REVISIONS

LTR	DESCRIPTION	DATE (YR-MO-DA)	APPROVED
D	Add vendor CAGE 34371. Add device type 02. Delete vendors CAGE 07263 and 31019. Change drawing CAGE code to 67268. Technical changes to 1.3, 1.4, table I, and table II.	90 MAR 30	

CURRENT CAGE CODE 67268

REV													
SHEET													
REV													
SHEET													
REV STATUS OF SHEETS	REV	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

PMIC N/A	PREPARED BY Marcia B Kelleher	DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444
STANDARDIZED MILITARY DRAWING	CHECKED BY Thomas J. Ricciuti	MICROCIRCUITS, DIGITAL, CMOS, QUAD 2-INPUT NAND GATE WITH SCHMITT TRIGGERS, MONOLITHIC SILICON
THIS DRAWING IS AVAILABLE FOR USE BY ALL DEPARTMENTS AND AGENCIES OF THE DEPARTMENT OF DEFENSE	APPROVED BY	
	DRAWING APPROVAL DATE 6 OCTOBER 1977	SIZE A | CAGE CODE 14933 | 77046
AMSC N/A	REVISION LEVEL D	SHEET 1 OF

DESC FORM 193-1
SEP 87

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5962-E1415

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

77046	01	C	X
Drawing number	Device type (1.2.1)	Case outline (1.2.2)	Lead finish per MIL-M-38510

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

Device type	Generic number	Circuit function
01	4093B	Quad 2-input NAND gate with Schmitt triggers
02	4093B	Quad 2-input NAND gate with Schmitt triggers

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
C	D-4 (14-lead, .785" x .310" x .200"), dual-in-line package
D	F-4 (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 dc to +18 V dc 1/
Supply voltage range (V_{DD}), Device type 02	-0.5 V dc to +20 V dc 1/
Input voltage range	-0.5 V dc to V_{DD} +0.5 V dc
DC input current	±10 mA
Storage temperature range	-65°C to +150°C
Maximum power dissipation (P_D)	500 mW dc 2/
Lead temperature (soldering, 10 seconds)	+300°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 dc to +15 V dc
Supply voltage range (V_{DD}), Device type 02	+3.0 V dc to +18 V dc
Case operating temperature range (T_C)	-55°C to +125°C
Maximum low level input voltage (V_{IL}):	
V_{DD} = 5 V dc	1.5 V dc
V_{DD} = 15 V dc	4.0 V dc
Minimum high level input voltage (V_{IH}):	
V_{DD} = 5 V dc	3.5 V dc
V_{DD} = 15 V dc	11.0 V dc

1/ Supply voltages are referenced to the V_{SS} terminal.
2/ For T_C = +100°C to +125°C, derate linearly at 12 mW/°C to 200 mW.

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

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

3.2.3 Case outlines. The case outlines shall be in accordance with 1.2.2 herein.

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

TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions $-55^\circ C \le T_C \le +125^\circ C$ unless otherwise specified		Device types	Group A subgroups	Limits		Unit
						Min	Max	
Quiescent supply current	I_{DD}	V_{DD} = 5 V, 1/ V_{IN} = 0.0 V or V_{DD}		All	1, 3		1	µA
					2		30	
		V_{DD} = 10 V, 1/ V_{IN} = 0.0 V or V_{DD}		All	1, 3		2	
					2		60	
		V_{DD} = 15 V, 1/ V_{IN} = 0.0 V or V_{DD}		All	1, 3		4	
					2		120	
		V_{DD} = 20 V, 2/ V_{IN} = 0.0 V or V_{DD}		02	1, 3		20	
					2		600	
Low level output voltage	V_{OL}	V_{IN} = 0.0 V or V_{DD}, $\lvert I_O \rvert$ < 1 µA	V_{DD} = 5 V 3/	All	1, 2, 3		0.05	V
			V_{DD} = 10 V 3/	All	1, 2, 3		0.05	
			V_{DD} = 15 V	All	1, 2, 3		0.05	
High level output voltage	V_{OH}	V_{IN} = 0.0 V or V_{DD}, $\lvert I_O \rvert$ < 1 µA	V_{DD} = 5 V 3/	All	1, 2, 3	4.95		V
			V_{DD} = 10 V 3/	All	1, 2, 3	9.95		
			V_{DD} = 15 V	All	1, 2, 3	14.95		

See footnotes at end of table.

TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions $-55^{\circ}C \leq T_C \leq +125^{\circ}C$ unless otherwise specified	Device types	Group A subgroups	Limits Min	Limits Max	Unit
Low level output current	I_{OL}	V_{DD} = 5 V, V_O = 0.4 V, V_{IN} = 0.0 V or V_{DD}	All	1	0.51		mA
				2	0.36		
				3	0.64		
		V_{DD} = 10 V, 3/ V_O = 0.5 V, V_{IN} = 0.0 V or V_{DD}	All	1	1.3		
				2	0.9		
				3	1.6		
		V_{DD} = 15 V, 3/ V_O = 1.5 V, V_{IN} = 0.0 V or V_{DD}	All	1	3.4		
				2	2.4		
				3	4.2		
High level output current	I_{OH}	V_{DD} = 5 V, V_O = 4.6 V, V_{IN} = 0.0 V or V_{DD}	All	1	-0.51		mA
				2	-0.36		
				3	-0.64		
		V_{DD} = 5 V, V_O = 2.5 V, V_{IN} = 0.0 V or V_{DD}	02	1	-1.6		
				2	-1.15		
				3	-2.0		
		V_{DD} = 10 V, 3/ V_O = 9.5 V, V_{IN} = 0.0 V or V_{DD}	All	1	-1.3		
				2	-0.9		
				3	-1.6		
		V_{DD} = 15 V, 3/ V_O = 13.5 V, V_{IN} = 0.0 V or V_{DD}	All	1	-3.4		
				2	-2.4		
				3	-4.2		
Input current	I_{IN}	V_{DD} = 15 V, V_{IN} = 0.0 V or V_{DD}	01	1, 3		±0.1	µA
				2		±1.0	
		V_{DD} = 20 V, 2/ V_{IN} = 0.0 V or V_{DD}	02	1, 3		±0.1	
				2		±1.0	

See footnotes at end of table.

TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions $-55^{\circ}C \leq T_C \leq +125^{\circ}C$ unless otherwise specified	Device types	Group A subgroups	Limits Min	Limits Max	Unit
Positive trigger threshold voltage	V_{T+}	$V_{DD} = 5$ V, $V_O = 0.5$ V, $\lvert I_O \rvert < 1$ µA	All	1, 2, 3	2.2	3.65	V
		$V_{DD} = 10$ V, $V_O = 1.0$ V, $\lvert I_O \rvert < 1$ µA	All	1, 2, 3	4.6	7.15	
		$V_{DD} = 15$ V, $V_O = 1.5$ V, $\lvert I_O \rvert < 1$ µA	All	1, 2, 3	6.8	10.8	
Negative trigger threshold voltage	V_{T-}	$V_{DD} = 5$ V, $V_O = 4.5$ V, $\lvert I_O \rvert < 1$ µA	All	1, 2, 3	0.9	2.80	V
		$V_{DD} = 10$ V, $V_O = 9.0$ V, $\lvert I_O \rvert < 1$ µA	All	1, 2, 3	2.5	5.20	
		$V_{DD} = 15$ V, $V_O = 13.5$ V, $\lvert I_O \rvert < 1$µ A	All	1, 2, 3	4.0	7.40	
Input capacitance	C_{IN}	$V_{IN} = 0$ V, $T_C = +25^{\circ}C$, See 4.3.1c	All	4		7.5	pF
Functional test		See 4.3.1.d	All	7			

See footnotes at end of table.

TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions $-55^\circ C \leq T_C \leq +125^\circ C$ unless otherwise specified		Device types	Group A subgroups	Limits		Unit
						Min	Max	
Propagation delay time	t_{PHL}, t_{PLH}	R_L = 200 kΩ, C_L = 50 pF, $t_r = t_f$ = 20 ns, See figure 3	V_{DD} = 5 V	01	9	1.5	600	ns
					10, 11	1.5	840	
				02	9	1.5	380	
					10, 11	1.5	494	
			V_{DD} = 10 V	01	9	1.5	300	
					10, 11	1.5	420	
				02	9	1.5	180	
					10, 11	1.5	234	
			V_{DD} = 15 V	01	9	1.5	240	
					10, 11	1.5	335	
				02	9	1.5	130	
					10, 11	1.5	169	
Transition time	t_{THL}, t_{TLH}	R_L = 200 kΩ C_L = 50 pF, $t_r = t_f$ = 20 ns, See figure 3	V_{DD} = 5 V	01	9	1.5	200	
					10, 11	1.5	300	
				02	9	1.5	200	
					10, 11	1.5	260	
			V_{DD} = 10 V	02	9	1.5	100	
					10, 11	1.5	130	
			V_{DD} = 15 V	02	9	1.5	80	
					10, 11	1.5	104	

1/ For device type 02, this parameter is guaranteed, if not tested, to the specified limits in table I.
2/ This test is performed with V_{DD} = 18 V. T_C = -55°C.
3/ This parameter is guaranteed, if not tested, to the specified limits in table I.

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Device types	01 and 02
Case outlines	C and D
Terminal number	Terminal symbol
1	1A
2	1B
3	1Y
4	2Y
5	2A
6	2B
7	V_{SS}
8	3A
9	3B
10	3Y
11	4Y
12	4A
13	4B
14	V_{DD}

FIGURE 1. Terminal connections.

Input		Output
A	B	Y
L	L	H
L	H	H
H	L	H
H	H	L

H = High voltage level
L = Low voltage level

FIGURE 2. Truth table.

