REVISIONS			
LTR	DESCRIPTION	DATE (YR-MO-DA)	APPROVED
D	Convert to SMD format. Added device type 02. Technical changes to 1.3, 1.4, Table I and Table II. Editorial changes throughout.	92-01-23	

CURRENT CAGE CODE 67268

REV																			
SHEET																			
REV																			
SHEET																			
REV STATUS OF SHEETS	REV	D	D	D	D	D	D	D	D	D	D								
	SHEET	1	2	3	4	5	6	7	8	9	10								

PMIC N/A

STANDARDIZED MILITARY DRAWING

THIS DRAWING IS AVAILABLE FOR USE BY ALL DEPARTMENTS AND AGENCIES OF THE DEPARTMENT OF DEFENSE

AMSC N/A

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DRAWING APPROVAL DATE
77-09-13

REVISION LEVEL D

DEFENSE ELECTRONICS SUPPLY CENTER
DAYTON, OHIO 45444

MICROCIRCUIT, DIGITAL, CMOS, QUAD 2-INPUT AND GATE, MONOLITHIC SILICON

SIZE	CAGE CODE	
A	14933	**77024**

SHEET 1

DESC FORM 193
JUL 91

5962-E462

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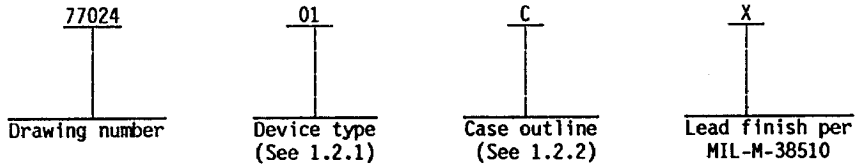
1. SCOPE

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



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

Device type	Generic number	Circuit function
01	4081B	Quad 2-input AND gate
02	4081B	Quad 2-input AND gate

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
C	D-1 (14 lead, .785" X .310" X .200"), dual-in-line package
D	F-2 (14 lead, .390" X .260" X .085"), flat package

1.3 Absolute maximum ratings.

Supply voltage range (V_{DD}) device type 01	-0.5 V to +18 V
Supply voltage range (V_{DD}) device type 02	-0.5 V to +20 V
(voltages refrenced to V_{SS} terminal)	
Input voltage range	-0.5 V to V_{DD} + 0.5 V
Storage temperature range	-65°C to +150°C
Maximum power dissipation, P_D	500 mW 1/
Lead temperature (soldering, 10 seconds)	+260°C
Thermal resistance, junction-to-case (θ_{JC})	See MIL-M-38510, appendix C
Junction temperature (T_J)	+175°C

1.4 Recommended operating conditions.

Supply voltage range (V_{DD}) device type 01	+3.0 V minimum to +15 V maximum
Supply voltage range (V_{DD}) device type 02	+3.0 V minimum to +18 V maximum
Minimum high level input voltage (V_{IH})	+3.5 V at V_{DD} = 5 V
Maximum low level input voltage (V_{IL})	+1.5 V at V_{DD} = 5 V
Case operating temperature range	-55°C to +125°C

1/ For T_A = +100°C, derate linearly at 12 mW/°C to 200 mW.

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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.

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 table. The truth table shall be as specified on figure 2.

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

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.

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TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions $-55°C \le T_C \le +125°C$ unless otherwise specified		Group A subgroups	Device type	Limits		Unit
						Min	Max	
High-level output voltage	V_{OH}	1/ V_{DD} = 5.0 V 1/ V_{DD} = 10 V V_{DD} = 15 V	V_{IN} = 0 or V_{DD}	1,2,3	All	4.95 9.95 14.95		V
Low-level output voltage	V_{OL}	1/ V_{DD} = 5.0 V 1/ V_{DD} = 10 V V_{DD} = 15 V	V_{IN} = V_{DD} or 0	1,2,3	All		0.05 0.05 0.05	V
Low-level input voltage	V_{IL}	V_O = 4.5 or 0.5 V	V_{DD} = 5.0 V	1,2,3	All		1.5	V
		V_O = 9.0 or 1.0 V	V_{DD} = 10 V 1/				3.0	
		V_O = 13.5 or 1.5 V	V_{DD} = 15 V				4.0	
High-level input voltage	V_{IH}	V_O = 4.5 or 0.5 V	V_{DD} = 5.0 V	1,2,3	All	3.5		V
		V_O = 9.0 or 1.0 V	V_{DD} = 10 V 1/			7.0		
		V_O = 13.5 or 1.5 V	V_{DD} = 15 V			11.0		
High-level output current	I_{OH}	V_O = 4.6	V_{DD} = 5.0 V	1,2,3 2/	All	-0.36		mA
		V_O = 9.5	V_{DD} = 10 V			-0.9		
		V_O = 13.5	V_{DD} = 15 V			-2.4		
Low-level output current	I_{OL}	V_{OL} = 0.4	V_{DD} = 5.0 V	1,2,3 2/	All	0.36		mA
		V_{OL} = 0.5	V_{DD} = 10 V			0.9		
		V_{OL} = 1.5	V_{DD} = 15 V			2.4		
Input current	I_{IN}	V_{DD} = 15 V		1,2,3	01		± 1.0	µA
		V_{DD} = 18 V			02		± 1.0	
Input capacitance	C_{IN}	V_{IN} = 0 V	See 4.3.1b	4	All		7.5	pF
Quiescent current	I_{DD}	V_{DD} = 5.0 V 1/ V_{DD} = 10 V 1/ V_{DD} = 15 V 1/		1,2,3	All		7.5 15.0 30.0	µA
		V_{DD} = 20 V 3/		1,2,3	02		150.0	
Functional tests		See 4.3.1c		7,8	All			

