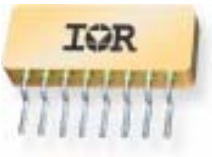
PD-96983A

International
IOR Rectifier

Radiation Hardended, Solid-State Relay with Buffered Inputs

RDHA710SE10A2FK
Dual, 100V, 10A



8-PIN SURFACE MOUNT

Product Summary ⑤

Part Number	Breakdown Voltage	Current	tr / tf	Logic Drive Voltage
RDHA710SE10A2FK	100V	10A	Fast	3.3V

Description

The RDHA710SE10A2FK 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/cm^2. The input and output MOSFETs utilize International Rectifier's R5 technology. The RDHA710SE10A2FK 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/cm^2
- Optically Coupled
- $1000V_{DC}$ Input to Output Isolation
- Buffered Input Stage
- 3.3V Compatible Logic Level Input
- Controlled Switching Times
- Hermetically Sealed Package

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

Parameter	Symbol	Value	Units
Output Maximum Voltage⑤	V_S	100	V
Output Current ④ ⑤	I_O	12	A
Input Buffer Voltage - (pins 4 & 6) ③	V_{IN}	±7.5	V
Input Buffer Current	I_{IN}	±10	mA
Input Supply Voltage (pin 5) ⑦	V_{DD}	5.25	V
Input Supply Current ⑦	I_{DD}	25	mA
Power Dissipation ④⑤	P_{DISS}	60	W
Operating Temperature Range	T_J	-55 to +125	°C
Storage Temperature Range	T_S	-65 to +150	
Lead Temperature	T_L	300	

For notes, please refer to page 3

General Characteristics per Channel @ -55°C≤T_C≤+125°C (Unless Otherwise Specified)

Parameter	Group A Subgroups	Test Conditions	Symbol	Min.	Typ.	Max.	Units
Input Buffer Threshold Voltage①③		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	I_{I-O}	--	--	1.0	µA
Output Capacitance①		V_{IN} = 0.1V, f = 1.0MHz, V_S =25V T_C = 25°C	C_{OSS}	--	365	--	pF
Thermal Resistance①		V_{IN} = 3.3V, V_{DD} = 5.0V ①,④	R_{THJC}	--	--	1.7	°C/W
MTBF (Per Channel)		MIL-HDBK-217F, SF@Tc= 25°C		6.0	--	--	MHrs

Pre-Irradiation

Electrical Characteristics per Channel @ -55°C≤T_C≤+125°C (Unless Otherwise Specified)

Parameter	Group A Subgroups	Test Conditions	Symbol	Min.	Typ.	Max.	Units
Output On-Resistance	1	V_{IN} = 3.3V	$R_{DS(ON)}$	--	0.070	0.100	Ω
	2	V_{DD} = 5.0V, I_O= 10A		--	0.125	0.165	
Output Leakage Current	1	V_{IN} = 0.1V, V_S = 100V	I_O	--	--	25	µA
	2	V_{IN} = 0.1V, V_S = 80V		--	--	250	
Input Supply Current	1,2,3	V_{DD} = 5.0V, I_O= 10A	I_{DD}	--	18	25	mA
Input Buffer Current	1	V_{IN} = 3.3V	I_{IN}	--	--	1.0	µA
	2,3			--	--	3.0	
Turn-On Delay⑥	1,2,3	V_{IN} =3.3V, V_{DD} =5.0V, V_S =30V RC = 7.0Ω/100µF, PW = 50ms	t_{on}	--	0.18	0.45	ms
Turn-Off Delay⑥	1,2,3	V_{IN} =0.1V, V_{DD} =5.0V, V_S =30V RC = 7.0Ω/100µF, PW = 50ms	t_{off}	--	0.50	0.75	
Rise Time②,⑥	1,2,3	V_{IN} =3.3V, V_{DD} =5.0V, V_S =30V RC = 7.0Ω/100µF, PW = 50ms	t_r	--	0.25	0.40	
Fall Time②,⑥	1,2,3	V_{IN} =0.1V, V_{DD} =5.0V, V_S =30V RC = 7.0Ω/100µF, PW = 50ms	t_f	--	1.50	1.80	

