REVISIONS			
LTR	DESCRIPTION	DATE (YR-MO-DA)	APPROVED

REV																			
SHEET																			
REV																			
SHEET	15	16	17	18	19														

REV STATUS OF SHEETS	REV														
	SHEET	1	2	3	4	5	6	7	8	9	10	11	12	13	14

PMIC N/A

STANDARD MICROCIRCUIT DRAWING

THIS DRAWING IS AVAILABLE FOR USE BY ALL DEPARTMENTS AND AGENCIES OF THE DEPARTMENT OF DEFENSE

AMSC N/A

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DRAWING APPROVAL DATE
94-12-21

REVISION LEVEL

DEFENSE ELECTRONICS SUPPLY CENTER
DAYTON, OHIO 45444

MICROCIRCUIT, MEMORY, DIGITAL, CMOS, ELECTRICALLY ERASABLE PROGRAMMABLE LOGIC DEVICE, MONOLITHIC SILICON

SIZE	CAGE CODE	
A	67268	5962-94762

SHEET 1 OF 19

DESC FORM 193
JUL 94

5962-E407-94

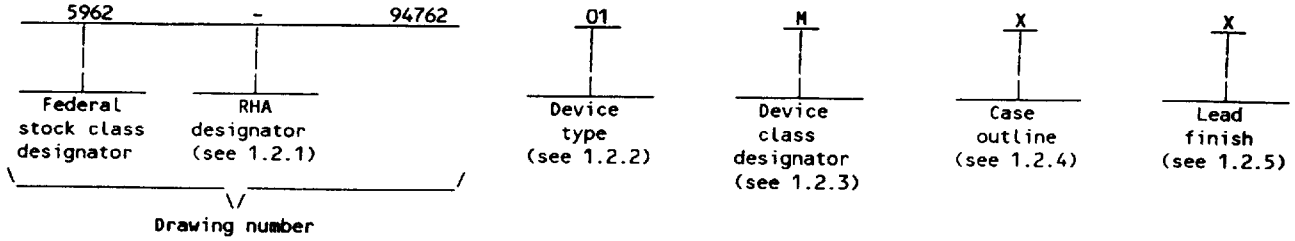
DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.

9004708 0009603 921

1. SCOPE

1.1 Scope. This drawing forms a part of a one part - one part number documentation system (see 6.6 herein). Two product assurance classes consisting of military high reliability (device classes Q and M) and space application (device class V), and a choice of case outlines and lead finishes are available and are reflected in the Part or Identifying Number (PIN). Device class M microcircuits represent non-JAN 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". When available, a choice of Radiation Hardness Assurance (RHA) levels are reflected in the PIN.

1.2 PIN. The PIN shall be as shown in the following example:



1.2.1 RHA designator. Device class M RHA marked devices shall meet the MIL-I-38535 appendix A specified RHA levels and shall be marked with the appropriate RHA designator. Device classes Q and V RHA marked devices shall meet the MIL-I-38535 specified RHA levels and shall be marked with the appropriate RHA designator. A dash (-) indicates a non-RHA device.

1.2.2 Device type(s). The device type(s) shall identify the circuit function as follows:

Device type	Generic number	Circuit function	Maximum clock frequency
01	ispLSI1016	EECMOS 2,000 gate in-system programmable logic device	60 MHz

1.2.3 Device class designator. The device class designator shall be a single letter identifying the product assurance level as follows:

Device class	Device requirements documentation
M	Vendor self-certification to the requirements for non-JAN class B microcircuits in accordance with 1.2.1 of MIL-STD-883
Q or V	Certification and qualification to MIL-I-38535

1.2.4 Case outline(s). The case outline(s) shall be as designated in MIL-STD-1835 and as follows:

Outline letter	Descriptive designator	Terminals	Package style
X	CQCC2-J44	44	J-Leaded Chip Carrier

1.2.5 Lead finish. The lead finish shall be as specified in MIL-STD-883 (see 3.1 herein) for class M or MIL-I-38535 for classes Q and V. Finish letter "X" shall not be marked on the microcircuit or its packaging. The "X" designation is for use in specifications when lead finishes A, B, and C are considered acceptable and interchangeable without preference.

1.3 Absolute maximum ratings. 1/

Supply voltage range	-0.5 Vdc to +7.0 V dc
Input voltage range (applied)	-2.5 Vdc to V_{CC} + 1.0 Vdc
Off-state output voltage range applied.	-2.5 Vdc to V_{CC} + 1.0 Vdc
Thermal resistance, junction-to-case (θ_{JC})	See MIL-STD-1835
Maximum power dissipation (P_D) 2/	1.9 W
Maximum junction temperature	+175°C
Lead temperature (soldering, 10 seconds max)	+300°C
Data retention (at +55°C)	20 years (minimum)
Endurance	1,000 erase/write cycles (minimum)

1.4 Recommended operating conditions.

Supply voltage range, V_{CC}	4.5 Vdc to 5.5 Vdc
High level input voltage range (V_{IH})	2.0 V dc to V_{CC} + 1.0 V dc
Low Level input voltage range (V_{IL})	0.0 V dc to 0.8 V dc
Case operating temperature range, T_C	-55°C to +125°C

1.5 Digital logic testing for device classes Q and V.

Fault coverage measurement of manufacturing logic tests (MIL-STD-883, test method 5012)	XX percent 3/

2. APPLICABLE DOCUMENTS

2.1 Government specification, standards, bulletin, and handbook. Unless otherwise specified, the following specification, standards, bulletin, and handbook 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-I-38535 - Integrated Circuits, Manufacturing, General Specification for.

