ISOCOM® LTD

PART NUMBER	**CSM150/L2S**
COMPONENT	**ISSUE 1**
SPECIFICATION	**January 2014**

Component Specification
For Ceramic Hermetically Sealed, Radiation Hard Photo-Diode Optocouplers

M1077 IECQ **1077/M**

PRELIMINARY

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, NE38 0AH, UK
Tel: +44 0191 4166 546 Fax: +44 0191 4155 055

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ISOCOM® LTD

Ceramic Hermetically Sealed, Radiation Hard Photo-Diode Optocouplers

■ CSM150
■ CSM150/L2
■ CSM150/L2S

Features

- Released to European Standard and Complies to Mil Std
- Total Ionizing Dose Tested to 150KRad(si)
- Displacement Damage to 1 MEV x 10^{12}
- High Isolation Voltage 1000vdc
- 4 Pin LCC Package
- Low Input Requirements
- 200V Breakdown (Typically)
- High Speed Switching
- Hermetically Sealed

Applications

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

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Description

These devices are single, hermetically sealed optically coupled isolators. Each channel is composed of a infra-red emitting diode and a silicon photo-diode. The CSM150 series is 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 4 Pin LCC Package with surface mount, solder dip option 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.

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Standards

The following specifications have been complied with 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.

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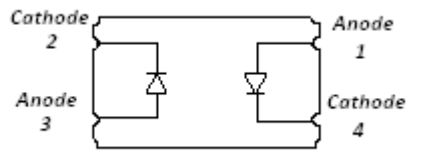
Selection Guide Package Styles and Configuration Options

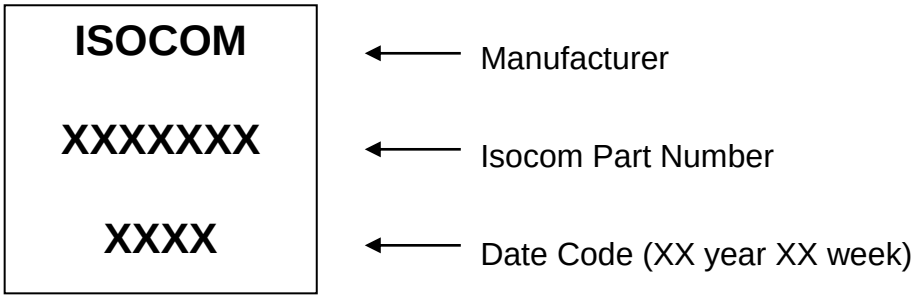
Package	4 pin LCC
Lead Style	
Channels	1
Common Channel Wiring	
Isocom Part Number and Options	
Commercial	CSM150
Defense Screen Level	CSM150/L2
Space Screen Level	CSM150/L2S
Standard Gold Plate Finish	Gold Plate
Solder Dipped	Option 20

Functional Diagrams

CSM150
4 pin LCC
1 Channel



Device Marking



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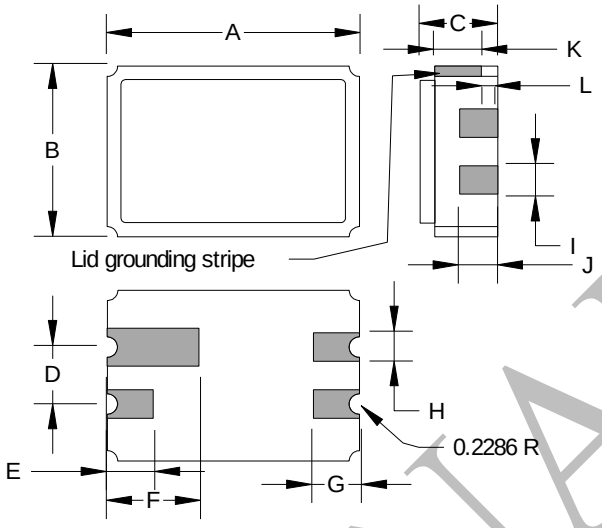
Outline Drawings



	Inches		Millimetres	
SYMBOL	MIN.	MAX.	MIN.	MAX.
A	0.215	0.225	5.46	5.71
B	0.145	0.155	3.68	3.94
C	0.061	0.075	1.55	1.91
D	0.045	0.055	1.14	1.40
E	0.032	0.048	0.81	1.22
F	0.072	0.088	1.83	2.24
G	0.032	0.048	0.81	1.22
H	0.022	0.028	0.56	0.71
I	0.010	0.024	0.25	0.61
J	0.029	0.044	0.74	1.12
K	0.036	0.044	0.91	1.12
L	0.011	0.019	0.28	0.48

