MC012

MICROCOUPLER, PHOTO DARLINGTON OUTPUT
(Electrically Similar To 6N140)

OPTOELECTRONIC PRODUCTS DIVISION

08/10/2012

Features:

- High current transfer ratio: 1000% typical
- Low input current requirement: 0.5mA
- Low power consumption
- Faraday shield to provide high common mode rejection

Applications:

- Military and space
- High reliability systems
- Voltage level shifting
- Isolated receiver input
- Communication systems
- Medical systems

DESCRIPTION

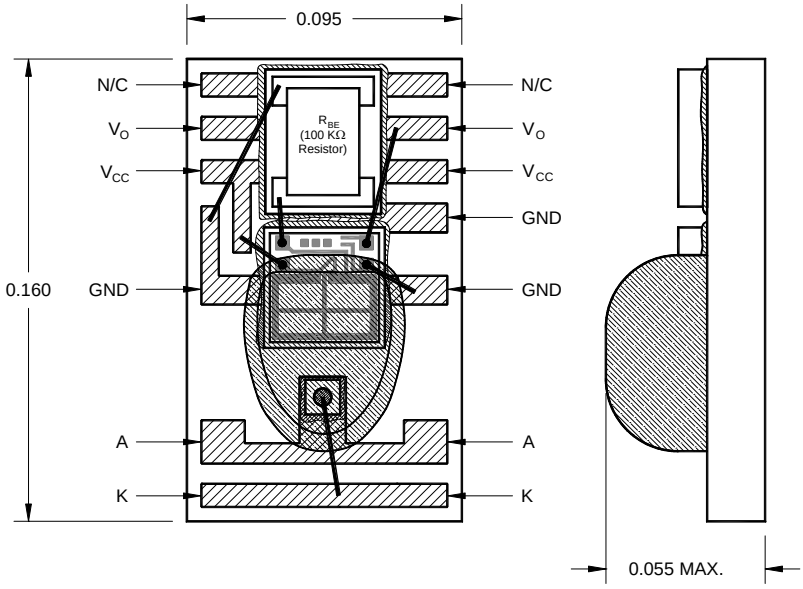
The ***MC012*** microcoupler consists of an LED optically coupled to a high gain photo detector on a wire bondable ceramic substrate. This unique device provides high CTR and low leakage currents over the full military temperature range (-55°C to +125°C). The MC012 is provided with 100% DC testing at 25℃ and is available with class H or class K element evaluation.

ABSOLUTE MAXIMUM RATINGS

Peak Forward Input Current (<1ms duration)	20 mA
Average Forward Input Current (Note 1)	10 mA
Reverse Input Voltage	5 V
Supply Voltage - V_{CC} (Note 2)	-0.5 TO 20 V
Output Current - I_O	40 mA
Output Power Dissipation (Note 3)	50 mW
Output Voltage - V_O (Note 2)	-0.5 TO 20 V
Storage Temperature	-65℃ to +150℃
Operating Free-Air Temperature Range	-55℃ to +125℃

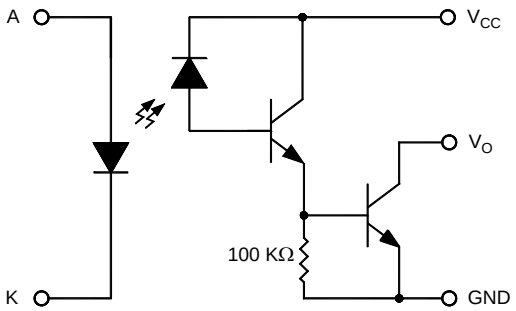
Notes:
1. Derate I_F at a rate of 0.33 mA/℃ above 110℃.
2. GND should be the most negative voltage at the detector side. The lowest total I_{OH} over temperature is developed by keeping V_{CC} as low as possible, but greater that 2.0 V.
3. Collector output power plus supply power is total output power. Derate at rate of 0.5 mW/℃ above 25℃.

