REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED

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PAGES	1	2	3	4	5	6	7	8	9	10	11	12	13	14

Defense Electronics Supply Center
Dayton, Ohio

Original date of drawing:
11 September 1986

AMSC N/A

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SIZE A

CODE IDENT. NO. 14933

REV

MILITARY DRAWING

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

TITLE: MICROCIRCUITS, DIGITAL, OCTAL DYNAMIC MEMORY DRIVER, MONOLITHIC SILICON

DWG NO. 5962-86707

5962-E121

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

DESC FORM 193

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:

5962-86707	01	R	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	2965	Octal dynamic memory driver with three-state outputs and inverting drivers
02	2966	Octal dynamic memory driver with three-state outputs and non-inverting drivers

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
R	D-8 (20-lead, 1/4" x 1 1/16"), dual-in-line package
2	C-2 (20-terminal, .350" x .350"), square chip carrier package

1.3 Absolute maximum ratings.

Supply voltage range	-0.5 V dc to 7.0 V dc
Input voltage range	-1.5 V dc to 5.5 V dc
Storage temperature range	-65°C to +150°C
Maximum power dissipation (P_D) 1/;	
Device type 01	770 mW
Device type 02	830 mW
Lead temperature (soldering, 10 seconds)	+300°C
Thermal resistance, junction-to-case (ΘJC):	
Case R	See MIL-M-38510, appendix C
Case 2	80°C/W 2/
Junction temperature (T_J)	+175°C

1.4 Recommended operating conditions.

Supply voltage (V_{CC})	4.5 V dc minimum to 5.5 V dc maximum
Minimum high-level input voltage (V_{IH})	2.0 V dc
Maximum low-level input voltage (V_{IL})	0.8 V dc
Case operating temperature range (T_C)	-55°C to +125°C

1/ Must withstand the added P_D due to short circuit test (e.g., I_{OS}).
2/ When a thermal resistance value for this case is included in MIL-M-38510, appendix C, that value shall supersede the value indicated herein.

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 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, 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.

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 $-55°C \le T_C \le +125°C$ $4.5\ V \le V_{CC} \le 5.5\ V$ (unless otherwise specified)		Device Type	Group A subgroups	Limits Min	Limits Max	Unit
Output high voltage	V_{OH}	V_{CC} = 4.5 V and 5.5 V 1/, $V_{IN} = V_{IH}$ or V_{IL}, $I_{OH} = -1.0$ mA		All	1, 2, 3	V_{CC} -1.15		V
Output low voltage	V_{OL1}	V_{CC} = 4.5 V,	I_{OL} = 1.0 mA	All	1, 2, 3		0.5	V
	V_{OL2}	$V_{IN} = V_{IH}$ or V_{IL}	I_{OL} = 12 mA	All	1, 2, 3		0.8	V
Input high voltage	V_{IH}	2/		All	1, 2, 3	2.0		V
Input low voltage	V_{IL}	2/		All	1, 2, 3		0.8	V
Input clamp voltage	V_{IC}	V_{CC} = 4.5 V, I_{IN} = -18 mA		All	1, 2, 3		-1.2	V
Input low current	I_{IL}	V_{CC} = 5.5 V,	DATA	All	1, 2, 3		-200	µA
		V_{IN} = 0.4 V	$\overline{1G}$, $\overline{2G}$	All	1, 2, 3		-400	µA
Input high current	I_{IH1}	V_{CC} = 5.5 V	V_{IN} = 2.7 V	All	1, 2, 3		20	µA
	I_{IH2}		V_{IN} = 7.0 V	All	1, 2, 3		0.1	mA
Off-state output current	I_{OZH}	V_{CC} = 5.5 V,	V_O = 2.7 V	All	1, 2, 3		100	µA
	I_{OZL}	$\overline{G} = V_{IH}$	V_O = 0.4 V	All	1, 2, 3		-200	µA
Output sink current	I_{OL}	V_{CC} = 4.5 V, V_{OL} = 2.0 V		All	1, 2, 3	50		mA
Output source current	I_{OH}	V_{CC} = 4.5 V, V_{OH} = 2.0 V		All	1, 2, 3	-35		mA
Output short-circuit current	I_{OS}	V_{CC} = 5.5 V, V_O = 0 V 3/		All	1, 2, 3	-60	-200	mA

per BB

See footnotes at end of table.

TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions $-55°C \le T_C \le +125°C$, $4.5\ V \le V_{CC} \le 5.5\ V$ (unless otherwise specified)		Device Type	Group A subgroups	Limits Min	Limits Max	Unit
Supply current	I_{CC1}	V_{CC} = 5.5 V, Outputs open	Outputs high	01	1, 2, 3		50	mA
				02	1, 2, 3		75	mA
	I_{CC2}		Outputs low	01	1, 2, 3		125	mA
				02	1, 2, 3		130	mA
	I_{CC3}		Outputs hi-Z	01	1, 2, 3		125	mA
				02	1, 2, 3		150	mA
Functional tests			See 4.3.1c	All	7, 8			
Propagation delay time, from low to high output (see figure 4)	t_{PLH1}	V_{CC} = 5.0 V, C_L = 50 pF, T_C = +25°C		All	9	6.0	15	ns
	t_{PLH2}	C_L = 50 pF		All	9, 10, 11	4.0	20	ns
	t_{PLH3}	C_L = 500 pF, T_C = +25°C 4/		All		18	30	ns
	t_{PLH4}	C_L = 500 pF 4/		All		18	40	ns
Propagation delay time, from high to low output (see figure 4)	t_{PHL1}	V_{CC} = 5.0 V, C_L = 50 pF, T_C = +25°C		All	9	5.0	15	ns
	t_{PHL2}	C_L = 50 pF		01	9, 10, 11	6.0	22	ns
				02	9, 10, 11	4.0	20	ns
	t_{PHL3}	CL = 500 pF, T_C = +25°C 4/		All		18	30	ns
	t_{PHL4}	C_L = 500 pF 4/		All		18	40	ns
Output enable time from low (see figure 5)	t_{PLZ1}	V_{CC} = 5.0 V, C_L = 50 pF, T_C = +25°C		All	9		20	ns
	t_{PLZ2}	C_L = 50 pF		All	10, 11		24	ns

See footnotes at end of table.

TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions $-55°C \le T_C \le +125°C$ $4.5\ V \le V_{CC} \le 5.5\ V$ (unless otherwise specified)	Device Type	Group A subgroups	Limits Min	Limits Max	Unit
Output enable time from high (see figure 5)	t_{PHZ1}	V_{CC} = 5.0 V, C_L = 50 pF, T_C = +25°C	All	9		12	ns
	t_{PHZ2}	C_L = 50 pF	All	10, 11		16	ns
Output disable time from low (see figure 5)	t_{PZL1}	V_{CC} = 5.0 V, C_L = 50 pF, T_C = +25°C	All	9		20	ns
	t_{PZL2}	C_L = 50 pF	All	10, 11		28	ns
Output disable time from high (see figure 5)	t_{PZH1}	V_{CC} = 5.0 V, C_L = 50 pF, T_C = +25°C	All	9		20	ns
	t_{PZH2}	C_L = 50 pF	All	10, 11		28	ns
Output to output skew 5/	t_{SKEW}	V_{CC} = 5.0 V C_L = 50 pF, T_C = +25°C	All			±3.0	ns
Output voltage undershoot 5/	V_{ONP}	C_L = 50 pF	All		0	-0.5	V

1/ V_{OH} is tested at both V_{CC} = 4.5 V and at V_{CC} = 5.5 V.

