TABLE 1 - Failure (or Pass/Fail) N-Channel Device Vds Voltages for the Indicated Ion Beams																
BVds	**Mfr.**	**Mfr. No.**	**Gen. No.**	**Chan. Type**	**Samp.**	**Vgs (off) [V]**	**Low Z Ions**	**Cu = 16: Fe, Ni, Co LET = 27:**	**Br, Kr LET = 38**	**Hi Z Ions**	**Hi-Energy Beams***	**Fail mode**	**Test Org.**	**Date**	**Test Fac.**	**Remarks**
	Rated Vds < 100 V															
60	INR	IRHM7054		n		0		60(Ni)				none	Rock	7/93	BNL	D/C 9242. R. Ferdon. WP-04
60	INR	IRFM054		n		5		60				none	BREL	4/93	UCB	D/C 9212. W. Will. WP-01
60	INR	IRHM7054		n		5		60(Ni)				none	Rock	7/93	BNL	D/C 9242. R. Ferdon. WP-04
60	INR	IRHM7054		n	4	12			55(Br)	<35(I)		SEGR	NWSC	4/95	BNL	Titus, Rept #SEGR-003 (T = 25° C only)
60	INR	IRHM7054		n		20			46(Br)			SEGR	NWSC	4/95	BNL	Titus, Rept #SEGR-003 (T = 25° C only)
60	SIL		2N6660	n		5		40(Ni)				SEB	Rock/ Aero	7/93	BNL	Revised fab last 2 yrs. DC9230. Rob Ferdon
60	SIL		2N6660	n	1	10	60(N) 50(Ne) 40(Ar)	22(Cu)				SEB	Rock/ Aero	1990	UCB	
80	SIL	VN88AF		n	1	0					60/70(Ne)	SEB	JPL	11/95	TAM	Nichols LET(Xe) = 44.
80	SIL	VN88AF		n	1	10					60/65(Ne)	SEB	JPL	11/95	TAM	Nichols LET(Xe) = 44.
	Rated Vds = 100 V															
100	GEC	IRF150	2N6764	n	2	10	>95(Ne) 70(Ar)	70(Cu)				SEB	Rock/ Aero	1990	UCB	
100	**HAR**	**FRK150**		**n**	**3**	**0**		**80/100(Ni)**				**SEGR**	**Rock**	**12/92**	**BNL**	**T = 90° C**
100	**HAR**	**FRK150**		**n**	**2**	**0**		**100(Ni)**				**none**	**Rock**	**12/92**	**BNL**	**T = 90° C**
100	HAR	FRK150R	2N7291	n	5	0		80/100(Ni)				SEGR	Rock	12/92	BNL	WP-04. T = 90° C.
100	**HAR**	**FRK160**		**n**	**2**	**0**			**70/80(Br)**			**SEGR**	**JPL**	**12/91**	**BNL**	**T = 25° C**
100	HAR	FRK160D	2N7299	n	2	0			70/80(Br)			SEGR	JPL	91/92	BNL	
100	**HAR**	**FRL130D1**		**n**	**1**	**0**				**50/52.5(I)**		**SEGR**	**JPL**	**6/97**	**BNL**	**Selva/Swift**
100	**HAR**	**FRM140**		**n**	**1**	**0**		**80/90(Fe)**				**SEGR**	**JPL**	**12/91**	**BNL**	**T = 25° C**
100	**HAR**	**FRM140**		**n**	**2**	**0**			**70/80(Br)**			**SEGR**	**JPL**	**12/91**	**BNL**	**T = 25° C**
100	**HAR**	**FRM140**		**n**	**2**	**0**			**60/80(Br)**			**SEGR**	**JPL**	**12/91**	**BNL**	**T = 100° C**
100	HAR	FRM140D1	2N7283	n	2	0			70/80(Br)			SEGR	JPL	91/92	BNL	Data @ T = 100° C exists for Vgs = 0 & 15 V.
100	HAR	IRF150	2N6764	n	2	0					40/50(Xe)	SEB	JPL	11/95	TAM	Nichols. LET(Xe) = 44.
100	HAR	130 family	2N6756	n		5		41(Ni?)					HAR	1993	BNL?	SSF Table
100	**HAR**	**FRK150**		**n**	**4**	**5**		**80/100(Ni)**				**SEGR**	**Rock**	**12/92**	**BNL**	**T = 90° C**
100	HAR	FRK150	2N7291	n		5		97(Ni?)					HAR	1993	BNL?	SSF Table
100	HAR	FRK150R	2N7291	n	4	5		80/100(Ni)				SEGR	Rock	12/92	BNL	WP-04. T = 90° C.
100	HAR	FRK160	2N7299	n		5		100(Ni?)				none	HAR	1993	BNL?	SSF Table
100	**HAR**	**FRL130D1**		**n**	**1**	**5**				**37.5/40(I)**		**SEGR**	**JPL**	**6/97**	**BNL**	**Selva/Swift**
100	HAR	FRM130	2N7271	n		5		100(Ni?)				none	HAR	1993	BNL?	SSF Table
100	HAR	FRM140	2N7283	n		5		98(Ni?)					HAR	1993	BNL?	SSF Table
100	HAR	IRF130	2N6796	n		5		40(Co)				SEB	BREL	4/93	UCB	WP-01. D/C M9226. Same results @ 45 & 100° C.
100	**HAR**	**FRL130D1**		**n**	**1**	**10**				**25/27.5(I)**		**SEGR**	**JPL**	**6/97**	**BNL**	**Selva/Swift**
100	HAR		2N6764	n	1	10					45/50(Xe)	SEGR	JPL	11/95	TAM	Nichols. Note change in failure mode vs Vgs.
100	**HAR**	**FRL130D1**		**n**	**1**	**15**				**17.5/20(I)**		**SEGR**	**JPL**	**6/97**	**BNL**	**Selva/Swift**
100	HAR	FRM140D1	2N7283	n	3*	15			20/40(Kr)			SEGR	JPL	91/92	UCB	*Harris says these are their latest technology.

