REVISIONS			
LTR	DESCRIPTION	DATE (YR-MO-DA)	APPROVED
A	Add figure 4. Technical changes in 1.3, 1.4, table I, and table II. Change terminal connections. Editorial changes throughout.	89 AUG 18	M. A. Frye

REV																									
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SHEET																									
REV STATUS OF SHEETS	REV	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											

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: Monica L. Poelking

CHECKED BY: Monica L. Poelking

APPROVED BY: M. A. Frye

DRAWING APPROVAL DATE: 19 NOVEMBER 1987

REVISION LEVEL: A

DEFENSE ELECTRONICS SUPPLY CENTER
DAYTON, OHIO 45444

MICROCIRCUIT, DIGITAL, ECL, TRIPLE, 2-INPUT EXCLUSIVE OR/NOR GATE, MONOLITHIC SILICON

SIZE	CAGE CODE	
A	67268	5962-87727

SHEET 1 OF 13

DESC FORM 193
SEP 87

* U.S. GOVERNMENT PRINTING OFFICE: 1987 — 748-129/60911

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:

5962-87727	01	E	X
Drawing number	Device type (1.2.1)	Case outline (1.2.2)	Lead finish per MIL-M-38510

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

Device type	Generic number	Circuit function
01	10H507	Triple 2-input EXCLUSIVE-OR/NOR 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
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 (V_{EE})	-8.0 V dc to 0.0 V dc
Input voltage range	-5.2 V dc to 0.0 V dc
Storage temperature range	-65°C to +165°C
Lead temperature (soldering, 10 seconds)	+300°C
Junction temperature (T_J)	+165°C
Maximum power dissipation (P_D)	+125 mW
Thermal resistance, junction-to-case (θ_{JC})	See MIL-M-38510, appendix C

1.4 Recommended operating conditions.

Supply voltage range (V_{EE})	-5.46 V dc to -4.94 V dc
Supply voltage range (V_{CC})	-0.02 V dc to +0.02 V dc or +1.98 V dc to +2.02 V dc
Ambient operating temperature range (T_A)	-55°C to +125°C
Minimum high level input voltage (V_{IH}):	
T_A = +25°C	-0.780 V dc
T_A = +125°C	-0.650 V dc
T_A = -55°C	-0.840 V dc
Maximum low level input voltage (V_{IL})	-1.950 V dc

2. APPLICABLE DOCUMENTS

2.1 Government specification and standard. Unless otherwise specified, the following specification and standard, 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.

(Copies of the specification and standard 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 Logic diagram. The logic diagram shall be as specified on figure 3.

3.2.4 Test circuit and switching waveforms. The test circuit and switching waveforms shall be as specified on figure 4.

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

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

3.4 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 6.4 herein.

3.5 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 6.4. The certificate of compliance submitted to DESC-ECS prior to listing as an approved source of supply shall state that the manufacturer's product meets the requirements of MIL-STD-883 (see 3.1 herein) and the requirements herein.

TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions $-55°C \le T_A \le +125°C$ Unless otherwise specified	V_{IH}	V_{IL}	Group A subgroups	Limits Min	Limits Max	Unit
Cases E, F, and 2		Quiescent tests 1/						
High level output voltage	V_{OH}	Outputs terminated through 100Ω to -2 V, V_{CC} = 0.0 V, V_{EE} = -5.2 V 2/	-0.780	-1.950	1	-1.010	-0.780	V
			-0.650	-1.950	2	-1.860	-0.650	
			-0.840	-1.950	3	-1.060	-0.840	
Low level output voltage	V_{OL}		-0.780	-1.950	1	-1.950	-1.580	V
			-0.650	-1.950	2	-1.950	-1.565	
			-0.840	-1.950	3	-1.950	-1.610	
High level threshold output voltage	V_{OHA}		-1.110	-1.480	1	-1.010	-0.780	V
			-0.960	-1.465	2	-0.860	-0.650	
			-1.160	-1.510	3	-1.060	-0.840	
Low level threshold output voltage	V_{OLA}		-1.110	-1.480	1	-1.950	-1.580	V
			-0.960	-1.465	2	-1.950	-1.565	
			-1.160	-1.510	3	-1.950	-1.610	
Power supply drain current 3/	I_{EE}	V_{EE} = -5.46 V, V_{CC} = 0.0 V, V_{IH} = -0.780 V at +25°C, V_{IH} = -0.650 V at +125°C, V_{IH} = -0.840 V at -55°C			1	-28		mA
					2, 3	-31		
High level input current	I_{IH1}		Input A		1, 2		220	µA
					3		425	
	I_{IH2}		Input B		1, 2		265	µA
					3		425	
Low level input current	I_{IL}	V_{EE} = -4.94 V, V_{IL} = -1.950 V, V_{CC} = 0.0 V 3/			1, 3	0.5		µA
					2	0.3		
Functional tests		See 4.3.1c			7, 8			

