

**PART NUMBER**

**MC810/811**

**COMPONENT**

**ISSUE 2**

**SPECIFICATION**

**October 2014**

**Component Specification  
For Ceramic Hermetically Sealed, Radiation Hard  
High Speed Transistor Optocoupler**



**M1077 IECQ**



Further copies of this document may be obtained from:

ISOCOM LIMITED  
WASHINGTON, UK  
NE38 0AH  
[www.isocom.uk.com](http://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

## Ceramic Hermetically Sealed, Radiation Hard High Speed Transistor Optocoupler

- MC810/811
- MC810/811/L2
- MC810/811/L2S

### Features

- Released to European Standard and Complies to Mil Std
- Total Ionizing Dose Tested to 1MRad(si)
- Low Input Requirements
- Hermetically Sealed
- High Isolation Voltage
- 6 Pin TO-5 Metal Can Package
- Minimum 100% CTR

### 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 and a silicon phototransistor. The MC810 series are being used in environments encountered 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 TO-5 Metal Can Package with solder dip option available. These packages have a shield effect to cut off ambient light as they are designed for high density mounting applications.

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 5 - Absolute Maximum Ratings 14/10/2014

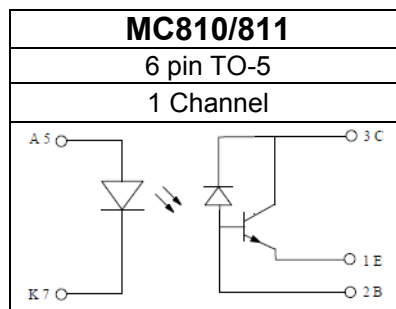
For sales enquiries, or further information, please contact our sales office at:

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

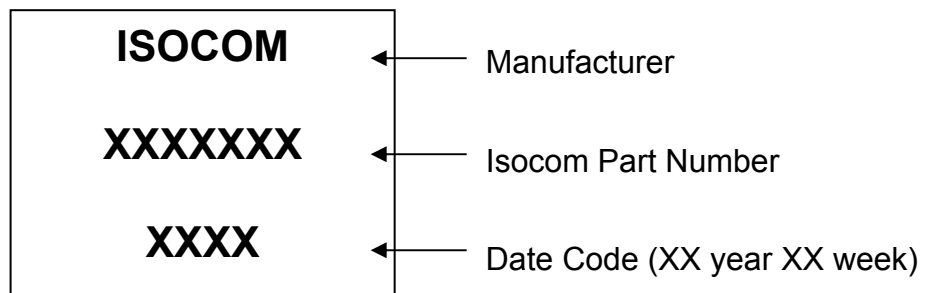
## Selection Guide Package Styles and Configuration Options

Package	6 pin TO-5
Lead Style	
Channels	1
Common Channel Wiring	
<b>Isocom Part Number and Options</b>	
Commercial	MC810/811
Defense Screen Level	MC810/811/L2
Space Screen Level	MC810/811/L2S
Standard Gold Plate Finish	Gold Plate
Solder Dipped	Option 20

## Functional Diagrams



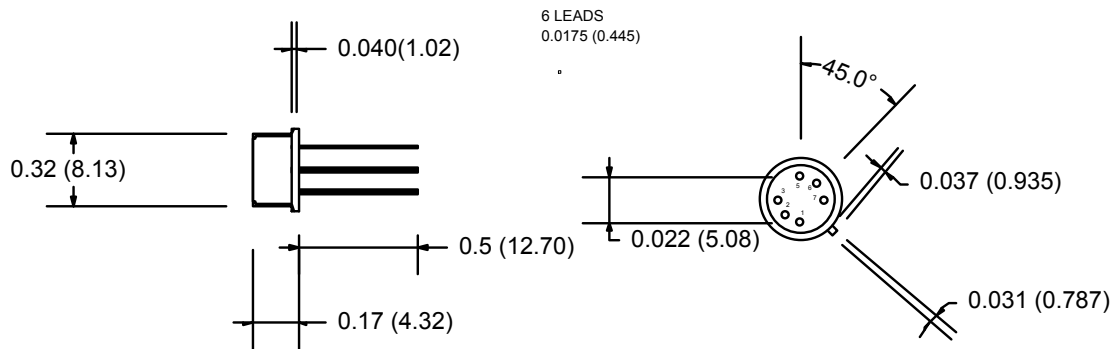
## Device Marking



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

## Outline Drawings



## Absolute Maximum Ratings

$T_A = 25^\circ\text{C U.O.S.}$

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

Reverse Voltage	3V	
Input Diode Forward DC Current	40mA	
Power Dissipation	80mW	
Collector-Base Voltage	40V	
Collector-Emitter Voltage	40V	
Emitter-Base Voltage	4V	
Collector Current	50 mA	

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

## Electrical Characteristics

### Input Diode Electrical Characteristics

T<sub>A</sub> = 25°C U.O.S.

