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Defense Electronics Supply Center Dayton, Ohio Original date of drawing: 18 AUG 87 AMSC N/A	PREPARED BY <i>Donald R. Osborne</i>	MILITARY DRAWING This drawing is available for use by all Departments and Agencies of the Department of Defense
	CHECKED BY <i>DA Di Enzo</i>	
	APPROVED BY <i>MAH</i>	TITLE: MICROCIRCUITS, LINEAR, HIGH-SPEED, DIGITAL TO ANALOG CONVERTER, MONOLITHIC SILICON
	SIZE A	CODE IDENT. NO. 67268
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5962-E378

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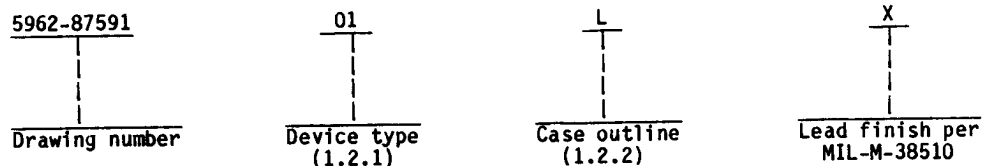
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1. SCOPE

1.1 Scope. This drawing describes device requirements for class B microcircuits in accordance with 1.2.1 of MIL-STD-883, "Provisions for the use of MIL-STD-883 in conjunction with compliant non-JAN devices".

1.2 Part number. The complete part number shall be as shown in the following example:



1.2.1 Device types. The device types shall identify the circuit function as follows:

Device type	Generic number	Circuit function
01	AD7572	12.5 microsecond, 11-bit linearity, 12-bit resolution CMOS A/D converter with 45 ppm/°C reference.
02	AD7572	12.5 microsecond, 11-bit linearity, 12-bit resolution CMOS A/D converter with 25 ppm/°C reference.
03	AD7572	12.5 microsecond, 12-bit linearity, 12-bit resolution CMOS A/D converter with 25 ppm/°C reference.
04	AD7572	5 microsecond, 11-bit linearity, 12-bit resolution CMOS A/D converter with 45 ppm/°C reference.
05	AD7572	5 microsecond, 11-bit linearity, 12-bit resolution CMOS A/D converter with 25 ppm/°C reference.
06	AD7572	5 microsecond, 12-bit linearity, 12-bit resolution CMOS A/D converter with 25 ppm/°C reference.

1.2.2 Case outlines. The case outlines shall be as designated in appendix C of MIL-M-38510, and as follows:

Outline letter	Case outline
L	D-9 (24-lead, 1/4" x 1-1/4"), dual-in-line package.
3	C-4 (28-terminal, 0.45" x 0.45"), leadless ceramic square chip carrier package.

1.3 Absolute maximum ratings ($T_A = +25^\circ\text{C}$, unless otherwise noted).

V_{DD} to DGND	-0.3 V to +7 V
V_{SS} to DGND	+0.3 V to -17 V
AGND to DGND	-0.3 V, $V_{DD} + 0.3$ V
A_{IN} to AGND	-15 V to +15 V
Digital input voltage to DGND: (Pins 17, 19-21)	-0.3 V, $V_{DD} + 0.3$ V
Digital output voltage to DGND: (Pins 4-11, 13-16, 18, 22)	-0.3 V, $V_{DD} + 0.3$ V
Storage temperature	-65°C to +150°C
Power dissipation $< +75^\circ\text{C}$	1,000 mW 1/
Thermal resistance (θ_{JC}):	
Case L	See MIL-M-38510, appendix C
Case 3	See MIL-M-38510, appendix C
Junction temperature (T_J)	175°C

1/ Derate power dissipation above +75°C by 10 mW/C.

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1.4 Recommended operating conditions.

