REVISIONS			
LTR	DESCRIPTION	DATE (YR-MO-DA)	APPROVED
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REV																			
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SHEET	15	16	17	18	19	20	21	22	23	24	25								

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

PREPARED BY
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DRAWING APPROVAL DATE
96-03-12

REVISION LEVEL

DEFENSE ELECTRONICS SUPPLY CENTER
DAYTON, OHIO 45444

MICROCIRCUIT, MEMORY, DIGITAL, CMOS, 9500 GATE PROGRAMMABLE LOGIC ARRAY, MONOLITHIC SILICON

SIZE	CAGE CODE	
A	67268	**5962-95612**

SHEET 1 OF 25

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5962-E274-96

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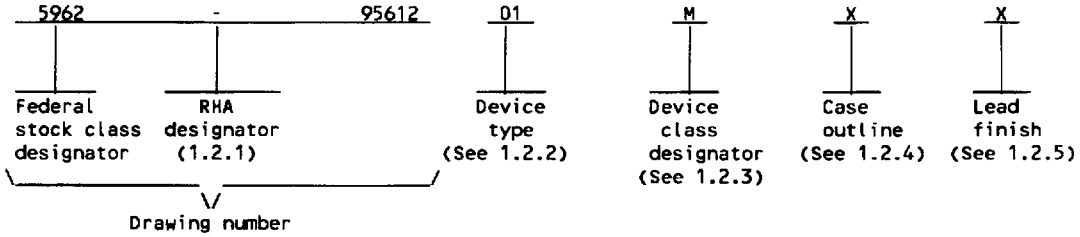
1. SCOPE

1.1 Scope. This drawing documents two product assurance class levels consisting of high reliability (device classes Q and V) and space application (device class V). A choice of case outlines and lead finishes are available and are reflected in the Part or Identifying Number (PIN). When available, a choice of Radiation Hardness Assurance (RHA) levels are reflected in the PIN.

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



1.2.1 RHA designator. Device classes Q and V RHA marked devices meet the MIL-PRF-38535 specified RHA levels and are marked with the appropriate RHA designator. Device class M RHA marked devices meet the MIL-PRF-38535, appendix A specified RHA levels and are 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	Toggle Speed
01	3195A-05	9500 gate programmable array	4.1 ns
02	3195A-04	9500 gate programmable array	3.3 ns

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

Device class	Device requirements documentation
M	Vendor self-certification to the requirements for MIL-STD-883 compliant, non-JAN class level B microcircuits in accordance with MIL-PRF-38535, appendix A
Q or V	Certification and qualification to MIL-PRF-38535

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

Outline letter	Descriptive designator	Terminals	Package style
X	CMGA8-175	175 1/	Pin grid array package
Y	See figure 1	164	Quad flat package
Z	See figure 1	164	Quad flat package

1.2.5 Lead finish. The lead finish is as specified in MIL-PRF-38535 for device classes Q and V or MIL-PRF-38535, appendix A for device class M.

1.3 Absolute maximum ratings. 2/

Supply voltage range to ground potential (V_{CC})	-0.5 V dc to +7.0 V dc
DC input voltage range	-0.5 V dc to V_{CC} +0.5 V dc
Voltage applied to three-state output(V_{TS})	-0.5 V dc to V_{CC} +0.5 V dc
Lead temperature (soldering, 10 seconds)	+260°C
Thermal resistance, junction-to-case (θ_{JC}):	
Case outline X	See MIL-STD-1835
Case outlines Y, Z	20°C/W 3/
Junction temperature (T_J)	+150°C 4/
Storage temperature range	-65°C to +150°C

1/ 175 = actual number of pins used, not maximum listed in MIL-STD-1835
2/ 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.
3/ When a thermal resistance for this case is specified in MIL-STD-1835 that value shall supersede the value indicated herein.
4/ Maximum junction temperature shall not be exceeded except for allowable short duration burn-in screening conditions in accordance with method 5004 of MIL-STD-883.

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1.4 Recommended operating conditions. 5/

Case operating temperature Range(T_C)	-55°C to +125°C
Supply voltage (V_{CC})	+4.5 V dc minimum to +5.5 V dc maximum
Ground voltage (GND)	0 V dc

1.5 Digital logic testing for device classes Q and V.

Fault coverage measurement of manufacturing logic tests (MIL-STD-883, test method 5012)	6/ percent

2. APPLICABLE DOCUMENTS

2.1 Government specification, standards, and handbooks. The following specification, standards, and handbooks form a part of this drawing to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DoDISS) and supplement thereto, cited in the solicitation.

SPECIFICATION

MILITARY

MIL-PRF-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.

HANDBOOKS

MILITARY

MIL-HDBK-103 - List of Standard Microcircuit Drawings (SMD's).
MIL-HDBK-780 - Standard Microcircuit Drawings.

(Unless otherwise indicated, copies of the specification, standards, and handbooks are available from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

2.2 Non-Government publications. The following documents 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, PA 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, 2500 Wilson Blvd., Arlington, VA 22201.

(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.)

5/ All voltage values in this drawing are with respect to V_{SS}.
6/ Values will be added when they become available.

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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 takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 Item requirements. The individual item requirements for device classes Q and V 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. The individual item requirements for device class M shall be in accordance with MIL-PRF-38535, appendix A for non-JAN class level B devices and as specified herein.

3.2 Design, construction, and physical dimensions. The design, construction, and physical dimensions shall be as specified in MIL-PRF-38535 and herein for device classes Q and V or MIL-PRF-38535, appendix A and herein for device class M.

3.2.1 Case outline(s). The case outline(s) shall be in accordance with 1.2.4 herein and figure 1.

3.2.2 Terminal connections. The terminal connections shall be as specified on figure 2.

3.2.3 Logic block diagram. The logic block diagram shall be as specified in figure 3.

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. In addition, the manufacturer's PIN may also be marked as listed in MIL-HDBK-103. For packages where marking of the entire SMD PIN number is not feasible due to space limitations, the manufacturer has the option of not marking the "5962-" on the device. For RHA product using this option, the RHA designator shall still be marked. Marking for device classes Q and V shall be in accordance with MIL-PRF-38535. Marking for device class M shall be in accordance with MIL-PRF-38535, appendix A.

3.5.1 Certification/compliance mark. The certification mark for device classes Q and V shall be a "QML" or "Q" as required in MIL-PRF-38535. The compliance mark for device class M shall be a "C" as required in MIL-PRF-38535, appendix A.

3.6 Certificate of compliance. 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 6.6.1 herein). 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-HDBK-103 (see 6.6.2 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 classes Q and V, the requirements of MIL-PRF-38535 and herein or for device class M, the requirements of MIL-PRF-38535, appendix A and herein.