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BVds	**Mfr.**	**Mfr. No.**	**Gen. No.**	**Chan. Type**	**Samp.**	**Vgs (off) [V]**	**Low Z Ions**	**Cu = 16: Fe, Ni, Co LET = 27:**	**Br, Kr LET = 38**	**Hi Z Ions**	**Hi-Energy Beams***	**Fail mode**	**Test Org.**	**Date**	**Test Fac.**	**Remarks**
100	**HAR**	**FRL130D1**		**n**	**1**	**20**				**12.5/15(I)**		**SEGR**	**JPL**	**6/97**	**BNL**	**Selva/Swift**
100	**HAR**	**FSL130**		**n**	**11**	**20**		**100(Ni)**				**none**	**NSWC**	**7/93**	**BNL**	**T = 25°C**
100	HAR	IRF140		n	5	25			50?(Br)			SEGR	UA	1994	IPN	Mouret, 94IEEE TNS. RT and angle data exist.
100	**HAR**	**FSL110**		**n**	**2**	**35**		**100(Ni)**				**none**	**NSWC**	**2/95**	**BNL**	**T = 25°C**
100	**HAR**	**FSL110**		**n**	**2**	**40**		**100(Ni)**				**none**	**NSWC**	**2/95**	**BNL**	**T = 25°C**
100	HAR	FSF150R		n		<20			100(Br)	100(I)		SEGR	NWSC	1995	BNL	Titus, 95IEEE TNS. FSF = "SEE Hard"
100	HAR		2N6782	n	13	0&5		40/45(Ni)				SEB	HON	11/93	BNL	D/G 9352. Same response @ RT and 90° C. Lintz.
100	**INR**	**2N7261SH**	**130**	**n**	**5**	**0**		**100**				**none**	**BREL**	**7/97**	**88"**	
100	INR	IRF110	2N7682	n		0		70/80(Ni)	50/70(Br)			SEGR	ESA	1/94	BNL	D/C 9039B. Harwell Rept. AEA-RS-1348
100	INR	IRF120	2N6788	n		0		100(Ni)	80/90(Br)			SEB	ESA	1/94	BNL	D/C 9228G. Harwell Rept. AEA-RS-1348
100	INR	IRF130	2N6796	n		0		70/80(Ni)	60/70(Br)			SEB	ESA	1/94	BNL	D/C 8915A. Harwell Rept. AEA-RS-1348
100	INR	IRF130	2N6796	n		0		85(Cu?)				SEB	Aero	6/87	UCB	Koga
100	INR	IRF140		n		0		100(Ni)	70/80(Br)			SEB	ESA	1/94	BNL	D/C 9203E. Harwell Rept. AEA-RS-1348
100	INR	IRF150	2N6764	n		0		90/100(Ni)	70/80(Br)			SEB	ESA	1/94	BNL	D/C 9228E. Harwell Rept. AEA-RS-1348
100	INR	IRF150	2N6764	n		0	105	75(Cu?)	75			SEB	Aero	5/92	UCB	Koga
100	INR	IRFF130	2N6796	n		0			82(Br)			SEB	SNL	1990	BNL	200 MeV Br Range = 28µ
100	INR	IRH130		n		0			100(Br)	50/60(I)		?	NWSC		BNL	
100	INR	IRH7150		n	6	0			1 failure @ 60/70(Br)			SEB	JPL	91/92	BNL	One maverick.
100	INR	IRH7150		n		0			100(Kr)			none	Aero	5/92	UCB	Koga reports no SEB up to 150 V.
100	INR	IRHF130		n		0			100(Br)			none	JPL	1991	BNL	
100	**INR**		**2N6782**	**n**	**1**	**0**				**65/70(I)**		**SEGR**	**JPL**	**6/97**	**BNL**	**Selva/Swift**
100	**INR**		**2N6782**	**n**	**4**	**0**				**58/59(I)**		**SEGR**	**JPL**	**6/97**	**BNL**	**Selva/Swift**
100	INR	IRFG6110		n & p		2		85(Fe) p-chan only				SEB	MM	5/93	BNL?	D/C 9118. WP-02. No SEGR, no SEB in n-channel devices.
100	INR	IRHF7110		n		2		100(Ni)	100(Br)			none	Rock	7/92	BNL	T = 90° C.
100	INR	IRHF7130	2N7261	n		2		100(Ni)	<100(Br)			SEGR	Rock	7/92	BNL	T = 90° C.
100	INR	IRF120	2N6788	n		5		90				SEB	BREL	12/92	UW	Oberg. T = 23° C. Note failure mode versus temperature
100	INR	IRF120	2N6788	n		5		80				SEGR	BREL	12/92	UW	Oberg. T = 80° C.
100	INR	IRF130	2N6796	n		5		100(Cu?)				none	BREL	3/93	UCB	D/C 9236. Oberg. WP-01
100	INR	IRHM7130		n		5		80				SEGR	SEGR	1/93	UW	D/C 9112. WP-01. T = 100° C.
100	**INR**		**2N6782**	**n**	**3**	**5**				**55/60(I)**		**SEGR**	**JPL**	**6/97**	**BNL**	**Selva/Swift**
100	INR	IRHF130		n		7.5			<100(Br)			SEGR	JPL	1991	BNL	
100	INR	1RFF110	2N7682	n		10	100(N) 100(Ne) 90(Ar)	60(Cu)				SEGR	Rock/ Aero	1990	UCB	
100	INR	IRF130	2N6756	n	3	10	100(N) 100(Ne) 90(Ar)	60(Cu)				SEB	Rock/ Aero	1990	UCB	

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BVds	**Mfr.**	**Mfr. No.**	**Gen. No.**	**Chan. Type**	**Samp.**	**Vgs (off) [V]**	**Low Z Ions**	**Cu = 16: Fe, Ni, Co LET = 27:**	**Br, Kr LET = 38**	**Hi Z Ions**	**Hi-Energy Beams***	**Fail mode**	**Test Org.**	**Date**	**Test Fac.**	**Remarks**
100	INR	IRF150	2N6764	n	3	10	100(Ne) 70(Ar)	50(Cu)			40/60 (La)	SEB	Rock/ Aero/ JPL	1990	UCB	JPL used 12 GeV La Bevalac ion, LET = 30. 6/88
100	INR	IRFF130	2N6796	n	5	10	100(N) 100(Ne) 90(Ar)	60(Cu)				SEB	Rock/ Aero	1990	UCB	Compare to SIL part.
100	INR	IRH130		n		10			100(Br)			none	NWSC		BNL	
100	INR	IRH150	2N6764	n		10		100(Cu) 100(Fe)	100(Kr)		60/100 (La)	SEB	JPL/ Rock	1990	UCB	JPL, 12 GeV @ Bevalac, 6/88
100	**INR**		**2N6782**	**n**	**1**	**10**				**40(I)**		**SEGR**	**JPL**	**6/97**	**BNL**	**Selva/Swift**
100	INR	IRHF7110		n	4	12			85(Br)	41(I)		SEGR	NWSC	4/95	BNL	Titus, Rept #SEGR-003 (T = 25° C only)
100	INR	IRH7150		n	4	15			60/70(Br)			SEGR	JPL	91/92	BNL	Data @ T = 100° C exists for Vgs = 15 V only.
100	INR	IRHF130		n		15			<100(Br)			SEGR	JPL	1991	BNL	
100	INR	IRHF7110		n		15		100(Ni)	70(Br)			SEGR	Rock	7/92	BNL	T = 90° C.
100	INR	IRHF7130	2N7261	n		15		100(Ni)	60(Br)			SEGR	Rock	7/92	BNL	T = 90° C.
100	**INR**		**2N6782**	**n**	**1**	**15**				**30/32.5(I)**		**SEGR**	**JPL**	**6/97**	**BNL**	**Selva/Swift**
100	INR	IRHF7110		n		20			63(Br)	29(I)		SEGR	NWSC	4/95	BNL	Titus, Rept #SEGR-003 (T = 25° C only)
100	**INR**		**2N6782**	**n**	**1**	**20**				**22.5/25(I)**		**SEGR**	**JPL**	**6/97**	**BNL**	**Selva/Swift**
100	INR	IRH7150		n	2/3	0?		100(Ni)			>80(Xe)	none	CNES	11/90	GANIL	Used 3 GANIL ions. Tastet, RADECS91
100	INR	IRF150	2N6764	n	3	0?0	100(Cl)	70(Ni)	65(Br)	55(I)	50(Fe)	SEB	CNES	11/90	BNL	Used 1-4 GeV GANIL ions. Tastet, RADECS91
100	INR	IRF120	2N6788	n		2?	95(Ar)	<55(Cu)				SEB	Rock	1990	UCB	
100	INR	IRFF120	2N6788	n	1	2?		<60(Cu)				SEB	Rock	1990	UCB	
100	INR	IRH150	2N6764	n				100(Cu)	90/100(Kr)				Rock	1990	UCB	Waskiewicz & Groniger, DNA Rept 2/90
100	PHL	ECG2392		n	1	0					60 (Xe)	SEGR SEB	JPL	11/94	TAM	Nichols. Igs & Ids mA. At LET = 80, >50mA
100	RCA	IRF150	2N6764	n		10	100(N) 100(Ne) 50(Ar)	<50(Cu)				SEB	Rock	1990	UCB	
100	SIL	IRFF130	2N6796	n		5		50(Co)				SEB	BREL	7/95	UCB	
100	SIL	IRF150	2N6764	n	1	10	80(Ne) <50(Ar)	40(Cu)				SEB	Rock/ Aero	1990	UCB	
100	SIL	IRFF130	2N6796	n	2	10	100(N) 100(Ne) 70(Ar)	50(Cu)				SEB	Rock/ Aero	1990	UCB	
	Rated 100 V <Vds < 200 V															
180	RCA	RFM12N18		n		0	100	90	65			SEB	Aero	5/88	UCB	Koga
	Rated Vds = 200 V															
200	**APT**	**20M45BNFR**		**n**	**5**	**0**		**115/120(Co)**				**SEB**	**BREL**	**3/97**	**UCB**	
200	GEC	IRF250	2N6766	n	1	10	180(N) 170(Ne) <80(Ar)					SEB	Rock/ Aero	1990	UCB	
200	**HAR**	**FRK250**		**n**	**3**	**0**			**80/100(Br)**			**SEGR**	**Rock**	**9/92**	**BNL**	**WP-04. T = 90° C**

