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Defense Electronics Supply Center Dayton, Ohio	PREPARED BY Rich C. Offner	**MILITARY DRAWING** This drawing is available for use by all Departments and Agencies of the Department of Defense
	CHECKED BY D A DiCenzo	
Original date of drawing: 07 August 1987	APPROVED BY M J Kaucic	TITLE: MICROCIRCUITS, DIGITAL, PROGRAMMABLE ARRAY LOGIC, MONOLITHIC SILICON
	SIZE A / CODE IDENT. NO. 67268	DWG NO. 5962-87528
AMSC N/A	REV	PAGE 1 OF 13

5962-E288

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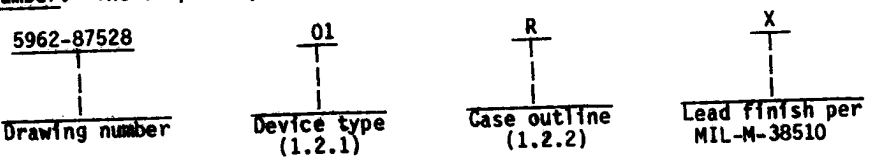
DESC FORM 193
MAY 86

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:



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

Device type	Generic number	Circuit function
01	PAL18P8A	18-input, 8-output AND-OR programmable array logic
02	PAL18P8B	18-input, 8-output AND-OR programmable array logic
03	PAL18P8AL	18-input, 8-output AND-OR programmable array logic
04	PAL18P8L	18-input, 8-output AND-OR programmable array logic
05	PAL18P8Q	18-input, 8-output AND-OR programmable array logic

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
S	F-9 (20-lead, 1/4" x 1/2"), flat package
2	C-2 (20-terminal, .350" x .350"), square chip carrier package

1.3 Absolute maximum ratings. 1/

Supply voltage range	-0.5 V to +7.0 V 2/
Input voltage range	-0.5 V to +5.5 V
Output voltage applied	-0.5 V to +7.0 V 2/
Output sink current	-90 mA 2/
Thermal resistance, junction-to-case (θ_{JC}):	
Cases R and S	See MIL-M-38510, appendix C
Case 2	15°C/W 3/
Maximum power dissipation (P_D) 4/	1.2 W
Maximum junction temperature (T_J)	+175°C
Lead temperature (soldering, 10 seconds maximum)	+260°C
Storage temperature	-65°C to +150°C

1.4 Recommended operating conditions. 1/

Supply voltage (V_{CC})	4.5 V to 5.5 V
High-level input voltage (V_{IH})	2.0 V (minimum)
Low-level input voltage (V_{IL})	0.8 V (maximum)
Case operating temperature range	-55°C to +125°C

1/ All voltages referenced to ground.
2/ Except during programming. Current into the output during programming (one second maximum duration) is 200 mA maximum.
3/ When a thermal resistance value is included in MIL-M-38510, appendix C it shall supersede the value stated herein.
4/ Must withstand the added P_D due to short circuit test (e.g., I_{OS}).

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.

3.2.2.1 Unprogrammed devices. The truth table for unprogrammed devices for contracts involving no altered item drawing shall be as specified on figure 2. When required in groups A, B, or C (see 4.3.1c), the devices shall be programmed by the manufacturer prior to test in a checkerboard pattern (a minimum of 50 percent of the total number of gates programmed) or to any altered item drawing pattern which includes at least 25 percent of the total number of gates programmed.

