

REVISIONS																												
LTR	DESCRIPTION	DATE (YR-MO-DA)	APPROVED																									
D	Add device type 05 to the drawing for vendor CAGE 34335. Add vendor CAGE 01295 for device type 04LX, 043X, and 04KX. Add footnote 9 to table I, subgroups 9, 10, and 11 testing. Changes to vendor similar part number for vendor CAGE 01295. Correction to table I, parameter IqS. Editorial changes throughout.	91-05-01	<i>M.O. Lge</i>																									
<p>CURRENT CAGE CODE 67268</p>																												
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REV STATUS OF SHEETS	REV	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
	SHEET	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
PMIC N/A		PREPARED BY <i>James E. Jamison</i>										DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444																
STANDARDIZED MILITARY DRAWING		CHECKED BY <i>Charles Reusing</i>										MICROCIRCUITS, DIGITAL MEMORY, BIPOLAR PROGRAMMABLE LOGIC																
THIS DRAWING IS AVAILABLE FOR USE BY ALL DEPARTMENTS AND AGENCIES OF THE DEPARTMENT OF DEFENSE		APPROVED BY <i>[Signature]</i>										DRAWING APPROVAL DATE 10 JULY 1986																
AMSC N/A		REVISION LEVEL D										SIZE A	CAGE CODE 14933	5962-86053														
												SHEET 1																

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

5962-E175

DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.

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 or Identifying Number (PIN). The complete PIN shall be as shown in the following example:

5962-86053	01	K	X
┆	┆	┆	┆
┆	┆	┆	┆
┆	┆	┆	┆
┆	┆	┆	┆
Drawing number	Device type (1.2.1)	Case outline (1.2.2)	Lead finish per MIL-M-38510

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

Device type	Generic number	Circuit function
01	PAL22V10A	22-input 10-output registered AND-OR logic array
02	PAL22V10	22-input 10-output registered AND-OR logic array
03	PAL22VP10-25	22-input 10-output registered AND-OR logic array
04	PAL22V10-20	22-input 10-output registered AND-OR logic array
05-	PAL22V10-12	22-input 10-output registered AND-OR logic array

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

Outline letter	Case outline
K	F-6 (24-lead, 0.640" x 0.420" x 0.090"), flat package
L	D-9 (24-lead, 1.280" x 0.310" x 0.200"), dual-in-line package
3	C-4 (28-terminal, 0.460" x 0.460" x 0.100"), square chip carrier package

1.3 Absolute maximum ratings. 1/

Supply voltage range - - - - -	-0.5 V dc to +7.0 V dc
Input voltage range - - - - -	-0.5 V dc to +5.5 V dc
Output voltage applied - - - - -	-0.5 V dc to +7.0 V dc 2/
Output sink current - - - - -	+100 mA 2/
Thermal resistance, junction-to-case (θ_{JC}):	
Cases K, L, and 3 - - - - -	See MIL-M-38510, appendix C
Maximum power dissipation (P_D) 3/ - - - - -	1.2 W
Maximum junction temperature - - - - -	+175°C
Lead temperature (soldering, 10 seconds maximum) - -	+260°C

1.4 Recommended operating conditions.

Supply voltage (V_{CC}) - - - - -	4.5 V dc to 5.5 V dc
High level input voltage (V_{IH}) - - - - -	2.0 V dc minimum
Low level input voltage (V_{IL}) - - - - -	0.8 V dc maximum

1/ All voltages referenced to V_{SS} .

2/ Except during programming.

3/ 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, standard, and bulletin. Unless otherwise specified, the following specification, standard, and bulletin 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.

BULLETIN

MILITARY

MIL-BUL-103 - List of Standardized Military Drawings (SMD's).

(Copies of the specification, standard, and bulletin 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. Titanium-tungsten resistors or Platinum-silicide shall be used as the fusible link or programming element.

