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Defense Electronics
Supply Center
Dayton, Ohio

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AMSC N/A

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SIZE A

CODE IDENT. NO. 67268

REV

MILITARY DRAWING

This drawing is available for use by all Departments and Agencies of the Department of Defense

TITLE: MICROCIRCUIT, DIGITAL ADVANCED
CMOS DUAL 1-OF-4 DECODER
MONOLITHIC SILICON

DWG NO. 5962-87623

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5962-E433-2

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

DESC FORM 193
MAY 86

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:

5962-87623	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	54AC139	Dual 1-of-4 decoder

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, 1/4" x 7/8") dual-in-line package
F	F-5 (16-lead, 1/4" x 3/8") flat-package
2	C-2 (20-terminal, .350" x .350") 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 (per pin)	±100 mA
Storage temperature range	-65°C to +150°C
Maximum power dissipation P_D	500 mW
Lead temperature (soldering, 10 seconds)	+245°C
Thermal resistance, junction-to-case (θ_{JC}):	
Cases E and F	(See MIL-M-38510, appendix C)
Case 2	60°C/W 2/
Junction temperature (T_J) 3/	+175°C

1/ Unless otherwise specified, all voltages are referenced to GND.
2/ When a thermal resistance value is included in MIL-M-38510, appendix C, it shall supersede the value stated herein.
3/ 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})	2.0 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°
Input rise or fall times:	
V_{CC} = 3.6 V	0 to 116 ns (10-90%, 40 ns/V)
V_{CC} = 5.5 V	0 to 88 ns (10-90%, 20 ns/V)

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 Logic diagram and terminal connections. The logic diagram and 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, the electrical performance characteristics are as specified in table I and apply over the full recommended case 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.

TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions $-55^\circ C \le T_C \le +125^\circ C$		Group A subgroups	Limits		Unit
					Min	Max	
High-level output voltage 1/	V_{OH}	$V_{IN} = V_{IH}$ or V_{IL} $I_{OH} = -50$ uA	$V_{CC} = 3.0$ V	1,2,3	2.9		V
			$V_{CC} = 4.5$ V		4.4		
			$V_{CC} = 5.5$ V		5.4		
		$V_{IN} = V_{IH}$ or V_{IL} $I_{OH} = -4$ mA	$V_{CC} = 3.0$ V		2.4		
		$V_{IN} = V_{IH}$ or V_{IL} $I_{OH} = -24$ mA	$V_{CC} = 4.5$ V		3.7		
			$V_{CC} = 5.5$ V		4.7		
		$V_{IN} = V_{IH}$ or V_{IL} $I_{OH} = -50$ mA	$V_{CC} = 5.5$ V		3.85		
Low-level output voltage 1/	V_{OL}	$V_{IN} = V_{IH}$ or V_{IL} $I_{OL} = 50$ µA	$V_{CC} = 3.0$ V	1,2,3		0.1	V
			$V_{CC} = 4.5$ V			0.1	
			$V_{CC} = 5.5$ V			0.1	
		$V_{IN} = V_{IH}$ or V_{IL} $I_{OL} = 12$ mA	$V_{CC} = 3.0$ V			0.5	
		$V_{IN} = V_{IH}$ or V_{IL} $I_{OL} = 24$ mA	$V_{CC} = 4.5$ V			0.5	
			$V_{CC} = 5.5$ V			0.5	
		$V_{IN} = V_{IH}$ or V_{IL} $I_{OL} = 50$ mA	$V_{CC} = 5.5$ V			1.65	
High-level input voltage 2/	V_{IH}		$V_{CC} = 3.0$ V		2.1		V
			$V_{CC} = 4.5$ V		3.15		
			$V_{CC} = 5.5$ V		3.85		
Low-level input voltage 2/	V_{IL}		$V_{CC} = 3.0$ V			0.9	V
			$V_{CC} = 4.5$ V			1.35	
			$V_{CC} = 5.5$ V			1.65	
Input leakage current	I_{IL}	VM = 0.0 V	$V_{CC} = 5.5$ V	1,2,3		-1.0	µA
	I_{IH}	VM = 5.5 V				1.0	

See footnotes at end of table.

TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions $-55^\circ C \leq T_C \leq +125^\circ C$		Group A subgroups	Limits		Unit
					Min	Max	
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		8.0	pF
Power dissipation 3/ capacitance	C_{PD}	See 4.3.1c		4		85	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 High to low Low to high	t_{PHL}	$T_C = +25^\circ C$ $C_L = 50$ pF $R_L = 500\Omega$ See figure 3	$V_{CC} = 3.0$ V	9	1.0	10.0	ns
			$V_{CC} = 4.5$ V		1.0	8.0	
	t_{PLH}		$V_{CC} = 3.0$ V		1.0	11.5	
			$V_{CC} = 4.5$ V		1.0	9.0	
An to $\overline{On}$ 4/	t_{PHL}	$T_C = -55^\circ C/+125^\circ C$ $C_L = 50$ pF $R_L = 500\Omega$ See figure 3	$V_{CC} = 3.0$ V	10,11	1.0	12.5	ns
			$V_{CC} = 4.5$ V		1.0	10.0	
	t_{PLH}		$V_{CC} = 3.0$ V		1.0	14.5	
			$V_{CC} = 4.5$ V		1.0	11.0	
Propagation delay time High to low Low to high	t_{PHL}	$T_C = +25^\circ C$ $C_L = 50$ pF $R_L = 500\Omega$ See figure 3	$V_{CC} = 3.0$ V	9	1.0	10.0	ns
			$V_{CC} = 4.5$ V		1.0	8.0	
	t_{PLH}		$V_{CC} = 3.0$ V		1.0	12.0	
			$V_{CC} = 4.5$ V		1.0	8.5	
$\overline{E1}$ to $\overline{On}$ 4/	t_{PHL}	$T_C = -55^\circ C/+125^\circ C$ $C_L = 50$ pF $R_L = 500\Omega$ See figure 3	$V_{CC} = 3.0$ V	10,11	1.0	12.5	ns
			$V_{CC} = 4.5$ V		1.0	10.0	
	t_{PLH}		$V_{CC} = 3.0$ V		1.0	14.5	
			$V_{CC} = 4.5$ V		1.0	11.0	

See footnotes on next page.

1/ V_{OH} and V_{OL} tests will be tested at V_{CC} = 3.0 V and V_{CC} = 4.5 V. All other voltages are guaranteed if 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/ V_{IH} and V_{IL} tests are guaranteed by 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 5.5 V V_{CC} are equal to limits at 4.5 V V_{CC} and guaranteed by testing at 4.5 V V_{CC}. Minimum ac guaranteed for 5.5 V V_{CC} by guardbanding 4.5 V V_{CC} limits to 1.5 ns (minimum)

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.

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).

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.