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BVds	Mfr.	Mfr. No.	Gen. No.	Chan. Type	Samp.	Vgs (off) [V]	Low Z Ions	Cu = 16: Fe, Ni, Co LET = 27:	Br, Kr LET = 38	Hi Z Ions	Hi-Energy Beams*	Fail mode	Test Org.	Date	Test Fac.	Remarks
200	HAR	FRK250		n	2	0		140160(Ni)				SEGR	Rock	12/92	BNL	WP-04. T = 90° C
200	HAR	FRK250		n	2	0		160/180(Ni)				SEGR	Rock	12/92	BNL	WP-04. T = 90° C
200	HAR	FRL230D1		n	1	0				60/62.5(I)		SEGR	JPL	6/97	BNL	Selva/Swift
200	HAR	FRL230D1		n	1	0			90/95(Br)			SEGR	JPL	6/97	BNL	Selva/Swift
200	HAR	FRM230		n	1	0		180/200(Ni)				SEGR	Rock	12/92	BNL	T = 90° C
200	HAR	FRM230R		n	1	0		150/170(Ni)				SEGR	Rock	12/92	BNL	T = 90° C
200	HAR	FRM240		n	2	0		60/100(Fe)				SEGR	JPL	12/91	BNL	T = 25° C
200	HAR	FRM240		n	2	0			80/100(Br)			SEGR	JPL	12/91	BNL	T = 25° C
200	HAR	FRM240		n	1	0			60/80(Br)			SEGR	JPL	6/92	BNL	T = 25° C
200	HAR	FRM240D1	2N7285	n	2 & 2	0		60/100(Fe)	80/100(Br)			SEGR	JPL	91/92	BNL	T = 100° C data has Vds(th) = 60/80 with Br.
200	HAR	230 family	2N6758	n		5		64					HAR	1993	BNL?	SSF Table
200	HAR	230 family	2N6758	n		5		70					HAR	1993	BNL?	SSF Table
200	HAR	230 family	2N6758	n		5		70				SEB SEGR	BREL	3/93	UCB	WP-01. D/C M9226. T = 45° C.
200	HAR	230 family	2N6758	n		5		80				SEB SEGR	BREL	3/93	UCB	WP-01. D/C M9226. T = 100° C.
200	HAR	FRK250		n	1	5			80/100(Br)			SEGR	Rock	9/92	BNL	WP-04. T = 90° C
200	HAR	FRK250		n	3	5		140160(Ni)				SEGR	Rock	12/92	BNL	WP-04. T = 90° C
200	HAR	FRK250		n	1	5		120/140(Ni)				SEGR	Rock	12/92	BNL	WP-04. T = 90° C
200	HAR	FRK250R	2N7293	n	2	5			90(Kr)			SEGR	NASDA	2&3/95	JAERI?	D/C 9249. T = 80° C. Shinosaki.
200	HAR	FRL230D1		n	1	5				47.5/50(I)		SEGR	JPL	6/97	BNL	Selva/Swift
200	HAR	FRL230D1		n	1	5			90/95(Br)			SEGR	JPL	6/97	BNL	Selva/Swift
200	HAR	FRL230R		n		5			100(Kr)			SEGR	NASDA	2&3/95	JAERI?	D/C 9327. T = 25 & 80° C. Shinosaki
200	HAR	FRM230		n	1	5		180/200(Ni)				SEGR	Rock	12/92	BNL	T = 90° C
200	HAR	FRM230	2N7274	n		5		166(Ni?)					HAR	1993	BNL?	SSF Table
200	HAR	FRM230R		n	1	5		160/180(Ni)				SEGR	Rock	12/92	BNL	T = 90° C
200	HAR	FRL230D1		n	1	10				30/32.5(I)		SEGR	JPL	6/97	BNL	Selva/Swift
200	HAR	FRL230D1		n	1	10			90/95(Br)			SEGR / SEB	JPL	6/97	BNL	Selva/Swift
200	HAR	FRL230D1		n	1	10			70(Br)			SEGR	JPL	6/97	BNL	Selva/Swift
200	HAR	FRL230D1		n	1	15				22.5/25(I)		SEGR	JPL	6/97	BNL	Selva/Swift
200	HAR	FRM240D1	2N7285	n	1*	15	180/200(Ar)					SEB	JPL	91/92	UCB	*Not latest technology. T = 100° C data has no SEB.
200	HAR	FRL230D1		n	1	20				17.5/20(I)		SEGR	JPL	6/97	BNL	Selva/Swift
200	HAR	FRL230D1		n	1	20			30/32.5(Br)			SEGR	JPL	6/97	BNL	Selva/Swift
200	HAR	FSL230		n	3	22		200(Ni)				none	NSWC	7/93	BNL	T = 25°C
200	INR	2N6798		n	3	0					170-p	SEB	BREL	1995	HCL	148 MeV protons
200	INR	2N7262SG	230	n	10	0		136	155			SEGR	BREL	7/97	88"	
200	INR	2N7269SG	250	n	10	0		145	150			SEGR	BREL	9/97	88"	
200	INR	2N7269SG	250	n	10	0		157	180			SEGR	BREL	9/97	88"	

