



Single-Event-Effects Summary Report

IR RAD-Hard Gen-5 30V N-channel

SEE Qualifications of:

JANTXVR, F, G, H AND JANSR, F, G, H 2N7467U2 MIL-PRF-19500/683
JANTXVR, F, G, H AND JANSR, F, G, H 2N7478T1 MIL-PRF-19500/697
JANTXVR, F, G, H AND JANSR, F, G, H 2N7479U3 MIL-PRF-19500/703
JANTXVR, F, G, H AND JANSR, F, G, H 2N7482T3 MIL-PRF-19500/702
JANTXVR, F, G, H AND JANSR, F, G, H 2N7491T2 MIL-PRF-19500/701
JANTXVR, F, G, H AND JANSR, F, G, H 2N7494U5 MIL-PRF-19500/700
IRHNA57Z60, IRHNA53Z60, IRHNA56Z60, IRHNA58Z60 SCV AND SCS
IRHMS57Z60, IRHMS53Z60, IRHMS56Z60, IRHMS58Z60 SCV AND SCS
IRHNJ57Z30, IRHNJ53Z30, IRHNJ56Z30, IRHNJ58Z30 SCV AND SCS
IRHY57Z30CM, IRHY53Z30CM, IRHY56Z30CM, IRHY58Z30CM SCV AND SCS
IRHF57Z30, IRHF53Z30, IRHF56Z30, IRHF58Z30 SCV AND SCS
IRHE57Z30, IRHE53Z30, IRHE56Z30, IRHE58Z30 SCV AND SCS



Fab-2 Wafer Lot: Q780265 Split A
SEE Test Date: February 11th & 12th 2009
SEE Test Facility: Brookhaven National Lab (BNL)

Ion	Br	I	Au
LET	37.34	59.88	82.43
Energy	285	350	28.6
Range	36.9	33.1	354
Run Numbers	205-229	567-598	941-959

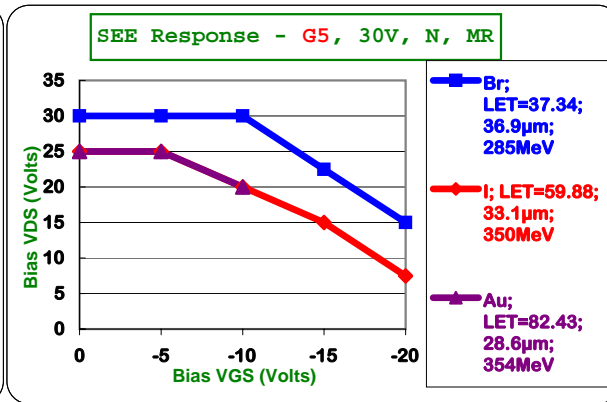
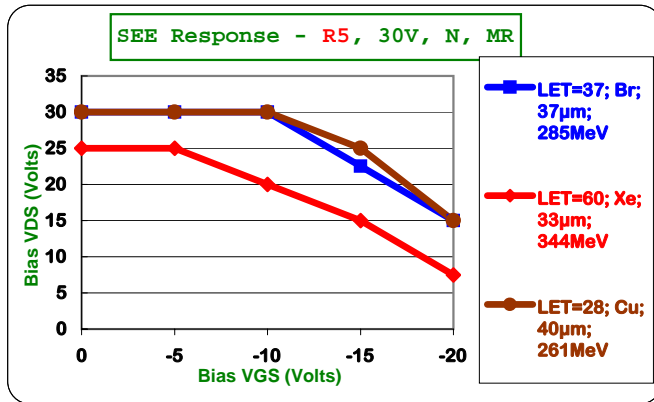
IR Fab-5 Specs

VGS Bias	VDS Bias (Volts)		
	LET=37; Br; 37µm; 285MeV	LET=60; Xe; 33µm; 344MeV	LET=28; Cu; 40µm; 261MeV
	0	30	25
-5	30	25	30
-10	30	20	30
-15	22.5	15	25
-20	15	7.5	15

IR Fab-2 Qual to Specs

VGS (Volts)	VDS Bias (Volts)		
	Br; LET=37.34 ; 36.9µm; 285MeV	I; LET=59.88 ; 33.1µm; 350MeV	Au; LET=82.43 ; 28.6µm; 354MeV
	0	30	25
-5	30	25	25
-10	30	20	20
-15	22.5	15	
-20	15	7.5	

