

DISPLACEMENT DAMAGE TEST REPORT RH1959 February 2013



Radiation Test Report

Product:	RH1959
Fluence:	5E11, 1E12 n/cm ²
Test Method:	MIL-STD-883 - TM1017
Facilities:	University of Massachusetts Lowell
Tested:	2/14/13

The RADTEST® DATA SERVICE is a compilation of radiation test results on Analog Devices' Space grade products. It is designed to assist customers in selecting the right product for applications where radiation is a consideration. Many products manufactured by Analog Devices, Inc. have been shown to be radiation tolerant to most tactical radiation environments. Analog Devices, Inc. does not make any claim to maintain or guarantee these levels of radiation tolerance without lot qualification test.

It is the responsibility of the Procuring Activity to screen products from Analog Devices, Inc. for compliance to Nuclear Hardness Critical Items (HCI) specifications.

Warning:

Analog Devices, Inc. does not recommend use of this data to qualify other product grades or process levels. Analog Devices, Inc. is not responsible and has no liability for any consequences, and all applicable Warranties are null and void if any Analog Devices product is modified in any way or used outside of normal environmental and operating conditions, including the parameters specified in the corresponding data sheet. Analog Devices, Inc. does not guarantee that wafer manufacturing is the same for all process levels.

	Serial #	VPWR IQ @ 16V			VPWR IQ STARTUP @ 0.6V-2.6V			BOOST ILEAK @ 16V, BOOST 15V		
		Pre	Post DD	Delta	Pre	Post DD	Delta	Pre	Post DD	Delta
1.00E+12	585	3.24	3.26	0.02	1590	1610	20	0.97	1.26	0.29
	586	3.25	3.29	0.04	1600	1620	20	1.00	1.16	0.16
	588	3.25	3.29	0.04	1590	1620	30	1.32	1.54	0.22
	589	3.26	3.31	0.05	1600	1620	20	0.99	1.26	0.27
	590	3.23	3.27	0.04	1590	1610	20	1.09	1.12	0.03
5.00E+11	591	3.27	3.30	0.03	1610	1620	10	1.56	2.00	0.44
	592	3.26	3.28	0.02	1610	1610	0	1.05	1.12	0.07
	593	3.29	3.31	0.02	1620	1620	0	1.15	1.21	0.06
	594	3.29	3.32	0.03	1610	1620	10	1.07	1.20	0.13
	595	3.27	3.30	0.03	1610	1610	0	0.90	1.21	0.31
	596	3.30	3.30	0.00	1610	1610	0	1.24	1.20	-0.04
	587	3.31	3.31	0.00	1620	1620	0	11.90	12.30	0.40

	Serial #	VPWR IQ @ 4.3V			VPWR IQ @ 16V			SHUTDOWN IQ @ 16V		
		Pre	Post DD	Delta	Pre	Post DD	Delta	Pre	Post DD	Delta
1.00E+12	585	3.19	3.23	0.04	3.23	3.28	0.05	34.40	35.30	0.90
	586	3.20	3.24	0.04	3.26	3.29	0.03	36.00	36.90	0.90
	588	3.21	3.25	0.04	3.26	3.29	0.03	35.90	36.30	0.40
	589	3.22	3.26	0.04	3.26	3.30	0.04	35.70	36.20	0.50
	590	3.18	3.22	0.04	3.24	3.27	0.03	36.50	36.50	0.00
5.00E+11	591	3.23	3.25	0.02	3.28	3.30	0.02	36.20	36.80	0.60
	592	3.22	3.24	0.02	3.26	3.28	0.02	35.80	36.20	0.40
	593	3.25	3.26	0.01	3.30	3.31	0.01	35.10	35.50	0.40
	594	3.25	3.27	0.02	3.29	3.32	0.03	35.70	36.00	0.30
	595	3.23	3.25	0.02	3.27	3.29	0.02	36.00	36.50	0.50
	596	3.25	3.25	0.00	3.29	3.30	0.01	36.30	36.70	0.40
	587	3.26	3.26	0.00	3.31	3.31	0.00	35.80	35.60	-0.20

