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5 October 2007
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MIL-M-38510/207D
16 February 2007

MILITARY SPECIFICATION

MICROCIRCUIT, DIGITAL, 256-BIT, SCHOTTKY, BIPOLAR, PROGRAMMABLE READ-ONLY MEMORY (PROM), MONOLITHIC SILICON

Inactive for new design after 24 July 1995

This specification is approved for use by all Departments and Agencies of the Department of Defense.

The requirements for acquiring the product herein shall consist of this specification sheet and MIL-PRF 38535.

1. SCOPE

1.1 Scope. This specification covers the detail requirements for monolithic silicon, PROM microcircuits which employ thin film nichrome (NiCr) resistors, tungsten (W), titanium tungsten (TiW), or zapped vertical emitter (ZVE) as the fusible link or programming element. Two product assurance classes and a choice of case outlines and lead material and finishes are provided for each type and are reflected in the complete part number. For this product, the requirements of MIL-M-38510 have been superseded by MIL-PRF-38535, (see 6.4).

1.2 Part or Identifying Number (PIN). The PIN is in accordance with MIL-PRF-38535, and as specified herein.

1.2.1 Device types. The device types are as follows:

Device type	Circuit
01, 03	32 word / 8 bits per word PROM with open collector
02, 04	32 word / 8 bits per word PROM with tri-state output

1.2.2 Device class. The device class is the product assurance level as defined in MIL-PRF-38535.

1.2.3 Case outlines. The case outlines are as designated in MIL-STD-1835 and as follows:

Outline letter	Descriptive designator	Terminals	Package style
E	GDIP1-T16 or CDIP2-T16	16	Dual-in-line
F	GDFP2-F16 or CDFP3-F16	16	Flat pack

Comments, suggestions, or questions on this document should be addressed to: Commander, Defense Supply Center Columbus, ATTN: DSCC-VAS, P. O. Box 3990, Columbus, OH 43218-3990, or emailed to memory@dscc.dla.mil. Since contact information can change, you may want to verify the currency of this address information using the ASSIST Online database at http://assist.daps.dla.mil

1.3 Absolute maximum ratings.

Supply voltage range	-0.5 V dc to +7.0 V dc
Input voltage range	-1.5 V dc at -10 mA to +5.5 V dc
Storage temperature range	-65° to +150°C
Lead temperature (soldering, 10 seconds)	+300°C
Thermal resistance, junction to case (θ_{JC}):	
Cases E and F	See MIL-STD-1835 1/
Output voltage applied	-0.5 V dc to +V_{CC}
Output sink current	100 mA
Maximum power dissipation (P_D)	739 mW dc 2/
Maximum junction temperature (T_J)	+175°C 3/

1.4 Recommended operating conditions.

Supply voltage range (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
Normalized fanout (each output)	16 mA
Case operating temperature range (T_C)	-55 °C to +125 °C

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3, 4, or 5 of this specification. This section does not include documents cited in other sections of this specification or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements of documents cited in sections 3, 4, or 5 of this specification, whether or not they are listed.

2.2 Government documents.

2.2.1 Specifications and Standards. The following specifications and standards form a part of this specification to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

DEPARTMENT OF DEFENSE SPECIFICATIONS

MIL-PRF-38535 - Integrated Circuits (Microcircuits) Manufacturing, General Specification for.

DEPARTMENT OF DEFENSE STANDARDS

MIL-STD-883 - Test Method Standard for Microelectronics.
MIL-STD-1835 - Interface Standard Electronic Component Case Outline

(Copies of these documents are available online at http://assist.daps.dla.mil/quicksearch/ or http://assist.daps.dla.mil or from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

1/ Heat sinking is recommended to reduce the junction temperature.
2/ Must withstand the added P_D due to short circuit test (e.g. I_{OS}).
3/ Maximum junction temperature shall not be exceeded except for allowable short duration burn-in screening conditions per method 5004 of MIL-STD-883.

2.3 Order of precedence. In the event of a conflict between the text of this specification and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 Qualification. Microcircuits furnished under this specification shall be products that are manufactured by a manufacturer authorized by the qualifying activity for listing on the applicable qualified manufacturers list before contract award (see 4.3 and 6.3).

3.2 Item requirements. The individual item requirements shall be in accordance with MIL-PRF-38535 and as specified herein or as modified in the device manufacturer's Quality Management (QM) plan. The modification in the QM plan shall not affect the form, fit, or function as described herein.

3.3 Design, construction, and physical dimensions. The design, construction, and physical dimensions shall be as specified in MIL-PRF-38535 and herein.

3.3.1 Terminal connections. The terminal connections shall be as specified on figure 1.

3.3.2 Truth tables.

3.3.2.1 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 inspection (see 4.4), 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 bits programmed) or to any altered item drawing pattern which includes at least 25 percent of the total number of bits programmed.

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

3.3.3 Functional block diagram. The functional block diagram shall be as specified on figure 3.

3.3.4 Case outlines. The case outlines shall be as specified in 1.2.3.

3.4 Lead material and finish. The lead material and finish shall be in accordance with MIL-PRF-38535 (see 6.6).

3.5 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.

3.6 Electrical test requirements. The electrical test requirements for each device class shall be the subgroups specified in table II. The electrical tests for each subgroup are described in table III.

3.7 Marking. Marking shall be in accordance with MIL-PRF-38535.

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

3.8.1 Unprogrammed PROM delivered to the user. All testing shall be verified through group A testing as defined in 3.3.2.1, table II, and table III. It is recommended that users perform subgroups 7 and 9 after programming to verify the specific program configuration.

3.8.2 Manufacture-programmed PROM 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.

3.9 Microcircuit group assignment. The devices covered by this specification shall be in microcircuit group number 14 (see Appendix A MIL-PRF-38535.)

TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions 1/ $-55°C \le T_C \le +125°C$ unless other wise specified	Device type	Limits		Units
				Min	Max	
High-level output voltage	V_{OH}	V_{CC} = 4.5 V, I_{OH} = -2 mA, V_{IL} = 0.8 V, V_{IH} = 2.0 V	02, 04	2.4		V
Low-level output voltage	V_{OL}	V_{CC} = 4.5 V, I_{OL} = 16 mA, V_{IL} = 0.8 V, V_{IH} = 2.0 V	01, 02, 03, 04		0.5	V
Input clamp voltage	V_{IC}	V_{CC} = 4.5 V, I_{IN}= -10 mA, T_C = +25ºC	01, 02, 03, 04		-1.5	V
Maximum collector cut-off current	I_{CEX1}	V_{CC} = 5.5 V, V_{OH} = 5.2 V	01, 03		100	µA
High impedance (off-state) output high current	I_{OHZ}	V_{CC} = 5.5 V, V_{OH} = 5.2 V	02, 04		40	µA
High impedance (off-state) output low current	I_{OLZ}	V_{CC} = 5.5 V, V_{OL} = 0.5 V	02, 04		-40	µA
High level input current	I_{IH1}	V_{CC} = 5.5 V, V_{IN} = 5.5 V	01, 02, 03, 04		50	µA
	I_{IH2}	V_{CC} = 5.5 V, V_{IN} = 4.5 V , special programming pin			100	
Low level input current	I_{IL}	V_{CC} = 5.5 V, V_{IN} = 0.5 V	01, 02, 03, 04	-1.0	-250	µA
Short circuit output current	I_{OS}	V_{CC} = 5.5 V, 2/ V_O = 0.0 V	02, 04	-10	-100	mA
Supply current	I_{CC}	V_{CC} = 5.5 V, V_{IN} = 0 V, outputs = open	01, 02, 03, 04		130	mA
Propagation delay time, high to low level logic, address to output	t_{PHL1}	V_{CC} = 4.5 V and 5.5 V, C_L = 30 pF, see figure 4	01, 02		80	ns
			03, 04		35	
Propagation delay time, low to high level logic, address to output	t_{PLH1}	V_{CC} = 4.5 V and 5.5 V, C_L = 30 pF, see figure 4	01, 02		80	ns
			03, 04		35	
Propagation delay time, high to low level logic, enable to output	t_{PHL2}	V_{CC} = 4.5 V and 5.5 V, C_L = 30 pF, see figure 4	01, 02		50	ns
			03, 04		25	
Propagation delay time, low to high level logic, enable to output	t_{PLH2}	V_{CC} = 4.5 V and 5.5 V, C_L = 30 pF, see figure 4	01, 02		50	ns
			03, 04		25	

1/ Complete terminal conditions shall be specified in table III.
2/ Not more than one output shall be grounded at one time. Output shall be at high logic level prior to test.

Device types	01, 02, 03, and 04
Case outlines	E and F
Terminal number	Terminal symbol
1	O_1
2	O_2
3	O_3
4	O_4
5	O_5
6	O_6
7	O_7
8	GND
9	O_8
10	A_0
11	A_1
12	A_2
13	A_3
14	A_4
15	$\overline{CE}$
16	V_{CC}

FIGURE 1. Terminal connections.

Word number	$\overline{CE}$	Address				
		A_4	A_3	A_2	A_1	A_0
NA	L	X	X	X	X	X
NA	H	X	X	X	X	X

Word number	$\overline{CE}$	DATA							
		O_1	O_2	O_3	O_4	O_5	O_6	O_7	O_8
NA	L	5/	5/	5/	5/	5/	5/	5/	5/
NA	H	OC	OC	OC	OC	OC	OC	OC	OC

NOTES:

1. NA = Not applicable.
2. X = Input may be high level, low level or open circuit.
3. OC = Open circuit (high resistance output).
4. Program readout can only be accomplished with enable input at low level.
5. The outputs for an unprogrammed device shall be high for circuits A and B; and shall be low for circuits C, G, and H.

FIGURE 2. Truth table (unprogrammed).