3.7 Certificate of conformance. A certificate of conformance as required for device classes Q and V in MIL-PRF-38535 or for device class M in MIL-PRF-38535, appendix A 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-PRF-38535, appendix A).

4. QUALITY ASSURANCE PROVISIONS

4.1 Sampling and inspection. For device classes Q and V, 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. For device class M, sampling and inspection procedures shall be in accordance with MIL-PRF-38535, appendix A.

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4.2 Screening. For device classes Q and V, screening shall be in accordance with MIL-PRF-38535, and shall be conducted on all devices prior to qualification and technology conformance inspection. 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.

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4.2.1 Additional criteria for device class M.

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

b. For device class M, 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. For device class M the test circuit shall specify the inputs, outputs, biases, and power dissipation, as applicable, in accordance with the intent specified in test method 1015.

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

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-PRF-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-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 IIA herein.

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

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

4.4 Conformance inspection. Technology conformance inspection for classes Q and V shall be in accordance with MIL-PRF-38535 including groups A, B, C, D, and E inspections and as specified herein except where option 2 of MIL-PRF-38535 permits alternate in-line control testing. Quality conformance inspection for device class M shall be in accordance with MIL-PRF-38535, appendix A 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).

4.4.1 Group A inspection.

a. Tests shall be as specified in table IIA 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 consist of verifying functionality of the device. These tests form a part of the vendors test tape and shall be maintained and available upon request. 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 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 technical review board (TRB) in accordance with MIL-PRF-38535 and shall be made available to the preparing activity or acquiring activity upon request. Testing shall be on all pins, on 5 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} and C_{OUT} measurements) shall be measured only for initial qualification and after any process or design changes which may affect input or output capacitance. Capacitance shall be measured between the designated terminal and GND at a frequency of 1 MHz. Sample size is five devices with no failures, and all input and output terminals tested.

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TABLE I. Electrical performance characteristics.

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Test	Symbol	Conditions $4.5\ V \le V_{CC} \le 5.5\ V$ $-55^{\circ}C \le T_C \le +125^{\circ}C$ unless otherwise specified	Group A Subgroups	Device type	Limits		Unit
					Min	Max	
High Level output voltage	V_{OH}	V_{CC} = 4.5 V, V_{IL} = 0.8V I_{OH} = -8.0 mA, V_{IH} = 2.0 V	1,2,3	All	3.7		V
Low level output voltage	V_{OL}	V_{CC} = 5.5 V, I_{OL} = 8.0V V_{IL} = 0.8 V, V_{IH} = 2.0 V	1,2,3	All		0.4	V
Quiescent power supply current	I_{CCO}	CMOS inputs, $V_{CC} = V_{IN}$ = 5.5 V	1,2,3	All		8	mA
Quiescent power supply current	I_{CCO}	TTL inputs, $V_{CC} = V_{IN}$ = 5.5 V	1,2,3	All		14	mA
Input leakage current	I_{IL}	V_{CC} = 5.5 V, V_{IN} = 0 V and 5.5 V	1,2,3	All	-20	20	uA
Horizontal long line, pull-up current	I_{RLL}	V_{CC} = 5.5 V, V_{IN} = 0 V and 5.5 V	1,2,3	All	0.20	4.20	mA
High level input voltage	V_{IHT}	TTL inputs	1,2,3	All	2.0		V
Low level input voltage	V_{ILT}	TTL inputs	1,2,3	All		0.8	V
High level input voltage	V_{IHC}	CMOS inputs	1,2,3	All	0.7 V_{CC}		V
Low level input voltage	V_{ILC}	CMOS inputs	1,2,3	All		0.2 V_{CC}	V
Power down ($\overline{PWR\ DWN}$)voltage 2/	V_{PD}	PWR DWN = 0.0 V	1,2,3	All	3.5		V
Input capacitance except XTL1 AND XTL2	C_{IN}	See 4.4.1e	4	All		16	pF
Input capacitance XTL1 and XTL2	C_{IN}	See 4.4.1e	4	All		20	pF
Output capacitance	C_{OUT}	See 4.4.1e	4	All		16	pF
Functional test		See 4.4.1c	7,8A,8B	All			
$t_{PID} + 484(t_{ILO}) + t_{OPF}$	t_{B1}		9,10,11	01		2233.8	ns
				02		1845.9	
$t_{PID} + 484(t_{CKO}) + t_{OPF}$ + interconnect	t_{B2}		9,10,11	01		2193.4	ns
				02		1850.3	
$t_{PID} + 484t_{QLO} + t_{OPF}$ + interconnect	t_{B3}		9,10,11	01		3742.2	ns
				02		3157.1	
$t_{PID} + 44t_{PUS} + t_{OPF}$ + interconnect	t_{B4}		9,10,11	01		1233.6	ns
				02		1089.0	

See footnotes at end of table.

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TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions $4.5\ V \le V_{CC} \le 5.5\ V$ $-55^{o}C \le T_C \le +125^{o}C$ unless otherwise specified	Group A Subgroups	Device type	Limits		Unit
					Min	Max	
$t_{PID} + 44t_{PUF} + t_{OPF} +$ interconnect	t_{B5}		9,10,11	01		969.6	ns
				02		869.0	
$t_{PID} + 44t_{ON1} + t_{OPF} +$ interconnect	t_{B6}		9,10,11	01		446.0	ns
				02		411.4	
$t_{PID} + 44t_{ON2} + t_{OPF} +$ interconnect	t_{B7}		9,10,11	01		512.0	ns
				02		477.4	
Logic input to output (combinational)	t_{ILO}	See figures 4 and 5 as applicable	3/	01		4.1	ns
				02		3.3	
Reset input to output	t_{RIO}		3/	01		4.4	ns
				02		3.7	
Reset direct width	t_{RPW}		3/	01	3.8		ns
				02	3.2		
Master reset pin to CLB output (X, Y)	t_{MRQ}		3/	01		24	ns
				02		20	
K clock input to CLB output	t_{CKO}		3/	01		3.1	ns
				02		2.5	
Clock K to the outputs X or Y when Q is return through function generators to drive X or Y	t_{QLO}		3/	01		6.3	ns
				02		5.2	
K clock logic-input setup	t_{ICK}		3/	01	3.1		ns
				02	2.5		
K clock logic-input hold	t_{CKI}		3/	All	0		ns
Logic input setup to K clock	t_{DICK}		3/	01	2.0		ns
				02	1.6		
Logic input hold from K clock	t_{CKDI}		3/	01	1.2		ns
				02	1.0		
Logic input setup to enable clock	t_{ECCK}		3/	01	3.8		ns
				02	3.2		
Logic input hold to enable clock	t_{CKEC}		3/	All	1.0		ns

See footnotes at end of table.

