

# **Single-Event-Effects Summary Report**

## **IR RAD-Hard Gen-6 200V N-channel**

### ***SEE Qualifications of:***

**JANTXVR, F, G, H AND JANSR, F, G, H 2N7591U3 MIL-PRF-19500/746**

**JANTXVR, F, G, H AND JANSR, F, G, H 2N7592T3 MIL-PRF-19500/755**

**JANTXVR, F, G, H AND JANSR, F, G, H 2N7583U2 MIL-PRF-19500/760**

**JANTXVR, F, G, H AND JANSR, F, G, H 2N7584T1 MIL-PRF-19500/753**

**IRHNJ67230, IRHNJ63230, IRHNJ66230, IRHNJ68230 SCV AND SCS**

**IRHYS67230CM, IRHYS63230CM, IRHYS66230CM, IRHYS68230CM SCV AND SCS**

**IRHNA67260, IRHNA63260, IRHNA66260, IRHNA68260 SCV AND SCS**

**IRHMS67260, IRHMS63260, IRHMS66260, IRHMS68260 SCV AND SCS**



**Fab-2 Wafer Lot:** Q781941D  
**SEE Test Date:** June 9th 2009  
**SEE Test Facility:** Texas A&M Cyclotron

Ion	Xe	Xe	Au
LET	43	59	90.1
Energy	2440	825	1472
Range	205	65.9	80
Run Numbers	16-32	282-294	375-378

**IR Fab-5 Specs**

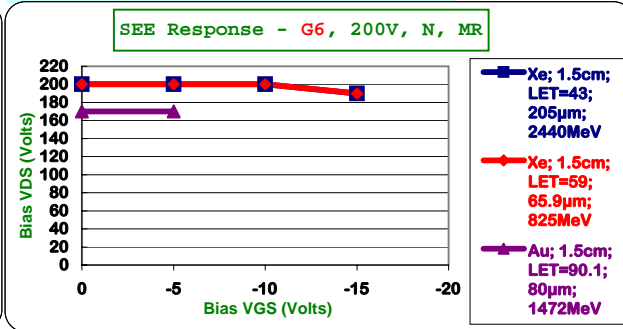
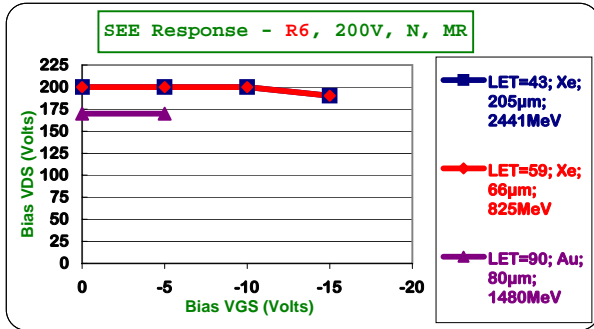
VDS Bias (Volts)

VGS Bias	LET=43; Xe; 205µm; 2441MeV	LET=59; Xe; 66µm; 825MeV	LET=90; Au; 80µm; 1480MeV
0	200	200	170
-5	200	200	170
-10	200	200	
-15	190	190	
-20			

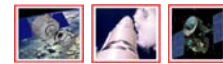
**IR Fab-2 Qual to Specs**

VDS Bias (Volts)

VGS Bias	Xe; 1.5cm; LET=43; 205µm; 2440MeV	Xe; 1.5cm; LET=59; 65.9µm; 825MeV	Au; 1.5cm; LET=90.1; 80µm; 1472MeV
0	200	200	170
-5	200	200	170
-10	200	200	
-15	190	190	
-20			



