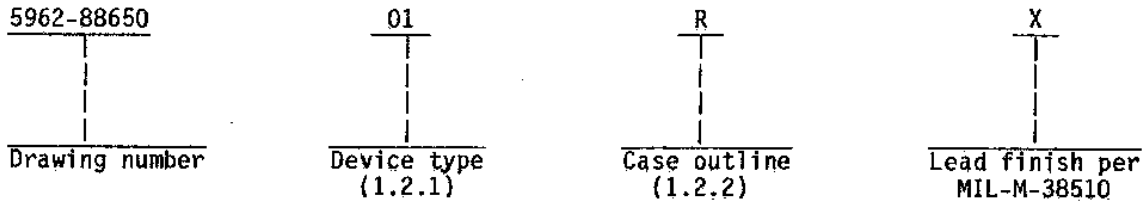


NOTICE OF REVISION (NOR)		1. DATE (YYMMDD) 96-01-11	Form Approved OMB No. 0704-0188
THIS REVISION DESCRIBED BELOW HAS BEEN AUTHORIZED FOR THE DOCUMENT LISTED.			
<small>Public reporting burden for this collection is estimated to average 2 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Department of Defense, Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188), Washington, DC 20503. PLEASE DO NOT RETURN YOUR COMPLETED FORM TO EITHER OF THESE ADDRESSES. RETURN COMPLETED FORM TO THE GOVERNMENT ISSUING CONTRACTING OFFICER FOR THE CONTRACT/ PROCURING ACTIVITY NUMBER LISTED IN ITEM 2 OF THIS FORM.</small>		2. PROCURING ACTIVITY NO.	
		3. DODAAC	
4. ORIGINATOR	b. ADDRESS (Street, City, State, Zip Code) Defense Electronics Supply Center 1507 Wilmington Pike Dayton, OH 45444-5765	5. CAGE CODE 67268	6. NOR NO. 5962-R036-96
a. TYPED NAME (First, Middle Initial, Last)		7. CAGE CODE 67268	8. DOCUMENT NO. 5962-88650
9. TITLE OF DOCUMENT MICROCIRCUIT, LINEAR, CMOS, 8-BIT, MICROPROCESSOR COMPATIBLE, A/D CONVERTER WITH TRACK/HOLD, MONOLITHIC SILICON		10. REVISION LETTER	
		a. CURRENT	b. NEW A
11. ECP NO. N/A			
12. CONFIGURATION ITEM (OR SYSTEM) TO WHICH ECP APPLIES All			
13. DESCRIPTION OF REVISION			
<p>Sheet 1: Revisions ltr column; add "A". Revisions description column; add "Changes in accordance with NOR 5962-R036-96". Revisions date column; add "96-01-11". Revision level block; add "A". Rev status of sheets; for sheet 1 and 6 add "A".</p> <p>Sheet 6: Table I, for data access time (RD mode) test, T_{ACCO}, in the unit column, change from "ns" to "μs". Revision level block; add "A".</p>			
14. THIS SECTION FOR GOVERNMENT USE ONLY			
a. (X one)	X	(1) Existing document supplemented by the NOR may be used in manufacture.	
		(2) Revised document must be received before manufacturer may incorporate this change.	
		(3) Custodian of master document shall make above revision and furnish revised document.	
b. ACTIVITY AUTHORIZED TO APPROVE CHANGE FOR GOVERNMENT DESC-ELDS		c. TYPED NAME (First, Middle Initial, Last) Michael A. Frye	
d. TITLE Chief, Microelectronics Branch	e. SIGNATURE Michael A. Frye		f. DATE SIGNED (YYMMDD) 96-01-11
15a. ACTIVITY ACCOMPLISHING REVISION DESC-ELDS	b. REVISION COMPLETED (Signature) Dan Wonnell		c. DATE SIGNED (YYMMDD) 96-01-11

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	Total unadjusted error
01	AD7820U	CMOS 8-bit ADC with T/H	±0.5 LSB
02	AD7820T	CMOS 8-bit ADC with T/H	±1.0 LSB

