

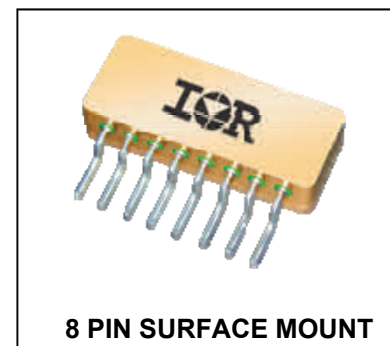
RDHB710SE20A2SX

RADIATION HARDENED BUFFERED INPUT SOLID STATE RELAY

Dual 200V, 10A

Product Summary

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



Description

The RDHB710SE20A2SX is part of the International Rectifier HiRel family of products. 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 100kRads(Si) total ionizing dose, and neutron fluence level of $1.8E^{12}n/cm^2$. The input and output MOSFETs utilize International Rectifier HiRel R6 technology. The RDHB710SE20A2SX is optically coupled and actuated by standard logic inputs.

Features

- Total Dose Capability to 100kRads(Si)
- Neutron Fluence Level of $1.8E^{12}n/cm^2$
- Optically Coupled
- Buffered Input Stage
- 3.3V Compatible Logic Level Input
- Controlled Switching Times
- 1000V_{DC} Input to Output Isolation
- Hermetically Sealed Package

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

Parameter	Symbol	Value	Units
Output Maximum Voltage ⑤⑧	V _S	200	V
Output Current ④⑤	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 ④⑤	P _{DISS}	73	W
Operating Junction Range	T _J	-55 to +150	°C
Storage Temperature Range	T _{STG}	-65 to +150	
Lead Temperature	T _L	300	

For Notes, refer to the page 3.

General Characteristics per Channel @ $-55^{\circ}\text{C} \leq T_C \leq +125^{\circ}\text{C}$ (Unless Otherwise Specified)

Parameter	Group A Subgroups	Test Conditions	Symbol	Min.	Typ.	Max.	Units
Input Buffer Threshold Voltage ①③		$V_{DD} = 5.0\text{V}$, $I_O = 10\text{A}$	$V_{IN(TH)}$	3.0	—	—	V
Input-to-Output Leakage Current	1	$V_{I-O} = 1.0\text{kV}_{DC}$, $d_{well} = 5.0\text{s}$ $T_C = 25^{\circ}\text{C}$	I_{I-O}	—	—	1.0	μA
Output Capacitance ①		$V_{IN} = 0.8\text{V}$, $f = 1.0\text{MHz}$, $V_S = 25\text{V}$, $T_C = 25^{\circ}\text{C}$	C_{OSS}	—	210	—	pF
Thermal Resistance ①		$V_{IN} = 3.3\text{V}$, $V_{DD} = 5.0\text{V}$ ①④	R_{THJC}	—	—	1.4	$^{\circ}\text{C/W}$
MTBF (Per Channel)		MIL-HDBK-217F, SF @ $T_C = 25^{\circ}\text{C}$		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 Subgroups	Test Conditions	Symbol	Min.	Typ.	Max.	Units
Output On-Resistance	1	$V_{IN} = 3.3\text{V}$, $V_{DD} = 5.0\text{V}$	$R_{DS(ON)}$	—	—	0.15	Ω
	2	$I_O = 10\text{A}$		—	—	0.29	
Output Leakage Current	1	$V_{IN} = 0.1\text{V}$, $V_S = 200\text{V}$	I_O	—	—	25	μA
	2	$V_{IN} = 0.1\text{V}$, $V_S = 150\text{V}$		—	—	250	
Input Supply Current	1, 2, 3	$V_{DD} = 5.0\text{V}$, $I_O = 10\text{A}$	I_{DD}	—	10	15	mA
		$V_{DD} = 10\text{V}$, $I_O = 10\text{A}$ ① ⑦		—	—	25	
Input Buffer Current	1	$V_{IN} = 3.3\text{V}$	I_{IN}	—	—	1.0	μA
	2, 3			—	—	3.0	
Turn-On Delay ⑥	9, 10, 11	$V_{IN} = 3.3\text{V}$, $V_{DD} = 5.0\text{V}$, $V_S = 50\text{V}$ $R_L = 5\Omega$, $PW = 50\text{ms}$	t_{on}	—	—	1.5	ms
Turn-Off Delay ⑥	9, 10, 11	$V_{IN} = 0.1\text{V}$, $V_{DD} = 5.0\text{V}$, $V_S = 50\text{V}$ $R_L = 5\Omega$, $PW = 50\text{ms}$	t_{off}	—	—	10	
Rise Time ②⑥	9, 10, 11	$V_{IN} = 3.3\text{V}$, $V_{DD} = 5.0\text{V}$, $V_S = 50\text{V}$ $R_L = 5\Omega$, $PW = 50\text{ms}$	t_r	—	—	1.5	
Fall Time ②⑥	9, 10, 11	$V_{IN} = 0.1\text{V}$, $V_{DD} = 5.0\text{V}$, $V_S = 50\text{V}$ $R_L = 5\Omega$, $PW = 50\text{ms}$	t_f	—	—	3.5	