Run No.	Test Date	Ion	DUT Id	Socket	Wafer	Serial	Batch	VGS Volts	VDS Volts	Pass/Fail Blank=Pass
16	6/7/2009	Xe (25AeV)	D1	10	20	1	1	-10	200	CurvePoint-1
17	6/7/2009	Xe (25AeV)	D2	11	20	2	1	-10	200	CurvePoint-1
18	6/7/2009	Xe (25AeV)	D3	12	20	3	1	-10	200	CurvePoint-1
19	6/7/2009	Xe (25AeV)	D4	13	20	4	1	-10	200	CurvePoint-1
20	6/7/2009	Xe (25AeV)	D5	14	20	5	1	-15	150	
21	6/7/2009	Xe (25AeV)	D5	14	20	5	1	-15	170	
22	6/7/2009	Xe (25AeV)	D5	14	20	5	1	-15	190	CurvePoint-2
23	6/7/2009	Xe (25AeV)	D6	15	20	6	1	-15	190	CurvePoint-2
24	6/7/2009	Xe (25AeV)	D7	16	20	7	1	-15	190	CurvePoint-2
25	6/7/2009	Xe (25AeV)	D8	17	20	8	1	-15	190	CurvePoint-2
26	6/7/2009	Xe (25AeV)	D9	18	20	9	1	-15	200	EngineeringPoint1
27	6/7/2009	Xe (25AeV)	D9	18	20	9	1	-20	50	
28	6/7/2009	Xe (25AeV)	D9	18	20	9	1	-20	75	
29	6/7/2009	Xe (25AeV)	D9	18	20	9	1	-20	100	
30	6/7/2009	Xe (25AeV)	D9	18	20	9	1	-20	150	
31	6/7/2009	Xe (25AeV)	D9	18	20	9	1	-20	175	
32	6/7/2009	Xe (25AeV)	D9	18	20	9	1	-20	200	EngineeringPoint2
282	6/7/2009	Xe (15AeV)	D10	10	20	10	11	-10	200	CurvePoint-1
283	6/7/2009	Xe (15AeV)	D11	11	21	11	11	-10	200	CurvePoint-1
284	6/7/2009	Xe (15AeV)	D12	12	21	12	11	-10	200	CurvePoint-1
285	6/7/2009	Xe (15AeV)	D13	13	21	13	11	-10	200	CurvePoint-1
286	6/7/2009	Xe (15AeV)	D14	14	21	14	11	-15	180	
287	6/7/2009	Xe (15AeV)	D14	14	21	14	11	-15	190	CurvePoint-2
288	6/7/2009	Xe (15AeV)	D15	15	21	15	11	-15	180	
289	6/7/2009	Xe (15AeV)	D15	15	21	15	11	-15	190	CurvePoint-2
290	6/7/2009	Xe (15AeV)	D16	16	21	16	11	-15	180	
291	6/7/2009	Xe (15AeV)	D16	16	21	16	11	-15	190	CurvePoint-2
292	6/7/2009	Xe (15AeV)	D17	17	21	17	11	-15	180	
293	6/7/2009	Xe (15AeV)	D17	17	21	17	11	-15	190	CurvePoint-2
294	6/7/2009	Xe (15AeV)	D18	18	21	18	11	-15	200	EngineeringPoint
375	6/7/2009	Au	D19	10	21	19	16	-5	170	CurvePoint
376	6/7/2009	Au	D20	11	21	20	16	-5	170	CurvePoint
377	6/7/2009	Au	D21	12	22	21	16	-5	170	CurvePoint
378	6/7/2009	Au	D22	13	22	22	16	-5	170	CurvePoint