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BVds	**Mfr.**	**Mfr. No.**	**Gen. No.**	**Chan. Type**	**Samp.**	**Vgs (off) [V]**	**Low Z Ions**	**Cu = 16: Fe, Ni, Co LET = 27:**	**Br, Kr LET = 38**	**Hi Z Ions**	**Hi-Energy Beams***	**Fail mode**	**Test Org.**	**Date**	**Test Fac.**	**Remarks**
200	INR	IRF210	2N6784	n		0		140/150(Ni)	100/120(Br)			SEB	ESA	1/94	BNL	D/C 9228G. Harwell Rept. AEA-RS-1348
200	INR	IRF230	2N6798	n		0		160/170(Ni)	<140(Br)			SEB	ESA	1/94	BNL	D/C 9228G. Harwell Rept. AEA-RS-1348
200	INR	IRF240		n		0		140/150(Ni)	120/130(Br)			SEB	ESA	1/94	BNL	D/C 9228G. Harwell Rept. AEA-RS-1348
200	INR	IRF250	2N6766	n		0		120/140(Ni)	<120(Br)			SEB	ESA	1/94	BNL	D/C 9228G. Harwell Rept. AEA-RS-1348
200	**INR**	**IRF250**		**n**	**6**	**0**					**200-n**	**SEB**	**BREL**	**1995**	**WNR**	**Cosmic ray neutrons**
200	INR	IRFF230	2N6798	n		0		135(Ni)				SEB	Rock	7/93	BNL	D/C 9146. R. Ferdon
200	INR	IRFF230	2N6798	n		0		140				SEB	BREL	10/93	UW	D/C 9217. T = 22° C. WP-01. Oberg.
200	INR	IRH7230		n	5	0		200(Ni)				none	Rock	12/92	BNL	D/C 9042. T = 90°C.
200	INR	IRH7250		n	4	0			200(Br)			none	JPL	91/92	BNL	
200	INR	IRH7250		n		0		180(Ni)				SEGR	Rock	8/93	BNL	D/C A9316. WP-04. R. Ferdon.
200	INR	IRHM8250		n	4	0		140				SEGR	BREL	1/93	UW	WP-01. T = 100° C. Oberg
200	**INR**		**2N6790**	**n**	**1**	**0**				**105/110(I)**		**SEGR**	**JPL**	**6/97**	**BNL**	**Selva/Swift**
200	INR	IR7250		n	18	2			125(Br)	50(Au)		SEGR	NWSC	8/95	BNL	Titus
200	INR	IRHF7230	2N7262	n		2		200(Ni)	160(Br)			SEGR	Rock	7/92	BNL	IR7xxx = Rad tolerant. T = 90° C.
200	INR	IRF220		n		5		145(Co)				SEB	BREL	6/93	UCB	D/C 9218G. T = 45° C. WP-01. W.Will.
200	INR	IRF220		n		5		150(Co)				SEB	BREL	6/93	UCB	T =100° C. WP-01. W. Will
200	INR	IRF250	2N7225	n		5		150(Co?)				SEB	BREL	11/93	UCB	WP-01. T = 25° C.
200	INR	IRF250	2N7225	n		5		160(Co?)				SEB	BREL	11/93	UCB	WP-01. T = 100° C.
200	INR	IRFF220	2N6790	n		5		145(Ni)				SEB	Rock	7/93	BNL	D/C 9040. WP-04. R. Ferdon
200	INR	IRFF230	2N6798	n		5		135(Ni)				SEB	Rock	7/93	BNL	D/C 9146. R. Ferdon
200	INR	IRFF230	2N6798	n		5		120				SEB SEGR	BREL	10/93	UW	T = 80° C. WP-01. Oberg.
200	INR	IRFF230	2N6798	n	2	5			120(Kr)			SEB	NASDA	3/95	JAERI?	D/C 9313. T = 25 & 80° C. Shinosaki.
200	INR	IRFM250	2N7225	n	2	5			130(Kr)			SEB	NASDA	3/95	JAERI?	D/C 9120. T = 80° C. Shinosaki. Need RT data>
200	INR	IRH7230		n	5	5		200(Ni)				none	Rock	12/92	BNL	D/C 9042. T = 90°C.
200	INR	IRH7250		n		5		120?(Ni)				SEGR	Rock	8/93	BNL	D/C A9316. WP-04. R. Ferdon.
200	INR	IRHM7250	2N7269	n		5		200				none	BREL	1/94	UCB	WP-01. T = 100° C. Oberg
200	INR	IRHM8250		n		5		110				SEGR	BREL	1/93	UW	WP-01. T = 100° C. Oberg
200	**INR**		**2N6790**	**n**	**1**	**5**				**90/95(I)**		**SEGR**	**JPL**	**6/97**	**BNL**	**Selva/Swift**
200	INR	IRF250	2N6766	n	2	10	190(N) 200(Ne) 120(Ar)	100(Ni) 90(Cu)	85(Br)			SEB	Rock/ Aero	90/92	UCB BNL	Waskiewicz
200	**INR**		**2N6790**	**n**	**1**	**10**				**65(I)**		**SEGR**	**JPL**	**6/97**	**BNL**	**Selva/Swift**
200	**INR**		**2N6790**	**n**	**2**	**10**				**70/75(I)**		**SEGR**	**JPL**	**6/97**	**BNL**	**Selva/Swift**
200	INR	IRHM7250	2N7269	n		12		170				SEGR	BREL	1/94	UCB	WP-01. T = 100° C. Oberg
200	INR	IR7250		n		15			75(Br)	25(Au)		SEGR	NWSC	8/95	BNL	Titus
200	INR	IRH7250		n	3,2,4	15	180/200(Ar)	160/200(Fe)	120/140(Br)			SEGR	JPL	91/92	BNL	Data @ T = 100° C exists for Vgs = 15 V only.
200	INR	IRHF7230	2N7262	n	5	15		*200(Ni)	90(Br)			SEGR	Rock	7/92	BNL	*1 OF 5 Failed @ 200 V with Ni.
200	INR	IRH7250		n	2	20			80(Br)			SEGR	JPL	91/92	BNL	
200	**INR**		**2N6790**	**n**	**3**	**20**				**35/37.5(I)**		**SEGR**	**JPL**	**6/97**	**BNL**	**Selva/Swift**

