ISOCOM® LTD

IECQ-CECC **QC 88000-C002**

COMPONENT **ISSUE 1**

SPECIFICATION **March 2007**

Component Specification For Ceramic Hermetically Sealed High Speed 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-A0001

Ceramic Hermetically Sealed High Speed Optocouplers

- 4N55
- CD850
- CH380
- CS800/801
- CSM168-2
- CSM168-4
- CSM1801
- CSM1800
- MC800

Features

- Release to IECQ-CECC
- Hermetically Sealed
- High Density Packaging
- 1500V DC withstand Test Voltage
- Low Input Requirements
- High Current Transfer Ratio

Applications

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

Description

These devices are single, dual and quad, hermetically sealed optocouplers. Each channel is composed of a Gallium Arsenide infra-red emitting diode and a silicon phototransistor. Package styles for these devices include 6 pin, 8 pin, 16 pin flat pack, and hybrid 4 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.

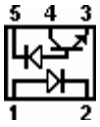
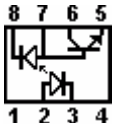
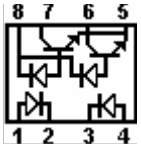
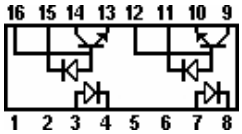
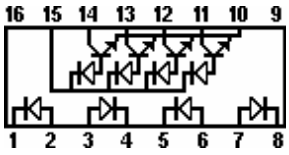
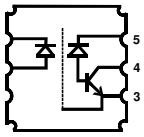
For sales enquiries, or further information, please contact our sales office at:

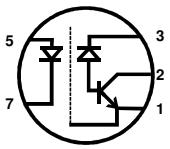
Isocom Ltd, Hutton Close, Crowther Industrial Estate, District 3, Washington, NE38 0AH
Tel: +44 0191 4166 546 Fax: +44 0191 4155 055

Selection Guide Package Styles and Configuration Options

Package	16 pin DIP	8 pin DIP	6 pin Hybrid	16 pin Flat Pack	6 Pad LCC	6pin metal Can TO-5
Lead Style						
Channels	2	1/2	1	4	1	1
Common Channel Wiring						
Isocom Part Numbers and Options						
Commercial	4N55	CS800/801 CD850	CH380	CSM168-2/4	CSM1800/01	MC800
Defense Level	4N55/L2	CS800/801/L2 CD850/L2	CH380/L2	CSM168-2/4/L2	CSM1800/01	MC800/L2
Space Level	4N55/L2S	CS800/801/L2S CD850/L2S	CH380/L2S	CSM168-2/4/L2S	CSM1800/01	MC800/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

CH380	CS800/801	CD850	4N55	CSM168-4 CSM168-2	CSM1800/01
1 Channel	1 Channel	2 Channel	2 Channel	2-4 Channel	1 Channel
					

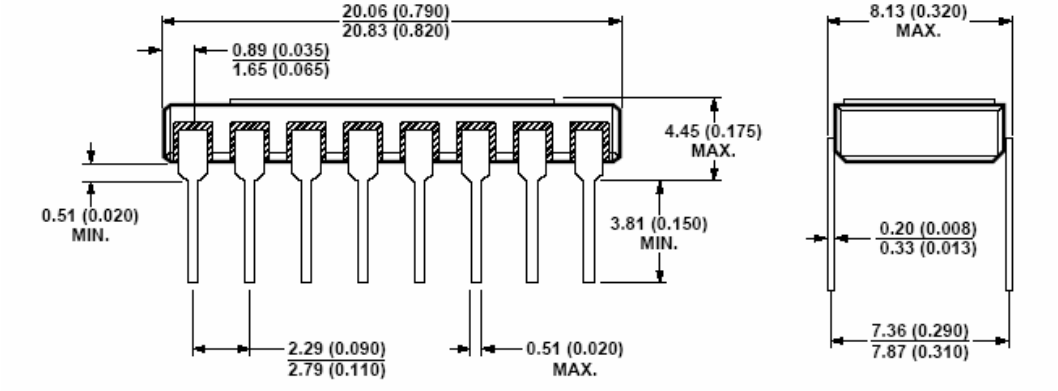
MC800
1 Channel


For sales enquiries, or further information, please contact our sales office at:

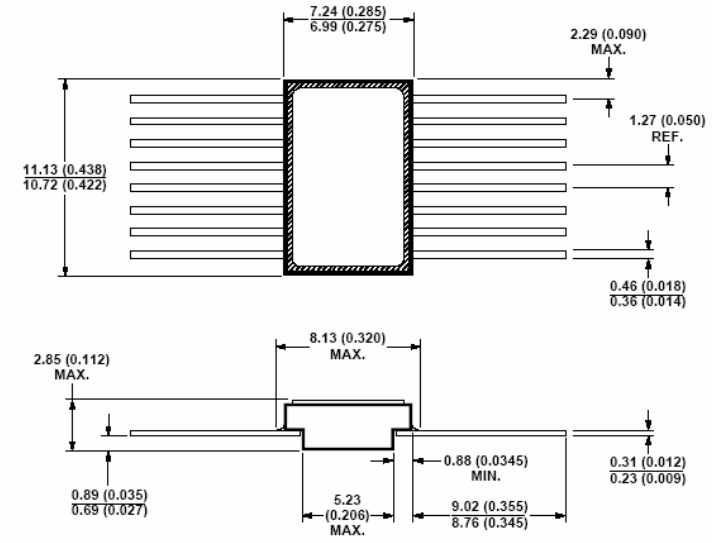
Isocom Ltd, Hutton Close, Crowther Industrial Estate, District 3, Washington, NE38 0AH
Tel: +44 0191 4166 546 Fax: +44 0191 4155 055