STANDARDS

MILITARY

MIL-STD-883 - Test Methods and Procedures for Microelectronics.
MIL-STD-973 - Configuration Management.
MIL-STD-1835 - Microcircuit Case Outlines.

BULLETIN

MILITARY

MIL-BUL-103 - List of Standardized Military Drawings (SMD's).

1/ Stresses above the absolute maximum rating may cause permanent damage to the device. Extended operation at the maximum levels may degrade performance and affect reliability.
2/ Must withstand the added P_D due to short circuit test; e.g., I_{OS}.
3/ Values will be added when they become available.

HANDBOOK

MILITARY

MIL-HDBK-780 - Standardized Military Drawings.

(Copies of the specification, standards, bulletin, and handbook 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 Non-Government publications. The following document(s) form a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are DoD adopted are those listed in the issue of the DODISS cited in the solicitation. Unless otherwise specified, the issues of documents not listed in the DODISS are the issues of the documents cited in the solicitation.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM Standard F1192-88 - Standard Guide for the Measurement of Single Event Phenomena from Heavy Ion Irradiation of Semiconductor Devices.

(Applications for copies of ASTM publications should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pennsylvania 19103).

ELECTRONICS INDUSTRIES ASSOCIATION (EIA)

JEDEC Standard No. 17 - A Standardized Test Procedure for the characterization of LATCH-UP in CMOS Integrated Circuits.

(Applications for copies should be addressed to the Electronics Industries Association, 2001 Pennsylvania Avenue, N.W., Washington, DC 20006.)

(Non-Government standards and other publications are normally available from the organizations that prepare or distribute the documents. These documents also may be available in or through libraries or other informational services.)

2.3 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 for device class M 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. The individual item requirements for device classes Q and V shall be in accordance with MIL-I-38535, the device manufacturer's Quality Management (QM) plan, and as specified herein.

3.2 Design, construction, and physical dimensions. The design, construction, and physical dimensions shall be as specified in MIL-STD-883 (see 3.1 herein) for device class M and MIL-I-38535 for device classes Q and V and herein.

3.2.1 Case outlines. The case outlines shall be in accordance with 1.2.4 herein.

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

3.2.3 Truth tables. The truth tables shall be as specified on figure 2.

3.2.3.1 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 screening (see 4.2 herein), or qualification conformance inspection groups A, B, C, or D (see 4.3 herein), the devices shall be programmed by the manufacturer prior to test.

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

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

3.2.5 Radiation exposure circuit. The radiation exposure circuit shall be specified when available.

3.3 Electrical performance characteristics and postirradiation parameter limits. Unless otherwise specified herein, the electrical performance characteristics and postirradiation parameter limits are as specified in table I and shall apply over the full case operating temperature range.

3.4 Electrical test requirements. The electrical test requirements shall be the subgroups specified in table IIA. The electrical tests for each subgroup are defined in table I.

3.5 Marking. The part shall be marked with the PIN listed in 1.2 herein. Marking for device class M shall be in accordance with MIL-STD-883 (see 3.1 herein). In addition, the manufacturer's PIN may also be marked as listed in MIL-BUL-103. Marking for device classes Q and V shall be in accordance with MIL-I-38535.

3.5.1 Certification/compliance mark. The compliance mark for device class M shall be a "C" as required in MIL-STD-883 (see 3.1 herein). The certification mark for device classes Q and V shall be a "QML" or "Q" as required in MIL-I-38535.

3.6 Certificate of compliance. For device class M, a certificate of compliance shall be required from a manufacturer in order to be listed as an approved source of supply in MIL-BUL-103 (see 6.8.2 herein). For device classes Q and V, a certificate of compliance shall be required from a QML-38535 listed manufacturer in order to supply to the requirements of this drawing (see 6.8.1 herein). The certificate of compliance submitted to DESC-EC prior to listing as an approved source of supply for this drawing shall affirm that the manufacturer's product meets, for device class M, the requirements of MIL-STD-883 (see 3.1 herein), or for device classes Q and V, the requirements of MIL-I-38535 and the requirements herein.

3.7 Certificate of conformance. A certificate of conformance as required for device class M in MIL-STD-883 (see 3.1 herein) or for device classes Q and V in MIL-I-38535 shall be provided with each lot of microcircuits delivered to this drawing.

3.8 Notification of change for device class M. For device class M, notification to DESC-EC of change of product (see 6.2 herein) involving devices acquired to this drawing is required for any change as defined in MIL-STD-973.

3.9 Verification and review for device class M. For device class M, 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.

3.10 Microcircuit group assignment for device class M. Device class M devices covered by this drawing shall be in microcircuit group number 42 (see MIL-I-38535, appendix A).

3.11 Processing of EEPLDs. All testing requirements and quality assurance provisions herein shall be satisfied by the manufacturer prior to delivery.

3.11.1 Conditions of the supplied devices. Devices will be supplied in cleared state per truth table in figure 2. No provision will be made for supplying written devices.

3.11.2 Writing of EEPLDs. When specified, devices shall be written in accordance with the procedures and characteristics specified in 4.6.

3.11.3 Clearing of EEPLDs. When specified, devices shall be cleared in accordance with the procedures and characteristics specified in 4.7.