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TABLE I. Electrical performance characteristics - Continued.

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Test	Symbol	Conditions $4.5\ V \le V_{CC} \le 5.5\ V$, $-55^{\circ}C \le T_C \le +125^{\circ}C$ unless otherwise specified	Group A Subgroups	Device type	Limits		Unit
					Min	Max	
Pad (package pin) to input direct	t_{PID}	See figures 4 and 5 as applicable	3/	01		2.8	ns
				02		2.5	
Pad (package pin) to inputs Tcckin,Bcckin	t_{PIDc}		3/	01		1.5	ns
				02		1.3	
I/O clock to I/O RI input (FF)	t_{IKRI}		3/	01		2.8	ns
				02		2.5	
I/O clock to pad-input setup	t_{PICK}		3/	01	15		ns
				02	14		
I/O clock to pad-input hold	t_{IKPI}		3/	All	0		ns
I/O propagation delay clock (OK) to pad (fast)	t_{OKPOf}		3/	01		5.5	ns
				02		5	
I/O clock to pad-output setup	t_{OOK}		3/	01	6.2		ns
				02	5.6		
I/O clock to pad-output hold	t_{OKO}		3/	All	0		ns
Output (enabled fast) to pad	t_{OPF}		3/	01		4.1	ns
				02		3.7	
Output (enabled slow) to pad	t_{OPS}		3/	01		13	ns
				02		11	
Master RESET to input RI	t_{RRI}		3/	01		29.1	ns
				02		24.8	
Master RESET to output (FF)	t_{RPO}		3/	01		34	ns
				02		29	
Bidirectional buffer delay	t_{BIDI}		3/	01		1.4	ns
				02		1.2	
TBUF data input to output	t_{IO}		3/	01		6.0	ns
				02		5.5	
TBUF three-state to output active and valid(single pull-up)	t_{ON1}		3/	01		7.6	ns
				02		6.8	
(double pull-up)	t_{ON2}		3/	01		9.1	
				02		8.3	

See footnotes at end of table.

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TABLE I. Electrical performance characteristics - Continued.

查询"5962-9561201MXC"供应商

Test	Symbol	Conditions $4.5\ V \le V_{CC} \le 5.5\ V$, $-55^{o}C \le T_C \le +125^{o}C$ unless otherwise specified	Group A Subgroups	Device type	Limits		Unit
					Min	Max	
TBUF three-state to output inactive (single pull-up)	t_{PUS}	See figures 4 and 5 as applicable	3/	01		25.5	ns
				02		22.2	
TBUF three-state to output inactive (pair of pull-ups)	t_{PUF}		3/	01		19.5	ns
				02		17.2	

1/ Tested initially and after any design or process change that may affect this parameter and guaranteed to the limits specified in table I with the following conditions:
Global clock at 16 Mhz for device 01 and 25 MHz for device 02.
20 outputs at 5 MHz
50 outputs at 1 MHz
Alternate clock at 10 MHz
100 configurable logic blocks (CLB) at 5 MHz
150 CLBs at 1 MHz
20 horizontal long lines at 5 MHz
30 vertical long lines at 1 MHz
50 inputs at 5 MHz
10 inputs at 10 MHz

2/ $\overline{\text{PWRDWN}}$ transitions must occur during operational V_{CC} levels.

3/ Parameter is not directly tested. Devices are first 100 percent functionally tested. Benchmark patterns (t_{B1-9}) are then used to determine the compliance of this parameter. For class M only characterization data is taken at initial device testing, prior to the introduction of significant changes, and at least twice yearly to monitor correlation between benchmark patterns and this parameter.

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Cases Y and Z (See note 6)

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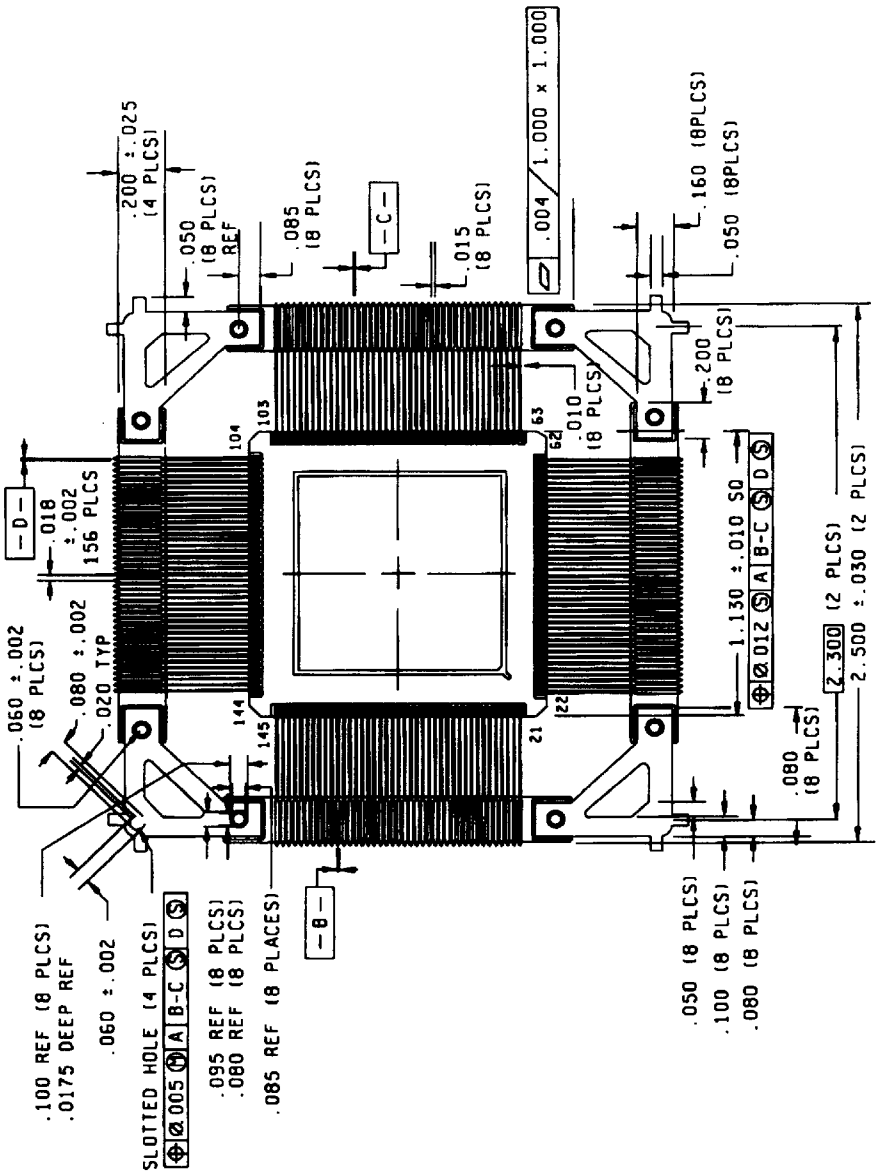

FIGURE 1. Case outline.