3.2.2.2 Programmed devices. The truth table for programmed devices shall be as specified by an altered item drawing.

3.2.3 Logic diagram. The logic diagram for unprogrammed devices 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.

TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions 1/ $-55°C \le T_C \le +125°C$	Group A subgroups	Device types	Limits Min	Limits Max	Unit
Input clamp voltage	V_{IC}	V_{CC} = 4.5 V, I_I = -18 mA	1, 2, 3	All		-1.2	V
High-level output voltage	V_{OH}	I_O =-2.0 mA, V_{CC} = 4.5 V, V_{IN} = 0.8 V or 2.0 V	1, 2, 3	All	2.4		V
Low-level output voltage	V_{OL}	V_{CC} = 4.5 V, V_{IN} = 0.8 V or 2.0 V (I_O = 12.0 mA)	1, 2, 3	01-04		0.5	V
		(I_O = 8.0 mA)		05			
High-level input current	I_{IH}	V_{IH} = 2.7 V, V_{CC} = 5.5 V	1, 2, 3	All		25	µA
		V_{IH} = 5.5 V, V_{CC} = 5.5 V	1, 2, 3	All		1.0	mA
Low-level input current	I_{IL}	V_{IL} = 0.4 V, V_{CC} = 5.5 V	1, 2, 3	All		-100	µA
Supply current	I_{CC}	V_{CC} = 5.5 V, inputs = GND	1, 2, 3	01,02		180	mA
				03,04		90	
				05		55	
Output short 2/ circuit current	I_{OS}	V_{CC} = 5.5 V, V_O = 0.5 V	1, 2, 3	All	-30	-90	mA
Output leakage current	I_{OZL}	V_O = 0.4 V, V_{CC} = 5.5 V 3/	1, 2, 3	All		-250	µA
	I_{OZH}	V_O = 2.7 V, V_{CC} = 5.5 V 3/	1, 2, 3	All		100	µA
Propagation delay data input to output	t_{PHL}	V_{CC} = 4.5 V to 5.5 V, See figure 4, tested with switch S_1 closed 4/	9,10,11	02		20	ns
				01,03		30	
				04,05		40	

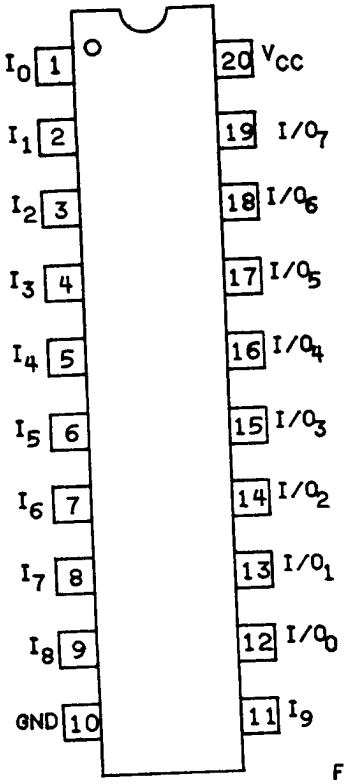
See footnotes at end of table.

TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions 1/ $-55°C \le T_C \le +125°C$	Group A subgroups	Device types	Limits Min	Limits Max	Unit
Propagation delay data input to output	t_{PLH}	V_{CC} = 4.5 V to 5.5 V See figure 4 4/ tested with switch S_1 closed	9, 10, 11	02		20	ns
				01,03		30	
				04,05		40	
Propagation delay input to output enable	t_{PZL}	V_{CC} = 4.5 V to 5.5 V See figure 4 4/ 5/	9, 10, 11	02		20	ns
				01,03		30	
				04,05		40	
Propagation delay input to output enable	t_{PZH}		9, 10, 11	02		20	ns
				01,03		30	
				04,05		40	
Propagation delay input to output disable	t_{PHZ}	V_{CC} = 4.5 V to 5.5 V See figure 4 4/ 5/	9, 10, 11	02		20	ns
				01,03		30	
				04,05		40	
Propagation delay input to output disable	t_{PLZ}		9, 10, 11	02		20	ns
				01,03		30	
				04,05		40	

1/ All voltages are referenced to ground.
2/ Only one output shorted at a time. Duration of short not to exceed one second.
3/ V_{IL} = 0.8 V, V_{IH} = 2.0 V.
4/ These parameters are tested at V_{IL} = 0.0 V and V_{IH} = 3.0 V.
5/ For three-state output, output enable times are tested with C_L = 50 pF to the 1.5V level; S_1 is open for high-impedance to high tests and closed for high-impedance to low tests. Output disable times are tested with C_L = 5 pF. High to high-impedance tests are made to an output voltage of V_{OH}-0.5 V with S_1 open; low to high-impedance tests are made to the V_{OL}+0.5 V level with S_1 closed.