3.11.4 Verification of state of EEPLDs. When specified, devices shall be verified as either written to the specified pattern or cleared. As a minimum, verification shall consist of performing a read of the entire array to verify that all bits are in the proper state. Any bit that does not verify to be in the proper state shall constitute a device failure and the device shall be removed from the lot or sample.

3.12 Endurance. A reprogrammability test shall be completed as part of the vendor's reliability process. This reprogrammability test shall be done for initial characterization and after any design or process changes which may affect the reprogrammability of the device. The methods and procedures may be vendor specific, but will guarantee the number of program/erase endurance cycles listed in section 1.3 herein. The vendor's procedure shall be under document control and shall be made available upon request.

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	Group A subgroups	Device type	Limits		Units
					Min	Max	
Low level output voltage	V_{OL}	$I_{OL} = 8.0$ mA, $V_{IL} = 0.8$ V, $V_{CC} = 4.5$ V	1, 2, 3	All		0.4	V
High level output voltage	V_{OH}	$I_{OH} = -4.0$ mA, $V_{IL} = 0.8$ V, $V_{CC} = 4.5$ V	1, 2, 3	All	2.4		V
High level input voltage	V_{IH}	1/	1, 2, 3	All		0.8	V
Low level input voltage	V_{IL}	1/	1, 2, 3	All	2.0		V
Input or I/O low leakage current	I_{IL}	$0\ V \le V_{IN} \le 0.8\ V$	1, 2, 3	All		-10	µA
Input or I/O high leakage current	I_{IH}	$3.5\ V \le V_{IN} \le V_{CC}$	1, 2, 3	All		10	µA
I/O active pull-up current 2/	I_{PU}	$0\ V \le V_{IN} \le V_{IL}$	1, 2, 3	All		-150	µA
Output short circuit current 3/	I_{OS}	$V_{OUT} = 0.5$ V, $V_{CC} = 5.0$ V, $T_A = +25°C$, see 4.4.1f	1	All	-60	-200	mA
Operating power supply current 4/	I_{CC}	$V_{IL} = 0.5$ V, $V_{IH} = 3.0$ V, f = 1.0 MHz	1, 2, 3	All		170	mA
Dedicated input capacitance	C_{IN}	$V_{IN} = 2.0$ V, $V_{CC} = 5.0$ V, $T_A = +25°C$, f = 1.0 MHz, see 4.4.1e	4	All		10	pF
I/O and clock capacitance	$C_{I/O}$, C_Y	$V_{I/O}$, $V_Y = 2.0$ V, $V_{CC} = 5.0$ V, $T_A = +25°C$, f = 1.0 MHz, see 4.4.1e	4	All		10	pF
Functional tests		See 4.4.1c	7, 8A, 8B	All			
Data propagation delay, 4PT bypass, ORB bypass	t_{PD1}	$V_{CC} = 4.5$ V, see figure 4 5/ 6/	9, 10, 11	01		20	ns
Data propagation delay, worst case path	t_{PD2}		9, 10, 11	01		25	ns
Clock frequency with internal feedback 7/	f_{MAX1}		9, 10, 11	01	60		MHz
Clock frequency with external feedback 8/	f_{MAX2}		9, 10, 11	01	38		MHz

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	Group A subgroups	Device type	Limits		Units
					Min	Max	
Clock frequency, maximum toggle 9/	f_{MAX3}	V_{CC} = 4.5 V, see figure 4 5/ 6/	9, 10, 11	01	83		MHz
GLB register setup time before clock, 4PT bypass	t_{SU1}		9, 10, 11	01	9.0		ns
GLB register clock to delay, ORP bypass	t_{CO1}		9, 10, 11	01		13	ns
GLB register hold time after clock, 4PT bypass	t_{H1}		9, 10, 11	01	0		ns
GLB register setup time before clock	t_{SU2}		9, 10, 11	01	13		ns
GLB register clock to output delay	t_{CO2}		9, 10, 11	01		16	ns
GLB register hold time after clock	t_{H2}		9, 10, 11	01	0		ns
External reset pin to output delay	t_R		9, 10, 11	01		22.5	ns
External reset pulse duration	t_{RPW}		9, 10, 11	01	13		ns
Input to output enable	t_{PZH}, t_{PZL}		9, 10, 11	01		24	ns
Input to output disable	t_{PHZ}, t_{PLZ}		9, 10, 11	01		24	ns
External synchronous clock pulse duration, high	t_{PWH}		9, 10, 11	01	6.0		ns
External synchronous clock pulse duration, low	t_{PWL}		9, 10, 11	01	6.0		ns
I/O register setup time before external synchronous clock (Y2, Y3)	t_{SU5}		9, 10, 11	01	2.5		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	Group A subgroups	Device type	Limits		Units
					Min	Max	
I/O register hold time after external synchronous clock (Y2, Y3)	t_{H5}	V_{CC} = 4.5 V, see figure 4 5/ 6/	9, 10, 11	01	8.5		ns

1/ These are absolute values with respect to device ground and all overshoots due to system or tester noise are included.
2/ Pull-up circuitry is programmable.
3/ One output at a time for a maximum duration of one second. V_{OUT} = 0.5 V was selected to avoid test problems by tester ground degradation. If not tested, shall be guaranteed to the limits specified in table I.
4/ Measured using six 16-bit counters.
5/ AC tests are performed with input rise and fall times (10% to 90%) of 3.0 ns, timing reference levels of 1.5 V, input pulse levels of 0 V to 3.0 V, and the output load of figure 4. Input pulse levels are absolute values with respect to device ground and all overshoots due to system or tester noise are included. Unless otherwise specified, all parameters use a GRP load of 4 GLB's, 20 PTXOR path, ORP and YO clock.
6/ May not be tested directly but shall be guaranteed to the values specified in table I.
7/ Standard 16-bit loadable counter using GRP feedback.
8/ Calculated value; $1/t_{SU2} + t_{CO1}$.
9/ f_{MAX3} may be less than $1/(t_{PWH} + t_{PWL})$. This is to allow for a clock duty cycle of other than 50%.