For Notes, refer to the 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	
Turn-On Delay ⑥	9	$V_{IN} = 3.3V$, $V_{DD} = 5.0V$, $V_S = 50V$ $R_L = 5\Omega$, $PW = 50ms$	t_{on}	—	—	1.5	ms
Turn-Off Delay ⑥	9	$V_{IN} = 0.1V$, $V_{DD} = 5.0V$, $V_S = 50V$ $R_L = 5\Omega$, $PW = 50ms$	t_{off}	—	—	10	
Rise Time ②⑥	9	$V_{IN} = 3.3V$, $V_{DD} = 5.0V$, $V_S = 50V$ $R_L = 5\Omega$, $PW = 50ms$	t_r	—	—	1.5	
Fall Time ②⑥	9	$V_{IN} = 0.1V$, $V_{DD} = 5.0V$, $V_S = 50V$ $R_L = 5\Omega$, $PW = 50ms$	t_f	—	—	3.5	

Notes for Maximum Ratings, General and Electrical Characteristics Tables:

- ① Specification is guaranteed by design.
- ② Rise and fall time are controlled internally.
- ③ Inputs protected by $V_{IN} < 1.0V$ 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 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 IRHNJ67230 datasheet.
- ⑤ 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.
- ⑥ Reference Fig. 3 and 4 for Switching Test Circuits and Wave Forms: Output Voltage (V_{OUT}) of Fig 4, Switching Test Waveform 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 IR HiRel does not currently have a DLA Certified Radiation Hardness Assurance Program.

Radiation Performance:

IR HiRel Radiation Hardened SSRs are tested to verify their hardness capability. The hardness assurance program at IR HiRel 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.

