

REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED
A	<p>Pgs 4, 5: Corrected Table I and deleted some unnecessary testing at 5V/10 V biases.</p> <p>Pg 7: Added Cond. A to Burn-in; separated C_{in} test in 4.4.1.</p> <p>Pg 8: Corrected Table II.</p> <p>Pgs 9, 10: Added Military replacement P/N.</p>	3-17-78	WGB/Hanley
B	<p>Pg 10: Corrected similar vendor type numbers; and complete document editorial revision.</p>	9-28-81	WGB/Hanley
C	Pg 1: Document Inactive	7-20-82	WGB/Hanley

Prepared in accordance with MIL-STD-100

Prepared in accordance with the following:														
REV	C	B	B	B	B		B	B	B	E	B			
PAGE	1	2	3	4	5	6	7	8	9	10	11			
REV STATUS	REV													
OF PAGES	PAGES													
Original Date of Drawing 13 September 1977			PREPARED BY <i>A. J. Foley 6 Sept. 77</i>					DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO						
			CHECKED BY <i>C. R. Jackson 9-12-77</i>					TITLE Microcircuits, Digital, CMOS, HEX Inverter, Monolithic Silicon						
			APPROVED BY <i>W. L. Luck 13 Sep 77</i>											
			SIZE A		CODE IDENT. NO. 14933									
			REV			C		PAGE					1	OF

5962-

1. SCOPE

1.1 Scope. This drawing describes the requirements for monolithic silicon, low-power CMOS, Hex Inverter microcircuits. This drawing provides for a level of microcircuit quality and reliability assurance for procurement of microcircuits in accordance with MIL-M-38510.

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

77027	01	C	X
┆	┆	┆	┆
┆	┆	┆	┆
┆	┆	┆	┆
┆	┆	┆	┆
Drawing number	Device type (1.2.1)	Case outline (1.2.2)	Lead finish (3.3)

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

Device type	Generic number	Circuit
01	CD4069UB	Hex Inverter

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

Outline letter	Case outline
C	D-1 (14 Lead 1/4" x 3/4", dual-in-line pack)
D	F-2 (14 Lead 1/4" x 3/8", flat-pack)

1.3 Absolute maximum ratings.

Supply voltage range - - - - -	-0.5 to +18 Vdc
Input voltage range- - - - -	-0.5 to V_{DD} +0.5 Vdc
Storage temperature range- - - - -	-65°C to +150°C
Maximum power dissipation, P_D 1/ - - - - -	500 mWdc 2/
Thermal resistance, junction to case - - - - -	θ_{JC} = 0.09°C/mW for flat pack 0.08°C/mW for dual-in-line
Lead temperature (soldering, 10 seconds) - - - - -	+300°C
Junction temperature - - - - -	T_J = +175°C

1.4 Recommended operating conditions.

Supply voltage - - - - -	+3.0 Vdc minimum to +18 Vdc maximum
Case operating temperature range - - - - -	-55°C to +125°C

1/ Must withstand the added P_D due to short circuit test (e.g., I_{OS}) at one output for 5 seconds.

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2. APPLICABLE DOCUMENTS

2.1 Issues of documents. The following documents, of the issue in effect on date of invitation for bids or request for proposal, 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 specifications, standards, drawings, and publications required by contractors in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

3. REQUIREMENTS

3.1 Item requirements. The individual item requirements shall be in accordance with MIL-M-38510, 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 Design documentation. The design documentation shall be in accordance with MIL-M-38510 and, unless otherwise specified in the contract or purchase order, shall be retained by the manufacturer but be available for review by the procuring activity or contractor upon request.

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

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

3.3 Lead material and finish. The lead material and finish shall be in accordance with MIL-M-38510.

3.4 Electrical performance characteristics. The electrical performance characteristics are as specified in table 1 and apply over the full recommended case operating temperature range, unless otherwise specified.

