REVISIONS			
LTR	DESCRIPTION	DATE (YR-MO-DA)	APPROVED
A	Changes in accordance with NOR 5962-R146-95. - ksr	95-07-03	Michael Frye
B	Changes in accordance with NOR 5962-R008-97. - ksr	96-10-29	Ray Monnin
C	Update drawing to meet current MIL-PRF-38535 requirements. glg.	14-04-04	Charles F. Saffle

REV																				
SHEET																				
REV	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C				
SHEET	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30				

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

PMIC N/A

PREPARED BY
Kenneth Rice

CHECKED BY
Jeff Bowling

APPROVED BY
Michael Frye

DRAWING APPROVAL DATE
94-10-18

REVISION LEVEL
C

DLA LAND AND MARITIME
COLUMBUS, OHIO 43218-3990
http://www.landandmaritime.dla.mil

STANDARD MICROCIRCUIT DRAWING

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

AMSC N/A

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

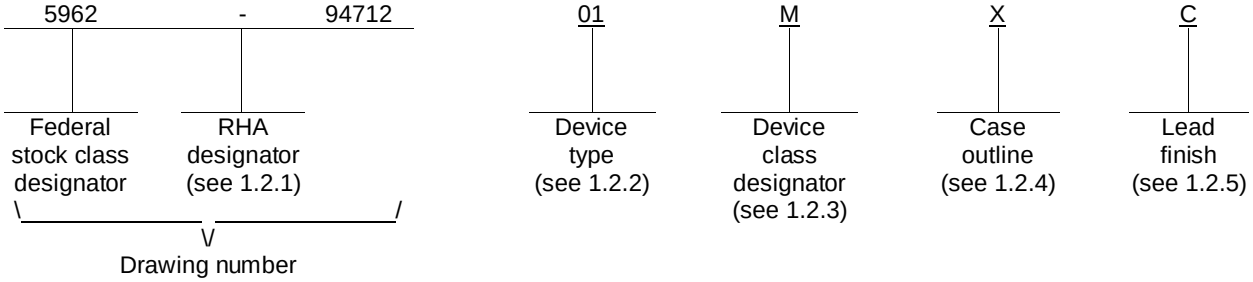
SIZE	CAGE CODE	
A	**67268**	**5962-94712**

SHEET 1 OF 30

1. SCOPE

1.1 Scope. This drawing documents two product assurance class levels consisting of high reliability (device classes Q and M) 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 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) identify the circuit function as follows:

Device type	Generic number	Circuit function	Access time
01	4003A-10	3000 gate programmable array	10 ns
02	4003A-6	3000 gate programmable array	6 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	CMGA5-P120	120	Pin grid array package
Y	see figure 1	100	Quad flat package
Z	see figure 1	100	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. 1/ 2/

Supply voltage range to ground potential (V_{CC})	-0.5 V dc to +7.0 V dc
DC input voltage range (V_{IN})	-0.5 V dc to V_{CC} + 5.0 V dc
Voltage applied to three-state output (V_{IS})	-0.5 V dc to V_{CC} + 5.0 V dc
Thermal resistance, junction-to-case (θ_{JC})	See MIL-STD-1835
Thermal resistance, junction-to-ambient (θ_{JA})	+50ºC/W
Power dissipation (P_D)	500 mW
Junction temperature (T_J)	+150ºC 3/
Lead temperature (soldering, 10 seconds)	+260ºC
Storage temperature range	-65ºC to +150ºC

1.4 Recommended operating conditions.

Supply voltage relative to ground (V_{CC})	+4.5 V dc minimum to +5.5 V dc maximum
Input high voltage (V_{IH})	2.0 V dc to V_{CC}
Input low voltage (V_{IL})	0 V dc to 0.8 V dc
Maximum input signal transition time (t_{IN})	250 ns
Case operating temperature range (T_C)	-55ºC to +125ºC

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 cited in the solicitation or contract.

DEPARTMENT OF DEFENSE SPECIFICATION

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

DEPARTMENT OF DEFENSE STANDARDS

MIL-STD-883 - Test Method Standard Microcircuits.
MIL-STD-1835 - Interface Standard Electronic Component Case Outlines.

DEPARTMENT OF DEFENSE HANDBOOKS

MIL-HDBK-103 - List of Standard Microcircuit Drawings.
MIL-HDBK-780 - Standard Microcircuit Drawings.

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

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 are the issues of the documents cited in the solicitation.