Outline Drawings

16 pin DIP, 4 Channel

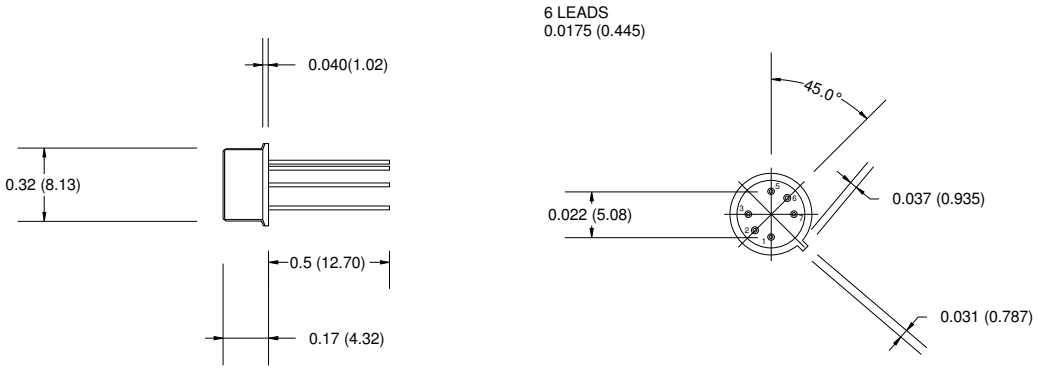


16 pin Flat Pack, 4 Channel



NOTE: DIMENSIONS IN MILLIMETERS

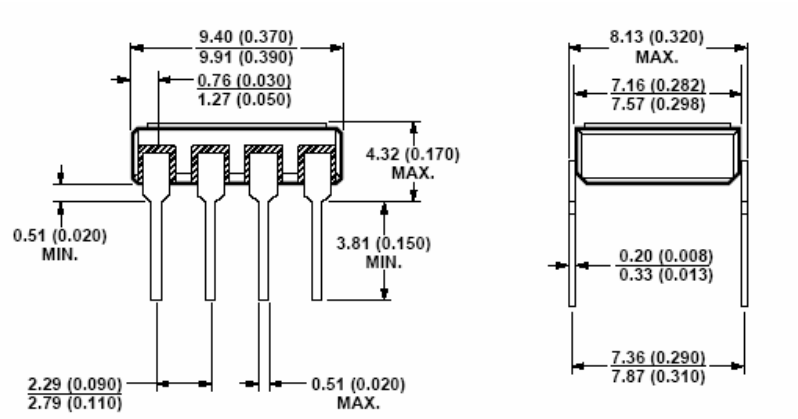
6 pin TO-5, 1 Channel



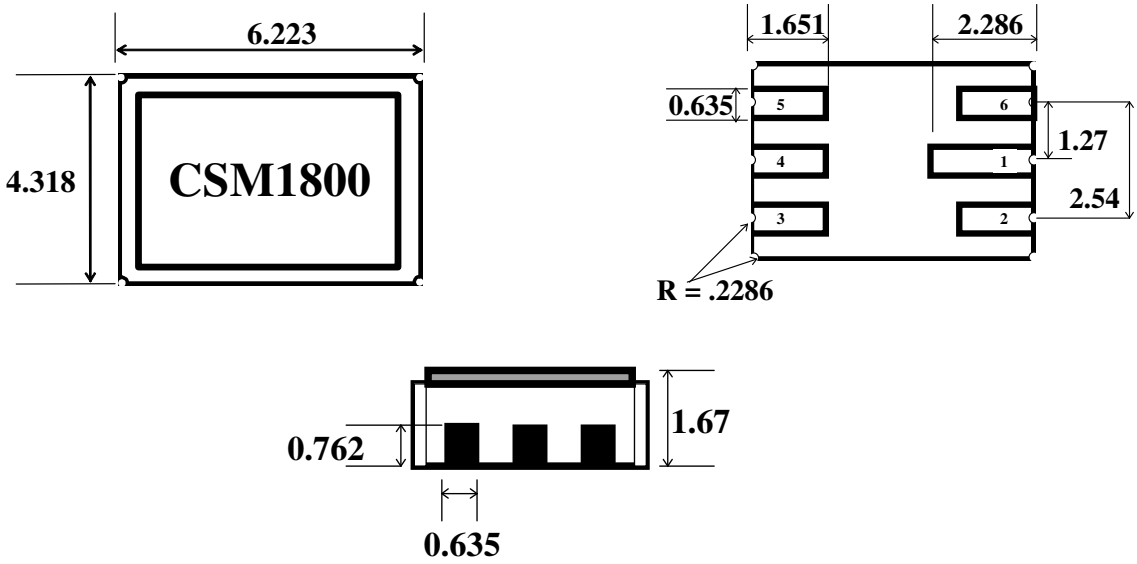
For sales enquiries, or further information, please contact our sales office at:

Isocom Ltd, Hutton Close, Crowther Industrial Estate, District 3, Washington, NE38 0AH
Tel: +44 0191 4166 546 Fax: +44 0191 4155 055