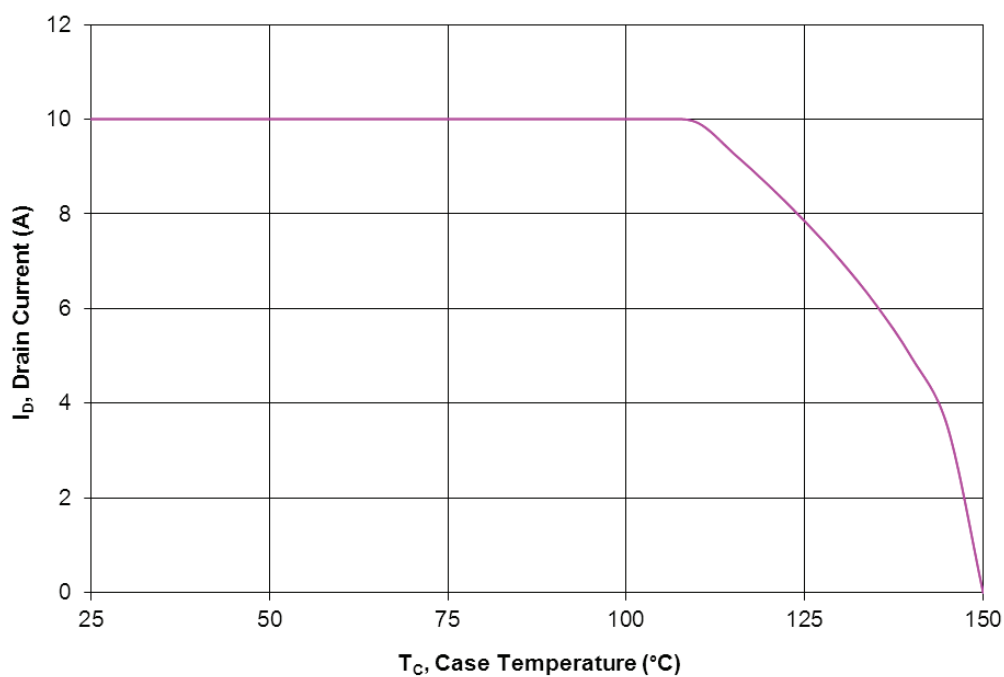


Fig 1. Maximum Drain Current Vs Case Temperature per Channel

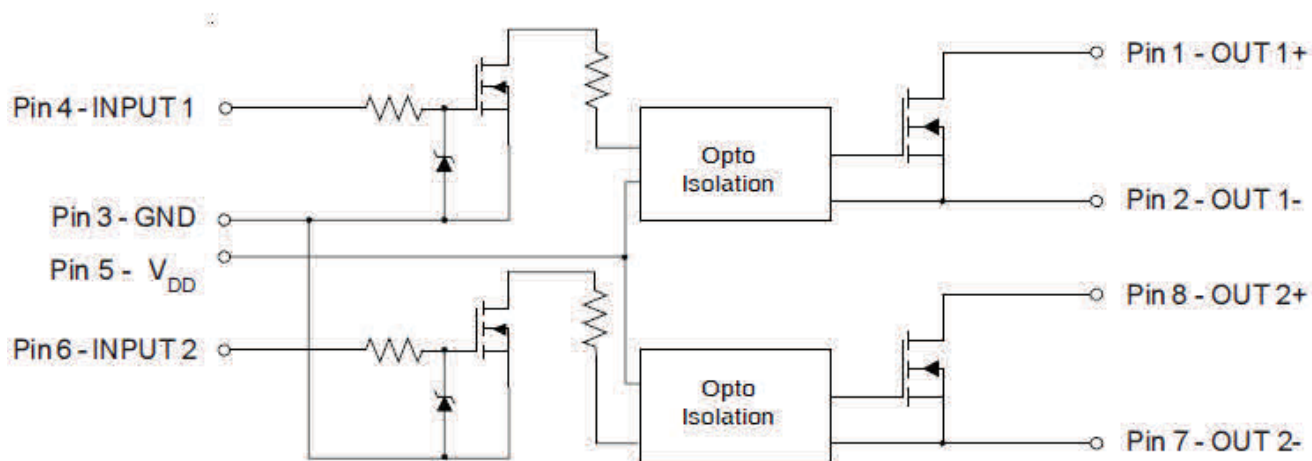


Fig 2. Typical Application