Device type	All	Device type	All
Case outline	X	Case outline	X
Terminal number	Terminal symbol	Terminal number	Terminal symbol
1	GND	30	I/O13
2	IN3	31	I/O14
3	I/O24	32	I/O15
4	I/O25	33	Y2/SCLK*
5	I/O26	34	VCC
6	I/O27	35	Y1/RESET
7	I/O28	36	IN2/MODE*
8	I/O29	37	I/O16
9	I/O30	38	I/O17
10	I/O31	39	I/O18
11	YO	40	I/O19
12	VCC	41	I/O20
13	*ispEN	42	I/O21
14	*SDI/INO	43	I/O22
15	I/OO	44	I/O23
16	I/O1		
17	I/O2		
18	I/O3		
19	I/O4		
20	I/O5		
21	I/O6		
22	I/O7		
23	GND		
24	*SDO/IN1		
25	I/O8		
26	I/O9		
27	I/O10		
28	I/O11		
29	I/O12		

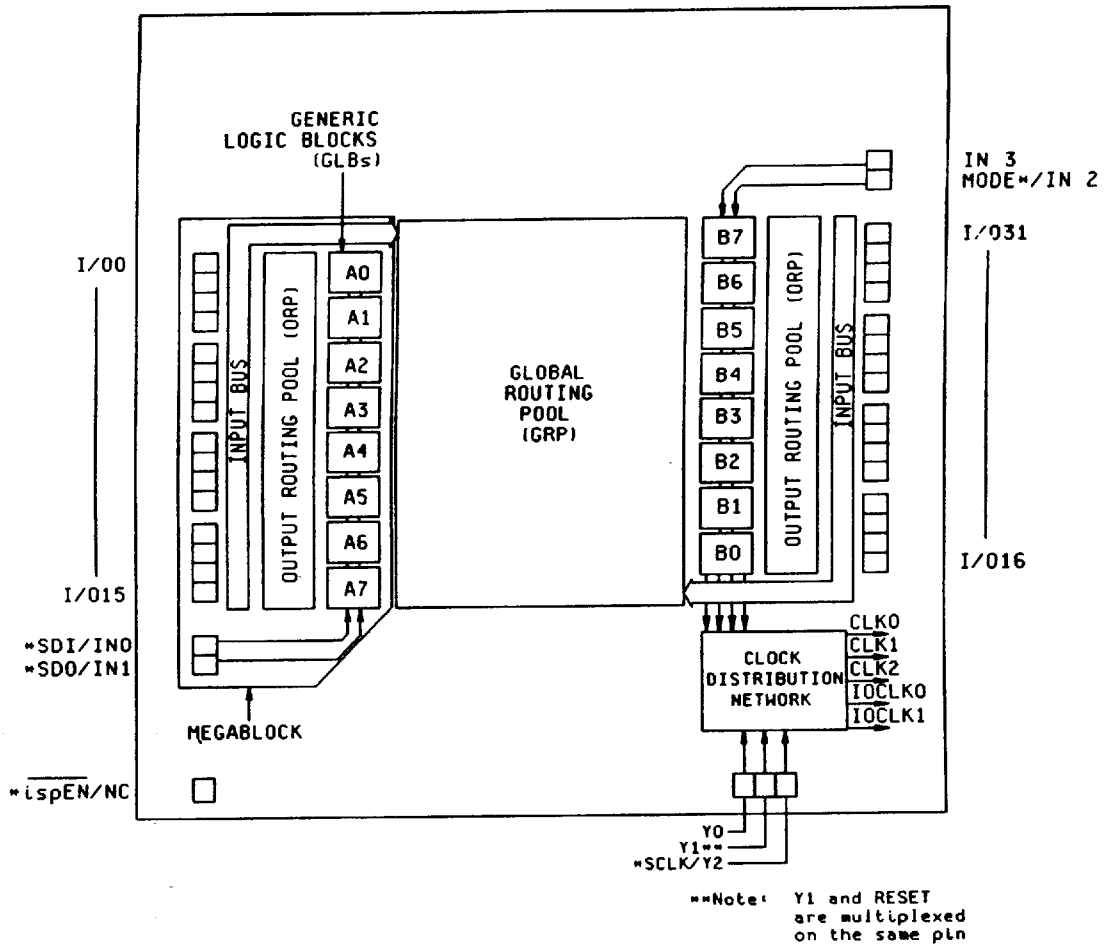
FIGURE 1. Terminal connections.