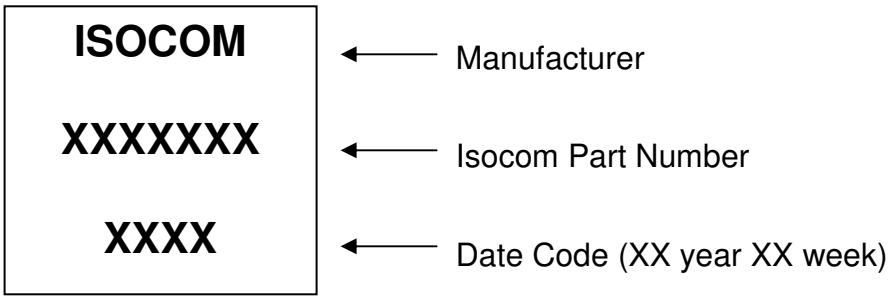
8 pin DIP 1 and 2 Channel



6 Terminal LCC Surface Mount, 1 Channel



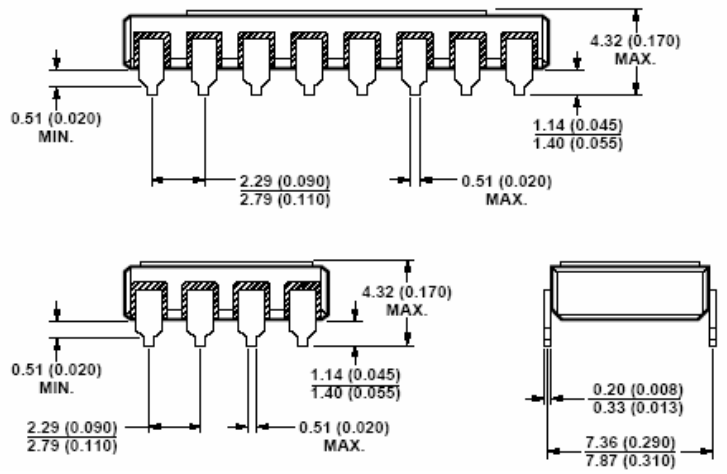
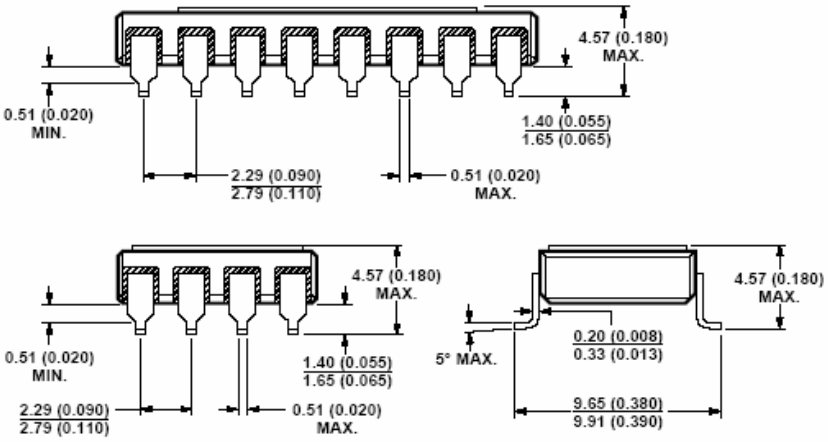
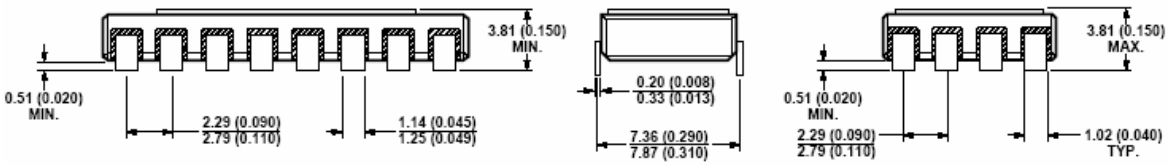
Device Marking



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

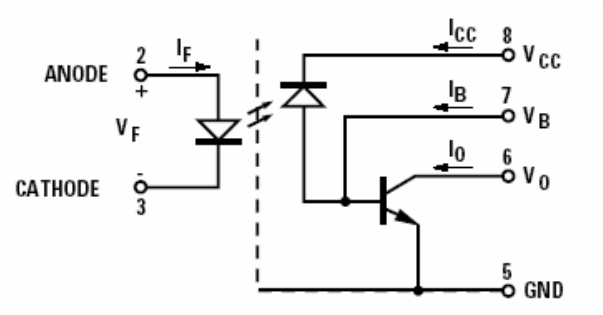
Input Diode

Peak Forward Current	40mA	≤ 1 mS duration
Average Forward Current	20mA	
Reverse Voltage	5V	
Power Dissipation	36mW	Derate linearly above 100°C at 1.4W/°C for CH380 and CS800/801

Output Detector

Supply Voltage	-0.5 to 20V	V_{CC}
Average Current	8mA	I_O
Peak Current	16mA	I_O
Voltage	-0.5 to 20V	V_O
Power Dissipation	40mW	For CH380 and CS800/801
	50mW	Derate linearly above 100°C at 1.4W/°C for CD850, CSM6530 and 4N55
Emitter-Base Reverse Voltage	3V	BV_{EBO}
Base Current	5mA	I_B

