70°C)
66012-004	Quad Channel optocoupler, commercial (-40°C to +85°C)