

PART NUMBER

CS3061/3062/3063

COMPONENT

ISSUE 1

SPECIFICATION

October 2013

**Component Specification
For Ceramic Hermetically Sealed, Radiation Hard
Zero Crossing Triac Optocoupler**



M1077 IECQ

BS9000



1077/M



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

Ceramic Hermetically Sealed, Radiation Hard Zero Crossing Triac Optocoupler

- **CS3061/3062/3063**
- **CS3061/3062/3063/L2**
- **CS3061/3062/3063/L2S**

Features

- Released to European Standard and complies to Mil Std
- Hermetically Sealed
- High Isolation 1500Vdc
- 6 Pin Dual In Line Package
- 600V Peak Blocking Voltage
- Zero Crossing Voltage

Applications

- Space Radiation Equipment
- Military, high reliability system
- Medical instruments
- Power Supply

Description

These devices are single, hermetically sealed optically coupled isolators. Each channel is composed of a Gallium Arsenide infra-red emitting diode coupled to a silicon detector performing the function of a zero voltage crossing bilateral triac driver. The CS3061 series is being used in environments encountered by space applications. It is manufactured to 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 DIL 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 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.

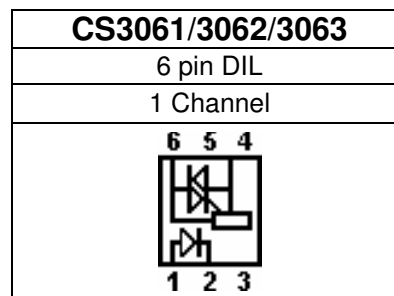
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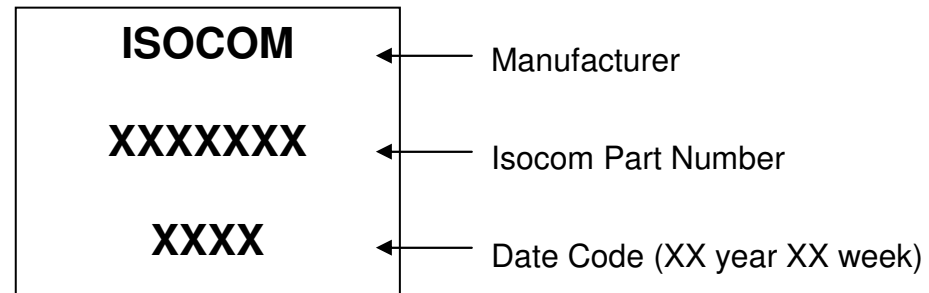
Selection Guide Package Styles and Configuration Options

| Package | 6 pin DIL |
|---------------------------------------|----------------------|
| Lead Style | |
| Channels | 1 |
| Common Channel Wiring | |
| Isocom Part Number and Options | |
| Commercial | CS3061/3062/3063 |
| Defense Screen Level | CS3061/3062/3063/L2 |
| Space Screen Level | CS3061/3062/3063/L2S |
| Standard Gold Plate Finish | Gold Plate |
| Butt Joint | Option 10 |
| Solder Dipped | Option 20 |
| Gull Wing | Option 30 |
| Butt Joint | Option 60 |

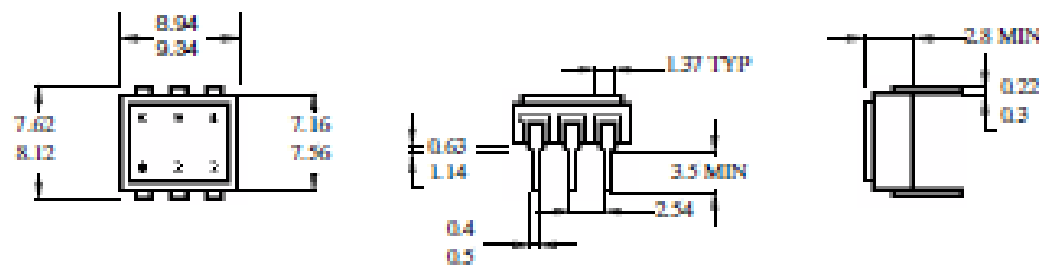
Functional Diagrams



Device Marking



Outline Drawings



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Hermetic Optocoupler Options