INPUTS				INPUTS/OUTPUTS
I	Y	$\overline{\text{RESET}}$	$\overline{\text{ispEN}}$	I/O
X	X	X	H or NC 1/	Z

H = Logic high voltage level
L = Logic low voltage level
X = Don't care
Z = High impedance state
NC = Not connected

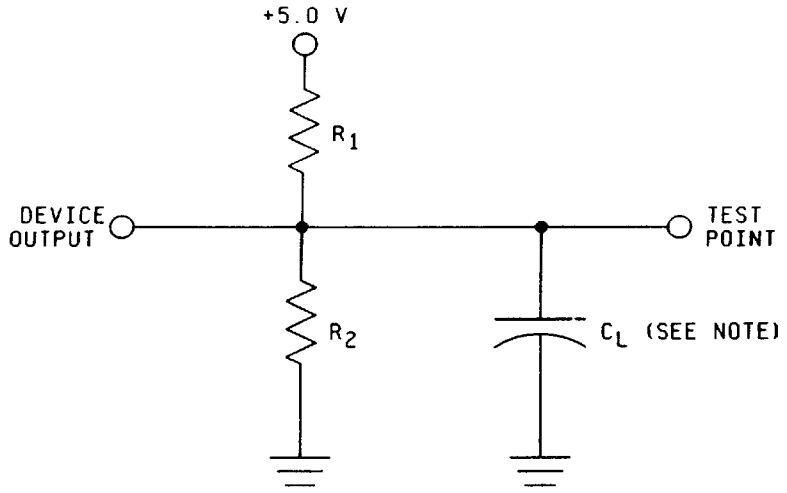
1/ If logic L, certain outputs become undefined.

FIGURE 2. Truth table (unprogrammed).



* These in-system-control functions are used on this device.

FIGURE 3. Functional block diagram.



Test	R_1	R_2	C_L
t_{PZH}	∞	390Ω	35pF
t_{PZL}	470Ω	390Ω	35pF
t_{PHZ} (at V_{OH} - 0.5 V)	∞	390Ω	5pF
t_{PLZ} (at V_{OL} + 0.5 V)	470Ω	390Ω	5pF
All others	470Ω	390Ω	35pF

Note: C_L includes test fixture and probe capacitance.

FIGURE 4. Switching times test circuit and waveforms.

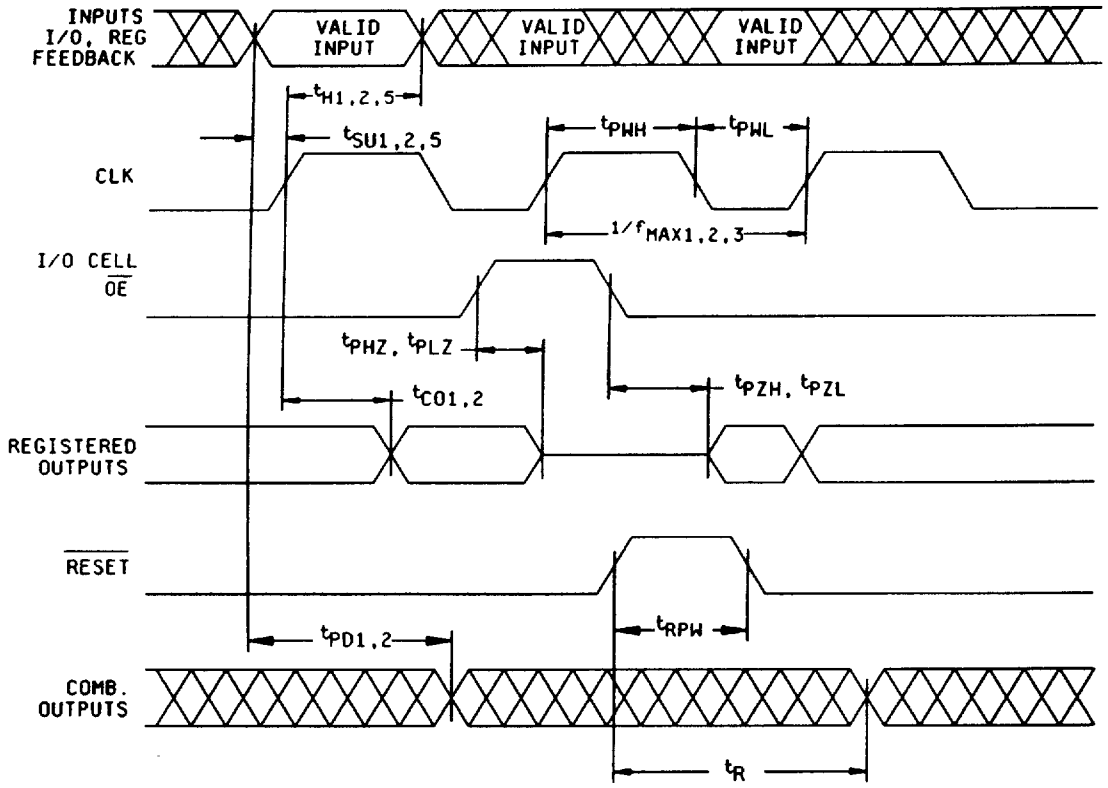


FIGURE 4. Switching times test circuit and waveforms - continued.

3.13 Data retention. A data retention stress test shall be completed as part of the vendor's reliability process. This test shall be done initially and after any design or process change which may affect data retention. The methods and procedures may be vendor specific, but will guarantee the number of years listed in section 1.3 herein. The vendors procedure shall be under document control and shall be made available upon request. Data retention capability shall be guaranteed over the full military temperature range.