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

Parameter	Symbol	Test Conditions	Device	Min	Type	Max	Units
Current Transfer Ratio (See notes 1 & 2)	$h_{f(CTR)}$	V_{CC} = 4.5V, V_O = 0.4V, I_F = 16mA,		9	20	-	%
			CS801	15	-		
		V_{CC} = 4.5V, V_O = 0.5V, I_F = 16mA	CD850	9	17	-	
Logic Low Output Voltage	V_{OL}	V_{CC} = 4.5V, I_F = 16mA I_O = 1.44mA		-	0.3	0.4	V
			CD850	-	0.3	0.5	
Logic High Output Current (See note 1)	I_{OH}	I_{F1} = 0, I_{F2} = 20mA V_O = V_{CC} = 18V		-	30	250	µA
		I_{F1} = $_{F2}$ = 20mA, V_O = V_{CC} = 15	CD850 CSM1800				
Logic Low Supply Current (See note 1)	I_{CCL}	V_{CC} = 18V, I_{F1} = I_{F2} = 20Ma		-	30	200	µA
		V_{CC} = 18V, I_{F1} = 20Ma	CS800/1				
		V_{CC} = 15V I_{F1} = 16Ma I_{F2} =0	CH380 CSM1800				
		V_{CC} = 16V$_{F1}$ = I_{F2} =16mA	CD850			400	
Logic High Supply Current (See note 1)	I_{CCH}	Vcc = 18V, I_F = 0mA, IF (other channel) = 20mA		-	0.4	10	µA
Input Forward Voltage (See note 1)	V_F	I_F = 20mA		-	1.45	1.9	V
Input Reverse Breakdown (See note 1)	V_{BR}	I_R = 10µA		3	-	-	V
Input-Output Insulation Leakage Current (See notes 3 & 9)	I_{IO}	RH = 45%, T_A = 25℃, t = 5S V_{IO} = 1500VDC		-	-	1.0	µA
		RH = 45%, T_A = 25℃, t = 5S V_{IO} = 500VDC	CH380				
Propagation Delay Time to Logic Low at Output (See note 1)	t_{PHL}	R_L = 8.2KΩ, I_F = 16mA, V_{CC} = 5V C_L = 50pF		-	0.4	2.0	µS
		R_L = 1.9K, I_F = 16mA, V_{CC} = 5V	CD850 CSM1800			2.0	
Propagation Delay Time to Logic High at Output (See note 1)	t_{PLH}	R_L = 8.2KΩ, I_F = 16mA, V_{CC} = 5V C_L = 50pF		-	2.0	6.0	µS
		R_L = 1.9K, I_F = 16mA, V_{CC} = 5V	CD850 CSM1800			6.0	

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

Typical Characteristics

T_A = 25℃

Parameter	Symbol	Test Conditions	Notes	Min	Type	Max	Units
Temperature Coefficient of Forward Voltage	$\frac{\Delta V_F}{\Delta T_A}$	I_F = 20mA	1	-	-1.9	-	mV/℃
Input Capacitance	C_{IN}	f = 1mhz, V_F = 0	1	-	125	-	pF
Resistance (Input-Output)	R_{I-O}	V_{1-0} = 500Vdc	1	-	10^{12}	-	Ω
Capacitance (Input-Output)	C_{I-O}	f = 1MHz	1 & 4	-	1.0	-	pF
Input-Input Insulation Leakage Current	I_{I-I}	45% Relative Humidity VH = 500Vdc, t = 5S	5	-	1	-	pA
Capacitance (Input-Input)	C_{I-I}	f = 1MHz	5	-	0.6	-	pF
Transistor DC Current Gain	hFE	V_O = 5V, I_O = 3mA	1	-	130	-	-
Small Signal Current Transfer Ratio	$\frac{\Delta I_O}{\Delta I_F}$	V_{CC} = 5V, V_O = 2V	1	-	20	-	%
Common Mode Transient Immunity at Logic Low Level Output	CM_L	I_F = 16mA,R_L = 8.2KΩ V_{CM} = $10V_{P-P}$ V_O (max) = 0.8V	1 & 7	-	-1000	-	V/µS
Common Mode Transient Immunity at Logic High Level Output	CM_H	I_F = 0mA,R_L = 8.2KΩ V_{CM} = $10V_{P-P}$ V_O (max) = 2.0V	1 & 6	-	1000	-	V/µS
Bandwidth	BW	RL = 100Ω	8	-	2	-	MHz

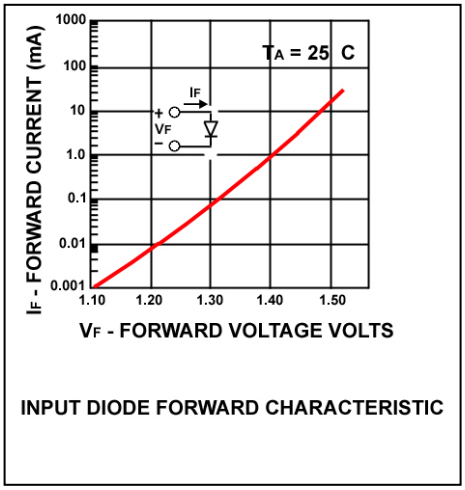
Notes (Apply typically to 16 pin package)