Parameter	Symbol	Test Conditions	Min	Type	Max	Units
Forward Voltage	V <sub>F</sub>	I <sub>F</sub> = 10mA	0.7	1.2	1.8	V
		I <sub>F</sub> = 10mA -55°C	0.7	1.3	1.8	V
		I <sub>F</sub> = 10mA +125°C	0.7	1.1	1.8	V
Reverse Current	I <sub>R</sub>	V <sub>R</sub> = 2.0V	-	-	100	μA

### Output Detector Electrical Characteristics

Collector-Emitter Breakdown Voltage	V <sub>(BR)CEO</sub>	I <sub>C</sub> = 1mA	40	-	-	V
Collector-Base Breakdown Voltage	V <sub>(BR)CBO</sub>	I <sub>B</sub> = 100μA	40	-	-	V
Emitter-Collector Breakdown Voltage	V <sub>(BR)ECO</sub>	I <sub>E</sub> = 100μA	7	-	-	V
Off State Collector Current	I <sub>C(OFF)</sub>	V <sub>CE</sub> = 20v, I <sub>F</sub> = 0	-	-	100	nA
		V <sub>CE</sub> = 20v, I <sub>F</sub> = 0, +125°C	-	-	100	μA

### Coupled Electrical Characteristics

On State Collector Current	I <sub>C(ON)</sub>	V <sub>CE</sub> = 1.0v, I <sub>F</sub> = 10 mA	10.0	-	-	mA
		V <sub>CE</sub> = 1.0v, I <sub>F</sub> = 10 mA -55°C	10.0	-	-	
		V <sub>CE</sub> = 1.0v, I <sub>F</sub> = 10 mA +125°C	7.0	-	-	
Collector-Emitter Saturation Voltage	V <sub>CE (Sat)</sub>	I <sub>C</sub> = 10.0mA I <sub>F</sub> = 20mA	-	-	0.3	V
Isolation Voltage	V <sub>in-out</sub>	T = 5s (Note 2)	1500	-	-	V <sub>dc</sub>
Input to Output Resistance	R <sub>in-out</sub>	V <sub>IO</sub> = 500V (Note 2)	-	10 <sup>11</sup>	-	Ω
Rise Time Transistor	t <sub>r</sub>	R <sub>L</sub> = 100Ohms V <sub>cc</sub> = 10V I <sub>F</sub> = 5mA	-	6	20	μS
Fall Time Transistor	t <sub>f</sub>	R <sub>L</sub> = 100Ohms V <sub>cc</sub> = 10V I <sub>F</sub> = 5mA	-	6	20	μS
Rise Time Photodiode	t <sub>r</sub>	R <sub>L</sub> = 100Ohms V <sub>cc</sub> = 10V I <sub>F</sub> = 5mA	-	-	3	μS
Fall Time Photodiode	t <sub>f</sub>	R <sub>L</sub> = 100Ohms V <sub>cc</sub> = 10V I <sub>F</sub> = 5mA	-	-	3	μS

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
<b>Group A</b>			
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
<b>Group B</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)	
	<b>Electrical measurement</b>	pre and post	yes
	Decap internal visual inspection	2075	
	<b>Bond strength</b>	Method 2037, Cond. D	yes
	<b>Die shear</b>	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)	
	<b>Electrical measurement</b>	pre and post	yes
	<b>Bond strength</b>	Method 2037, Cond. D	yes
SG 5	Acc. steady-state operation life	Method 1027	
	<b>Electrical measurement</b>	pre and post	yes
	<b>Bond strength</b>	Method 2037, Cond. D	yes
<b>Group C</b>			
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	
	<b>Electrical measurement</b>	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	
	<b>Electrical measurement</b>	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