4. QUALITY ASSURANCE PROVISIONS

4.1 Sampling and inspection. For device class M, sampling and inspection procedures shall be in accordance with MIL-STD-883 (see 3.1 herein). For device classes Q and V, sampling and inspection procedures shall be in accordance with MIL-I-38535 and the device manufacturer's QM plan.

4.2 Screening. For device class M, screening shall be in accordance with method 5004 of MIL-STD-883, and shall be conducted on all devices prior to quality conformance inspection. For device classes Q and V, screening shall be in accordance with MIL-I-38535, and shall be conducted on all devices prior to qualification and technology conformance inspection.

4.2.1 Additional criteria for device class M.

a. Delete the sequence specified as initial (preburn-in) electrical parameters through interim (postburn-in) electrical parameters of method 5004 and substitute lines 1 through 6 of table IIA herein.

b. The test circuit shall be maintained by the manufacturer under document revision level control and shall be made available to the preparing or acquiring 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.

(1) Dynamic burn-in for device class M (method 1015 of MIL-STD-883, test condition D; for circuit, see 4.2.1b herein).

(2) Devices shall be burned-in containing a pattern that assures all inputs and I/O's are dynamically switched. This pattern must have all cells programmed in a high or low state (not neutralized).

(3) The burn-in pattern shall be read before and after burn-in. Devices having any logic array bits not in the proper state shall constitute a device failure and shall be added as failures for PDA calculation.

c. Interim and final electrical test parameters shall be as specified in table IIA herein.

d. After the completion of all screening, the devices shall be erased and verified prior to delivery.

4.2.2 Additional criteria for device classes Q and V.

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-I-38535. The burn-in test circuit shall be maintained under document revision level control of the device manufacturer's Technology Review Board (TRB) in accordance with MIL-I-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.

b. Interim and final electrical test parameters shall be as specified in table IIB herein.

c. Additional screening for device class V beyond the requirements of device class Q shall be as specified in appendix B of MIL-I-38535.

4.3 Qualification inspection for device classes Q and V. Qualification inspection for device classes Q and V shall be in accordance with MIL-I-38535. Inspections to be performed shall be those specified in MIL-I-38535 and herein for groups A, B, C, D, and E inspections (see 4.4.1 through 4.4.4).

4.4 Conformance inspection. Quality conformance inspection for device class M shall be in accordance with MIL-STD-883 (see 3.1 herein) and as specified herein. Inspections to be performed for device class M shall be those specified in method 5005 of MIL-STD-883 and herein for groups A, B, C, D, and E inspections (see 4.4.1 through 4.4.4). Technology conformance inspection for classes Q and V shall be in accordance with MIL-I-38535 including groups A, B, C, D, and E inspections and as specified herein except where option 2 of MIL-I-38535 permits alternate in-line control testing.

4.4.1 Group A inspection.

a. Tests shall be as specified in table IIB herein.

b. Subgroups 5 and 6 of table I of method 5005 of MIL-STD-883 shall be omitted.

c. For device class M, subgroups 7, 8A, and 8B tests shall be sufficient to verify functionality of the device. For device classes Q and V, subgroups 7, 8A, and 8B shall include verifying the functionality of the device; these tests shall have been fault graded in accordance with MIL-STD-883, test method 5012 (see 1.5 herein).

d. O/V (latch-up) tests shall be measured only for initial qualification and after any design or process changes which may affect the performance of the device. For device class M, the procedures and circuits shall be maintained under document revision level control by the manufacturer and shall be made available to the preparing activity or acquiring activity upon request. For device classes Q and V, the procedures and circuits shall be under the control of the device manufacturer's TRB in accordance with MIL-I-38535 and shall be made available to the preparing activity or acquiring activity upon request. Testing shall be on all pins, on five devices with zero failures. Latch-up test shall be considered destructive. Information contained in JEDEC standard number 17 may be used for reference.

e. Subgroup 4 (C_{IN}, $C_{I/O}$, and C_Y measurements) shall be measured only for initial qualification and after any process or design changes which may affect input, I/O, or clock capacitance. Capacitance shall be measured between the designated terminal and GND per table I. Sample size is 5 devices with no failures, and all input, I/O, and clock terminals tested.

f. I_{OS} measurements in subgroup 1 may be measured only for the initial test and after process or design changes which may affect I_{OS}. Sample size is 15 devices with no failures, and all I/O terminals tested.

4.4.2 Group C inspection. The group C inspection end-point electrical parameters shall be as specified in table IIA herein. Delta limits shall apply only to subgroup 1 of group C inspection and shall consist of tests specified in table IIB herein.

4.4.2.1 Additional criteria for device class M. Steady-state life test conditions, method 1005 of MIL-STD-883:

a. Test condition D. The test circuit shall be maintained by the manufacturer under document revision level control and shall be made available to the preparing or acquiring 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.

b. T_A = +125°C, minimum.

c. Test duration: 1,000 hours, except as permitted by method 1005 of MIL-STD-883.

d. All devices shall be programmed with a pattern that assures all inputs and I/O's are dynamically switched.

4.4.2.2 Additional criteria for device classes Q and V. 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-I-38535. The test circuit shall be maintained under document revision level control by the device manufacturer's TRB, in accordance with MIL-I-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.

4.4.3 Group D inspection. The group D inspection end-point electrical parameters shall be as specified in table IIA herein.

