MILITARY SPECIFICATION

MICROCIRCUITS, DIGITAL, NMOS, 65,536 BIT, DYNAMIC RANDOM ACCESS MEMORY (DRAM), MONOLITHIC SILICON

This amendment forms a part of Military Specification MIL-M-38510/244B(USAF), dated 30 July 1984, and is approved for use by the Department of the Air Force and is available for use by all Departments and Agencies of the Department of Defense.

PAGE 1

* Title: Delete and substitute as printed above.

* 1.1, line 2: Delete "N-channel" and "/1-".

* 1.1, line 4: Add after classes "and a choice of case outlines and lead finishes".

* 1.3, Thermal resistance: Delete in its entirety and substitute the following:

"Thermal resistance (minimum cycle time)
Case E - - - - - - - - - - - - - - - See MIL-M-38510, appendix C
Case Z - - - - - - - - - - - - - - - θ_{JC} = 0.08°C/W 2/"

* 1.3, after Maximum junction temperature: Add "3/".

* 1.3, Short circuit output current: Delete "150" and substitute "50".

* 1.3, following footnote 1/, add footnotes 2/ and 3/ as follows:

"2/ When a thermal resistance value is included in MIL-M-38510, appendix C, it shall supersede the value stated herein."

3/ Maximum junction temperature shall not be exceeded except for allowable short duration burn-in screening conditions in accordance with method 5004 of MIL-STD-883.

PAGE 3

* I_{CC1}, delete and substitute the following:

"

I_{CC1} 1/	$\overline{RAS}$ and $\overline{CAS}$ cycling $t_{RC} = t_{RC}$ MIN, see figure 10	ALL		60	mA	

"

t_{OFF}, delete and substitute the following:

"

Output buffer turn off delay	t_{OFF}	See figures 5, 6, 8	01, 02	0	40	ns	
			03	0	50	ns	

"

PAGE 4

* t_{CAS}, delete and substitute the following:

"

$\overline{CAS}$ pulse width	t_{CAS}	See figures 5, 6, 7, 8	01,02	90	10000	ns	
			03	115	10000		

"

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PAGE 6

* TABLE II, delete and substitute new table as shown on page 4 of this amendment.

PAGE 7

Following 4.3, add:

"4.3.1 Qualification extension. For qualification inspection, if a manufacturer qualifies to device type 02 which is designed and manufactured identically (i.e., same die and process) in all respects to device types 01 and 03 on this military specification, then qualification may be extended to device types 01 and 03, without further testing, when authorized by the qualifying activity."

PAGE 8

* 4.4.1d, delete in its entirety.

4.4.3b, add the following:

"At the option of the manufacturer, an alternate test procedure may be submitted to the qualifying activity for approval."

PAGE 11

* FIGURE 3, truth table, note 7: Delete and substitute the following:

"7/ A 500 µs pause plus eight initialization cycles required before truth table applies. All timing requirements must be applied."

PAGES 18 and 19

* FIGURES 10 and 11, delete and substitute new figures as shown on pages 5 and 6 respectively of this amendment.

PAGES 20 AND 22

TESTS 1-26, I_{IL} and I_{IH}: Insert "16/" in the symbol column.

PAGES 21 AND 23

TESTS 38-52, Subgroup 9: Insert "17/" in the symbol column.

PAGE 23

Note 8, line 3: Delete "40 ns" (both places) and substitute "40 ns (device types 01 and 02) or 50 ns (device type 03)". Also add the following at end of note: "This may be performed as a functional test."

Following note 15/, add:

"16/ The device manufacturer may, at his option, measure I_{IL} and I_{IH} for individual inputs or measure all inputs together using the single input limit.

"17/ These tests may be performed using attributes data."

PAGES 24, 25, 26, AND 27

Delete tables IVa and IVb in their entirety, and substitute new tables as printed on pages 7, 8, 9, and 10 of this amendment.

PAGE 29

* 6.4.1, line 1, delete "100" and substitute "500".

PAGE 30

* 6.4.5, line 2, delete "1.0 milliseconds." and substitute "the maximum refresh as defined in 1.2.1".

