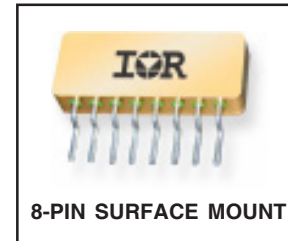


**Radiation Hardended,
 Solid-State Relay
 with Buffered Inputs**

**RDHB710SE20A2SX
 Dual, 200V, 10A**

Product Summary 5

Part Number	Breakdown Voltage	Current	tr / tf	Logic Drive Voltage
RDHB710SE20A2SX	200V	10A	Controlled	3.3V



Description

The RDHB710SE20A2SX is a radiation hardened dual solid-state relay in a hermetic package. It is configured as a dual, single-pole-single-throw (SPST) normally open relay with common input supply. This device is characterized for 100 Krad(Si) total ionizing dose, and neutron fluence level of $1.8E^{12}$ n/cm². The input and output MOSFETs utilize International Rectifier's R6 technology. The RDHB710SE20A2SX is optically coupled and actuated by standard logic inputs.

Features:

- Total Dose Capability to 100 Krad (Si)
- Neutron Fluence Level of $1.8E^{12}$ n/cm²
- Optically Coupled
- 1000VDC Input to Output Isolation
- Buffered Input Stage
- 3.3V Compatible Logic Level Input
- Controlled Switching Times
- Hermetically Sealed Package

Absolute Maximum Ratings per Channel @ T_J = 25°C (unless otherwise specified)

Parameter	Symbol	Value	Units
Output Voltage 5, 8	V _S	200	V
Output Current 4, 5	I _O	10	A
Input Buffer Voltage - (Pins 4 & 6) 3	V _{IN}	±7.0	V
Input Buffer Current	I _{IN}	±10	mA
Input Supply Voltage (Pin 5) 7	V _{DD}	10	V
Input Supply Current 7	I _{DD}	25	mA
Power Dissipation 4, 5	P _{DISS}	73	W
Operating Temperature Range	T _J	-55 to +150	°C
Storage Temperature Range	T _S	-65 to +150	
Lead Temperature	T _L	300	

For Notes, please refer to page 3

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General Characteristics per Channel @ $-55^{\circ}\text{C} \leq T_c \leq +125^{\circ}\text{C}$ (unless otherwise specified)

Parameter	Group A	Test Conditions	Symbol	Min.	Typ.	Max.	Units
	Subgroups						
Input Buffer Threshold Voltage 1, 3		$V_{DD} = 5.0V, I_O = 10A$	$V_{IN(TH)}$	3.0			V
Input-to-Output Leakage Current	1	$V_{I-O} = 1.0KVdc, dwell = 5.0s$ $T_C = 25^{\circ}C$	I_{I-O}			1.0	μA
Output Capacitance 1		$V_{IN} = 0.1V, f = 1.0MHz,$ $V_S = 25V, T_C = 25^{\circ}C$	C_{OSS}		210		pF
Thermal Resistance 1		$V_{IN} = 3.3V, V_{DD} = 5.0V$ 1, 4	R_{THJC}			1.4	$^{\circ}C/W$
MTBF (Per Channel)		MIL-HDBK-217F, SF@Tc= 25 $^{\circ}C$		6.0			MHrs
Weight			W			25	gms

Pre-Irradiation

Electrical Characteristics per Channel @ $-55^{\circ}\text{C} \leq T_c \leq +125^{\circ}\text{C}$ (unless otherwise specified)

Parameter	Group A	Test Conditions	Symbol	Min.	Typ.	Max.	Units
	Subgroups						
Output On-Resistance	1	$V_{IN} = 3.3V$	$R_{DS(ON)}$			0.15	Ω
	2	$V_{DD} = 5.0V, I_O = 10A$				0.29	
Output Leakage Current	1	$V_{IN} = 0.1V, V_S = 200V$	I_O			25	μA
	2	$V_{IN} = 0.1V, V_S = 150V$				250	
Input Supply Current	1, 2, 3	$V_{DD} = 5.0V, I_O = 10A$	I_{DD}		10	15	mA
		$V_{DD} = 10V, I_O = 10A$ 1, 7				25	
Input Buffer Current	1	$V_{IN} = 3.3V$	I_{IN}			1.0	μA
	2, 3					3.0	
Turn-On Delay 6	1, 2, 3	$V_{IN} = 3.3V, V_{DD} = 5.0V, V_S = 50V$ $R_L = 5\Omega, PW = 50ms$	t_{on}			1.5	ms
Turn-Off Delay 6	1, 2, 3	$V_{IN} = 0.1V, V_{DD} = 5.0V, V_S = 50V$ $R_L = 5\Omega, PW = 50ms$	t_{off}			10	
Rise Time 2, 6	1, 2, 3	$V_{IN} = 3.3V, V_{DD} = 5.0V, V_S = 50V$ $R_L = 5\Omega, PW = 50ms$	t_r			0.5	
Fall Time 2, 6	1, 2, 3	$V_{IN} = 0.1V, V_{DD} = 5.0V, V_S = 50V$ $R_L = 5\Omega, PW = 50ms$	t_f			2.5	