JEDEC SOLID STATE TECHNOLOGY ASSOCIATION (JEDEC)

JESD 78 - IC Latch-Up Test.

(Copies of these documents are available online at http://www.jedec.org or from JEDEC – Solid State Technology Association, 3103 North 10th Street, Suite 240–S, Arlington, VA 22201-2107.)

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.

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/ All voltage values in this drawing are with respect to V_{SS}.
3/ 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.

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 outlines. The case outlines 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.

3.2.4 Logic block diagram. The logic block diagram shall be as specified on 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. 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 DLA Land and Maritime-VA 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 DLA Land and Maritime-VA of change of product (see 6.2 herein) involving devices acquired to this drawing is required for any change that affects this drawing.

3.9 Verification and review for device class M. For device class M, DLA Land and Maritime, DLA Land and Maritime'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. VERIFICATION

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.

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.

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.

(1) 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 method 1015.

(2) T_A = +125°C, minimum.

b. 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 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. 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 and 8 tests shall be sufficient to verify the truth table. For device classes Q and V, subgroups 7 and 8 shall include verifying the functionality of the device.

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 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 five devices with zero failures. Latch-up test shall be considered destructive. Information contained in JESD 78 may be used for reference.

e. Subgroup 4 (C_{IN} measurements) shall be measured only for initial qualification and after any process or design changes which may affect input capacitance. Capacitance shall be measured between the designated terminal and GND at a frequency of 1 MHz. Sample size is 15 devices with no failures, and all input terminals tested.

TABLE I. Electrical performance characteristics.

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, I_{OH} = -4.0 mA	1, 2, 3	All	2.4		V
Low level output voltage 1/	V_{OL}	V_{CC} = 5.5 V, I_{OL} = 8.0 mA,	1, 2, 3	All		0.4	V
Quiescent LCA supply current 2/	I_{CCO}	$V_{CC} = V_{IN}$ = 5.5 V	1, 2, 3	All		50	mA
Input leakage current	I_{IL}	V_{IN} = 0 V and 5.5 V, V_{CC} = 5.5 V	1, 2, 3	All	-10	+10	µA
Pad pull-up current (when selected)	I_{RIN}	V_{IN} = 0 V	1, 2, 3	All		0.5	mA
Horizontal long line pull-up current (when selected)	I_{RLL}	At logic low	1, 2, 3	All		2.5	mA
Input capacitance	C_{IN}	See 4.4.1e	4, 5, 6	All		15	pF
Functional test	FT	See 4.4.1c	7, 8A, 8B	All			
Interconnect + t_{PID} + t_{OPS} + t_{ILO}	t_{B1}		9,10,11	01		136.6	ns
				02		96.6	
Interconnect + t_{PID} + t_{HHO} + t_{OPS}	t_{B2}		9, 10, 11	01		116.6	ns
				02		106.6	
Interconnect + t_{PID} + t_{OPS} + t_{IHO}	t_{B3}		9, 10, 11	01		176.6	ns
				02		116.6	
Interconnect + t_{PID} + t_{OPS} + t_{RIO}	t_{B4}		9, 10, 11	01		186.6	ns
				02		126.6	
Interconnect + t_{CKO} + t_{ICK} + t_{CKI}	t_{B5}		9, 10, 11	01		21.6	ns
				02		12.6	
Interconnect + t_{CKO} + t_{HHCK} + t_{CKHH}	t_{B6}		9, 10, 11	01		19.6	ns
				02		13.6	
Interconnect + t_{CKO} + t_{IHCK} + t_{CKIH}	t_{B7}		9, 10, 11	01		25.6	ns
				02		14.6	
Interconnect + t_{CKO} + t_{DICK} + t_{CKDI}	t_{B8}		9, 10, 11	01		17.6	ns
				02		10.6	
Interconnect + t_{CKO} + t_{ECCK} + t_{CKEC}	t_{B9}		9, 10, 11	01		22.6	ns
				02		13.6	
Interconnect + t_{PID} + t_{OPS} + t_{OPCY} + t_{SUM} - t_{BYP}	t_{B10}		9, 10, 11	01		188.7	ns
				02		152.7	

See footnotes at end of table.

TABLE I. Electrical performance characteristics - continued.

