

PART NUMBER

CS3031/3032/3033

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:

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Ceramic Hermetically Sealed, Radiation Hard Zero Crossing Triac Optocoupler

- **CS3031/3032/3033**
- **CS3031/3032/3033/L2**
- **CS3031/3032/3033/L2S**

Features

- Released to European Standard and complies to Mil Std
- Hermetically Sealed
- High Isolation 1500Vdc
- 6 Pin Dual In Line Package
- 250V High Breakdown 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. The 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 CS3031 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.

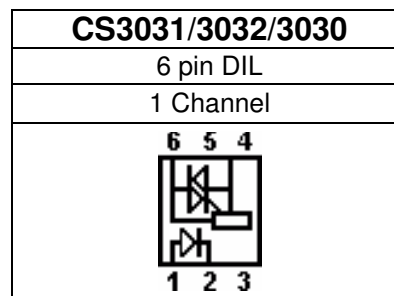
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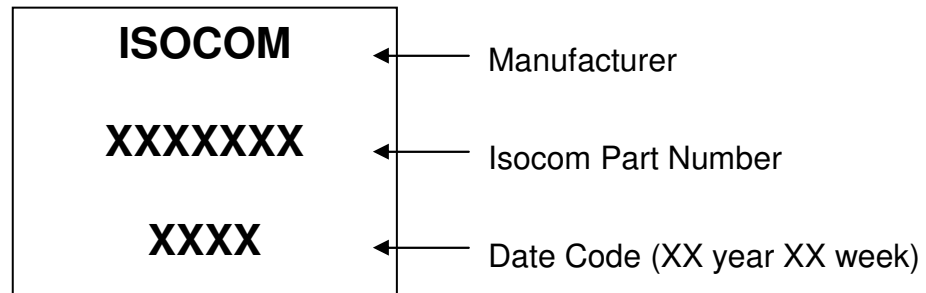
Selection Guide Package Styles and Configuration Options

Package	6 pin DIL
Lead Style	
Channels	1
Common Channel Wiring	
Isocom Part Number and Options	
Commercial	CS3031/3032/3033
Defense Screen Level	CS3031/3032/3033/L2
Space Screen Level	CS3031/3032/3033/L2S
Standard Gold Plate Finish	Gold Plate
Butt Joint	Option 10
Solder Dipped	Option 20
Gull Wing	Option 30
Butt Joint	Option 60

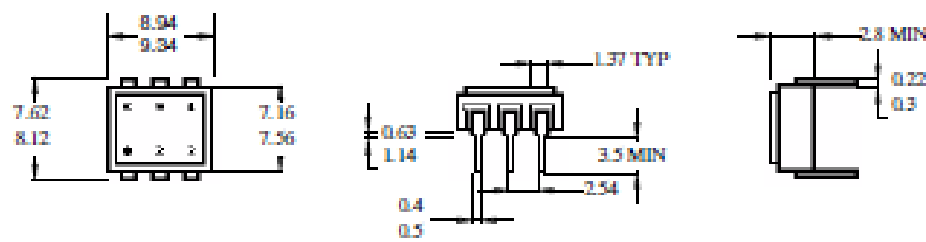
Functional Diagrams



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> <p>Technical drawings for Option 10 showing top and side views of a 6-pin DIP package. Dimensions are provided in inches (mm) with Min and Max values. Top view dimensions: 0.51 (0.02) Min, 2.29 (0.09), 2.79 (0.11), 0.51 (0.02) Max, 4.32 (0.17) Max, 1.14 (0.045), 1.40 (0.055). Side view dimensions: 0.51 (0.02) Min, 2.29 (0.09), 2.79 (0.11), 0.51 (0.02) Max, 4.32 (0.17) Max, 1.14 (0.045), 1.40 (0.055), 0.2 (0.008), 0.33 (0.013), 7.36 (0.29), 7.87 (0.31).</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> <p>Technical drawings for Option 30 showing top and side views of a 6-pin DIP package with gull-wing leads. Dimensions are provided in inches (mm) with Min and Max values. Top view dimensions: 0.51 (0.02) Min, 2.29 (0.09), 2.79 (0.11), 0.51 (0.02) Max, 4.57 (0.18) Max, 1.4 (0.055), 1.65 (0.065). Side view dimensions: 0.51 (0.02) Min, 2.29 (0.09), 2.79 (0.11), 0.51 (0.02) Max, 4.57 (0.18) Max, 5 deg Max, 1.4 (0.055), 1.65 (0.065), 0.2 (0.008), 0.33 (0.013), 9.65 (0.38), 9.91 (0.39).</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> <p>Technical drawings for Option 60 showing top and side views of a 6-pin DIP package. Dimensions are provided in inches (mm) with Min and Max values. Top view dimensions: 0.51 (0.02) Min, 2.29 (0.09), 2.79 (0.11), 1.14 (0.045), 1.25 (0.049), 3.81 (0.15) Min, 3.81 (0.15) Max. Side view dimensions: 0.2 (0.008), 0.33 (0.013), 7.36 (0.29), 7.87 (0.31), 0.51 (0.02) Min, 2.29 (0.09), 2.79 (0.11), 1.02 (0.04) Typ.</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	3V	
Power Dissipation	120mW	Derate linearly above 25°C at 1.33mW/°C.