Cases R and S



Case 2

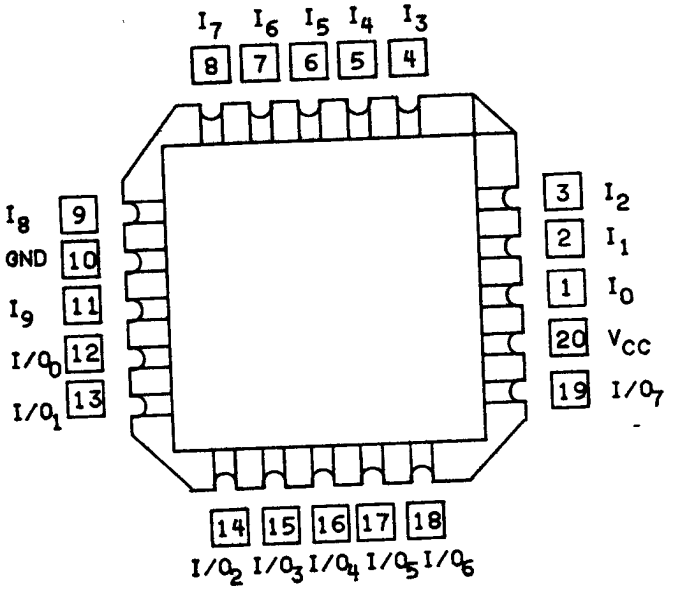


FIGURE 1. Terminal connections.

Fusible link type 1/	Inputs (all)	Outputs (all)
A	X	Z
B	X	L

NOTE: X = logic "don't care" state, Z = logic "high impedance" state, L = logic "low" state

1/ See 6.4.

FIGURE 2. Truth table (unprogrammed).