For notes, please refer to page 3

Post Total Dose Irradiation ⑦,⑧,⑨

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	$R_{DS(ON)}$	--	0.070	0.100	Ω
Input Supply Current	1	V_{DD} = 5.0V, I_O= 10A	I_{DD}	--	18	25	mA
Output Leakage Current	1	V_{IN} = 0.1V, V_S = 100V	I_O	--	--	25	μA
Input Buffer Current	1	V_{IN} = 3.3V	I_{IN}	--	--	1.0	
Turn-On Delay⑥	1	V_{IN} =3.3V, V_{DD} =5.0V, V_S =30V RC = 7.0Ω/100μF, PW = 50ms	t_{on}	--	0.18	0.45	ms
Turn-Off Delay⑥	1	V_{IN} =0.1V, V_{DD} =5.0V, V_S =30V RC = 7.0Ω/100μF, PW = 50ms	t_{off}	--	0.50	0.75	
Rise Time②⑥	1	V_{IN} =3.3V, V_{DD} =5.0V, V_S =30V RC = 7.0Ω/100μF, PW = 50ms	t_r	--	0.25	0.40	
Fall Time②⑥	1	V_{IN} =0.1V, V_{DD} =5.0V, V_S =30V RC = 7.0Ω/100μF, PW = 50ms	t_f	--	1.50	1.80	

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} > 7.5V
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 IRHNJ57130 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
⑦ Total Dose Irradiation with Input Bias. 10mA I_{DD} applied and V_{DS} = 0 during Irradiation
⑧ Total Dose Irradiation with Output Bias. 80 Volts V_{DS} applied and I_{DD} = 0 during Irradiation
⑨ International Rectifier does not currently have a DSCC certified Radiation Hardness Assurance Program

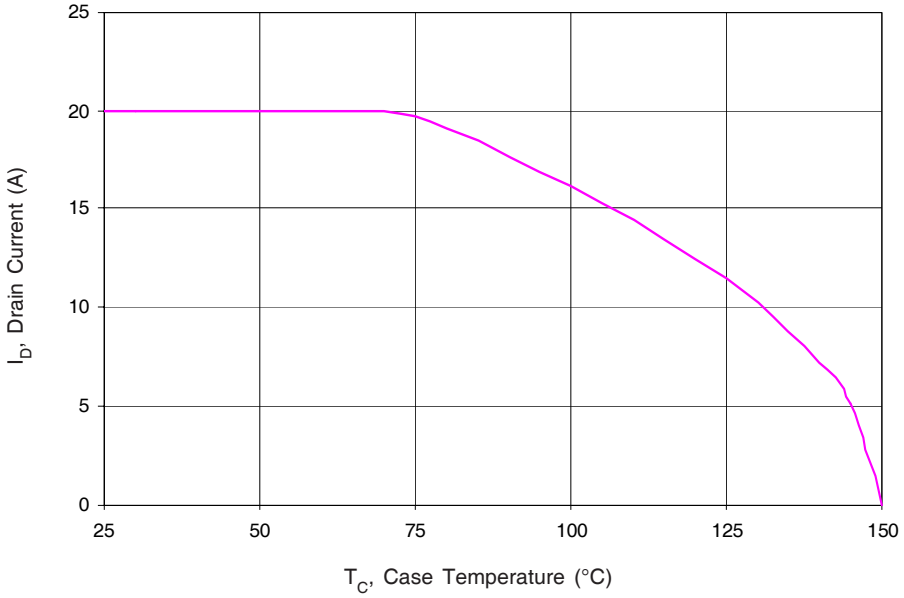


Fig 1: Maximum Drain Current Vs Case Temperature per Channel

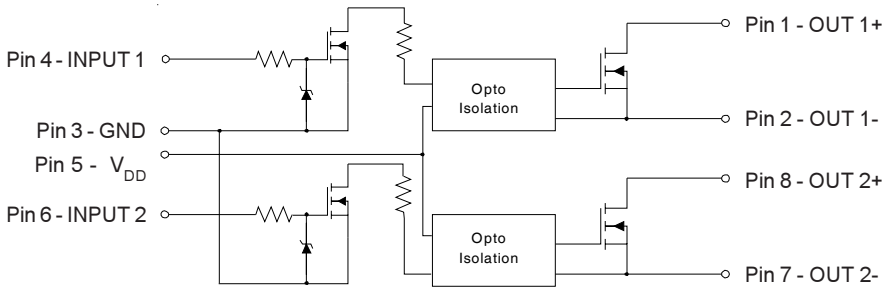


Fig 2: Typical Application

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 comparision.