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		REVISION LEVEL	SHEET 10

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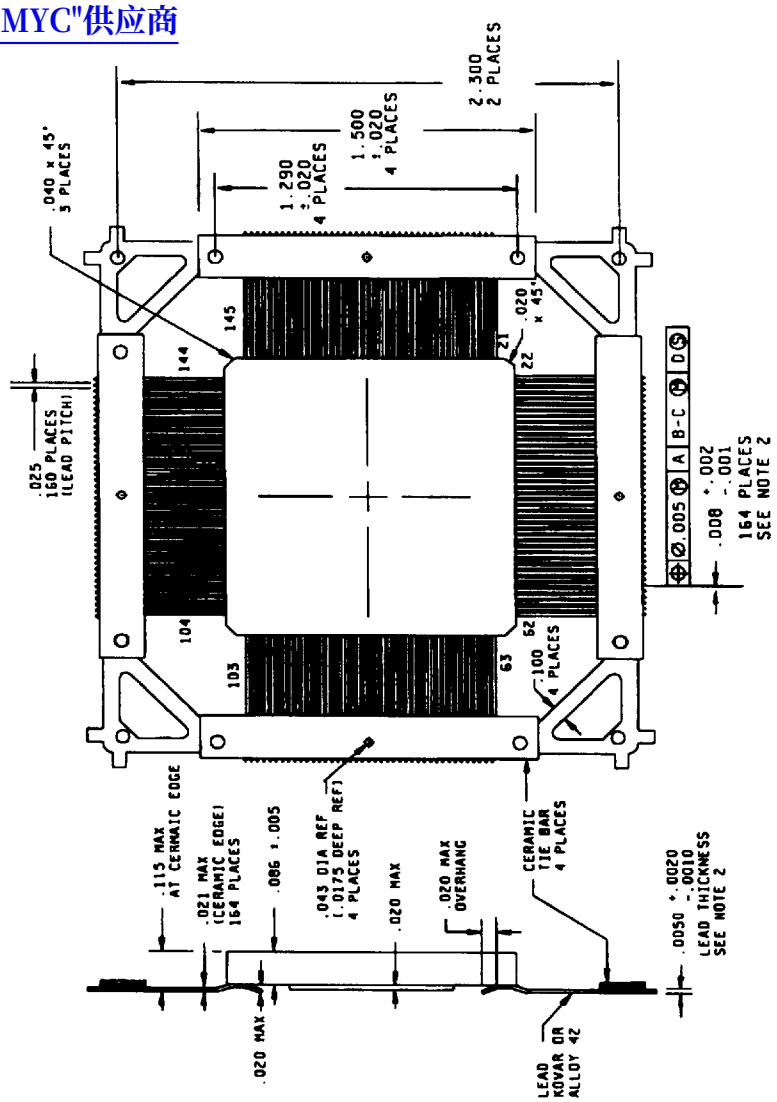

NOTES:

1. Dimensions are in inches.
2. The US goverment preferred system of measurement is the metric SI system. However, this item was originally designed using inch-pound units of measurement. In the event of conflict between the metric and inch-pound units, the inch-pound units shall take precedence.
3. Packages are shipped flat as depicted
4. Lead dimensions call out includes lead finish.
5. The leads of this package style shall be protected from mechanical distortion and damage such that dimensions pertaining to relative lead/body "true positions" and lead "coplanarity" are always maintained until the next higher level package attachment process is complete. Package lead protection mechanisms (tie bars) are shown on the drawing for reference only. When microcircuit devices contained in this package style are shipped for use in Government equipment, or shipped directly to the Government as spare parts or mechanical qualification samples, lead "true position" and "coplanarity" protection shall be in place.
6. Case Y represents marking the device on the nonlid side of device, i.e., lid side facing down. When mounted in this position, the pin out is clockwise. Case Z represents marking the device on the lid side of the device i.e., lid side facing up. When mounted in this position, the pin out is counterclockwise.

FIGURE 1. Case outline - Continued.

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Inches	mm	Inches	mm
.0010	0.025	.050	1.27
.001	0.03	.060	1.52
.002	0.05	.080	2.03
.004	0.10	.086	2.18
.005	0.13	.095	2.41
.008	0.20	.100	2.54
.010	0.25	.115	2.92
.012	0.30	.160	4.06
.0175	0.445	.200	5.08
.018	0.46	.645	16.38
.020	0.51	1.000	25.50
.021	0.53	1.130	28.70
.025	0.64	1.290	32.77
.030	0.76	1.500	38.10
.040	1.02	2.300	58.42
		2.500	63.50

NOTE: Metric equivalents are for reference only.

FIGURE 1. Case outline - Continued.

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Case outline X

Device type	All		Device type	All		Device type	All
Terminal number	Terminal symbol		Terminal number	Terminal symbol		Terminal number	Terminal symbol
A2	NC		C1	A8-I/O		D15	I/O
A3	NC		C2	A9-I/O		D16	LDC-I/O
A4	I/O		C3	GND		E1	A7-I/O
A5	I/O		C4	I/O		E2	I/O
A6	I/O		C5	I/O		E3	A10-I/O
A7	I/O		C6	I/O		E14	HDC-I/O
A8	I/O		C7	I/O		E15	I/O
A9	I/O		C8	I/O		E16	I/O
A10	I/O		C9	I/O		F1	I/O
A11	I/O		C10	I/O		F2	A12-I/O
A12	I/O		C11	I/O		F3	I/O
A13	I/O		C12	I/O		F14	I/O
A14	I/O		C13	I/O		F15	I/O
A15	NC		C14	GND		F16	I/O
A16	NC		C15	M2-I/O		G1	I/O
B1	I/O		C16	I/O		G2	I/O
B2	PWRDN		D1	A11-I/O		G3	I/O
B3	I/O		D2	I/O		G14	I/O
B4	I/O		D3	V_{CC}		G15	I/O
B5	I/O		D4	TCLKIN-I/O		G16	I/O
B6	I/O		D5	I/O		H1	A6-I/O
B7	I/O		D6	I/O		H2	A13-I/O
B8	I/O		D7	I/O		H3	V_{CC}
B9	I/O		D8	GND		H14	V_{CC}
B10	I/O		D9	V_{CC}			
B11	I/O		D10	I/O		H15	$\overline{INIT}$-I/O
B12	I/O		D11	I/O		H16	I/O
B13	I/O		D12	I/O		J1	I/O
B14	M1-RDATA		D13	I/O		J2	I/O
B15	M0-RTRIG		D14	V_{CC}		J3	GND
B16	I/O					J14	GND

NC = no connect

FIGURE 2. Terminal connections.

