



Single-Event-Effects Summary Report

IR RAD-Hard Gen-7 60V N-channel (Size-3 and Size-6)

SEE Qualifications of:

JANTXVR, F, G, H AND JANSR, F, G, H 2N7604U2 MIL-PRF-19500/TBA

JANTXVR, F, G, H AND JANSR, F, G, H 2N7605T1 MIL-PRF-19500/TBA

JANTXVR, F, G, H AND JANSR, F, G, H 2N7606U3 MIL-PRF-19500/756

JANTXVR, F, G, H AND JANSR, F, G, H 2N7607T3 MIL-PRF-19500/756

IRHLNA77064, IRHLNA73064, IRHLNA76064, IRHLNA78064 SCV AND SCS

IRHLMS77064, IRHLMS73064, IRHLMS76064, IRHLMS78064 SCV AND SCS

IRHLNJ77034, IRHLNJ73034, IRHLNJ76034, IRHLNJ78034 SCV AND SCS

IRHLYS77034CM, IRHLYS73034CM, IRHLYS76034CM, IRHLYS78034CM SCV AND SCS

SEE Summary Report - RH, G7, N, MR, 60V



Fab-2 Wafer Lot: Q781130 Split A
SEE Test Date: April 18th - 20th 2009
SEE Test Facility: Texas A&M Cyclotron

Ion	Kr	Xe	Au
LET	38.9	63.3	88.2
Energy	315	371	403
Range	39	34.1	30
Run Numbers	157-164	165-173	397-408

(For Worst-Case SEGR)

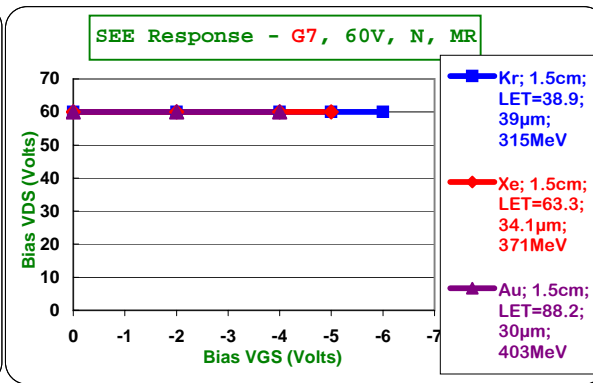
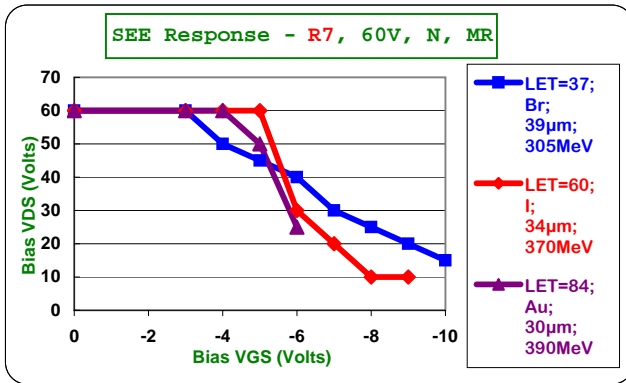
IR Fab-5 Specs (Size-6)

VGS (Volts)	VDS Bias (Volts)		
	LET=37; Br; 39µm; 305MeV	LET=60; I; 34µm; 370MeV	LET=84; Au; 30µm; 390MeV
0	60	60	60
-3	60	60	60
-4	50	60	60
-5	45	60	50
-6	40	30	25
-7	30	20	
-8	25	10	
-9	20	10	
-10	15		

IR Fab-2 Qual to Simplified Specs

VGS (Volts)	VDS Bias (Volts)		
	Kr; 1.5cm; LET=38.9; 39µm; 315MeV	Xe; 1.5cm; LET=63.3; 34.1µm; 371MeV	Au; 1.5cm; LET=88.2; 30µm; 403MeV
0	60	60	60
-2	60	60	60
-4	60	60	60
-5	60	60	60
-6	60	60	60
-7	60		

(Standardization SEE Specs for RH R7 ... VGS specified upto -7V)