1. Each channel, where appropriate.
2. Current Transfer ratio is defined as the ratio of output collector current, IO, to the forward LED input current, I_F, times 100%. CTR is known to degrade slightly over the unit's lifetime as a function of input current, temperature, signal duty cycle and system on time. It is recommended that designers allow at least 20-25% guard band for CTR degradation.
3. Measured between pins 1 through 8 shorted together, and pins 9 through 16 shorted together.
4. Measured between each input pair shorted together, and the output pins for that channel shorted together.
5. Measured between pins 3 and 4 shorted together, and pins 7 and 8 shorted together.
6. CM_H is the steepest slope (dV/dt) on the leading edge of the common mode pulse, V_{CM}, for which the output will remain in the logic high state (i.e., V_O > 2.0V).
7. CM_L is the steepest slope (dV/dt) on the trailing edge of the common mode pulse, V_{CM}, for which the output will remain in the logic low state (i.e., VO < 0.8V).
8. Bandwidth is the frequency at which the AC output voltage is 3dB below the low frequency asymptote.
9. This is a momentary withstand test, not an operating condition.

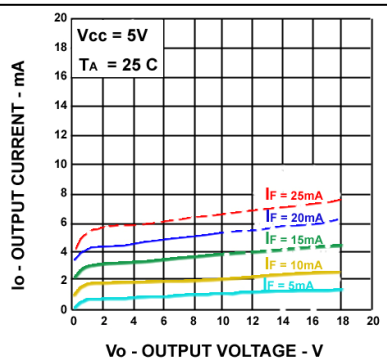
For sales enquiries, or further information, please contact our sales office at:

Isocom Ltd, Hutton Close, Crowther Industrial Estate, District 3, Washington, NE38 0AH
Tel: +44 0191 4166 546 Fax: +44 0191 4155 055

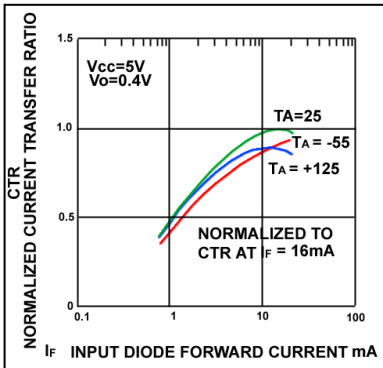
Electrical Characteristics



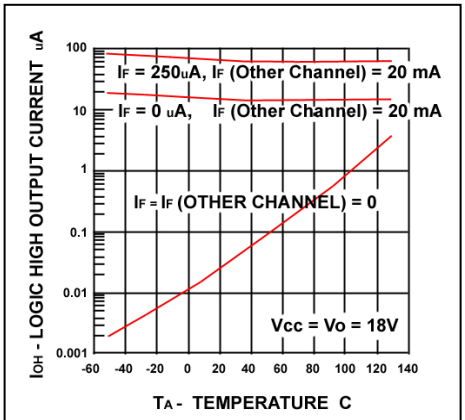
INPUT DIODE FORWARD CHARACTERISTIC



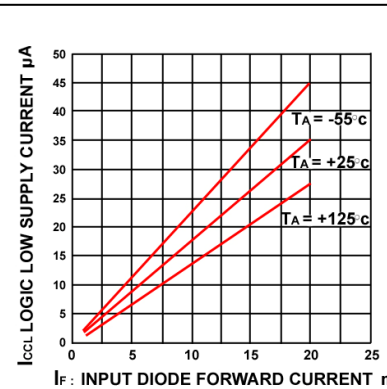
DC AND PULSED TRANSFER CHARACTERISTIC



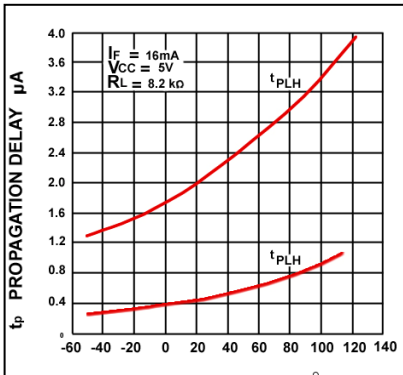
Normalized Current Transfer Ratio vs Input Diode Forward Current