TABLE IIA. Electrical test requirements. 1/ 2/ 3/ 4/ 5/ 6/ 7/

Line no.	Test requirements	Subgroups (in accordance with MIL-STD-883, TM 5005, table I)	Subgroups (in accordance with MIL-I-38535, table III)	
		Device class M	Device class Q	Device class V
1	Interim electrical parameters (see 4.2)			1, 7, 9
2	Static burn-in I and II (method 1015)	Not required	Not required	Required
3	Same as line 1			1*, 7* Δ
4	Dynamic burn-in (method 1015)	Required	Required	Required
5	Same as line 1			1*, 7* Δ
6	Final electrical parameters (see 4.2)	1*, 2, 3, 7*, 8A, 8B, 9, 10, 11	1*, 2, 3, 7*, 8A, 8B, 9, 10, 11	1*, 2, 3, 7*, 8A, 8B, 9, 10, 11
7	Group A test requirements (see 4.4)	1, 2, 3, 4**, 7, 8A, 8B, 9, 10, 11	1, 2, 3, 4**, 7, 8A, 8B, 9, 10, 11	1, 2, 3, 4**, 7, 8A, 8B, 9, 10, 11
8	Group C end-point electrical parameters (see 4.4)	2, 3, 7, 8A, 8B	2, 3, 7, 8A, 8B	1, 2, 3, 7, 8A, 8B, 9, 10, 11 Δ
9	Group D end-point electrical parameters (see 4.4)	2, 3, 8A, 8B	2, 3, 8A, 8B	2, 3, 8A, 8B
10	Group E end-point electrical parameters (see 4.4)	1, 7, 9	1, 7, 9	1, 7, 9

1/ Blank spaces indicate tests are not applicable.
2/ Any or all subgroups may be combined when using high-speed testers.
3/ Subgroups 7, 8A, and 8B functional tests shall verify the truth table.
4/ * indicates PDA applies to subgroups 1 and 7.
5/ ** see 4.4.1e.
6/ Δ indicates delta limit (see table IIB) shall be required where specified, and the delta values shall be computed with reference to the previous interim electrical parameters (see line 7).
7/ See 4.4.1d.

TABLE IIB. Delta limits at +25°C.

Parameter 1/	Device types
	All
I_{IL}	±100% of specified limit in table I.
I_{IH}	±100% of specified limit in table I.

1/ The above parameter shall be recorded before and after the required burn-in and life tests to determine the delta.

4.4.4 Group E inspection. Group E inspection is required only for parts intended to be marked as radiation hardness assured (see 3.5 herein). RHA levels for device classes Q and V shall be M, D, R, and H and for device class M shall be M and D.

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

b. For device class M, the devices shall be subjected to radiation hardness assured tests as specified in MIL-I-38535, appendix A, for the RHA level being tested. For device classes Q and V, the devices or test vehicle shall be subjected to radiation hardness assured tests as specified in MIL-I-38535 for the RHA level being tested. All device classes must meet the postirradiation end-point electrical parameter limits as defined in table I at T_A = +25°C ±5°C, after exposure, to the subgroups specified in table IIA herein.

c. When specified in the purchase order or contract, a copy of the RHA delta limits shall be supplied.

4.5 Delta measurements for device classes Q and V. Delta measurements, as specified in table IIA, shall be made and recorded before and after the required burn-in screens and steady-state life tests to determine delta compliance. The electrical parameters to be measured, with associated delta limits are listed in table IIB. The device manufacturer may, at his option, either perform delta measurements or within 24 hours after burn-in perform final electrical parameter tests, subgroup 1, 7, and 9.

4.6 Programming procedures. The programming procedures shall be as specified by the device manufacturer and shall be made available upon request.

4.7 Erasing procedures. The erasing procedures shall be as specified by the device manufacturer and shall be made available upon request.

5. PACKAGING

5.1 Packaging requirements. The requirements for packaging shall be in accordance with MIL-STD-883 (see 3.1 herein) for device class M and MIL-I-38535 for device classes Q and V.

6. NOTES

6.1 Intended use. Microcircuits conforming to this drawing are intended for use for Government microcircuit applications (original equipment), design applications, and logistics purposes.

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

6.1.2 Substitutability. Device class Q devices will replace device class M devices.

6.2 Configuration control of SMD's. All proposed changes to existing SMD's will be coordinated with the users of record for the individual documents. This coordination will be accomplished in accordance with MIL-STD-973 using DD Form 1692, Engineering Change Proposal.

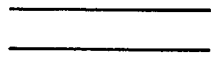
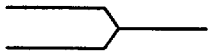
6.3 Record of users. Military and industrial users shall inform Defense Electronics Supply Center when a system application requires configuration control and which SMD's are applicable to that system. DESC will maintain a record of users and this list will be used for coordination and distribution of changes to the drawings. Users of drawings covering microelectronic devices (FSC 5962) should contact DESC-EC, telephone (513) 296-6047.

6.4 Comments. Comments on this drawing should be directed to DESC-EC, Dayton, Ohio 45444-5270, or telephone (513) 296-5377.

6.5 Abbreviations, symbols, and definitions. The abbreviations, symbols, and definitions used herein are defined in MIL-I-38535 and MIL-STD-1331.

6.5.1 Timing limits. The table of timing values shows either a minimum or a maximum limit for each parameter. Input requirements are specified from the external system point of view. Thus, setup time is shown as a minimum since the system must supply at least that much time (even though most devices do not require it). On the other hand, responses from the device are specified from the device point of view. Thus, the data propagation delay is shown as a maximum since the device never changes states later than that time.

