RDHA701CD10A2NX

Radiation Hardened Dual Solid State Relay
100V, 1.0A, R5 Technology

Features

- Total dose capability to 100kRads(Si)
- Optically coupled
- 1000VDC input-to-output, channel-to-channel, and pin-to-case isolation
- Hermetically sealed
- Ceramic package

Typical applications

- Solar array management, heater controls, bus switching, ground power isolation, generic load switching

Product validation

Screened to MIL-PRF-38534, and meets Qualification Conformance Inspection per MIL-PRF-38534 for Class K product

Description

The RDHA701CD10A2NX is a radiation hardened dual Solid State Relay in a hermetic package. It is configured as dual single pole single throw (SPST) normally open relay. This device is characterized for 100KRad (Si) total ionizing dose. The output MOSFET utilizes IR HiRel R5 technology.

Ordering Information

<table>
<thead>
<tr>
<th>Table 1</th>
<th>Ordering options</th>
</tr>
</thead>
<tbody>
<tr>
<td>Part number</td>
<td>Package</td>
</tr>
<tr>
<td>RDHA701CD10A2NX</td>
<td>8 Pin Ceramic</td>
</tr>
</tbody>
</table>
Radiation Hardened Dual Solid State Relay

Table of contents

Table of contents

Features ........................................................................................................................................ 1
Typical applications ....................................................................................................................... 1
Product validation .......................................................................................................................... 1
Description .................................................................................................................................... 1
Ordering Information .................................................................................................................... 1
Table of contents ............................................................................................................................ 2
1 Absolute Maximum Ratings ...................................................................................................... 3
2 Device Characteristics .............................................................................................................. 4
2.1 Electrical Characteristics (Per Channel) .................................................................................. 4
3 Test Circuits .............................................................................................................................. 5
4 Package Outline ........................................................................................................................ 6
5 Part Numbering Nomenclature ................................................................................................ 7
Revision history ............................................................................................................................ 8
RDHA701CD10A2NX
Radiation Hardened Dual Solid State Relay

Absolute Maximum Ratings

1 Absolute Maximum Ratings

Table 2 Absolute Maximum Ratings

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Value</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output Withstand Voltage</td>
<td>$V_{O(OFF)}$</td>
<td>100</td>
<td>V</td>
</tr>
<tr>
<td>Output Current</td>
<td>$I_O$</td>
<td>1.0</td>
<td>A</td>
</tr>
<tr>
<td>Input Forward Current</td>
<td>$I_F$</td>
<td>40</td>
<td>mA</td>
</tr>
<tr>
<td>Peak Input Forward Current (t ≤ 1.0ms)</td>
<td>$I_{Fpk}$</td>
<td>100</td>
<td>mA</td>
</tr>
<tr>
<td>Peak Input Reverse Voltage (t ≤ 1.0ms)</td>
<td>$V_R$</td>
<td>5.0</td>
<td>V</td>
</tr>
<tr>
<td>Power Dissipation</td>
<td>$P_{Diss}$</td>
<td>1.0</td>
<td>W</td>
</tr>
<tr>
<td>Operating Temperature Range</td>
<td>$T_J$</td>
<td>-55 to +125</td>
<td>°C</td>
</tr>
<tr>
<td>Storage Temperature Range</td>
<td>$T_S$</td>
<td>-65 to +150</td>
<td>°C</td>
</tr>
<tr>
<td>Lead Temperature (soldering ≤ 10sec)</td>
<td>$T_L$</td>
<td>300</td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td></td>
<td>0.8 (Typical)</td>
<td>g</td>
</tr>
</tbody>
</table>

1 While the SSR design meets the design requirements specified in MIL-PRF-38534, the end user is responsible for product derating as applicable for the application.
## Device Characteristics

