REVISIONS			
LTR	DESCRIPTION	DATE (YR-MO-DA)	APPROVED
A	Change case X to case W. Change vendor part number. Change drawing CAGE code. Editorial changes throughout.	1988 MAR 7	

CURRENT CAGE CODE 67268

REV																								
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REV STATUS OF SHEETS	REV	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A								
	SHEET	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15								

PMIC N/A

STANDARDIZED MILITARY DRAWING

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AMSC N/A

PREPARED BY: Greg A. Pitz

CHECKED BY: Roy Monnin

APPROVED BY:

DRAWING APPROVAL DATE: 9 APRIL 1986

REVISION LEVEL: A

DEFENSE ELECTRONICS SUPPLY CENTER
DAYTON, OHIO 45444

MICROCIRCUITS, DIGITAL, PROGRAMMABLE TIMER/COUNTER DMA ADDRESS GENERATOR, MONOLITHIC SILICON

SIZE	CAGE CODE	
A	14933	5962-86801

SHEET 1 OF 15

DESC FORM 193-1
SEP 87

* U.S. GOVERNMENT PRINTING OFFICE: 1987 — 748-129/60912

5962-E822

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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:

5962-86801	01	W	X
Drawing number	Device type (1.2.1)	Case outline (1.2.2)	Lead finish per MIL-M-38510

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

Device type	Generic number	Circuit function
01	2942	Programmable timer/counter DMA address generator

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
W	D-7 (22-lead, 1.111" x .410" x .225"), dual-in-line package
3	C-4 (28-terminal, .460" x .460" x .100"), square chip carrier package

1.3 Absolute maximum ratings.

Supply voltage range	-0.5 V dc to 7.0 V dc
Input voltage range	-0.5 V dc to 5.5 V dc
Storage temperature range	-65°C to +150°C
Maximum power dissipation (P_D) 1/	1.6 W
Lead temperature (soldering, 10 seconds)	300°C
Thermal resistance, junction-to-case (θ_{JC}): Cases W and 3	See MIL-M-38510, appendix C
Junction temperature (T_J)	200°C

1.4 Recommended operating conditions.

Supply voltage (V_{CC})	4.5 V dc minimum to 5.5 V dc maximum
Minimum high-level input voltage (V_{IH})	2.0 V dc
Maximum low-level input voltage (V_{IL})	0.8 V dc
Case operating temperature range (T_C)	-55°C to +125°C

1/ Must withstand the added P_D due to short circuit test; e.g., I_{OS}.

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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 Block diagram. The block diagram shall be as specified on figure 2.

3.2.3 Function table. The function table shall be as specified on figure 3.

3.2.4 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 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

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.

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TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions $-55°C \le T_C \le +125°C$ $4.5\ V \le V_{CC} \le 5.5\ V$		Group A subgroups	Limits Min	Limits Max	Unit
Output high voltage	V_{OH}	V_{CC} = 4.5 V, V_{IN} = V_{IH} or V_{IL}, I_{OH} = -1.0 mA		1, 2, 3	2.4		V
Output low voltage	V_{OL1}	V_{CC} = 4.5 V, V_{IN} = V_{IH} or V_{IL}	$\overline{WCO}$, $\overline{ACO}$ I_{OL} = 8.0 mA	1, 2, 3		0.5	V
	V_{OL2}		D_{0-7}, DONE I_{OL} = 16 mA	1, 2, 3		0.5	V
Input high voltage	V_{IH}	1/		1, 2, 3	2.0		V
Input low voltage	V_{IL}	1/		1, 2, 3		0.8	V
Input clamp voltage	V_{IC}	V_{CC} = 4.5 V, I_{IN} = -18 mA		1, 2, 3		-1.5	V
Input low current	I_{IL1}	V_{CC} = 5.5 V, V_{IN} = 0.5 V	D_{0-7}	1, 2, 3		-0.15	mA
	I_{IL2}		All others	1, 2, 3		-0.8	mA
Input high current	I_{IH1}	V_{CC} = 5.5 V, V_{IN} = 2.7 V	D_{0-7}	1, 2, 3		150	µA
	I_{IH2}		All others	1, 2, 3		40	µA
Output leakage current on DONE	I_{CEX}	V_{CC} = 5.5 V, V_O = 5.5 V		1, 2, 3		250	µA
Input high current	I_{IH3}	V_{CC} = 5.5 V, V_{IN} = 5.5 V		1, 2, 3		1.0	mA
Output short-circuit current	I_{OS}	V_{CC} = 6.0 V, V_O = 0.5 V 2/		1, 2, 3	-30	-85	mA
Output OFF current	I_{OZH}	$\overline{OE}$ = 2.4 V, V_{CC} = 5.5 V, D_{0-7}	V_{OUT} = 2.4 V	1, 2, 3		150	µA
	I_{OZL}		V_{OUT} = 0.5 V	1, 2, 3		-150	µA