6.6, delete the following part numbers from the Generic industry type column: "6665", "2164", and "8264".

PAGE 34

Pattern 9, Data Background, delete "X-Bar" and substitute "alternating columns of "1's" and "0's".

PAGE 35

Pattern 10, Step 3, delete "($\overline{CAS}$ = $\overline{WE}$ = "1")" and substitute "($\overline{WE}$ = "1")".

The margins of this amendment are marked with an asterisk to indicate where changes (additions, modifications, corrections, deletions) from the previous amendment were made. This was done as a convenience only and the Government assumes no liability whatsoever for any inaccuracies in these notations. Bidders and contractors are cautioned to evaluate the requirements of this document based on the entire content irrespective of the marginal notations and relationship to the last previous amendment.

Custodian:
Air Force - 17

Review activities:
Air Force - 11, 19, 85, 99
DLA - ES

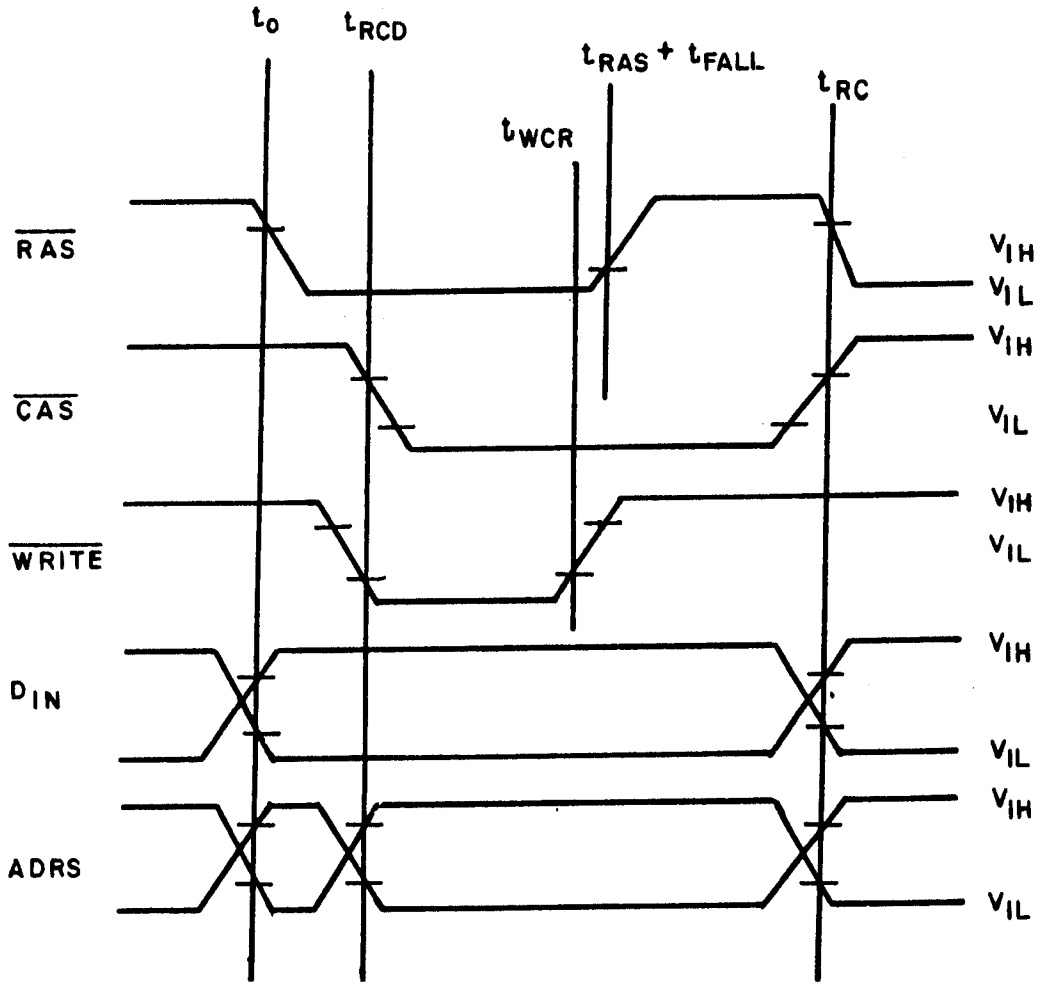
Preparing activity:
Air Force - 17

(Project 5962-F689)

TABLE II. Electrical test requirements.