Package Dimensions



ALL DIMENSIONS ARE IN INCHES

Schematic Diagram



MC012

MICROCOUPLER, PHOTO DARLINGTON OUTPUT (Electrically Similar To 6N140)

08/10/2012

ELECTRICAL CHARACTERISTICS

T_a = -55°C to 125°C unless otherwise specified.

PARAMETER	SYMBOL	MIN	TYP	MAX	UNITS	TEST CONDITIONS	NOTE
Current Transfer Ratio	CTR	300 300 200	1000 750 400		%	I_F = 0.5 mA, V_O = 0.4 V, V_{CC} = 4.5 V I_F = 1.6 mA, V_O = 0.4 V, V_{CC} = 4.5 V I_F = 5.0 mA, V_O = 0.4 V, V_{CC} = 4.5 V	1
Logic Low Output Voltage	V_{OL}		0.1 0.2	0.4 0.4	V	I_F = 0.5 mA, I_{OL} = 1.5 mA, V_{CC} = 4.5 V I_F = 5.0 mA, I_{OL} = 10 mA, V_{CC} = 4.5 V	
Logic High Output Current	I_{OH}		0.005	50	µA	I_F = 2 µA, V_O = V_{CC} = 18 V	
Logic High Supply Current	I_{CCH}		0.010	40	µA	I_F = 0 mA, V_{CC} = 18 V	
Low Level Supply Current	I_{CCL}		0.8	4	mA	I_F = 1.6 mA, V_{CC} = 18 V	
Input Forward Voltage	V_F		1.4	1.7	V	I_F = 1.6 mA	
Input Reverse Breakdown Voltage	BV_R	5			V	I_R = 10 µA	
Propagation Delay Time To High Output Level	t_{PLH}		5 4	60 20	µs	I_F = 0.5 mA, V_{CC} = 5.0 V, R_L = 4.7 kΩ I_F = 5 mA, V_{CC} = 5.0 V, R_L = 680 kΩ	
Propagation Delay Time To Low Output Level	t_{PHL}		8 2	100 5	µs	I_F = 0.5 mA, V_{CC} = 5.0 V, R_L = 4.7kΩ I_F = 5 mA, V_{CC} = 5.0 V, R_L = 680 kΩ	

TYPICAL CHARACTERISTICS

T_a = 25°C, V_{CC} = 5V

PARAMETER	SYMBOL	MIN	TYP	MAX	UNITS	TEST CONDITIONS	NOTE
Input Capacitance	C_{IN}		60		pF	V_F = 0, f = 1 MHz	
Capacitance (Input-Output)	C_{I-O}		1.5		pF	f = 1 MHz	
Common Mode Transient immunity at High Output Level	CM_H	500	1000		V/µs	V_{CM} = 50 V_{P-P} ,V_{CC} = 5.0V, R_L = 1.5 kΩ, I_F = 0 mA	2, 4
Common Mode Transient Immunity at Low Output Level	CM_L	500	1000		V/µs	V_{CM} = 50 V_{P-P} ,V_{CC} = 5.0 V, R_L = 1.5 kΩ, I_F = 1.6 mA	3, 4

NOTES:

1. CURRENT TRANSFER RATIO is defined as the ratio of output collector current, I_O, to the forward LED input current, I_F, times 100%.
2. CM_H is the maximum tolerable common mode transient to assure that the output will remain in a high logic state (i.e. $V_O > 2.0V$).
3. CM_L is the maximum tolerable common mode transient to assure that the output will remain in a low logic state (i.e. $V_O < 0.8V$).
4. 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 ICs from destructively high surge currents. The recommended value is $R_{CC} = \frac{1\ V}{0.6\ I_F(mA)} =$ kΩ.

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
66012-400	Evaluated to class H
66012-401	Evaluated to class K
66012-402	Commercial