REVISIONS			
LTR	DESCRIPTION	DATE (YR-MO-DA)	APPROVED
A	Change ac limits in table I. Add vendor CAGE 18714 to device type 01CX. Editorial changes throughout.	87 NOV 18	M.A. Frye
B	Add device type 02, add case outline E and CAGE code 01295. Made editorial changes throughout document.	89 OCT 2	M.A. Frye

CURRENT CAGE CODE 67268

REV																								
SHEET																								
REV																								
SHEET																								
REV STATUS OF SHEETS	REV	B	B	B	B	B	B	B	B	B	B	B	B											
	SHEET	1	2	3	4	5	6	7	8	9	10	11	12											

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

PREPARED BY: Larry T. Wander

CHECKED BY: Monica L. Poelking

APPROVED BY: Michael A. Frye

DRAWING APPROVAL DATE: 27 MAY 1987

REVISION LEVEL: B

DEFENSE ELECTRONICS SUPPLY CENTER
DAYTON, OHIO 45444

MICROCIRCUITS, DIGITAL, ADVANCED CMOS
QUAD TWO-INPUT AND GATE, MONOLITHIC SILICON

SIZE	CAGE CODE	
A	14933	5962-87615

SHEET 1 OF 13

DESC FORM 193-1
SEP 87

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

5962-E1392

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

Powered by ICminer.com Electronic-Library Service CopyRight 2003

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:

5962-87615	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	54AC08	Quad two-input AND gate
02	54AC11008	Quad two-input AND gate

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-1 (14-lead, .785" x .310" x .200"), dual in line package
D	F-2 (14-lead, .390" x .260" x .085"), flat package
E	D-2 (16-lead, .840" x .310" x .200"), dual in line package
2	C-2 (20-terminal, .358" x .358" x .100"), square chip carrier package

1.3 Absolute maximum ratings.

Supply voltage range 1/	-0.5 V dc to +6.0 V dc
DC input voltage range 1/	-0.5 V dc to V_{CC} + 0.5 V dc
DC output voltage range 1/	-0.5 V dc to V_{CC} + 0.5 V dc
Clamp diode current	±20 mA
DC output current (per pin)	±50 mA
DC V_{CC} or GND current	±100 mA
Storage temperature range	-65°C to +150°C
Maximum power dissipation (P_D)	500 mW
Lead temperature (soldering, 10 seconds)	+260°C
Thermal resistance, junction-to-case (θ_{JC})	See MIL-M-38510, appendix C
Junction temperature (T_J) 2/	+175°C

1/ Unless otherwise specified, all voltages are referenced to GND.

2/ Maximum junction temperature shall not be exceeded except for allowable short duration burn-in screening conditions per method 5004 of MIL-STD-883.

Powered by ICminer.com Electronic-Library Service CopyRight 2003

1.4 Recommended operating conditions.

Supply voltage range (V_{CC}) 3/	+3.0 V dc to +5.5 V dc
Input voltage range	0.0 V dc to V_{CC}
Output voltage range	0.0 V dc to V_{CC}
Case operating temperature range (T_C)	-55°C to +125°C
Input rise of fall times range:	
V_{CC} = 3.6 V, 5.5 V	0 to 8 ns/V

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/ Operation from 2.0 V dc to 3.0 V dc is provided for compatibility with data retention and battery backup systems. Data retention implies no input transitions and no stored data loss with the following conditions: $V_{IH} \geq 70\%\ V_{CC}$, $V_{IL} \leq 30\%\ V_{CC}$, $V_{OH} \geq 70\%\ V_{CC}$ at -20 µA, $V_{OL} \leq 30\%\ V_{CC}$ at +20 µA.

Powered by ICminer.com Electronic-Library Service CopyRight 2003

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 Test circuit and switching waveforms. The test circuit and switching waveforms 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 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 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.