TABLE 1 - Failure (or Pass/Fail) N-Channel Device Vds Voltages for the Indicated Ion Beams																
BVds	**Mfr.**	**Mfr. No.**	**Gen. No.**	**Chan. Type**	**Samp.**	**Vgs (off) [V]**	**Low Z Ions**	**Cu = 16: Fe, Ni, Co LET = 27:**	**Br, Kr LET = 38**	**Hi Z Ions**	**Hi-Energy Beams***	**Fail mode**	**Test Org.**	**Date**	**Test Fac.**	**Remarks**
200	INR	IRF210	2N6784	n				<130(Cu)				SEB	Rock	1990	UCB	
200	**IXY**	**IXFH50N20**		**n**	**5**	**0**		**50**	**55**			**SEB**	**BREL**	**3/97**	**88"**	
200	RCA	25N20		n	1	10	200(N) 200(Ne) 180(Ar)	<70(Cu)				SEB	Rock/ Aero	1990	UCB	
200	RCA	IRF250	2N6766	n	1	10	180(N) 120(Ar)	80(Cu)				SEB	Rock/ Aero	1990	UCB	
200	RCA	IRF230	2N6758	n		2?		<100(Cu)				SEB	Rock	1990	UCB	
200	RCA	IRFF230	2N6798	n		2?		<90(Cu)				SEB	Rock	1990	UCB	
200	**SIL**	**2N6790**	**220**	**n**	**5**	**0**		**80**	**90**			**SEB**	**BREL**	**7/97**	**88"**	
200	SIL	9230 family	2N6851	n		5		200(Co)				none	BREL	7/95	UCB	Oberg. T ~100°C. (looking for SEGR)
200	SIL	IRF250	2N6766	n	2	10	160(N) 60(Ar)					SEB	Rock/ Aero	1990	UCB	
200	SIL	IRFF230	2N6798	n		12		180				SEGR	BREL	10/93	UW	Oberg. T = 100°C. Worst case for SEGR. SSF WP-01
	Rated Vds = 250 V															
250	**HAR**	**FRL234**		**n**	**1**	**0**		**175/200(Ni)**				**SEGR**	**Rock**	**4/93**	**BNL**	**T = 90° C**
250	**HAR**	**FRL234**		**n**	**4**	**0**		**200/225(Ni)**				**SEGR**	**Rock**	**4/93**	**BNL**	**T = 90° C**
250	**HAR**	**FRL234**		**n**	**1**	**0**		**175/200(Ni)**				**SEGR**	**Rock**	**6/93**	**BNL**	**T = 90° C**
250	**HAR**	**FRL234**		**n**	**4**	**0**		**200/225(Ni)**				**SEGR**	**Rock**	**6/93**	**BNL**	**T = 90° C**
250	HAR	FRL234R		n	5	0		175/200(Ni)				SEGR	Rock	3/93	BNL	D/C 9312. T = 90° C.
250	HAR	FSF254R		n		0			250(Br)	170(I)		SEGR	NWSC	1995	BNL	Titus, 95IEEE TNS, pg 1933. FSF = "SEE Hard"
275	HAR	TA17463RH		n	6	0	210(Ne) 175(Ar)		75(Kr)			SEB	JPL	3&6/90	UCB	Higher thresholds @ T = 100° C. Nichols.
250	HAR	TA17663		n	6	0	250(Ne) 250(Ar)		245(Kr)			SEB	JPL	3&6/90	UCB	Hard @ T = 100° C. Nichols.
250	HAR	FRF254R	2N7296	n	2	5			100(Kr)			SEGR	NASDA	2&3/95	JAERI?	D/C 9041,T = 80° C. Shinosaki.
250	HAR	FRK264D	2N7303	n		5		160				SEGR	BREL	11/93	UW UCB	WP-01. Tested @ RT & 100° C.
250	HAR	FRK264R	2N7303	n	2	5			75(Kr)			SEGR	NASDA	2&3/95	JAERI?	D/C 9328. T = 80° C. Shinosaki
250	**HAR**	**FRL234**		**n**	**5**	**5**		**175/200(Ni)**				**SEGR**	**Rock**	**4/93**	**BNL**	**T = 90° C**
250	**HAR**	**FRL234**		**n**	**1**	**5**		**150/175(Ni)**				**SEGR**	**Rock**	**6/93**	**BNL**	**T = 90° C**
250	**HAR**	**FRL234**		**n**	**3**	**5**		**175/200(Ni)**				**SEGR**	**Rock**	**6/93**	**BNL**	**T = 90° C**
250	**HAR**	**FRL234**		**n**	**5**	**5**		**200/225(Ni)**				**SEGR**	**Rock**	**6/93**	**BNL**	**T = 90° C**
250	HAR	FRM234		n		5		238					HAR	1993	BNL?	SSF Table
250	HAR	FSL234		n		5		250(Co)					BREL	3/95	UCB	Oberg
250	HAR	FSL254		n		5		250(Co)					BREL	3/95	UCB	Oberg
250	HAR	FSF254R		n		15						SEGR	NWSC	1995	BNL	Titus, 95IEEE TNS, pg 1933. FSF = "SEE Hard"
250	**HAR**	**FSL234**		**n**	**5**	**20**		**250(Ni)**				**none**	**NSWC**	**7/93**	**BNL**	**T = 25°C**
250	**INR**	**IRH7264SE**	**2N7434**	**n**	**3**	**0**		**250(Cu)**				**SEGR**	**INR/ NSWC**	**2/98**	**BNL**	
250	**INR**	**IRH7264SE**	**264**	**n**	**5**	**0**		**250**				**SEB**	**BREL**	**3/97**	**UCB**	

TABLE 1 - Failure (or Pass/Fail) N-Channel Device Vds Voltages for the Indicated Ion Beams																
BVds	Mfr.	Mfr. No.	Gen. No.	Chan. Type	Samp.	Vgs (off) [V]	Low Z Ions	Cu = 16: Fe, Ni, Co LET = 27:	Br, Kr LET = 38	Hi Z Ions	Hi-Energy Beams*	Fail mode	Test Org.	Date	Test Fac.	Remarks
250	**INR**	**IRH7264SE**	**264**	**n**	**5**	**0**		**250**	**NA**			**Pass**	**BREL**	**3/97**	**88"**	
250	**INR**	**IRH7264SE**	**2N7434**	**n**	**3**	**5**		**250(Cu)**				**SEGR**	**INR/ NSWC**	**2/98**	**BNL**	
250	INR	IRH254		n		10		200(Cu)	225/250(Kr)			none	Rock	1990	UCB	
250	**INR**	**IRH7264SE**	**2N7434**	**n**	**3**	**10**		**250(Cu)**	**250(Br)**			**SEGR**	**INR/ NSWC**	**2/98**	**BNL**	
250	**INR**	**IRH7264SE**	**2N7434**	**n**	**3**	**15**		**250(Cu)**	**225/240(Br)**			**SEGR**	**INR/ NSWC**	**2/98**	**BNL**	
250	**INR**	**IRH7264SE**	**2N7434**	**n**	**3**	**20**		**250(Cu)**	**250(Br)**			**SEGR**	**INR/ NSWC**	**2/98**	**BNL**	
250	**INR**	**IRH7264SE**	**2N7434**	**n**	**3**	**25**		**250(Cu)**				**SEGR**	**INR/ NSWC**	**2/98**	**BNL**	**At V_{GS} = 30 V, 2 devices passed, 1 failed with Cu.**
250	INR	IRH254		n		2?		200(Cu)	>225(Kr)			none	Rock	1990	UCB	
250	IXY	IXFM40N25RH		n	6	0	200(Ne) 140(Ar)		55(Kr)			SEB	JPL	3 & 6/90	UCB	Higher thresholds @ T = 100° C. Nichols.
	Rated Vds = 300 V															
300	**APT**	**30M85BNFR**		**n**	**5**	**0**		**200/210**				**SEB**	**BREL**	**3/97**	**UCB**	
300	IXY	IXTM35N30		n	4	0	225(Ne) 160(Ar)		67(Kr)			SEB	JPL	6/90	UCB	Higher thresholds @ T = 100° C. Nichols.
300	UTR	IRFF320	2N6792	n		2?		<260(Cu)				SEB	Rock	1990	UCB	Compare to INR device
	Rated Vds = 400 V															
400	APT	APT40M42		n	3	12		200/225				SEB	HON	2/93	BNL	D/C 9302. SSF WP-02
400	**HAR**	**FRL430**		**n**	**1**	**0**				**72.5/75(I)**		**SEGR**	**JPL**	**6/97**	**BNL**	**Selva/Swift**
400	HAR	IRHM7360		n	2 & 4	0		225/250(Ni)	175/200(Br)			SEGR	Rock	9/92	BNL	T = 90° C.
400	HAR		2N6800	n		5		130				SEB	BREL	1/93	UW	WP-01. D/C 8830. T = 28° C.
400	HAR		2N6800	n		5		130				SEB	BREL	1/93	UW	WP-01. T = 100° C. See preceding.
400	**HAR**	**FRL430**		**n**	**1**	**10**				**47.5/50(I)**		**SEGR**	**JPL**	**6/97**	**BNL**	**Selva/Swift**
400	**HAR**	**FRL430**		**n**	**1**	**20**				**25/27.5(I)**		**SEGR**	**JPL**	**6/97**	**BNL**	**Selva/Swift**
400	INR	IRF310	2N6786	n		0		260/270(Ni)	250/260(Br)			SEB	ESA	1/94	BNL	D/C 9228G. Harwell Rept. AEA-RS-1348
400	INR	IRF330	2N6800	n		0		240/260(Ni)	200/240(Br)			SEB	ESA	1/94	BNL	D/C 9228G. Harwell Rept. AEA-RS-1348
400	INR	IRF340		n		0		250/260(Ni)	240/280(Br)			SEB	ESA	1/94	BNL	D/C 9228G. Harwell Rept. AEA-RS-1348
400	INR	IRF350	2N6768	n		0		260/280(Ni)	200/240(Br)			SEB	ESA	1/94	BNL	D/C 9228G. Harwell Rept. AEA-RS-1348
400	INR	IRF360		n	5 & 4	0		220/230(Ni)	225/250(Br)			SEB	Rock	9/92 12/92	BNL	D/C 9143. Br @ T = 90° C; Ni @ RT
400	**INR**	**IRF360**		**n**	**6**	**0**					**290-n**	**SEB**	**BREL**	**1995**	**WNR**	**Cosmic ray neutrons**
400	**INR**	**IRF360**		**n**	**3**	**0**					**350-n**	**SEB**	**BREL**	**1996**	**14 MeV**	**14 MeV neutrons**
400	**INR**	**IRH7264SE**	**2N7391**	**n**	**3**	**0**		**325/350(Cu)**	**400(Br)**			**SEGR**	**INR/ NSWC**	**2/98**	**BNL**	**Different D/Cs?**
400	INR		2N6780	n		0			200/240(Br)			SEB	ESA	1/94	BNL	Commercial, Harwell Rept. AEA-RS-1348
400	INR	IRFF330	2N6800	n		2		<235(Cu)	235(Br)			SEB	Rock	7/92	BNL	T = 90° C.
400	INR	IRF340		n		5		260				SEB	BREL	5/94	UCB	T =45 & 100° C tests. Oberg.