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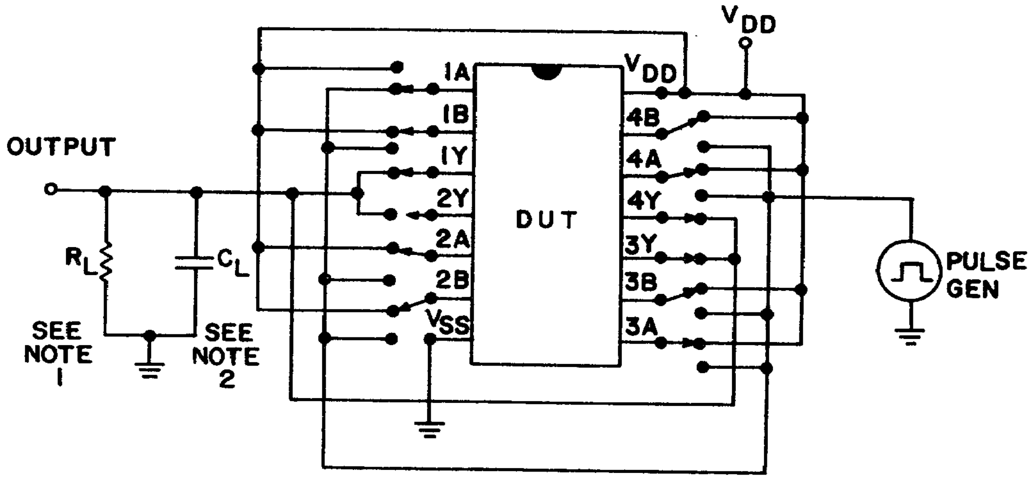
Device types 01 and 02



NOTES:
1. R_L = 200 kΩ.
2. C_L = 50 pF, includes probe and jig capacitance.

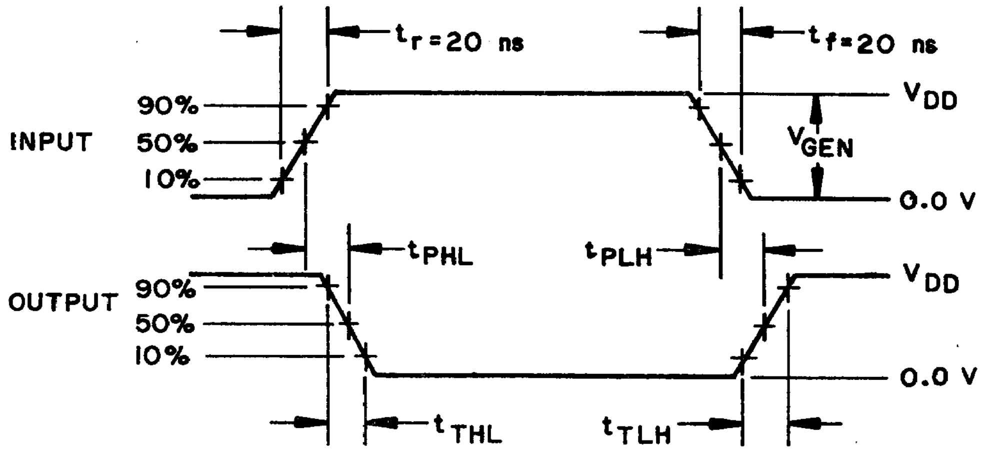


FIGURE 3. Test circuit and switching waveforms.

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		REVISION LEVEL D	SHEET 9

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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 part number listed in 1.2 herein. In addition, the manufacturer's part number 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 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.

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 and 6 in table I, method 5005 of MIL-STD-883 shall be omitted.

c. Subgroup 4 (C_{IN} measurement) shall be measured only for the initial test and after process or design changes which may affect capacitance. Test all applicable pins on five devices with zero failures.

d. Subgroup 7 and 8 tests shall verify the truth table as specified on figure 2.

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
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 guaranteed to the specified limits in table I.

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

(2) $T_A = +125^\circ C$, 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.

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.

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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 is established, the part numbered device specified in this drawing will be replaced by the microcircuit identified as part number M38510/177001B--.

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. The 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) 296-6022.

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

6.6 Approved sources of supply. Approved sources of supply are listed in MIL-BUL-103. Additional sources will be added to MIL-BUL-103 as they become available. 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. The approved sources of supply listed below are for information purposes only and are current only to the date of the last action of this document.

Military drawing part number	Vendor CAGE number	Vendor similar part number 1/	Replacement military specification part number
7704601CX	27014	CD4093BMD/883	M38510/17701BCX
7704601DX	27014	CD4093BMW/883	M38510/17701BDX
7704602CX	34371	CD4093BF/3A	M38510/17701BCX

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
34371	Harris Semiconductor 200 Palm Bay Boulevard P.O. Box 883 Melbourene FL 32901
27014	National Semiconductor P. O. Box 58090 Santa Clara, CA 95052-8090 Point of contact: 333 Western Avenue South Portland, ME 04106

DESC FORM 193A
SEP 87

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