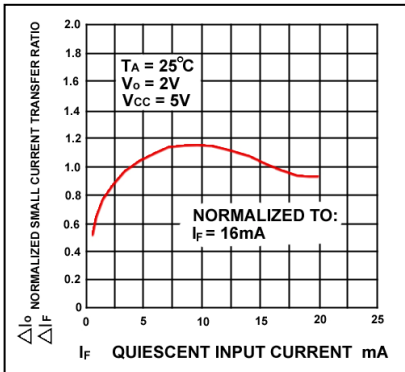
LOGIC HIGH OUTPUT CURRENT vs TEMPERATURE



Logic Low Supply Current VS Input Diode Forward Current



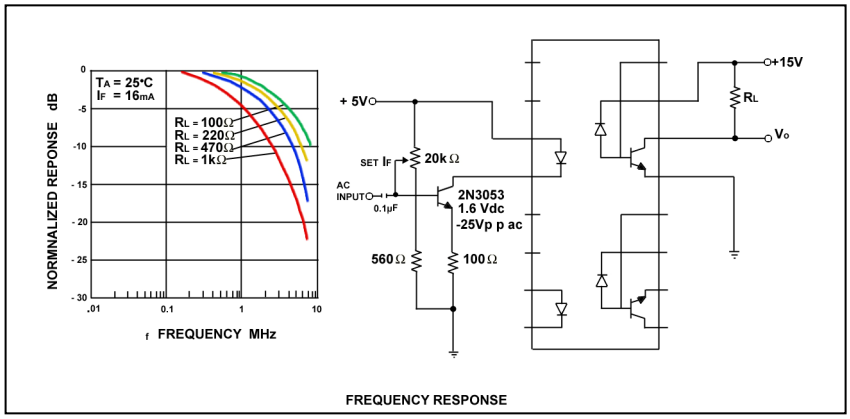
Propagation Delay VS Temperature



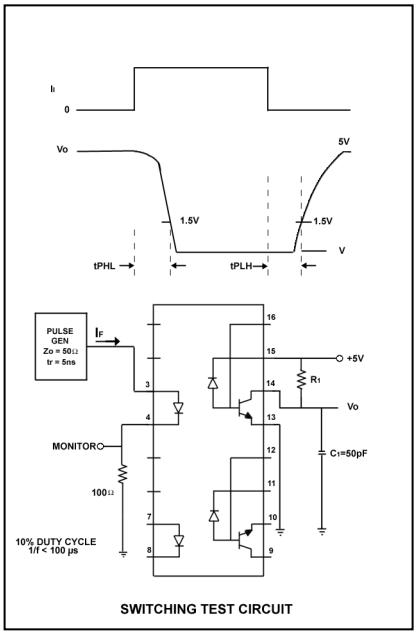
Normalized Small Signal Current Transfer Ratio vs Quiescent Input Current

For sales enquiries, or further information, please contact our sales office at:

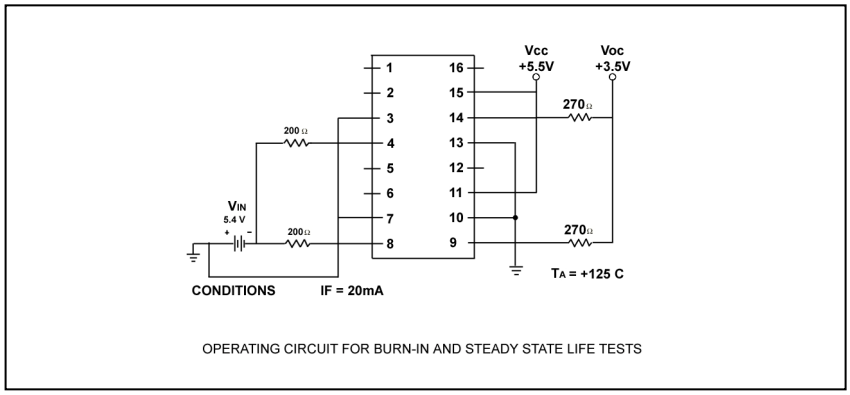
Isocom Ltd, Hutton Close, Crowther Industrial Estate, District 3, Washington, NE38 0AH
Tel: +44 0191 4166 546 Fax: +44 0191 4155 055



FREQUENCY RESPONSE



SWITCHING TEST CIRCUIT



OPERATING CIRCUIT FOR BURN-IN AND STEADY STATE LIFE TESTS

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