CIRCUITS A AND B

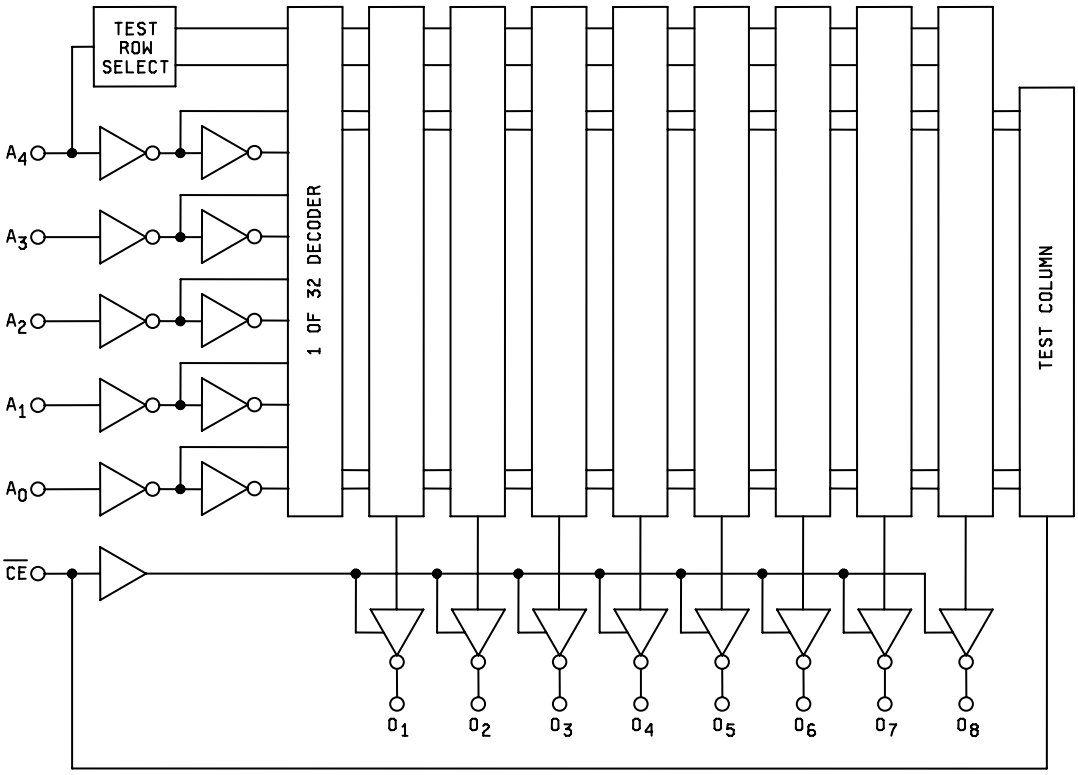
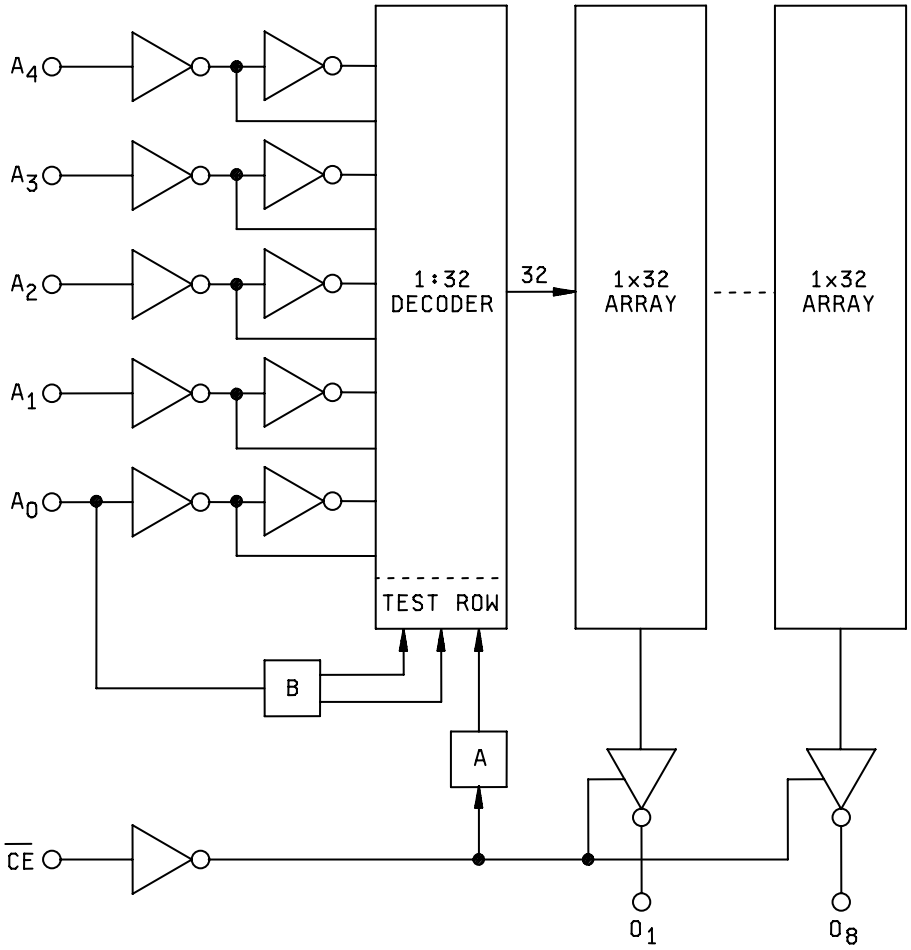


FIGURE 3. Functional block diagrams.

CIRCUIT C



NOTE: This circuit is also used as circuit H.

FIGURE 3. Functional block diagrams – Continued.

CIRCUIT G

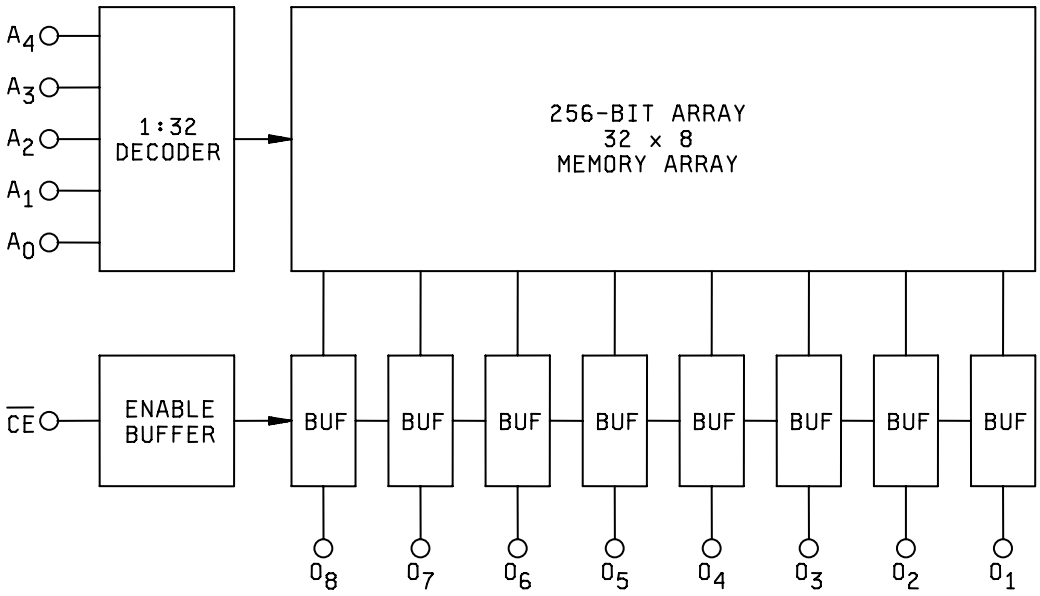
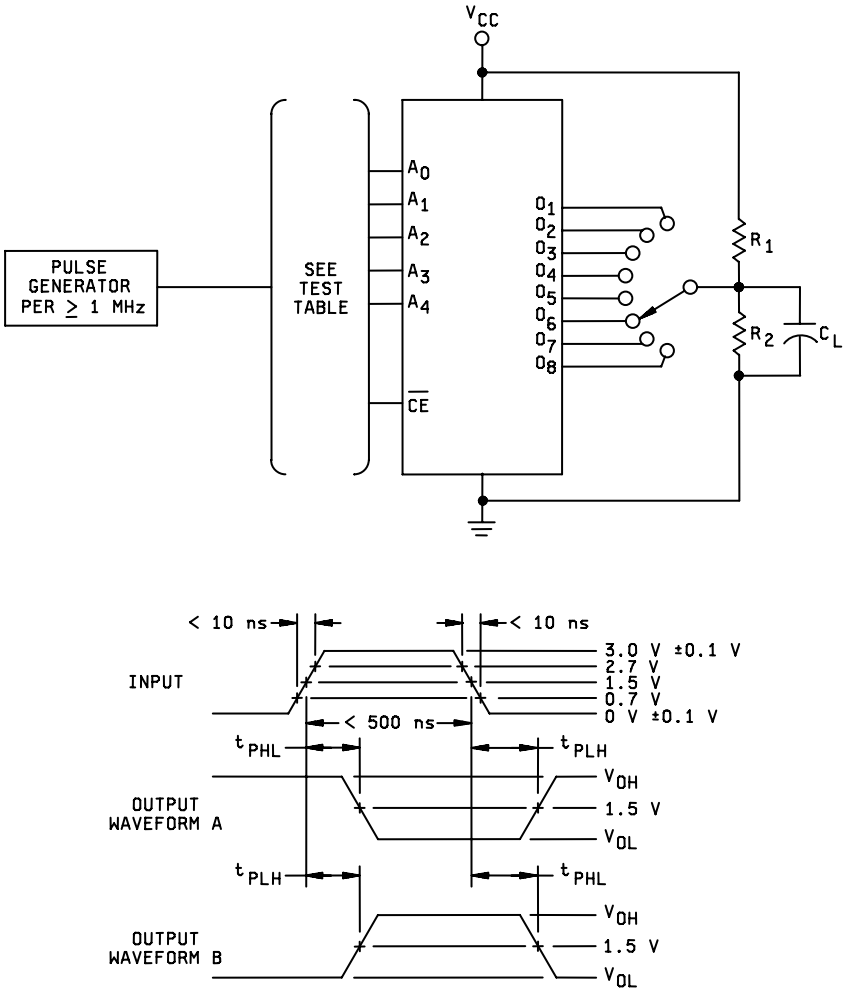


