ISOCOM® LTD

PART NUMBER **CSM1600/L2S**

COMPONENT **ISSUE 2**

SPECIFICATION **September 2014**

Component Specification
For Ceramic Hermetically Sealed, Radiation Hard High Gain Photon Optocoupler

M1077 IECQ

Further copies of this document may be obtained from:

ISOCOM LIMITED
WASHINGTON, UK
NE38 0AH
www.isocom.uk.com

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

Isocom Ltd, 48, Hutton Close, Crowther Industrial Estate, Washington, Tyne and Wear, UK, NE38 0AH
Tel: +44 0191 4166 546 Fax: +44 0191 4155 055

ISOCOM® LTD

Ceramic Hermetically Sealed, Radiation Hard High Gain Photon Optocoupler

- **CSM1600**
- **CSM1600/L2**
- **CSM1600/L2S**

Features

- Released to European Standard and Complies to Mil Std
- Total Ionizing Dose Tested to 1MRad(si)
- Displacement Damage Tested to 1 MEV $x10^{13}$
- Hermetically Sealed
- High Withstand Test Voltage 1500vdc
- 6 Pin LCC Package
- High Common Mode Rejection
- High Current Transfer Ratio

Applications

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

Description

These devices are single, hermetically sealed optically coupled isolators. Each channel is composed of a Gallium Arsenide infra-red emitting diode coupled to an integrated high speed photon detector. The output of the detector is an open collector Schottky clamped transistor. These optocouplers have internal shield providing a guaranteed common mode transient immunity specification of 1000V/µS. These optocouplers are for Isolation Voltage applications requiring up to 2500vdc. The CSM1600 series are being used in environments encounted by space applications. It is manufactured to meet the JANS standard in conjunction with MIL-PRF-19500 procedures (please see next page for all other applicable specifications). Package styles for this device include 6 Pin LCC Package with solder dip options available.
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, 48, Hutton Close, Crowther Industrial Estate, Washington, Tyne and Wear, UK, NE38 0AH
Tel: +44 0191 4166 546 Fax: +44 0191 4155 055

Standards

The following specifications have been included in the manufacturing of this product:

Military Compliance Specifications

MIL-PRF-19500 – General Specification for Discrete Semiconductor Devices
IECQ – M1077

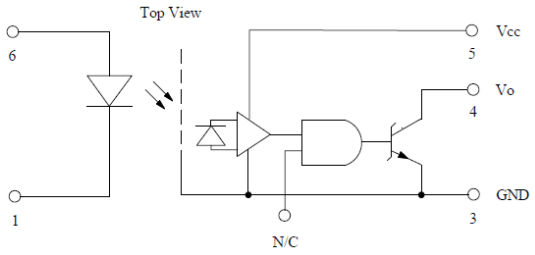
Military Compliance Standards

MIL-STD-202 – Test Method Standard Electronic and Electrical Component Parts
MIL-STD-883 – Test Method Standard Microcircuits
MIL-STD-750 – Test Methods for Semiconductor Devices
ISO 9001:2008 – Manufacturing of Optocouplers and Optoelectronic components.

Amendment Record

Issue 1 – Changed Page 3 Single Channel Schematic and removed Electrical Characteristic Diagrams from Pages 7&8

Single Channel Schematic



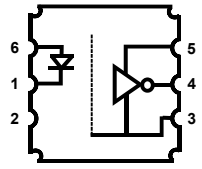
For sales enquiries, or further information, please contact our sales office at:

Isocom Ltd, 48, Hutton Close, Crowther Industrial Estate, Washington, Tyne and Wear, UK, NE38 0AH
Tel: +44 0191 4166 546 Fax: +44 0191 4155 055

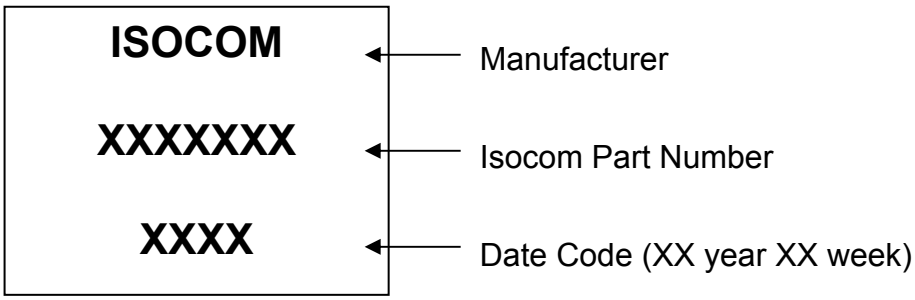
Selection Guide Package Styles and Configuration Options