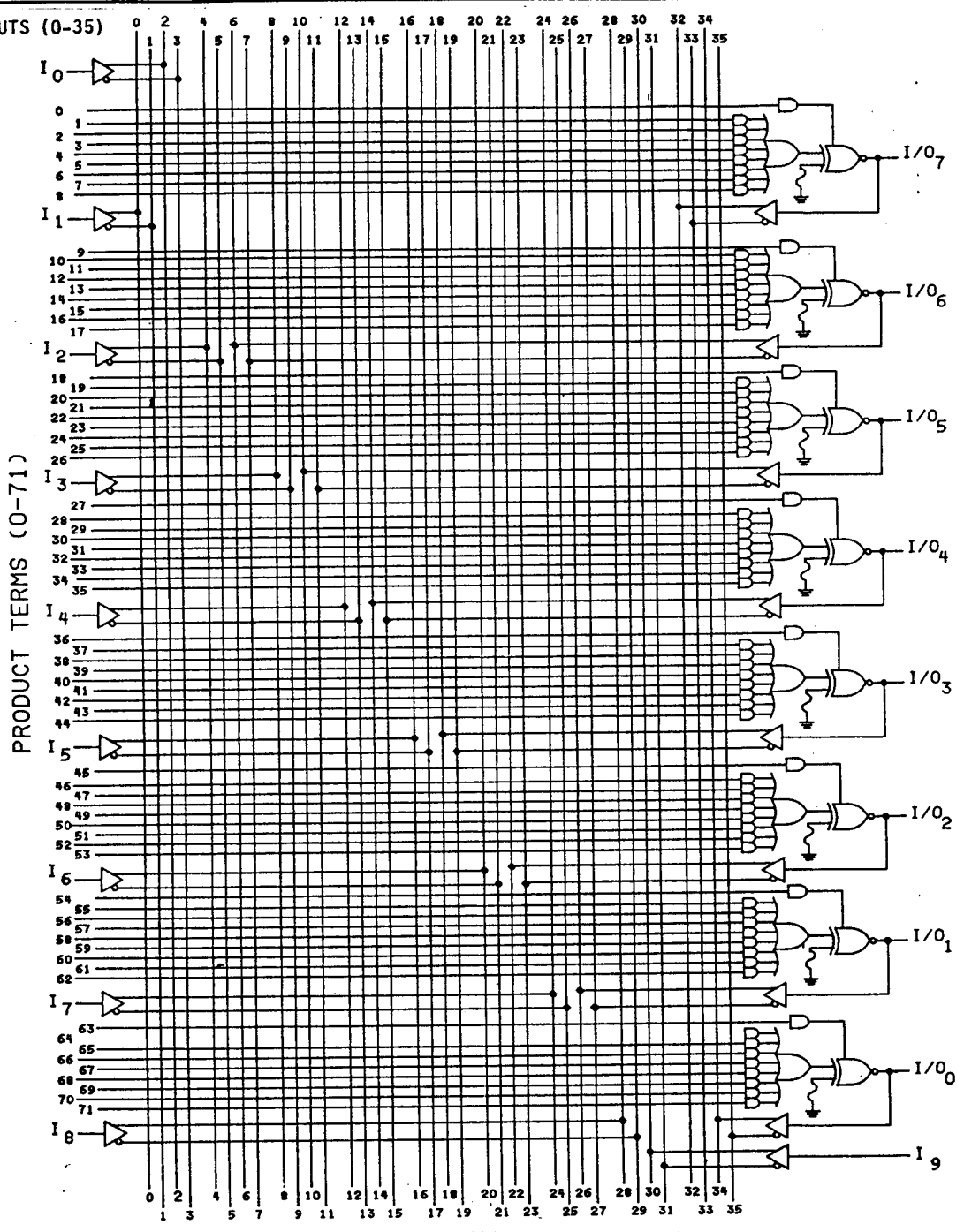
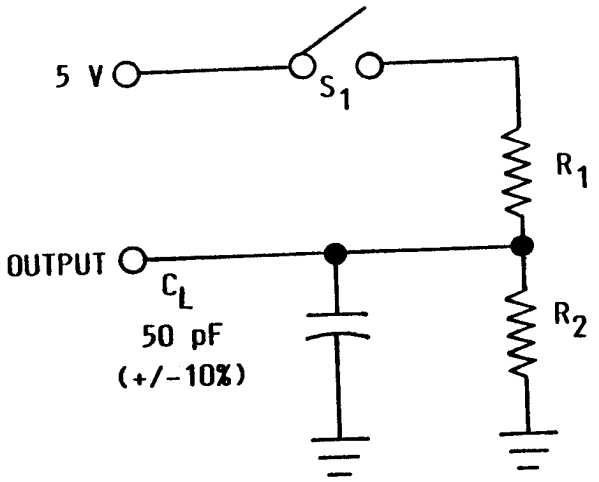


FIGURE 3. Logic diagram (unprogrammed).



Test output loads		
Device type	R_1 (ohms)	R_2 (ohms)
01 - 04	390 (±5%)	750 (±5%)
05	600 (±5%)	1200 (±5%)

NOTE: Capacitors may be used to bypass V_{CC} during testing.

FIGURE 4. Switching times test circuit.

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.

3.9 Processing options. Since the device is capable of being programmed by either the manufacturer or the user to result in a wide variety of configurations; two processing options are provided for selection in the contract, using an altered item drawing.

3.9.1 Unprogrammed device delivered to the user. All testing shall be verified through group A testing as defined in 3.2.2.1 and table II. It is recommended that users perform subgroups 7 and 9 after programming to verify the specific program configuration.