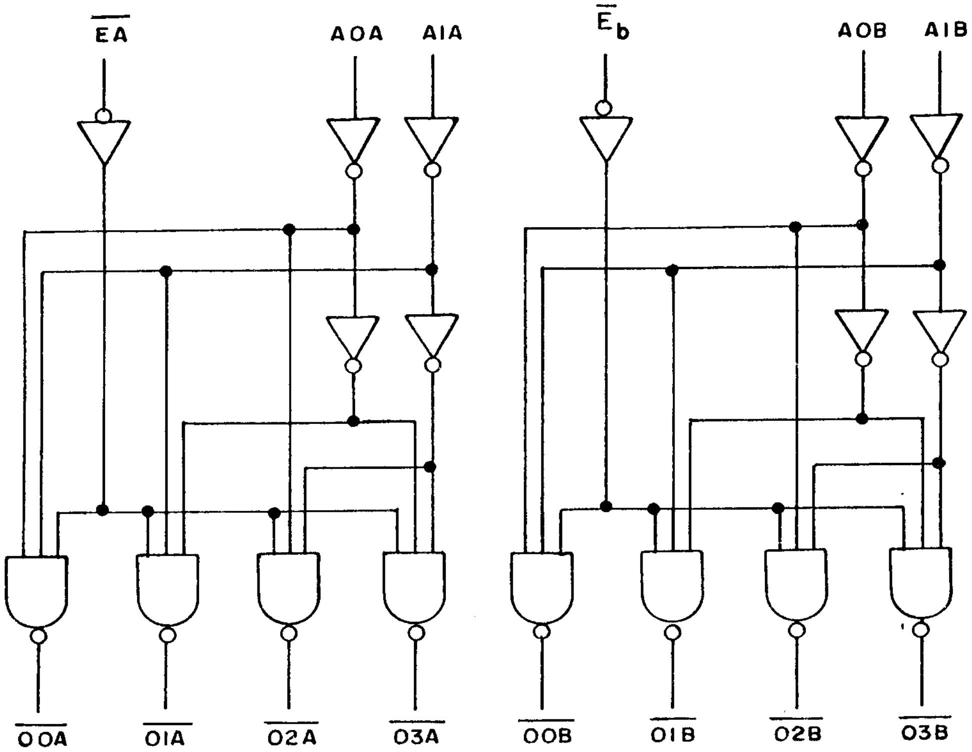
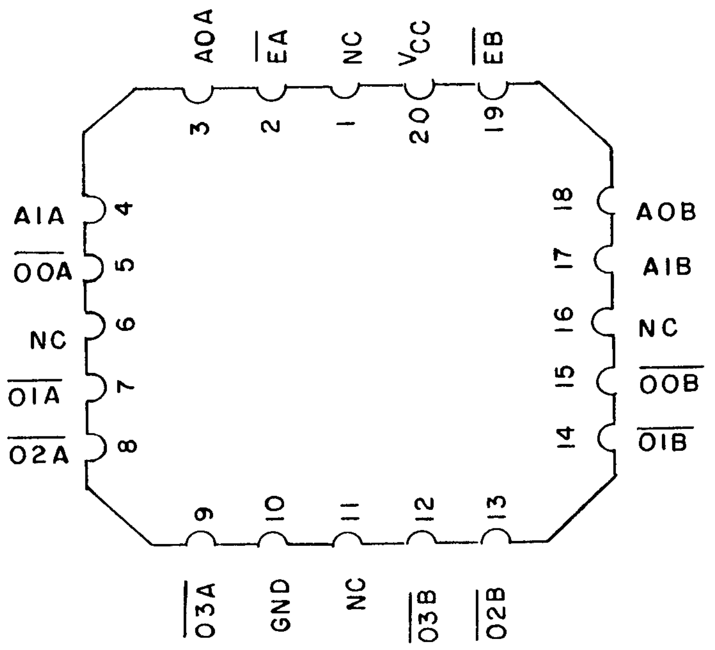


FIGURE 1. Logic diagram and terminal connections.

Case 2



Cases E and F

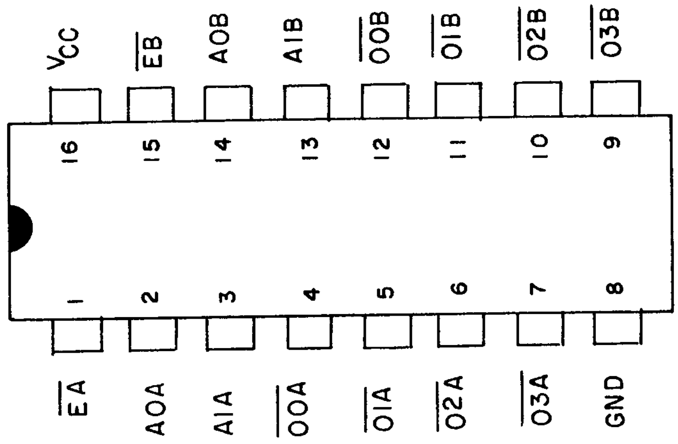


FIGURE 1. Logic diagram and terminal connections - Continued.