3.5 Marking. Marking shall be in accordance with MIL-M-38510 except the part number shall be in accordance with 1.2 herein. The Vendor Similar Part Number may also be marked in accordance with 6.8 herein. Both part numbers, when used, shall be printed on the same surface. The "M38510/XXXXY" part number and the "JAN" or "J" mark shall not be used. Lead finish letter "X" is used only as specified in MIL-M-38510 and shall not be marked on the microcircuit or its packaging. The country of origin shall be marked on the microcircuit.

3.6 Quality assurance requirements. Microcircuits furnished under this drawing shall have been subjected to, and passed all the requirements, tests, and inspections detailed herein including screening and quality conformance inspections.

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TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions -55°C < T _C < 125°C, unless otherwise specified	Group A subgroups	Limits		Unit
				Min	Max	
High-level output voltage	V _{OH}	V _{DD} = 15 Vdc, V _{IN} = 0 or V _{DD}	1,2,3	14.95	---	V
Low-level output voltage	V _{OL}	V _{DD} = 15 Vdc, V _{IN} = V _{DD} or 0	1,2,3	---	.05	V
Low-level input voltage	V _{IL}	V _O = 3.6 or 1.4 Vdc; V _{DD} = 5 Vdc	1,2,3	---	1.5	V
		V _O = 11.5 or 3.5 Vdc; V _{DD} = 15 Vdc		---	4.0	
High-level input voltage	V _{IH}	V _O = 1.4 or 3.6 Vdc; V _{DD} = 5 Vdc	1,2,3	3.5	---	V
		V _O = 3.5 or 11.5 Vdc; V _{DD} = 15 Vdc		11.0	---	
High-level output current (source)	I _{OH}	V _{OH} = 4.6 Vdc; V _{DD} = 5 Vdc	1,2,3	-0.36	---	mA
		V _{OH} = 13.5 Vdc; V _{DD} = 15 Vdc		-2.4	---	
Low-level output current (sink)	I _{OL}	V _{OL} = 0.4 Vdc; V _{DD} = 5 Vdc	1,2,3	0.36	---	mA
		V _{OL} = 1.5 Vdc; V _{DD} = 15 Vdc		2.4	---	
Input current	I _{IN}	V _{DD} = 15 Vdc	1,2,3	---	±1.0	μA
Input capacitance	C _{IN}	V _{IN} = 0; T _C = 25°C	4	---	7.5	pF
Quiescent current	I _{DD}	V _{DD} = 15 Vdc	1,2,3	---	40	μA

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TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions -55°C < T _C < 125°C, unless otherwise specified	Group A subgroups	Limits		Unit
				Min	Max	
Propagation delay time	t _{PHL}	(C _L = 50 pF ±10%, R _L = 200 kΩ)	9	---	125	ns
	t _{PLH}	V _{DD} = 5 Vdc V _{DD} = 10 Vdc V _{DD} = 15 Vdc T _C = 25°C		---	80 60	
		V _{DD} = 5 Vdc V _{DD} = 10 Vdc V _{DD} = 15 Vdc T _C = -55°C, 125°C	10,11	---	190 120 90	ns
Transition time	t _{THL}	V _{DD} = 5 Vdc V _{DD} = 10 Vdc V _{DD} = 15 Vdc T _C = 25°C	9	---	200 100 80	ns
	t _{TLH}	V _{DD} = 5 Vdc V _{DD} = 10 Vdc V _{DD} = 15 Vdc T _C = 25°C		---	100 80	
		V _{DD} = 5 Vdc V _{DD} = 10 Vdc V _{DD} = 15 Vdc T _C = -55°C, 125°C	10,11	---	300 150 120	ns

3.6.1 Screening. Screening shall be in accordance with method 5004, class B, of MIL-STD-883 and 4.2 herein. The 100-percent final electrical screening for off-the-shelf devices shall consist of the normal 100 percent dc tests at 25°C with a percent defective allowable (PDA) of 10, high and low temperature dc tests, and 25°C ac tests followed by normal sampling and lot tolerance percent defectives (LTPD's) at group A lot acceptance.