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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	⇧1000VDC

Input Diode

Forward DC Current	40mA	DC at (or below) +65°C Derates linearly to +125°C free air temperature at the rate of 0.67mA/°C.
Reverse DC Voltage	2V	
Peak forward Current	1.0mA	P_W≤1µS, PRR<300pps ≤ 10µS ms
Power Dissipation	60mW	Derates linearly above 65°C at 1.0W/°C

Output Diode

Reverse Bias	200V	
Power Dissipation	300mW	

Coupled Device

Input to Output Isolation Voltage	1000V	
Power Dissipation	360mW	
SolderingTemperature,Soldering Iron	260,5	°C,s This part shall not be re-soldered until 3 minutes have elapsed.

Electrical Characteristics

Input Diode Electrical Characteristics T_A = 25°C U.O.S.

Parameter	Symbol	Test Conditions	Min	Type	Max	Units
Forward Voltage	V_F	I_F = 10mA	1.3	-	1.8	V
		I_F = 10mA -55°C	1.3	-	1.8	V
		I_F = 10mA +125°C	1.1	-	1.8	V
Reverse Current	I_R	V_R = 2.0V	-	-	100	µA

Output Detector Electrical Characteristics

Dark Current	I_D	R_L = 1MΩ,V_R = 5V	-	100	-	µA
Reverse Breakdown Voltage	$V_{(BR)}$	I_B = 1mA	200	-	-	V

Coupled Electrical Characteristics

DC Current Transfer Ratio	IC/IF	$I_{F(IN)}$ = 15mA, $V_{(OUT)}$ = 5V	-	1.6	-	%
		$I_{F(IN)}$ = 15mA, $V_{(OUT)}$ = 5V	-	1.62	-	%
		$I_{F(IN)}$ = 1.0mA, $V_{(OUT)}$ = 1V	-	1.0	-	%
		$I_{F(IN)}$ = 3.0mA, $V_{(OUT)}$ = 1V	-	1.29	-	%
		$I_{F(IN)}$ = 15mA, $V_{(OUT)}$ = 1V	-	1.6	-	%
		$I_{F(IN)}$ = 10mA, $V_{(OUT)}$ = 5V	-	1.56	-	%
Output Voltage	V_O	R_L = 3.3KΩ,V_{cc} = 5V,I_F = 75mA	-	1.3	-	V_{P-P}
Isolation Voltage	V_{in-out}	T = 5s (Note 2)	1000	-	-	Vdc
Input to Output Resistance	R_{in-out}	V_{IO} = 500V (Note 2)	-	10^5		Ω
Rise Time	tr	R_L = 3.3KΩ V_{cc} = 5V I_F = 10mA	-	200	-	ηS
Fall Time	tf	R_L = 3.3KΩ V_{cc} = 5V I_F = 10mA	-	200	-	ηS

Notes:
1) Sample and hold pulse shall not be longer than 0.1 seconds. Duty cycle shall be 10.
2) Measurements with inputs shorted together and outputs shorted together

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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		

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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	

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***** The parts are electrical tested before and after & recorded to MIL-STD-750

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Space Qualification

PROCESS FLOW CHART FOR PACKAGED DEVICES

- QA INSPECTION
- 100% DC PROBE
- WAFER SCRIBE & BREAK
- BOND PULL TEST
- DIE SHEAR TEST
- HIGH TEMPERATURE BAKE
- WAFER SELECTION
- VISUAL INSPECTION
- ANALYSIS
- MIL QA VISUAL INSPECTION & SPACE ONLY
- SERIALISATION
- ASSEMBLE
- 100% RTH MEASUREMENT
- 100% PRE-CAP VISUAL INSPECTION
- PACKAGE SEAL
- MARKING
- 100% TEMP CYCLE - 20 CYCLES
- 100% CONSTANT ACCELERATION 5000G
- HERMETIC SEAL TEST 100% FINE & GROSS
- 100% GROUP A ELECTRICAL TEST R&R
- 100% HTRB
- 100% GROUP A ELECTRICAL TEST R&R
- 100% DC POWER BURN-IN: 240hr @ Tch=125˚C
- 100% ELECTRICAL DELTA EVALUATION
- PDA ONLY SAMPLES
- 100% QA FINAL INSPECTION
- SHIP

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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

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