Operating voltage range:

Positive supply (V_{DD})	-----	+4.75 V dc to +5.25 V dc
Negative supply (V_{SS})	-----	-14.25 V dc to -15.75 V dc
Clock frequency (f_{CLK})	-----	1.0 MHz for device types 01, 02, and 03
		2.5 MHz for device types 04, 05, and 06

Analog input voltage range (A_{IN})

(Specifications apply to slow memory mode):	-----	0 to +5.0 V
Operating temperature range	-----	-55°C to +125°C

2. APPLICABLE DOCUMENTS

2.1 Government specification and standard. Unless otherwise specified, the following specification and standard, of the issue listed in that issue of the Department of Defense Index of Specifications and Standards specified in the solicitation, form a part of this drawing to the extent specified herein.

SPECIFICATION

MILITARY

MIL-M-38510 - Microcircuits, General Specification for.

STANDARD

MILITARY

MIL-STD-883 - Test Methods and Procedures for Microelectronics.

(Copies of the specification and standard required by manufacturers in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting activity.)

2.2 Order of precedence. In the event of a conflict between the text of this drawing and the references cited herein, the text of this drawing shall take precedence.

3. REQUIREMENTS

3.1 Item requirements. The individual item requirements shall be in accordance with 1.2.1 of MIL-STD-883, "Provisions for the use of MIL-STD-883 in conjunction with compliant non-JAN devices" and as specified herein.

3.2 Design, construction, and physical dimensions. The design, construction, and physical dimensions shall be as specified in MIL-M-38510 and herein.

3.2.1 Terminal connections. The terminal connections shall be as specified on figure 1.

3.2.2 Load circuits. The load circuits shall be as specified on figures 2 and 3.

3.2.3 Timing diagrams. Timing diagrams and tables shall be as specified on figures 4, 5, 6, and 7.

3.2. Case outlines. The case outlines shall be in accordance with 1.2.2 herein.

3.3 Electrical performance characteristics. Unless otherwise specified, the electrical performance characteristics are as specified in table I and apply over the full recommended case operating temperature range.

3.4 Marking. Marking shall be in accordance with MIL-STD-883 (see 3.1 herein). The part shall be marked with the part number listed in 1.2 herein. In addition, the manufacturer's part number may also be marked as listed in 6.4 herein.

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TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions $-55^{\circ}\text{C} \leq T_A \leq +125^{\circ}\text{C}$ unless otherwise specified	Device types	Group A subgroups	Limits		Unit
					Min	Max	
Integral linearity error	LE	$V_{DD} = 5\text{ V}, V_{SS} = -15\text{ V}$	01, 02 04, 05 03, 06 03, 06	1 2,3 12	-1 -1 -3/4 -1/2	+1 +1 +3/4 +1/2	LSB
Differential linearity error	DLE	$V_{DD} = 5\text{ V}, V_{SS} = -15\text{ V}$	A11	1,2,3	-1	+1	
Offset error	V_{OS}	$V_{DD} = 5\text{ V}$ $V_{SS} = -15\text{ V}$	A11 01, 04 02, 05 03, 06 02, 05 03, 06	1 2,3 12	-4 -6 -5 -4 -3	+4 +6 +5 +4 +3	LSB
Full scale error including internal voltage reference error, (Ideal last code transition = FS-3/2LSB's)	AE	$V_{DD} = 5\text{ V}$ $V_{SS} = -15\text{ V}$ Full scale = 5 V	A11 02, 03 05, 06	1 12	-15 -10	+15 +10	LSB
Full scale temperature coefficient, including internal voltage reference drift	dAE/dT	$V_{DD} = 5\text{ V}$ $V_{SS} = -15\text{ V}$	01, 04 02, 03 05, 06	2,3		45 25	ppm/ $^{\circ}\text{C}$
Analog input current	I_{IN}	$A_{IN} = 5\text{ V}$	A11	1,2,3		3.5	mA
Internal reference voltage output	V_{REF}	$V_{DD} = 5\text{ V}, V_{SS} = -15\text{ V}$	A11	1	-5.3	-5.2	V
Internal reference output current sink capability		Constant external load during conversion	A11	13,14,15		550	μA
Digital input low voltage	V_{INL}	CS, RD, HBEN, CLK IN. $V_{DD} = 4.75\text{ V}, V_{SS} = -15\text{ V}$	A11	1,2,3		0.8	V
Digital input high voltage	V_{INH}					2.4	
Digital input capacitance	C_{IN}			13		10	pF
Digital input current	I_{IN}	CS, RD, HBEN. $V_{DD} = 5.25\text{ V}, V_{SS} = -15\text{ V},$ $A_{IN} = 0\text{ to }V_{DD}$	A11	1,2,3	-10	+10	μA
		CLK IN. $V_{DD} = 5.25\text{ V},$ $V_{SS} = -15\text{ V}, A_{IN} = 0\text{ to }V_{DD}$	A11		-20	+20	