Package	6 pin LCC
Lead Style	
Channels	1
Common Channel Wiring	
Isocom Part Number and Options	
Commercial	CSM1600
Defense Screen Level	CSM1600/L2
Space Screen Level	CSM1600/L2S
Standard Gold Plate Finish	Gold Plate
Solder Dipped	Option 20

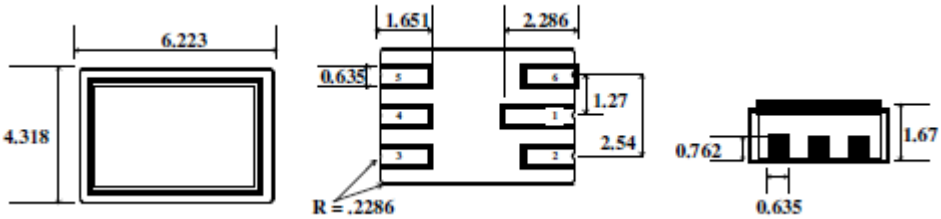
Functional Diagrams

CSM1600
6 pin LCC
1 Channel


Device Marking



Outline Drawings



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

Isocom Ltd, 48, Hutton Close, Crowther Industrial Estate, Washington, Tyne and Wear, UK, NE38 0AH
Tel: +44 0191 4166 546 Fax: +44 0191 4155 055

Absolute Maximum Ratings

T_A = 25°C U.O.S.

Storage Temperature	-65°C to +150°C
Operating Temperature	-55°C to +125°C
Lead Soldering Temperature	260°C 1.6mm from case for 10S
Input-to-Output Isolation Voltage	⇧1500VDC

Input Diode

Peak Forward Current	40mA	≤ 1 mS duration, 500pps
Average Forward Current	20mA	(see note 3)
Reverse Voltage	5V	
Power Dissipation	35mW	

Output Detector

Supply Voltage	7V	Vcc (1 minute maximum)
Current	25mA	
Collector Power Dissipation	40mW	
Voltage	7V	Vo (see note 1)

Electrical Characteristics

T_A = -55°C to +125°C U.O.S.

Parameter	Symbol	Test Conditions	Min	Type	Max	Units
Current Transfer Ratio (see note 1)	CTR	V_{CC} =5.5V, V_O=0.6V, I_F = 10mA	100	-	-	%
Lower Level output voltage (see notes 1 & 9)	V_{OL}	V_{CC} =5.5V, I_F = 10mA, I_{oL}(sinking) 10mA	-	0.4	0.6	V
High level output current (see note 1)	I_{oH}	I_F =250µA, V_O= V_{CC}=5.5V	-	20	250	µA
High level supply current	I_{CCH}	V_{CC}=5.5V, I_{F1} = I_{F2} = 0	-	15	30	mA
Low level supply current	I_{CCL}	V_{CC}=5.5V, I_{F1} = I_{F2} = 13mA	-	-	36	mA
Input forward voltage (see note 1)	V_F	I_F = 10mA, T_A = 25°C	-	1.5	1.9	V
		I_F = 20mA	-	-	1.9	V
Input-Output Insulation Leakage Current (see notes 2 & 10)	I_{I-O}	RH=45%, t=5S, T_A = 25°C, V_{I-O}= 1500vdc	-	-	1.0	µA
Input reverse breakdown (see note 1)	V_{BR}	I_R = 10µA, T_A = 25°C	5	-	-	V

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

Isocom Ltd, 48, Hutton Close, Crowther Industrial Estate, Washington, Tyne and Wear, UK, NE38 0AH
Tel: +44 0191 4166 546 Fax: +44 0191 4155 055