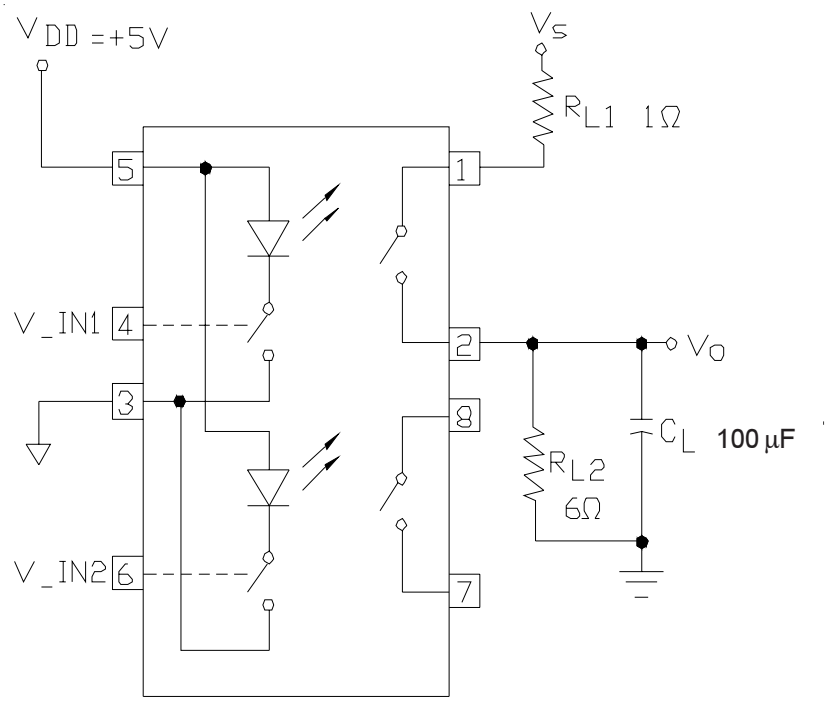


Fig 3: Switching Test Circuit (Only one channel shown)

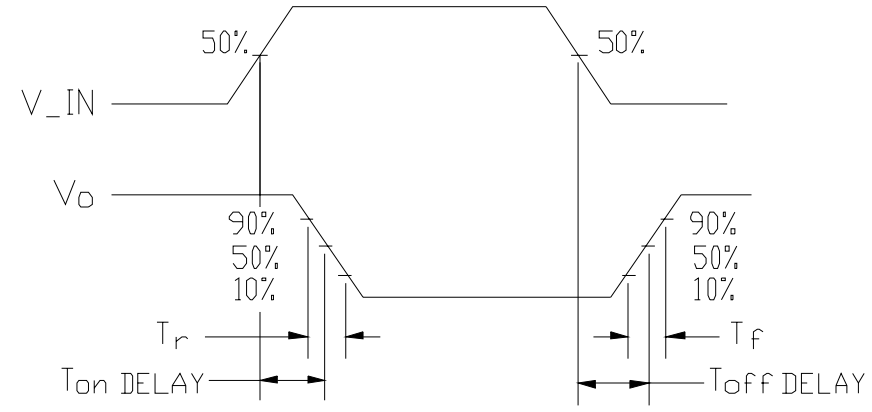
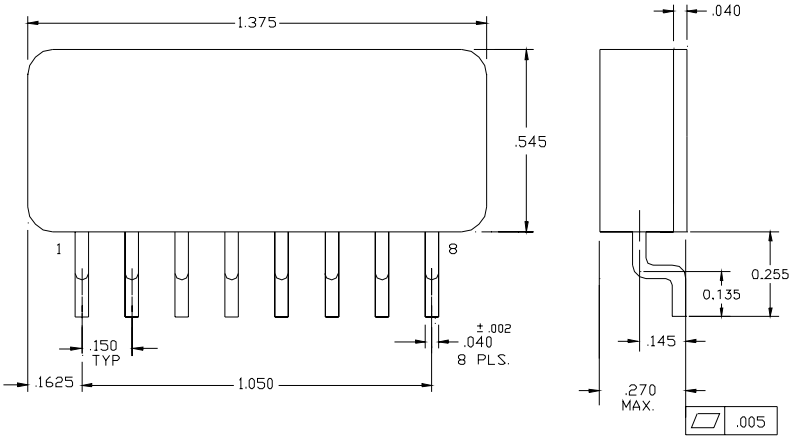