See footnotes at end of table.

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TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions $-55°C \le T_A \le +125°C$ Unless otherwise specified	V_{IH}	V_{IL}	Group A subgroups	Limits Min	Limits Max	Unit
Cases E and F		DC rapid tests 4/						
High level output voltage	V_{OH}	Outputs terminated through 100Ω to -2 V V_{CC} = 0.0 V V_{EE} = -5.2 V 2/	-0.789	-1.950	1	-1.019	-0.789	V
			-0.660	-1.950	2	-1.869	-0.660	
			-0.850	-1.950	3	-1.069	-0.850	
Low level output voltage	V_{OL}		-0.789	-1.950	1	-1.950	-1.583	V
			-0.660	-1.950	2	-1.950	-1.568	
			-0.850	-1.950	3	-1.950	-1.613	
High level threshold output voltage	V_{OHA}		-1.119	-1.483	1	-1.019	-0.789	V
			-0.969	-1.468	2	-0.869	-0.660	
			-1.169	-1.513	3	-1.069	-0.850	
Low level threshold output voltage	V_{OLA}		-1.119	-1.483	1	-1.950	-1.583	V
			-0.969	-1.468	2	-1.950	-1.568	
			-1.169	-1.513	3	-1.950	-1.613	
Power supply drain current 3/	I_{EE}	V_{EE} = -5.46 V V_{CC} = 0.0 V V_{IH} = -0.780 V at +25°C V_{IH} = -0.650 V at +125°C V_{IH} = -0.840 V at -55°C			1	-27		mA
					2, 3	-30		
High level input current	I_{IH1}		Input A		1, 2		205	µA
					3		410	
	I_{IH2}		Input B		1, 2		250	µA
					3		410	
Low level input current	I_{IL}	V_{EE} = -4.94 V 3/ V_{IL} = -1.950 V V_{CC} = 0.0 V			1, 3	0.5		µA
					2	0.3		
Functional tests		See 4.3.1c			7, 8			

See footnotes at end of table.

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TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions $-55°C \le T_A \le +125°C$ Unless otherwise specified			Group A subgroups	Limits		Unit
						Min	Max	
Case 2		DC rapid tests 4/						
High level output voltage	V_{OH}	Outputs terminated through 100Ω to -2 V V_{CC} = 0.0 V V_{EE} = -5.2 V 2/	V_{IH}	V_{IL}				
			-0.794	-1.950	1	-1.023	-0.794	V
			-0.665	-1.950	2	-0.874	-0.665	
			-0.855	-1.950	3	-1.074	-0.855	
Low level output voltage	V_{OL}		-0.794	-1.950	1	-1.950	-1.584	V
			-0.665	-1.950	2	-1.950	-1.570	
			-0.855	-1.950	3	-1.950	-1.615	
High level threshold output voltage	V_{OHA}		-1.123	-1.484	1	-1.023	-0.794	V
			-0.974	-1.470	2	-0.874	-0.665	
			-1.174	-1.515	3	-1.074	-0.855	
Low level threshold output voltage	V_{OLA}		-1.123	-1.484	1	-1.950	-1.584	V
			-0.974	-1.470	2	-1.950	-1.570	
			-1.174	-1.515	3	-1.950	-1.615	
Power supply drain current 3/	I_{EE}	V_{EE} = -5.46 V V_{CC} = 0.0 V V_{IH} = -0.780 V at +25°C V_{IH} = -0.650 V at +125°C V_{IH} = -0.840 V at -55°C			1 2,3	-27 -30		mA
High level input current	I_{IH1}		Input A		1,2 3		205 410	µA
	I_{IH2}		Input B		1,2 3		250 410	µA
Low level input current	I_{IL}	V_{EE} = -4.94 V 3/ V_{IL} = -1.950 V V_{CC} = 0.0 V			1,3 2	0.5 0.3		µA
Functional tests		See 4.3.1c			7,8			