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
R	D-8 (20-lead, 1.060" x .310" x .200"), dual-in-line package
2	C-2 (20-terminal, .358" x .358" x .100"), square chip carrier package

1.3 Absolute maximum ratings. 1/

Supply voltage to ground (V_{DD})	0 V dc to +7.0 V dc
Digital input voltage	-0.3 V dc to V_{DD}
Digital output voltage	-0.3 V dc to V_{DD}
Positive reference voltage	V_{REF-} to V_{DD}
Negative reference voltage	0 V dc to V_{REF+}
Input voltage (V_{IN})	-0.3 V dc to V_{DD}
Storage temperature range	-65°C to +150°C
Lead temperature (soldering, 10 seconds)	+300°C
Power dissipation (P_D)	450 mW 2/
Thermal resistance, junction-to-case (θ_{JC}):	
Cases R and 2	See MIL-M-38510, appendix C
Thermal resistance, junction-to-ambient (θ_{JA}):	
Cases R and 2	120°C/W
Junction temperature (T_J)	+150°C

1.4 Recommended operating conditions.

Supply voltage range (V_{DD})	+4.75 V dc to +5.25 V dc
Positive reference voltage (V_{REF+})	+5.0 V dc
Negative reference voltage (V_{REF-})	0 V dc
Ground potential (GND)	0 V dc
Ambient operating temperature range (T_A)	-55°C to +125°C

1/ All voltages are with respect to ground.

2/ Derate above $T_A = +75^\circ\text{C}$ at 6.0 mW/°C.

STANDARDIZED MILITARY DRAWING DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	SIZE A	5962-88650
	REVISION LEVEL	SHEET 2

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 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 ambient 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.

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.

STANDARDIZED MILITARY DRAWING DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	SIZE A		5962-88650
		REVISION LEVEL	SHEET 3

TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions 1/ 2/ -55°C < T _A < +125°C unless otherwise specified	Group A subgroups	Device types	Limits		Unit
					Min	Max	
Resolution	RES	This is the minimum resolution for which no missing codes are guaranteed.	1, 2, 3	All	8.0		LSB
Total unadjusted error	TUE	3/	1	01		±1	
			2, 3, 12			±0.5	
			1, 2, 3	02		±1	LSB
Analog input leakage current	I _{IN}		1, 2, 3	All		±3.0	μA
Analog input capacitance	C _{IA}	See 4.3.1c, T _A = +25°C	4	All		60	pF
Reference input resistance	R _{IN}		1, 2, 3	All	1.0	4.0	kΩ
Digital input high level voltage	V _{IH}	CS, WR, and RD inputs (Pin 7)	1, 2, 3	All	2.4		V
		Mode input			3.5		
Digital input low level voltage	V _{IL}	CS, WR, and RD inputs (Pin 7)	1, 2, 3	All		0.8	V
		Mode input				1.5	
Digital input high current	I _{IH}	CS and RD inputs	1, 2, 3	All		±1.0	μA
		WR input				±3.0	
		Mode input (Pin 7)				±200	

See footnotes at end of table.

STANDARDIZED MILITARY DRAWING DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	SIZE A		5962-88650
		REVISION LEVEL	SHEET 4

TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions 1/ 2/ -55°C < T _A < +125°C unless otherwise specified	Group A subgroups	Device types	Limits		Unit
					Min	Max	
Digital input low current	I _{IL}	\overline{CS} , \overline{WR} , \overline{RD} , and mode inputs (Pin 7)	1, 2, 3	A11		-1.0	μA
Digital input capacitance	C _{ID}	\overline{CS} , \overline{WR} , \overline{RD} , and mode inputs, See 4.3.1c, T _A = +25°C	4	A11		8.0	pF
Digital output high level voltage	V _{OH}	DB ₀ - DB ₇ , \overline{OFL} , and INT outputs, I _{SOURCE} = 360 μA	1, 2, 3	A11	4.0		V
Digital output low level voltage	V _{OL}	DB ₀ - DB ₇ , \overline{OFL} , and INT outputs, I _{SINK} = 1.6 mA	1, 2, 3	A11		0.4	V
Floating state leakage current	I _{OUT}	DB ₀ - DB ₇	1, 2, 3	A11		±3.0	μA
Digital output capacitance	C _{OUT}	See 4.3.1c, T _A = +25°C	4	A11		8.0	pF
Supply current from V _{DD}	I _{DD}	\overline{CS} = \overline{RD} = 0 V	1, 2, 3	A11		20.0	mA
Power supply sensitivity	PSS	V _{DD} = 5.0 V ±5%	1, 2, 3	A11		±.25	LSB
CS to RD/WR setup time	t _{CSS}	6/ 7/	9,10,11	A11	0		ns
CS to RD/WR hold time	t _{CSH}	6/ 7/	9,10,11	A11	0		ns
CS to RDY delay	t _{RDY}	C _L = 50 pF, pull-up resistor = 2.0 kΩ 6/ 7/	9	A11		70	ns
			10, 11			100	
Conversion time (RD mode)	t _{CRD}	See figure 3. 7/	9	A11		1.6	μs
			10, 11			2.5	