New Gold Specs replace Old Copper Specs



Run No.	Ion	DUT Id	Socket	Wafer	Serial	Batch	VGS Volts	VDS Volts	Pass/Fail Blank=Pass
205	Br	M1	1	2	32	7	-10	20	
206	Br	M1	1	2	32	7	-10	24	
207	Br	M1	1	2	32	7	-10	26	
208	Br	M1	1	2	32	7	-10	28	
209	Br	M1	1	2	32	7	-10	30	
210	Br	M1	1	2	32	7	-15	20	
211	Br	M1	1	2	32	7	-15	22.5	
212	Br	M1	1	2	32	7	-20	15	
213	Br	M1	1	2	32	7	-15	25	
214	Br	M1	1	2	32	7	-15	30	F
215	Br	M2	2	2	33	7	-20	20	
216	Br	M2	2	2	33	7	-20	22	
217	Br	M2	2	2	33	7	-20	23	
218	Br	M3	3	2	34	7	-10	30	CurvePoint1
219	Br	M3	3	2	34	7	-15	22.5	CurvePoint2
220	Br	M3	3	2	34	7	-20	15	CurvePoint3
221	Br	M4	4	2	35	7	-20	15	CurvePoint3
222	Br	M4	4	2	35	7	-15	22.5	CurvePoint2
223	Br	M4	4	2	35	7	-10	30	CurvePoint1
224	Br	M5	5	2	36	7	-10	30	CurvePoint1
225	Br	M5	5	2	36	7	-15	22.5	CurvePoint2
226	Br	M5	5	2	36	7	-20	15	CurvePoint3
227	Br	M6	6	2	37	7	-20	15	CurvePoint3
228	Br	M6	6	2	37	7	-15	22.5	CurvePoint2
229	Br	M6	6	2	37	7	-10	30	CurvePoint1



Run No.	Ion	DUT Id	Socket	Wafer	Serial	Batch	VGS Volts	VDS Volts	Pass/Fail Blank=Pass
567	I	M10	1	2	24	16	-5	25	CurvePoint1
568	I	M10	1	2	24	16	-5	30	
569	I	M10	1	2	24	16	-10	20	CurvePoint2
570	I	M10	1	2	24	16	-10	25	
571	I	M10	1	2	24	16	-15	15	CurvePoint3
572	I	M10	1	2	24	16	-15	20	
573	I	M10	1	2	24	16	-20	7.5	CurvePoint4
574	I	M10	1	2	24	16	-20	10	
575	I	M10	1	2	24	16	-10	30	EngCurvePoint1
576	I	M10	1	2	24	16	-15	25	EngCurvePoint2
577	I	M10	1	2	24	16	-20	15	EngCurvePoint3
578	I	M11	2	2	25	16	-5	25	CurvePoint1
579	I	M11	2	2	25	16	-10	20	CurvePoint2
580	I	M11	2	2	25	16	-10	30	EngCurvePoint1
581	I	M11	2	2	25	16	-15	15	CurvePoint3
582	I	M11	2	2	25	16	-15	25	EngCurvePoint2
583	I	M11	2	2	25	16	-20	7.5	CurvePoint4
584	I	M11	2	2	25	16	-20	15	EngCurvePoint3
585	I	M12	3	2	26	16	-5	25	CurvePoint1
586	I	M12	3	2	26	16	-10	20	CurvePoint2
587	I	M12	3	2	26	16	-10	30	EngCurvePoint1
588	I	M12	3	2	26	16	-15	15	CurvePoint3
589	I	M12	3	2	26	16	-15	25	EngCurvePoint2
590	I	M12	3	2	26	16	-20	7.5	CurvePoint4
591	I	M12	3	2	26	16	-20	15	EngCurvePoint3
592	I	M13	4	2	27	16	-5	25	CurvePoint1
593	I	M13	4	2	27	16	-10	20	CurvePoint2
594	I	M13	4	2	27	16	-10	30	EngCurvePoint1
595	I	M13	4	2	27	16	-15	15	CurvePoint3
596	I	M13	4	2	27	16	-15	25	EngCurvePoint2
597	I	M13	4	2	27	16	-20	7.5	CurvePoint4
598	I	M13	4	2	27	16	-20	15	EngCurvePoint3
941	Au	M18	1	2	41	26	-5	15	
942	Au	M18	1	2	41	26	-5	20	
943	Au	M18	1	2	41	26	-5	25	
944	Au	M18	1	2	41	26	-5	30	
945	Au	M18	1	2	41	26	-10	20	
946	Au	M18	1	2	41	26	-10	25	
947	Au	M18	1	2	41	26	-10	30	F
948	Au	M19	2	2	42	26	-5	25	
949	Au	M19	2	2	42	26	-5	30	
950	Au	M19	2	2	42	26	-10	20	
951	Au	M19	2	2	42	26	-10	25	F
952	Au	M20	3	2	43	26	-5	25	CurvePoint1
953	Au	M20	3	2	43	26	-10	20	CurvePoint2
954	Au	M21	4	2	44	26	-5	25	CurvePoint1
955	Au	M21	4	2	44	26	-10	20	CurvePoint2
956	Au	M22	5	2	45	26	-5	25	CurvePoint1
957	Au	M22	5	2	45	26	-10	20	CurvePoint2
958	Au	M23	6	2	46	26	-5	25	CurvePoint1
959	Au	M23	6	2	46	26	-10	20	CurvePoint2