### 2.1 Electrical Characteristics (Per Channel)

**Table 3** Electrical Characteristics per Channel @ -55°C ≤ T<sub>C</sub> ≤ +125°C (Unless Otherwise Specified) ¹

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Group A Subgroups</th>
<th>Test Conditions</th>
<th>Symbol</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output On-Resistance</td>
<td>1</td>
<td>I&lt;sub&gt;F&lt;/sub&gt; = 10mA, I&lt;sub&gt;O&lt;/sub&gt; = 1.0A</td>
<td>R&lt;sub&gt;DS(ON)&lt;/sub&gt;</td>
<td>—</td>
<td>0.25</td>
<td>0.40</td>
<td>Ω</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td>0.39</td>
<td>0.80</td>
<td></td>
</tr>
<tr>
<td>Output Leakage Current</td>
<td>1</td>
<td>I&lt;sub&gt;F&lt;/sub&gt; = 0, V&lt;sub&gt;OUT&lt;/sub&gt; = 100V</td>
<td>I&lt;sub&gt;0&lt;/sub&gt;</td>
<td>—</td>
<td>—</td>
<td>10</td>
<td>μA</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td></td>
<td></td>
<td>—</td>
<td>—</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>Input Forward Voltage</td>
<td>1, 2, 3</td>
<td>I&lt;sub&gt;F&lt;/sub&gt; = 10mA</td>
<td>V&lt;sub&gt;F&lt;/sub&gt;</td>
<td>1.0</td>
<td>—</td>
<td>1.85</td>
<td>V</td>
</tr>
<tr>
<td>Input-to-Output Leakage Current</td>
<td>1</td>
<td>V&lt;sub&gt;I-O&lt;/sub&gt; = 100Vdc, dwell = 5s</td>
<td>I&lt;sub&gt;I-O&lt;/sub&gt;</td>
<td>—</td>
<td>—</td>
<td>1.0</td>
<td>μA</td>
</tr>
<tr>
<td>Channel-to-Channel Leakage Current</td>
<td>1</td>
<td>V&lt;sub&gt;I-O&lt;/sub&gt; = 1000Vdc, dwell = 5s</td>
<td>I&lt;sub&gt;CH-CH&lt;/sub&gt;</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td></td>
</tr>
<tr>
<td>Pin-to-Case Leakage Current</td>
<td></td>
<td></td>
<td>I&lt;sub&gt;CASE&lt;/sub&gt;</td>
<td>—</td>
<td>—</td>
<td>1.0</td>
<td>μA</td>
</tr>
<tr>
<td>Turn-On Time</td>
<td>9, 10, 11</td>
<td>I&lt;sub&gt;F&lt;/sub&gt; = 0 to 10mA, V&lt;sub&gt;Bus&lt;/sub&gt; = 28V, I&lt;sub&gt;O&lt;/sub&gt; = 1.0A, Duty Cycle ≤ 1.0%</td>
<td>t&lt;sub&gt;on&lt;/sub&gt;</td>
<td>—</td>
<td>—</td>
<td>4.0</td>
<td>ms</td>
</tr>
<tr>
<td>Turn-Off Time</td>
<td>9, 10, 11</td>
<td>I&lt;sub&gt;F&lt;/sub&gt; = 10mA to 0, V&lt;sub&gt;Bus&lt;/sub&gt; = 28V, I&lt;sub&gt;O&lt;/sub&gt; = 1.0A, Duty Cycle ≤ 1.0%</td>
<td>t&lt;sub&gt;off&lt;/sub&gt;</td>
<td>—</td>
<td>—</td>
<td>2.0</td>
<td></td>
</tr>
<tr>
<td>Output Capacitance</td>
<td></td>
<td>I&lt;sub&gt;F&lt;/sub&gt; = 0, V = +25V, f = 1MHz, T&lt;sub&gt;C&lt;/sub&gt; = 25°C</td>
<td>C&lt;sub&gt;OSS&lt;/sub&gt;</td>
<td>—</td>
<td>110</td>
<td>—</td>
<td>pF</td>
</tr>
<tr>
<td>Thermal Resistance</td>
<td></td>
<td>Per Channel</td>
<td>R&lt;sub&gt;THJC&lt;/sub&gt;</td>
<td>—</td>
<td>—</td>
<td>15</td>
<td>°C/W</td>
</tr>
<tr>
<td>MTBF</td>
<td></td>
<td>MIL-HDBK-217F, SF@ TC = 25°C</td>
<td>22.7</td>
<td>—</td>
<td>—</td>
<td>MHrs</td>
<td></td>
</tr>
</tbody>
</table>

¹ IR HiRel does not currently have a DLA Certified Radiation Hardness Assurance Program.

