REVISIONS			
LTR	DESCRIPTION	DATE (YR-MO-DA)	APPROVED
A	Add device type 02. Add vendor CAGE 01295 for device type 02, cases E, F, and 2. Technical changes in 1.4 and table I. Change drawing CAGE code to 67268. Editorial changes throughout.	1989 AUG 11	M. A. Frye

CURRENT CAGE CODE 67268

REV																									
SHEET																									
REV																									
SHEET																									
REV STATUS OF SHEETS	REV	A	A	A	A	A	A	A	A	A	A	A	A	A	A										
	SHEET	1	2	3	4	5	6	7	8	9	10	11	12	13	14										

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: Marcia B Kelleher

CHECKED BY: Monica L Poelking

APPROVED BY: M. A. Frye

DRAWING APPROVAL DATE: 5 JUNE 1987

REVISION LEVEL: A

DEFENSE ELECTRONICS SUPPLY CENTER
DAYTON, OHIO 45444

MICROCIRCUITS, DIGITAL, ADVANCED CMOS, 3-INPUT NAND GATES, MONOLITHIC SILICON

SIZE	CAGE CODE	
A	14933	5962-87610

SHEET 1 OF 14

DESC FORM 193-1
SEP 87

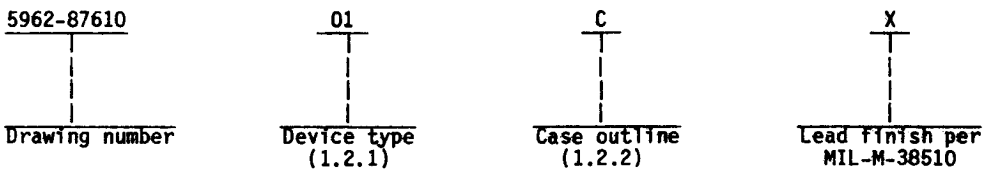
* U.S. GOVERNMENT PRINTING OFFICE: 1987 — 748-129/60912

5962-E1356-2

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:



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

Device type	Generic number	Circuit function
01	54AC10	Triple three-input NAND gate
02	54AC11010	Triple three-input NAND 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
F	F-5 (16-lead, .440" x .285" x .085"), flat 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 1/	-0.5 V dc to V_{CC} + 0.5 V dc
DC output voltage 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 in accordance with method 5004 of MIL-STD-883.

1.4 Recommended operating conditions.

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

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/ 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: $V_{IH} \geq 70$ percent V_{CC}, $V_{IL} \leq 30$ percent V_{CC}, $V_{OH} \geq 70$ percent V_{CC} at -20 µA, $V_{OL} \leq 30$ percent V_{CC} at 20 µA.

3.2.2 Logic diagram. The logic diagram shall be as specified on figure 2.

3.2.3 Truth table. The truth table 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.

TABLE I. Electrical performance characteristics.

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

See footnotes at end of table.

TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions $-55°C \le T_C \le +125°C$ unless otherwise specified		Device types	Group A subgroups	Limits		Unit
						Min	Max	
High level input voltage 2/	V_{IH}		V_{CC} = 3.0 V	All	1, 2, 3	2.1		V
			V_{CC} = 4.5 V			3.15		
			V_{CC} = 5.5 V			3.85		
Low level input voltage 2/	V_{IL}		V_{CC} = 3.0 V	All	1, 2, 3		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	All	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		All	1, 2, 3		80	µA
	I_{CCL}						80	
Input capacitance	C_{IN}	See 4.3.1c		All	4		8.0	pF
Power dissipation capacitance 3/	C_{PD}	See 4.3.1c		All	4		40	pF
Functional tests		Tested at V_{CC} = 3.0 V and repeated at V_{CC} = 5.5 V, see 4.3.1d		All	7, 8			

See footnotes at end of table.

TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions $-55°C \le T_C \le +125°C$ unless otherwise specified		Device types	Group A subgroups	Limits Min	Limits Max	Unit
Propagation delay time 4/	t_{PHL}	C_L = 50 pF, R_L = 500Ω, see figure 4	V_{CC} = 3.0 V	01	9	1.0	8.5	ns
					10, 11	1.0	10.0	
				02	9	1.0	9.0	
					10, 11	1.0	10.4	
			V_{CC} = 4.5 V	01	9	1.0	6.0	
					10, 11	1.0	7.0	
				02	9	1.0	6.4	
					10, 11	1.0	7.4	
	t_{PLH}		V_{CC} = 3.0 V	01	9	1.0	9.5	
					10, 11	1.0	11.0	
				02	9	1.0	9.5	
					10, 11	1.0	11.0	
			V_{CC} = 4.5 V	01	9	1.0	7.0	
					10, 11	1.0	8.5	
				02	9	1.0	7.0	
					10, 11	1.0	8.5	

1/ V_{OH} and V_{OL} tests will be tested at V_{CC} = 3.0 V and V_{CC} = 4.5 V. V_{CC} = 5.5 V tests will be guaranteed, but not tested. Limits shown apply to operation at V_{CC} = 3.3 V ±0.3 V and V_{CC} = 5.0 V ±0.5 V. Transmission driving tests are performed at V_{CC} = 5.5 V with a 2 ms duration maximum.

2/ The V_{IH} and V_{IL} tests are not required and 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, $PD = (C_{PD} + C_L) V_{CC}^2 f + I_{CC} V_{CC}$, 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 guaranteed for V_{CC} = 5.5 V by guardbanding V_{CC} = 4.5 V limits to 1.5 ns (minimum).

Device types	01		02	
Case outlines	C, D	2	E, F	2
Terminal number	Terminal symbol			
1	1A	NC	1A	NC
2	1B	1A	1Y	V_{CC}
3	2A	1B	2Y	2A
4	2B	2A	GND	1C
5	2C	NC	GND	1B
6	2Y	2B	3Y	NC
7	GND	NC	3C	1A
8	3Y	2C	3B	1Y
9	3A	2Y	3A	2Y
10	3B	GND	2C	GND

Device types	01		02	
Case outlines	C, D	2	E, F	2
Terminal number	Terminal symbol			
11	3C	NC	2B	NC
12	1Y	3Y	V_{CC}	GND
13	1C	3A	V_{CC}	3Y
14	V_{CC}	3B	2A	3C
15	---	NC	1C	3B
16	---	3C	3Y	NC
17	---	NC	---	3A
18	---	1Y	---	2C
19	---	1C	---	2B
20	---	V_{CC}	---	V_{CC}

FIGURE 1. Terminal connections.