Electrical Codes:

RadHard MOSFET - G5, Hex 3, 30V, N-channel

Expected Good Devices

SEE-Failed Devices

Post - SEE Electricals Data

SEE-UnTested Devices

Parameter	I DSS	I GSSf	I GSSr	V GS(th)	BV DSS	R DS(on)	VSD
Conditions	VDS=-24V VGS=0V	VGS=-20V VDS=0V	VGS=20V VDS=0V	IDS=1mA VDS=VGS	IDSS=1mA	ID=22A VGS=0V	IS=22A
Limits	10µA Max	-100nA Max	100nA Max	2V to 4V	30V Min	20mOhms	1.2V Max
Unit	nA	nA	nA	V	V	mOhms	V

SEE Id	Log Serial	Q780265A (BNL 02-11 & 02-12-2009) IRHC57Z30						Good Matched Electricals to SEE	
	21	0.21	0.51	0.15	3.580	35.3	15.40	0.964	Unused
	22	0.18	0.50	0.14	3.572	35.4	15.48	0.964	Unused
	23	0.22	0.51	0.15	3.581	35.3	15.61	0.966	Unused
M10	24	2.72	0.50	0.15	3.567	35.3	15.67	0.967	Pass -5/25,-10/20,-15/15,-20/7.5 I
M11	25	1.75	0.51	0.15	3.574	35.3	15.68	0.969	Pass -5/25,-10/20,-15/15,-20/7.5 I
M12	26	1.94	0.48	0.13	3.683	35.1	15.51	0.966	Pass -5/25,-10/20,-15/15,-20/7.5 I
M13	27	2.39	0.46	0.14	3.667	35.2	15.37	0.964	Pass -5/25,-10/20,-15/15,-20/7.5 I
	28	46.78	0.52	0.15	3.672	35.2	15.42	0.962	Unused
	29	0.25	0.52	0.15	3.610	35.4	15.32	0.961	Unused
	30	0.24	0.47	0.13	3.652	35.3	15.79	0.968	Unused
	31	15.60	0.52	0.15	3.674	35.2	15.54	0.968	Unused
M1	32	1.85	0.52	0.15	3.677	35.2	15.40	0.964	Failed -15/30 Br
M2	33	3.26	0.47	0.14	3.659	35.2	15.40	0.961	Failed -20/23 Br
M3	34	0.30	0.46	0.13	3.656	35.3	15.45	0.962	Pass -10/30,-15/22.5,-20/15 Br
M4	35	0.34	0.49	0.14	3.643	35.3	15.09	0.958	Pass -10/30,-15/22.5,-20/15 Br
M5	36	0.34	0.45	0.14	3.605	35.4	15.12	0.958	Pass -10/30,-15/22.5,-20/15 Br
M6	37	0.33	0.52	0.15	3.574	35.4	15.63	0.964	Pass -10/30,-15/22.5,-20/15 Br
	38	0.23	0.52	0.15	3.649	35.3	15.30	0.961	Unused
	39	0.20	0.46	0.13	3.641	35.4	15.42	0.963	Unused
	40	0.22	0.52	0.15	3.637	35.3	15.69	0.972	Unused
M18	41	514300.00	909600.00	999900.00	3.667	34.5	15.95	0.968	Failed -10/30 Au
M19	42	3181000.00	999900.00	999900.00	3.668	8.3	21.09	0.961	Failed -10/25 Au
M20	43	2.53	0.50	0.14	3.656	35.2	15.25	0.958	Pass -5/25, -10/20 Au
M21	44	2.62	0.50	0.14	3.603	35.4	15.44	0.963	Pass -5/25, -10/20 Au
M22	45	2.77	0.51	0.15	3.579	35.4	15.54	0.965	Pass -5/25, -10/20 Au
M23	46	2.55	0.50	0.15	3.543	35.4	15.35	0.961	Pass -5/25, -10/20 Au



VGS (Volts)	LET=38±5%; 38µm±7.5%; 300MeV±7.5%	LET=61±5%; 31µm±10%; 330MeV±7.5%	LET=84±5%; 28µm±7.5%; 350MeV±10%
0	30	25	25
-5	30	25	25
-10	30	20	20
-15	22.5	15	
-20	15	7.5	

Final QPL Specs

for 2N7467U2/683 (IRHNA57Z60) and 2N7478T1/697 (IRHMS57Z60)
 for 2N7479U3/703 (IRHNJ57Z30) and 2N7482T3/702 (IRHY57Z30CM)
 for 2N7491T2/701 (IRHF57Z30) and 2N7494U5/700 (IRHE57Z30)

