IECQ-CECC **QC 88000-C003**

COMPONENT **ISSUE 1**

SPECIFICATION **March 2007**

Component Specification For Ceramic Hermetically Sealed Low Input Current High Gain Optocouplers

Up-to-date lists and bibliographical references of IEQC-CECC publications may be downloaded from www.iecq.org

Further copies of this document may be obtained from:

IEC
International Electrotechnical Commission
Commission Electrotechnique Internationale

Box 131, rue de Varembé, CH 1211 Geneva 20, Switzerland

For sales enquiries, or further information, please contact our sales office at:
Isocom Ltd, Hutton Close, Crowther Industrial Estate, District 3, Washington, NE38 0AH
Tel: +44 0191 4166 546 Fax: +44 0191 4155 055

FOREWORD

The IECQ Quality Assessment System for Electronic Components (IECQ) is composed of those member countries of the International Electrotechnical Commission (IEC) who wish to take part in a harmonized system for electronic components of assessed quality. IECQ is also known in some European member countries as IECQ-CECC.

The object of the System is to facilitate international trade by the harmonization of the specifications and quality assessment procedures for electronic components, and by the grant of an internationally recognised Mark, or Certificate of Conformity. The components produced or services provided under the system are thereby acceptable in all member countries without further testing.

This Component Specification is based upon the requirements of IEC Publication QC 001002-2, and has been prepared by:

Isocom Ltd
Hutton Close
Crowther Industrial Estate
Washington
Tyne and Wear
NE38 0AH

Tel: +44 0191 4166 546
Fax: +44 0191 4155 055

and published under the authority of:

BSI Product Services
Maylands Avenue
Hemel Hempstead
Hertfordshire
HP2 4SQ
United Kingdom

AMENDMENT RECORD

No previous issue.

REQUIREMENTS

The requirements for IECQ-CECC Component Specifications as detailed in QC 001002-2 Amendment 1 clause 5.4 are satisfied by the following data sheet.

It should note that IECQ-CECC are not responsible for manufacturers declarations made in data sheets which fall outside the limits of approved detailed in IECQ-CECC certificates.

This Component Specification is intended for use with applicable IECQ-CECC Assessment Specifications. Eg: QC 88000-A001

ISOCOM® LTD

Ceramic Hermetically Sealed Low Input Current High Gain Optocouplers

- 4N49
- 6N140A
- CD750
- CD5731
- CH370
- CS5700
- CS700
- CSM141/A
- CSM160/161/162
- CSM1700
- CSM6730

Features

- Release to IECQ-CECC
- Hermetically Sealed
- High Density Packaging
- 1500V DC withstand Test Voltage
- Low Input Requirements: 0.5mA
- High Current Transfer Ratio: 1000% Typical

Applications

- Military, high reliability system
- Medical instruments
- Mos, Cmos Applications
- Logic Interfacing
- Data Transmission
- Transportation

Description

These devices are single, dual and quad, hermetically sealed optocouplers. The products are capable of operation and storage over the full military and space temperature range. Each channel is composed of a light emitting diode, optically coupled to an integrated high gain photon detector. The high gain output features an open collector output providing both lower saturation voltage and higher signalling speed. Package styles for these devices include 8 pin, 16 pin, 16 pin flat pack, leadless 6 pin and hybrid 5 pin, with surface mount, butt cut and gull wing options available.

The same electrical die, assembly processes and materials are used for each channel of each device shown below. Therefore absolute maximum ratings, recommended operating conditions, electrical specifications and performance characteristics are identical for all units. Any exceptions, due to packaging variations and limitations, are as noted.