See footnotes at end of table.

STANDARDIZED MILITARY DRAWING DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	SIZE A		5962-88650
		REVISION LEVEL	SHEET 5

TABLE 1. Electrical performance characteristics - Continued.

Test	Symbol	Conditions 1/ 2/ -55°C < T _A < +125°C unless otherwise specified	Group A subgroups	Device types	Limits		Unit
					Min	Max	
Data access time (\overline{RD} mode)	t _{ACCO}	4/ 7/	9	A11		1.62	ns
			10, 11			2.55	
\overline{RD} to \overline{INT} delay (\overline{RD} mode)	t _{INTH}	C _L = 50 pF 7/	9	A11		175	ns
			10, 11			225	
Data hold time	t _{DH}	5/ 6/ 7/	9	A11		60	ns
			10, 11			100	
Delay time between conversion	t _p	6/ 7/	9	A11	500		ns
			10, 11		600		
Write pulse width	t _{WR}	6/	9,10,11	A11	0.6	50	μs
Delay time between \overline{WR} and \overline{RD} pulses	t _{RD}	6/	9	A11	600		ns
			10, 11		700		
Data access time ($\overline{WR}/\overline{RD}$ mode)	t _{ACC1}	4/ 6/	9	A11		160	ns
			10, 11			250	
\overline{RD} to \overline{INT} delay	t _{R1}	6/	9	A11		140	ns
			10, 11			225	

See footnotes at end of table.

STANDARDIZED MILITARY DRAWING DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	SIZE A		5962-88650
		REVISION LEVEL	SHEET 6

TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions 1/ 2/ -55°C < T _A < +125°C unless otherwise specified	Group A subgroups	Device types	Limits		Unit
					Min	Max	
\overline{WR} to \overline{INT} delay	t _{INTL}	C _L = 50 pF 6/	9	A11		1.0	μs
			10, 11			1.7	
Data access time ($\overline{WR}/\overline{RD}$ mode)	t _{ACC2}	4/ 6/	9	A11		70	ns
			10, 11			110	
\overline{WR} to \overline{INT} delay (Stand alone operation)	t _{IHWR}	C _L = 50 pF 6/	9	A11		100	ns
			10, 11			150	
Data access time after \overline{INT} (Stand alone operation)	t _{ID}	6/	9	A11		50	ns
			10, 11			75	

1/ V_{DD} = +5.0 V; V_{REF(+)} = +5.0 V; V_{REF(-)} = GND = 0 V unless otherwise specified. Specifications apply for \overline{RD} mode (Pin 7 = 0 V).

2/ All input control signals are specified with t_r = t_f = 20 ns (10 percent to 90 percent of +5.0 V) and timed from a voltage level of 1.6 V.

3/ Includes gain error, offset error and linearity error.

4/ Measured with load circuits of figure 2 and defined as the time required for an output to cross 0.8 V to 2.4 V.

5/ Defined as the time required for the data lines to change 0.5 V when loaded with the circuits of figure 2 and is measured only for the initial test and after process or design changes which may affect t_{DH}.

6/ Refer to timing diagrams of figure 3. These parameters, if not tested, shall be guaranteed to the limits specified in table I.