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BVds	**Mfr.**	**Mfr. No.**	**Gen. No.**	**Chan. Type**	**Samp.**	**Vgs (off) [V]**	**Low Z Ions**	**Cu = 16: Fe, Ni, Co LET = 27:**	**Br, Kr LET = 38**	**Hi Z Ions**	**Hi-Energy Beams***	**Fail mode**	**Test Org.**	**Date**	**Test Fac.**	**Remarks**
400	INR	IRF350	2N6768	n		5		260				SEB	BREL	6/93	UCB	WP-01. Vth = 280 @ T = 100° C. Oberg.
400	INR	IRF350	2N6768	n		5		240(Co)				SEB	BREL	5/94		WP-01. RT & 100° C tests. Oberg
400	INR	IRFF330	2N6800	n		5		240(Co)				SEB	BREL	12/92	UW	D/C E9115. WP-01 T = 100° C.
400	INR	IRFF330	2N6800	n		5		240(Co)				SEB	BREL	3/95		WP-01. RT & 100° C tests. Oberg
400	**INR**	**IRH7264SE**	**2N7391**	**n**	**3**	**5**		**400(Cu)**	**400(Br)**			**SEGR**	**INR/ NSWC**	**2/98**	**BNL**	
400	INR	IRHM7360		n	5	5		175/200(Ni)				SEGR	Rock	12/92 4/93	BNL	T = 90° C.
400	**INR**		**2N6786**	**n**	**1**	**5**				**150(I)**		**SEGR**	**JPL**	**6/97**	**BNL**	**Selva/Swift**
400	INR	IRHM7360		n	5	7		175/200(Ni)				SEGR	Rock	4/93	BNL	T = 90° C.
400	**INR**	**IRH7264SE**	**2N7391**	**n**	**3**	**10**		**400(Cu)**	**400(Br)**			**SEGR**	**INR/ NSWC**	**2/98**	**BNL**	
400	**INR**		**2N6786**	**n**	**1**	**10**				**110/115(I)**		**SEGR**	**JPL**	**6/97**	**BNL**	**Selva/Swift**
400	INR	IRF360		n	4	12		225/250				SEGR	HON	2/93	BNL	D/C 9238G. Lintz
400	INR	IRFF330	2N6800	n		15			235(Br)			SEB	Rock	7/92	BNL	T = 90° C.
400	**INR**	**IRH7264SE**	**2N7391**	**n**	**3**	**15**		**400(Cu)**	**275/300(Br)**			**SEGR**	**INR/ NSWC**	**2/98**	**BNL**	**At V_{GS} = 20 V, 2 devices passed, 1 failed with Cu.**
400	INR	IRHM7360		n		15			125(Br)			SEGR	Rock	7/92	BNL	T = 90° C.
400	**INR**		**2N6786**	**n**	**1**	**20**				**40/45(I)**		**SEGR**	**JPL**	**6/97**	**BNL**	**Selva/Swift**
400	INR	IRHM7360		n	6	0 to 2		175/200(Ni)	220(Br)			SEGR	Rock	7/92 4/93	BNL	T = 90° C.
400	INR	IRF340		n		2?		245				SEB	MM	8/93	BNL?	WP-02. D/Cs 8924, 9031, 9110. T. Rao-Sahib
400	INR	IRFF320	2N6792	n		2?		<260(Cu)				SEB	Rock	1990		Compare UTR device.
400	INR	IRF350	2N6768	n						130		SEB	CNES	1992	GANIL	Dufour, et. al., 92IEEE Workshop Record.
400	INR	IRH7360		n			400					none	INR	1/93	BNL	IR7xxx = Rad tolerant.
400	SIL	IRF350	2N6768	n		10		<120(Cu)				SEB	Rock	1990	UCB	
	Rated 400V < Vds < 500 V															
450	IXY	IXTM21N45		n	5	0	316(Ne) 214(Ar)		144(Kr)			SEB	JPL	3 & 6/90	UCB	Higher thresholds @ T = 100° C. Nichols.
450	IXY	IXTM21N45R H		n	3		300(Ne) 270(Ar)		140(Kr)			SEB	JPL	3 & 6/90	UCB	Higher thresholds @ T = 100° C. Nichols.
	Rated Vds = 500 V															
500	HAR	420 family	2N6794	n		0		220				SEB	BREL	12/92	UW	WP-01. T = 22° C. Oberg.
500	HAR	430 family	2N6802	n		0		250				SEB SEGR	BREL	12/92	UW	WP-01. T = 100° C. Oberg.
500	HAR	EN469		n		0			300(Br)			SEGR	Rock	1992	BNL	Deleted from wp-04 design.
500	HAR	FRL430D		n		0		>400				SEB	HON	2/93	BNL	WP-02
500	HAR	FRL430D		n		0			>400			SEB	HON	2/93	BNL	WP-02
500	HAR	FRL430D		n	4	0		>400(Ni)	<250(Br)			SEGR	HON	2/93	BNL	D/C 9138. Lintz.
500	**HAR**	**FRL430D1**	**430**	**n**	**5**	**0**		**240(Co)**				**SEGR**	**BREL**	**3/95**	**UCB**	
500	**HAR**	**FRL430D1**	**430**	**n**	**5**	**0**		**240/275(Co)**				**SEGR**	**BREL**	**3/97**	**UCB**	