For sales enquiries, or further information, please contact our sales office at:
Isocom Ltd, Hutton Close, Crowther Industrial Estate, District 3, Washington, NE38 0AH
Tel: +44 0191 4166 546 Fax: +44 0191 4155 055

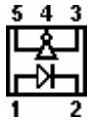
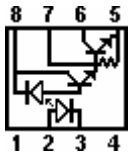
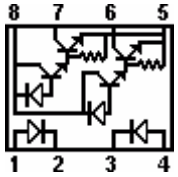
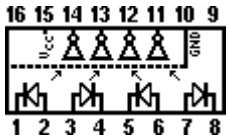
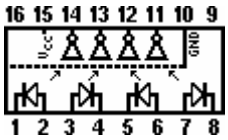
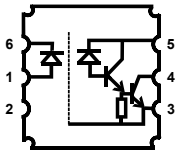
Selection Guide Package Styles and Configuration Options

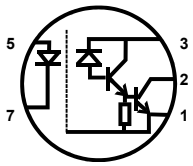
Package	16 pin DIP	8 pin DIP	8 pin DIP	16 pin Flat Pack	6 Pad LCC	6 pin Metal Can TO-5
Lead Style						
Channels	4	1	2	4	1	1
Common Channel Wiring						

Isocom Part Numbers and Options

Commercial	6N140A	CS700	CD750 /CD5731	CSM160 /161/162	CSM1700 CSM141/A	4N49
Defense Level	6N140A/L2	CS700/L2	CD750 /CD5731/L2	CSM160 /161/162 /L2	CSM1700 CSM141/A	4N49/L2
Space Level	6N140A/L2S	CS700/L2S	CD750 /CD5731/L2S	CSM160 /161/162/L2S	CSM1700 CSM141/A	4N49/L2S
Standard Gold Plate Finish	Gold Plate	Gold Plate	Gold Plate	Gold Plate	Gold Plate	Gold Plate
Solder Dipped	Option 20	Option 20	Option 20			
Butt Cut/Gold Plate	Option 10	Option 10	Option 10			
Gull Wing/Soldered	Option 30	Option 30	Option 30			
Crew Cut/Gold Plate	Option 60	Option 60	Option 60			

Functional Diagrams

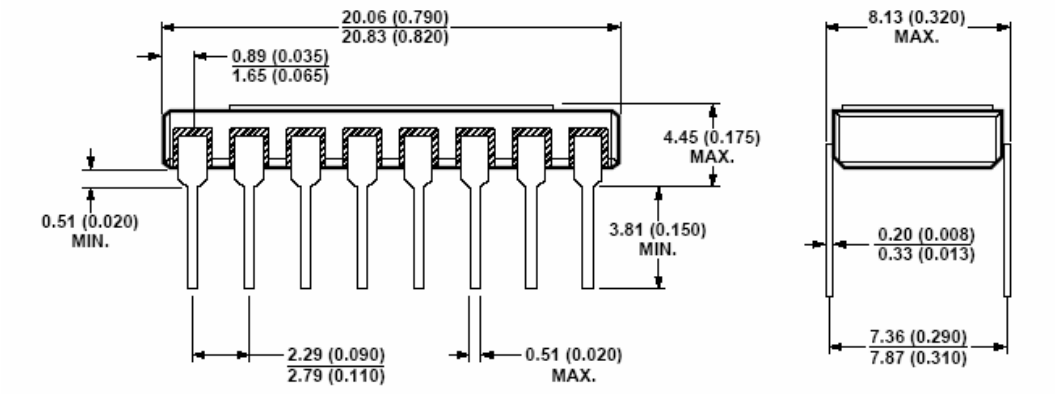
CH370	CS700	CD750 CD5731	6N140A	CSM160 CSM161/162	CSM141/A CSM1700
	8 pin DIP	8 pin DIP	16 pin DIP	16 pin Flat Pack	6 Pad LCC
1 Channel	1 Channel	2 Channel	4 Channel	4 Channel	1 Channel
					

