PART NUMBER **CSMR140**

COMPONENT **ISSUE 1**

SPECIFICATION **JANUARY 2017**

OPTICALLY COUPLED SOLID STATE RELAY

FEATURES	APPLICATIONS
Compact Isolation Solid State Switches	Space equipment and systems
Continuous Output Current of 0.8A to 3A	Military equipment and hi-reliability systems
1A Output Surge	Aircraft Controls
High Level of Transient Immunity	Electromechanical and Solid State Relay Replacement
Optically Coupled between Input and Output	Computer Systems
Space/Military Screening available	Standard 28 VDC and 48 VDC Load Driver
Full Military temperature range -55°C to +125°C	Motor Driver
	H Bridge Driver

DESCRIPTION

The CSMR140 is a Solid State Relay MOSFET optocoupler in a single 4-pin Leadless Chip Carrier (LCC) package. The CSMR140 series is being used in environments encounted by space, military/defence, aerospace and commercial applications. This popular hermetic ceramic package combined with 1,000vdc isolation between input and output makes this device ideal for solid-state relay applications. It is manufactured to JANS standard in conjunction with MIL-PRF-19500 procedures (see next page for all other applicable specifications). These devices are complete with standard gold-plated finish, with additional solder dip option available.

M1077 & E1280/F GB15/92780 GB09/76607 0005

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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

AS9100C – Design & Manufacture of Optocouplers and Optoelectronic Components
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

19/01/2017: Issue 1

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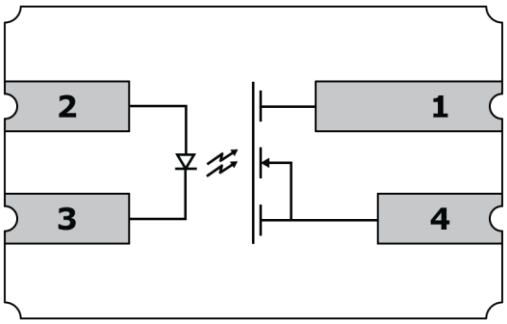
SELECTION GUIDE PACKAGE STYLES AND CONFIGURATION OPTIONS

ISOCOM PART NUMBER AND OPTIONS	
Package	4-pin LCC
Channels	1
Commercial	CSMR140
Defence Screen Level	CSMR140/L2
Space Screen Level	CSMR140/L2S
Standard Finish	Gold Plate
Solder Dipped	Option 20

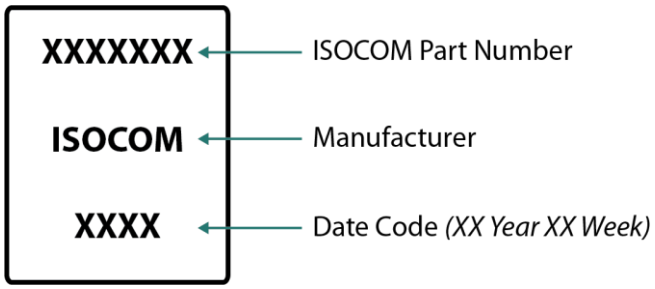
FUNCTIONAL DIAGRAMS

CSMR140
4-pin LCC



TRUTH TABLE	
INPUT	**OUTPUT**
CLOSED	CLOSED
OPEN	OPEN

DEVICE MARKING



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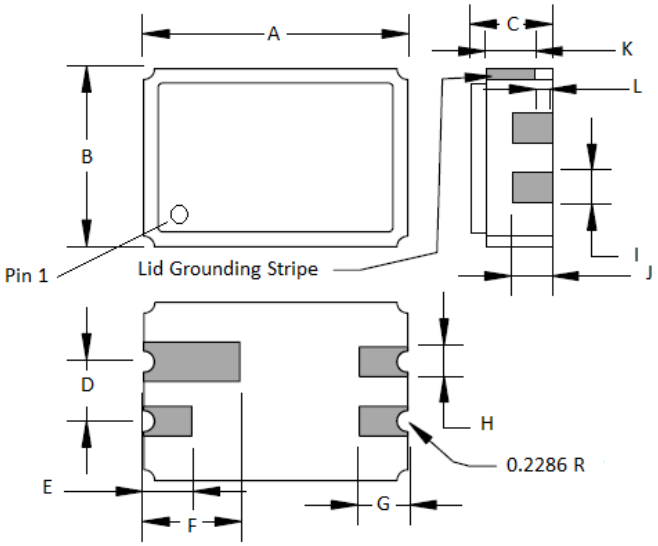
PACKAGE DIMENSIONS

LCC-4



PACKAGE DIMENSIONS

	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

HERMETIC OPTOCOUPLER OPTIONS

Option	Description
20	Solder Dipped

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ABSOLUTE MAXIMUM RATINGS

T_A 25°C **U.O.S.**

Storage Temperature	-65°C to +150°C
Operating Temperature – T_A	-55°C to +125°C
Junction Temperature – T_J	+150°C
Lead Soldering Temperature (for 10 seconds)	260°C (1.6mm below seating plane)
Average Input Current – I_F	20 mA
Peak Repetitive Input Current – I_{Fpk}	40 mA (pulse width < 100mS; duty cycle < 50%)
Peak Surge Input Current – $I_{Fpk\ surge}$	100 mA (pulse width < 0.2mS; duty cycle < 0.1%)
Continuous Output Current per relay – I_O	0.6 A
Output Voltage – V_O	400 V_{DC}
Input-to-Output Isolation Voltage	⇧1000 V_{DC}

RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	MIN	MAX	UNITS
Input Current (ON)	$I_{F(ON)}$	10	20	mA
Input Voltage (OFF)	$V_{F(OFF)}$	0	0.6	VDC
Operating Temperature	T_A	-55	+125	°C

ELECTRICAL CHARACTERISTICS

T_A = -55°C – +125°C **U.O.S.**

PARAMETER	SYMBOL	CONDITIONS	LIMITS		UNIT
			MIN	MAX	
Output Withstand Voltage	$V_{O(OFF)}$	$V_{O(OFF)}$ = 0.6V, I_O = 10µA	400	–	V
Output On-Resistance	$R_{(ON)}$	I_{FON} = 10mA, I_O = 800mA, pulse duration ≤30mS, duty cycles < 10%	–	1.2	Ω
Output Leakage Current	$I_{O(OFF)}$	$V_{F(OFF)}$ = 0.6V, V_O = 90V	–	10	µA
Input Forward Voltage	$V_{F(OFF)}$	I_{FON} = 10mA	1.0	1.7	V
Input Reverse Breakdown Voltage	V_R	I_R = 10µA	5.0	–	V
Input-Output Isolation Current	I_{I-O}	V_{I-O} = 1000vdc, t = 5s, R_H ≤ 45%. T_A = 25°C	–	1.0	µA
Channel-Channel Isolation Current	I_{ISO}	V_{ISO} = 1000vdc, t = 5s, R_H ≤ 45%. T_A = 25°C	–	1.0	µA
Turn-On Time	tON	I_{FON} = 10mA, I_O = 800mA, pulse duration ≤ 30 mS, duty cycles < 10%	–	6.0	ms
Turn-Off Time	tOFF	I_{FON} = 10mA, I_O = 800mA, pulse duration ≤ 30 mS, duty cycles < 10%	–	2.0	ms

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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 105, -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 D			
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 DIPPED		
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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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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