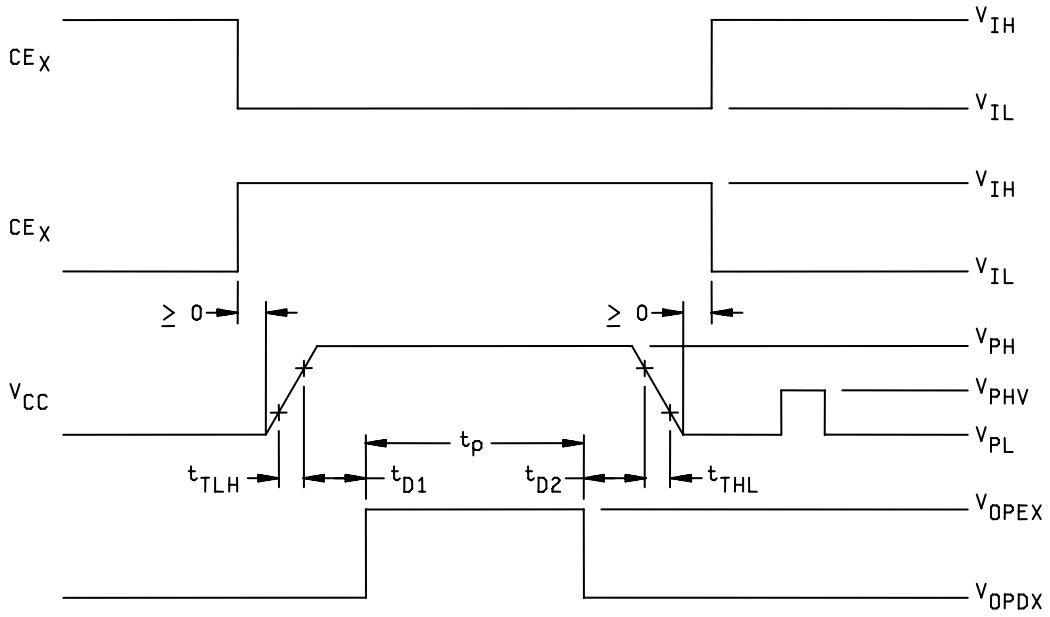
FIGURE 3. Functional block diagrams – Continued.



NOTES:

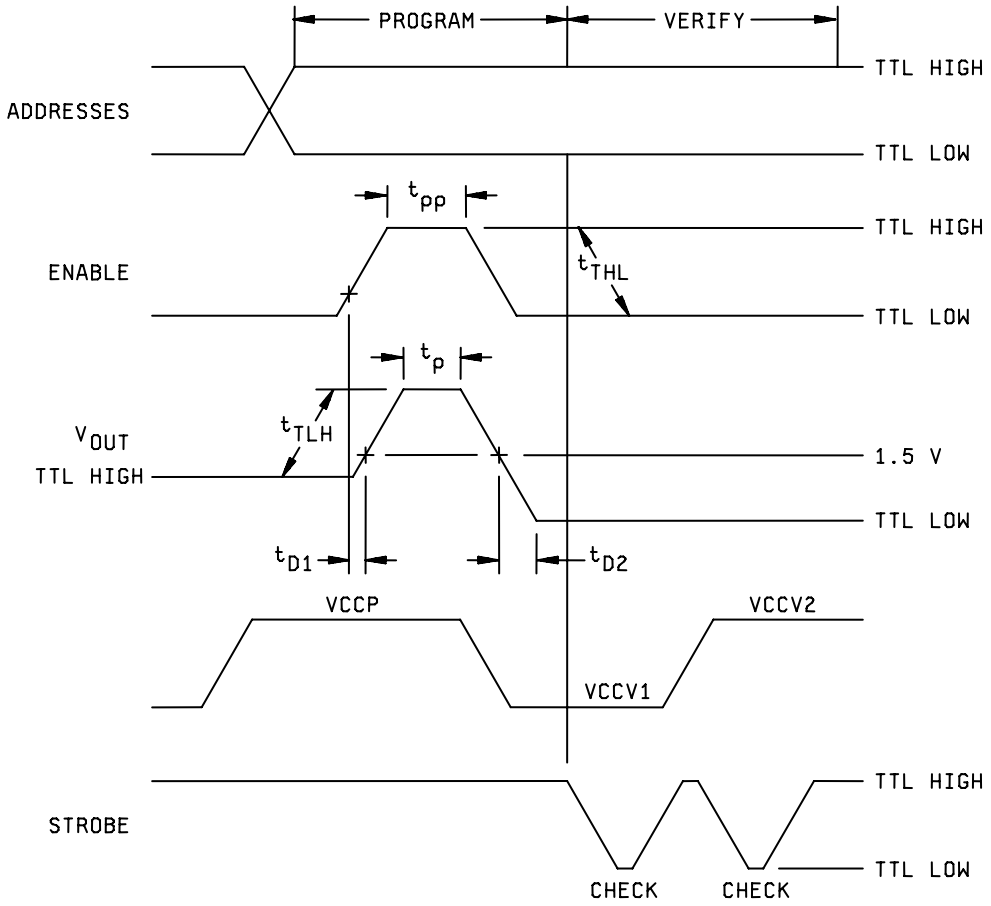
1. Test table for devices programmed in accordance with an altered item drawing may be replaced by the equivalent tests which apply to the specific program configuration for the resulting read-only memory.
2. C_L = 30 pF minimum, including jig and probe capacitance; R_1 = 330 Ω ±25% and R_2 = 680 Ω ±20 %.
3. Outputs may be under load simultaneously.

FIGURE 4. Switching time test circuit.



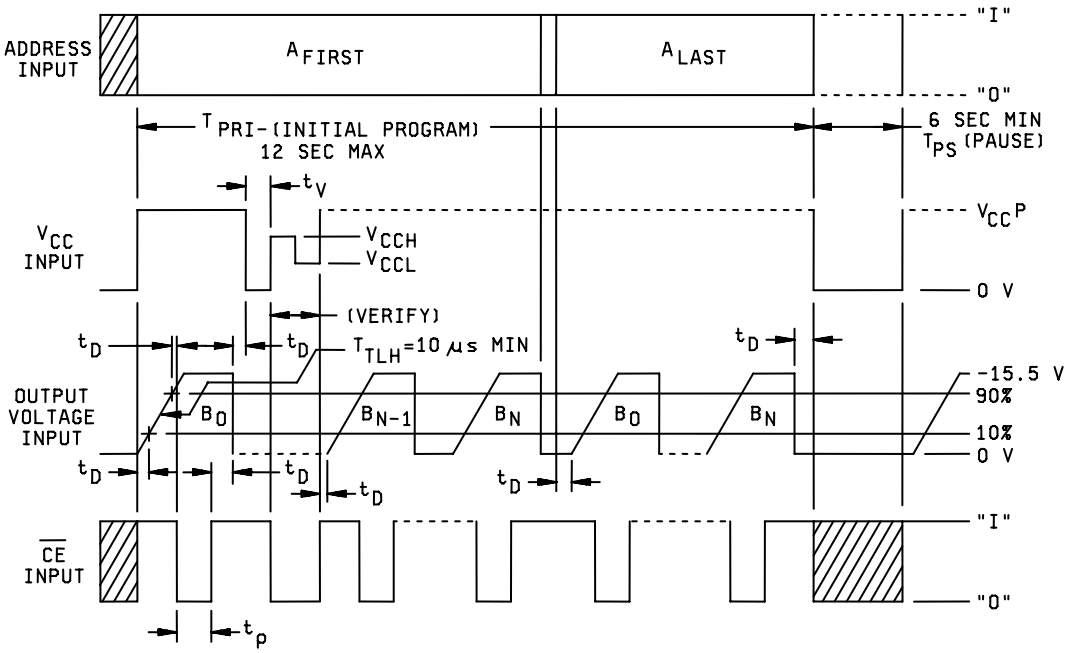
NOTE: All other waveform characteristics shall be as specified in table IVA.

FIGURE 5A. Typical programming voltage waveforms during programming for circuit A.



NOTES:
1. Output load is 0.2 mA and 12 mA during 7.0 V and 4.0 V check respectively.
2. All other waveform characteristics shall be as specified in table IVB.

FIGURE 5B. Typical programming voltage waveforms during programming for circuit B.



NOTE: All other waveform characteristics shall be as specified in tables IVC.

FIGURE 5C. Typical programming voltage waveforms during programming for circuit C.