See footnotes at end of table.

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TABLE I. Electrical performance characteristics - Continued.

Test		Symbol	Conditions $-55°C \le T_C \le +125°C$ $4.5\ V \le V_{CC} \le 5.5\ V$	Group A subgroups	Limits Min	Limits Max	Unit
Power supply current		I_{CC1}	V_{CC} = 5.5 V	1, 2, 3		285	mA
		I_{CC2}	V_{CC} = 5.5 V, T_C = +125°C	2		205	mA
Functional tests			See 4.3.1(c)	7, 8			
Setup times	D_{0-7}	t_{s1}	Setup and hold times are relative to clock LOW-to-HIGH transition, see figure 4	9, 10, 11	27		ns
	I_{0-3}, $\overline{IE}$	t_{s2}		9, 10, 11	49		ns
	$\overline{ACI}$, $\overline{WCI}$	t_{s3}		9, 10, 11	34		ns
Hold times	D_{0-7}	t_{h1}		9, 10, 11	7.0		ns
	$\overline{ACI}$, $\overline{WCI}$ I_{0-3}, $\overline{IE}$	t_{h2}		9, 10, 11	5.0		ns
Propagation delay times	$\overline{ACI}$ to $\overline{ACO}$	t_{PD1}	See figure 4	9, 10, 11		21	ns
	$\overline{WCI}$ to $\overline{WCO}$	t_{PD2}		9, 10, 11		21	ns
	$\overline{WCI}$ to DONE 3/	t_{PD3}		9, 10, 11		54	ns
	I_{0-3} to D_{0-7}	t_{PD4}		9, 10, 11		41	ns
	CP to $\overline{ACO}$ or $\overline{WCO}$	t_{PD5}		9, 10, 11		64	ns
	CP to DONE 4/	t_{PD6}		9, 10, 11		88	ns
	CP to D_{0-7}	t_{PD7}		9, 10, 11		68	ns
	$\overline{IE}$ to D_{0-7}	t_{PD8}		9, 10, 11		41	ns

See footnotes at end of table.

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TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions $-55°C \le T_C \le +125°C$, $4.5\ V \le V_{CC} \le 5.5\ V$	Group A subgroups	Limits Min	Limits Max	Unit
Output enable time, from $\overline{OE}$ to D_{0-7}	t_{en}	See figure 4	9, 10, 11		30	ns
Output disable time, from $\overline{OE}$ to D_{0-7}	t_{dis}		9, 10, 11		30	ns
Minimum clock LOW time	t_{PWL}		9, 10, 11	23		ns
Minimum clock HIGH time	t_{PWH}		9, 10, 11	35		ns
Maximum clock frequency	f_{MAX}		9, 10, 11	17		MHz

1/ These input levels provide no guaranteed noise immunity and should only be static tested in a noise-free environment (not functionally tested).