	Serial #	VSW, GND ILEAK @ 16V			VPWR, VSW ILEAK @ 16V			VPWR IQ @ 5V		
		Pre	Post DD	Delta	Pre	Post DD	Delta	Pre	Post DD	Delta
1.00E+12	585	0.55	3.57	3.02	0.47	1.34	0.87	3200	3240	40
	586	-0.01	3.66	3.67	-0.90	1.18	2.08	3210	3260	50
	588	-0.03	2.13	2.16	-1.51	1.18	2.69	3220	3260	40
	589	1.58	3.77	2.19	0.01	2.87	2.86	3230	3280	50
	590	2.94	-0.98	-3.92	-1.51	1.18	2.69	3190	3230	40
5.00E+11	591	-1.50	3.77	5.27	-1.66	2.72	4.38	3240	3260	20
	592	1.65	4.86	3.21	-1.36	0.88	2.24	3230	3250	20
	593	-0.03	1.82	1.85	-0.14	0.11	0.25	3250	3270	20
	594	0.92	3.73	2.81	1.23	0.11	-1.12	3250	3280	30
	595	-0.70	3.64	4.34	-0.14	0.88	1.02	3240	3260	20
	596	0.98	3.61	2.63	-0.14	0.27	0.41	3260	3270	10
	587	1.74	2.59	0.85	-0.14	1.49	1.63	3270	3270	0

	Serial #	SHUTDOWN IQ @ 5V			VPWR, VSW ILEAK @ 5V			VREF @ 15V, VC 1.5V		
		Pre	Post DD	Delta	Pre	Post DD	Delta	Pre	Post DD	Delta
1.00E+12	585	29.80	30.70	0.90	-1.87	0.08	1.95	1.20	1.21	0.01
	586	31.00	31.70	0.70	-0.58	-0.15	0.43	1.20	1.20	0.00
	588	30.90	31.40	0.50	1.17	2.00	0.83	1.21	1.21	0.00
	589	30.60	31.20	0.60	0.03	0.08	0.05	1.21	1.21	0.00
	590	31.00	31.70	0.70	-0.96	2.61	3.57	1.21	1.21	0.00
5.00E+11	591	31.30	31.60	0.30	0.56	-0.84	-1.40	1.21	1.21	0.00
	592	31.10	31.30	0.20	-0.50	0.08	0.58	1.21	1.21	0.00
	593	30.20	30.80	0.60	-0.58	0.69	1.27	1.21	1.21	0.00
	594	31.00	31.20	0.20	0.11	2.61	2.50	1.21	1.21	0.00
	595	30.80	31.40	0.60	0.26	2.61	2.35	1.21	1.21	0.00
	596	31.30	31.50	0.20	-1.19	0.69	1.88	1.21	1.21	0.00
	587	30.70	31.00	0.30	-0.58	-0.38	0.20	1.21	1.21	0.00

	Serial #	VREF LINE REG @ 4.3V-15V, VC 1.5V			DELTA VREF			EA ISOURCE @ 5V, VC 1.5V		
		Pre	Post DD	Delta	Pre	Post DD	Delta	Pre	Post DD	Delta
1.00E+12	585	-0.01	-0.01	0.00	-0.65	-0.71	-0.06	-192	-194	-2
	586	-0.01	-0.01	0.00	-0.69	-0.79	-0.10	-193	-195	-2
	588	-0.01	-0.01	0.00	-0.74	-0.69	0.05	-195	-197	-2
	589	-0.01	-0.01	0.00	-0.69	-0.85	-0.17	-195	-197	-2
	590	0.00	0.00	0.00	-0.61	-0.61	0.00	-194	-196	-2
5.00E+11	591	-0.01	0.00	0.00	-0.76	-0.61	0.15	-195	-197	-2
	592	-0.01	-0.01	0.00	-0.84	-0.69	0.15	-196	-197	-1
	593	-0.01	0.00	0.00	-0.69	-0.58	0.10	-196	-197	-1
	594	-0.01	-0.01	0.00	-0.78	-0.69	0.09	-198	-199	-1
	595	-0.01	-0.01	0.00	-0.74	-0.84	-0.10	-196	-198	-2
	596	-0.01	-0.01	0.00	-0.74	-0.86	-0.12	-198	-198	0
	587	-0.01	-0.01	0.00	-0.80	-0.69	0.11	-199	-199	0