4N49
TO-5
1 Channel


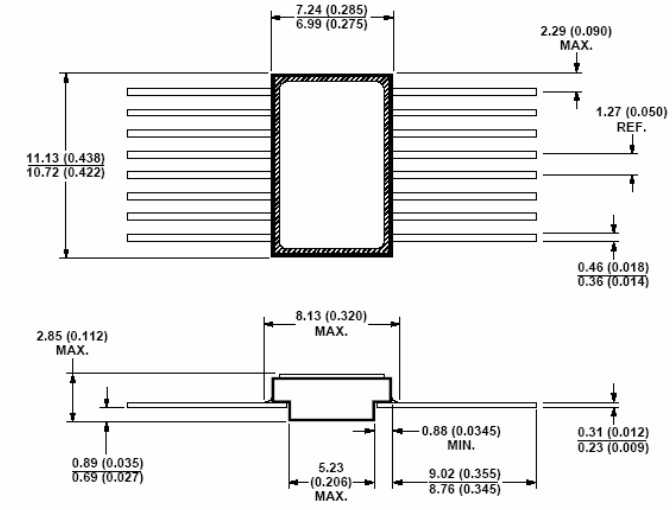
For sales enquiries, or further information, please contact our sales office at:
Isocom Ltd, Hutton Close, Crowther Industrial Estate, District 3, Washington, NE38 0AH
Tel: +44 0191 4166 546 Fax: +44 0191 4155 055