2/ Not more than one output should be tested at a time. Duration of short circuit test should not exceed one second.

3/ $\overline{WCI}$ to DONE occurs only in control modes 0 and 1.

4/ CP to DONE occurs only in control modes 0, 1, and 2.

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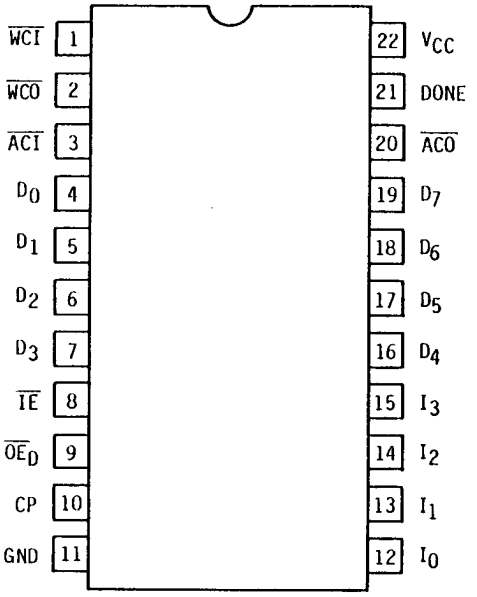
Device type 01

Case W



Case 3

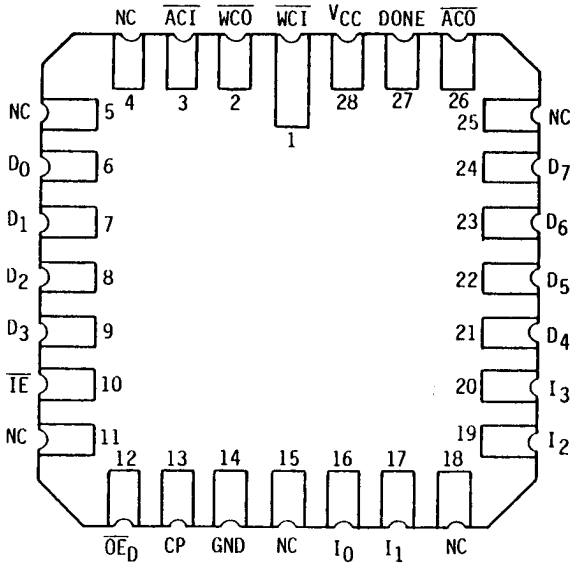


FIGURE 1. Terminal connections (top view).

STANDARDIZED MILITARY DRAWING DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	SIZE A		5962-86801
		REVISION LEVEL A	SHEET 7