For Notes, please refer to page 3

Post Total Dose Irradiation 9, 10, 11

Electrical Characteristics per Channel @ 25°C (unless otherwise specified)

Parameter	Group A Subgroups	Test Conditions	Symbol	Min.	Typ.	Max.	Units
Output On-Resistance	1	$V_{IN} = 3.3V, V_{DD} = 5.0V, I_O = 10A$	$R_{DS(ON)}$			0.15	Ω
Input Supply Current	1	$V_{IN} = 3.3V, V_{DD} = 5.0V, I_O = 10A$	I_{DD}		10	15	mA
Output Leakage Current	1	$V_{IN} = 0.1V, V_S = 200V$	I_O			25	μA
Input Buffer Current	1	$V_{IN} = 3.3V$	I_{IN}			1.0	μA
Turn-On Delay ⁶	1	$V_{IN} = 3.3V, V_{DD} = 5.0V, V_S = 50V$ $RL = 5\Omega, PW = 50ms$	t_{on}			1.5	ms
Turn-Off Delay ⁶	1	$V_{IN} = 0.1V, V_{DD} = 5.0V, V_S = 50V$ $RL = 5\Omega, PW = 50ms$	t_{off}			10	
Rise Time ^{2, 6}	1	$V_{IN} = 3.3V, V_{DD} = 5.0V, V_S = 50V$ $RL = 5\Omega, PW = 50ms$	t_r			0.5	
Fall Time ^{2, 6}	1	$V_{IN} = 0.1V, V_{DD} = 5.0V, V_S = 50V$ $RL = 5\Omega, PW = 50ms$	t_f			2.5	

Notes for Maximum Ratings and Electrical Characteristic Tables

1. Specification is guaranteed by design.
2. Rise and fall times are controlled internally.
3. Inputs protected for $V_{IN} < 1.0V$ and $V_{IN} > 7.0V$.
4. Optically coupled Solid State Relays (SSRs) have relatively slow turn on and turn off times. Care must be taken to insure that transient currents do not cause violation of SOA. If transient conditions are present, IR recommends a complete simulation to be performed by the end user to insure compliance with SOA requirements as specified in the IRHNJ67230 data sheet.
5. While the SSR design meets the design requirements specified in MIL-PRF-38534, the end user is responsible for product derating, as required for the application.
6. Reference Figures 3 & 4 for Switching Test Circuits and Wave Form; Output Voltage (V_O) of Figure 4, Switching Test Wave Form is representative of the Output MOSFET and Drain-to-Source.
7. Input Supply voltage shall not exceed 5.25V @ $T_c \geq 70^\circ C$.
8. Breakdown voltage (BV_{DSS}) of Output MOSFET, @ $-55^\circ C$, shall be derated to 80% of Maximum Rated Voltage.
9. Total Dose Irradiation with Input Bias. 10mA I_{DD} applied and $V_{DS} = 0$ during Irradiation.
10. Total Dose Irradiation with Output Bias. 160Volts V_{DS} applied and $I_{DD} = 0$ during Irradiation.
11. International Rectifier does not currently have a DLA certified Radiation Hardness.

Radiation Performance

International Rectifier Radiation Hardened Solid State Relays are tested to verify their hardness capability. The hardness assurance program at IR uses a Cobalt-60 (^{60}Co) Source and heavy ion irradiation. Both pre- and post-irradiation performance are tested and specified using the same drive circuitry and test conditions to provide a direct comparison.