## RadHard MOSFET - G6, Size 3, 200V, N-channel

Expected Good Devices

SEE-Failed Devices

SEE-UnTested Devices

### Post - SEE Electricals Data

Parameter	I DSS	I GSSf	I GSSr	V GS(th)	BV DSS	R DS(on)	VSD				
Conditions	VDS=-160V VGS=0V	VGS=-20V VDS=0V	VGS=20V VDS=0V	IDS=1mA VDS=VGS	IDSS=1mA	ID=10A VGS=12V	IS=16A				
Limits	10µA Max	-100nA Max	100nA Max	2V to 4V	200V Min	132mOhms	1.2V Max				
Unit	nA 10000	nA 100	nA 100	V	V	Ohms	V				
<b>SEE Id</b>	<b>Log Serial</b>	<b>Q781941D (TAMU 06-09-2009) IRHC67230</b>						<b>Good</b>			
D1	1	3.31	0.52	0.14	3.76	216.8	126.6	0.987	Pass	Xe	25AMeV-Xe -10V/200V
D2	2	3.33	0.48	0.13	3.77	217.2	127.6	0.984	Pass	Xe	25AMeV-Xe -10V/200V
D3	3	3.20	0.52	0.15	3.81	217.2	125.6	0.990	Pass	Xe	25AMeV-Xe -10V/200V
D4	4	3.26	0.49	0.13	3.80	217.5	126.3	0.991	Pass	Xe	25AMeV-Xe -10V/200V
D5	5	3.40	0.51	0.15	3.80	215.9	126.4	0.988	Pass	Xe	25AMeV-Xe -15V/190V
D6	6	3.49	0.52	0.14	3.82	215.7	126.0	0.981	Pass	Xe	25AMeV-Xe -15V/190V
D7	7	3.06	0.50	0.14	3.85	217.8	129.5	0.990	Pass	Xe	25AMeV-Xe -15V/190V
D8	8	3.16	0.48	0.13	3.84	218.1	130.5	0.991	Pass	Xe	25AMeV-Xe -15V/190V
D9	9	3.22	0.50	0.14	3.87	217.7	126.9	0.990	Pass	Xe	Also passed -20V/200V
D10	10	3.23	0.45	0.13	3.88	217.5	126.6	0.990	Pass	Xe	15AMeV-Xe -10V/200V
D11	11	3.67	0.50	0.14	3.82	216.6	123.1	0.976	Pass	Xe	15AMeV-Xe -10V/200V
D12	12	3.44	0.50	0.13	3.85	216.9	123.7	0.978	Pass	Xe	15AMeV-Xe -10V/200V
D13	13	3.70	0.51	0.14	3.79	215.9	120.6	0.981	Pass	Xe	15AMeV-Xe -10V/200V
D14	14	3.76	0.48	0.13	3.83	215.8	120.3	0.982	Pass	Xe	15AMeV-Xe -15V/190V
D15	15	3.73	0.43	0.12	3.85	215.5	121.4	0.978	Pass	Xe	15AMeV-Xe -15V/190V
D16	16	3.55	0.49	0.13	3.86	215.4	120.9	0.979	Pass	Xe	15AMeV-Xe -15V/190V
D17	17	3.76	0.51	0.14	3.84	217.7	125.3	0.980	Pass	Xe	15AMeV-Xe -15V/190V
D18	18	3.53	0.52	0.14	3.83	217.9	126.8	0.980	Pass	Xe	Also passed -20V/200V
D19	19	3.94	0.49	0.14	3.89	217.4	121.9	0.974	Pass	Au	15AMeV-Au -5V/170V
D20	20	3.80	3610.00	2350.00	3.89	217.2	121.8	0.983	Failed	Au	15AMeV-Au -5V/170V
D21	21	4.31	0.54	0.14	3.76	217.0	129.9	1.001	Pass	Au	15AMeV-Au -5V/170V
D22	22	3.99	0.53	0.15	3.72	217.3	130.7	1.005	Pass	Au	15AMeV-Au -5V/170V
D23	23	3.29	0.53	0.15	3.79	216.0	127.1	0.994	Pass	Au	Un-Tested
D24	24	3.37	0.51	0.14	3.76	217.1	126.4	0.997	Pass	Au	Un-Tested
D25	25	3.17	0.48	0.13	3.82	217.4	129.5	1.000	Pass	Au	Un-Tested
D26	26	3.30	0.48	0.13	3.77	216.7	125.9	1.004	Pass	Au	Un-Tested
D27	27	3.32	0.48	0.13	3.83	217.6	130.5	1.004	Pass	Au	Un-Tested

Note that the device D20 is leaky during SEE Exposure and thus have expected high IGSS's in Post-SEE Electricals

VGS (Volts)	LET=42±5%; 205µm±5%; 2450MeV±5%	LET=61±5%; 66µm±7.5%; 825MeV±5%	LET=90±5%; 80µm±5%; 1470MeV±5%
0	200	200	170
-5	200	200	170
-10	200	200	
-15	190	190	
-20			

### Final QPL Specs

for 2N7591U3/746 (IRHNJ67230)  
for 2N7592T3/755 (IRHYS67230CM)  
for 2N7583U2/760 (IRHNA67260)  
for 2N7584T1/753 (IRHMS67260)