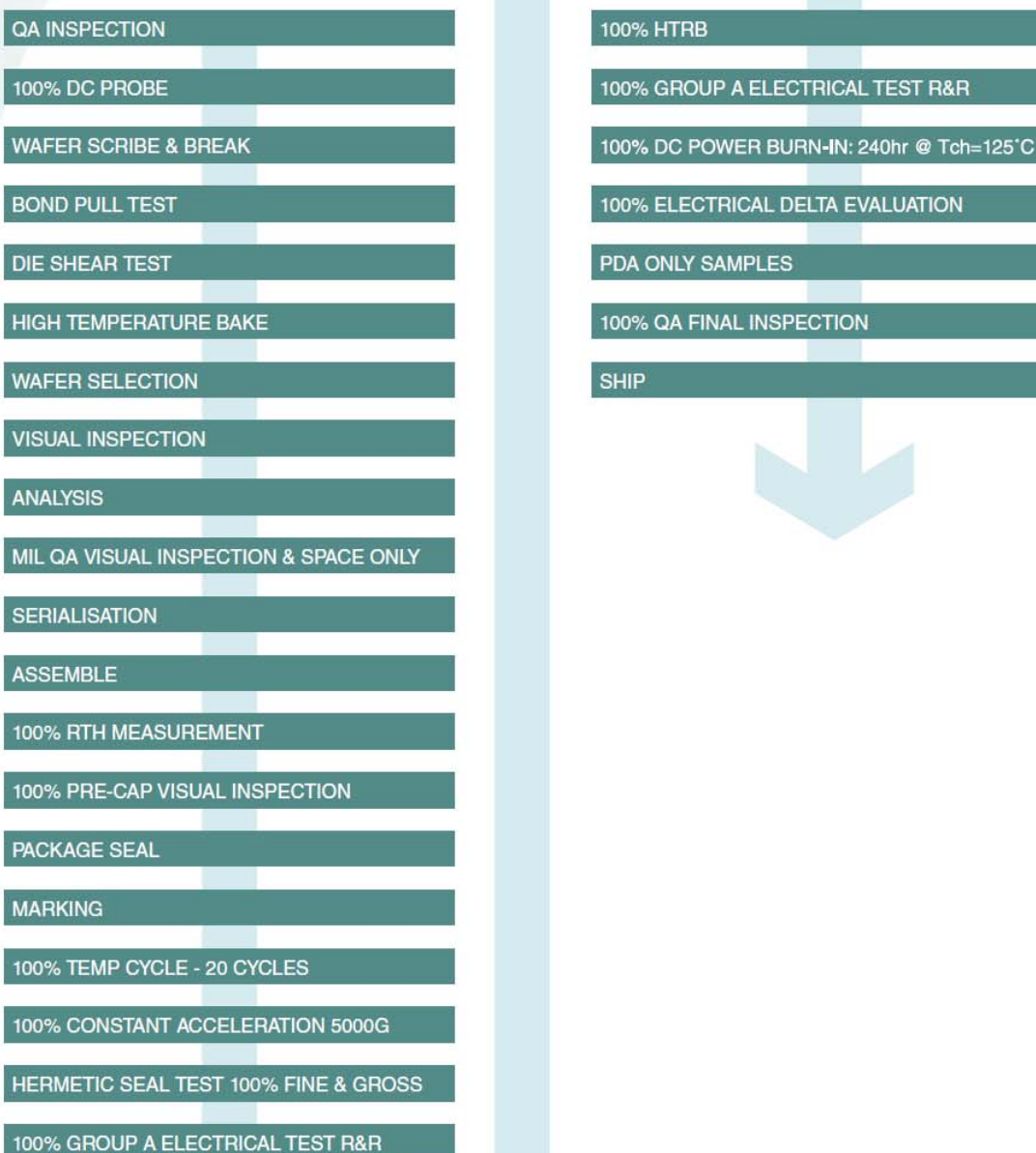
TEST	MIL-STD-750	READ AND RECORD?
Internal Visual	2072	
<b>Sealing</b>		
(Fine Leak)	1071, Condition H1	
(Gross Leak)	1071, Condition C	
Temp Cycling	1051, Condition B-55/+125°C, 20 Cycles.	
Const. Acceler	2006, 5000G, Y1 only.	
PIND	2052, Condition A	
Radiography	2076	
Initial Electrical	125°C, -55°C, 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	
<b>Solder Dip</b>		
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
• <i>Military Grade</i>	25 cycles	25 cycles
• <i>Space Grade</i>	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
• <i>Fine Leak</i>	Condition A1	Condition G or H
• <i>Gross Leak</i>	Condition C	Method 1051
Temperature Cycle ( <i>Standard Military Level</i> )	Method 1010, Condition C	Method 1051, Condition C
Temperature Cycle ( <i>Standard Space Level</i> )	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 ( <i>High Temperature Reverse Bias</i> )	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