		EA ISINK @ 5V, VC 1.5V			uA	EA VOH @ 5V, VFB VREF-50MV			V	EA VOL @ 5V, VFB VREF+50MV			V
	Serial #	Pre	Post DD	Delta	Pre	Post DD	Delta	Pre	Post DD	Delta	Pre	Post DD	Delta
1.00E+12	585	203	206	3	2.12	2.12	0.00	0.65	0.66	0.00			
	586	211	214	3	2.13	2.13	0.00	0.64	0.65	0.01			
	588	210	212	2	2.14	2.14	0.00	0.64	0.64	0.00			
	589	208	211	3	2.14	2.14	0.00	0.65	0.65	0.00			
	590	208	211	3	2.14	2.14	0.00	0.65	0.66	0.01			
5.00E+11	591	219	221	2	2.13	2.13	0.00	0.64	0.64	0.00			
	592	199	201	2	2.14	2.14	0.00	0.65	0.65	0.00			
	593	221	223	2	2.13	2.13	0.00	0.64	0.64	0.00			
	594	215	216	1	2.15	2.15	0.00	0.64	0.65	0.00			
	595	206	207	1	2.14	2.14	0.00	0.64	0.64	0.00			
	596	214	214	0	2.15	2.15	0.00	0.64	0.64	0.00			
	587	211	210	-1	2.15	2.15	0.00	0.66	0.66	0.00			

		EA GAIN @ 5V, VC VOH-0.2V VOL+0.2V			V/V	DELTA VFB			mV	VREF @ 15V, VC VOL+0.2V			V
	Serial #	Pre	Post DD	Delta	Pre	Post DD	Delta	Pre	Post DD	Delta	Pre	Post DD	Delta
1.00E+12	585	424	423	-1	-2.53	-2.52	0.01	1.21	1.21	0.00			
	586	410	419	9	-2.66	-2.59	0.07	1.21	1.21	0.00			
	588	432	428	-4	-2.55	-2.57	-0.02	1.21	1.21	0.00			
	589	412	433	21	-2.65	-2.51	0.14	1.21	1.21	0.00			
	590	412	424	12	-2.64	-2.55	0.09	1.21	1.21	0.00			
5.00E+11	591	406	418	12	-2.69	-2.60	0.09	1.21	1.21	0.00			
	592	442	435	-7	-2.47	-2.50	-0.03	1.21	1.21	0.00			
	593	400	429	29	-2.74	-2.55	0.19	1.21	1.21	0.00			
	594	426	425	-1	-2.59	-2.58	0.01	1.21	1.21	0.00			
	595	440	431	-9	-2.51	-2.56	-0.05	1.21	1.21	0.00			
	596	437	429	-8	-2.54	-2.58	-0.04	1.21	1.21	0.00			
	587	418	411	-7	-2.59	-2.64	-0.05	1.21	1.21	0.00			

		VREF @ 4.3V, VC VOH-0.2V			V	EA IBIAS @ 5V, VC 1.5V			uA	VPWR VMIN (VC VOH)			V
	Serial #	Pre	Post DD	Delta	Pre	Post DD	Delta	Pre	Post DD	Delta	Pre	Post DD	Delta
1.00E+12	585	1.20	1.20	0.00	-0.44	-0.36	0.08	4.02	4.02	0.00			
	586	1.20	1.20	0.00	-0.43	-0.34	0.08	4.02	4.02	0.00			
	588	1.21	1.21	0.00	-0.40	-0.33	0.07	4.05	4.05	0.00			
	589	1.21	1.21	0.00	-0.41	-0.33	0.08	4.05	4.05	0.00			
	590	1.21	1.21	0.00	-0.42	-0.35	0.07	4.02	4.05	0.03			
5.00E+11	591	1.20	1.20	0.00	-0.39	-0.34	0.05	4.02	4.05	0.03			
	592	1.21	1.21	0.00	-0.40	-0.36	0.04	4.05	4.05	0.00			
	593	1.20	1.21	0.01	-0.36	-0.33	0.03	4.05	4.05	0.00			
	594	1.21	1.21	0.00	-0.38	-0.34	0.04	4.05	4.05	0.00			
	595	1.21	1.21	0.00	-0.39	-0.35	0.04	4.05	4.05	0.00			
	596	1.21	1.21	0.00	-0.34	-0.35	-0.01	4.05	4.05	0.00			
	587	1.21	1.21	0.00	-0.33	-0.34	-0.01	4.05	4.05	0.00			