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TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions -55°C < T _A < +125°C unless otherwise specified	Device types	Group A subgroups	Limits		Unit
					Min	Max	
Digital output low voltage	V _{OL}	D11-D0/8, BUSY, CLK OUT V _{DD} = 4.75 V, V _{SS} = -15 V, I _{Sink} = 1.6 mA	A11	1,2,3		0.4	V
Digital output high voltage	V _{OH}	I _{Source} = 200 µA			4.0		
Floating state leakage current	I _{LKG}	D11-D0/8. V _{DD} = 5.25 V, V _{SS} = -15 V	A11	1,2,3	-10	+10	µA
Floating state output capacitance	C _{OUT}		A11	13,14,15		15	pF
Conversion time using synchronous clock	t _{CONV}		04,05,06 01,02,03	13,14,15		5 12.5	µs
Conversion time using asynchronous clock 1/			04,05,06 01,02,03	9,10,11	4.8 12.0	5.2 13.0	
Power supply current from V _{DD}	I _{DD}	V _{DD} = 5.25 V, V _{SS} = -15.75 V CS = RD = BUSY = HIGH; A _{IN} = 5 V	A11	1,2,3		7	mA
Power supply current from V _{SS}	I _{SS}					12	
CS to RD setup time	t ₁	See figures 6, 7, 8, and 9	A11	9,14,15	0		ns
RD to BUSY propagation delay 2/	t ₂			9 14,15		190 270	
Data access time after RD, CL = 60 pF (see figure 2)	t ₃ 3/			9 14,15		110 150	
Data access time after RD, CL = 100 pF (see figure 2)	t ₃ 3/			9 14,15		125 170	
RD pulse width	t ₄			9,14,15	t ₃		
CS to RD hold time	t ₅			9,14,15	0		
Data setup time after BUSY CL = 60 pF (see figure 2)	t ₆ 3/			9 14,15		70 100	

See footnotes at end of table.

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TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions -55°C < T _A < +125°C unless otherwise specified	Device types	Group A subgroups	Limits		Unit
					Min	Max	
Bus relinquish time (see figure 3)	t ₇ 4/	See figures 6, 7, 8, and 9	All	9	20	75	ns
				14,15	20	90	
HBEN to RD setup time	t ₈			9,14,15	0		
HBEN to RD hold time	t ₉			9,14,15	0		
Delay between successive read operations	t ₁₀			14,15	500		

- 1/ Conversion time using asynchronous clock is measured by setting the clock frequency at the appropriate value (see 1.4) and checking all remaining tested specifications.
- 2/ All input control signals are specified with t_r = t_f = 5 ns (10 percent to 90 percent of +5 V) and timed from a voltage level of 1.6 V. Time t₆ and t₁₀ are measured only for the initial test and after process or design changes which may affect switching parameters.
- 3/ Time t₃ and t₆ are measured with the load circuits of figure 2 and defined as the time required for an output to cross 0.8 V or 2.4 V.
- 4/ Time t₇ is defined as the time required for the data lines to change 0.5 V when loaded with the circuits of figure 3.