Powered by ICminer.com Electronic-Library Service CopyRight 2003

TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions $-55°C \le T_C \le +125°C$ unless otherwise specified		Group A subgroups	Limits		Unit
					Min	Max	
High level output voltage	V_{OH}	$V_{IN} = V_{IH}$ minimum or V_{IL} maximum $I_{OH} = -50\ \mu A$ 1/	$V_{CC} = 3.0$ V	1, 2, 3	2.9		V
			$V_{CC} = 4.5$ V		4.4		
			$V_{CC} = 5.5$ V		5.4		
		$V_{IN} = V_{IH}$ minimum or V_{IL} maximum $I_{OH} = -4$ mA 1/	$V_{CC} = 3.0$ V		2.4		
		$V_{IN} = V_{IH}$ minimum or V_{IL} maximum $I_{OH} = -24$ mA 1/	$V_{CC} = 4.5$ V		3.7		
			$V_{CC} = 5.5$ V		4.7		
		$V_{IN} = V_{IH}$ minimum or V_{IL} maximum $I_{OH} = -50$ mA 1/	$V_{CC} = 5.5$ V		3.85		
Low level output voltage	V_{OL}	$V_{IN} = V_{IH}$ minimum or V_{IL} maximum $I_{OL} = 50\ \mu A$ 1/	$V_{CC} = 3.0$ V	1, 2, 3		0.1	V
			$V_{CC} = 4.5$ V			0.1	
			$V_{CC} = 5.5$ V			0.1	
		$V_{IN} = V_{IH}$ minimum or V_{IL} maximum $I_{OL} = 12$ mA 1/	$V_{CC} = 3.0$ V			0.5	
		$V_{IN} = V_{IH}$ minimum or V_{IL} maximum $I_{OL} = 24$ mA 1/	$V_{CC} = 4.5$ V			0.5	
			$V_{CC} = 5.5$ V			0.5	
		$V_{IN} = V_{IH}$ minimum or V_{IL} maximum $I_{OL} = 50$ mA 1/	$V_{CC} = 5.5$ V			1.65	

See footnotes at end of table.

Powered by ICminer.com Electronic-Library Service CopyRight 2003

TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions $-55°C \le T_C \le +125°C$ unless otherwise specified		Group A subgroups	Limits Min	Limits Max	Unit
High level input voltage	V_{IH}	2/	V_{CC} = 3.0 V		2.1		V
			V_{CC} = 4.5 V		3.15		
			V_{CC} = 5.5 V		3.85		
Low level input voltage	V_{IL}	2/	V_{CC} = 3.0 V			0.9	V
			V_{CC} = 4.5 V			1.35	
			V_{CC} = 5.5 V			1.65	
Input leakage current	I_{IL}	V_{IN} = 0.0 V	V_{CC} = 5.5 V	1, 2, 3		-1.0	µA
	I_{IH}	V_{IN} = 5.5 V				1.0	
Quiescent current	I_{CCH}	V_{IN} = V_{CC} or GND V_{CC} = 5.5 V		1, 2, 3		80	µA
	I_{CCL}					80	
Input capacitance	C_{IN}	See 4.3.1c		4		10	pF
Power dissipation capacitance	C_{PD}	See 4.3.1c 3/		4		50	pF
Functional tests		Tested at V_{CC} = 3.0 V and repeated at V_{CC} = 5.5 V See 4.3.1d.		7, 8			
Propagation delay time, A, B to Y	t_{PHL}, t_{PLH}	C_L = 50 pF R_L = 500Ω See figure 3	V_{CC} = 3.0 V	9 10, 11	1.0 1.0	10.0 12.5	ns
			V_{CC} = 4.5 V	9 10, 11	1.0 1.0	7.5 9.0	

See footnotes on next page.

Powered by ICminer.com Electronic-Library Service CopyRight 2003

1/ V_{OH} and V_{OL} tests will be tested at V_{CC} = 3.0 V and V_{CC} = 4.5 V. V_{OH} and V_{OL} tests will be guaranteed if not tested to V_{CC} 5.5 V. Limits shown apply to operation at V_{CC} = 3.3 V ±0.3 V and V_{CC} = 5.0 V ±0.5 V. Tests with output current at ±50 mA are performed on only one output at a time and the duration of the test shall not exceed 10 milliseconds.

2/ V_{IH} and V_{IL} tests are not required; V_{IH} and V_{IL} shall be applied as forcing functions for the V_{OH} and V_{OL} tests.