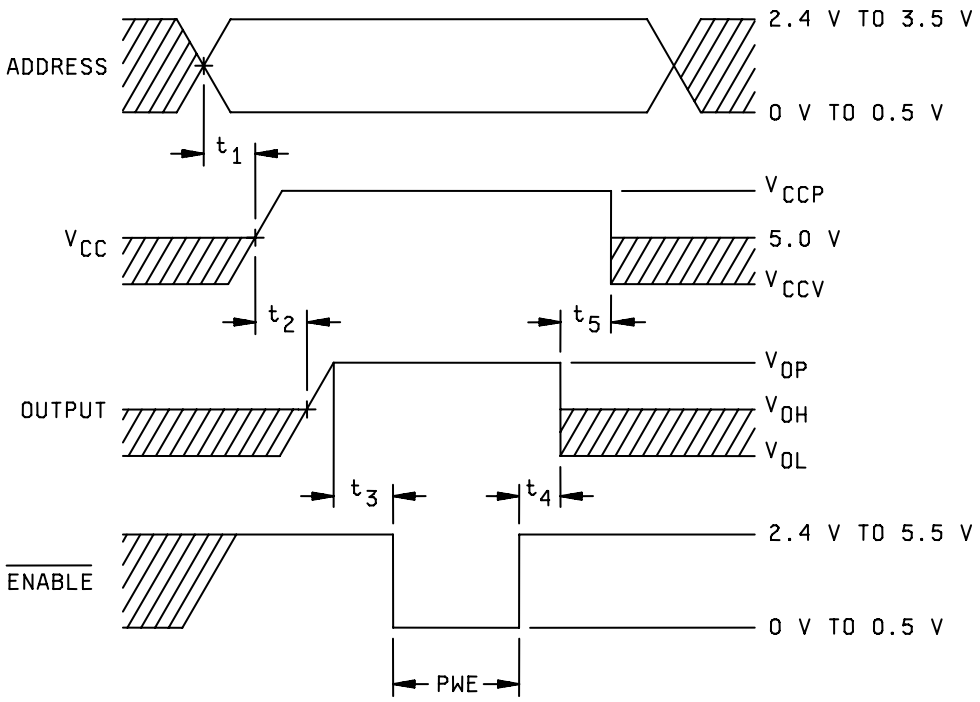
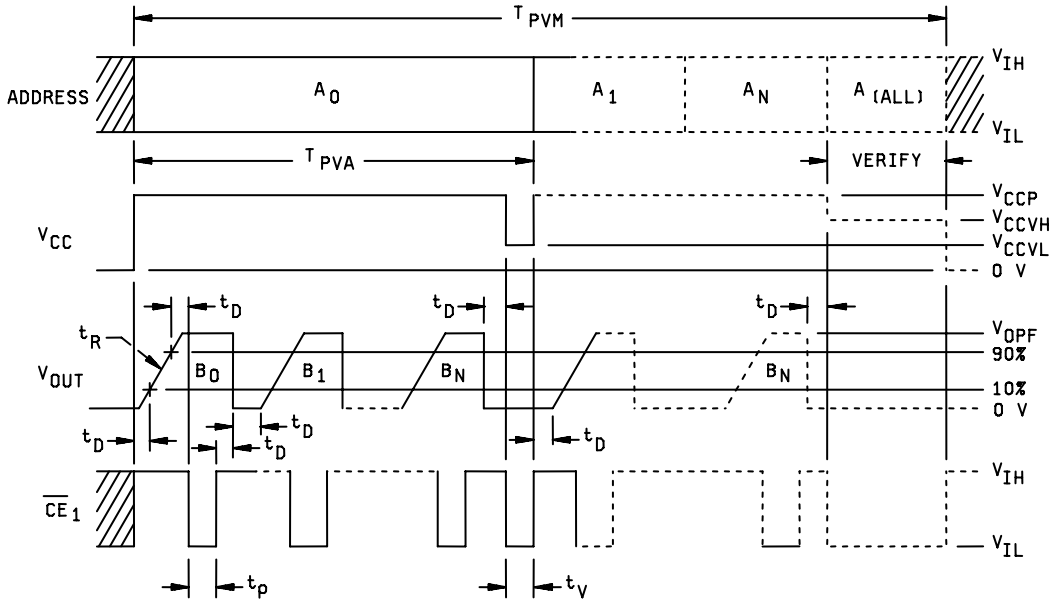


FIGURE 5D. Typical programming voltage waveforms during programming for circuit G.



NOTES:

1. All other waveform characteristics shall be as specified in tables IVH.
2. Programming verification at both high and low V_{CC} margins is optional. For convenience, verification can also be executed at the operating V_{CC} limits specified in the dc characteristics.

FIGURE 5E. Typical programming voltage waveforms during programming for circuit H.

4. VERIFICATION

4.1 Sampling and inspection. Sampling and inspection procedures shall be in accordance with MIL-PRF-38535 or as modified in the device manufacturer's Quality Management (QM) plan. The modification in the QM plan shall not affect the form, fit, or function as described herein.

4.2 Screening. Screening shall be in accordance with MIL-PRF-38535 and shall be conducted on all devices prior to qualification and quality conformance inspection. The following additional criteria shall apply:

a. The burn-in test duration, test condition, and test temperature, or approved alternatives shall be as specified in the device manufacturer's QM plan in accordance with MIL-PRF-38535. The burn-in test circuit shall be maintained under document control by the device manufacturer's Technology Review Board (TRB) in accordance with MIL-PRF-38535 and shall be made available to the acquiring or preparing activity upon request. The test circuit shall specify the inputs, outputs, biases, and power dissipation, as applicable, in accordance with the intent specified in test method 1015 of MIL-STD-883.

b. Interim and final electrical test parameters shall be as specified in table II, except interim electrical parameters test prior to burn-in is optional at the discretion of the manufacturer.

c. Additional screening for space level product shall be as specified in MIL-PRF-38535, appendix B.

d. Class B devices processed to an altered item drawing may be programmed either before or after burn-in at the manufacturer’s discretion. The required electrical testing shall include, as a minimum, the final electrical tests for programmed devices as specified in table II herein. Class S devices processed by the manufacturer to an altered item drawing shall be programmed prior to burn-in.

4.3 Qualification inspection. Qualification inspection shall be in accordance with MIL-PRF-38535. Qualification data for subgroups 7 through 11 shall be by attributes only.

4.3.1 Qualification extension. When authorized by the qualifying activity, for qualification inspection, if a manufacturer qualifies faster device type which is manufactured identically to slower device types on this specification, then the slower device types may be qualified by conducting only group A electrical tests and any electrical specified as additional group C subgroups and submitting data in accordance with MIL-PRF-38535 (for example, groups B, C, and D tests are not required).

4.4 Technology Conformance inspection (TCI). Technology conformance inspection shall be in accordance with MIL-PRF-38535 and as specified herein for groups A, B, C, and D inspections (see 4.4.1 through 4.4.4).

4.4.1 Group A inspection. Group A inspection shall be in accordance with table III of MIL-PRF-38535 and as follows:

a. Electrical test requirements shall be as specified in table II herein.

b. Subgroups 4, 5, and 6 shall be omitted.

c. For unprogrammed devices, 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 3.3.2.1). If more than 2 devices fail to program, the lot shall be rejected. At the manufacturer’s option, the sample may be increased to 24 total devices with no more than 4 total device failures allowed.

d. For unprogrammed devices, 10 devices from the programmability sample shall be subjected to the requirements of group A, subgroups 9, 10, and 11. If more than two total devices fail in all three subgroups, the lot shall be rejected. At the manufacturer’s option, the sample may be increased to 20 total devices with no more than 4 total device failures allowable.

TABLE II. Electrical test requirements.

MIL-PRF-38535 test requirements	Subgroups (see table III) 1/, 2/, 3/	
	Class S devices	Class B devices
Interim electrical parameters	1	1
Final electrical test parameters for unprogrammed devices	1*, 2, 3, 7*, 8	1*, 2, 3, 7*, 8
Final electrical test parameters for programmed devices	1*, 2, 3, 7* 8, 9, 10, 11	1*, 2, 3, 7*, 8, 9,
Group A test requirements	1, 2, 3, 7, 8, 9, 10, 11	1, 2, 3, 7, 8 9, 10, 11
Group B end-point electrical parameters when using the method 5005 QCI option	1, 2, 3, 7, 8, 9, 10, 11	N/A
Group C end-point electrical parameters	1, 2, 3, 7, 8, 9, 10, 11	1, 2, 3, 7, 8
Group D test requirements	1, 2, 3, 7, 8	1, 2, 3, 7, 8

1/ * indicates PDA applies to subgroups 1 and 7 (see 4.2c).
2/ Any or all subgroups may be combined when using high-speed testers.
3/ Subgroups 7 and 8 shall consist of verifying the pattern specified.

4.4.2 Group B inspection. Group B inspection shall be in accordance with table II MIL-PRF-38535.

4.4.3 Group C inspection. Group C inspection shall be in accordance with table IV of MIL-PRF-38535 and as follows:

a. End-point electrical parameters shall be as specified in table II herein.

b. The steady-state life test duration, test condition, and test temperature, or approved alternatives shall be as specified in the device manufacturer's QM plan in accordance with MIL-PRF-38535. The burn-in test circuit shall be maintained under document control by the device manufacturer's Technology Review Board (TRB) in accordance with MIL-PRF-38535 and shall be made available to the acquiring or preparing activity upon request. The test circuit shall specify the inputs, outputs, biases, and power dissipation, as applicable, in accordance with the intent specified in test method 1005 of MIL-STD-883.

c. For qualification inspection, at least 50 percent of the sample selected for testing in subgroup 1 shall be programmed (see 3.3.2). For quality conformance inspection, the programmability sample (see 4.4.1c) shall be included in the life tests.

4.4.4 Group D inspection. Group D inspection shall be in accordance with table V of MIL-PRF-38535. End-point electrical parameters shall be as specified in table II herein.

TABLE III. Group A inspection for device types 01 and 03.
Terminal conditions (outputs not designated are open or resistive coupled to GND or voltage;
inputs not designated are ≥ 2.0 V, low ≤ 0.8 V).