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Device type	All		Device type	All		Device type	All
Terminal number	Terminal symbol		Terminal number	Terminal symbol		Terminal number	Terminal symbol
J15	I/O		N8	GND		R2	CCLK
J16	I/O		N9	V_{CC}		R3	D0-DIN-I/O
K1	A5-I/O		N10	I/O		R4	I/O
K2	A14-I/O		N11	I/O		R5	D1-I/O
K3	I/O		N12	I/O		R6	I/O
K14	I/O		N13	D7-I/O		R7	D2-I/O
K15	I/O		N14	GND		R8	CS1-I/O
K16	I/O		N15	I/O		R9	D4-I/O
L1	I/O		N16	I/O		R10	CS0-I/O
L2	A4-I/O		P1	A2-I/O		R11	I/O
L3	I/O		P2	A0-WS-I/O		R12	I/O
L14	I/O		P3	V_{CC}		R13	I/O $\overline{}$
L15	I/O		P4	I/O $\overline{}$ $\overline{}$		R14	DONE-PG
L16	I/O		P5	RDY/BUSY-RCLK-I/O		R15	RESET
M1	A15-I/O		P6	I/O		R16	I/O
M2	I/O		P7	I/O		T1	NC
M3	A1-CS2-I/O		P8	D3-I/O		T2	NC
M14	I/O		P9	I/O		T3	NC
M15	I/O		P10	I/O		T4	I/O
M16	I/O		P11	I/O		T5	I/O
N1	A3-I/O		P12	D6-I/O		T6	I/O
N2	I/O		P13	I/O		T7	I/O
N3	GND		P14	V_{CC}		T8	I/O
N4	DOUT-I/O		P15	XTAL2(IN)-I/O		T9	I/O
N5	I/O		P16	I/O		T10	I/O
N6	I/O		R1	I/O		T11	D5-I/O
N7	I/O					T12	I/O
						T13	I/O
						T14	XTALK1(OUT)-BCLKIN-I/O
						T15	NC
						T16	NC

NC = no connect

FIGURE 2. Terminal connections - Continued.

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Device type	All		Device type	All		Device type	All
Terminal number	Terminal symbol		Terminal number	Terminal symbol		Terminal number	Terminal symbol
1	V_{CC}		29	I/O		57	I/O
2	A13-I/O		30	I/O		58	I/O
3	A6-I/O		31	I/O		59	I/O
4	I/O		32	I/O		60	I/O
5	I/O		33	I/O		61	I/O
6	I/O		34	I/O		62	M1-RDATA
7	I/O		35	I/O		63	GND
8	A12-I/O		36	I/O		64	M0-RTRIG
9	A7-I/O		37	I/O		65	V_{CC}
10	I/O		38	I/O		66	M2-I/O
11	I/O		39	I/O		67	HDC-I/O
12	A11-I/O		40	I/O		68	I/O
13	A8-I/O		41	GND		69	I/O
14	I/O		42	V_{CC}		70	I/O
15	I/O		43	I/O		71	LDC-I/O
16	A10-I/O		44	I/O		72	I/O
17	A9-I/O		45	I/O		73	I/O
18	V_{CC}		46	I/O		74	I/O
19	GND		47	I/O		75	I/O
20	PWRDWN		48	I/O		76	I/O
21	TCLKIN-I/O		49	I/O		77	I/O
22	I/O		50	I/O		78	I/O
23	I/O		51	I/O		79	I/O
24	I/O		52	I/O		80	I/O
25	I/O		53	I/O		81	INIT-I/O
26	I/O		54	I/O		82	V_{CC}
27	I/O		55	I/O		83	GND
28	I/O		56	I/O		84	I/O

FIGURE 2. Terminal connections - Continued.

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Device type	All		Device type	All		Device type	All
Terminal number	Terminal symbol		Terminal number	Terminal symbol		Terminal number	Terminal symbol
85	I/O		112	I/O		139	I/O
86	I/O		113	I/O		140	I/O
87	I/O		114	I/O		141	I/O
88	I/O		115	D5-I/O		142	I/O
89	I/O		116	CSO-I/O		143	DO-DIN-I/O
90	I/O		117	I/O		144	DOUT-I/O
91	I/O		118	I/O		145	CCLK
92	I/O		119	I/O		146	V_{CC}
93	I/O		120	I/O		147	GND
94	I/O		121	D4-I/O		148	AO-WS-I/O
95	I/O		122	I/O		149	A1-CS2-I/O
96	I/O		123	V_{CC}		150	I/O
97	I/O		124	GND		151	I/O
98	I/O		125	D3-I/O		152	A2-I/O
99	XTAL2(IN)-I/O		126	CS1-I/O		153	A3-I/O
100	GND		127	I/O		154	I/O
101	RESET		128	I/O		155	I/O
102	V_{CC}		129	I/O		156	A15-I/O
103	DONE-PG		130	I/O		157	A4-I/O
104	D7-I/O		131	D2-I/O		158	I/O
105	XTAL1(OUT)-BCLKIN-I/O		132	I/O		159	I/O
			133	I/O		160	A14-I/O
106	I/O		134	I/O		161	A5-I/O
107	I/O		135	I/O		162	I/O
108	I/O		136	I/O		163	I/O
109	D6-I/O		137	D1-I/O		164	GND
110	I/O		138	RDY/BUSY-RCLK-I/O			
111	I/O						

FIGURE 2. Terminal connections - Continued.