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BVds	**Mfr.**	**Mfr. No.**	**Gen. No.**	**Chan. Type**	**Samp.**	**Vgs (off) [V]**	**Low Z Ions**	**Cu = 16: Fe, Ni, Co LET = 27:**	**Br, Kr LET = 38**	**Hi Z Ions**	**Hi-Energy Beams***	**Fail mode**	**Test Org.**	**Date**	**Test Fac.**	**Remarks**
500	**HAR**	**FRM450**		**n**	**2**	**0**		**275/300(Ni)**				**SEGR**	**Rock**	**4/93**	**BNL**	**T = 90° C**
500	**HAR**	**FRM450**		**n**	**3**	**0**		**300/325(Ni)**				**SEGR**	**Rock**	**4/93**	**BNL**	**T = 90° C**
500	**HAR**	**FRM450**		**N**	**4**	**0**			**175/200(Br)**			**SEGR**	**Rock**	**9/92**	**BNL**	**T = 90° C**
500	HAR	FRM450R		n	5 & 1	0		200/225(Ni)	100/125(Br)			SEGR	Rock	9/92 3/93	BNL	D/C/9232. T = 90° C.
500	HAR	IR450		n		0						SEB	Aero	9/93	UCB	Koga
500	HAR	TA17465		n	2	0	410(N) 380(Ne)		250(Kr)			SEB	JPL	3&6/90	UCB	RT. Nichols.
500	HAR	TA17665RH		n	6	0			494(Kr)			SEB	JPL	3&6/90	UCB	RT. On 6/90 a maverick failed @ 323 V with Kr.
500	HAR	420 family	2N6794	n		5		250				SEB	BREL	12/92	UW	WP-01. T = 80° C. Oberg.
500	HAR	430 family	2N6762	n		5		280					HAR	1993	BNL?	SSF Table
500	HAR	FRL430D		n		5			<250			SEB	HON	2/93	BNL	WP-02
500	**HAR**	**FRM450**		**n**	**5**	**5**		**200/225(Ni)**				**SEGR**	**Rock**	**4/93**	**BNL**	**T = 90° C**
500	**HAR**	**FRM450**		**N**	**1**	**5**			**100/125(Br)**			**SEGR**	**Rock**	**9/92**	**BNL**	**T = 90° C**
500	HAR	FRM450R		n	5& 4	5		275/300(Ni)	175/200(Br)			SEGR	Rock	9/92 3/93	BNL	D/C/9232. T = 90° C.
500	**HAR**	**FSF450**		**n**	**1**	**5**		**500(Ni)**				**none**	**NSWC**	**4/95**	**BNL**	**T = 25°C**
500	HAR	IRF440		n	5	15			246(Br)			SEGR	UA	1993	IPN	Mouret, 94IEEE TNS, RT Angle data exists.
500	**HAR**	**FSF450**		**n**	**6**	**20**		**450(Ni)**				**none**	**NSWC**	**9/97**	**BNL**	**T = 25°C**
500	**HAR**	**FSL430**		**n**	**5**	**20**		**500(Ni)**				**none**	**NSWC**	**7/93**	**BNL**	**T = 25°C**
500	HAR	FRL430D		n		Dyn?			>400			SEB	HON	2/93	BNL	WP-02
500	**INR**	**2N6802**	**430**	**n**	**10**	**0**		**305/310(Co)**				**SEB**	**BREL**	**1/98**	**UCB**	**D/C 9715**
500	**INR**	**2N6802**	**430**	**n**	**10**	**0**		**317/320(Co)**				**SEB**	**BREL**	**8/95**	**UCB**	**D/C 9429**
500	INR	IR7450		n	18	0			385(Br)			SEGR	NWSC	8/95	BNL	Titus Rept "SEGR-002". T = 25° C only.
500	INR	IRF430	2N6802	n		0		300/350(Ni)	320(Br)			SEB	ESA	1/94	BNL	D/C 9228G. Harwell Rept. AEA-RS-1348
500	INR	IRF440		n		0		300/350(Ni)	250/300(Br)			SEB	ESA	1/94	BNL	D/C 9228G. Harwell Rept. AEA-RS-1348
500	INR	IRF450	2N6770	n		0		300/350(Ni)	300(Br)			SEB	ESA	1/94	BNL	D/C 9228G. Harwell Rept. AEA-RS-1348
500	INR	IRF450	2N6770	n	5 & 1	0		290/300(Ni)	275/300(Br)			SEB	Rock	9/92 12/92	BNL	Br @T = 90° C; Ni @ RT
500	**INR**	**IRF460**		**n**	**6**	**0**					**325-n**	**SEB**	**BREL**	**1995**	**WNR**	**Cosmic ray neutrons**
500	INR	IRFE430		n	2	0		300/350(Ni)				SEB	HON	8/94	BNL	Also survived 450 V Vds peak @ 37kHz. Lintz.
500	INR	IRFM450	2N7227	n		0	370	350	320			SEB	Aero	9/93	UCB	Koga has cross sections for each LET.
500	**INR**	**IRH7450SE**		**n**	**3**	**0**		**500(Cu)**	**350/375(Br)**			**SEGR**	**INR/ NSWC**	**2/98**	**BNL**	
500	INR	IR420	2N6794	n		5		300				SEB	BREL	11/93	UCB	WP-01. T = 100° C data only. Oberg
500	INR	IRF440		n		5		300				SEB	BREL	6/93	UCB	WP-01. Ambient = 45° C. Oberg.
500	INR	IRF450	2N6770	n	5 & 3	5		290/300(Ni)	275/300(Br)			SEB	Rock	9/92 12/92	BNL	Br @T = 90° C; Ni @ RT
500	INR	IRFF430	2N6802	n		5		316(Co)				SEB	BREL	7/95	UCB	WP-01. Ambient and 100° C. Oberg
500	INR	IRFF430	2N6802	n		5		300				SEB	BREL	4/93	UCB	WP-01. Ambient = 45° C. Oberg