		FOSC SHIFT THRESHOLD VFB @ IFB 2UA			V	SHUTDOWN IBIAS @ 5V, VSH 0V			uA	SHUTDOWN VPULLUP @ 5V, ISOURCE 1UA			V
	Serial #	Pre	Post DD	Delta	Pre	Post DD	Delta	Pre	Post DD	Delta	Pre	Post DD	Delta
1.00E+12	585	0.72	0.72	0.00	-12.30	-12.00	0.30	4.27	4.26	-0.01			
	586	0.72	0.72	0.00	-12.80	-12.60	0.20	4.26	4.26	0.00			
	588	0.73	0.73	0.00	-12.70	-12.30	0.40	4.27	4.26	-0.01			
	589	0.72	0.72	0.00	-12.60	-12.30	0.30	4.27	4.27	0.00			
	590	0.73	0.73	0.00	-12.90	-12.50	0.40	4.27	4.26	-0.01			
5.00E+11	591	0.73	0.73	0.00	-12.60	-12.40	0.20	4.26	4.25	-0.01			
	592	0.73	0.73	0.00	-12.60	-12.30	0.30	4.27	4.26	-0.01			
	593	0.72	0.72	0.00	-12.20	-12.00	0.20	4.27	4.26	-0.01			
	594	0.73	0.73	0.00	-12.30	-12.20	0.10	4.27	4.27	0.00			
	595	0.73	0.73	0.00	-12.60	-12.40	0.20	4.27	4.26	-0.01			
	596	0.73	0.73	0.00	-12.50	-12.50	0.00	4.26	4.26	0.00			
	587	0.73	0.73	0.00	-12.20	-12.20	0.00	4.26	4.26	0.00			

		SHUTDOWN VCLAMP @ 5V, ISINK 10UA			V	SHUTDOWN ENTRY THRESHOLD @ 5V			V	SHUTDOWN EXIT THRESHOLD @ 5V			V
	Serial #	Pre	Post DD	Delta	Pre	Post DD	Delta	Pre	Post DD	Delta	Pre	Post DD	Delta
1.00E+12	585	7.19	7.19	0.00	0.40	0.40	0.00	0.53	0.53	0.00			
	586	7.18	7.18	0.00	0.41	0.41	0.00	0.54	0.55	0.01			
	588	7.18	7.18	0.00	0.41	0.41	0.00	0.54	0.54	0.00			
	589	7.17	7.17	0.00	0.40	0.40	0.00	0.53	0.53	0.00			
	590	7.19	7.19	0.00	0.40	0.40	0.00	0.53	0.53	0.00			
5.00E+11	591	7.19	7.19	0.00	0.40	0.40	0.00	0.54	0.54	0.00			
	592	7.18	7.18	0.00	0.40	0.40	0.00	0.53	0.53	0.00			
	593	7.17	7.17	0.00	0.39	0.39	0.00	0.52	0.52	0.00			
	594	7.18	7.17	-0.01	0.40	0.40	0.00	0.53	0.53	0.00			
	595	7.18	7.18	0.00	0.39	0.39	0.00	0.52	0.52	0.00			
	596	7.18	7.18	0.00	0.41	0.41	0.00	0.54	0.54	0.00			
	587	7.20	7.20	0.00	0.41	0.41	0.00	0.54	0.54	0.00			

	FOSC @ 5V			KHz	FOSC @ 3KOHM FB-GND			KHz	FOSC @ 4.3V			KHz
	Serial #	Pre	Post DD		Delta	Pre	Post DD		Delta	Pre	Post DD	
1.00E+12	585	480	485	5	106	107	1	480	484	4		
	586	480	485	5	106	107	1	480	484	4		
	588	476	482	6	105	107	2	476	481	5		
	589	481	486	5	106	108	2	481	486	5		
	590	476	481	5	105	107	2	476	481	5		
5.00E+11	591	481	484	3	107	107	0	481	484	3		
	592	493	496	3	111	111	0	493	496	3		
	593	486	488	2	107	108	1	485	488	3		
	594	487	489	2	108	109	1	487	489	2		
	595	478	480	2	105	106	1	478	480	2		
	596	482	483	1	107	107	0	482	482	0		
	587	488	488	0	109	109	0	488	488	0		