3.2.1 Case outline(s). The case outline(s) shall be in accordance with 1.2.2 herein.

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

3.2.3 Truth tables.

3.2.3.1 Unprogrammed devices. The truth table for unprogrammed devices for contracts involving no altered item drawing shall be as specified on figure 2. When required in groups A, B, or C (see 4.4), the devices shall be programmed by the manufacturer prior to test with a minimum of 50 percent of the total number of gates programmed) or to any altered item drawing pattern which includes at least 25 percent of the total number of gates programmed.

3.2.3.2 Programmed devices. The truth table for programmed devices shall be as specified by an attached altered item drawing.

3.2.4 Logic diagram. The logic diagram for unprogrammed devices shall be as specified on figure 3.

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TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions $\frac{1/}{-55^{\circ}\text{C} \leq T_C \leq +125^{\circ}\text{C}}$	Group A subgroups	Device types	Limits		Unit
					Min	Max	
Input clamp voltage	V_{IC}	$V_{CC} = 4.5 \text{ V}, I_I = -18 \text{ mA}$	1, 2, 3	A11		-1.2	V
High level output voltage	V_{OH}	$I_O = -2.0 \text{ mA}, V_{CC} = 4.5 \text{ V}, V_{IN} = 2.0 \text{ V or } 0.8 \text{ V}$	1, 2, 3	A11	2.4		V
Low level output voltage	V_{OL}	$I_O = 12.0 \text{ mA}, V_{CC} = 4.5 \text{ V}, V_{IN} = 2.0 \text{ V or } 0.8 \text{ V}$	1, 2, 3	A11		0.5	V
High impedance output leakage current $\frac{2/}{}$	I_{OZH}	$V_{CC} = 5.5 \text{ V}, V_O = 2.7 \text{ V}$	1, 2, 3	A11		100	μA
	I_{OZL}	$V_{IN} = V_{IH} \text{ or } V_{IL}, V_O = 0.4 \text{ V}$				-100	
High level input current	I_{IH}	$V_{IN} = 2.7 \text{ V}, V_{CC} = 5.5 \text{ V}$	1, 2, 3	A11		25	μA
		$V_{IN} = 5.5 \text{ V}, V_{CC} = 5.5 \text{ V}$	1, 2, 3	A11		1.0	mA
Low level input current	I_{IL}	$V_{IN} = 0.4 \text{ V}, V_{CC} = 5.5 \text{ V}$	1, 2, 3	A11		-250	μA
Supply current	I_{CC}	$V_{CC} = 5.5 \text{ V}$	1, 2, 3	01,02		180	mA
				03		230	
				04,05		200	
Output short circuit current $\frac{3/}{}$	I_{OS}	$V_{CC} = 5.5 \text{ V}, V_O = 0.5 \text{ V}$	1, 2, 3	01,02,03,04	-30	-90	mA
				05	-30	-130	
Propagation delay output high impedance to output valid	t_{PZH}	$V_{CC} = 5.0 \text{ V} \pm 10\%, C_L = 50 \text{ pF}$ See figures 4 and 5 $\frac{4/}{}$	9,10,11	01		30	ns
				02		40	
				03		25	
				04		20	
				05		15	
Propagation delay output valid to output high impedance $\frac{5/}{}$	t_{PDZ}		9,10,11	01		30	ns
				02		40	
				03		25	
				04		20	
				05		12.5	

See footnotes at end of table.

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TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions <u>1/</u> $-55^{\circ}\text{C} \leq T_C \leq +125^{\circ}\text{C}$	Group A subgroups	Device types	Limits		Unit
					Min	Max	
Propagation delay <u>6/</u> data input to output	t_{PHL}	$V_{\text{CC}} = 5.0 \text{ V} \pm 10\%$, $C_L = 50 \text{ pF}$ See figures 4 and 5 <u>4/</u>	9,10,11	01		30	ns
				02		40	
				03		25	
				04		20	
				05		12	
Propagation delay <u>6/</u> data input to output	t_{PLH}		9,10,11	01		30	ns
				02		40	
				03		25	
				04		20	
				05		12	
Clock pulse width <u>7/</u>	t_{CL}		9,10,11	01,03	20		ns
				02	30		
				04	15		
				05	6		
Setup time <u>7/</u>	t_{SU}		9,10,11	01,03	25		ns
				02	35		
				04	17		
				05	10		
Hold time <u>7/</u>	t_{H}		9,10,11	All	0		ns
Maximum clock frequency <u>7/ 8/</u>	f_{MAX}		9,10,11	01		22	MHz
				02		16.5	
				03		25	
				04		33.3	
				05		50	
Asynchronous reset pulse width <u>7/ 9/</u>	t_{AW}		9,10,11	01,03	30		ns
				02	40		
				04	20		
				05	15		
Asynchronous reset recovery time <u>7/ 9/</u>	t_{AR}		9,10,11	01,03	30		ns
				02	40		
				04	20		
				05	10		