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Device type 01

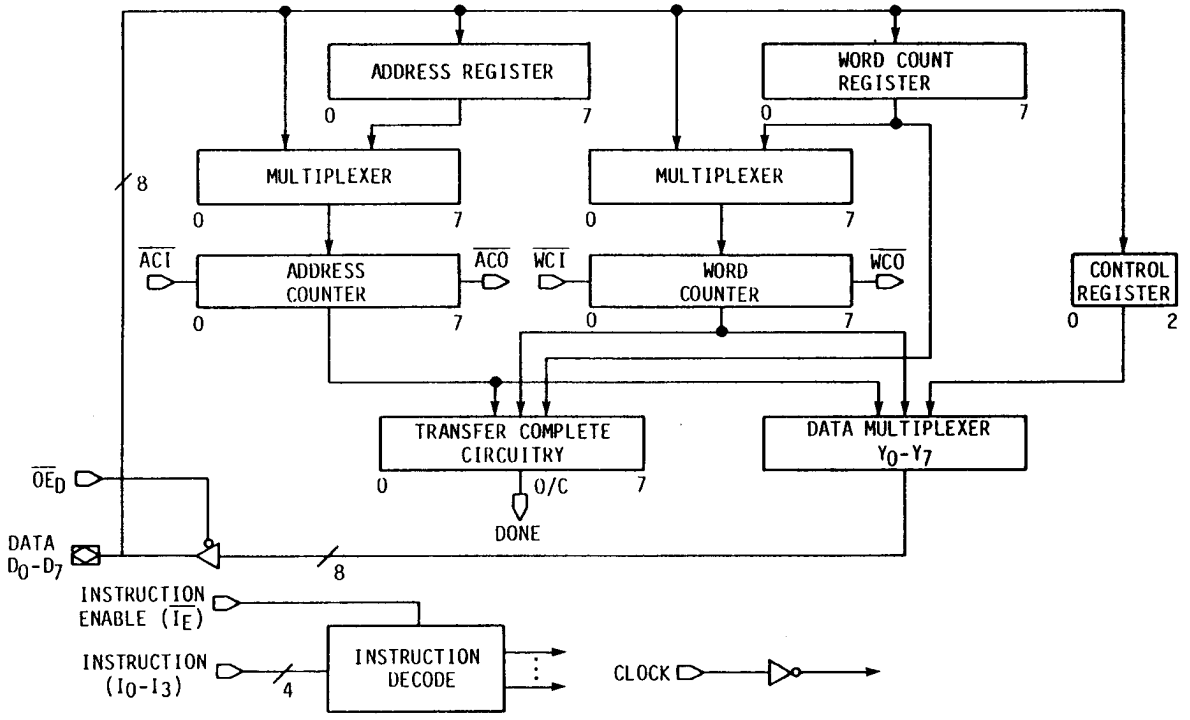

FIGURE 2. Block diagram.

STANDARDIZED MILITARY DRAWING DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	SIZE A		5962-86801
		REVISION LEVEL A	SHEET 8

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$\overline{TE}$	I_{0-3} (Hex)	Function	Mne-monic	Control mode	Word register (WR)	Word counter (WC)	Address register (AR)	Address counter (AC)	Control register (CR)	Data multiplexer output (D)
L	0	WRITE CONTROL REGISTER	WRCR	0,1,2,3	HOLD	HOLD	HOLD	HOLD	$D_{0-2} \rightarrow CR$	FORCED HIGH
L	1	READ CONTROL REGISTER	RDCR	0,1,2,3	HOLD	HOLD	HOLD	HOLD	HOLD	CONTROL REGISTER
L	2	READ WORD COUNTER	RDWC	0,1,2,3	HOLD	HOLD	HOLD	HOLD	HOLD	WORD COUNTER
L	3	READ ADDRESS COUNTER	RDAC	0,1,2,3	HOLD	HOLD	HOLD	HOLD	HOLD	ADDRESS COUNTER
L	4	REINITIALIZE COUNTERS	REIN	0,2,3	HOLD	WR → WC	HOLD	AR → AC	HOLD	ADDRESS COUNTER
				1	HOLD	ZERO → WC	HOLD	AR → AC	HOLD	ADDRESS COUNTER
L	5	LOAD COUNT	LDAD	0,1,2,3	HOLD	HOLD	D → AR	D → AC	HOLD	WORD COUNTER
L	6	LOAD WORD COUNT	LDWC	0,2,3	D → WR	D → WC	HOLD	HOLD	HOLD	FORCED HIGH
				1	D → WR	ZERO → WC	HOLD	HOLD	HOLD	FORCED HIGH
L	7	ENABLE COUNTERS	ENCT	0,1,3	HOLD	ENABLE	HOLD	ENABLE	HOLD	ADDRESS COUNTER
				2	HOLD	HOLD	HOLD	ENABLE	HOLD	ADDRESS COUNTER
H	0-7	INSTRUCTION DISABLE	---	0,1,3	HOLD	ENABLE	HOLD	ENABLE	HOLD	ADDRESS COUNTER
				2	HOLD	HOLD	HOLD	ENABLE	HOLD	ADDRESS COUNTER

FIGURE 3. Function table.