Typical Characteristics

T_A = 25°C, Vcc = 5V each channel were appropriate

Parameter	Symbol	Test Conditions	Notes	Min	Type	Max	Units
Resistance	R_{IO}	V_{10} = 500Vdc	3	-	10^{12}	-	Ω
Capacitance	C_{IO}	f = 1MHz	3	-	1.9	-	pF
Input Capacitance	C_{IN}	f = 1MHz, V_F = 0	1	-	60	-	pF
Input Diode Temperature Coefficient	$\frac{\Delta V_F}{\Delta T_A}$	I_F = 20mA	1	-	-1.9	-	mV/°C
Input-Input Insulation Leakage Current	I_{I-I}	45% Relative Humidity V_{II} = 500Vdc, t = 5S,	4	-	0.5	-	nA
Resistance	R_{I-I}	V_{II} = 500Vdc	4	-	10^{12}	-	Ω
Capacitance	C_{I-I}	f = 1MHz	4	-	0.6	-	pF
Output Rise (10-90%)	tr	R_L = 510Ω, V_{CC} = 5V, I_F = 13mA T_A = 25°C, C_L= 15pF	1	-	35	-	ns
Output Fall Time (90-10%)	tf	R_L = 510Ω, V_{CC} = 5V, I_F = 13mA T_A = 25°C, C_L= 15pF	1	-	35	-	ns
Common Mode Transient Immunity at Logic High Output Level	CM_H	Vo (min) =2V, I_F = 0mA, V_{cm} =10V (peak), R_L = 510Ω	1 & 7	-	-1000	-	V/µS
Common Mode Transient Immunity at Logic Low Output Level	CM_L	Vo (max) =0.8V, I_F = 10mA, V_{cm} =10V (peak), R_L = 510Ω	1 & 7	-	-1000	-	V/µS

Notes: (Apply typically to 16 pin package)

1. Each channel, where appropriate.
2. Measured between pins 1 through 4 shorted together, and pins 9 through 16 shorted together.
3. Measured between pins 1 and 2, or 5 and 6 shorted together, and pins 9 through 16 shorted together.
4. Measured between pins 1 and 2 shorted together, and pins 5 and 6 shorted together.
5. The t_{PLH} propagation delay is measured from the 6.5mA point on the trailing edge of the input pulse to the 1.5V point on the trailing edge of the output pulse.
6. The t_{PHL} propagation delay is measured from the 6.5mA point on the leading edge of the input pulse to the 1.5V point on the leading edge of the output pulse.
7. 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).
8. 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 < 2.0V).
9. It is essential that a bypass capacitor (0.1 to 0.1µF, ceramic) be connected from pin 10 to pin 15. Total lead length between both ends of the capacitor and the isolator pins should not exceed 20mm.
10. This is a momentary withstand test, not an operating condition.

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

Isocom Ltd, 48, Hutton Close, Crowther Industrial Estate, Washington, Tyne and Wear, UK, NE38 0AH
Tel: +44 0191 4166 546 Fax: +44 0191 4155 055

GROUP TESTING to MIL-STD 750

GROUP	TEST	MIL-STD-750	READ AND RECORD
Group A			
SG1	Visual inspection & mechanical dimensions	Method 2071	
SG2	DC static test at 25°C		yes
SG3	DC static test at 125°C and -55°C		yes
SG4	Dynamic test at 25°C		yes
Group B			
SG 1	Physical dimensions	Method 2066	
SG 2	Solderability	Method 2026	
	Resistance to solvents	Method 1022	
SG 3	Thermal Shock	Method 1056 Cond. B, 25 cycles	
	Temperature cycling	Method 1051, 100 cycles, -55/+125°C	
	Hermetic seal fine and gross leak	Method 1071, Cond. H (fine), Cond. C (gross)	
	Electrical measurement	pre and post	yes
	Decap internal visual inspection	2075	
	Bond strength	Method 2037, Cond. D	yes
	Die shear	Method 2017	yes
SG 4	Intermittent operation life	Method 1037, 1042, Cond D, Tab.5-5	
	Hermetic seal fine and gross leak	Method 1071, Cond. H (fine), Cond. C (gross)	
	Electrical measurement	pre and post	yes
	Bond strength	Method 2037, Cond. D	yes
SG 5	Acc. steady-state operation life	Method 1027	
	Electrical measurement	pre and post	yes
	Bond strength	Method 2037, Cond. D	yes
Group C			
SG 2	Thermal Shock	Method 1056, Cond. B, 25 shocks	
	Temperature cycling	Method 1051, Cond. C, -55/+125°C , 25 cycles (total 45 cycles including screening)	
	Hermetic seal fine and gross leak	Method 1071, Cond. H (fine), Cond. C (gross)	
	Moisture resistance	Method 1021	
	Electrical measurement	pre and post	yes
SG 3	Mechanical shock	Method 2016, non-operating, 1500 G, 0.5 ms, 5 blows in each orientation (X1,Y1,Z1)	
	Vibration	Method 2056	
	Constant acceleration	Method 2006, at a peak level of 5000 G	
	Electrical measurement	pre and post	yes
SG 6	Steady state operating life Not required as B5 is available on same lot		