Outline Drawings

16 pin DIP, 4 Channel

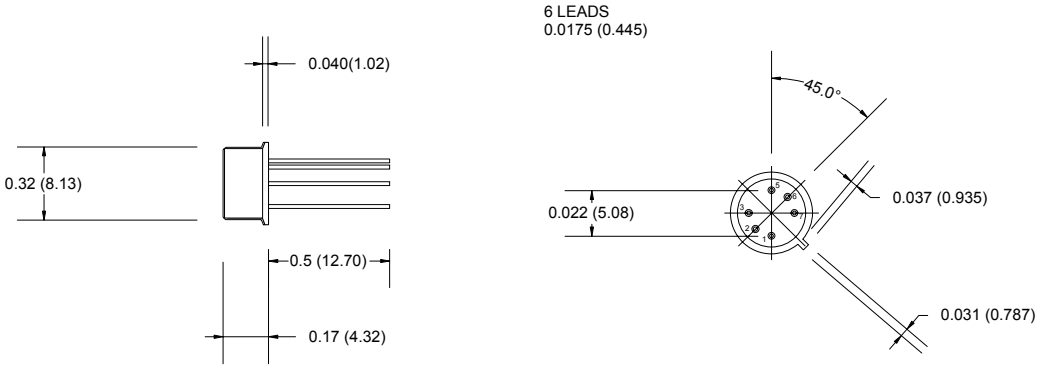


16 pin Flat Pack, 4 Channel



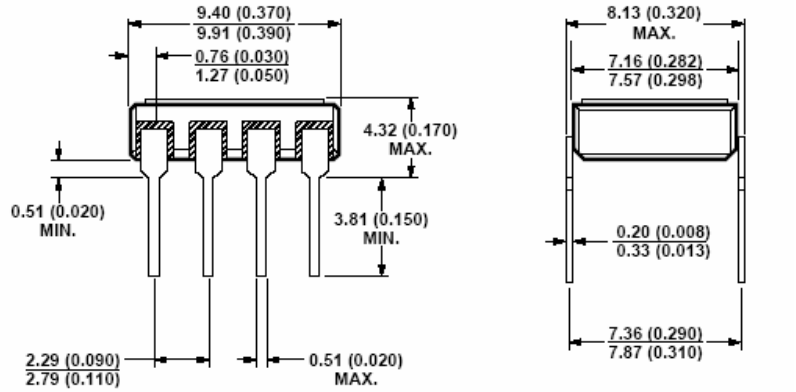
NOTE: DIMENSIONS IN MILLIMETERS

6 pin TO-5, 1 Channel

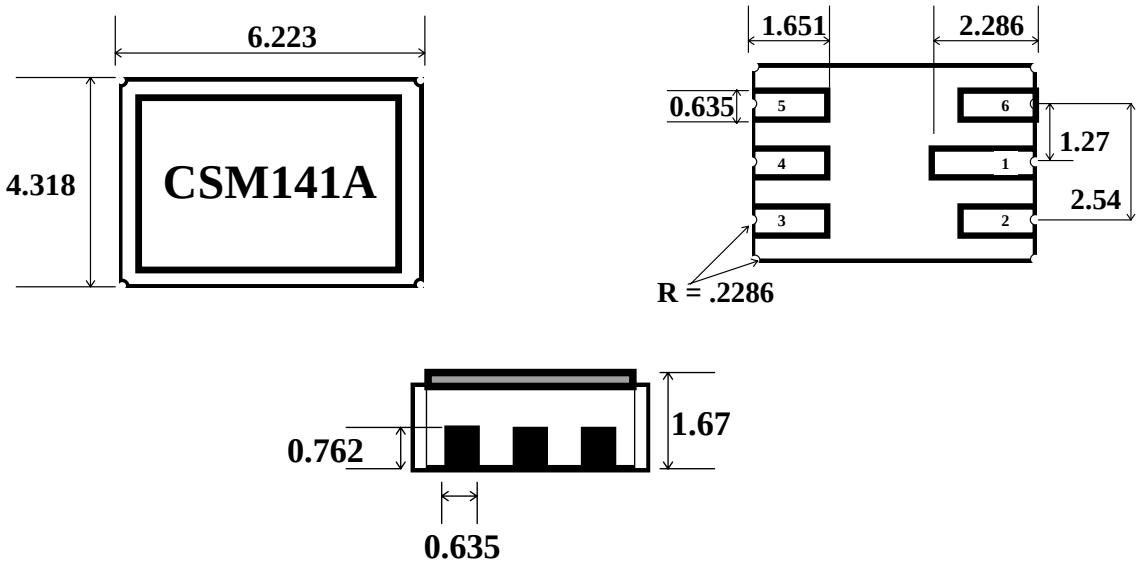


For sales enquiries, or further information, please contact our sales office at:
Isocom Ltd, Hutton Close, Crowther Industrial Estate, District 3, Washington, NE38 0AH
Tel: +44 0191 4166 546 Fax: +44 0191 4155 055

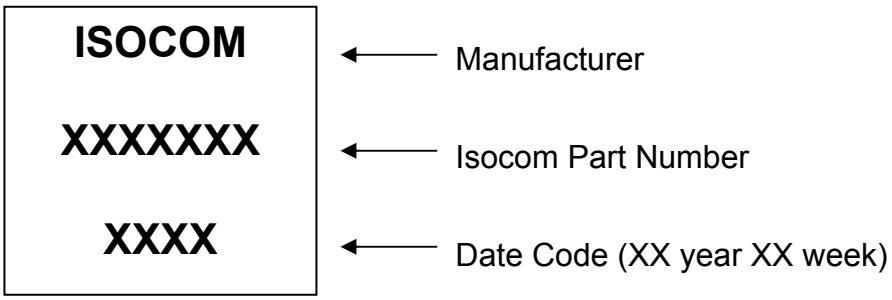
8 pin DIP 1 and 2 Channel



6 Terminal LCC Surface Mount, 1 Channel

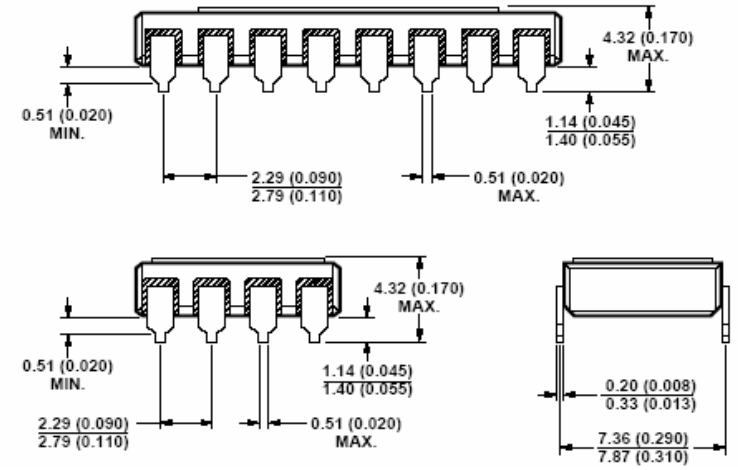
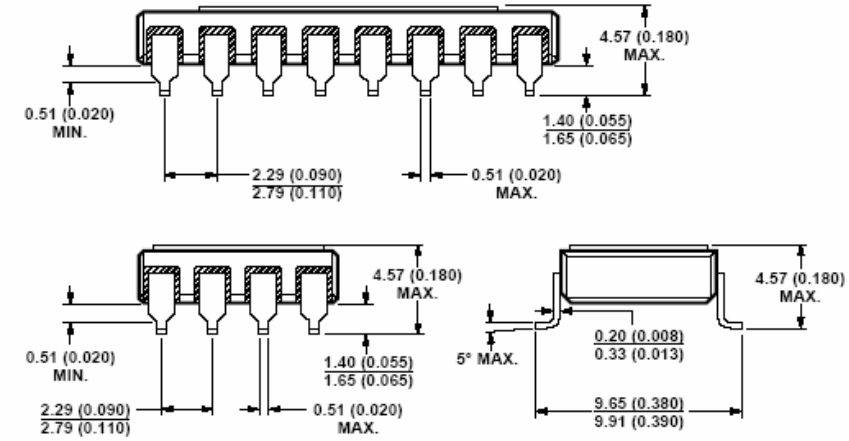
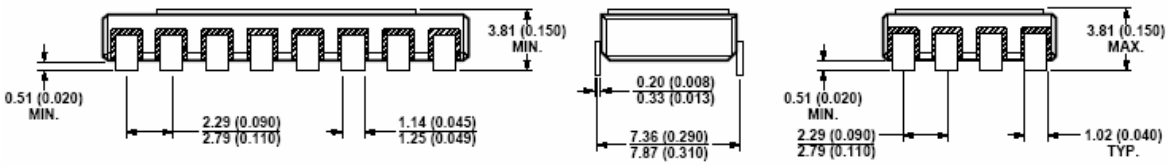