3.5 Certificate of compliance. A certificate of compliance shall be required from a manufacturer in order to be listed as an approved source of supply in 6.4. The certificate of compliance submitted to DESC-ECS prior to listing as an approved source of supply shall state that the manufacturer's product meets the requirements of MIL-STD-883 (see 3.1 herein) and the requirements herein.

3.6 Certificate of conformance. A certificate of conformance as required in MIL-STD-883 (see 3.1 herein) shall be provided with each lot of microcircuits delivered to this drawing.

3.7 Notification of change. Notification of change to DESC-ECS shall be required in accordance with MIL-STD-883 (see 3.1 herein).

3.8 Verification and review. DESC, DESC's agent, and the acquiring activity retain the option to review the manufacturer's facility and applicable required documentation. Offshore documentation shall be made available onshore at the option of the reviewer.

4. QUALITY ASSURANCE PROVISIONS

4.1 Sampling and inspection. Sampling and inspection procedures shall be in accordance with section 4 of MIL-M-38510 to the extent specified in MIL-STD-883 (see 3.1 herein).

4.2 Screening. Screening shall be in accordance with method 5004 of MIL-STD-883, and shall be conducted on all devices prior to quality conformance inspection. The following additional criteria shall apply:

a. Burn-in test (method 1015 of MIL-STD-883).

(1) Test condition A or B using the circuit submitted with the certificate of compliance (see 3.5 herein).

(2) T_A = +125°C, minimum.

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Case L

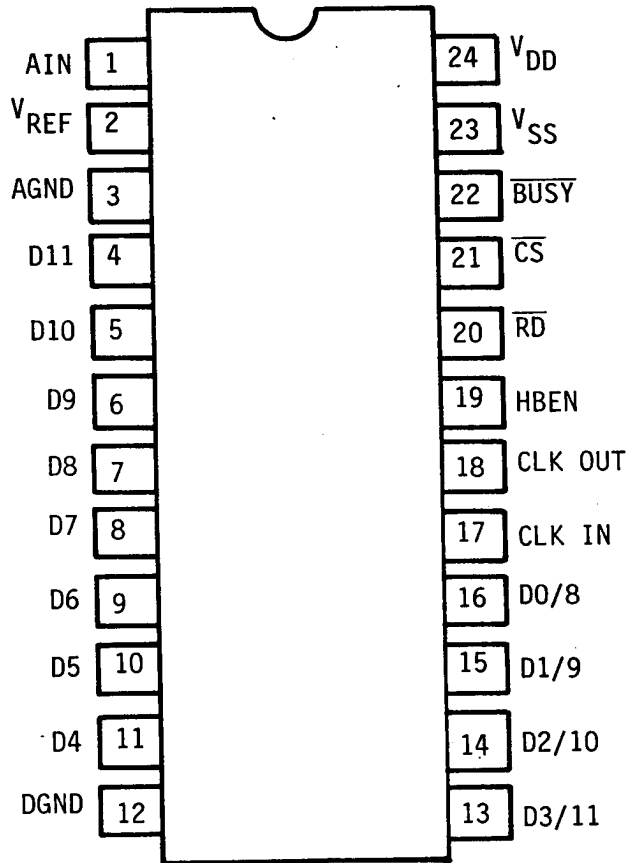


FIGURE 1. Terminal connections.