Subgroup	Symbol	MIL-STD-883 method	Cases E,F Test no.	1 O_1	2 O_2	3 O_3	4 O_4	5 O_5	6 O_6	7 O_7	8 GND	9 O_8	10 A_0	11 A_1	12 A_2	13 A_3	14 A_4	15 $\overline{CE}$	16 V_{CC}	Measured terminal	Test limits Min	Test limits Max	Unit
1 T_C = 25°C	V_{IC}		1 2 3 4 5 6								GND “ “ “ “ “		-10mA	-10mA	-10mA	-10mA	-10mA	-10mA	-10mA	4.5V “ “ “ “ “	A_0 A_1 A_2 A_3 A_4 $\overline{CE}$		-1.5 “ “ “ “ “	V “ “ “ “ “
	V_{OL}	3007 “ “ “ “ “ “ “	7 8 9 10 11 12 13 14	16mA	16mA	16mA	16mA	16mA	16mA	16mA	“ “ “ “ “ “ “ “	16mA	1/ 2/ 3/ “ “ “ “ “ “ “	1/ 3/ “ “ “ “ “ “ “	1/ 3/ “ “ “ “ “ “ “	1/ 3/ “ “ “ “ “ “ “	1/ 2/ 3/ 4/ “ “ “ “ “ “ “	0.5V “ “ “ “ “ “ “	“ “ “ “ “ “ “ “	O_1 O_2 O_3 O_4 O_5 O_6 O_7 O_8		0.5 “ “ “ “ “ “ “	“ “ “ “ “ “ “ “
	I_{IL}	3009 “ “ “ “ “	15 16 17 18 19 20								“ “ “ “ “ “		0.5V	0.5V	0.5V	0.5V	0.5V	0.5V	5.5V “ “ “ “ “	A_0 A_1 A_2 A_3 A_4 $\overline{CE}$	-1.0 “ “ “ “	-250 “ “ “ “ “	µA “ “ “ “ “
	I_{IH1}	3010 “ “ “ “	21 22 23 24 25								“ “ “ “ “		5.5V	5.5V	5.5V	5.5V	5.5V		“ “ “ “ “	A_0 A_1 A_2 A_3 A_4		50 “ “ “ “	“ “ “ “ “
	I_{IH2}	“	26								“							4.5V 5/	“	$\overline{CE}$		100	“
	I_{CEX}	“ “ “ “ “ “ “ “	27 28 29 30 31 32 33 34	5.2V	5.2V	5.2V	5.2V	5.2V	5.2V	5.2V	“ “ “ “ “ “ “ “	5.2V						“ “ “ “ “ “ “ “	“ “ “ “ “ “ “ “	O_1 O_2 O_3 O_4 O_5 O_6 O_7 O_8		“ “ “ “ “ “ “ “	“ “ “ “ “ “ “ “
	I_{CC}	3005	35								“		GND	GND	GND	GND	GND	GND	“	V_{CC}		130	mA
2	Same tests, terminal conditions, and limits as for subgroup 1, except T_C = 125°C and V_{IC} tests are omitted.																						
3	Same tests, terminal conditions, and limits as for subgroup 1, except T_C = -55°C and V_{IC} tests are omitted.																						

See footnotes at end of table.

TABLE III. Group A inspection for device types 01 and 03 – Continued.
Terminal conditions (outputs not designated are open or resistive coupled to GND or voltage;
inputs not designated are ≥ 2.0 V, low ≤ 0.8 V, or open).

Subgroup	Symbol	MIL-STD-883 method	Cases E,F Test no.	1 O_1	2 O_2	3 O_3	4 O_4	5 O_5	6 O_6	7 O_7	8 GND	9 O_8	10 A_0	11 A_1	12 A_2	13 A_3	14 A_4	15 $\overline{CE}$	16 V_{CC}	Measured terminal	Test limits Min	Test limits Max	Unit
7 T_C = 25°C	Functional test	6/	36	6/	6/	6/	6/	6/	6/	6/	GND	6/	6/	6/	6/	6/	6/	6/	6/	O_1 O_2 O_3 O_4 O_5 O_6 O_7 O_8		6/	
8	Same tests, terminal conditions, and limits as for subgroup 7, except T_C = 125°C and -55°C.																						
9 T_C = 25°C	t_{PHL1}	GALPAT Fig. 4	37	7/	7/	7/	7/	7/	7/	7/	GND	7/	8/	8/	8/	8/	8/	GND	8/	Outputs		9/	ns
	t_{PLH1}	GALPAT Fig. 4	38	"	"	"	"	"	"	"	"	"	8/	8/	8/	8/	8/	GND	8/	"		9/	"
	t_{PHL2}	Sequential Fig. 4	39	"	"	"	"	"	"	"	"	"	10/	10/	10/	10/	10/	10/	10/	"		9/	"
	t_{PLH2}	Sequential Fig. 4	40	"	"	"	"	"	"	"	"	"	10/	10/	10/	10/	10/	10/	10/	"		9/	"
10	Same tests, terminal conditions, and limits as for subgroup 9, except T_C = 125°C.																						
11	Same tests, terminal conditions, and limits as for subgroup 9, except T_C = -55°C.																						

See footnotes at end of table.

TABLE III. Group A inspection for device types 02 and 04.
Terminal conditions (outputs not designated are open or resistive coupled to GND or voltage;
inputs not designated are ≥ 2.0 V, low ≤ 0.8 V).

Subgroup	Symbol	MIL-STD-883 method	Cases E,F Test no.	1 O_1	2 O_2	3 O_3	4 O_4	5 O_5	6 O_6	7 O_7	8 GND	9 O_8	10 A_0	11 A_1	12 A_2	13 A_3	14 A_4	15 $\overline{CE}$	16 V_{CC}	Measured terminal	Test limits Min	Test limits Max	Unit
1 T_C = 25°C	V_{IC}		1 2 3 4 5 6								GND " " " " "		-10mA	-10mA	-10mA	-10mA	-10mA	-10mA	4.5V " " " " "	A_0 A_1 A_2 A_3 A_4 $\overline{CE}$		-1.5 " " " " "	V " " " " "
	V_{OL}	3007 " " " " " "	7 8 9 10 11 12 13 14	16mA	16mA	16mA	16mA	16mA	16mA	16mA	" " " " " " " "	16mA	1/ 2/ 3/ " " " " " " "	1/ 3/ " " " " " " "	1/ 3/ " " " " " " "	1/ 3/ " " " " " " "	1/ 2/ 3/ 4/ " " " " " " "	0.5V " " " " " " "	" " " " " " " "	O_1 O_2 O_3 O_4 O_5 O_6 O_7 O_8		0.5 " " " " " " "	" " " " " " " "
	V_{OH}	3006 " " " " " "	15 16 17 18 19 20 21 22	-2.0mA	-2.0mA	-2.0mA	-2.0mA	-2.0mA	-2.0mA	-2.0mA	" " " " " " " "	-2.0mA	1/ 11/ 12/ 13/ " " " " " " "	1/ 11/ 12/ 13/ " " " " " " "	1/ 11/ 12/ 13/ " " " " " " "	1/ 11/ 12/ 13/ " " " " " " "	1/ 11/ 12/ 13/ " " " " " " "	1/ " " " " " " "	" " " " " " " "	O_1 O_2 O_3 O_4 O_5 O_6 O_7 O_8	2.4 " " " " " " "		" " " " " " " "
	I_{IL}	3009 " " " " "	23 24 25 26 27 28								" " " " " " "		0.5V	0.5V	0.5V	0.5V	0.5V	0.5V	5.5V " " " " "	A_0 A_1 A_2 A_3 A_4 $\overline{CE}$	-1.0 " " " " "	-250 " " " " "	µA " " " " "
	I_{IH1}	3010 " " " "	29 30 31 32 33								" " " " " "		5.5V	5.5V	5.5V	5.5V	5.5V		" " " " "	A_0 A_1 A_2 A_3 A_4		50 " " " " "	" " " " "
	I_{IH2}	"	34								"							4.5V 4/	"	$\overline{CE}$		100	"
	I_{OHZ}		35 36 37 38 39 40 41 42	5.2V	5.2V	5.2V	5.2V	5.2V	5.2V	5.2V	" " " " " " " "	5.2V						5.5V " " " " " " "	" " " " " " " "	O_1 O_2 O_3 O_4 O_5 O_6 O_7 O_8		40 " " " " " " "	" " " " " " " "

See footnotes at end of table.

TABLE III. Group A inspection for devices type 02 and 04 – Continued.
Terminal conditions (outputs not designated are open or resistive coupled to GND or voltage;
inputs not designated are ≥ 2.0 V, low ≤ 0.8 V).