See footnotes at end of table.

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TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions ^{1/} $-55^{\circ}\text{C} \leq T_C \leq +125^{\circ}\text{C}$	Group A subgroups	Device types	Limits		Unit
					Min	Max	
Asynchronous reset to registered output reset ^{7/}	t_{AP}	<u>4/</u>	9,10,11	01		35	ns
				02		45	
				03,04		25	
				05		20	
Propagation delay clock to output ^{7/}	t_{CO}		9,10,11	01		20	ns
				02		25	
				03,04		15	
				05		10	

^{1/} All voltages are referenced to ground.

^{2/} I/O terminal leakage is the worst case of I_{IX} or I_{OZ} .

^{3/} Only one output shorted at a time.

^{4/} Equivalent test loads may be used for testing when submitted to and approved by DESC.

^{5/} $C_L = 5$ pF for t_{PDZ} test.

^{6/} Test applies only to non-registered (combinational logic) outputs.

^{7/} Test applies only to register outputs.

^{8/} f_{MAX} is derived by testing t_{SU} and t_{CO} and is not tested directly.

^{9/} Not tested directly, but guaranteed by testing of t_{AP} and t_{SU} .

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

3.4 Electrical test requirements. The electrical test requirements shall be the subgroups specified in table II. The electrical tests for each subgroup are described in table I.

3.5 Marking. Marking shall be in accordance with MIL-STD-883 (see 3.1 herein). The part shall be marked with the PIN listed in 1.2 herein. In addition, the manufacturer's PIN may also be marked as listed in MIL-BUL-103 (see 6.6 herein).

3.6 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 MIL-BUL-103 (see 6.6 herein). The certificate of compliance submitted to DESC-ECS prior to listing as an approved source of supply shall affirm that the manufacturer's product meets the requirements of MIL-STD-883 (see 3.1 herein) and the requirements herein.

3.7 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.

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

3.9 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.

3.10 Processing options. Since the device is capable of being programmed by either the manufacturer or the user to result in a wide variety of configurations, two processing options are provided for selection in the contract, using an altered item drawing.

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Case outlines K and L

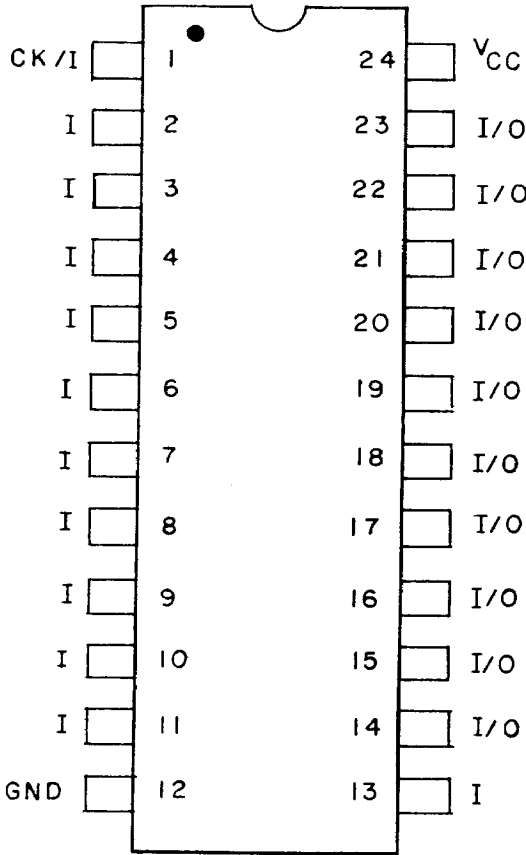


FIGURE 1. Terminal connections.