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International
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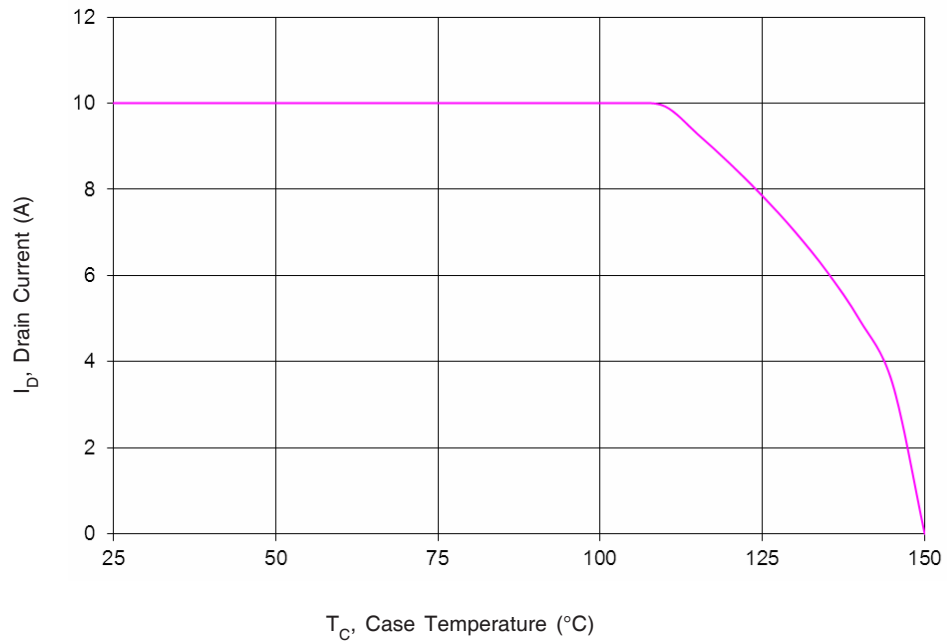


Figure 1: Maximum Drain Current Vs Case Temperature per Channel

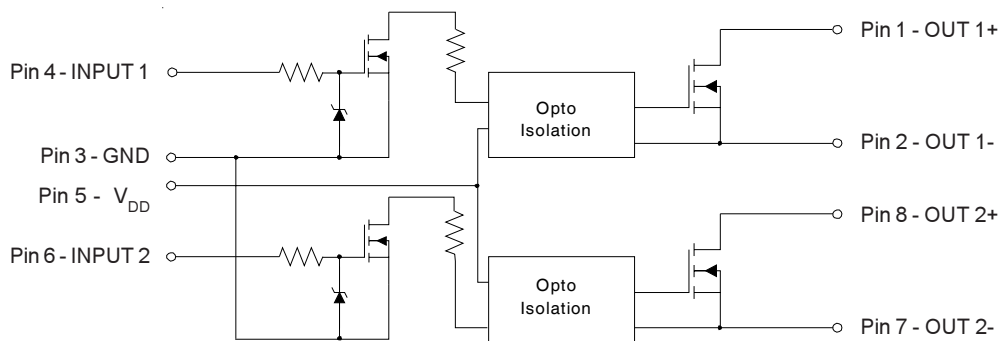


Figure 2: Typical Application

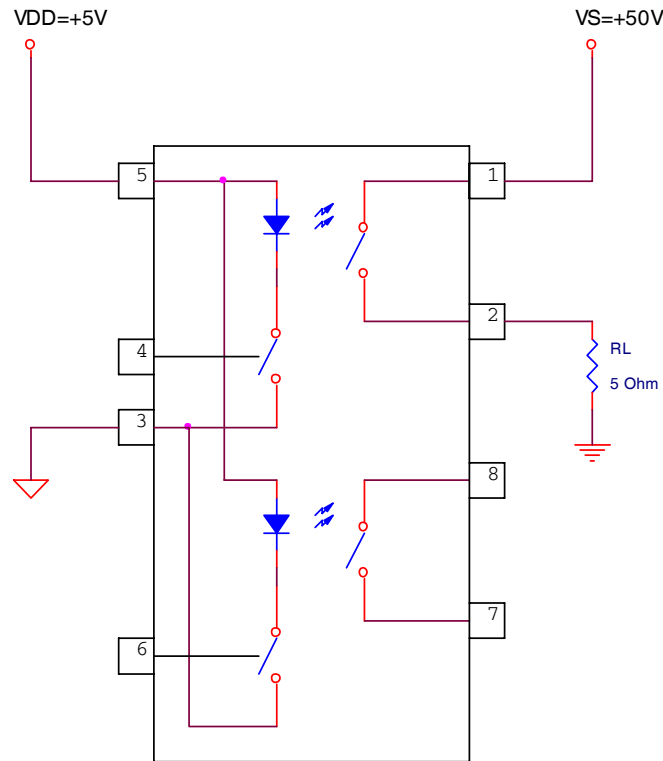


Figure 3: Switching Test Circuit (Only one channel shown)