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Case 3

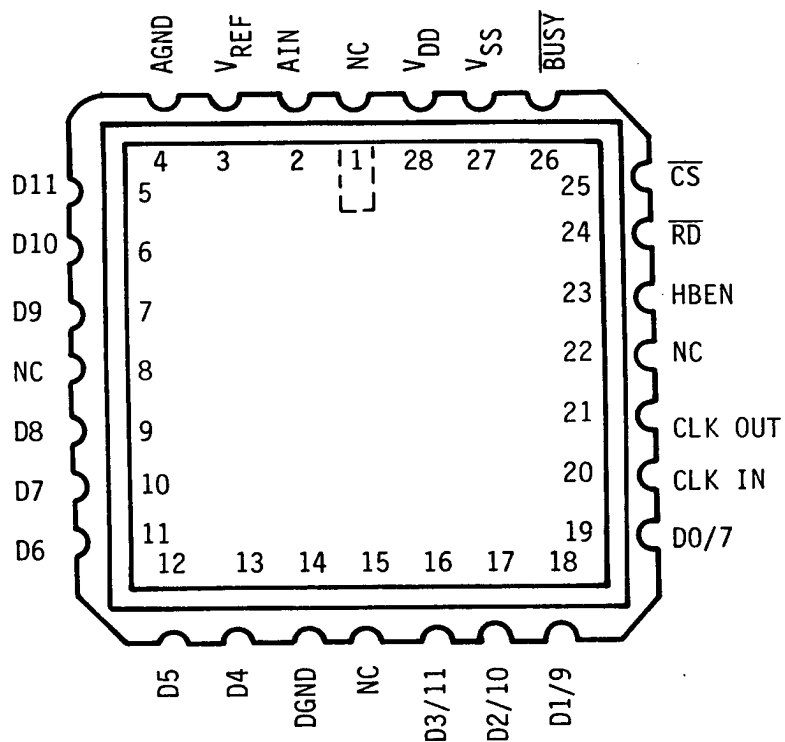


FIGURE 1. Terminal connections - Continued.

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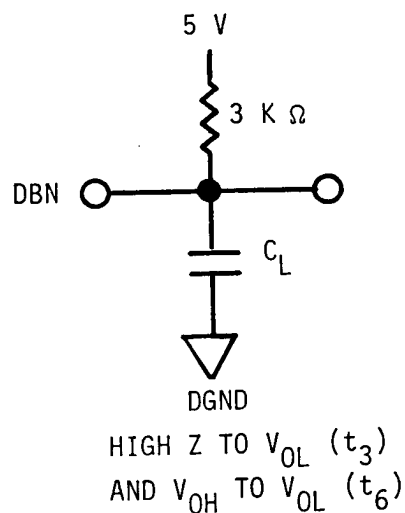
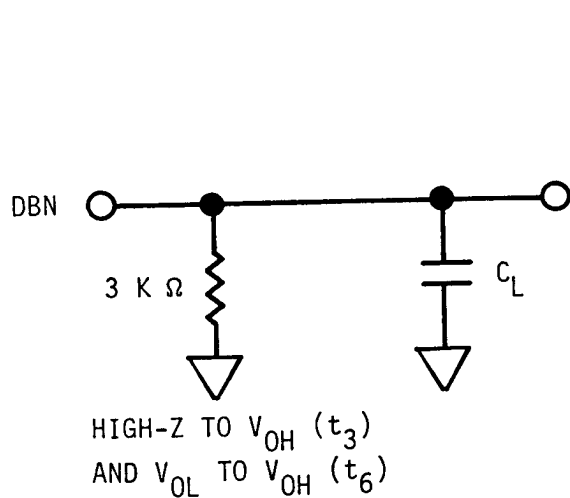


FIGURE 2. Load circuit for access time.

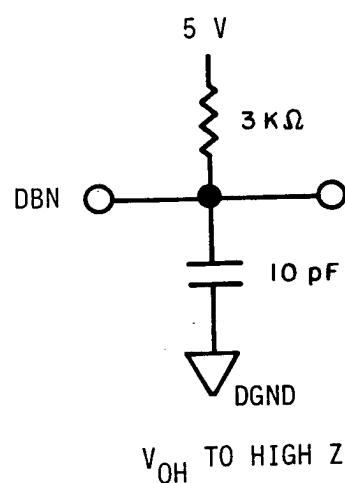
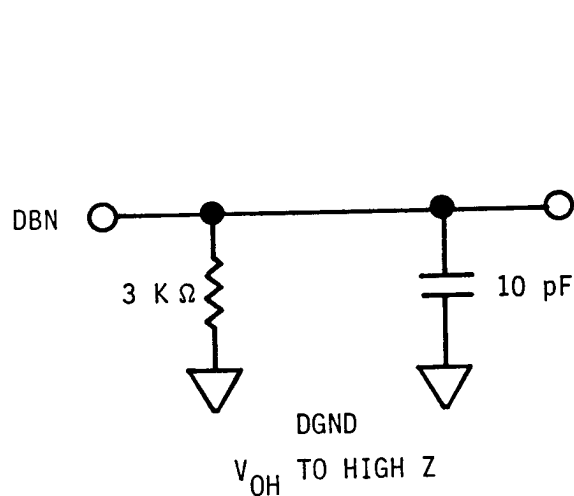