See footnotes at end of table

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TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions $-55°C \le T_C \le +125°C$ unless otherwise specified	Group A subgroups	Device type	Limits		Unit
					Min	Max	
Propagation delay time	t_{PHL} t_{PLH}	C_L = 50 pF Min V_{DD} = 5.0 V R_L = 200 kΩ 1/ V_{DD} = 10 V 4/ 1/ V_{DD} = 15 V	9	All		250 120 90	ns
		C_L = 50 pF Min V_{DD} = 5.0 V R_L = 200 kΩ V_{DD} = 10 V 4/ 1/ V_{DD} = 15 V	10,11			375 180 135	
Transition time	t_{THL} t_{TLH}	C_L = 50 pF Min V_{DD} = 5.0 V R_L = 200 kΩ 1/ V_{DD} = 10 V 4/ 1/ V_{DD} = 15 V	9	All		200 100 80	ns
		C_L = 50 pF Min V_{DD} = 5.0 V R_L = 200 kΩ V_{DD} = 10 V 4/ 1/ V_{DD} = 15 V	10,11			300 150 120	

1/ This condition is guranteed if not tested to the specification limits in table I.
2/ This parameter is guranteed if not tested for subgroups 2 and 3.
3/ This parameter is tested at V_{DD} = 18 V for subgroup 3.
4/ See figure 4 for switching waveforms.

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Device type	All
Case outlines	C and D
Terminal number	Terminal symbol
1	A
2	B
3	J
4	K
5	C
6	D
7	V_{SS}
8	E
9	F
10	L
11	M
12	G
13	H
14	V_{DD}

FIGURE 1. Terminal connections.

INPUTS		OUTPUT
A	B	J
L	L	L
H	L	L
L	H	L
H	H	H

FIGURE 2. Truth table.

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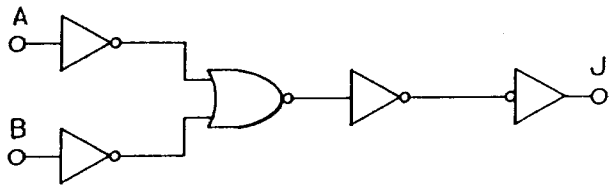
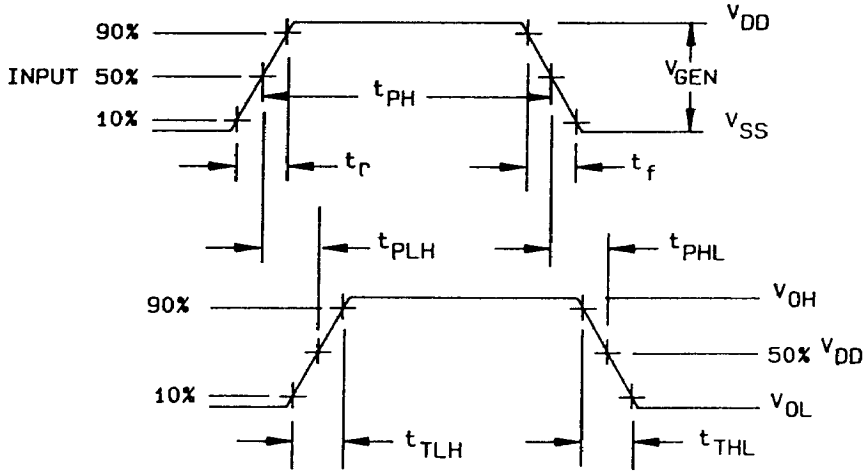


FIGURE 3. Logic Diagram (1 of 4 identical gates).



DYNAMIC TEST WAVEFORMS

Input pulse
$V_{GEN} = V_{DD} \pm 1.0\%$
$t_{PH} = 1.0 \pm 0.1\ \mu s$
$t_r = t_f = 20 \pm 2$ ns
PRR = 200 kHz

FIGURE 4. Switching time waveforms.

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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.

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 3.6 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.

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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, 9
Group A test requirements (method 5005)	1, 2, 3, 4, 7, 8, 9, 10,** 11**
Groups C and D end-point electrical parameters (method 5005)	1, 2, 3

* PDA applies to subgroup 1.
** Subgroups 10 and 11, if not tested, shall be guranteed to the limits specified in table I.

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. Subgroup 4 (C_{IN} measurement) shall be measured only for the initial test and after process or design changes which may affect input capacitance. Capacitance shall be measured between the designated terminal and V_{SS} at a frequency of 1MHz. Test all applicable pins on 5 devices with zero failures.

c. Subgroups 7 and 8 tests shall verify the truth table as shown on figure 2.

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 A, B, C, or D using the circuit submitted with the certificate of compliance (see 3.6 herein).

(2) T_A = +125°C, minimum.

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

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. Replaceability is determined as follows:

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

b. When a QPL source is established, the device specified in this drawing will be replaced by the microcircuit identified as PIN M38510/17001B**.

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 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 microelectronics devices (FSC 5962) should contact DESC-ECS, telephone (513) 296-6021.

6.5 Comments. Comments on this drawing should be directed to DESC-ECS, Dayton, Ohio 45444, or telephone (513) 296-8525.

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-ECC.

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