| Option | Description |
|--------|---|
| 10 | <p>Surface mountable hermetic optocoupler with leads trimmed for butt joint assembly. This option is available on commercial hi-rel product in 6, 8 and 16 pin DIP</p> |
| 20 | |
| 30 | <p>Surface mountable hermetic optocoupler with leads cut and bent for gull wing assembly. This option is available on commercial and hi-rel product in 6, 8 and 16 pin DIP.</p> |
| 60 | <p>Surface mountable hermetic optocoupler with leads trimmed for butt joint assembly. This option is available on commercial hi-rel product in 6, 8 and 16 pin DIP</p> |

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Absolute Maximum Ratings

T_A = 25°C U.O.S.

| | |
|--|-------------------------------|
| Storage Temperature | -40°C to +150°C |
| Operating Temperature | -40°C to +85°C |
| Normal Temperature Range (No Derating) | -55°C to +50°C |
| Lead Soldering Temperature | 260°C 1.6mm from case for 10S |
| Input-to-Output Isolation Voltage (Peak) | 1500V (60Hz, 5 sec duration) |

Input Diode

| | | |
|--------------------|-------|--|
| Forward DC Current | 60mA | |
| Reverse DC Voltage | 6V | |
| Power Dissipation | 120mW | Derate linearly above 25°C at 1.33mW/°C. |

Output Photo Triac

| | | |
|-----------------------------------|-------|--|
| Off-State Output Terminal Voltage | 600V | |
| RMS Forward Current | 100mA | |
| Forward Current (Peak) | 1.2A | P.W. = 10m.Sec |
| Power Dissipation | 150mW | Derate linearly above 25°C at 4.0mW/°C |
| Total Power Dissipation | 250mW | Derate linearly above 25°C at 4.4mW/°C |

Electrical Characteristics

T_A = 25°C U.O.S.

Input Diode Electrical Characteristics

| Parameter | Symbol | Test Conditions | Min | Typ | Max | Units |
|-----------------|----------------|-----------------------|-----|-----|-----|-------|
| Forward Voltage | V _F | I _F = 30mA | - | - | 1.5 | V |
| Reverse Current | I _R | V _R = 3.0V | - | - | 100 | μA |

Output Photo-SCR Characteristics

| | | | | | | |
|--|------------------|-------------------------------|-----|------|-----|------|
| Peak Off-State Current | I _{DRM} | V _{DRM} = 250V | - | - | 100 | nA |
| Peak Blocking Voltage | V _{DRM} | I _{DRM} = 100nA | 600 | - | - | V |
| On-State Voltage | V _{TM} | I _{TM} = 100mA(Peak) | - | 1.8 | 3.0 | V |
| Critical rate of rise of commutating Off-state Voltage | dv/dt(C) | | 600 | 1500 | - | V/μS |

Coupled Electrical Characteristics

| | | | | | | |
|-----------------------------------|-----------------|-----------------------------------|------|-----|----|-----|
| Input Current to Trigger | I _{FT} | Main Terminal Voltage = 3V CS3031 | - | - | 15 | mA |
| | | Main Terminal Voltage = 3V CS3032 | - | - | 10 | mA |
| | | Main Terminal Voltage = 3V CS3033 | - | - | 5 | mA |
| Holding Current, either Direction | | | - | 100 | - | μA |
| Input-to-Output Isolation Voltage | | | 1500 | - | - | Vac |

Zero Crossing Characteristics

| | | | | | | |
|----------------------------|-----------------|--|---|---|-----|----|
| Inhibit Voltage | V _{IH} | I _F = Rated I _{FM} ; MT-1, MT-2 voltage above which the device will not trigger. | - | 5 | 20 | V |
| Leakage in Inhibited State | I _R | I _F = Rated I _{FT} , V _{DRM} = 250V, Off-State | - | - | 500 | μA |