Subgroup	Symbol	MIL-STD-883 method	Cases E,F Test no.	1 O_1	2 O_2	3 O_3	4 O_4	5 O_5	6 O_6	7 O_7	8 GND	9 O_8	10 A_0	11 A_1	12 A_2	13 A_3	14 A_4	15 $\overline{CE}$	16 V_{CC}	Measured terminal	Test limits Min	Test limits Max	Unit
1 T_C = 25°C	I_{OLZ}		43	0.5V	0.5V	0.5V	0.5V	0.5V	0.5V	0.5V	GND	0.5V						5.5V	5.5V	O_1		-40	µA
			44								"							"	"	O_2		"	"
			45								"							"	"	O_3		"	"
			46								"							"	"	O_4		"	"
			47								"							"	"	O_5		"	"
			48								"							"	"	O_6		"	"
			49								"							"	"	O_7		"	"
			50								"							"	"	O_8		"	"
	I_{CC}	3005	51								"		GND	GND	GND	GND	GND	GND	"	V_{CC}		130	mA
	I_{OS}	3011	52	GND	GND	GND	GND	GND	GND	GND	"	GND	1/ 11/ 12/ 13/	1/ 11/ 12/ 13/	1/ 11/ 12/ 13/	1/ 11/ 12/ 13/	1/ 11/ 12/ 13/	0.5V	"	O_1	-10	-100	"
		"	53								"		"	"	"	"	"	"	"	O_2	"	"	"
		"	54								"		"	"	"	"	"	"	"	O_3	"	"	"
		"	55								"		"	"	"	"	"	"	"	O_4	"	"	"
		"	56								"		"	"	"	"	"	"	"	O_5	"	"	"
		"	57								"		"	"	"	"	"	"	"	O_6	"	"	"
		"	58								"		"	"	"	"	"	"	"	O_7	"	"	"
		"	59								"		"	"	"	"	"	"	"	O_8	"	"	"
2	Same tests, terminal conditions, and limits as for subgroup 1, except T_C = 125°C and V_{IC} tests are omitted.																						
3	Same tests, terminal conditions, and limits as for subgroup 1, except T_C = -55°C and V_{IC} tests are omitted.																						
7 T_C = 25°C	Func-tional tests	6/	60	6/	6/	6/	6/	6/	6/	6/	GND	6/	6/	6/	6/	6/	6/	6/	6/	6/	Outputs		6/	
8	Same tests, terminal conditions, and limits as for subgroup 7, except T_C = 125°C and T_C = -55°C.																						
9 T_C = 25°C	t_{PHL1}	GALPAT Fig. 4	61	7/	7/	7/	7/	7/	7/	7/	GND	7/	8/	8/	8/	8/	8/	GND	8/	Outputs		9/	ns
	t_{PLH1}	GALPAT Fig. 4	62	"	"	"	"	"	"	"	"	"	8/	8/	8/	8/	8/	GND	8/	"		9/	"
	t_{PHL2}	Sequen-tial Fig. 4	63	"	"	"	"	"	"	"	"	"	10/	10/	10/	10/	10/	10/	10/	"		9/	"
	t_{PLH2}	Sequen-tial Fig. 4	64	"	"	"	"	"	"	"	"	"	10/	10/	10/	10/	10/	10/	10/	"		9/	"
10	Same tests, terminal conditions, and limits as for subgroup 9, except T_C = 125°C.																						
11	Same tests, terminal conditions, and limits as for subgroup 9, except T_C = -55°C.																						

See footnotes at end of table.

TABLE III. Group A inspection – Continued.

1/ For programmed devices, select an appropriate address to acquire the desired output state, V_{IL} = 0.8 V, V_{IH} = 2.0 V.

2/ For unprogrammed devices, apply 11.0 V on pins 10 (A_0) and 14 (A_4) for circuit A devices.

3/ For unprogrammed 02 devices (V_{OL} test), apply 0 V on pins 10 (A_0) through 14 (A_4) for circuit G.

4/ For unprogrammed devices, apply 12.0 V on pin 14 (A_4) for circuit B devices.

5/ This test may, at the manufacturer's option, be performed with V_{IH} = 5.5 V (pin 15) and test limit of 50 μA maximum.

6/ The functional tests shall verify that no fuses are blown for unprogrammed devices or that the truth table specified in the altered item drawing exists for programmed devices (see table II and 3.3.2.2). All bits shall be tested. Terminal conditions shall be as follows:

a. Inputs: H = 3.0 V, L = 0.0 V.
b. Outputs: Output voltage shall be: H ≥ 1.0 V and L < 1.0 V.
c. The functional tests shall be performed with V_{CC} = 4.5 V and V_{CC} = 5.5 V.

7/ The outputs are loaded per figure 4.

8/ GALPAT (PROGRAMMED PROM).

This program will test all bits in the array, the addressing and interaction between bits for ac performance t_{PHL1} and t_{PLH1} . Each bit in the pattern is fixed by being programmed with a "H" and "L".

Description:

Step 1. Word 0 is read.
Step 2. Word 1 is read.
Step 3. Word 0 is read
Step 4. Word 2 is read.
Step 5. Word 0 is read.
Step 6. The reading procedure continues back and forth between word 0 and the next higher numbered word until word 255 is reached, then increments to the next word and reads back and forth as in step 1 through step 6 and shall include all words.
Step 7. Pass execution time = (n^2 + n) x cycle time. N = 256.
Step 8. The GALPAT tests shall be performed with V_{CC} = 4.5 V and 5.5 V.

9/

Device	t_{PHL1}	t_{PLH1}	t_{PHL2}	t_{PLH2}
01, 02	80 ns	80 ns	50 ns	50 ns
03, 04	35 ns	35 ns	25 ns	25 ns

TABLE III. Group A inspection – Continued.

10/ SEQUENTIAL (PROGRAMMED PROM).

This program will test all bits in the array for t_{PHL2} and t_{PLH2}.

Description:

Step 1. Each word in the pattern is tested from the enable lines to the output lines for recovery.
Step 2. Word 0 is addressed. Enable line is pulled high to low and low to high. t_{PHL2} and t_{PLH2} are read.
Step 3. Word 1 is addressed. Same enable sequence as above.
Step 4. The reading procedure continues until word 255 is reached.
Step 5. Pass execution time = 256 x cycle time.
Step 6. The sequential tests shall be performed with V_{CC} = 4.5 V and 5.5 V.

11/ For unprogrammed 01, 02 devices (with date codes before 8601), apply 10.0 V to pin 10 (A_0), apply 0.5 V to pin 11 (A_1), and other 5.0 V on all other addresses for circuit C.

12/ For unprogrammed 02 devices (V_{OH} test), with date codes before 8713, apply 0 V to pins 10 (A_0) through 13 (A_3), and 11.5 V to pin 14 (A_4), with date codes of 8713 or later apply 3.0 V to pins 10 (A_0) through 13 (A_3), and 10.5 V to pin 14 (A_4) for circuit G.

13/ For unprogrammed devices 01, 02 (with date codes of 8601 or later), 03 and 04, apply 10.0 V to pin 10 (A_0), 0.5 V to pins 12, 13, 14, (A_2, A_3, A_4) and 5.0 V to all other addresses for circuit C.

4.5 Methods of inspection. Methods of inspection shall be specified and as follows:

4.5.1 Voltage and current. All voltages given are referenced to the microcircuit ground terminal. Currents given are conventional and positive when flowing into the referenced terminal.

4.6 Programming procedure identification. The programming procedure to be utilized shall be identified by the manufacturer's circuit designator. The circuit designator is cross referenced in paragraph 6.6 herein with the manufacturer's symbol or CAGE number.

4.7 Programming procedure for circuit A. The programming characteristics in table IVA and the following procedures shall be used for programming the device.

a. Connect the device in the electrical configuration for programming. The waveforms on figure 5A and the programming characteristics in table IVA shall apply to these procedures.

b. Address the PROM with the binary address of the word to be programmed. Address inputs are TTL compatible. An open circuit shall not be used to address the PROM.

c. Apply V_{PL} voltage to V_{CC}.

d. Bring the $\overline{CE}_X$ inputs high and the $\overline{CE}_X$ inputs low to disable the device. The chip enables are TTL compatible. An open circuit shall not be used to disable the device.

e. Disable the programming circuitry by applying a voltage of V_{OPD} to the outputs of the PROM.

f. Raise V_{CC} to V_{PH} with rise time less than or equal to t_{TLH}.

g. After a delay equal to or greater than t_{D1} apply only one pulse with amplitude of V_{OPE} and duration of t_p to the output selected for programming. Note that the PROM is supplied with fuses intact, which generates an output high. Programming a fuse will cause the output to go low.

h. Lower V_{CC} to V_{PL} following a delay to t_{D2} from programming enable pulse applied to an output.

i. Enable the PROM for verification by applying V_{IL} to $\overline{CE}_X$ and V_{IH} to $\overline{CE}_X$.

j. Apply V_{PHV} to V_{CC} and verify bit is programmed.

k. Repeat steps a through j for all other bits to be programmed in the PROM.

l. For class S and B devices, if any bit does not verify as programmed, it shall be considered a programming reject.

TABLE IVA. Programming characteristics for circuit A.

Parameter	Symbol	Limits 1/			Unit
		Min	Recommended	Max	
Address input voltage 2/	V_{IH}	2.4	5.0	5.0	V
	V_{IL}	0.0	0.4	0.5	"
Programming	V_{PH} 3/	10.75	11.0	11.25	V
Voltage to V_{CC} low	V_{PL}	0.0	0.0	1.5	V
Program verify	V_{PHV}	---	5.5	---	V
Verify voltage	V_R 4/	4.5	5.0	5.5	V
Programming input low current at V_{PH}	I_{ILP}	---	-300	-600	µA
Programmed voltage (V_{CC}) transition time	t_{TLH}	1	5	10	µs
	t_{THL}	1	5	10	"
Programming delay	t_{D1}	10	10	20	µs
	t_{D2}	1	5	5	"
Programming pulse width	t_P 5/	90	100	110	µs
Programming duty cycle	PDC 6/	---	30	60	%
Output voltage Enable	V_{OPE} 7/	10.5	10.5	11.0	V
Output voltage Disable	V_{OPD} 7/	0.0	5.0	5.5	V

During the programming the chip must be disabled for proper operation.

1/ T_C = +25°C.

2/ No inputs should be left open for V_{IH}.

3/ V_{PH} source must be capable of supplying one ampere.

4/ It is recommended that post programming dual verification be made at V_R minimum and V_R maximum.

5/ Note step j in programming procedure.

6/ Programming duty cycle applies to DIPs only.

7/ V_{OPE} source must be capable of supplying 10 mA minimum.