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

Isocom Ltd, 48, Hutton Close, Crowther Industrial Estate, Washington, Tyne and Wear, UK, NE38 0AH
Tel: +44 0191 4166 546 Fax: +44 0191 4155 055

100% SCREENING to MIL-STD 750

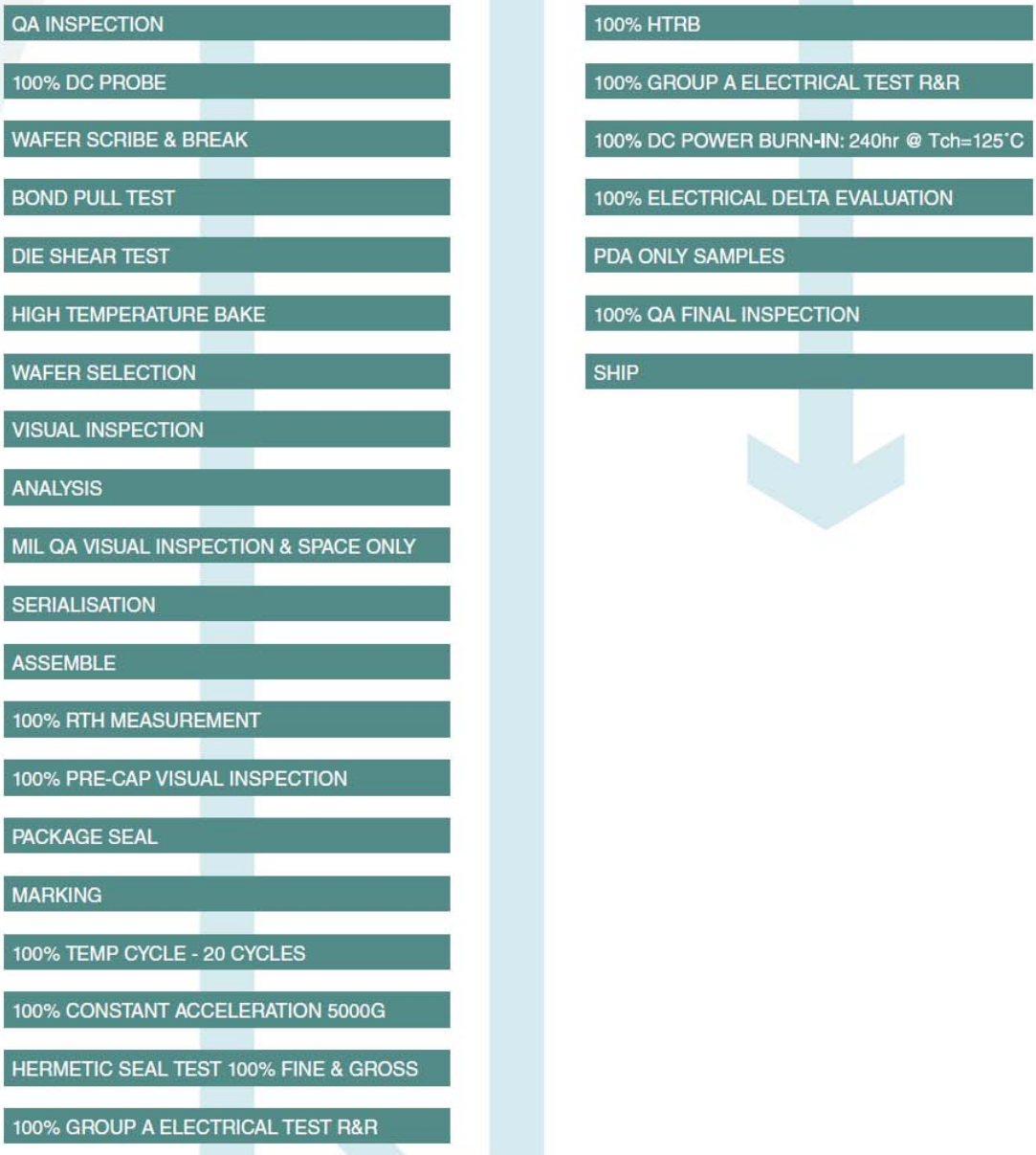
TEST	MIL-STD-750	READ AND RECORD?
Internal Visual	2072	
Sealing		
(Fine Leak)	1071, Condition H1	
(Gross Leak)	1071, Condition C	
Temp Cycling	1051, Condition B-55/+125°C, 20 Cycles.	
Const. Acceler	2006, 5000G, Y1 only.	
PIND	2052, Condition A	
Radiography	2076	
Initial Electrical	125°C, -55°C, 25°C	R & R
HTRB	1039	
Interim Electrical	25°C only	R & R
Burn-In	1039	
Final Electrical	125°C, -55°C, 25°C	R & R
PDA	Max. 5%, pre/post B1 electrical and delta at RT only	Calculate & R
(Fine Leak)	1071, Condition H1	
(Gross Leak)	1071, Condition C	
Solder Dip		
Fine Leak	1071, Condition H1	
Gross Leak	1071, Condition C	