7/ Refer to timing diagram of figure 3 (\overline{RD} mode). These parameters are tested to subgroup 9 under group A test requirements.

**STANDARDIZED
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DEFENSE ELECTRONICS SUPPLY CENTER
DAYTON, OHIO 45444

SIZE
A

5962-88650

REVISION LEVEL

SHEET

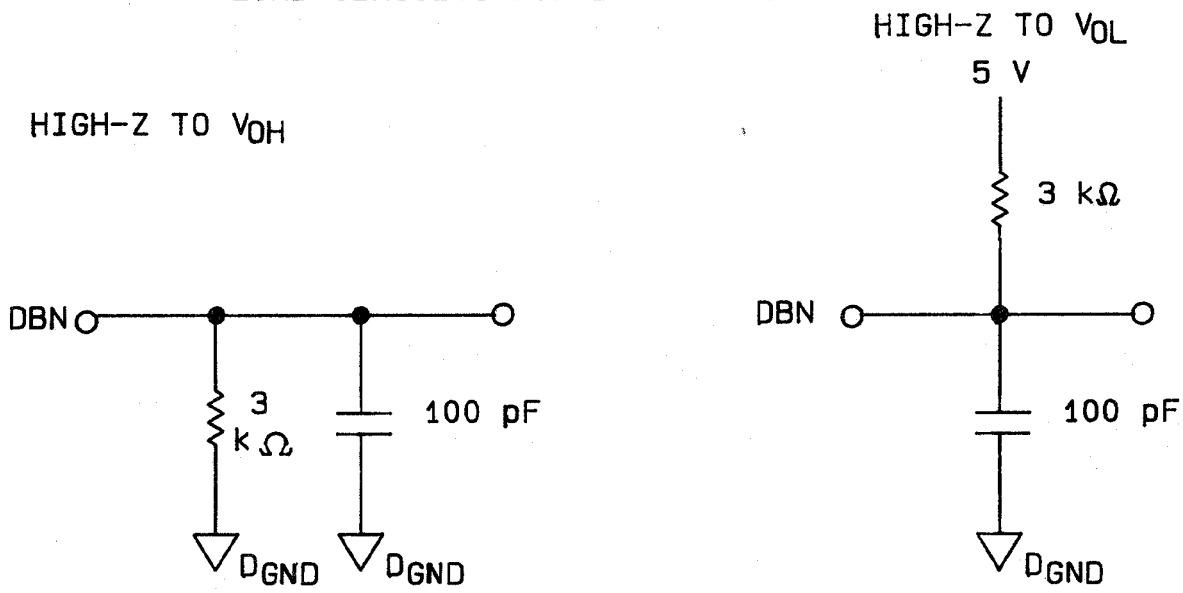
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Device types	A11
Case outlines	R and 2
Terminal number	Terminal symbol
1	V _{IN}
2	DB ₀ (LSB)
3	DB ₁
4	DB ₂
5	DB ₃
6	WR/RDY
7	Mode
8	RD
9	INT
10	GND
11	V _{REF-}
12	V _{REF+}
13	CS
14	DB ₄
15	DB ₅
16	DB ₆
17	DB ₇ (MSB)
18	OFL
19	NC
20	V _{DD}

FIGURE 1. Terminal connections.

STANDARDIZED MILITARY DRAWING DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	SIZE A		5962-88650
		REVISION LEVEL	SHEET 8