4.8 Programming procedure for circuit B. The programming characteristics in table IVB and the following procedures shall be used for programming the devices:

a. Connect the device in the electrical configuration for programming. The waveforms on figure 5B and the programming characteristics of table IVB shall apply to these procedures.

b. Raise V_{CC} to 5.5 volts.

c. Address the PROM with binary address of the selected word to be programmed. Address inputs are TTL compatible.

d. Disable the chip by applying V_{IH} to the $\overline{CE}$ input. $\overline{CE}$ input is TTL compatible.

e. Apply the V_{PP} pulse to the $\overline{CE}$ pin. In order to insure that the output transistor is off before increasing the voltage on the output pin, the program pin's voltage pulse shall precede the output pin's programming pulse by t_{D1} and leave after the output pin's programming pulse by t_{D2} (see figure 5B).

f. Apply the V_{OUT} pulse with duration of t_P to the output selected for programming (see table IVB). The outputs shall be programmed one output at a time, since internal decoding circuitry is capable of sinking only one unit of programming current at a time. Note that the PROM is supplied with fuses generating a high-level logic output. Programming a fuse will cause the output to go to a low-level logic in the verify mode.

g. Other bits in the same word may be programmed sequentially applying V_{OUT} pulses to each output to be programmed.

h. Repeat 4.8b through 4.8g for all bits to be programmed.

i. Enable the chip by applying V_{IL} to the $\overline{CE}$ input and verify the program.

   Verification may check for a low output by requiring the device to sink 12 mA at V_{CC} = 4.0 V and 0.2 mA at V_{CC} = 7.0 V at T_C = 25°C.

j. For classes S and B devices, if any bit does not verify as programmed it shall be considered a programming reject.

TABLE IVB. Programming characteristics for circuit B.

Parameter	Symbol	Conditions	Limits 1/			Unit
			Min	Recommended	Max	
Current into output during programming before the fuse has programmed	I_{OUT1}	V_{CC} = 5.5 V, V_{OUT} = 9.0 V		0.1		mA
		V_{CC} = 5.5 V, V_{OUT} = 25 V		35		
Current into output during programming after the fuse has programmed	I_{OUT2}	V_{CC} = 5.5 V, V_{OUT} = 20 V		3		mA
Rise time of program pulse applied to the data out from 10% to 90%	t_{TLH}		50	60	70	µs
Chip enable ($\overline{CE}$) pin pulse width	t_{PP}	Chip disabled V_{CC} = 5.5 V	80	95	110	µs
Pulse width of programming voltage	t_P	Chip disabled V_{CC} = 5.5 V	1		40	µs
Fall time of the pulse applied to the CE from 90% to 10%	t_{THL}		50		1000	ns
Required time delay between disabling memory output and application of output programming pulse	t_{D1}	Measured at 1.5 V levels	70	80	90	µs
Required time delay between removal of programming pulse and enabling memory output	t_{D2}	Measured at 1.5 V levels	100			ns
V_{CC} required during programming	V_{CCP}		5.40	5.50	5.60	V
Output current required during verification	I_{OLV1}	T_C = 25°C, V_{CC} = 4.20 V chip enabled	11	12	13	mA
Output current required during verification	I_{OLV2}	T_C = 25°C, V_{CC} = 6.0 V chip enabled	0.19	0.2	0.21	mA
Maximum duty cycle during automatic programming of enable and output pin	DC	T_P / T_C			25	%
Required programming voltage on the output pin	V_{OUT}		20	20	26	V
Required current limit of the power supply feeding the output during programming	I_L	V_{OUT} = 25 V, V_{CC} = 5.5 0 V	150			mA

1/ T_C = +25°C.

4.9 Programming procedure for circuit C. The programming characteristics in table IVC and the following procedures shall apply for programming the device:

a. Connect the device in the electrical configuration for programming. The waveforms on figure 5C and the programming characteristics in table IVC shall apply for programming to these procedures.

b. Terminate all device outputs with a 10 kΩ resistor to V_{CC}.

c. Address the PROM with the binary address of the selected word to be programmed. Raise V_{CC} to V_{CCP}.

d. After a t_D delay (10 μs), apply only one V_{OUT} pulse to the output to be programmed. Program one output at a time.

e. After a t_D delay (10 μs), pulse $\overline{CE}$ input to logic "0" for a duration of t_P.

f. After a t_D delay (10 μs), remove the V_{OUT} pulse from the programmed output. Note that the PROM is supplied with fuses generating a low-level logic output. Programming a fuse will cause the output to go to a high-level logic in the verify mode.

g. Other bits in the same word may be programmed sequentially while the V_{CC} input is at the V_{CCP} level by applying V_{OUT} pulses to each output to be programmed allowing a delay of t_D between pulses as shown on figure 5C.

h. Repeat 4.9b through 4.9g for all other bits to be programmed.

i. To verify programming after t_D (10 μs) delay, lower V_{CC} to V_{CCH} and apply a logic "0" level to both $\overline{CE}$ input. The programmed output should remain in the "1" state. Again lower V_{CC} and V_{CCL} and verify that the programmed output remains in the "1" state.

j. For class S and B devices, if any bit does not verify as programmed, it shall be considered a programming reject.

TABLE IVC. Programming characteristics for circuit C.

Parameter	Symbol	Conditions	Limits 1/			Unit
			Min	Recommended	Max	
Programming voltage to V_{CC}	V_{CCP} 1/	I_{CCP} = 375 ±75 mA; transient or steady-state	9.5	10.0	10.5	V
Verification upper limit	V_{CCH}		5.3	5.5	5.7	V
Verification lower limit	V_{CCL}		4.3	4.5	4.7	V
Verify threshold	V_S 2/		0.9	1.0	1.1	V
Programming supply current	I_{CCP}	V_{CCP} = +8.75 ±0.25 V	200	250	300	mA
Input voltage high level "1"	V_{IH}		2.4		5.5	V
Input voltage low level "0"	V_{IL}		0	0.4	0.8	V
Input current	I_{IH}	V_{IH} = +5.5 V			50	µA
Input current	I_{IL}	V_{IL} = +0.4 V			-500	µA
Output programming voltage	V_{OUT} 3/	I_{OUT} = 65 ±3 mA, transient or steady-state	15.0	15.5	16.0	V
Output programming current	I_{OUT}	V_{OUT} = +17 ±1 V	62	65	68	mA
Programming voltage transition time	t_{TLH}		10		50	µs
$\overline{CE}$ programming pulse width	t_P		300	400	500	µs
Pulse sequence delay	t_D		10			µs
Programming duty cycle	t_{PR} / $t_{PR} + t_{PS}$				50	%

1/ Bypass V_{CC} to GND with a 0.01 µF capacitor to reduce voltage spikes.

2/ V_S is the sensing threshold of the PROM output voltage for a programmed bit. It normally constitutes the reference voltage applied to a comparator circuit to verify a successful fusing attempt.

3/ Care should be taken to insure the 17 ±1 V output voltage is maintained during the entire fusing cycle. The recommended supply is a constant current source clamped at the specified voltage limit.

4.10 Programming procedure for circuit G. The programming characteristics on table IVG and the following procedures shall be used for programming.

a. Connect the device in the electrical configuration of programming. The waveforms on figure 5D and the programming characteristics of table IVG shall apply to these procedures.

b. Select the desired word by applying high or low levels to the appropriate address inputs. Disable the device by applying a high level to one or more active low chip enable inputs. NOTE: Address and enable inputs must be driven with TTL logic levels during programming and verification.

c. Increase V_{CC} from nominal to V_{CCP} (10.5 ±0.5 V) with a slew rate limit of I_{RR} (1.0 to 10.0 V/μs). Since V_{CC} is the source of the current required to program the fuse, as well as the I_{CC} for the device at the programming voltage, it must be capable of supplying 750 mA at 11.0 volts.

d. Select the output where a logical high is desired by raising that output voltage to V_{OP} (10.5 ±0.5 V). Limit the slew rate to I_{RR} (1.0 to 10.0 V/μs). This voltage change may occur simultaneously with the V_{CC} increase to V_{CCP}, but must precede it. It is critical that only one output at a time be programmed since the internal circuits can only supply programming current to one bit at a time. Outputs not being programmed must be left open or connected to a high impedance source of 20 kΩ minimum (remember that the outputs of the device are disabled at this time).

e. Enable the device by taking the chip enable(s) to a low level. This is done with a pulse PWE for 10 μs. The 10 μs duration refers to the time that the circuit (device) is enabled. Normal input levels are used and rise and fall times are not critical.

f. Verify that the bit has been programmed by first removing the programming voltage from the output and then reducing V_{CC} to 5.0 V (±0.25 V). The device must be enabled to sense the state of the outputs. During verification, the loading of the output must be within specified I_{OL} and I_{OH} limits.

g. If the device is not to be tested for V_{OH} over the entire operating range subsequent to programming, the verification of step f is to be performed at a V_{CC} level of 4.0 volt (±0.2 V). V_{OH}, during the 4 volt verification, must be at least 2.0 volts. The 4 volt V_{CC} verification assures minimum V_{OH} levels over the entire operating range.

h. Repeat steps 4.10b through 4.10f for each bit to be programmed to a high level. If the procedure is performed on an automatic programmer, the duty cycle of V_{CC} at the programming voltage must be limited to a maximum of 25%. This is necessary to minimize device junction temperatures. After all selected bits are programmed, the entire contents of the memory should be verified.

i. For class S and B devices, if any bit does not verify as programmed it shall be considered a programming reject.

TABLE IVG. Programming characteristics for circuit G.