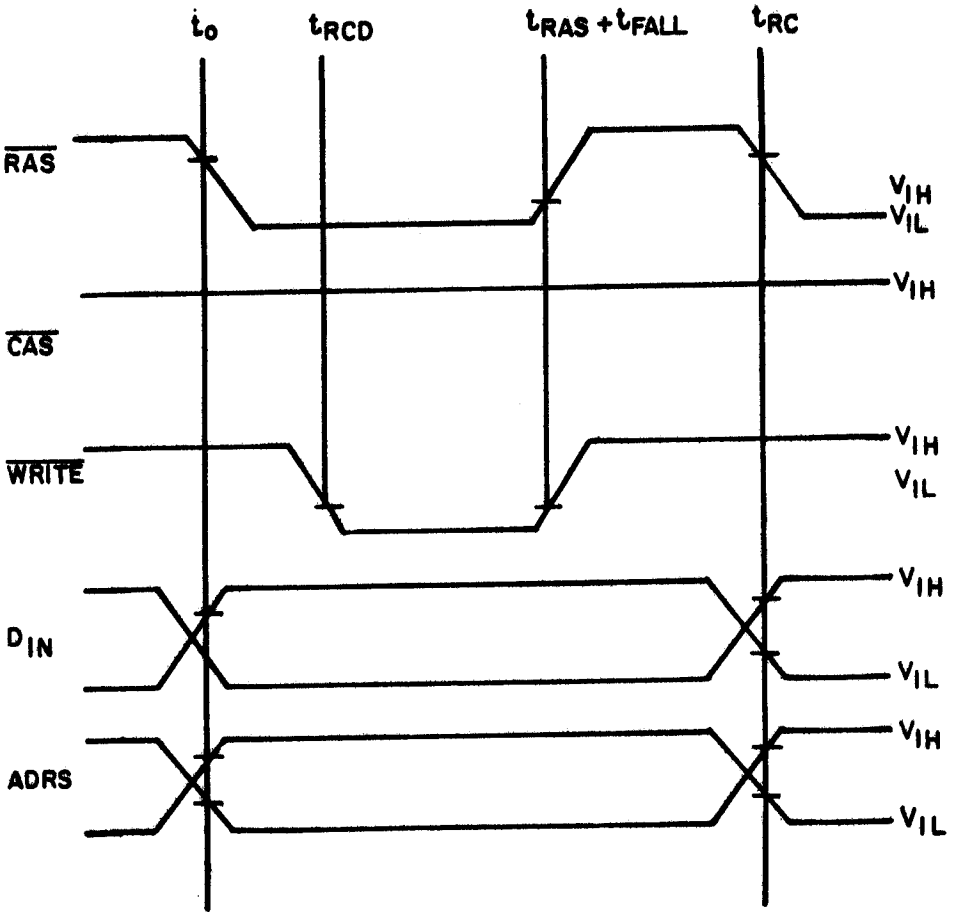
MIL-STD-883 test requirements	Subgroups (see table III)	
	Class S devices	Class B devices
Initial electrical parameters (pre burn-in) (method 5004)	2, 10	2, 10
Final electrical test parameters (method 5004)	1, 2*, 3, 9, 10*, 11	2*, 3, 10, 11
Group A test requirements (method 5005)	1, 2, 3, 4, 9 10, 11	2, 4, 10
Group B test requirements (method 5005) subgroup 5	1, 2, 3, 9 10, 11	N/A
Group C end-point electrical parameters (method 5005)	N/A	2, 10
Group D end-point electrical parameters (method 5005)	1, 2, 3, 10, 11	2, 10

*The PDA applies to subgroup 2 (see 4.2d.).



NOTE: $t_{RISE} = t_{FALL} = 5$ ns max.
$V_{IL} = 0.8V$
$V_{IH} = 2.4V$
TABLE IVa Timing Set 1 (01,02)
TABLE IV b Timing Set 1 (03)
(Early write, output tristate)

FIGURE 10. Timing waveforms for active current (I_{CC1}) measurements.