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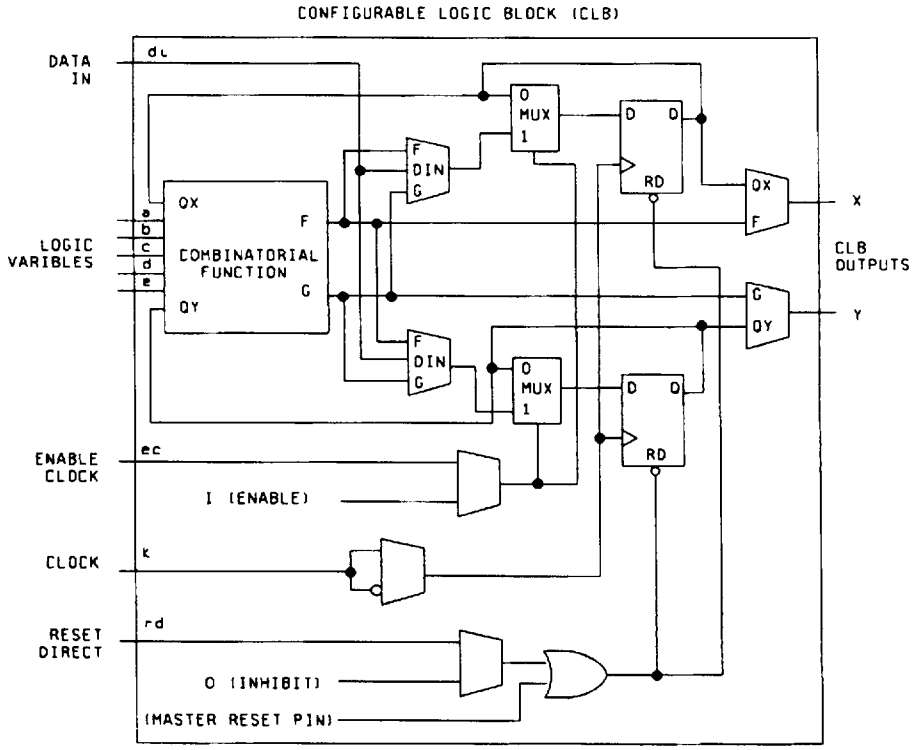

NOTE: Each configurable logic block includes a combinatorial logic section, two flip-flops, and program memory controlled multiplexer selection of function.

It has: Five logic variable inputs: a, b, c, d, and e.
a direct data input: di
an enable clock: ec
a clock (invertible): k
an asynchronous reset: rd
two outputs: x and y

FIGURE 3. Logic block diagram.

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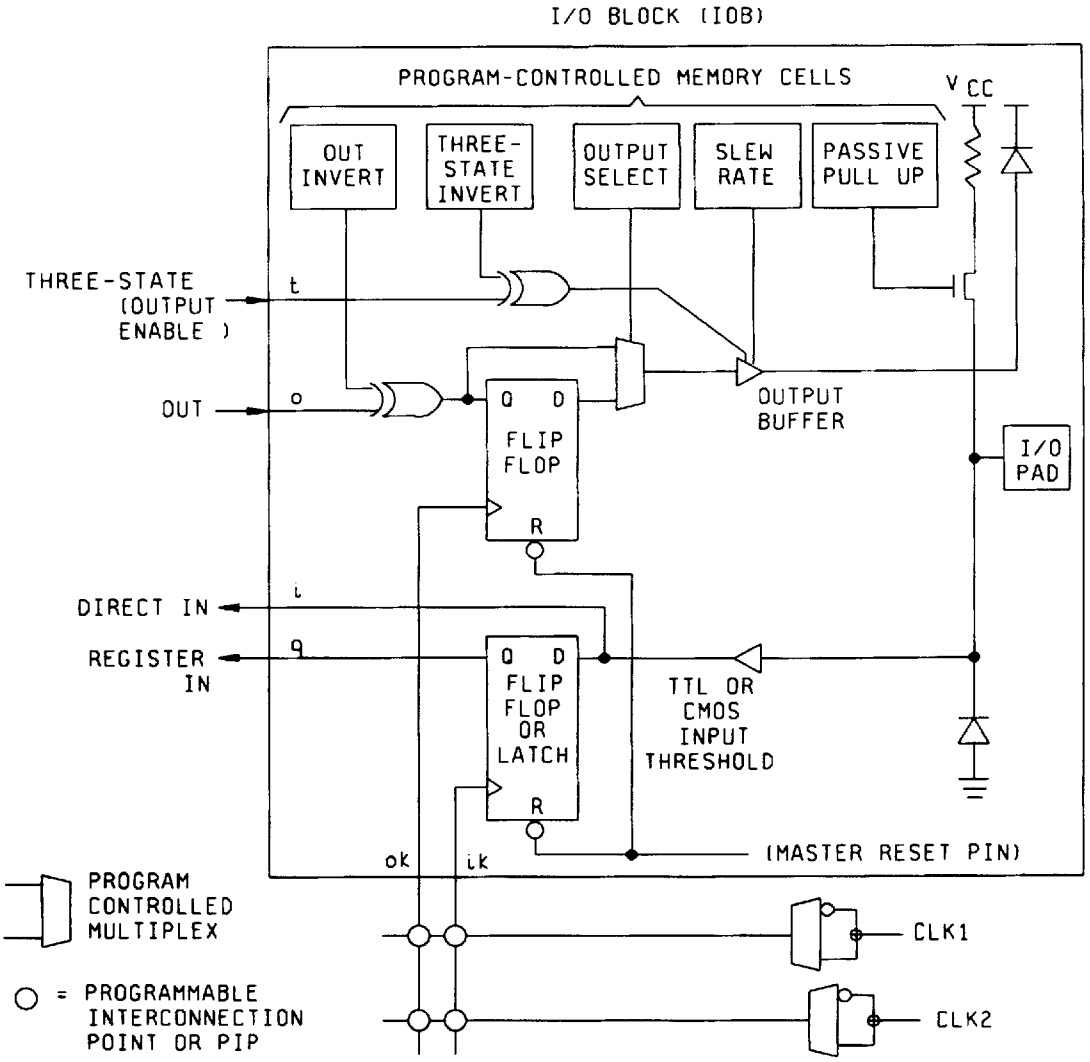

NOTE: The input/output block includes input and output storage elements and I/O options selected by configuration memory cells. A choice of two clocks is available on each die edge. The polarity of each clock line (not each flip-flop or latch) is programmable. A clock line that triggers the flip-flop on the rising edge is an active low latch enable (latch transparent) signal and vice versa. Passive pull-up can only be enable on inputs, not on outputs. All user inputs are programmed for TTL or CMOS thresholds.

FIGURE 3. Logic block diagram - Continued.

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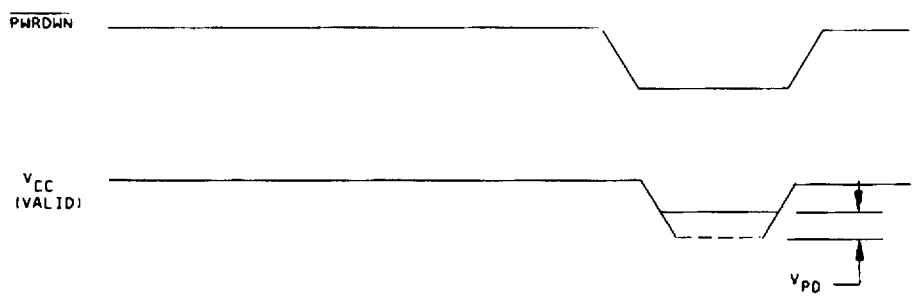
GENERAL LOGIC CELL ARRAY (LCA) SWITCHING CHARACTERISTICS



NOTE: All timings except t_{TSHZ} and t_{TSON} are measured at 1.5 V levels with 50 pF minimum output load. For input signals, rise and fall times are less than 6.0 ns, with low amplitude = 0.0 V, and high amplitude = 3.0 V.