Fig 4: Switching Test Waveform

Case Outline and Dimensions — 8 Pin Surface Mount Package



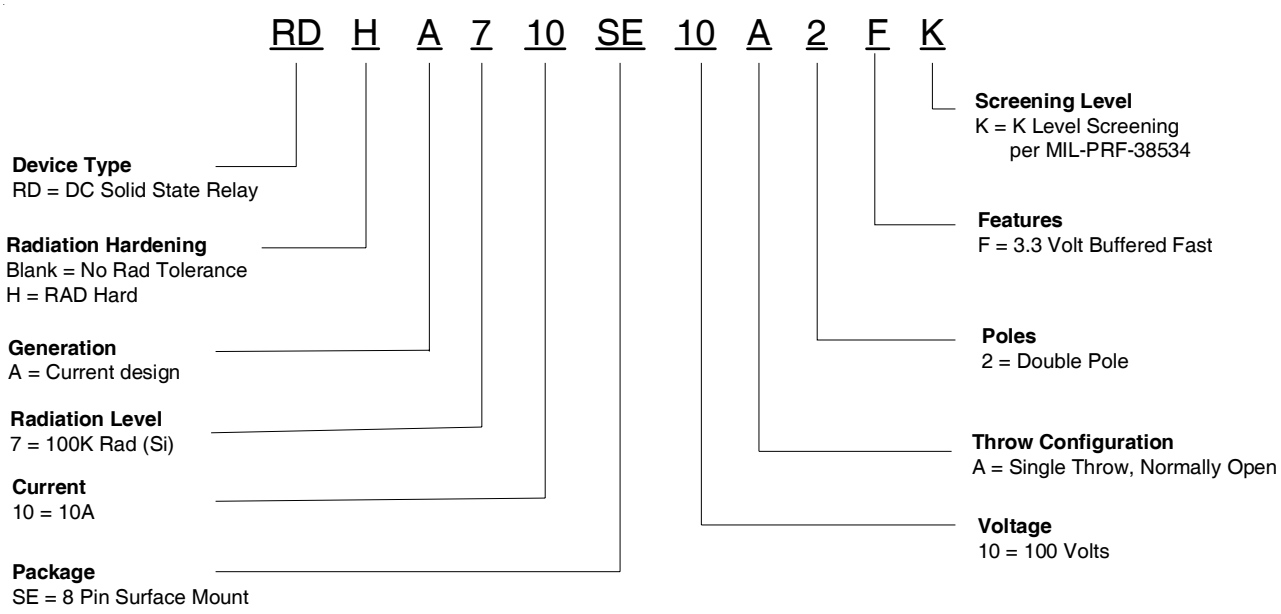
Pin Assignment

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 +

Notes

1. Dimensioning and Tolerancing per ASME Y14.5SM-1994
2. Controlling Dimension: Inch
3. Dimensions are shown in inches
4. Tolerances are +/- 0.005 UOS

Part Numbering Nomenclature



International
IOR Rectifier

IR WORLD HEADQUARTERS: 233 Kansas St., El Segundo, California 90245, USA Tel: (310) 252-7105
IR LEOMINSTER : 205 Crawford St., Leominster, Massachusetts 01453, USA Tel: (978) 534-5776
TAC Fax: (310) 252-7903
Visit us at www.irf.com for sales contact information.
Data and specifications subject to change without notice. 05/2012