6.5.2 Waveforms.

Waveform symbol	Input	Output
	MUST BE VALID	WILL BE VALID
	CHANGE FROM H TO L	WILL CHANGE FROM H TO L
	CHANGE FROM L TO H	WILL CHANGE FROM L TO H
	DON'T CARE ANY CHANGE PERMITTED	CHANGING STATE UNKNOWN
		HIGH IMPEDANCE

6.6 Additional operating data.

6.6.1 In-system programming voltage/timing characteristics. The in-system programming voltage/timing characteristics are as specified in table III and figure 5.

6.7 One part - one part number system. The one part - one part number system described below has been developed to allow for transitions between identical generic devices covered by the three major microcircuit requirements documents (MIL-H-38534, MIL-I-38535, and 1.2.1 of MIL-STD-883) without the necessity for the generation of unique PIN's. The three military requirements documents represent different class levels, and previously when a device manufacturer upgraded military product from one class level to another, the benefits of the upgraded product were unavailable to the Original Equipment Manufacturer (OEM), that was contractually locked into the original unique PIN. By establishing a one part number system covering all three documents, the OEM can acquire to the highest class level available for a given generic device to meet system needs without modifying the original contract parts selection criteria.

Military documentation format	Example PIN under new system	Manufacturing source listing	Document listing
New MIL-H-38534 Standardized Military Drawings	5962-XXXXXZZ(H or K)YY	QML-38534	MIL-BUL-103
New MIL-I-38535 Standardized Military Drawings	5962-XXXXXZZ(Q or V)YY	QML-38535	MIL-BUL-103
New 1.2.1 of MIL-STD-883 Standardized Military Drawings	5962-XXXXXZZ(M)YY	MIL-BUL-103	MIL-BUL-103

6.8 Sources of supply.

6.8.1 Sources of supply for device classes Q and V. Sources of supply for device classes Q and V are listed in QML-38535. The vendors listed in QML-38535 have submitted a certificate of compliance (see 3.6 herein) to DESC-EC and have agreed to this drawing.

6.8.2 Approved sources of supply for device class M. Approved sources of supply for class M are listed in MIL-BUL-103. The vendors listed in MIL-BUL-103 have agreed to this drawing and a certificate of compliance (see 3.6 herein) has been submitted to and accepted by DESC-EC.

TABLE III. In-system programming voltage/timing characteristics.

Parameter	Symbol	Conditions $0°C \le T_A \le +70°C$ unless otherwise specified	Device type	Limits		Units
				Min	Max	
Programming voltage	V_{CCP}		All	4.75	5.25	V
Programming supply current	I_{CCP}		All		100	mA
High level input voltage	V_{IHP}	$\overline{ispEN} = V_{IHL}$	All	2.0	V_{CCP}	V
Low level input voltage	V_{ILP}		All	0	0.8	V
Input current	I_{IP}		All		200	µA
High level output voltage	V_{OHP}		All	2.4	V_{CCP}	V
Low level output voltage	V_{OLP}	I_{OH} = -3.2 mA	All	0	0.5	V
Input rise and fall times	t_r, t_f	I_{OL} = 5.0 mA	All		0.1	µs
ispEN to output three-state	t_{en}	See figure 5	All		10	µs
ispEN to output active	t_{dis}		All		10	µs
Setup time	t_{su}		All	0.1		µs
Clock to output delay	t_{co}		All	0.1		µs
Hold time	t_h		All	0.1		µs
Clock pulse width, high or low	t_{clkh}, t_{clkl}		All	0.5		µs
Verify pulse width	t_{pwv}		All	20		µs
Programming pulse width	t_{pwp}		All	40	100	ms
Bulk erase pulse width	t_{bew}		All	200		ms
Reset time from valid V_{CCP}	t_{rst}		All	45		µs

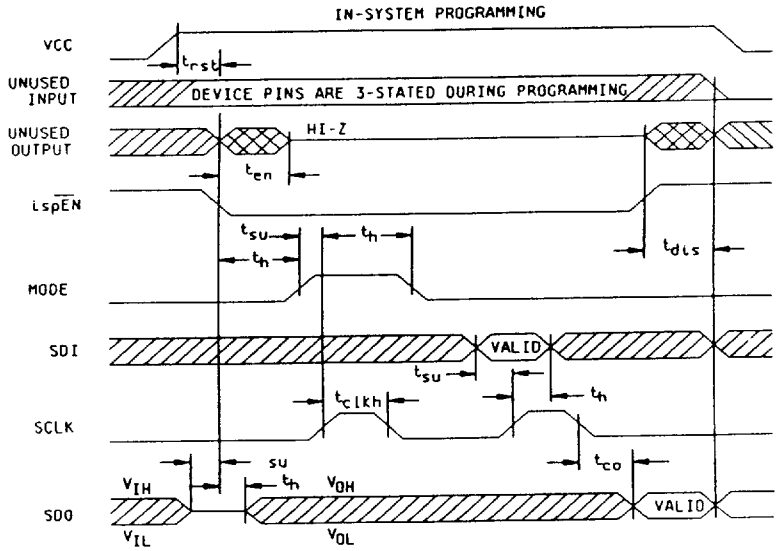


FIGURE 5. In-system programming waveforms.