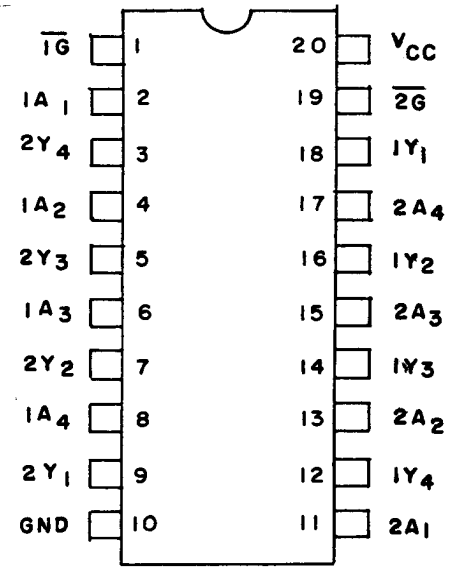
2/ Input thresholds are tested during DC tests and may be done in combination with testing of other DC parameters.

3/ Not more than one output should be shorted at a time. Duration of short-circuit should not exceed one second.

4/ 500 pF loads are not tested, but are correlated to 50 pF loads.

5/ Parameter guaranteed, but not tested.

Case R



Case 2

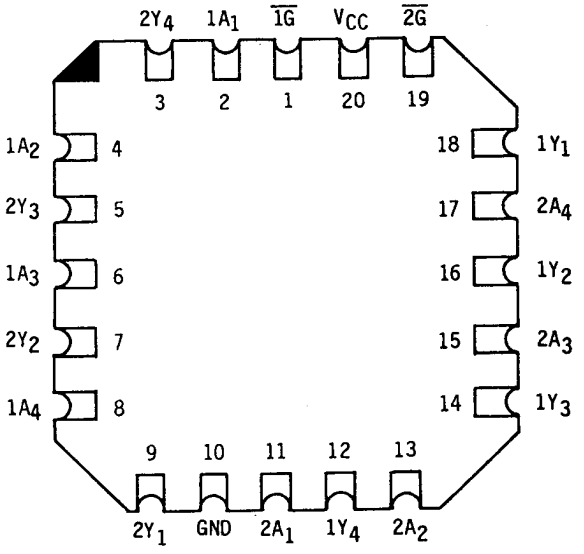
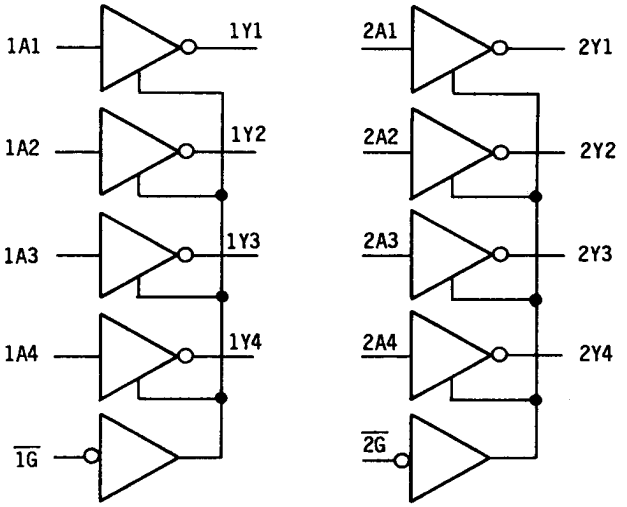


FIGURE 1. Terminal connections (top view).