3.9.2 Manufacturer-programmed device delivered to the user. All testing requirements and quality assurance provisions herein, including the requirements of the altered item drawing, shall be satisfied by the manufacturer prior to delivery.

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.

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. Unprogrammed devices shall be tested for programmability and ac performance compliance to the requirements of group A, subgroups 9, 10, and 11. Either of two techniques is acceptable:

(1) Testing the entire lot using additional built-in test circuitry which allows the manufacturer to verify programmability and ac performance without programming the user array. If this is done, the resulting test patterns shall be verified on all devices during subgroups 9, 10, and 11, group A testing in accordance with the sampling plan specified in MIL-STD-883, method 5005.

(2) If such compliance cannot be tested on an unprogrammed device, a sample shall be selected to satisfy programmability requirements prior to performing subgroups 9, 10, and 11. Twelve devices shall be submitted to programming (see 3.2.2.1). If more that two devices fail to program, the lot shall be rejected. At the manufacturer's option, the sample may be increased to twenty-four total devices with no more than four total device failures allowable. Ten devices from the programmability sample shall be submitted to the requirements of group A, subgroups 9, 10, and 11. If more than two total devices fail, the lot shall be rejected. At the manufacturer's option, the sample may be increased to twenty total devices with no more than four total device failures allowable.

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.

4.4 Programming procedures. The programming procedures shall be as specified by the device manufacturer.

TABLE II. Electrical test requirements. 1/ 2/ 3/

MIL-STD-883 test requirements	Subgroups (per method 5005, table I)
Interim electrical parameters (method 5004)	1
Final electrical test parameters (method 5004) for programmed devices	1*, 2, 3, 7*, 8
Final electrical test parameters (method 5004) for unprogrammed devices	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

1/ (*) indicates PDA applies to subgroups 1 and 7.
2/ Any or all subgroups may be combined when using high-speed testers.
3/ Subgroups 7 and 8 functional tests shall also verify that no fuses are blown for unprogrammed devices or that the altered item drawing pattern exists for programmed devices (see table II).

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

6.4 Approved sources of supply. Approved sources of supply are listed herein. Additional sources will be added as they become available. The vendors listed herein have agreed to this drawing and certificates of compliance (see 3.5 herein) have been submitted to DESC-ECS.

Military drawing part number	Vendor CAGE number	Vendor similar part number 1/
5962-8752801RX	34335	AmPAL18P8A/BRA
5962-8752801RX	18324	PLHS18P8A/BRA
5962-87528012X	34335	AmPAL18P8A/B2A
5962-87528012X	18324	PLHS18P8A/B2X
5962-8752801SX	34335	AmPAL18P8A/BSA
5962-8752802RX	34335	AmPAL18P8B/BRA
5962-87528022X	34335	AmPAL18P8B/B2A
5962-8752802SX	34335	AmPAL18P8B/BSA
5962-8752803RX	34335	AmPAL18P8AL/BRA
5962-87528032X	34335	AmPAL18P8AL/B2A
5962-8752803SX	34335	AmPAL18P8AL/BSA
5962-8752804RX	34335	AmPAL18P8L/BRA
5962-87528042X	34335	AmPAL18P8L/B2A
5962-8752804SX	34335	AmPAL18P8L/BSA

See footnote at end of table.

Military drawing part number	Vendor CAGE number	Vendor similar part number 1/
5962-8752805RX	34335	AmPAL18P8Q/BRA
5962-87528052X	34335	AmPAL18P8Q/B2A
5962-8752805SX	34335	AmPAL18P8Q/BSA

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	Fusible link
18324	Signetics Corporation 4130 South Market Court Sacramento, CA 95834	B (zapped vertical emitter)
34335	Advanced Micro Devices, Incorporated 901 Thompson Place P.O. Box 3453 Sunnyvale, CA 94088	A (platinum-silicide)