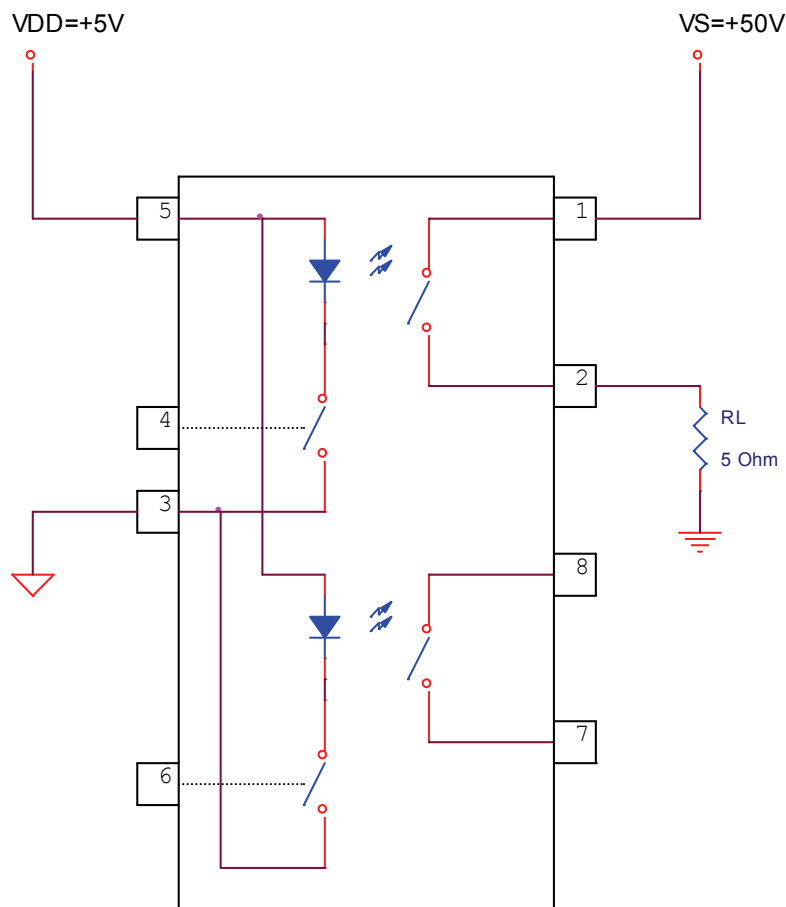


Fig 3. Switching Test Circuit (Only one Channel shown)

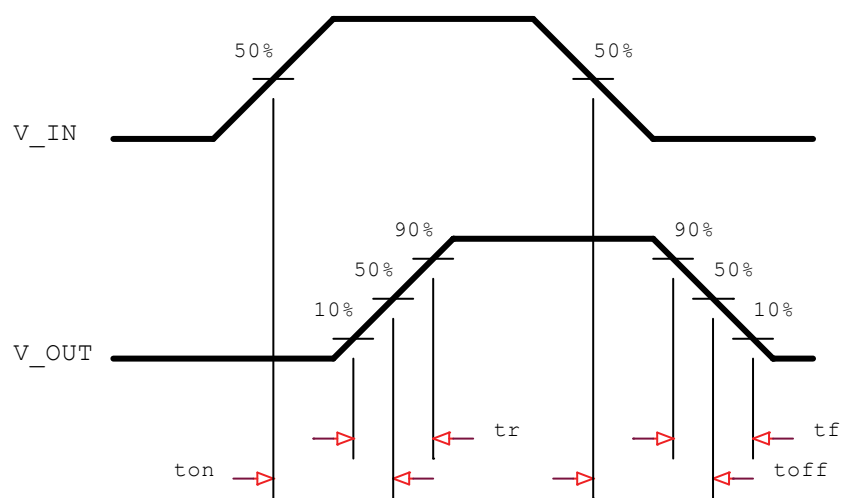
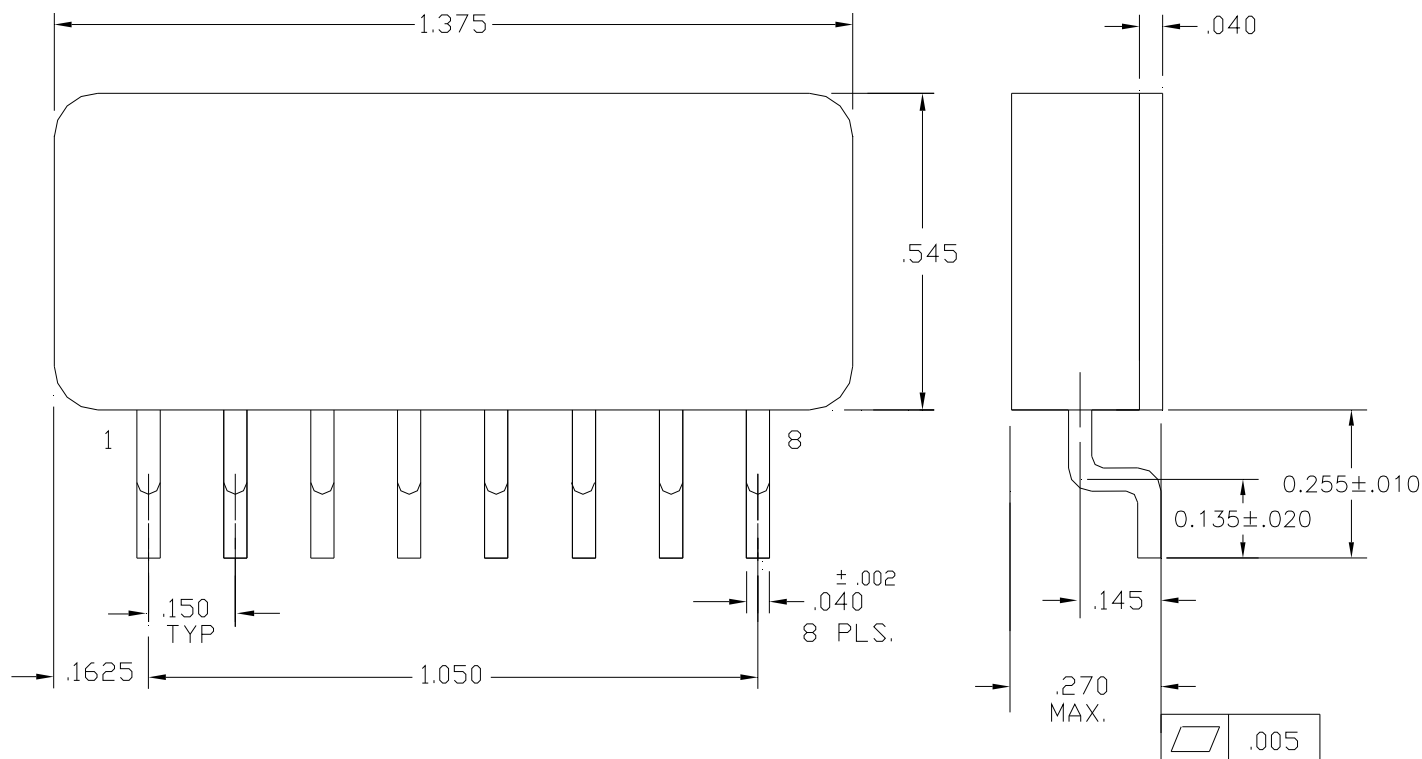