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Case outline 3

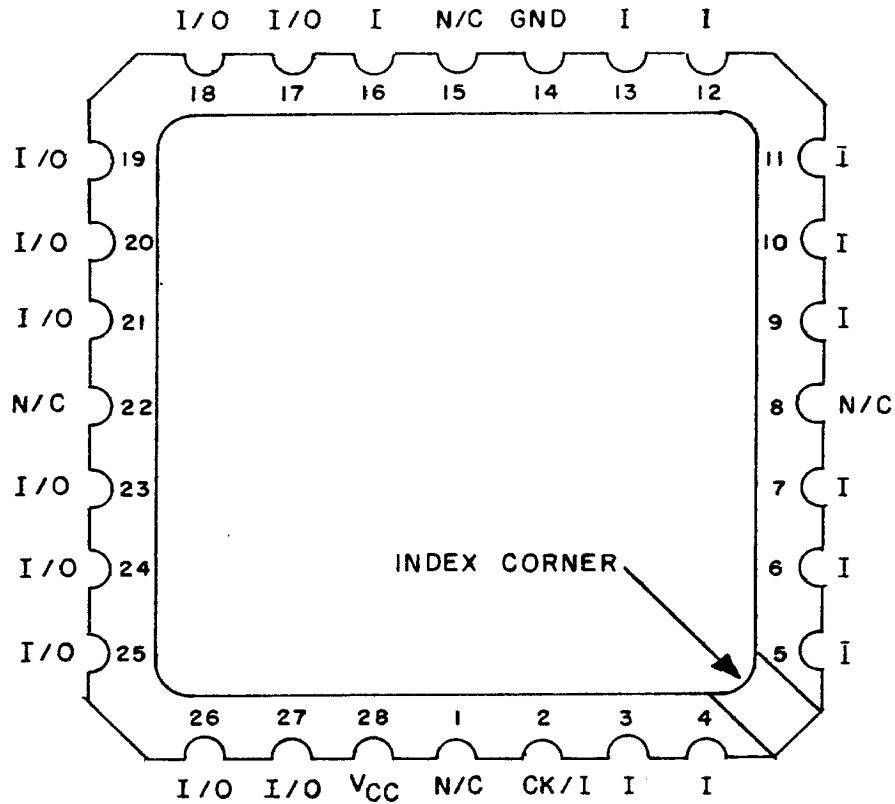


FIGURE 1. Terminal connections - Continued.

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Device types 01, 02, 03, 04, and 05