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$\overline{IE}$	I_{0-3} (Hex)	Function	Mne-monic	Control mode	Word register (WR)	Word counter (WC)	Address register (AR)	Address counter (AC)	Control register (CR)	Data multiplexer output (D)
L	8	WRITE CONTROL REGISTER, T/C	WCRT	0,1,2,3	HOLD	ENABLE	HOLD	ENABLE	D_{0-2} → CR	CONTROL REGISTER
L	9	REINITIALIZE ADDRESS COUNTER	REAC	0,1,2,3	HOLD	ENABLE	HOLD	AR → AC	HOLD	ADDRESS COUNTER
L	A	READ WORD COUNTER, T/C	RWCT	0,1,2,3	HOLD	ENABLE	HOLD	ENABLE	HOLD	WORD COUNTER
L	B	READ ADDRESS COUNTER, T/C	RACT	0,1,2,3	HOLD	ENABLE	HOLD	ENABLE	HOLD	ADDRESS COUNTER
L	C	REINITIALIZE ADDRESS AND WORD COUNTERS	RAWC	0,2,3	HOLD	WR → WC	HOLD	AR → AC	HOLD	ADDRESS COUNTER
				1	HOLD	ZERO → WC	HOLD	AR → AC	HOLD	ADDRESS COUNTER
L	D	LOAD ADDRESS, T/C	LDAT	0,1,2,3	HOLD	ENABLE	D → AR	D → AC	HOLD	WORD COUNTER
L	E	LOAD WORD COUNT, T/C	LWCT	0,2,3	D → WR	D → WC	HOLD	ENABLE	HOLD	FORCED HIGH
				1	D → WR	ZERO → WC	HOLD	ENABLE	HOLD	FORCED HIGH
L	F	REINITIALIZE WORD COUNTER	REWC	0,2,3	HOLD	WR → WC	HOLD	ENABLE	HOLD	WORD COUNTER
				1	HOLD	ZERO → WC	HOLD	ENABLE	HOLD	WORD COUNTER
H	8-F	INSTRUCTION DISABLE, T/C	---	0,1,3	HOLD	ENABLE	HOLD	ENABLE	HOLD	WORD COUNTER
				2	HOLD	HOLD	HOLD	ENABLE	HOLD	WORD COUNTER

FIGURE 3. Function table - Continued.

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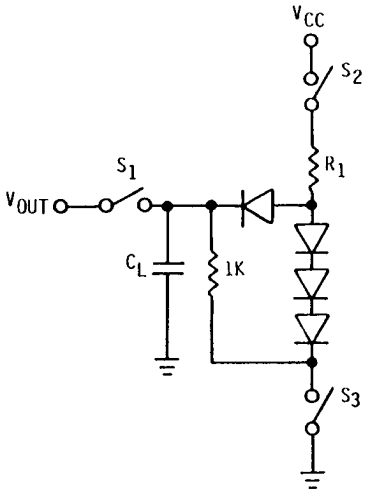
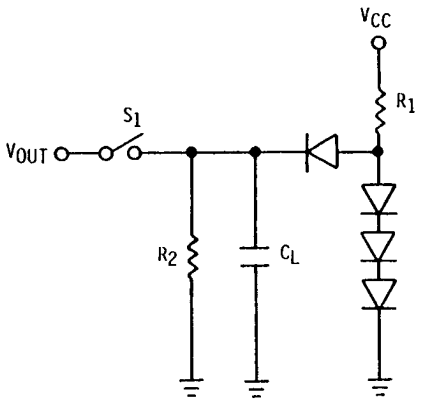
A. THREE STATE OUTPUTS