3.6.2 Qualification. Qualification inspection for the device type(s) specified herein shall not be required.

3.6.3 Quality conformance inspection. Quality conformance inspection shall be in accordance with MIL-M-38510 and 4.4 herein.

3.7 Manufacturer eligibility. To be eligible to supply microcircuits to this drawing, a manufacturer shall have manufacturer certification in accordance with MIL-M-38510 for at least one line and have PART I listing on Qualified Products List QPL-38510 for at least one device type (not necessarily the one for which the procurement of this drawing is to apply).

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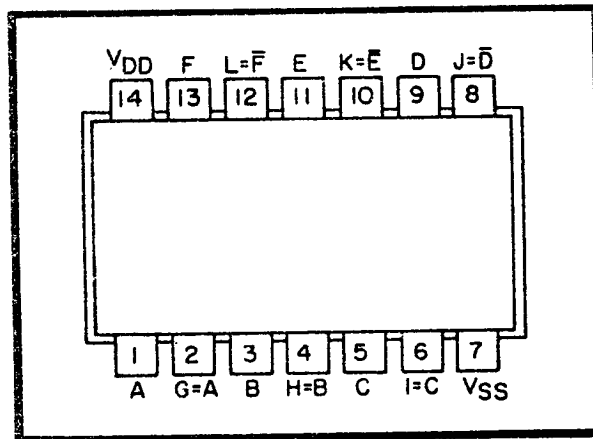
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Device type 01



Cases C and D

FIGURE 1. Terminal connections (top view).

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4. QUALITY ASSURANCE PROVISIONS

4.1 Sampling and inspection. Sampling and inspection procedures shall be in accordance with MIL-M-38510 and method 5005 of MIL-STD-883, except as modified 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, D or E.
 - (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.
- c. The PDA is specified as 10 percent based on failures from group A, subgroup 1, tests after cooldown as the final electrical test in accordance with method 5004 of MIL-STD-883, and with no intervening electrical measurements. If interim electrical parameter tests are performed prior to burn-in, failures resulting from pre burn-in screening may be excluded from the PDA. If interim electrical parameter tests prior to burn-in are omitted, then all screening failures shall be included in the PDA. The verified failures of group A, subgroup 1, after burn-in divided by the total number of devices submitted for burn-in in that lot shall be used to determine the percent defective for the lot.

4.3 Qualification inspection. Qualification inspection for the device type(s) specified herein shall not be required.

4.4 Quality conformance inspection. Quality conformance inspection shall be in accordance with MIL-M-38510. Group A inspection shall be performed on each lot. Manufacturers shall keep lot records for 3 years (minimum), monitor for compliance to the prescribed procedures, and observe that satisfactory manufacturing conditions and records on lots are maintained for these devices. The records, including as a minimum an attributes summary of all screening and quality conformance inspections conducted on each lot, shall be available for review by the customer at all times.

4.4.1 Group A inspection. Group A inspection shall consist of the test subgroups and LTPD values shown in table I of method 5005 of MIL-STD-883, class B, and as follows:

- a. Tests shall be as specified in table II herein.
- b. Subgroups 5, 6, 7, and 8 of table I of method 5005 of MIL-STD-883 shall be omitted.
- c. Subgroup 4 (C_{IN} measurement) shall be measured only after process or design changes which may affect input capacitance. Generic test data (6.5) may be used to satisfy the subgroup 4 requirement.

4.4.2 Group B inspection. Group B inspection shall consist of the test subgroups and LTPD values shown in table IIB of method 5005 of MIL-STD-883, class B.

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4.4.3 Groups C and D inspections. Groups C and D inspections shall be as specified in method 5005 of MIL-STD-883, Class B. The frequency of testing and the sample size shall be in accordance with MIL-M-38510. Generic test data (see 6.5) may be used to satisfy the requirements for 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, D or E.

(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.

c. Subgroups 3 and 4 shall be added to the group C inspection requirements and shall consist of the tests, conditions, and limits specified for subgroups 10 and 11 of group A.