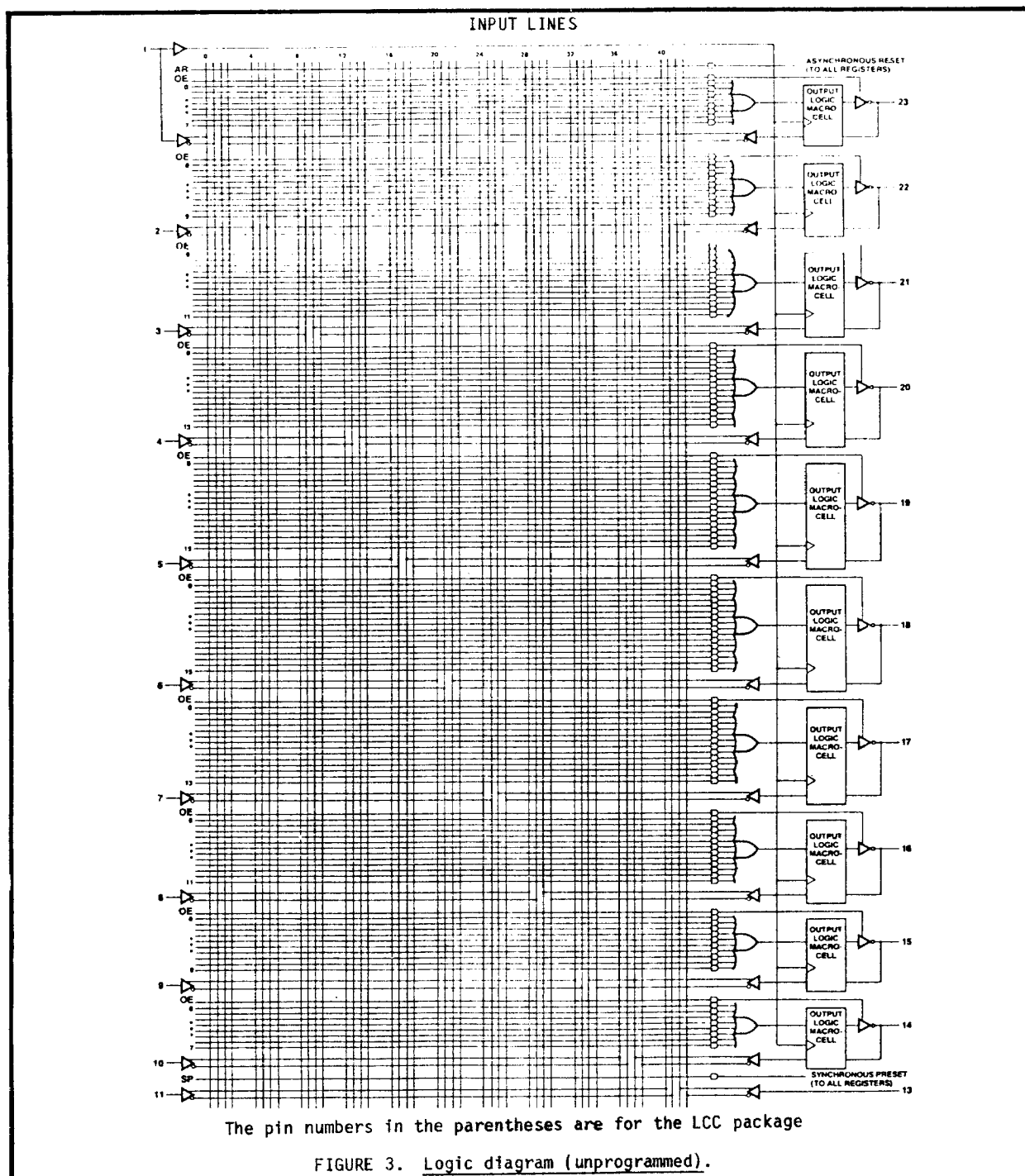
Truth table																			
Input pins														Output pins					
I	I	I	I	I	I	I	I	I	I	I	I	I	I	I/O	I/O	I/O	I/O	I/O	I/O
X	X	X	X	X	X	X	X	X	X	X	X	X	X	Z	Z	Z	Z	Z	Z

NOTES:

1. Z = Tristate.
2. X = Don't care.

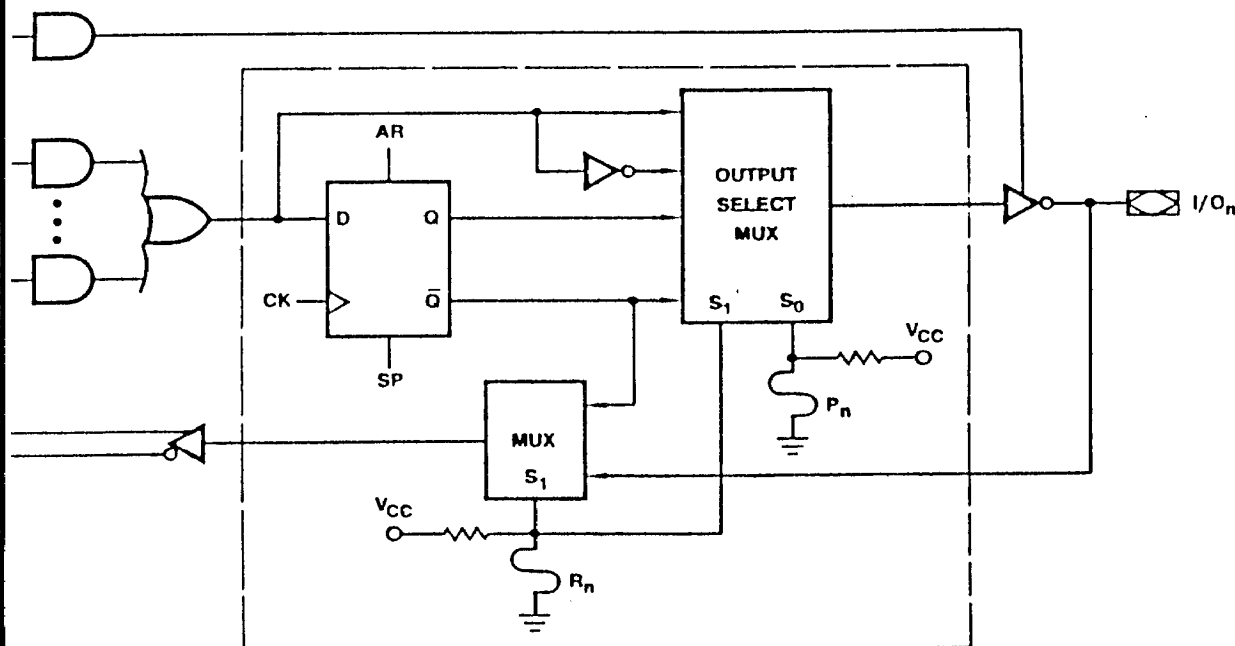
FIGURE 2. Truth table (unprogrammed).

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Output logic macrocell



S ₁	S ₀	Output configuration
0	0	Registered/active low
0	1	Registered/active high
1	0	Combinatorial/active low
1	1	Combinatorial/active high

0 = Unblown fuse
1 = Blown fuse

FIGURE 3. Logic diagram (unprogrammed) - Continued.

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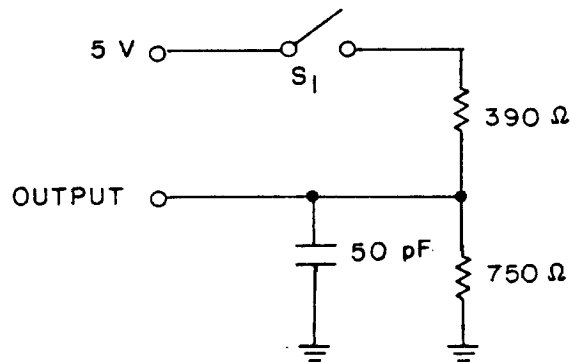
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NOTE: S_1 is open for high impedance to high tests and closed for high impedance to low test. Output disable times (t_{PDZ}) are tested with $C_L = 5$ pF. High to high impedance tests are made to output voltage of $V_{OH} - 0.5$ V with S_1 open; low to high impedance tests are made to $V_{OL} + 0.5$ V level with S_1 closed. Equivalent test load may be used when approved by DESC-ECS.

FIGURE 4. Output test circuit.

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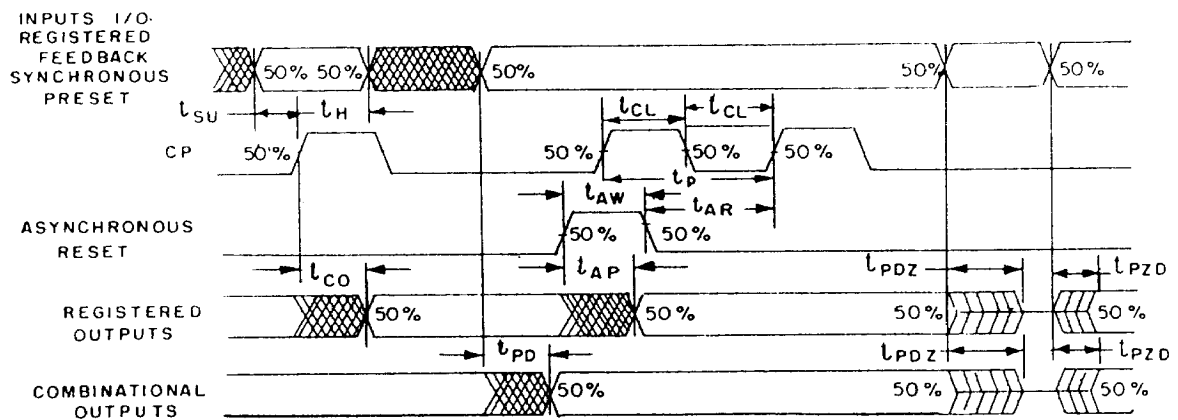