	FOSC @ 15V			KHz	/V FOSC LINE REG @ 4.3V-15V			%	DELTA FOSC			KHz
	Serial #	Pre	Post DD		Delta	Pre	Post DD		Delta	Pre	Post DD	
1.00E+12	585	482.00	486.00	4.00	0.03	0.03	0.00	1.59	1.62	0.03		
	586	481.00	486.00	5.00	0.03	0.03	0.00	1.44	1.32	-0.12		
	588	478.00	483.00	5.00	0.03	0.03	-0.01	1.71	1.45	-0.26		
	589	483.00	487.00	4.00	0.03	0.03	-0.01	1.74	1.48	-0.26		
	590	478.00	483.00	5.00	0.03	0.03	-0.01	1.71	1.31	-0.40		
5.00E+11	591	483.00	485.00	2.00	0.03	0.03	0.00	1.45	1.47	0.02		
	592	494.00	497.00	3.00	0.03	0.03	0.00	1.52	1.54	0.02		
	593	487.00	489.00	2.00	0.03	0.03	-0.01	1.77	1.34	-0.43		
	594	488.00	490.00	2.00	0.03	0.03	0.00	1.48	1.35	-0.13		
	595	479.00	481.00	2.00	0.03	0.03	0.01	1.29	1.59	0.30		
	596	483.00	484.00	1.00	0.03	0.03	0.00	1.31	1.46	0.15		
	587	490.00	490.00	0.00	0.03	0.03	0.00	1.49	1.49	0.00		

	MAX DUTY CYCLE @ 5V, VFB 1.05V			%	VC THRESHOLD ZERO %DC @ 5V			V	FB THRESHOLD @ 5V			mA
	Serial #	Pre	Post DD		Delta	Pre	Post DD		Delta	Pre	Post DD	
1.00E+12	585	92.40	92.40	0.00	0.85	0.85	0.00	-0.78	-0.76	0.02		
	586	92.20	92.30	0.10	0.84	0.84	0.00	-0.78	-0.78	0.00		
	588	92.30	92.20	-0.10	0.85	0.85	0.00	-0.78	-0.78	0.00		
	589	92.30	92.30	0.00	0.85	0.85	0.00	-0.80	-0.80	0.00		
	590	92.30	92.20	-0.10	0.84	0.84	0.00	-0.78	-0.78	0.00		
5.00E+11	591	92.30	92.40	0.10	0.84	0.84	0.00	-0.78	-0.78	0.00		
	592	92.00	92.00	0.00	0.84	0.84	0.00	-0.78	-0.78	0.00		
	593	92.30	92.40	0.10	0.84	0.85	0.01	-0.76	-0.76	0.00		
	594	92.20	92.20	0.00	0.85	0.85	0.00	-0.78	-0.78	0.00		
	595	92.30	92.30	0.00	0.85	0.85	0.00	-0.78	-0.78	0.00		
	596	92.30	92.30	0.00	0.85	0.85	0.00	-0.78	-0.78	0.00		
	587	92.40	92.30	-0.10	0.84	0.84	0.00	-0.80	-0.80	0.00		