NOTE: $\overline{CAS} = V_{IH}$
$t_{RISE} = t_{FALL} = 5$ ns max
$V_{IL} = 0.8V$
$V_{IH} = 2.4V$
TABLE IVa Timing Set 1 (01,02)
TABLE IVb Timing Set 1 (03)

FIGURE 11. Timing waveforms for refresh current (I_{CC3}) measurements.

TABLE IVa. Recommended timing set designation for screening table I limits (device type 01 and 02).

Parameter		Spec limit (ns)	Timing set no. 1	Timing set no. 2	Timing set no. 3	Timing set no. 4 (nominal)	Timing set no. 5 (RMW)	Timing set no. 6 (extended)
Number	Symbol							
1a	t_{RC} Min	250	250*	250*	---	---	---	---
b	Max	10,100	---	---	---	---	---	10,100*
2a	$t_{R/W}$ Min	270	---	---	---	---	270*	---
b	Max	10,100	---	---	---	---	---	---
3	t_{RAC} Max	150	150*	150*	---	150*	---	150*
4	t_{CAC} Max	85	---	85*	85*	---	85*	---
5	t_{RP} Min	90	90*	90*	90*	---	---	90*
6a	t_{RAS} Min	150	150*	150*	---	---	---	---
b	Max	10,000	---	---	---	---	---	10,000*
7	t_{RSH} Min	90	---	90*	90*	---	---	---
8	t_{CSH} Min	150	---	150*	---	---	---	---
9a	t_{CAS} Min	90	---	90*	---	---	---	---
b	Max	10,000	---	---	---	---	---	10,000*
10a	t_{RCD} Min	25	25*	---	---	---	---	25*
b	Max	60	---	60*	---	---	60*	---
11	t_{ASR} Min	0	0*	0*	0*	---	0*	0*
12	t_{RAH} Min	20	20*	---	---	---	---	20*
13	t_{ASC} Min	0	0*	0*	0*	---	0*	0*
14	t_{CAH} Min	30	---	30*	30*	---	30*	---
15	t_{AR} Min	80	80*	---	---	---	---	80*
16	t_{RCS} Min	0	0*	0*	0*	---	---	0*
17	t_{RCH} Min	0	0*	---	0*	---	---	0*
18	t_{WCH} Min	45	---	---	45*	---	---	---

See footnotes at end of table.

TABLE IVa. Recommended timing set designation for screening table I limits (device type 01 and 02) - Continued.

Parameter		Spec limit (ns)	Timing set no. 1	Timing set no. 2	Timing set no. 3	Timing set no. 4 (nominal)	Timing set no. 5 (RMW)	Timing set no. 6 (extended)
Number	Symbol							
19	t_{WCR} Min	120	120*	---	---	---	---	120*
20	t_{WP} Min	45	---	45*	---	---	45*	---
21	t_{RWL} Min	45	---	45*	---	---	45*	---
22	t_{CWL} Min	45	---	45*	---	---	45*	---
23a	$t_{DS(\overline{CAS})}$ Min	0	0*	---	0*	---	---	0*
b	$t_{DS(\overline{WE})}$ Min	0	---	0*	---	---	0*	---
24a	$t_{DH(\overline{CAS})}$ Min	45	---	---	45*	---	---	---
b	$t_{DH(\overline{WE})}$ Min	45	---	45*	---	---	45*	---
25	t_{DHR} Min	120	120*	---	---	---	---	120*
26	t_{WCS} Min	0	0*	---	0*	---	---	0*
27	t_{CRP} Min	0	0*	---	---	---	---	---
28	t_{RRH} Min	25	---	25*	---	---	---	25*
29	t_{CWD} Min	50	---	---	---	---	50*	---
30	t_{RWD} Min	110	---	---	---	---	110*	---

NOTES: * Indicates parameter shall be tested to at least the specification limit. (e. g. may be tested to a tighter limit).