FIGURE 4. Timing diagrams and switching characteristics.

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CONFIGURABLE LOGIC BLOCK (CLB) SWITCHING CHARACTERISTICS

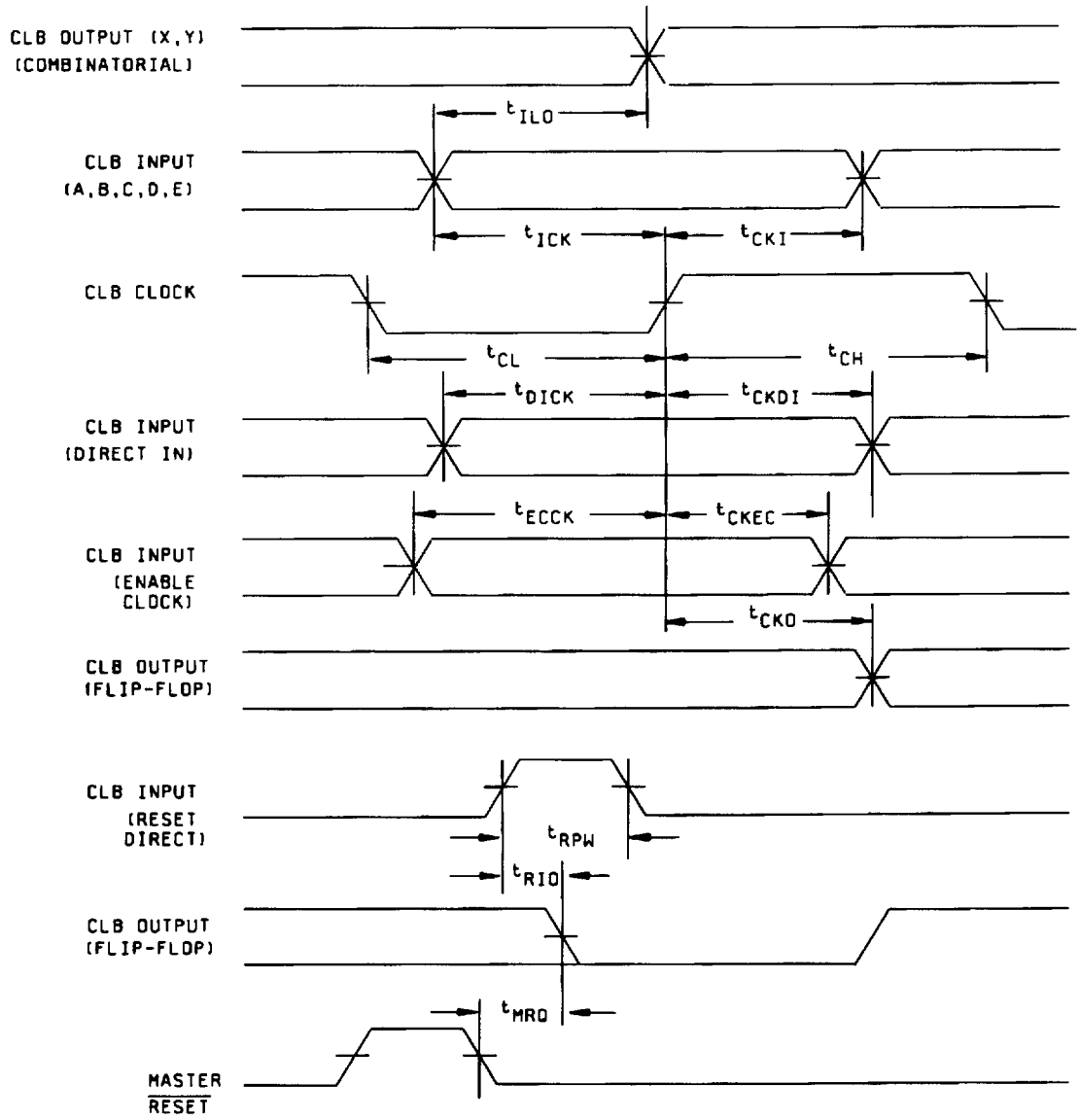

FIGURE 4. Timing diagrams and switching characteristics - Continued.

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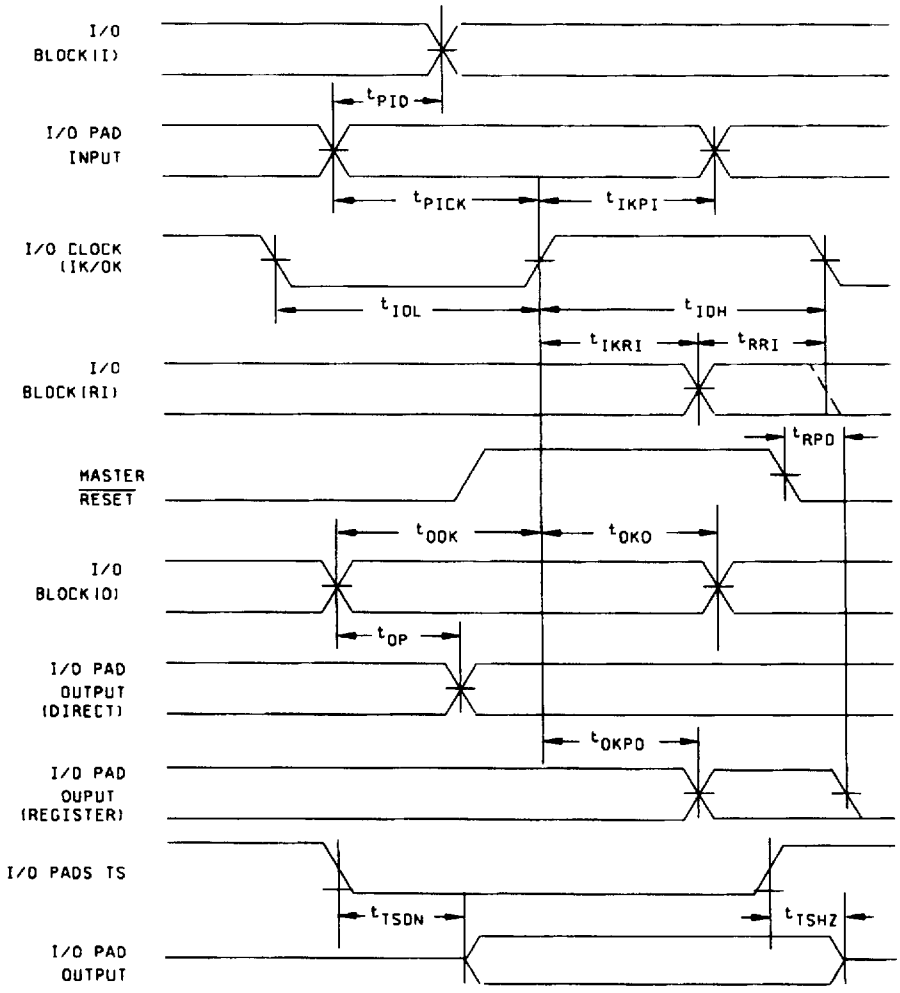
I/O BLOCK (IOB) SWITCHING CHARACTERISTICS