LOAD CIRCUITS FOR DATA ACCESS TIME



LOAD CIRCUITS FOR DATA HOLD TIME

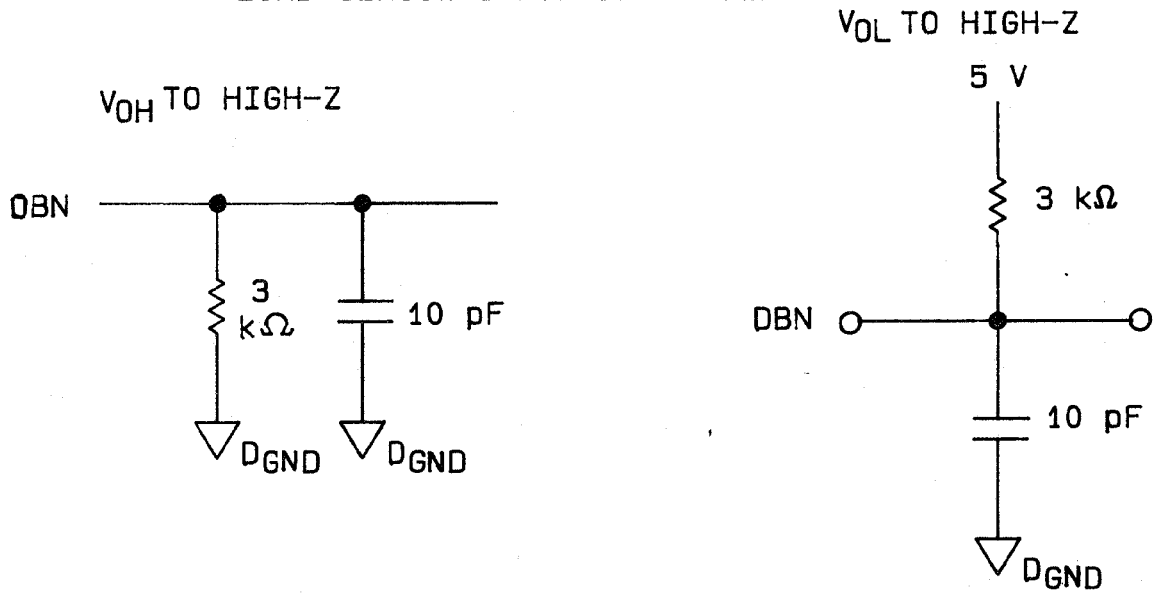


FIGURE 2. Output load circuits.