4.5 Inspection of packaging. Inspection of packaging shall be in accordance with MIL-M-38510.

TABLE II. Electrical test requirements.

MIL-STD-883 test requirements	Subgroups (per method 5005, table I)
Interim electrical parameters (pre burn-in) (method 5004)	---
Final electrical test parameters (method 5004)	1*,2,3,9
Group A test requirements (method 5005)	1,2,3,4,9
Groups C and D end-point electrical parameters (method 5005)	1,2,3
Additional electrical subgroups for group C periodic inspections	10,11

*PDA applies to subgroup 1 (see 4.2c).

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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 Notes. Only 6.4 of the notes specified in MIL-M-38510 shall apply to this drawing.

6.2 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. This drawing is intended exclusively to prevent the proliferation of unnecessary duplicate specifications, drawings, and stock catalog listings. When a military specification exists and the product covered by this drawing has been qualified for listing on QPL-38510, this drawing becomes obsolete and will not be used for new design. The QPL-38510 product shall be the preferred item for all applications.

6.3 Ordering data. The contract or purchase order should specify the following:

- a. Complete part number (see 1.2).
- b. Requirements for delivery of one copy of the quality conformance inspection data pertinent to the device inspection lot to be supplied with each shipment by the device manufacturer, if applicable.
- c. Requirements for certificate of compliance, if applicable.
- d. Requirements for notification of change of product or process to procuring activity, if applicable.
- e. Requirements for packaging and packing.
- f. Requirements for special carriers, lead lengths, or lead forming, if applicable. These requirements shall not affect the part number. Unless otherwise specified, these requirements will not apply to direct shipment to the Government.

6.4 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 part numbered device specified in this drawing will be replaced by the microcircuit identified as part number M38510/17401B---

6.5 Generic test data. Generic test data may be used to satisfy the requirements of 4.4.1(c) and 4.4.3. Generic test data is defined as test data from devices manufactured during the same time period, by means of the same production technique, materials, controls and design, and in the same microcircuit group (see 3.1.3 of MIL-M-38510) as the deliverable devices. The same time period shall be interpreted as covering a maximum span of 180 days between the generic test sample fabrication and the fabrication of deliverable devices. The vendor is required to retain generic data for a period of not less than 36 months from the date of shipment.

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

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6.7 Handling. MOS devices must be handled with certain precautions to avoid damage due to accumulation of static charge. Input protection devices have been designed in the chip to minimize the effect of this static buildup. However, the following handling practices are recommended:

- a. Devices should be handled on benches with conductive and grounded surfaces.
- b. Ground test equipment and tools.
- c. Do not handle devices by the leads.
- d. Store devices in conductive foam or carriers.
- e. Avoid use of plastic, rubber, or silk in MOS areas.
- f. Maintain relative humidity above 50 percent, if practical.

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6.8 Suggested sources of supply. Suggested sources of supply are listed herein. Additional sources will be added as they become available.

DESC drawing part number	Vendor FSCM number	Vendor similar part number	Replacement military specification part number
7702701CX	07263 04713 27014 18714 01295	4069UBDMQB* 4069UBCXS CD4069UBMD CD4069UBD/3 TFC4069UBBJ	M38510/17401BCX
7702701DX	07263 27014 18714	4069UBFMQB* CD4069UBMW CD4069UBK/3	M38510/17401BDX

Vendor FSCM number	Vendor name and address
07263	Fairchild Semiconductor 464 Ellis Street Mountain View, CA 94040
04713	Motorola, Incorporated Semiconductor Products Division Integrated Circuits Center P.O. Box 20906 Phoenix, AZ 85036
27014	National Semiconductor Corporation 2900 Semiconductor Drive Santa Clara, CA 95051
18714	RCA Corporation Solid State Division Route 202 Somerville, NJ 08876
01295	Texas Instruments, Inc. P. O. Box 6448 Midland, TX 79701

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