Parameter	Symbol	Conditions	Limits 1/			Unit
			Min	Recommended	Max	
Required V_{CC} for programming	V_{CCP}		10.0	10.5	11.0	V
I_{CC} during programming	I_{CCP}	V_{CC} = 11 V			750	mA
Required output voltage for programming	V_{OP}		10.0	10.5	11.0	V
Output current while programming	I_{OP}	V_{OUT} = 11 V			20	mA
Rate of voltage change of V_{CC} or output	I_{RR}		1.0		10.0	V/µs
Programming pulse width (enabled)	P_{WE}		9	10	11	µs
Required V_{CC} for verification	V_{CCV}		3.8	4.0	4.2	V
Maximum duty cycle for V_{CC} at V_{CCP}	MDC			25	25	%
Address set-up time	t_1		100			ns
V_{CCP} set-up time	t_2	2/	5			µs
V_{CCP} hold time	t_5		100			ns
V_{OP} set-up time	t_3		100			ns
V_{OP} hold time	t_4		100			ns

1/ T_C = +25°C.

2/ V_{CCP} set-up time may be greater than 0 if V_{CCP} rises at the same rate or faster than V_{OP}.

4.11 Programming procedure for circuit H. The programming characteristics in table IVH and the following procedures shall apply for programming the device:

a. Connect the device in the electrical configuration for programming. The waveforms on figure 5E and the programming characteristics in table IVH shall apply for programming to these procedures.

b. Terminate all device outputs with a 10 kΩ resistor to V_{CC}. The 10 kΩ is the pullup resistor for open collector devices.

c. Address the PROM with the binary address of the selected word to be programmed. Raise V_{CC} to V_{CCP}.

d. After a t_D delay (10 μs), apply V_{OPF} output to be programmed. Program one output at a time. Note leading edge rise time restrictions.

e. After a t_D delay (10 μs), pulse $\overline{CE}$ input to logic "0" for a duration of t_P.

f. After a t_D delay (10 μs), remove the V_{OPF} pulse from the programmed output. Note that the PROM is supplied with fuses generating a low-level logic output. Programming a fuse will cause the output to go to a high-level logic in the verify mode.

g. Repeat 4.11d through 4.11f to program other bits at the same address.

h. To verify programming of all bits at the same address, after t_D delay lower V_{CC} to V_{CCVL} and apply a logic low level to the $\overline{CE}_X$ input. All programmed outputs should remain in the same logic high state.

i. After t_D delay, repeat steps 4.11c through 4.11h to program and verify all other address locations.

j. After t_D delay, raise V_{CC} to V_{CCVH} and verify all memory locations by applying a logic low level to $\overline{CE}$ and cycling through all device addresses.

k. For class S and B devices, if any bit does not verify as programmed, it shall be considered a programming reject.

TABLE IVH. Programming characteristics for circuit H.

Parameter	Symbol	Conditions	Limits			Unit
			Min	Recommended	Max	
Programming voltage to V_{CC}	V_{CCP} 1/	I_{CCP} = 425 ±75 mA; transient or steady-state	8.5	8.75	9.0	V
Verification upper limit	V_{CCVH}		5.3	5.5	5.7	V
Verification normal limit	V_{CCVN}		4.75	5.0	5.25	V
Verification lower limit	V_{CCVL}		4.3	4.5	4.7	V
Verify threshold	V_S 2/		1.4	1.5	1.6	V
Programming supply current	I_{CCP}	V_{CCP} = +8.75 ±0.25 V	350		500	mA
Input voltage high level "1"	V_{IH}		2.4		5.5	V
Input voltage low level "0"	V_{IL}		0		0.8	V
Input current	I_{IH}	V_{IH} = +5.5 V			50	µA
Input current	I_{IL}	V_{IL} = +0.4 V			-500	µA
Forced output voltage (program)	V_{OPF} 3/	I_{OUT} = 200 ±20 mA, transient or steady-state	17	17.5	18.0	V
Forced output current (program)	I_{OPF}	V_{OPF} = +17 ±1 V	180		220	mA
Output pulse rise time	t_{RZ}		17	20	25	µs
$\overline{CE}$ programming pulse width	t_P		10	10	25	µs
Pulse sequence delay	t_D		5	10		µs
Address program verify cycle	t_{PVA}				1	ms
Memory program verify time (continuous)	t_{PVM}				20	sec
Fusing attempts per link	F_L				1	cycle

1/ Bypass V_{CC} to GND with a 0.01 µF capacitor to reduce voltage spikes.

2/ V_S is the sensing threshold of the PROM output voltage for a programmed bit. It normally constitutes the reference voltage applied to a comparator circuit to verify a successful fusing attempt.

3/ The voltage should be maintained within specified limits during the entire fusing cycle. For a transient current of 150 mA, limit voltage spikes to a maximum slew rate of 2 V/µs and 10 µs maximum recovery.

5. PACKAGING

5.1 Packaging requirements. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When packaging of materiel is to be performed by DoD or in-house contractor personnel, these personnel need to contact the responsible packaging activity to ascertain packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activity within the Military Service or Defense Agency, or within the military service's system command. Packaging data retrieval is available from the managing Military Department's or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

6. NOTES

(This section contains information of a general or explanatory nature which may be helpful, but is not mandatory.)

6.1 Intended use. Microcircuits conforming to this specification are intended for logistic support of existing equipment.

6.2 Acquisition requirements. Acquisition documents should specify the following:

a. Title, number, and date of the specification.

b. PIN and compliance identifier, if applicable (see 1.2).

c. Requirements for delivery of one copy of the conformance inspection data pertinent to the device inspection lot to be supplied with each shipment by the device manufacturer, if applicable.

d. Requirements for certificate of compliance, if applicable.

e. Requirements for notification of change of product or process to contracting activity in addition to notification to the qualifying activity, if applicable.

f. Requirements for failure analysis (including required test condition of method 5003 of MIL-STD-883), corrective action, and reporting of results, if applicable.

g. Requirements for product assurance options.

h. Requirements for special lead lengths, or lead forming, if applicable. Unless otherwise specified, these requirements will not apply to direct purchase by or direct shipment to the Government.

i. Requirement for programming the device, including processing option.

j. Requirements for "JAN" marking.

k. Packaging Requirements (see 5.1)

6.3 Qualification. With respect to products requiring qualification, awards will be made only for products which are, at the time of award of contract, qualified for inclusion in Qualified Manufacturers List QML-38535 whether or not such products have actually been so listed by that date. The attention of the contractors is called to these requirements, and manufacturers are urged to arrange to have the products that they propose to offer to the Federal Government tested for qualification in order that they may be eligible to be awarded contracts or purchase orders for the products covered by this specification. Information pertaining to qualification of products may be obtained from DSCC-VQ, 3990 E. Broad Street, Columbus, Ohio 43218-3990.

6.4 Superseding information. The requirements of MIL-M-38510 have been superseded to take advantage of the available Qualified Manufacturer Listing (QML) system provided by MIL-PRF-38535. Previous references to MIL-M-38510 in this document have been replaced by appropriate references to MIL-PRF-38535. All technical requirements now consist of this specification and MIL-PRF-38535. The MIL-M-38510 specification sheet number and PIN have been retained to avoid adversely impacting existing government logistics systems and contractor's parts lists.

6.5 Abbreviations, symbols, and definitions. The abbreviations, symbols, and definitions used herein are defined in MIL-PRF-38535, MIL-HDBK-1331, and as follows:

GND ..... Electrical ground (common terminal).
I_{IN} ..... Current flowing into an input terminal.
V_{IC} ..... Input clamp voltage.
V_{IN} ..... Voltage level at an input terminal.

6.6 Logistic support. Lead materials and finishes (see 3.4) are interchangeable. Unless otherwise specified, microcircuits acquired for Government logistic support will be acquired to device class B (see 1.2.2), lead material and finish A (see 3.4). Longer length leads and lead forming should not affect the part number. It is intended that spare devices for logistic support be acquired in the unprogrammed condition (see 3.8.1) and programmed by the maintenance activity, except where use quantities for devices with a specific program or pattern justify stocking of preprogrammed devices.

6.7 Substitutability. The cross-reference information below is presented for the convenience of users. Microcircuits covered by this specification will functionally replace the listed generic-industry type. Generic-industry microcircuit types may not have equivalent operational performance characteristics across military temperature ranges or reliability factors equivalent to MIL-M-38510 device types and may have slight physical variations in relation to case size. The presence of this information should not be deemed as permitting substitution of generic-industry types for MIL-M-38510 types or as a waiver of any of the provisions of MIL-PRF-38535.

Military device type	Generic-industry type	Circuit designator	Fusible links
01 1/	7602 / Harris Semiconductor, CAGE 34371	A	NiCr
01 1/	5330 / Monolithic Memories, CAGE 56364	B	NiCr
02	DM54S288 / National Semiconductor, CAGE 27014	G	TiW / W
02 1/	7603 / Harris Semiconductor, CAGE 34371	A	NiCr
02 1/	5331 / Monolithic Memories, CAGE 56364	B	NiCr
01, 03	82S23A / Signetics Corporation, CAGE 18324	C	NiCr
02, 04	82S123A / Signetics Corporation, CAGE 18324	C	NiCr
01, 03	82S23A / Signetics Corporation, CAGE 18324	H 2/	NiCr
01, 03	82S23A/QP Semiconductor	H 2/	ZVE
02, 04	82S123A / Signetics Corporation, CAGE 18324	H 2/	NiCr
02, 04	82S123A/QP Semiconductor	H 2/	ZVE

1/ This generic industry type is no longer manufactured.
2/ Updated circuit C to circuit H to reflect the current programming method. Contact the manufacturer for the correct programming method being used.

6.8 Change from previous issue. Marginal notations are used in this revision to identify changes with respect to the previous issue.

Custodians:
Army - CR
Navy - EC
Air Force - 11
DLA - CC

Preparing activity:
DLA - CC

Review activities:
Army – SM, MI
Navy - AS, CG, MC, SH TD
Air Force – 03, 19, 99

(Project 5962-2007-008)

NOTE: The activities listed above were interested in this document as of the date of this document. Since organization and responsibilities can change, you should verify the currency of the information above using the ASSIST Online database at http://assist.daps.dla.mil.