See footnotes at end of table.

TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions $-55°C \le T_A \le +125°C$ Unless otherwise specified	Group A subgroups	Limits		Unit
				Min	Max	
Cases E, F, and 2		AC tests				
Transition time	t_{TLH} t_{THL}	V_{EE} = -2.94 V V_{CC} = 2.0 V $C_L \le 5$ pF Load all outputs through 100Ω to ground See figure 4	9 10 11	0.50 0.50 0.50	1.60 1.90 1.50	ns
Propagation delay time, input to output	t_{PLH} t_{PHL} t_{PHH} t_{PLL}		9 10 11	0.40 0.40 0.40	1.60 1.90 1.50	ns

1/ The quiescent limits are determined after a device has reached thermal equilibrium. This is defined as the reading taken with the device in a socket with ≥ 500 LFPM of +25°C, +125°C or -55°C (as applicable) air blowing on the unit in a transverse direction with power applied for at least 4 minutes before the reading is taken. This method was used for theoretical limit establishment only. All devices shall be tested to the delta V (rapid test) conditions specified herein. The rapid test method is an equivalent method of testing quiescent conditions.

2/ The high and low level output current varies with temperature, and shall be calculated using the following formula: $I_{OH} = (V_{OH} - 2\ V)/100\Omega$ and $I_{OL} = (V_{OL} - 2\ V)/100\Omega$.

3/ The I_{EE} and I_{IL} limits, although specified in the minimum column, shall not be exceeded, in magnitude, as a minimum value.

4/ The dc rapid test forcing functions and limits are used for all dc testing. These limits are determined for each device type based on the power dissipation and package type. The rapid test (delta V) limits and forcing functions are skewed allowing rapid testing to be performed at standard temperatures without the addition of delta T's.

3.6 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.

3.7 Notification of change. Notification of change to DESC-ECS shall be required in accordance with MIL-STD-883 (see 3.1 herein).

3.8 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).

Case outlines	E	F	2
Terminal number	Terminal symbol		
1	V_{CC1}	Y3	NC
2	$\overline{YI}$	A3	V_{CC1}
3	Y1	B3	$\overline{YI}$
4	A1	V_{CC2}	Y1
5	B1	V_{CC1}	A1
6	NC	$\overline{YI}$	NC
7	B2	Y1	B1
8	V_{EE}	A1	NC
9	A2	B1	B2
10	Y2	NC	V_{EE}
11	$\overline{Y2}$	B2	NC
12	$\overline{Y3}$	V_{EE}	A2
13	Y3	A2	Y2
14	A3	Y2	$\overline{Y2}$
15	B3	$\overline{Y2}$	$\overline{Y3}$
16	V_{CC2}	$\overline{Y3}$	NC
17	---	---	Y3
18	---	---	A3
19	---	---	B3
20	---	---	V_{CC2}

NC = No connection

FIGURE 1. Terminal connections.

Inputs		Outputs	
A	B	Y	$\overline{Y}$
L	L	L	H
L	H	H	L
H	L	H	L
H	H	L	H

L = Low level voltage
H = High level voltage

FIGURE 2. Truth table.