3/ Power dissipation capacitance (C_{PD}), determines the dynamic power consumption, $P_D = (C_{PD} + C_L) V_{CC}^2 f + I_{CC} V_{CC}$, and the dynamic current consumption (I_S) is, $I_S = (C_{PD} + C_L) V_{CC} f + I_{CC}$.

4/ AC limits at V_{CC} = 5.5 V are equal to limits at V_{CC} = 4.5 V and guaranteed by testing at V_{CC} = 4.5 V. Minimum ac limits are guaranteed for V_{CC} = 5.5 V by guardbanding V_{CC} = 4.5 V limits to 1.5 ns (minimum). AC testing at V_{CC} = 3.0 V shall be guaranteed, if not tested, to the specified parameters in table I.

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.

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} and C_{PD} measurements) 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. Subgroups 7 and 8 tests shall verify the truth table specified on figure 2.

Powered by ICminer.com Electronic-Library Service CopyRight 2003

Device types	01		02	
Case outlines	C and D	2	E	2
Terminal number	Terminal symbol			
1	1A	NC	1A	NC
2	1B	1A	1Y	V_{CC}
3	1Y	1B	2Y	2B
4	2A	1Y	GND	2A
5	2B	NC	GND	1B
6	2Y	2A	3Y	NC
7	GND	NC	4Y	1A
8	3Y	2B	4B	1Y
9	3A	2Y	4A	2Y
10	3B	GND	3B	GND
11	4Y	NC	3A	NC
12	4A	3Y	V_{CC}	GND
13	4B	3A	V_{CC}	3Y
14	V_{CC}	3B	2B	4Y
15	---	NC	2A	4B
16	---	4Y	1B	NC
17	---	NC	---	4A
18	---	4A	---	3B
19	---	4B	---	3A
20	---	V_{CC}	---	V_{CC}

NC = No connection

FIGURE 1. Terminal connections.

☆ U. S. GOVERNMENT PRINTING OFFICE: 1988—549-904

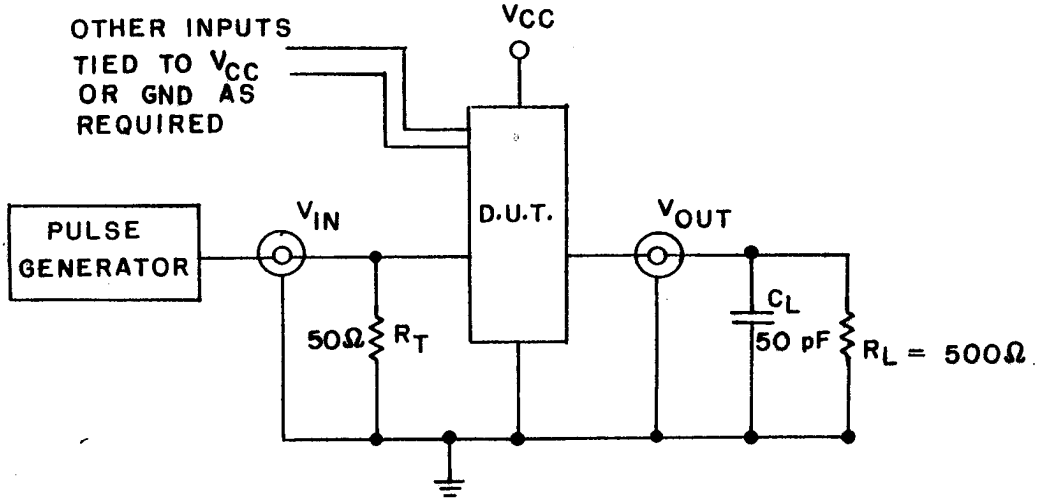
Powered by ICminer.com Electronic-Library Service CopyRight 2003

Inputs		Output
A	B	Y
L	L	L
H	L	L
L	H	L
H	H	H

H = High voltage level
L = Low voltage level

FIGURE 2. Truth table (each gate).

