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>Part number</th>
<th>Package</th>
<th>Screening Level</th>
<th>TID Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>RDHA701CD10A2NX</td>
<td>8 Pin Ceramic</td>
<td>Class K</td>
<td>100krad(Si)</td>
</tr>
</tbody>
</table>

Product Summary
- **Part number**: RDHA701CD10A2NX
- **Radiation level**: 100 kRads (Si)
- **Configuration**: Dual DC
- **Voltage**: 100V
- **I_D**: 1.0A
RDHA701CD10A2NX
Radiation Hardened Dual Solid State Relay

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## Absolute Maximum Ratings

Table 2  Absolute Maximum Ratings @ \( T_J = 25^\circ C \) (unless otherwise specified)

<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 (^1)</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 \leq 1.0)ms)</td>
<td>( I_{F pk} )</td>
<td>100</td>
<td>mA</td>
</tr>
<tr>
<td>Peak Input Reverse Voltage (( t \leq 1.0)ms)</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>( ^\circ C )</td>
</tr>
<tr>
<td>Storage Temperature Range</td>
<td>( T_S )</td>
<td>-65 to +150</td>
<td>( ^\circ C )</td>
</tr>
<tr>
<td>Lead Temperature (soldering ( \leq 10)sec)</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>
<thead>
<tr>
<th>Parameter</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>$I_F = 10,mA, I_O = 1.0,A$</td>
<td>$R_{DS(ON)}$</td>
<td>—</td>
<td>0.25</td>
<td>0.40</td>
<td>Ω</td>
</tr>
<tr>
<td>Output Leakage Current</td>
<td>$I_F = 0, V_{OUT} = 100,V$</td>
<td>$I_O$</td>
<td>—</td>
<td>—</td>
<td>10</td>
<td>μA</td>
</tr>
<tr>
<td>Input Forward Voltage</td>
<td>$I_F = 10,mA$</td>
<td>$V_F$</td>
<td>1.0</td>
<td>—</td>
<td>1.85</td>
<td>V</td>
</tr>
<tr>
<td>Input-to-Output Leakage Current</td>
<td>$V_{I-O} = 1000,V_{dc}$</td>
<td>$I_{I-O}$</td>
<td>—</td>
<td>—</td>
<td>1.0</td>
<td>μA</td>
</tr>
<tr>
<td>Channel-to-Channel Leakage Current</td>
<td>$V_{I-O} = 1000,V_{dc}$</td>
<td>$I_{CH-CH}$</td>
<td>—</td>
<td>—</td>
<td>1.0</td>
<td>μA</td>
</tr>
<tr>
<td>Pin-to-Case Leakage Current</td>
<td>$I_{CASE}$</td>
<td></td>
<td>—</td>
<td>—</td>
<td>4.0</td>
<td>ms</td>
</tr>
<tr>
<td>Turn-On Time</td>
<td>$I_F = 0$ to $10,mA, V_{BUS} = 28,V, I_O = 1.0,A, Duty Cycle ≤ 1.0%</td>
<td>$t_{on}$</td>
<td>—</td>
<td>—</td>
<td>4.0</td>
<td>ms</td>
</tr>
<tr>
<td>Turn-Off Time</td>
<td>$I_F = 10,mA$ to $0, V_{BUS} = 28,V, I_O = 1.0,A, Duty Cycle ≤ 1.0%</td>
<td>$t_{off}$</td>
<td>—</td>
<td>—</td>
<td>2.0</td>
<td>ms</td>
</tr>
<tr>
<td>Output Capacitance</td>
<td>$I_F = 0, V = +25,V, f = 1,MHz, T_C = 25,°C$</td>
<td>$C_{OSS}$</td>
<td>—</td>
<td>110</td>
<td>—</td>
<td>pF</td>
</tr>
<tr>
<td>Thermal Resistance</td>
<td>Per Channel</td>
<td>$R_{THJC}$</td>
<td>—</td>
<td>—</td>
<td>15</td>
<td>°C/W</td>
</tr>
<tr>
<td>MTBF</td>
<td>MIL-HDBK-217F, SF@ TC=25°C</td>
<td></td>
<td>22.7</td>
<td>—</td>
<td>—</td>
<td>MHrs</td>
</tr>
</tbody>
</table>

1. IR HiRel does not currently have a DLA Certified Radiation Hardness Assurance Program.
2. Turn-On Time ($t_{on}$) includes the turn-on delay and rise time; Turn-Off Time ($t_{off}$) 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 IRHQ57110 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
4 Package Outline

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>
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<tbody>
<tr>
<td></td>
<td>10/19/2010</td>
<td>Final datasheet</td>
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<tr>
<td>Rev A</td>
<td>10/26/2010</td>
<td>Updated Package Picture with IR logo – page 1</td>
</tr>
<tr>
<td>Rev C</td>
<td>05/25/2012</td>
<td>Updated per ECN-1120-00458</td>
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<tr>
<td>Rev C</td>
<td>09/02/2021</td>
<td>Updated per ECN-1120-8644</td>
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