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DEFENSE ELECTRONICS SUPPLY CENTER
DAYTON, OHIO 45444

SIZE
A

5962-88650

REVISION LEVEL

SHEET

9

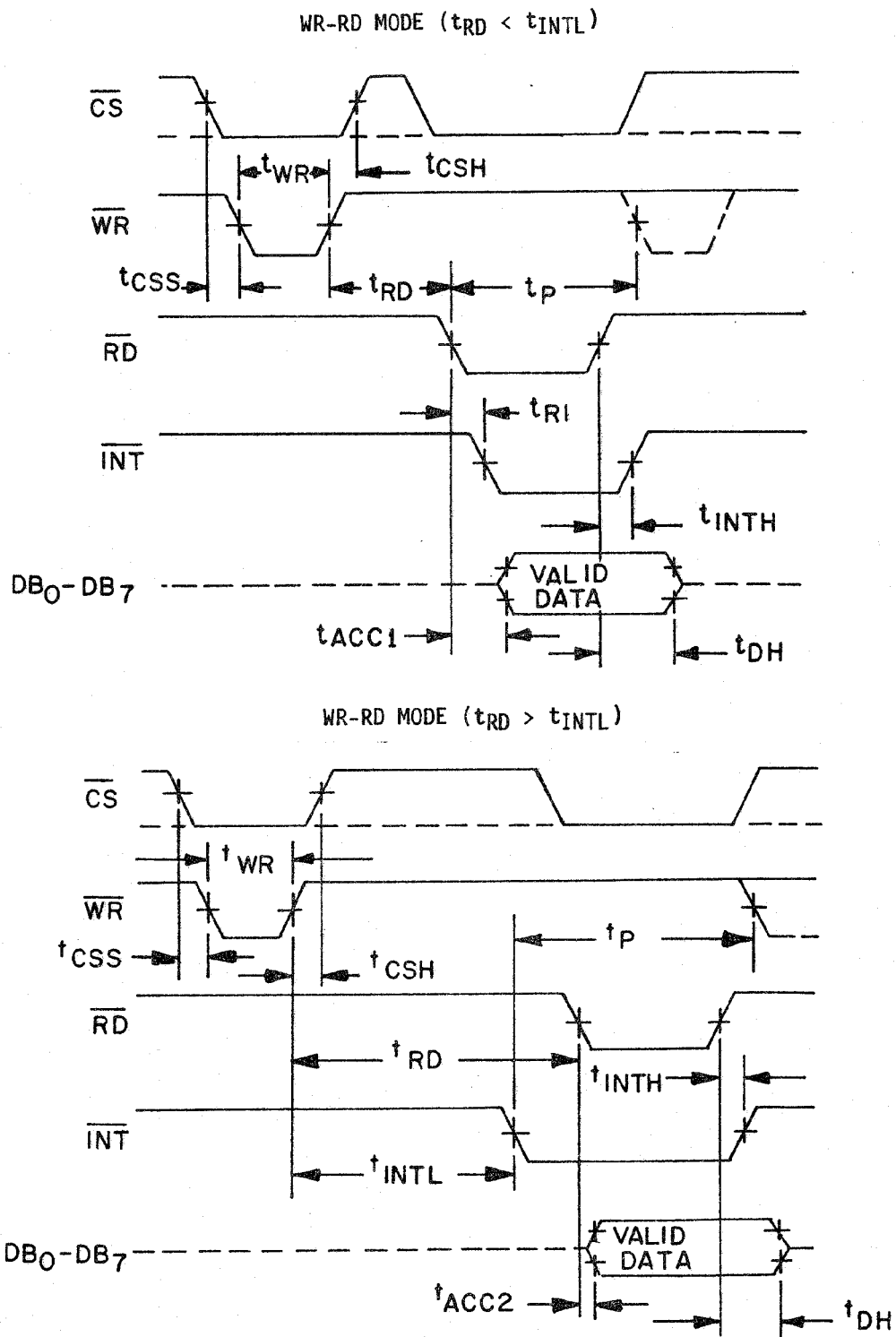


FIGURE 3. Mode timing waveforms.