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

Isocom Ltd, 48, Hutton Close, Crowther Industrial Estate, Washington, Tyne and Wear, UK, NE38 0AH
Tel: +44 0191 4166 546 Fax: +44 0191 4155 055

Space Qualification

PROCESS FLOW CHART FOR PACKAGED DEVICES



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

Isocom Ltd, 48, Hutton Close, Crowther Industrial Estate, Washington, Tyne and Wear, UK, NE38 0AH
Tel: +44 0191 4166 546 Fax: +44 0191 4155 055

Space Qualification

PROCESS FLOW CHART FOR PACKAGED DEVICES

Group B Testing	*MIL-STD-883	*MIL-STD-750
Physical Dimensions	Method 2016	Method 2066
Solderability	Method 2003	Method 2023
Resistance to Solvents	Method 2015	Method 1022
Temperature Cycling	Method 1010	Method 1051
• *Military Grade*	25 cycles	25 cycles
• *Space Grade*	50 cycles	50 cycles
Steady State Life (Tch 175°C / 340hr minimum)	Method 1005	Method 1027
DPA	*MIL-STD-1580A	*MIL-STD-1580A
	*Unless otherwise indicated	*Unless otherwise indicated

Environmental & Mechanical Testing Specifications		
	***MIL-STD-883**	***MIL-STD-750**
Hermetic Seal Test	Method 1014	Method 1071
• *Fine Leak*	Condition A1	Condition G or H
• *Gross Leak*	Condition C	Method 1051
Temperature Cycle *(Standard Military Level)*	Method 1010, Condition C	Method 1051, Condition C
Temperature Cycle *(Standard Space Level)*	Method 1010, Condition C	Method 1051, Condition C
Constant Acceleration	Method 2001	Method 2006
PIND Test	Method 2020	Method 2052, Condition A
RTH Measurement	Method 1012	
HTRB *(High Temperature Reverse Bias)*	Method 1015, Condition A	Method 1042, Condition B
DPA	*MIL-STD-1580A	*MIL-STD-1580A
	*Unless otherwise indicated	*Unless otherwise indicated

Inspection Table		
COMMERCIAL	**MILITARY**	**HI-REL / SPACE**
AQL Sampling Plan	MIL-STD-883, Method 2010, Class Level B	MIL-STD-883, Method 2010, Class Level S
Isocom Internal Specifications	MIL-STD-750, Method 2070, 2071,2072	MIL-STD-750, Method 2070, 2071,2072

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

Isocom Ltd, 48, Hutton Close, Crowther Industrial Estate, Washington, Tyne and Wear, UK, NE38 0AH
Tel: +44 0191 4166 546 Fax: +44 0191 4155 055