Device Marking



For sales enquiries, or further information, please contact our sales office at:
Isocom Ltd, Hutton Close, Crowther Industrial Estate, District 3, Washington, NE38 0AH
Tel: +44 0191 4166 546 Fax: +44 0191 4155 055

Hermetic Optocoupler Options

Option	Description
10	Surface mountable hermetic optocoupler with leads trimmed for butt joint assembly. This option is available on commercial hi-rel product in 8 and 16 pin DIP 
20	
30	Surface mountable hermetic optocoupler with leads cut and bent for gull wing assembly. This option is available on commercial and hi-rel product in 8 and 16 pin DIP. 
60	Surface mountable hermetic optocoupler with leads trimmed for butt joint assembly. This option is available on commercial hi-rel product in 8 and 16 pin DIP 

For sales enquiries, or further information, please contact our sales office at:
Isocom Ltd, Hutton Close, Crowther Industrial Estate, District 3, Washington, NE38 0AH
Tel: +44 0191 4166 546 Fax: +44 0191 4155 055

Absolute Maximum Ratings

Storage Temperature	-65°C to +150°C
Operating Temperature	-55°C to +125°C
Lead Soldering Temperature	260C for 10S, 1.6mm below seating plane where appropriate

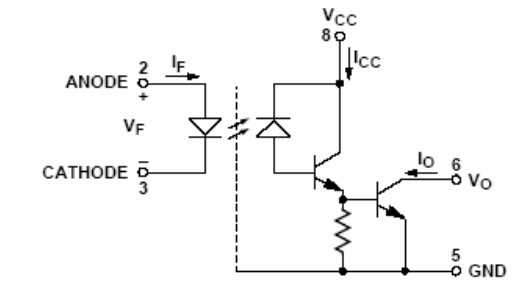
Input Diode

Peak Forward Current	20mA	≤ 1 mS duration, 500pps
Average Forward Current	10mA	(See note 3)
Reverse Voltage	5V	
Power Dissipation	35mW	

Output Detector

Supply Voltage	-0.5 to 20V	V_{CC} (See note 1)
Current	40mA	I_O
Collector Power Dissipation	50mW	(See note 2)
Voltage	-0.5 to 20V	V_O (See note 1)

Single Channel Schematic



For sales enquiries, or further information, please contact our sales office at:
Isocom Ltd, Hutton Close, Crowther Industrial Estate, District 3, Washington, NE38 0AH
Tel: +44 0191 4166 546 Fax: +44 0191 4155 055

Electrical Characteristics

T_{A} = -55°C to +125°C U.O.S.
All typical values at V_{CC} = 5V, T_A = 25°C (each channel where appropriate).