$$R_1 = \frac{5.0 - V_{BE} - V_{OL}}{\frac{I_{OL} + V_{OL}}{1K}}$$

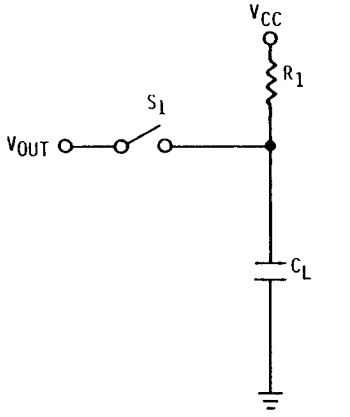
B. NORMAL OUTPUTS



$$R_2 = \frac{2.4V}{I_{OH}}$$

$$R_1 = \frac{5.0 - V_{BE} - V_{OL}}{\frac{I_{OL} + V_{OL}}{R_2}}$$

C. OPEN-COLLECTOR OUTPUTS



$$R_1 = \frac{5.0 - V_{OL}}{I_{OL}}$$

FIGURE 4. Switching times test circuit and waveforms.

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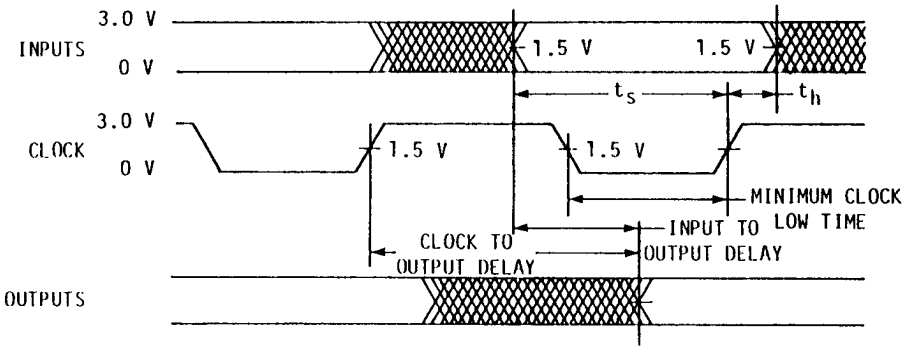

Test output loads

Pin name	Test circuit	R1 (ohms)	R2 (ohms)
D_{0-7}	A	220	1.0K
$\overline{ACO}$	B	470	2.4K
DONE	C	270	-
$\overline{WCO}$	B	470	2.4K

NOTES:
1. C_L = 50 pF includes scope probe, wiring and stray capacitance without device in test fixture.
2. S_1, S_2, S_3 are closed during function tests and all AC tests except output enable tests.
3. S_1 and S_3 are closed while S_2 is open for t_{en} test.
4. C_L = 5.0pF for output disable tests.

FIGURE 4. Switching times test circuit and waveforms - Continued.

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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 3.5 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 C or D using the circuit submitted with the certificate of compliance (see 3.5 herein).

(2) T_A = +125°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 4, 5, and 6 in table I, method 5005 of MIL-STD-883 shall be omitted.

c. Subgroup 7 and 8 tests sufficient to verify the function table.

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 conditions, method 1005 of MIL-STD-883.

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

(2) T_A = +125°C, minimum.

(3) Test duration: 1,000 hours, except as permitted by method 1005 of MIL-STD-883.

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TABLE II. Electrical test requirements.

MIL-STD-883 test requirements	Subgroups (per method 5005, table I)
Interim electrical parameters (method 5004)	---
Final electrical test parameters (method 5004)	1*, 2, 3, 7, 8, 9, 10**, 11**
Group A test requirements (method 5005)	1, 2, 3, 7, 8, 9, 10**, 11**
Groups C and D end-point electrical parameters (method 5005)	1, 2, 3, 7, 8

* PDA applies to subgroup 1.
** Subgroups 10 and 11, if not tested, shall be 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.

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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 1/
5962-8680101WX	34335	AM2942/BWA
5962-86801013X	34335	AM2942/B3A

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	Vendor name and address
34335	Advanced Micro Devices, Incorporated 901 Thompson Place Sunnyvale, CA 94088

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