Fig 4. Switching Test Waveforms

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 SHOWN IN INCHES.
4. UNLESS NOTED, 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 No.	Designation
1	OUT 1+
2	OUT 1-
3	GND
4	INPUT 1
5	V _{DD}
6	INPUT 2
7	OUT 2-
8	OUT 2+

Note: Refer to Fig. 2 – Typical Application

Part Numbering Nomenclature

	<u>RD</u>	<u>H</u>	<u>B</u>	<u>7</u>	<u>10</u>	<u>SE</u>	<u>20</u>	<u>A</u>	<u>2</u>	<u>S</u>	<u>X</u>	
Device Type RD = DC Solid State Relay												Screening Level P = Unscreened, 25°C Electrical Test (Not for Qualification) X = Class K per MIL-PRF-38534 (Fully compliant Class K is presently pending DLA Approval)
Radiation Characterization H = RAD Hard												Features N = Non Buffered Fast S = Buffer Controlled Input
Generation A = Current Design B = R6 Generation												Number of Poles 1 = Single Pole 2 = Dual Poles
Radiation Level 7 = 100 Krad (Si)												Throw Configuration A = Single Throw, Normally Open
Current 10 = 10A												Voltage 10 = 100 Volts 20 = 200 Volts
Package SE = 8 Pin Surface Mount												

IMPORTANT NOTICE

The information given in this document shall be in no event regarded as guarantee of conditions or characteristic. The data contained herein is a characterization of the component based on internal standards and is intended to demonstrate and provide guidance for typical part performance. It will require further evaluation, qualification and analysis to determine suitability in the application environment to confirm compliance to your system requirements.

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