FIGURE 3. Load circuit for bus relinquish time.

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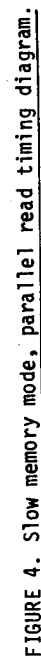
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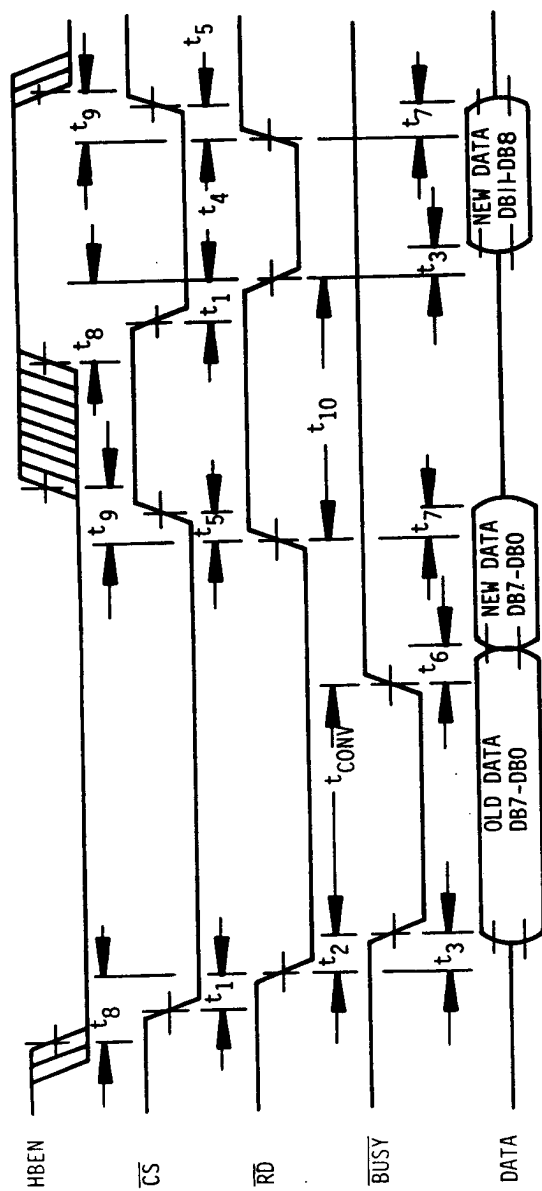


FIGURE 5. Slow memory mode, two byte read timing diagram.