Powered by ICminer.com Electronic-Library Service CopyRight 2003



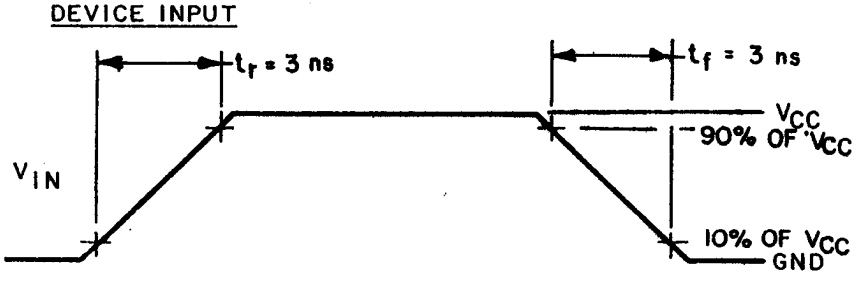


FIGURE 3. Test circuit and switching waveforms.

STANDARDIZED MILITARY DRAWING DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	SIZE A		5962-87615
		REVISION LEVEL B	SHEET 10

☆ U. S. GOVERNMENT PRINTING OFFICE: 1988—550-547

Powered by ICminer.com Electronic-Library Service CopyRight 2003

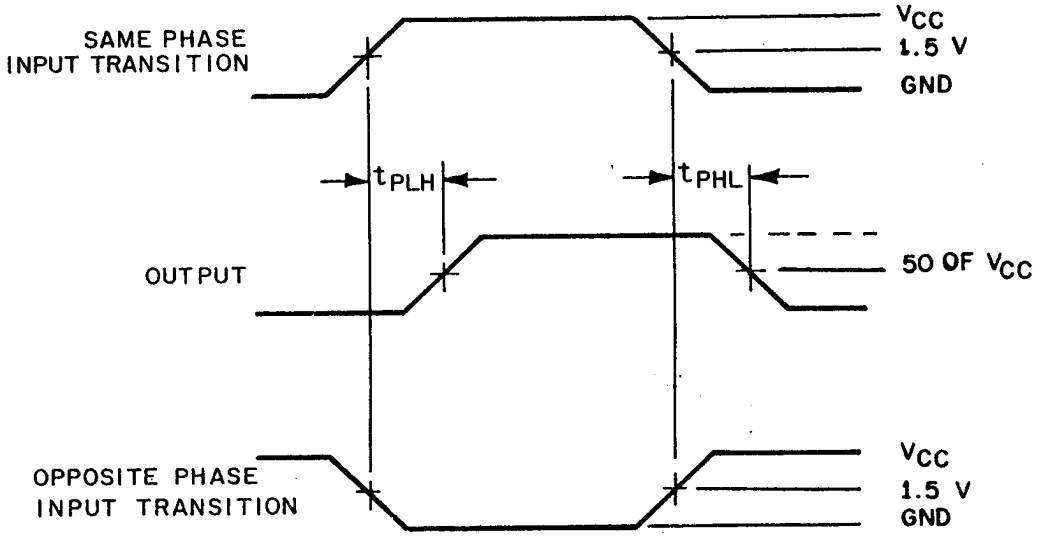


FIGURE 3. Test circuit and switching waveforms - Continued.

Powered by ICminer.com Electronic-Library Service CopyRight 2003

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.

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.

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. 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 M38510/75203B--.

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).

Powered by ICminer.com Electronic-Library Service CopyRight 2003

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, Ohio 45444, or telephone 513-296-5375.

6.6 Approved sources of supply. Approved sources of supply are listed in MIL-BUL 103. Additonal 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
5962-8761501CX	18714 27014	CD54AC08F/3A 54AC08DMQB	M38510/75203BCX
5962-8761501DX	27014	54AC08FMQB	M38510/75203BDX
5962-87615012X	27014	54AC08LMQB	M38510/75203B2X
5962-8761502EX	01295	54AC11008J	
5962-87615022X	01295	54AC11008FK	

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
01295	Texas Instruments, Incorporated P.O. Box 60448 Midland, TX 79711-0448
18714	RCA Corporation Route 202 Somerville, NJ 08876
27014	National Semiconductor 333 Western Avenue South Portland, ME 04106

Powered by ICminer.com Electronic-Library Service CopyRight 2003