Run No.	Ion	DUT Id	Socket	Wafer	Serial	Batch	VGS Volts	VDS Volts	Pass/Fail Blank=Pass
157	Kr	A1	1	1	3	9	-6	60	CurvePoint1
158	Kr	A2	2	1	4	9	-6	60	CurvePoint1
159	Kr	A3	3	1	5	9	-6	60	CurvePoint1
160	Kr	A4	4	1	6	9	-6	60	CurvePoint1
161	Kr	A6	6	1	9	9	-7	35	CurvePoint2
162	Kr	A7	7	1	10	9	-7	35	CurvePoint2
163	Kr	A8	8	2	11	9	-7	35	Leaky IGSS >100nA
164	Kr	A9	9	2	12	9	-7	35	Leaky IGSS then Failed
165	Xe	A10	10	3	21	9	-5	60	CurvePoint1 (GateStress ON)
166	Xe	A11	11	3	22	9	-5	60	CurvePoint1 (GateStress ON)
167	Xe	A12	12	3	23	9	-5	60	CurvePoint1 (GateStress ON)
168	Xe	A13	13	3	24	9	-6	30	Leaky then blown by GateStress
169	Xe	A14	14	3	25	9	-6	30	CurvePoint2 (GateStress Off)
170	Xe	A15	15	3	26	9	-6	30	Leaky IGSS >100nA (GS Off)
171	Xe	A16	16	2	19	9	-6	30	Leaky more then Failed (GS Off)
172	Xe	A17	17	2	14	9	-6	30	Leaky Leaky IGSS (GS Off)
173	Xe	A18	18	2	16	9	-6	30	Leaky more then Failed (GS Off)
397	Au	A19	1	3	27	22	-4	60	CurvePoint1
398	Au	A20	2	3	28	22	-4	60	CurvePoint1
399	Au	A21	3	3	29	22	-4	60	CurvePoint1
400	Au	A22	4	3	30	22	-4	60	CurvePoint1
401	Au	A23	5	4	33	22	-5	40	CurvePoint2
402	Au	A24	6	4	34	22	-5	40	CurvePoint2
403	Au	A25	7	4	35	22	-5	40	CurvePoint2
404	Au	A26	8	4	38	22	-5	40	Failed
405	Au	A27	9	4	39	22	-5	40	CurvePoint2
406	Au	A28	10	4	40	22	-5	40	CurvePoint2
407	Au	A29	11	6	41	22	-5	40	CurvePoint2
408	Au	A30	12	6	42	22	-5	40	Leaky IGSS >100nA



RadHard MOSFET - G7, Hex Z, 60V, N-channel

BATCH9	TAMU	IRHC77034	PRE	4/18/2009	5:34 PM	Kr/Xe		
SEE Id	SOCKET	BIN	(-)IGSS (A)	(+)IGSS (A)	IDSS (A)	BVR (V)	DATE	TIME
A1	1	PASS	4.41E-09	1.03E-08	2.59E-07	7.76E+01	4/18/2009	5:34:32 PM
A2	2	PASS	4.10E-09	1.06E-08	1.98E-07	7.76E+01	4/18/2009	5:34:38 PM
A3	3	PASS	6.90E-09	1.50E-08	2.27E-07	7.74E+01	4/18/2009	5:34:43 PM
A4	4	PASS	1.07E-08	6.63E-08	2.35E-07	7.74E+01	4/18/2009	5:34:47 PM
A5	5	FAIL	1.46E-08	1.01E-07	1.90E-07	7.75E+01	4/18/2009	5:34:52 PM
A6	6	PASS	1.34E-08	8.46E-08	1.90E-07	7.76E+01	4/18/2009	5:34:59 PM
A7	7	PASS	5.68E-09	1.24E-08	1.79E-07	7.75E+01	4/18/2009	5:35:04 PM
A8	8	PASS	5.08E-09	1.50E-08	1.55E-07	7.71E+01	4/18/2009	5:35:09 PM
A9	9	PASS	4.19E-09	1.01E-08	2.18E-07	7.71E+01	4/18/2009	5:35:14 PM
A10	10	PASS	4.44E-09	9.70E-09	1.98E-07	7.76E+01	4/18/2009	5:35:19 PM
A11	11	PASS	4.11E-09	1.03E-08	1.98E-07	7.75E+01	4/18/2009	5:35:23 PM
A12	12	PASS	4.19E-09	1.10E-08	1.83E-07	7.76E+01	4/18/2009	5:35:28 PM
A13	13	PASS	4.40E-09	1.19E-08	1.75E-07	7.76E+01	4/18/2009	5:35:32 PM
A14	14	PASS	5.62E-09	1.27E-08	1.85E-07	7.77E+01	4/18/2009	5:35:37 PM
A15	15	PASS	9.81E-09	2.12E-08	1.66E-07	7.77E+01	4/18/2009	5:35:42 PM
A16	16	PASS	1.10E-08	2.95E-08	1.94E-07	7.70E+01	4/18/2009	5:35:48 PM
A17	17	PASS	1.70E-08	9.10E-08	1.82E-07	7.70E+01	4/18/2009	5:35:53 PM
A18	18	PASS	1.58E-08	6.61E-08	2.22E-07	7.71E+01	4/18/2009	5:35:57 PM