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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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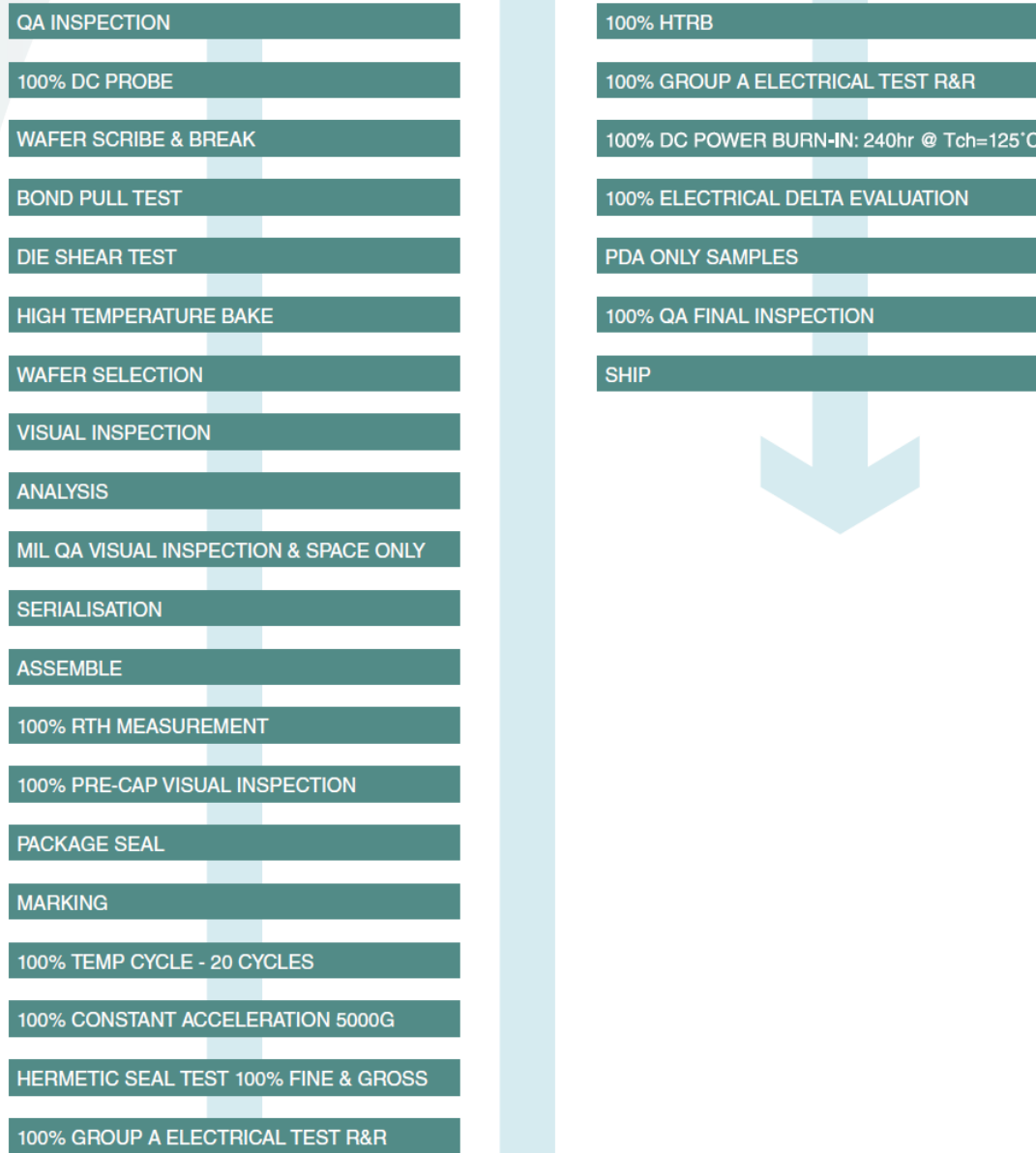
100% SCREENING to MIL-STD 750

| 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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Space Qualification PROCESS FLOW CHART FOR PACKAGED DEVICES



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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 |
| • <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 |

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