Parameter	Symbol	Test Conditions	Device	Min	Type	Max	Units
High Level Output Current (See notes 4 & 6)	I_{OH} I_{OHX}	I_F = 2µA, V_O = V_{CC} = 5.5V		-	0.001	250	µA
Lower Level Output Voltage (See note 4)	V_{OL}	I_F = 0.5mA, I_{OL}= 1.5mA, V_{CC} = 4.5V		-	0.1	0.4	V
		I_F = 5mA, I_{OL}= 10mA, V_{CC} = 4.5V		-	0.15	0.4	
High Level Supply Current	I_{CCH}	V_{CC} = 18V, I_{F1} = I_{F2} = I_{F3} = I_{F4} = 0		-	0.1	40	µA
		V_{CC} = 5.5, I_{F1} = I_{F2} = I_{F3} = I_{F4} = 0	Csm160/1			60	
Low Level Supply Current (See note 4)	I_{CCL}	V_{CC} = 18V, I_{F1} = I_{F2} = I_{F3} = I_{F4} = 1.6mA		-	1.4	4	mA
		V_{CC} = 5.5V, I_{F1} = I_{F2} = I_{F3} = I_{F4} = 4mA	CSM160/1			8	
Input-Output Insulation Leakage Current (See notes 7 & 13)	I_{I-O}	RH = 45%, T_A = 25°C, t = 5S V_{IO} = 1500Vdc		-	-	1.0	µA
Input Forward Voltage (See note 4)	V_F	I_F = 1.6mA, T_A = 25°C		-	1.45	1.9	V
		I_F = 4.0mA	CSM160/1				
Input Reverse Breakdown Voltage (See note 4)	B_{VR}	I_R = 10µA, T_A = 25°C		5	-	-	V
Propagation Delay Time to Logic High Output (See note 4)	t_{PLH}	R_L = 4.7KΩ, V_{CC} = 5V, I_F = 0.5A, T_A = 25°C	6N140 CS5700 CSM6730 CH370 CD750 CSM1700	-	8	60	µS
			CSM160/1			100	
		R_L = 680Ω, V_{CC} = 5V, I_F = 5mA, T_A = 25°C	6N140	-	8	20	
			CS5700 CSM6730			30	
			CH390 CD750 CSM1700			60	

For sales enquiries, or further information, please contact our sales office at:
Isocom Ltd, Hutton Close, Crowther Industrial Estate, District 3, Washington, NE38 0AH
Tel: +44 0191 4166 546 Fax: +44 0191 4155 055

Electrical Characteristics Continued

Propagation Delay Time to Logic Low Output (See note 4)	t_{PHL}	R_L = 4.7KΩ, V_{CC} = 5V, I_F = 0.5A, T_A = 25°C	CH370 CD750 CSM1700.	-	35	100	µS
			CSM160 CSM161 CS5700 CSM6730			100	
		R_L = 680Ω, V_{CC} = 5V, I_F = 5mA, T_A = 25°C	CH390 CD750 CSM1700	-	3	12	
			CS5700 CSM6730			10	
			CSM160/1			5	
Current Transfer Ratio (See notes 4 & 5)	CTR	I_F = 0.5mA, V_O = 0.4V, V_{CC} = 4.5V		300	700	-	%
		I_F = 1.6mA, V_O = 0.4V, V_{CC} = 4.5V		200	1000	-	
		I_F = 5mA, V_O = 0.4V, V_{CC} = 4.5V		200	600	-	
Common Mode Transient Immunity at Logical High Output Level (See notes 4, 10 & 12)	CM_H	V_{CC} = 5V, T_A = 25°C, V_{CM} = 50V p-p R_L = 1.5KΩ, I_F = 0Ma		500	1000	-	V/µS
		R_L = 2.2KΩ, I_F = 0mA	Ch370 Cs700 Csm1700 Csm6730				
Common Mode Transient Immunity at Logical Low Output Level (See notes 4, 10 & 12)	CM_L	V_{CC} = 5V, T_A = 25°C, V_{CM} = 50V p-p R_L = 1.5KΩ, I_F = 1.6mA		500	-1000	-	V/µS
		R_L = 2.2KΩ, I_F = 1.6mA	Ch370 Cs700 Csm1700 Csm6730				