BATCH9	TAMU	IRHC77034	POST	4/18/2009	5:57 PM	Kr		Ion, Insitu & SEE Results
SEE Id	SOCKET	BIN	(-)IGSS (A)	(+)IGSS (A)	IDSS (A)	BVR (V)	DATE	TIME
A1	1	PASS	5.03E-09	1.07E-08	2.46E-07	7.75E+01	4/18/2009	5:57:16 PM Kr Pass -6V / 100V
A2	2	PASS	4.19E-09	1.23E-08	1.79E-07	7.75E+01	4/18/2009	5:57:22 PM Kr Pass -6V / 100V
A3	3	PASS	7.12E-09	1.53E-08	2.08E-07	7.73E+01	4/18/2009	5:57:29 PM Kr Pass -6V / 100V
A4	4	PASS	1.09E-08	6.23E-08	2.39E-07	7.74E+01	4/18/2009	5:57:34 PM Kr Pass -6V / 100V
A5	5	FAIL	1.39E-08	1.06E-07	2.06E-07	7.74E+01	4/18/2009	5:57:38 PM Kr Un-Tested
A6	6	PASS	1.37E-08	8.64E-08	1.92E-07	7.75E+01	4/18/2009	5:57:44 PM Kr Pass -7V / 35V
A7	7	PASS	5.71E-09	1.25E-08	2.01E-07	7.74E+01	4/18/2009	5:57:49 PM Kr Pass -7V / 35V
A8	8	FAIL	2.66E-06	3.69E-06	2.77E-07	7.71E+01	4/18/2009	5:57:54 PM Kr Pass -7V / 35V
A9	9	FAIL	3.48E-06	1.79E-06	9.15E-07	7.70E+01	4/18/2009	5:58:00 PM Kr Failed -7V / 35V

BATCH9	TAMU	IRHC77034	POST	4/18/2009	5:59 PM	Kr		RE-TEST
SEE Id	SOCKET	BIN	(-)IGSS (A)	(+)IGSS (A)	IDSS (A)	BVR (V)	DATE	TIME
A8	8	FAIL	2.38E-06	3.76E-06	2.90E-07	7.71E+01	4/18/2009	5:59:26 PM Kr Pass -7V / 35V

BATCH9	TAMU	IRHC77034	POST	4/18/2009	6:00 PM	Kr		RE-TEST
SEE Id	SOCKET	BIN	(-)IGSS (A)	(+)IGSS (A)	IDSS (A)	BVR (V)	DATE	TIME
A8	8	FAIL	1.91E-06	3.52E-06	1.29E-07	7.71E+01	4/18/2009	6:00:20 PM Kr Pass -7V / 35V

Thus Qualified to -6V/60V Only for Krypton

BATCH9	TAMU	IRHC77034	POST	4/18/2009	7:05 PM	Xe		Ion, Insitu & SEE Results
SEE Id	SOCKET	BIN	(-)IGSS (A)	(+)IGSS (A)	IDSS (A)	BVR (V)	DATE	TIME
A10	10	PASS	5.42E-09	1.23E-08	1.69E-07	7.76E+01	4/18/2009	7:05:47 PM Xe Pass -5V / 60V
A11	11	PASS	5.18E-09	1.17E-08	1.98E-07	7.74E+01	4/18/2009	7:05:53 PM Xe Pass -5V / 60V
A12	12	PASS	4.28E-09	1.13E-08	1.98E-07	7.75E+01	4/18/2009	7:05:58 PM Xe Pass -5V / 60V
A13	13	FAIL	1.26E-03	8.75E-04	5.00E-03	6.94E+01	4/18/2009	7:06:03 PM Xe Failed -6V/30V (GS on)
A14	14	PASS	1.32E-08	2.01E-08	1.99E-07	7.76E+01	4/18/2009	7:06:08 PM Xe Pass -6V / 30V
A15	15	FAIL	2.15E-06	2.03E-03	5.00E-03	4.24E+01	4/18/2009	7:06:14 PM Xe Failed -6V/30V
A16	16	FAIL	2.67E-03	2.58E-03	5.00E-03	9.02E+00	4/18/2009	7:06:19 PM Xe Pass -6V / 30V
A17	17	FAIL	3.05E-03	2.08E-03	5.00E-03	2.26E+01	4/18/2009	7:06:24 PM Xe Failed -6V/30V
A18	18	FAIL	3.36E-03	2.29E-03	5.00E-03	1.48E+01	4/18/2009	7:06:30 PM Xe Failed -6V/30V