MILITARY DRAWING DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO	SIZE A	CODE IDENT. NO. 14933	DWG NO 5962-86707
		REV	PAGE 7

DESC FORM 193A
FEB 86

Device type 01



Device type 02

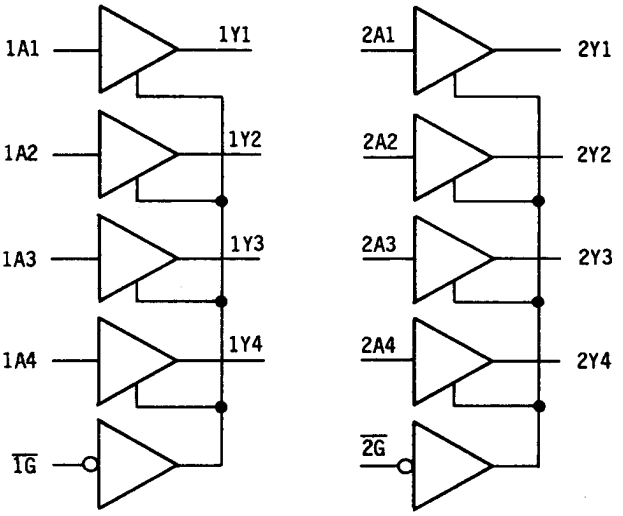


FIGURE 2. Logic diagram.

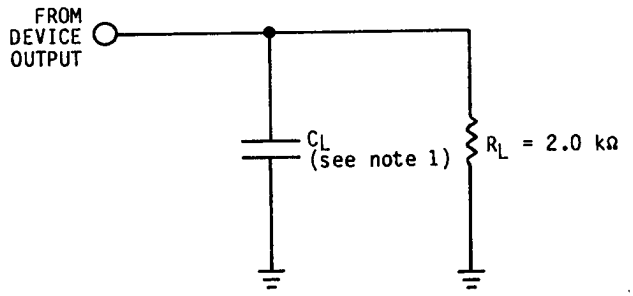
Device type 01

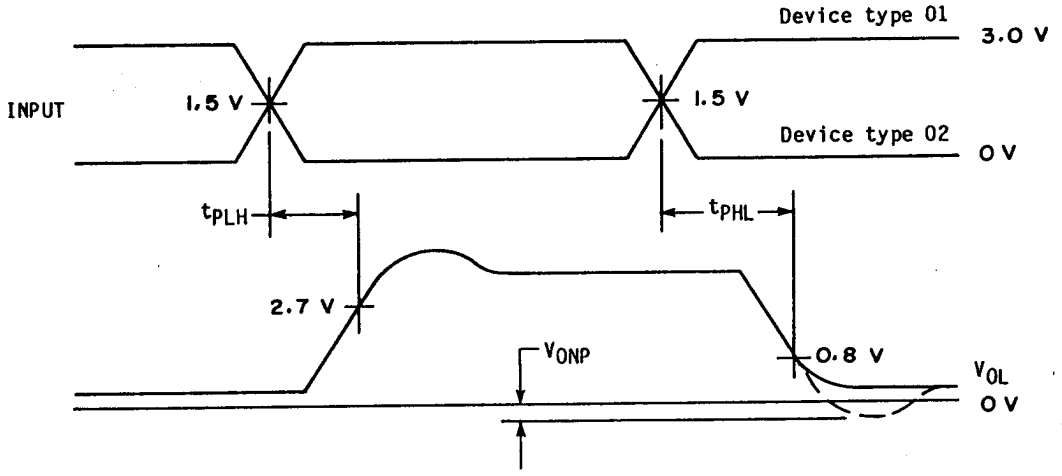
Inputs		Output
$\overline{G}$	A	Y
H	X	Z
L	H	L
L	L	H

Device type 02

Inputs		Output
$\overline{G}$	A	Y
H	X	Z
L	L	L
L	H	H

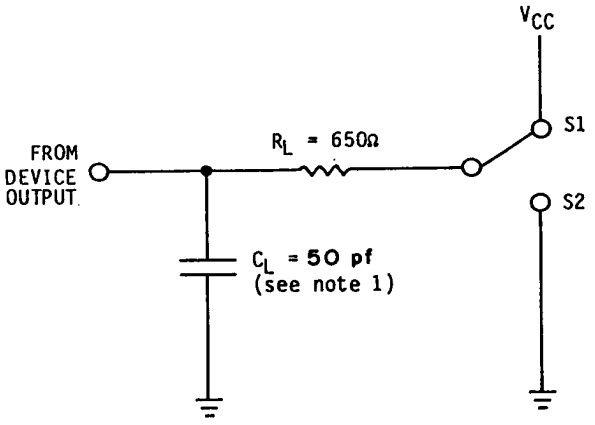
FIGURE 3. Truth table.