NOTE: All timings except tTSHZ and tTSON are measured at 1.5 V with 50 pF minimum load output. For input signals, rise and fall times are ≤ 6ns, low amplitude = 0 V and high = 3 V. t_{TSHZ} is determined when the output shifts 10 percent (of the output voltage swing) from V_{OL} level or V_{OH} level. See figure 5, circuit A herein for circuit used. t_{TSON} is measured at 0.5 V_{CC} level with V_{IN} = 0.0 for three-state to active high, and V_{IN} = V_{CC} for three-state to active low. See figure 5, circuit B herein for circuit used.

FIGURE 4. Timing diagrams and switching characteristics - Continued.

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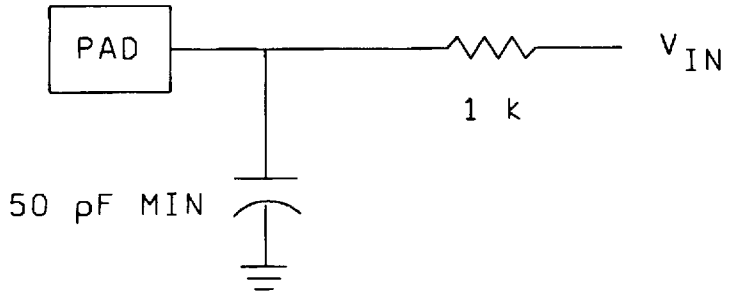
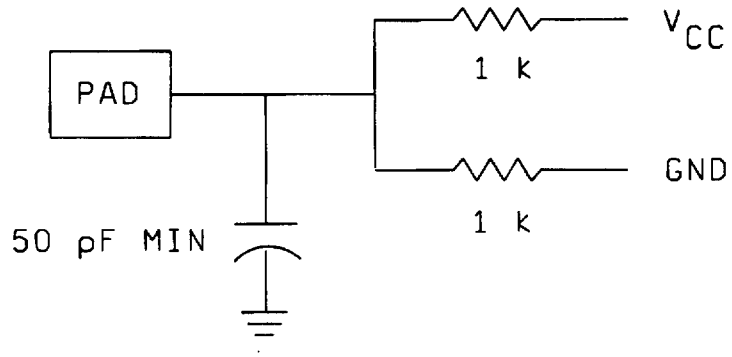


Circuit A



Circuit B

FIGURE 5. Load circuit.

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

Line no.	Test requirements	Subgroups (in accordance with MIL-STD-883, method 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	1,7,9
2	Static burn-in (method 1015)	Required	Required	Required
3	Same as line 1			1*,7* Δ
4	Dynamic burn-in (method 1015)	Not required	Not required	Not required
5	Final electrical parameters	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
6	Group A test requirements	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
7	Group C end-point electrical parameters	2,3,7, 8A,8B	1,2,3,7, 8A,8B	1,2,3,7, 8A,8B,9, 10,11 Δ
8	Group D end-point electrical parameters	2,3, 8A,8B	2,3, 8A,8B	2,3, 8A,8B
9	Group E end-point electrical parameters	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 and 8 functional tests shall verify the truth table.
4/ * indicates PDA applies to subgroup 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 1).
7/ See 4.4.1d.

TABLE IIB. Delta limits at +25°C.

Parameter 1/	Device types
	All
I_{CCO} standby	±300 μA
I_{IL}, I_{OL}	±2 nA

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

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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.

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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. For device class M, 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. For device classes M 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.

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-PRF-38535. The test circuit shall be maintained under document revision level control by the device manufacturer's 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.

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

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, L, R, F, G, 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 classes Q and V, the devices or test vehicle shall be subjected to radiation hardness assured tests as specified in MIL-PRF-38535 for the RHA level being tested. For device class M, the devices shall be subjected to radiation hardness assured tests as specified in MIL-PRF-38535, appendix A 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 class 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 life test perform final electrical parameter tests, subgroups 1, 7, and 9.

5. PACKAGING

5.1 Packaging requirements. The requirements for packaging shall be in accordance with MIL-PRF-38535 for device classes Q and V or MIL-PRF-38535, appendix A for device class M.

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 should 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.

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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-PRF-38535, MIL-HDBK-1331, and as follows.

PWRDWN	POWER-DOWN.
MO	MODE 0.
RTRIG	READ TRIGGER.
M1	MODE 1.
RDATA	READ DATA.
M2	MODE 2.
HDC	HIGH DURING CONFIGURATION.
LDC	LOW DURING CONFIGURATION
RESET	RESET
DONE	DONE
PG	PROGRAM
BCLKIN	BCLKIN
XTL1	EXTERNAL CRYSTAL
XTL2	EXTERNAL CRYSTAL
CCLK	CONFIGURATION CLOCK
DOUT	DATA OUT
DIN	DATA IN
CSO	CHIP SELECT, WRITE.
CS1	CHIP SELECT, WRITE.
CS2	CHIP SELECT, WRITE.
WS	CHIP SELECT, WRITE.
RCLK	READ CLOCK.
RDY/BUSY	During peripheral parallel mode configuration, this pin indicates when the chip is ready for another byte of data to be written into it. After configuration is complete, this pin becomes a user programmed I/O pin.
TCLKIN	TCLKIN
INIT	INIT
D0-D7	DATA
A0-A15	ADDRESS
I/O	INPUT/OUTPUT(DEDICATED).
V_{CC}	+5.0 V SUPPLY VOLTAGE.
GND	GROUND

6.6 Sources of supply.

6.6.1 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.

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

6.7 Additional operating data.

a. Power on delay is 2^{14} cycles from the non-master mode. This provides 11 to 33 ms of wait time.

b. Power on delay is 2^{16} cycles for the master mode. This provides 43 to 130 ms of wait time.

c. Clear is 375 cycles ±25 cycles and may take as long as 250 to 750 µs.

d. During normal power up, V_{CC} must rise from 2.0 V to V_{CC} minimum in less than 10 ms. If this does not occur, configuration must be delayed by using RESET.

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