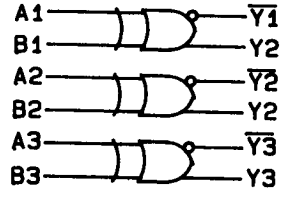
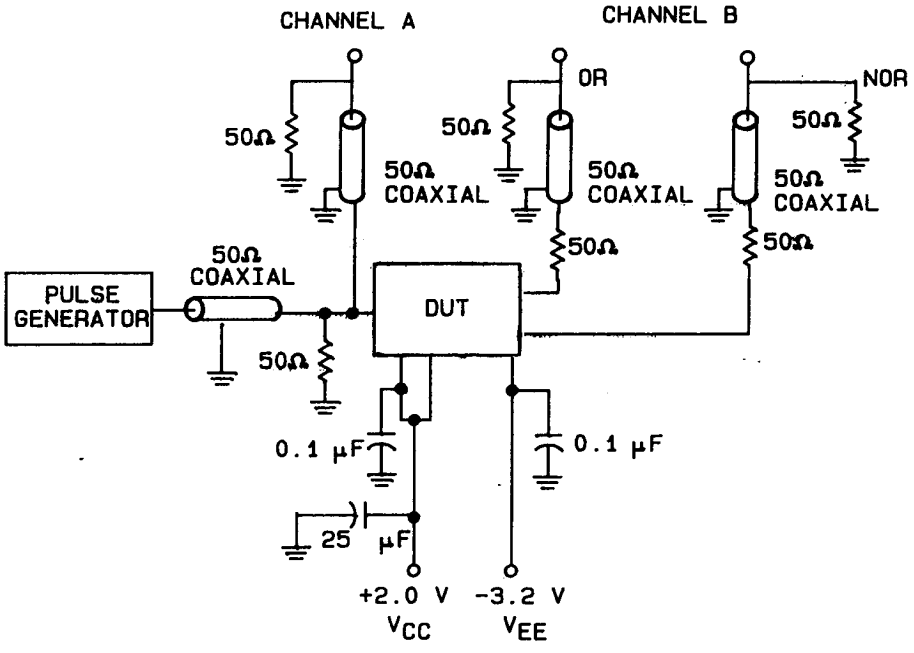
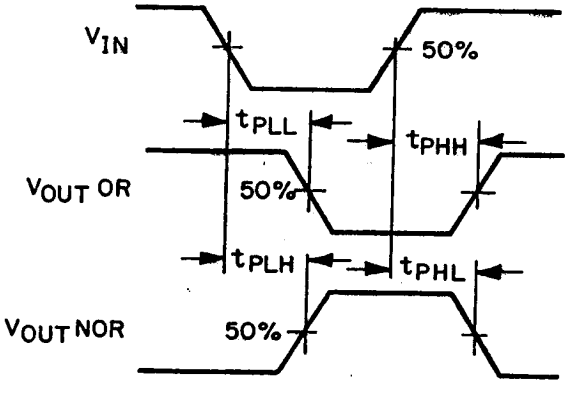


FIGURE 3. Logic diagram.





NOTE: Pulse generator characteristics: PRR = 1 MHz, $t_{THL} = t_{TLH}$ = 2.0 ±0.2 ns (20% to 80%), duty cycle = 50%.

FIGURE 4. Test circuit and switching waveforms.

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 3.5 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 4, 5, and 6 in table I, method 5005 of MIL-STD-883 shall be omitted.

c. Subgroups 7 and 8 tests shall verify the truth table specified on figure 2 herein.

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 3.5 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)	1
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 subgroups 1 and 7.

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

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

6.4 Approved source of supply. An approved source of supply is listed herein. Additional sources will be added as they become available. The vendor listed herein has agreed to this drawing and a certificate of compliance (see 3.5 herein) has been submitted to DESC-ECS.

Military drawing part number	Vendor CAGE number	Vendor similar part number 1/
5962-8772701EX	04713	10H507/BEAJC
5962-8772701FX	04713	10H507/BFAJC
5962-87727012X	04713	10H507M/B2AJC

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
04713	Motorola, Incorporated 7402 South Price Road Tempe, AZ 85283