² Turn-On Time (ton) includes the turn-on delay and rise time; Turn-Off Time (toff) includes the turn-off delay and fall time.

³ Reference Fig. 2 for Switching Test Circuits and Fig. 3 for Switching Test Wave Form.

⁴ Optically coupled Solid State Relays (SSRs) have relatively slow turn on and turn off times. Care must be taken to ensure that transient currents do not cause a violation of SOA. If transient conditions are present, IR HiRel recommends a complete simulation to be performed by the end user to ensure compliance with SOA requirements as specified in the IRRHQ57110 datasheet.

⁵ Rise and fall time are controlled internally.

⁶ Specification is guaranteed by design.
3 Test Circuits

Figure 1  Block Diagram

Figure 2  Switching Test Circuit

Figure 3  Switching Waveforms
Note: For the most updated package outline, please see the website: Package (8 Pin Ceramic)
Part Numbering Nomenclature

Device type
RD = DC solid state relay

Radiation characterization
H = Rad hard
F = Non rad hard

Generation
A = Current design
B = Future

Radiation level
7 = 100 krad (Si)

Current
01 = 1A

Package type
CD = 8 Pin Ceramic

Screening level
P = Unscreened, 25°C
Electrical test (not for qualification)
X = Class K per MIL-PRF-38534

Features
N = Non buffered fast

Number of poles
2 = Double poles

Throw configuration
A = Single throw, normally open

Voltage
10 = 100V
# Revision history

<table>
<thead>
<tr>
<th>Document version</th>
<th>Date of release</th>
<th>Description of changes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>10/19/2010</td>
<td>Final datasheet</td>
</tr>
<tr>
<td>Rev A</td>
<td>10/26/2010</td>
<td>Updated Package Picture with IR logo – page1</td>
</tr>
<tr>
<td>Rev C</td>
<td>05/25/2012</td>
<td>Updated per ECN-1120-00458</td>
</tr>
<tr>
<td>Rev C</td>
<td>09/02/2021</td>
<td>Updated per ECN-1120-8644</td>
</tr>
</tbody>
</table>
IMPORTANT NOTICE

The information given in this document shall in no event be regarded as a guarantee of conditions or characteristics (“Beschaffenheitsgarantie”).

With respect to any examples, hints or any typical values stated herein and/or any information regarding the application of the product, Infineon Technologies hereby disclaims any and all warranties and liabilities of any kind, including without limitation warranties of non-infringement of intellectual property rights of any third party. In addition, any information given in this document is subject to customer’s compliance with its obligations stated in this document and any applicable legal requirements, norms and standards concerning customer’s products and any use of the product of Infineon Technologies in customer’s applications.

The data contained in this document is exclusively intended for technically trained staff. It is the responsibility of customer’s technical departments to evaluate the suitability of the product for the intended application and the completeness of the product information given in this document with respect to such application.

For further information on the product, technology, delivery terms and conditions and prices please contact your nearest Infineon Technologies office (www.infineon.com).

WARNINGS

Due to technical requirements components may contain dangerous substances. For information or the types in question please contact your nearest International Rectifier HiRel Products, Inc., an Infineon Technologies company, office. International Rectifier HiRel Components may only be used in life-support devices or systems with the expressed written approval of International Rectifier HiRel Products, Inc., an Infineon Technologies company, if failure of such components can reasonably be expected to cause the failure of that life-support device or system, or to affect the safety and effectiveness of that device or system. Technologies, Infineon Technologies’ products may not be used in any applications where a failure of the product or any consequences of the use thereof can reasonably be expected to result in personal injury. Life support devices or systems are intended to be implanted in the human body, or to support and/or maintain and sustain and/or protect human life. If they fail, it is reasonable to assume that the health of the user or other persons may be endangered.

Trademarks

All referenced product or service names and trademarks are the property of their respective owners.