Device types 01 and 02

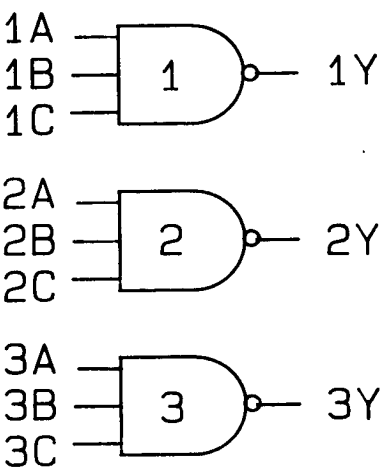


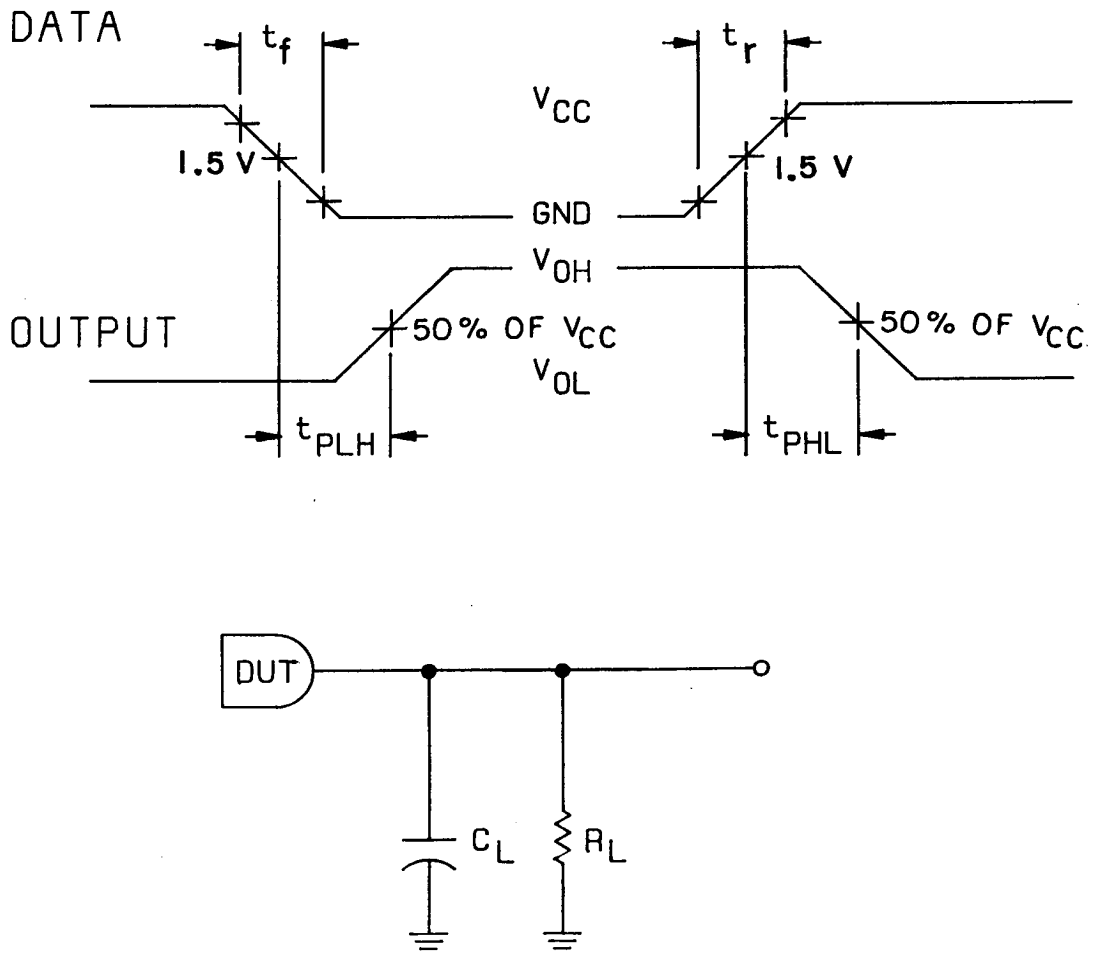
FIGURE 2. Logic diagram.

Device types 01 and 02

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

H = High voltage level
L = Low voltage level
Each gate

FIGURE 3. Truth table.



NOTES:
1. $t_r = t_f = 3.0$ ns, 10 percent to 90 percent or equivalent.
2. $R_L = 500\ \Omega$, $C_L = 50$ pF or equivalent.

FIGURE 4. Switching waveforms and test circuit.

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 as specified 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.

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, 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 M38510/75002B--.

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) 296-6022.

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. 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
5962-8761001CX	27014	54AC10DMQB	M38510/75002BCX
5962-8761001DX	27014	54AC10FMQB	M38510/75002BDX
5962-87610012X	27014	54AC10LMQB	M38510/75002B2X
5962-8761002EX	01295	SNJ54AC11010J	
5962-8761002FX	01295	SNJ54AC11010W	
5962-87610022X	01295	SNJ54AC11010FK	

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
27014	National Semiconductor 333 Western Avenue South Portland, ME 04106