Typical Characteristics

T_A = 25°C

Parameter	Symbol	Test Conditions	Notes	Min	Type	Max	Units
Resistance	R_{IO}	V_{10} = 500Vdc	4 & 8	-	10^{12}	-	Ω
Capacitance	C_{IO}	f = 1MHz	4 & 8	-	1.5	-	pF
Input Capacitance	C_{IN}	f = 1MHz, V_F = 0	4	-	60	-	pF
Temperature Coefficient of Forward Voltage	$\frac{\Delta V_F}{\Delta T_A}$	I_F = 1.6mA	1	-	-1.8	-	mV/° C
Input-Input Insulation Leakage Current	I_{I-I}	45% Relative Humidity V_{II} = 500Vdc, t = 5S	9	-	0.6	-	nA
Resistance	R_{I-I}	V_{II} = 500Vdc	9	-	10^{12}	-	Ω
Capacitance	C_{I-I}	f = 1MHz	9	-	1	-	pF

For sales enquiries, or further information, please contact our sales office at:
Isocom Ltd, Hutton Close, Crowther Industrial Estate, District 3, Washington, NE38 0AH
Tel: +44 0191 4166 546 Fax: +44 0191 4155 055

Notes:

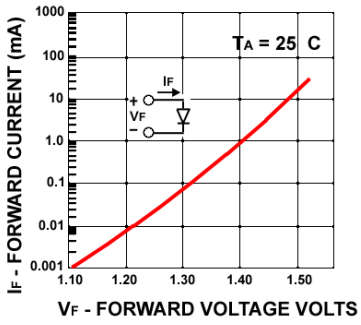
1. The ground pin should be the most negative voltage at the detector side. Keeping V_{CC} as low as possible, but greater than 2.0V, will provide lowest total I_{OH} over temperature.
2. Output power is collector output plus one fourth of total supply power. Derate at 1.66mW/°C above 110°C.
3. Derate I_F at 0.33mA/°C above 110°C.
4. Each channel.
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. I_{OHX} is the leakage current resulting from channel to channel optical crosstalk. I_F = 2μA for channel under test. For all other channels, I_F = 10mA.
7. Input pins are shorted together, and output pins are shorted together.
8. Measured between the LED anode and cathode shorted together and pins at output shorted together.
9. Measured between adjacent input pairs shorted together.
10. 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).
11. CM_L is the maximum tolerable common mode transient to assure that the output will remain in the logic low state (i.e., V_O< 0.8V).
12. In applications where dV/dt may exceed 50,000V/μS (such as a 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

$$R_{CC} = \frac{1V}{0.6I_F(mA)}\ k\Omega$$

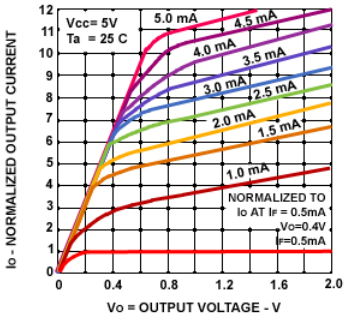
13. This is a momentary withstand test, not an operating condition.

For sales enquiries, or further information, please contact our sales office at:
Isocom Ltd, Hutton Close, Crowther Industrial Estate, District 3, Washington, NE38 0AH
Tel: +44 0191 4166 546 Fax: +44 0191 4155 055

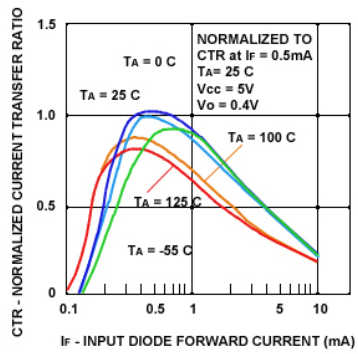
Electrical Characteristics



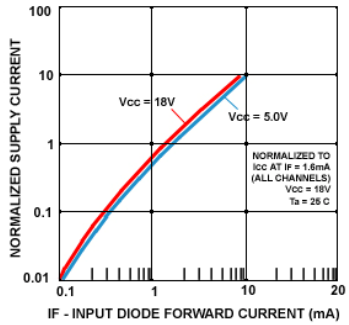
INPUT DIODE FORWARD CURRENT vs FORWARD VOLTAGE