TABLE 1 - Failure (or Pass/Fail) N-Channel Device Vds Voltages for the Indicated Ion Beams																
BVds	**Mfr.**	**Mfr. No.**	**Gen. No.**	**Chan. Type**	**Samp.**	**Vgs (off) [V]**	**Low Z Ions**	**Cu = 16: Fe, Ni, Co LET = 27:**	**Br, Kr LET = 38**	**Hi Z Ions**	**Hi-Energy Beams***	**Fail mode**	**Test Org.**	**Date**	**Test Fac.**	**Remarks**
500	INR	IRH7450		n	5 & 4	5		275/300(Ni)	225/250(Br)			SEGR	Rock	9/92 12/92	BNL	T = 90° C.
500	INR	IRH7450SE		n	10	5		373(Co)				SEB	BREL	7/95	UCB	Ambient & 100° C. Oberg.
500	INR	IRH7450SE		n	23+	5	>400(Ne) 360(Ar)	350(Cu)	350(Kr)			SEB	Aero	4/96	UCB	Also Vds (threshold) vs Vgs for SEGR (Kr). Koga.
500	**INR**	**IRH7450SE**		**n**	**3**	**5**		**500(Cu)**	**500(Br)**			**SEGR**	**INR/ NSWC**	**2/98**	**BNL**	
500	INR	IRHM7450		n		5		300				SEGR	BREL	1/93	UW	WP-01. T = 100° C. Oberg.
500	**INR**	**IRH7450SE**		**n**	**3**	**10**		**500(Cu)**	**500(Br)**			**SEGR**	**INR/ NSWC**	**2/98**	**BNL**	
500	INR	IRF440		n		12		325				SEB	BREL	6/93	UCB	WP-01. T = 100° C. Oberg.
500	INR	IRF440		n		12		300(Co)				SEB	BREL	5/94	UCB	WP-01. Ambient and 100° C. Oberg.
500	INR	IRFF430	2N6802	n		12		325				SEB	BREL	10/93	UW	WP-01. T = 100° C. Oberg
500	INR	IR7450		n		15			400(Br)			SEGR	NWSC	8/95	BNL	Titus Rept "SEGR-002". T = 25° C only.
500	INR	IRH7450		n		15			155(Br)			SEGR	Rock	7/92	BNL	T = 90° C.
500	**INR**	**IRH7450SE**		**n**	**3**	**15**		**500(Cu)**	**500(Br)**			**SEGR**	**INR/ NSWC**	**2/98**	**BNL**	
500	INR	IRF440		n	4	20			220?(Br)			SEGR	UA	1994	IPN	Mouret, 94IEEE TNS. RT and angle data exist.
500	**INR**	**IRH7450SE**		**n**	**3**	**20**		**500(Cu)**	**500(Br)**			**SEGR**	**INR/ NSWC**	**2/98**	**BNL**	
500	INR	IRH7450		n	5 & 5	0 to 2		300/325(Ni)	250/275(Br)	<120(I)		SEGR	Rock/ NWSC	7, 9 & 12/92	BNL	T = 90° C. Epi = 40-50µ for high voltage parts.
500	INR	IRF420		n	9	0-10		340/380(Ni)				SEB	HON	8/95	BNL	D/C 9517. 125 kHz, 3.2 µs OFF. Lintz
500	INR	IRF430	2N6802	n				<310(Cu)				SEB	Rock	1990	UCB	
500	INR	IRF450	2N6770	n							250	SEB	CNES	1992	GANIL	Dufour, et. al., 92IEEE Workshop Record.
500	**IXY**	**2N50**		**n**	**6**	**0**					**350-n**	**SEB**	**BREL**	**1995**	**WNR**	**Cosmic ray neutrons**
500	IXY	20N60		n		5		280				SEB	BREL	11/93	UCB	Oberg. T = 25°C. SSF WP-01
500	IXY	20N60		n		5		300				SEB	BREL	11/93	UCB	Oberg. T = 100°C. SSF WP-01
500	**MOT**	**MTW20N50E**		**n**	**4**	**0**					**400-n**	**SEB**	**BREL**	**1996**	**WNR**	**Cosmic ray neutrons**
500	MOT	IRF440		n	3	30			240?(Br)			SEGR	UA	1994	IPN	Mouret, IEEE94. Room temp. Angle data exists.
500	SIL	420 family	2N6794	n		5		300(Co)				SEB	BREL	3/95	UCB	Oberg. Ambient & 100°C
500	SIL	430 family	2N6802	n	10	5		317(Co)				SEB	BREL	7/95	UCB	Oberg. Ambient & 100°C. SSF WP-01
500	SIL	430 family	2N6802	n		5		300				SEB	BREL	4/93	UCB	Ambient = 45°C. SSF WP-01
500	SIL	430 family	2N6802	n		12		300				SEB SEGR	BREL	10/93	UW	T = 100°C. SSF WP-01
500	**STX**	**0350N5**		**n**	**6**	**0**					**350-n**	**SEB**	**BREL**	**1995**	**WNR**	**Cosmic ray neutrons**
	Rated Vds = 600 V															
600	HAR	TA9783	IGBT	n	2	5		325/350(Ni)				SEGR	Rock	12/92	BNL	RT
600	INR	IRGAC50U	IGBT	n	2	0		340/350(Ni)				SEB	Rock	12/92	BNL	RT
600	INR	IRGAC50U	IGBT	n	2	5		340/350(Ni)				SEB	Rock	12/92	BNL	RT
600	INR	IRGAC50U	IGBT	n		5		380(Co)				SEB	BREL	6/93	UCB	D/C 9308. T = 25° C. WP-01. W. Will

TABLE 1 - Failure (or Pass/Fail) N-Channel Device Vds Voltages for the Indicated Ion Beams																
BVds	**Mfr.**	**Mfr. No.**	**Gen. No.**	**Chan. Type**	**Samp.**	**Vgs (off) [V]**	**Low Z Ions**	**Cu = 16: Fe, Ni, Co LET = 27:**	**Br, Kr LET = 38**	**Hi Z Ions**	**Hi-Energy Beams***	**Fail mode**	**Test Org.**	**Date**	**Test Fac.**	**Remarks**
	Rated Vds = 800 V															
800	**APT**	**802R4AN**		**n**	**5**	**0**		**410/420(Co)**				**SEB**	**BREL**	**3/97**	**UCB**	
	Rated Vds = 1000 V															
1000	**APT**	**1002RBN**		**n**	**3**	**0**					**650-n**	**SEB**	**BREL**	**1996**	**WNR**	**Cosmic ray neutrons**
1000	**APT**	**1002RBN**		**n**	**3**	**0**					**800-n**	**SEB**	**BREL**	**1996**	**14 MeV**	**14 MeV neutrons**
1000	APT	1001R1AN		n	>2	5		400				SEGR SEB	BREL	4/93	UCB	D/C 9126. W. Will.
1000	APT	1001R1AN		n	>2	5		450				SEGR SEB	BREL	4/93	UCB	D/C 9126. T = 100°C - implies SEB. W. Will.
1000	**INR**	**IRFPG50**		**n**	**5**	**0**					**650-n**	**SEB**	**BREL**	**1996**	**WNR**	**Cosmic ray neutrons**
1000	**INR**	**IRFPG50**		**n**	**2**	**0**					**800-n**	**SEB**	**BREL**	**1996**	**14 MeV**	**14 MeV neutrons**
1000	INR	IRFAG30		n		5		400				SEGR SEB	BREL	6/93	UCB	D/C 9227. T = 45° C. WP-01.
1000	INR	IRFAG30		n		5		450				SEGR SEB	BREL	6/93	UCB	D/C 9227. T = 100° C. WP-01.
1000	IXY	10N100		n	3	5		450				SEGR SEB	BREL	6/93	UCB	D/C SC9019. T = 45°C. SSF WP-01 W. Will
1000	IXY	10N100		n		5		450				SEGR	BREL	6/93	UCB	D/C SC9019. T = 100°C. SSF WP-01 W. Will
	Rated Vds >1000 V															
1200	**HAR**	**20N120E2**		**IGBT**	**4**	**n/a**					**850-n**	**SEB**	**BREL**	**1996**	**WNR**	**Cosmic ray neutrons**

Legend:

Manufacturers: APT = Advanced Power Technology; GEC = General Electric Company; HAR = Harris; INR = International Rectifier; IXY = Ixys Corp.; MOT = Motorola;
PHL = Phillips; RCA = Radio Corporation of America; SIL = Siliconix; UTR = Unitrode.

* High energy beams also includes other particles, p stands for protons and n for neutrons

BNL - Tandem Van de Graaff, Brookhaven National Laboratories, Long Island, NY
GANIL - GANIL Accelerator, France
HCL - Harvard Cyclotron Laboratory, Boston, MA
IPN - Insitute Physique Nuclaire, University of Orsey, France
JAERI - Japanese Atomic Energy Research Institute, Japan
TAM - Texas A&M University Cyclotron Institute, College Station, TX
UCB - 88-inch cyclotron, University of California, Berkeley, CA
UW - University of Washington cyclotron, Seattle, WA
WNR - Los Alamos National Laboratories, NM

Aero = Aerospace Corp., El Segundo, CA
BREL = Boeing Radiation Effects Laboratory, Seattle, WA
CNES = Centre National d'etudes Spatiales, Toulouse, France
ESA = European Space Agency, Noordwijk, Netherlands
HON = Honeywell Space Systems, Clearwater, FL
JPL = Jet Propulsion Laboratory, Pasadena, CA
MM = Martin Marietta Aerospace, Valley Forge, PA
NASDA = National Space Development Agency of Japan, Tokyo, Japan
NSWC = Naval Surface Warfare Center, Crane, IN
Rock = Rockwell Corp. (now Boeing), Anaheim, CA
SNL = Sandia National Laboratories, Albuquerque, NM
UA = University of Arizona, Tuscon, AZ