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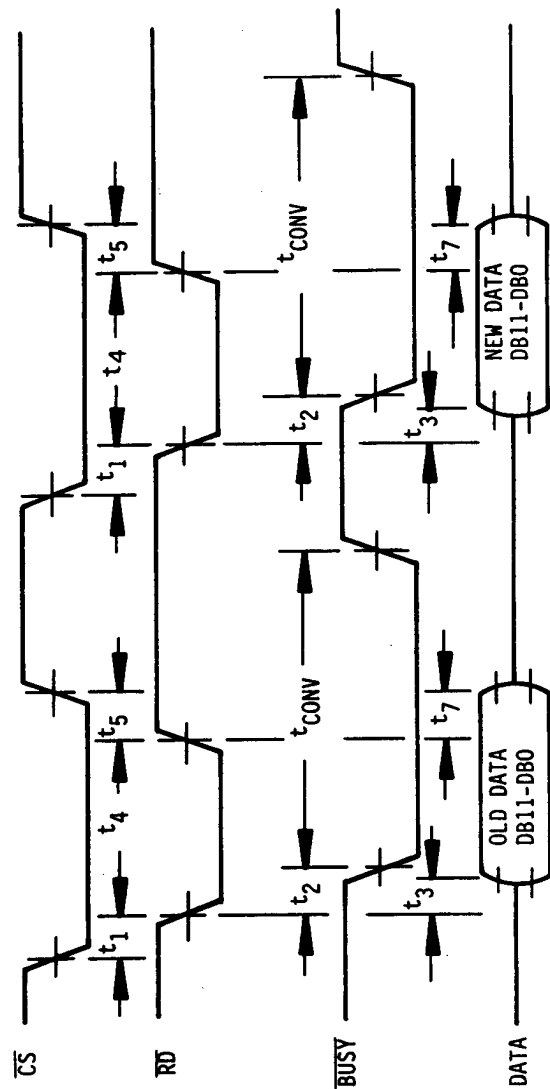


FIGURE 6. Rom mode, parallel read data bus timing diagram.

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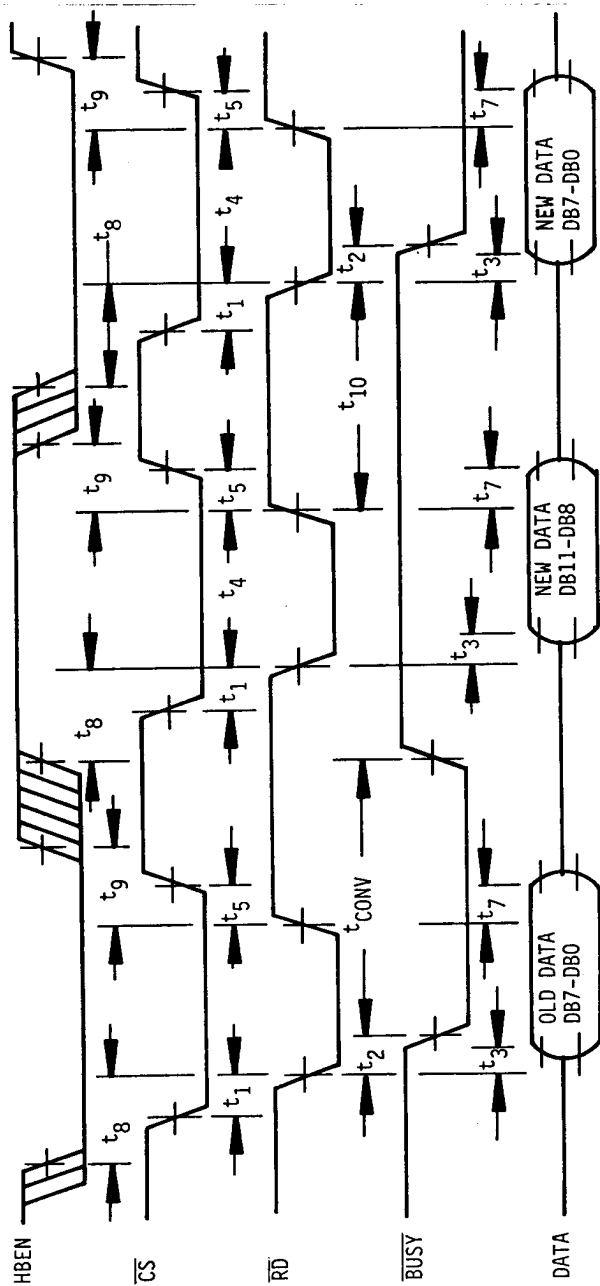


FIGURE 7. Rom mode, two byte read timing diagram.

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- b. Interim and final electrical test parameters shall be as specified in table II herein, except interim electrical parameter tests prior to burn-in are optional at the discretion of the manufacturer.