	LOCKOUT THRESHOLD @ 5V			V	FSW/FSYNC @ 5V, FSYNC 560KHZ			V	FSW/FSYNC @ 5V, FSYNC 1.1MHZ			V
	Serial #	Pre	Post DD		Delta	Pre	Post DD		Delta	Pre	Post DD	
1.00E+12	585	2.37	2.37	0.00	1.00	1.00	0.00	1.00	1.00	0.01		
	586	2.38	2.38	0.00	1.00	1.00	0.00	1.00	1.00	0.00		
	588	2.39	2.39	0.00	1.00	1.00	0.00	0.99	1.00	0.01		
	589	2.39	2.39	0.00	1.00	1.00	0.00	1.00	1.00	0.00		
	590	2.39	2.39	0.00	1.00	1.00	0.00	1.00	1.00	0.00		
5.00E+11	591	2.39	2.38	-0.01	1.00	1.00	0.00	1.00	1.00	0.00		
	592	2.39	2.39	0.00	1.00	1.00	0.00	1.00	1.00	0.00		
	593	2.39	2.38	-0.01	1.00	1.00	0.00	1.00	1.00	0.00		
	594	2.40	2.40	0.00	1.00	1.00	0.00	1.00	1.00	0.00		
	595	2.39	2.39	0.00	1.00	1.00	0.00	1.00	1.00	0.00		
	596	2.40	2.40	0.00	1.00	1.00	0.00	1.00	1.00	0.00		
	587	2.39	2.39	0.00	1.00	1.00	0.00	1.00	1.00	0.00		

	EA GM @ 5V, VC 1.5V FI +/-10UA			Delta	DELTA VFB			mV	VSAT @ 1A, NO BOOST			V
	Serial #	Pre	Post DD		Pre	Post DD	Delta		Pre	Post DD	Delta	
1.00E+12	585	1860	1890	30	-10.80	-10.60	0.20	1.89	1.89	0.00		
	586	1900	1930	30	-10.50	-10.30	0.20	1.88	1.89	0.01		
	588	1910	1940	30	-10.50	-10.30	0.20	1.89	1.90	0.01		
	589	1900	1930	30	-10.50	-10.30	0.20	1.89	1.90	0.01		
	590	1900	1930	30	-10.50	-10.40	0.10	1.88	1.89	0.01		
5.00E+11	591	1960	1970	10	-10.20	-10.10	0.10	1.89	1.90	0.01		
	592	1880	1890	10	-10.60	-10.60	0.00	1.89	1.90	0.01		
	593	1970	1990	20	-10.20	-10.00	0.20	1.89	1.90	0.01		
	594	1970	1970	0	-10.20	-10.20	0.00	1.89	1.90	0.01		
	595	1890	1930	40	-10.60	-10.40	0.20	1.89	1.89	0.00		
	596	1970	1960	-10	-10.20	-10.20	0.00	1.89	1.90	0.01		
	587	1980	1930	-50	-10.10	-10.30	-0.20	1.89	1.89	0.00		

		VSAT @ 1A, BOOST 5V			IBOOST @ 1A, VPWR+5V			VPWR IQ @ 16V		
		Pre	Post DD	Delta	Pre	Post DD	Delta	Pre	Post DD	Delta
1.00E+12	Serial #									
	585	166	164	-2	17.50	16.70	-0.80	3.24	3.27	0.03
	586	169	167	-2	16.80	15.90	-0.90	3.25	3.29	0.04
	588	168	166	-2	17.40	16.40	-1.00	3.26	3.29	0.03
	589	167	165	-2	16.90	16.00	-0.90	3.27	3.30	0.03
5.00E+11	590	166	164	-2	17.50	16.50	-1.00	3.22	3.27	0.05
	591	170	170	0	15.90	15.50	-0.40	3.27	3.29	0.02
	592	169	167	-2	16.50	16.20	-0.30	3.26	3.28	0.02
	593	168	165	-3	16.50	16.10	-0.40	3.29	3.31	0.02
	594	168	166	-2	16.50	16.10	-0.40	3.28	3.32	0.04
	595	165	164	-1	16.90	16.50	-0.40	3.28	3.30	0.02
	596	167	167	0	16.10	16.10	0.00	3.29	3.30	0.01
587	163	164	1	15.70	15.70	0.00	3.31	3.30	-0.01	

		DELTA VPWR IQ @ 16V		mA
		Pre	Post DD	Delta
1.00E+12	Serial #			
	585	0.00	0.01	0.00
	586	0.00	0.00	0.00
	588	0.01	0.00	-0.01
	589	0.00	0.00	0.00
5.00E+11	590	-0.01	0.00	0.01
	591	0.00	0.00	-0.01
	592	0.00	0.00	0.00
	593	-0.01	0.00	0.01
	594	-0.01	0.00	0.01
	595	0.01	0.00	-0.01
	596	-0.01	0.00	0.01
587	0.00	-0.01	-0.01	