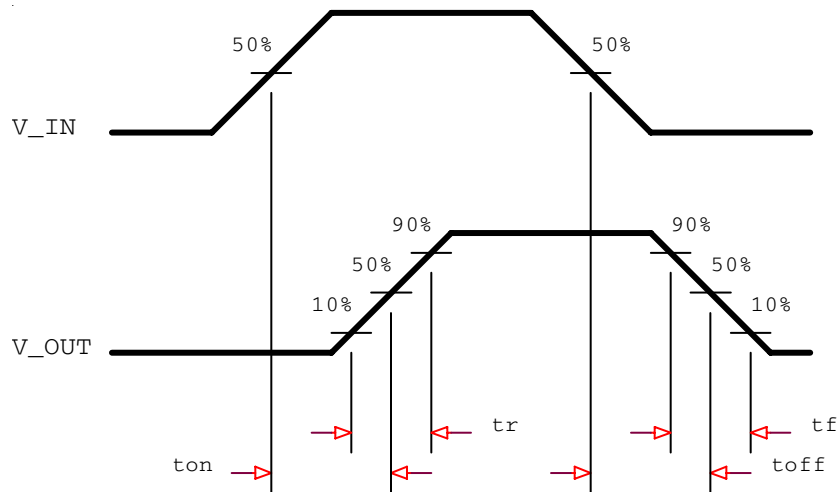
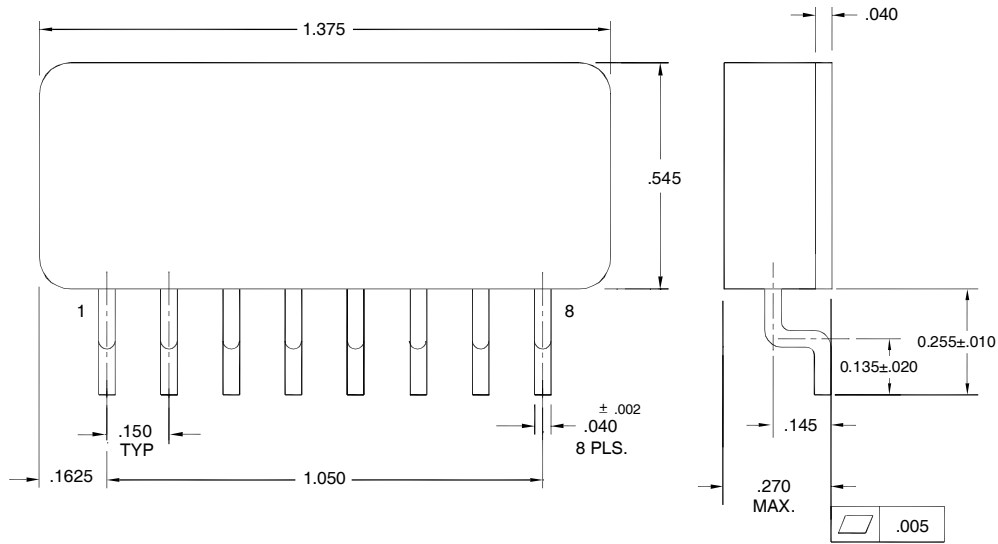


Figure 4: Switching Test Waveform

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Case Outline and Dimensions — 8-Pin Surface Mount Package



NOTES:

1. Dimensioning and Tolerancing per ASME Y14.53M-1994
2. Controlling Dimension: Inch
3. Dimensions are shown in inches
4. Tolerances are ± 0.005 UOS
5. Lead Dimensions are prior to Hot Solder Dip
6. Lead Finish per MIL-PRF-38534, Finish A, Hot Solder Dip (Sn63Pb37)

Pin Designation

Pin #	Pin Description
1	OUT 1 +
2	OUT 1 -
3	INPUT GND
4	INPUT 1
5	V_{DD}
6	INPUT 2
7	OUT 2 -
8	OUT 2 +

Part Numbering Nomenclature