4.3 Quality conformance inspection. Quality conformance inspection shall be in accordance with method 5005 of MIL-STD-883 including groups A, B, C, and D inspections. The following additional criteria shall apply.

4.3.1 Group A inspection.

- a. Tests shall be as specified in table II herein.
- b. Subgroups 5, 6, 7, and 8 in table I, method 5005 of MIL-STD-883 shall be omitted.
- c. Special subgroup 12 (as referenced in table I) added for grading and selection tests at 25°C, not included in PDA.
- d. Special subgroups 13, 14, and 15 (as referenced in table I) shall be measured only for the initial test and after process or design changes which may affect the parameter in these subgroups. Subgroup 13 is +25°C tests, subgroup 14 is +125°C tests, and subgroup 15 is -55°C tests.

4.3.2 Groups C and D inspections.

- a. End-point electrical parameters shall be as specified in table II herein.
- b. Steady-state life test (method 1005 of MIL-STD-883) conditions:
 - (1) Test condition A or B using the circuit submitted with the certificate of compliance (see 3.5 herein).
 - (2) $T_A = +125^\circ\text{C}$, minimum.
 - (3) Test duration: 1,000 hours, except as permitted by appendix B of MIL-M-38510 and method 1005 of MIL-STD-883.

TABLE II. Electrical test requirements.

MIL-STD-883 test requirements	Subgroups (per method 5005, table I)
Interim electrical parameters (method 5004)	1
Final electrical test parameters (method 5004)	1*, 2, 3, 4, 9, 10, 11, 12
Group A test requirements (method 5005)	1, 2, 3, 4, 9, 10, 11, 12
Groups C and D end-point electrical parameters (method 5005)	1, 12

*PDA applies to subgroup 1.

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5. PACKAGING

5.1 Packaging requirements. The requirements for packaging shall be in accordance with MIL-M-38510.

6. NOTES

6.1 Intended use. Microcircuits conforming to this drawing are intended for use when military specifications do not exist and qualified military devices that will perform the required function are not available for OEM application. When a military specification exists and the product covered by this drawing has been qualified for listing on QPL-38510, the device specified herein will be inactivated and will not be used for new design. The QPL-38510 product shall be the preferred item for all applications.

6.2 Replaceability. Microcircuits covered by this drawing will replace the same generic device covered by a contractor-prepared specification or drawing.

6.3 Comments. Comments on this drawing should be directed to DESC-ECS, Dayton, Ohio 45444, or telephone 513-296-5375.

6.4 Approved source of supply. An approved source of supply is listed herein. Additional sources will be added as they become available. The vendor listed herein has agreed to this drawing and a certificate of compliance (see 3.5 herein) has been submitted to DESC-ECS.

Military drawing part number	Vendor CAGE number	Vendor similar part number <u>1/</u>	Replacement military specification part number
5962-8759101LX ✓	24355	AD7572SQ12/883B	N/A
5962-87591013X ✓	"	AD7572SE12/883B	"
5962-8759102LX ✓	"	AD7572TQ12/883B	"
5962-87591023X ✓	"	AD7572TE12/883B	"
5962-8759103LX ✓	"	AD7572UQ12/883B	"
5962-87591033X ✓	"	AD7572UE12/883B	"
5962-8759104LX ✓	"	AD7572SQ05/883B	"
5962-87591043X ✓	"	AD7572SE05/883B	"
5962-8759105LX ✓	"	AD7572TQ05/883B	"
5962-87591053X ✓	"	AD7572TE05/883B	"
5962-8759106LX ✓	"	AD7572UQ05/883B	"
5962-87591063X ✓	"	AD7572UE05/883B	"

1/ Caution. Do not use this number for item acquisition. Items acquired to this number may not satisfy the performance requirements of this drawing.

N/A = Not applicable

Vendor CAGE
number

24355

Vendor name
and address

Analog Devices
1 Technology Way
Norwood, MA 02062

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