Test Org.*	Device	Function	Technology	Mfr.	Effective SEU LET* Threshold	Device Xsection (cm^2)	Bits Tested	Bit Xsection (cm^2)	Test Date	LUth	LU Xsection (cm^2)	Fac.	Remarks 23-Aug-99
		Microprocessor (16-bit)											
	Note: Entries in **RED** indicate data added since the 1997 Compendium.												
ESA	8086		NMOS/HMOS	INT	<3	1.0E-03	160	6.0E-06					
JH	80186		NMOS	INT	0.4	5.0E-04	~500			>100		BNL	R.Mauer (JH) estimate of tested bits.
JH	64500/1		CMOS/epi	LSI						75		BNL	1750A CPU
JPL/ARSP	80C 86		CMOS/bulk	HAR	<5	6.0E-02	~600	1.0E-04		11 to 18		UCB	
JPL/ARSP	80C 86		CMOS/epi	HAR	3	6.0E-02	~600	1.0E-04	Oct-87			UCB	Nichols, et al, 88IEEE TNS, No. 6, pg 1619. High temp. data.
ESA	80C 86		CMOS/epi	HAR	~1	2.4E-03	~600	3.0E-06	Oct-88			HARW	Harboe-Sorensen, ESTEC. Mask 1750.
ESA	80C 86		CMOS/epi	HAR	~1	2.4E-03	~600	4.0E-06	Oct-88			Cf-252	Harboe-Sorensen, ESTEC. Mask 1860. Compare facility below
ESA	80C 86		CMOS/epi	HAR	~1	2.4E-03	~600	2.0E-05	Jul-92			GANIL	Mask 1860. IEEE NS submittal--High energy ions. Compare facility above.
ESA	80C 86		CMOS/epi	HAR	~1	2.4E-03	~600	3.0E-05	Jul-91			GANIL	Mask 3584. IEEE NS submittal--High energy ions.
JPL/ESA/ SNL	80C 86		CMOS/epi	INT	1	4.0E-03	~600	6.5E-06	Oct-88			BNL	ESA: LET_{th}. JPL: LU w/heavy ions. SNL: LU w/(Cf-252 & protons)
ESA	80C 86		---	NEC	>>2.0				Oct-88			GANIL	See below. 171 MeV 0xygen only.
ESA	80C 86		---	OKI	>>3.1				Oct-88			GANIL	100 MeV Oxygen only.
ESA	80C 86-2/B		CMOS/epi	INT	~1			1.0E-05	Jul-92			GANIL	Harboe-Sorensen, 94IEEE TNS, No. 6, pg 2340.
JPL/JH	80C 86RH		CMOS/epi	HAR	3	1.7E-03			Apr-90	>75		UCB	JPL 2/89. Mask No. 3227: JH 4/90. D/C 8817. Rad-hard 80C86 version
JPL	80C 86RRH		CMOS/epi	HAR	3	8.5E-04			Feb-89	>100		UCB	Mask 3582. RH with SEU-hardened elements (only ½ the elements were hardened).