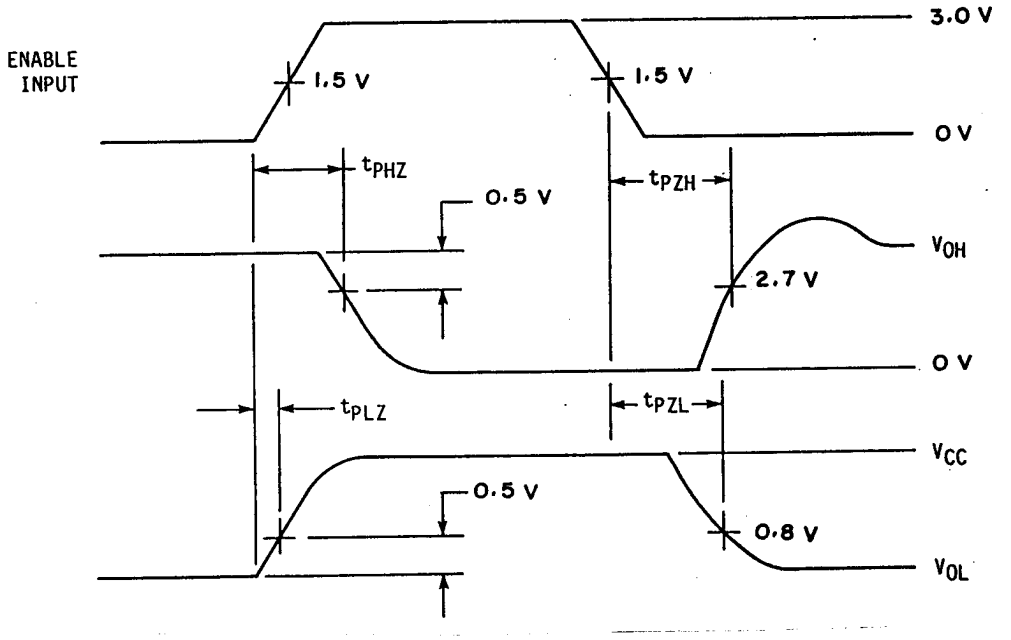
NOTES:
1. C_L = 50 or 500 pF and includes scope probe, wiring, and stray capacitance without device in test fixture.
2. $t_r = t_f$ = 2.5 ns, f = 2.5 MHz, and t_{pw} = 200 ns.

FIGURE 4. Propagation delay times test circuit and waveforms.



Switch Matrix

Parameter	S1	S2
t_{PLZ}	Closed	Open
t_{PHZ}	Open	Closed
t_{PZL}	Closed	Open
t_{PZH}	Open	Closed



NOTES:
1. C_L = 50 pF and includes scope probe, wiring and stray capacitance without device in test fixture.
2. $t_r = t_f$ = 3.0 ns, f = 1.0 MHz, and t_{pw} = 800 ns.

FIGURE 5. Output enable and disable test circuit and waveforms.

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 3.1 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 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, 10**, 11**
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
Additional electrical subgroups for group C periodic inspections	---

* PDA applies to subgroup 1.
** Subgroups 10 and 11, if not tested, shall be guaranteed to the limits specified in table I.

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/
5962-8670701RX	34335	AM2965/BRA
5962-86707012X	34335	AM2965/B2C
5962-8670702RX	34335	AM2966/BRA
5962-86707022X	34335	AM2966/B2C

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
34335	Advanced Micro Devices, Incorporated 901 Thompson Place Sunnyvale, CA 94088