FIGURE 5. Switching waveforms.

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3.10.1 Unprogrammed device delivered to the user. All testing shall be verified through group A testing as defined in 3.2.3.1 and table II. It is recommended that users perform subgroups 7 and 9 after programming to verify the specific program configuration.

3.10.2 Manufacturer-programmed device delivered to the user. All testing requirements and quality assurance provisions herein, including the requirements of the altered item drawing, shall be satisfied by the manufacturer prior to delivery.

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 3.6 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.

TABLE II. Electrical test requirements. 1/ 2/ 3/

MIL-STD-883 test requirements	Subgroups (per method 5005, table I)
Interim electrical parameters (method 5004)	1
Final electrical test parameters (method 5004) for programmed devices	1*, 2, 3, 7*, 8, 9
Final electrical test parameters (method 5004) for unprogrammed devices	1*, 2, 3, 7*, 8
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

1/ (*) indicates PDA applies to subgroups 1 and 7.

2/ Any or all subgroups may be combined when using high-speed testers.

3/ Subgroups 7 and 8 functional tests shall also verify that no fuses are blown for unprogrammed devices or that the altered item drawing pattern exists for programmed devices.

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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 1, method 5005 of MIL-STD-883 shall be omitted.
- c. Unprogrammed devices shall be tested for programmability and ac performance compliance to the requirements of group A, subgroups 9, 10, and 11. Either of two techniques is acceptable:
 - (1) Testing the entire lot using additional built-in test circuitry which allows the manufacturer to verify programmability and ac performance without programming the user array. If this is done, the resulting test patterns shall be verified on all devices during subgroups 9, 10, and 11, group A testing in accordance with the sampling plan specified in MIL-STD-883, method 5005.
 - (2) If such compliance cannot be tested on an unprogrammed device, a sample shall be selected to satisfy programmability requirements prior to performing subgroups 9, 10, and 11. Twelve devices shall be submitted to programming (see 3.2.3.1). If more than 2 devices fail to program, the lot shall be rejected. At the manufacturer's option, the sample may be increased to 24 total devices with no more than 4 total device failures allowable. Ten devices from the programmability sample shall be submitted to the requirements of group A, subgroups 9, 10, and 11. If more than two total devices fail, the lot shall be rejected. At the manufacturer's option, the sample may be increased to 20 total devices with no more than 4 total device failures allowable.

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 3.6 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.

4.4 Programming procedures. The programming procedures shall be as specified by the device manufacturer.

5. PACKAGING

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

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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 Configuration control of SMD's. All proposed changes to existing SMD's will be coordinated with the users of record for the individual documents. This coordination will be accomplished in accordance with MIL-STD-481 using DD Form 1693, Engineering Change Proposal (Short Form).

6.4 Record of users. Military and industrial users shall inform the Defense Electronics Supply Center when a system application requires configuration control and the applicable SMD. DESC will maintain a record of users and this list will be used for coordination and distribution of changes to the drawings. Users of drawings covering microelectronic devices (FSC 5962) should contact DESC-ECS, telephone (513) 296-6022.

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

6.6 Approved sources of supply. Approved sources of supply are listed in MIL-BUL-103. The vendors listed in MIL-BUL-103 have agreed to this drawing and a certificate of compliance (see 3.6 herein) has been submitted to and accepted by DESC-ECS.

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