Thus Qualified to -5V/60V Only for Xenon



BATCH22	TAMU	IRHC77034	PRE	4/19/2009	7:37 PM	Au		
		(-)IGSS (A)	(+)IGSS (A)	IDSS (A)	BVR (V)		DATE	TIME
SOCKET	BIN	-1.00E+01V	1.00E+01V	4.80E+01V	2.50E-04A			
1	PASS	1.17E-09	1.94E-09	4.32E-09	77.76		4/19/2009	7:37:15 PM
2	PASS	1.59E-09	2.35E-09	5.554E-08	77.74		4/19/2009	7:37:23 PM
3	PASS	1.51E-09	2.25E-09	4.634E-08	77.69		4/19/2009	7:37:31 PM
4	PASS	1.96E-09	2.95E-09	6.881E-08	77.68		4/19/2009	7:37:39 PM
5	PASS	2.47E-09	3.69E-09	3.265E-08	77.33		4/19/2009	7:37:46 PM
6	PASS	2.22E-09	3.9E-09	4.036E-08	77.23		4/19/2009	7:37:53 PM
7	PASS	1.35E-09	2.25E-09	2.928E-08	77.2		4/19/2009	7:38:03 PM
8	PASS	1.24E-09	2.22E-09	5.001E-08	77.24		4/19/2009	7:38:11 PM
9	PASS	1.16E-09	2.16E-09	4.92E-08	77.33		4/19/2009	7:38:18 PM
10	PASS	1.16E-09	1.95E-09	4.383E-08	77.3		4/19/2009	7:38:26 PM
11	PASS	1.11E-09	1.87E-09	6.189E-08	77.52		4/19/2009	7:38:33 PM
12	PASS	1.2E-09	1.94E-09	4.61E-08	77.53		4/19/2009	7:38:41 PM

BATCH22	TAMU	IRHC77034	POST	4/19/2009	8:51 PM	Au			
		(-)IGSS (A)	(+)IGSS (A)	IDSS (A)	BVR (V)		DATE	TIME	Ion, Insitu & SEE Results
SOCKET	BIN	-1.00E+01V	1.00E+01V	4.80E+01V	2.50E-04A				
A19	1	PASS	1.13E-09	1.93E-09	5.279E-08	77.65	4/19/2009	8:51:53 PM	Au Pass -4V / 60V
A20	2	PASS	1.4E-09	2.52E-09	6.823E-08	77.61	4/19/2009	8:52:02 PM	Au Pass -4V / 60V
A21	3	PASS	1.46E-09	2.48E-09	5.957E-08	77.58	4/19/2009	8:52:09 PM	Au Pass -4V / 60V
A22	4	PASS	2.04E-09	3.02E-09	7.729E-08	77.56	4/19/2009	8:52:16 PM	Au Pass -4V / 60V
A23	5	PASS	2.55E-09	3.9E-09	6.21E-08	77.21	4/19/2009	8:52:24 PM	Au Pass -5V / 40V
A24	6	PASS	2.37E-09	3.74E-09	6.276E-08	77.13	4/19/2009	8:52:31 PM	Au Pass -5V / 40V
A25	7	PASS	1.37E-09	2.75E-09	3.998E-08	77.09	4/19/2009	8:52:39 PM	Au Pass -5V / 40V
A26	8	FAIL	2.99E-03	1.61E-03	5.00E-03	64.26	4/19/2009	8:52:47 PM	Au Failed -5V / 40V
A27	9	PASS	1.36E-09	2.13E-09	6.57E-08	77.23	4/19/2009	8:52:55 PM	Au Pass -5V / 40V
A28	10	PASS	1.24E-09	2.07E-09	6.077E-08	77.2	4/19/2009	8:53:03 PM	Au Pass -5V / 40V
A29	11	PASS	9.75E-10	1.91E-09	6.066E-08	77.44	4/19/2009	8:53:10 PM	Au Pass -5V / 40V
A30	12	FAIL	3.38E-06	3.41E-06	8.531E-08	77.44	4/19/2009	8:53:18 PM	Au Pass -5V / 40V

Thus Qualified to -4V/60V Only for Gold

VGS (Volts)	LET=38±5%; 38µm±7.5%; 300MeV±7.5%	LET=62±5%; 33µm±7.5%; 355MeV±7.5%	LET=85±5%; 29µm±7.5%; 380MeV±10%
0	60	60	60
-2	60	60	60
-4	60	60	60
-5	60	60	60
-6	60	60	60

Final QPL Specs

for 2N7606U3/756 (IRHLNJ77034) and 2N7607T3/756 (IRHLYS77034CM)
for 2N7604U2/TBA (IRHLNA77064) and 2N7605T1/TBA (IRHLMS77064)