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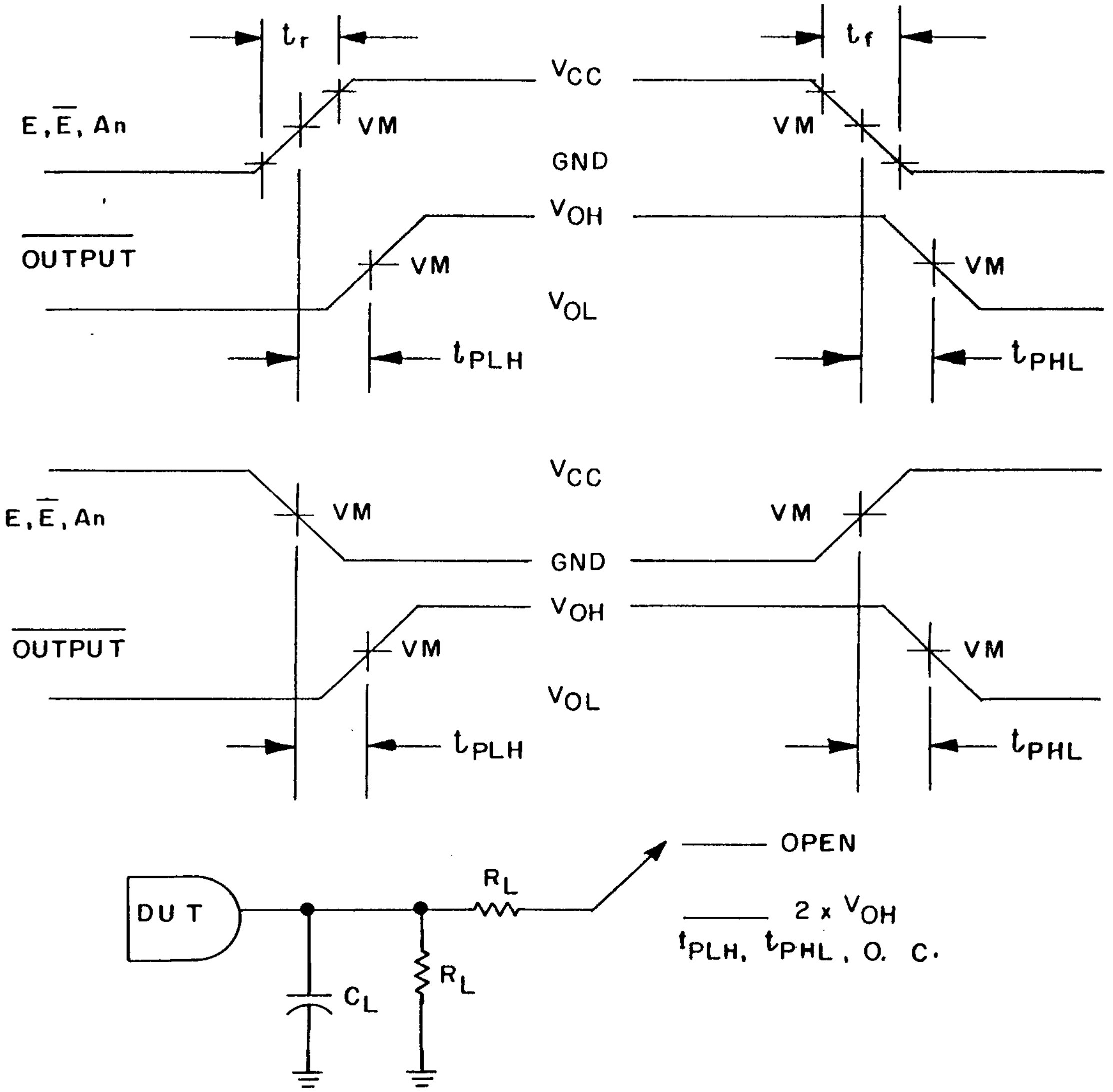
Inputs			Outputs			
$\overline{E}$	A0	A1	$\overline{00}$	$\overline{01}$	$\overline{02}$	$\overline{03}$
H	X	X	H	H	H	H
L	L	L	L	H	H	H
L	H	L	H	L	H	H
L	L	H	H	H	L	H
L	H	H	H	H	H	L

H = HIGH voltage level
L = LOW voltage level
X = Immaterial

FIGURE 2. Truth table.



NOTES:
1. $t_r = t_f = 3.0$ ns, 10 percent to 90 percent or equivalent.
2. Measure voltage (V_M) = 50 percent of V_{CC}.
3. $R_L = 500\Omega$, $C_L = 50$ pF or equivalent.

FIGURE 3. Switching waveforms.

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} measurement) shall be measured only for the initial test and after process or design changes which may affect input capacitance.

d. Subgroups 7 and 8 tests sufficient to verify the function table.

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 (method 1005 of MIL-STD-883) conditions:

(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 appendix B of MIL-M-38510 and 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
Additional electrical subgroups for group C periodic inspections	---

*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 numbered M38510/75803B--.

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/	Replacement military specification part number
5962-8762301EX	07263	54AC139DMQB	M38510/75803BEX
5962-8762301FX	07263	54AC139FMQB	M38510/75803BFX
5962-87623012X	07263	54AC139LMQB	M38510/75803B2X

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
07263	Fairchild Semiconductor 333 Western Avenue South Portland, ME 04106