ARSP	80C186		CHMOSIII	INT	~9	1.0E-03	~600	2.0E-06	Oct-91	>100		UCB	
JPL	80C186		CHMOSIII	INT	~9	1.0E-03	~600	4.5E-06	Sep-92	>100		BNL	
GE	80C186		CHMOSIII	INT	4		510	2.0E-07	Jun-92	>110		BNL	
ARSP	80C286		CMOS	HAR	12	1.0E-03			1994	>90		UCB	Koga Priv. comm. ~1994. Compare earlier CMOS/epi data
ARSP	BX1750A		CMOS/epi (3 & 5 µm)	ASI	20	5.0E-04			May-90			UCB	
ARSP	F9445		Bipolar-IIL	FAS	20	1.5E-04	~128	~1.2E-06				UCB	
CNES	ISMT225	Transputer (16-bit core)	CMOS	ISM	2			2.0E-05	1995	36	1.0E-04	IPN	Bezerra, RADECS 95, pg 340. Dyn = short appl; static = reg/R: also 500 µm2 for cache
JPL	MA31750		CMOS/SOS	MED	175				Jun-92	>175		BNL	GEC-Plessey
JPL	MAS281		CMOS/SOS	MED	180		~200		May-89	>180		UCB	1750 Compatible. 504 MeV Xe @ 70° angle, 60 °C
ARSP	**MG80C186-12/B**	**NOP**	**CMOS III**	**INT**	**10**	**3.0E-04**			**1997**	**>63**		**UCB**	**Crain, et al, 98IEEE Wrkshp Rec., pg 51. D/C 8951. Lockup errors begin @ LET ~10.**
ARSP	**MG80C186-12/B**	**ALU, Bus Unit**	**CMOS III**	**INT**	**10**	**2.0E-04**			**1997**	**>63**		**UCB**	**Crain, et al, 98IEEE Wrkshp Rec., pg 51. D/C 8951. Lockup errors begin @ LET ~10.**
ARSP	**MG80C186-12/B**	**General Register**	**CMOS III**	**INT**	**10**	**7.0E-04**			**1997**	**>63**		**UCB**	**Crain, et al, 98IEEE Wrkshp Rec., pg 51. D/C 8951. Lockup errors begin @ LET ~10.**

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Test Org.*	Device	Function	Technology	Mfr.	Effective SEU LET* Threshold	Device Xsection (cm^2)	Bits Tested	Bit Xsection (cm^2)	Test Date	LUth	LU Xsection (cm^2)	Fac.	Remarks 23-Aug-99
ARSP	**MG80C186-12/B**	**Segment Register**	**CMOS III**	**INT**	**10**	**5.0E-04**			**1997**	**>63**		**UCB**	**Crain, et al, 98IEEE Wrkshp Rec., pg 51. D/C 8951. Lockup errors begin @ LET ~10.**
ARSP	MG80C286		CMOS/epi (7 µm)	HAR	>3	4.0E-03		1.0E-05	May-90	>63		UCB	Koga. D/C 8936. Lockup errors. LET_{th} of registers & ALU vary
ARSP	**MG80C286-12/883**	**NOP, ALU**	**CMOS/epi**	**HAR**	**10**	**5.0E-04**			**1997**	**>63**		**UCB**	**Crain, et al, 98IEEE Wrkshp Rec., pg 51. D/C 8936. Lockup errors begin @ LET ~5.**
ARSP	**MG80C286-12/883**	**General Register**	**CMOS/epi**	**HAR**	**10**	**1.0E-03**			**1997**	**>63**		**UCB**	**Crain, et al, 98IEEE Wrkshp Rec., pg 51. D/C 8936. Lockup errors begin @ LET ~5.**
ARSP	**MG80C286-12/883**	**Segment Register**	**CMOS/epi**	**HAR**	**10**	**7.0E-03**			**1997**	**>63**		**UCB**	**Crain, et al, 98IEEE Wrkshp Rec., pg 51. D/C 8936. Lockup errors begin @ LET ~5.**
ARSP	**MG80C286-12/883**	**Bus Unit**	**CMOS/epi**	**HAR**	**7**	**5.0E-03**			**1997**	**>63**		**UCB**	**Crain, et al, 98IEEE Wrkshp Rec., pg 51. D/C 8936. Lockup errors begin @ LET ~5.**
JPL	NS32081	Floating Pt. Unit	NMOS	NSC	<3	6.0E-03	>256					UCB	Only the eight 32-bit registers were tested
JPL	NS32C016		CMOS/epi (20 µm)	NSC	~3	2.0E-02	>368		Dec-86	3		BNL	Also proton-induced LU, Harvard, 6/91
ARSP	P1750A		CMOS/epi	PFS					~1994	>100		UCB	Koga
ARSP	P1750A		CMOS/SOS	PFS					1994	10		UCB	Koga
JH	P1750A		CMOS/SOS (3 chips)	PFS	20	3.0E-04	3 chips	5.0E-08	Jul-92	>>80		BNL	J. Kinnison, 92IEEE Wrkshp Rec., pg 12.