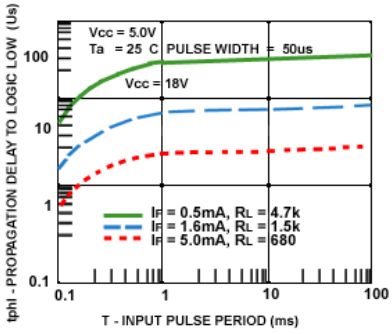
Normalized DC Transfer Characteristics



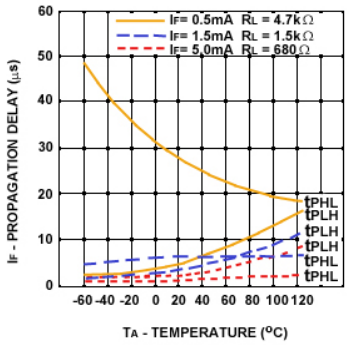
NORMALIZED CURRENT TRANSFER RATIO vs INPUT DIODE FORWARD CURRENT



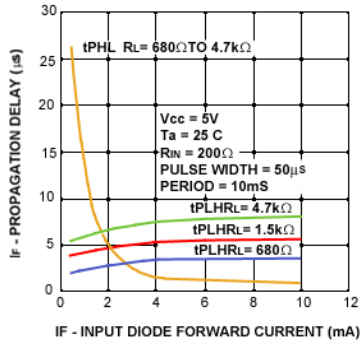
NORMALIZED SUPPLY CURRENT vs INPUT DIODE FORWARD CURRENT



PROPAGATION DELAY TO LOGIC LOW vs INPUT PULSE PERIOD

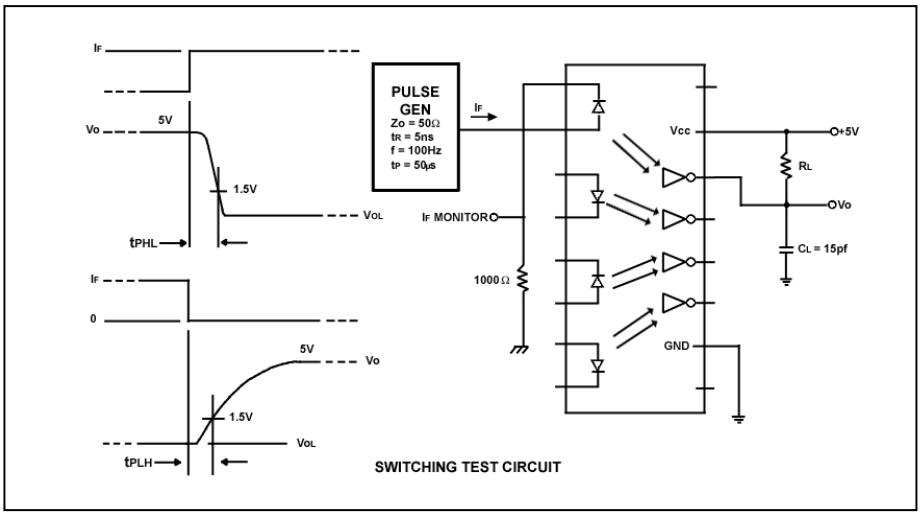


PROPAGATION DELAY vs TEMPERATURE



PROPAGATION DELAY vs INPUT DIODE FORWARD CURRENT

For sales enquiries, or further information, please contact our sales office at:
Isocom Ltd, Hutton Close, Crowther Industrial Estate, District 3, Washington, NE38 0AH
Tel: +44 0191 4166 546 Fax: +44 0191 4155 055



For sales enquiries, or further information, please contact our sales office at:
Isocom Ltd, Hutton Close, Crowther Industrial Estate, District 3, Washington, NE38 0AH
Tel: +44 0191 4166 546 Fax: +44 0191 4155 055