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DEFENSE ELECTRONICS SUPPLY CENTER
DAYTON, OHIO 45444

SIZE
A

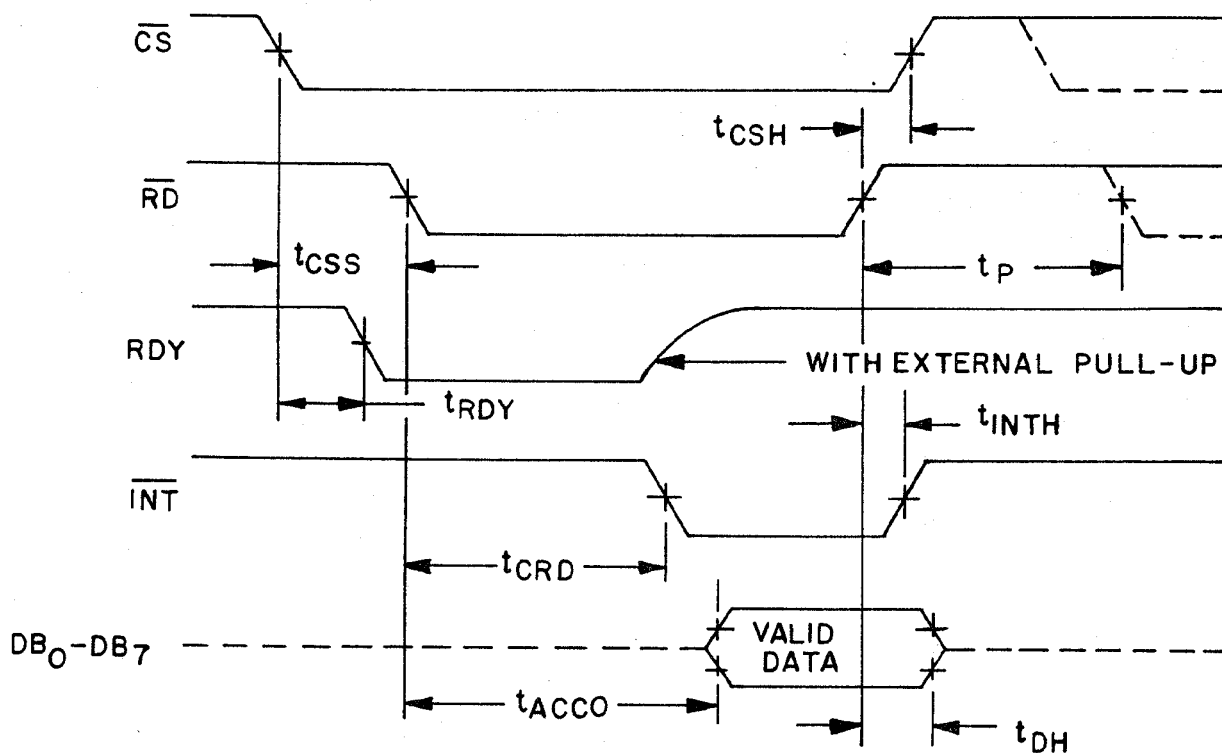
5962-88650

REVISION LEVEL

SHEET

10

RD MODE



WR-RD MODE STAND-ALONE OPERATION, $\overline{CS} = \overline{RD} = 0$

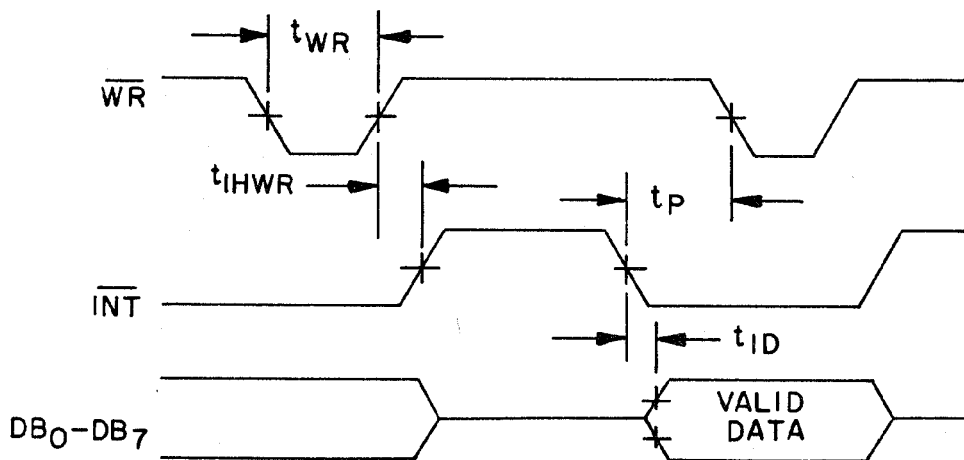


FIGURE 3. Mode timing waveforms - Continued.

STANDARDIZED MILITARY DRAWING DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	SIZE A	5962-88650	
		REVISION LEVEL	SHEET 11

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, B, C, or D using the circuit submitted with the certificate of compliance (see 3.5 herein).
 - (2) $T_A = +125^\circ\text{C}$, minimum.
- 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. Subgroup 4 (C_{IA} , C_{ID} , and C_{OUT} measurements) shall be measured only for the initial test and after process or design changes which may affect capacitance.
- d. Subgroup 12 test is used for grading and part selection at $T_A = +25^\circ\text{C}$ and is not included in PDA calculations.

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, B, C, or D 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 method 1005 of MIL-STD-883.

STANDARDIZED MILITARY DRAWING DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	SIZE A		5962-88650
		REVISION LEVEL	SHEET 12

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, 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

* PDA applies to subgroup 1.

** Subgroups 10 and 11 if not tested, are guaranteed to the limits specified in table I.

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.

STANDARDIZED MILITARY DRAWING DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	SIZE A	5962-88650
	REVISION LEVEL	SHEET 13

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
5962-8865001RX 5962-88650012X	24355 24355	AD7820UQ/883B AD7820UE/883B	M38510/14601BRX M38510/14601B2X
5962-8865002RX 5962-88650022X	24355 24355	AD7820TQ/883B AD7820TE/883B	M38510/14602BRX M38510/14602B2X

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

Vendor CAGE number

24355

Vendor name and address

Analog Devices
1 Technology Way
Norwood, MA 02062

STANDARDIZED MILITARY DRAWING DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	SIZE A		5962-88650
		REVISION LEVEL	SHEET 14