Output Photo Triac

Off-State Output Terminal Voltage	250V	
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	1.8	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	250	-	-	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)		1000	2000	-	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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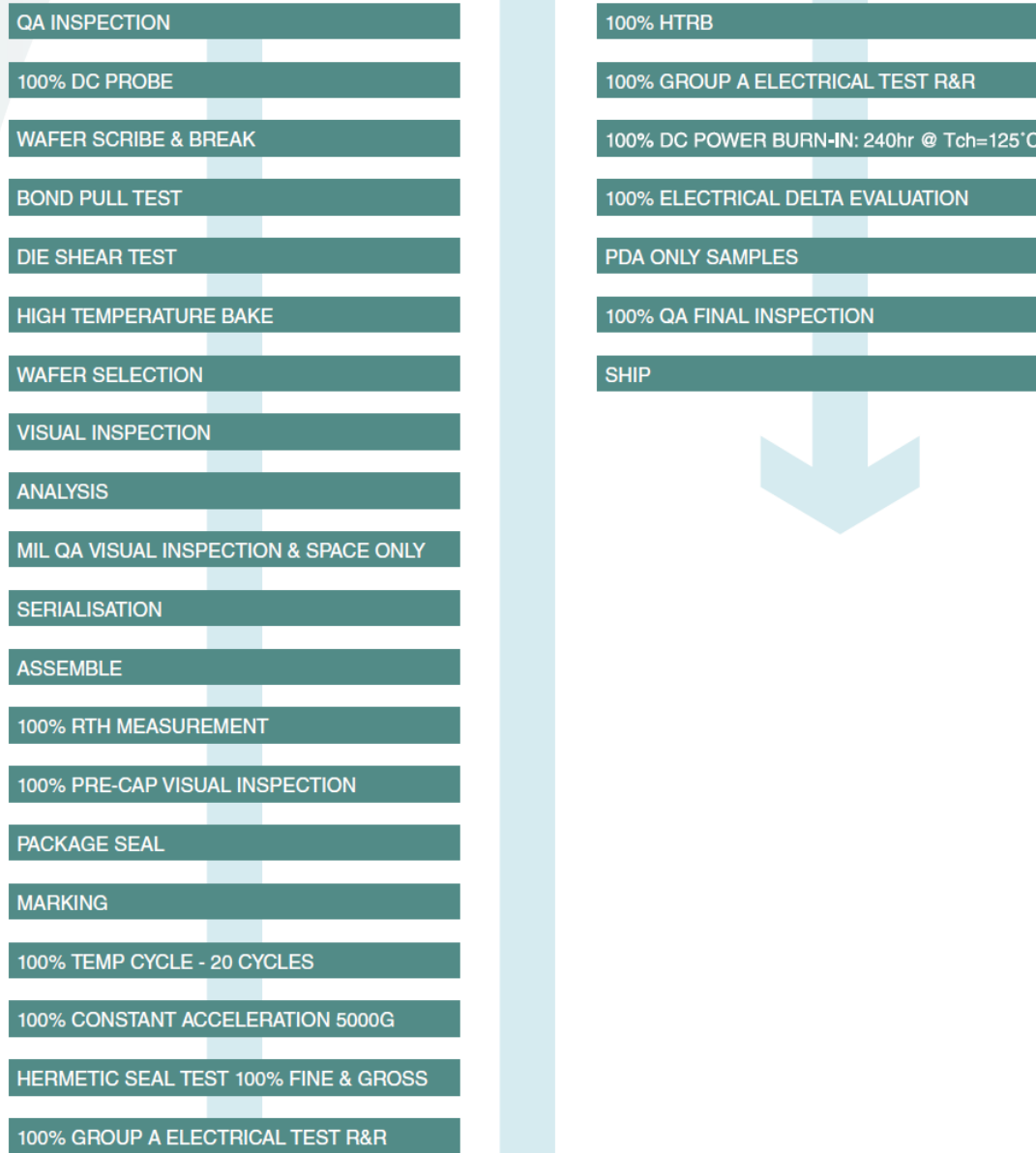
100% SCREENING to MIL-STD 750

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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