Timing set no. 1, no. 2, no. 3, no. 5, no. 6 - Use V_{IH} min (2.4 V) and V_{IL} max (0.8 V) and $t_{TRANSITION}$ = 5 ns

Timing set no. 4 - Nominal timing; will not violate limits if V_{IH} max (6.5 V) and V_{IL} min (-1.5 V) and $t_{TRANSITION}$ = 10 ns are used.

TABLE IVb. Recommended timing set designation for screening table I limits (device type 03).

Parameter		Spec limit (ns)	Timing set no. 1	Timing set no. 2	Timing set no. 3	Timing set no. 4 (nominal)	Timing set no. 5 (RMW)	Timing set no. 6 (extended)
Number	Symbol							
1a	t_{RC} Min	345	345*	345*	---	---	---	---
b	Max	10,145	---	---	---	---	---	10,145*
2a	$t_{R/W}$ Min	370	---	---	---	---	370*	---
b	Max	10,145	---	---	---	---	---	---
3	t_{RAC} Max	200	200*	200*	---	200*	---	200*
4	t_{CAC} Max	115	---	115*	115*	---	115*	---
5	t_{RP} Min	135	135*	135*	135*	---	---	135*
6a	t_{RAS} Min	200	200*	200*	---	---	---	---
b	Max	10,000	---	---	---	---	---	10,000*
7	t_{RSH} Min	115	---	115*	115*	---	---	---
8	t_{CSH} Min	200	---	200*	---	---	---	---
9a	t_{CAS} Min	115	---	115*	---	---	---	---
b	Max	10,000	---	---	---	---	---	10,000*
10a	t_{RCD} Min	35	35*	---	---	---	---	35*
b	Max	80	---	80*	---	---	80*	---
11	t_{ASR} Min	0	0*	0*	0*	---	0*	0*
12	t_{RAH} Min	25	25*	---	---	---	---	25*
13	t_{ASC} Min	0	0*	0*	0*	---	0*	0*
14	t_{CAH} Min	40	---	40*	40*	---	40*	---
15	t_{AR} Min	110	110*	---	---	---	---	110*
16	t_{RCS} Min	0	0*	0*	0*	---	---	0*
17	t_{RCH} Min	0	0*	---	0*	---	---	0*
18	t_{WCH} Min	55	---	---	55*	---	---	---

See footnotes at end of table.

TABLE IVb. Recommended timing set designation for screening table I limits (device type 03) - Continued.

Parameter		Spec limit (ns)	Timing set no. 1	Timing set no. 2	Timing set no. 3	Timing set no. 4 (nominal)	Timing set no. 5 (RMW)	Timing set no. 6 (extended)
Number	Symbol							
19	t_{WCR} Min	150	150*	---	---	---	---	150*
20	t_{WP} Min	55	---	55*	---	---	55*	---
21	t_{RWL} Min	55	---	55*	---	---	55*	---
22	t_{CWL} Min	55	---	55*	---	---	55*	---
23a	$t_{DS(\overline{CAS})}$ Min	0	0*	---	0*	---	---	0*
b	$t_{DS(\overline{WE})}$ Min	0	---	0*	---	---	0*	---
24a	$t_{DH(\overline{CAS})}$ Min	55	---	---	55*	---	---	---
b	$t_{DH(\overline{WE})}$ Min	55	---	55*	---	---	55*	---
25	t_{DHR} Min	150	150*	---	---	---	---	150*
26	t_{WCS} Min	0	0*	---	0*	---	---	0*
27	t_{CRP} Min	0	0*	---	---	---	---	---
28	t_{RRH} Min	30	---	30*	---	---	---	30*
29	t_{CWD} Min	80	---	---	---	---	80*	---
30	t_{RWD} Min	160	---	---	---	---	160*	---

NOTES: * Indicates parameter shall be tested to at least the specification limit (e.g. may be tested to a tighter limit).

Timing set no. 1, no. 2, no. 3, no. 5, no. 6 - Use V_{IH} min (2.4 V) and V_{IL} max (0.8 V) and $t_{TRANSITION}$ = 5 ns

Timing set no. 4 - Nominal timing; will not violate limits if V_{IH} max (6.5 V) and V_{IL} min (-1.5 V) and $t_{TRANSITION}$ = 10 ns are used.