CNES	P1750A		CMOS/epi (9 µm)	PFS	5	(Partial)						IPN	F9450 Compatible. LU and SEU have same cross section
CNES	P1750A		CMOS/epi (9 µm)	PFS					Feb-90	<11	7.0E-03	GANIL	D/C 8918. 1.25 µm technology. Also tested at IPN
CNES	P1750AE		CMOS/epi (9 µm)	PFS					Feb-90	>11			D/C 8936. 1.0 µm technology.
JH	P1750AE		CMOS/epi (9 µm)	PFS					1989	50		BNL	Kinnison. Static test. See below.
GD	P1750AE		CMOS/epi (9 µm)	PFS					Apr-90	7			Dynamic test. See above. E. C. Smith
CNES	PACE1650A		CMOS/epi	PFS					Aug-90		1.0E-02	IPN	Chapuis. Also tested at GANIL.
JH	RTX2000		CMOS/epi	HAR					1991	>120		BNL	Kinnison
JH	RTX2010RH		Std. Cell TSOS-4 process	HAR	150				Jul-92	>150		BNL	J. Kinnison, 92IEEE Wrkshp Rec., pg 12.
JPL	SA3300		CMOS/bulk Twin Well	SNL	30				Oct-88			BNL	Unhardened clone of NS32016.
SNL	SA3300		CMOS/bulk Twin Well (2 µm)	SNL	35				Dec-90			BNL	F. Sexton, et al, 89IEEE TNS, No. 6, pg. 1861.
SNL	SA3300		CMOS/bulk Twin Well (1.25 µm)	SNL	23				Dec-90			BNL	F. Sexton, et al, 89IEEE TNS, No. 6, pg. 1861.
JPL/SNL	SA3300		Above; with 80 kohm R.	SNL	>120				Oct-88	>120		BNL	
JPL	SBP9989		Bipolar-IIL (5 µm prototype)	TIX	~3	1.0E-04	336	~3.0E-07				UCB	
JPL	SBP9989		Bipolar-IIL (2 µm prototype)	TIX	12							UCB	

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Test Org.*	Device	Function	Technology	Mfr.	Effective SEU LET* Threshold	Device Xsection (cm^2)	Bits Tested	Bit Xsection (cm^2)	Test Date	LUth	LU Xsection (cm^2)	Fac.	Remarks 23-Aug-99
MMS	SBP9989-D		Bipolar-IIL	TIX	8	1.0E-02			1992	>104		GANIL	Dufour, et al, 92IEEE Wrkshp Rec., pg 24.
Legend													
	Manufacturers: AMD - Advanced Microdevices; FAS - Fairchild Semiconductor; HAR - Harris Corporation; INT - Intel; MHS - Matra Harris Semiconductor; MOT - Motorola Semiconductor Division; NSC - National Semiconductor;												
	RCA - Radio Corp of America; SGN - Signetics; SGS - Silicon General; TIX - Texas Instruments; ZIL - Zilog												
	Test Organizations			**Radiation Test Facilities**									
	ARSP - Aerospace Corp., El Segundo, CA			BNL - Tandem Van de Graaff, Brookhaven National Laboratories, Long Island, NY									
	CNES - Centre National d'etudes Spatiales, Toulouse, France			Cf-252 - Cf-252 Fission Source (various facilities)									
	ESA - European Space Agency, Noordwijk, Netherlands			GANIL - GANIL Accelerator, France									
	GD - General Dynamics, Azuza, CA			HARW - Harwell Laboratory, Oxford, UK									
	GE - General Electic, Valley Forge, PA			IPN - Insitute Physique Nuclaire, University of Orsay, France									
	JH - Johns Hopkins Applied Physics Lab, Laurel, MD			UCB - 88-inch Cyclotron, University of California, Berkeley, CA									
	JPL - Jet Propulsion Laboratory, Pasadena, CA												
	MMS - Matra Marconi Space, France												
	SNL - Sandia National Laboratories, Albuquerque, NM												