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	
Interconnect + t_{PID} + t_{OPS} + t_{ASCY} + t_{SUM} - t_{BYP}	t_{B11}		9, 10, 11	01		217.4	ns
				02		163.4	
Interconnect + t_{PID} + t_{OPS} + t_{INCY} + t_{SUM}	t_{B12}		9, 10, 11	01		119	ns
				02		99	
Interconnect + t_{PID} + t_{OPS} + t_{INCY} + t_{SUM} + t_{BYP}	t_{B13}		9, 10, 11	01		64.2	ns
				02		52.2	
WIDE DECODER SWITCHING CHARACTERISTICS							
Full length, both pull-ups inputs from IOB I-pins	T_{WAF}	See figures 3 and 4 as applicable. 3/	4/	All		9	ns
Full length, both pull-ups inputs from internal logic	T_{WAFL}		4/	All		12	ns
Half length, one pull-up inputs from IOB I-pins	T_{WAO}		4/	All		9	ns
Half length, one pull-up inputs from internal logic	T_{WAOL}		4/	All		12	ns
CLB SWITCHING CHARACTERISTICS							
Combinatorial delay F/G inputs to X/Y outputs	T_{ILO}	See figures 3 and 4 as applicable.	5/	01		10	ns
				02		6	
Combinatorial delay F/G inputs via H' to X/Y outputs	T_{IHO}		5/	01		14	ns
				02		8	
Combinatorial delay C inputs via H' to X/Y outputs	T_{HHO}		5/	01		8	ns
				02		7	
CLB fast carry logic operand inputs (F1, F2, G1, G4) to C_{OUT}	T_{OPCY}		6/	01		8	ns
				02		7	
CLB fast carry logic add/ subtract input (F3) to C_{OUT}	T_{ASCY}		6/	01		11	ns
				02		8	
CLB fast carry logic initialization inputs (F1,F3) to C_{OUT}	T_{INCY}		6/	All		6	ns
CLB fast carry logic C_{IN} through function generators to X/Y outputs	T_{SUM}		6/	01		12	ns
				02		8	
CLB fast carry logic C_{IN} to C_{OUT}, bypass function generators	T_{BYP}		6/	01		3	ns
				02		2	

See footnotes at end of table.

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	
CLB SWITCHING CHARACTERISTICS - Continued.							
Sequential delays clock K to outputs Q	T_{CKO}	See figures 3 and 4 as applicable	5/	01		9	ns
				02		5	
Set-up time before clock K, F/G inputs	T_{ICK}		5/	01	11		ns
				02	6		
Set-up time before clock K, F/G inputs via H'	T_{IHCK}		5/	01	15		ns
				02	8		
Set-up time before clock K, C inputs via H1	T_{HHCK}		5/	01	9		ns
				02	7		
Set-up time before clock K, C inputs via DIN	T_{DICK}		5/	01	7		ns
				02	4		
Set-up time before clock K, C inputs via EC	T_{ECCK}		5/	01	12		ns
				02	7		
Set-up time before clock K, C inputs via S/R, going low (inactive)	T_{RCK}		4/	01	10		ns
				02	6		
Set-up time before clock K, C_{IN} input via F'/G'	T_{CCK}		4/	All	8		ns
Set-up time before clock K, C_{IN} input via F'/G' and H'	T_{CHCK}		4/	All	10		ns
Hold time after clock K, F/G inputs	T_{CKI}		5/	All	0		ns
Hold time after clock K, F/G inputs via H'	T_{CKIH}		5/	All	0		ns
Hold time after clock K, C inputs via H1	T_{CKHH}		5/	All	0		ns
Hold time after clock K,C inputs via DIN	T_{CKDI}		5/	All	0		ns
Hold time after clock K, C inputs via EC	T_{CKEC}		5/	All	0		ns
Hold time after clock K, C inputs via S/R, going low (inactive)	T_{CKR}		4/	All	0		ns
Clock high time	T_{CH}		4/	01	5.5		ns
				02	5		
Clock low time	T_{CL}		4/	01	5.5		ns
				02	5		
Set/Reset direct width (high)	T_{RPW}		4/	01	6		ns
				02	5		

See footnotes at end of table.

TABLE I. Electrical performance characteristics - continued.

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	
CLB SWITCHING CHARACTERISTICS - continued.							
Set/Reset direct delay, from C to Q	T_{RIO}	See figures 3 and 4 as applicable.	5/	01		15	ns
				02		9	
Master set/reset width (high or low)	T_{MRW}		4/	01	24		ns
				02	21		
Master set/reset delay from global set/reset net to Q	T_{MRQ}		4/	01		37	ns
				02		33	
CLB SWITCHING CHARACTERISTICS (RAM OPTION)							
Read operation, address read cycle time (16 X 2)	T_{RC}	See figures 3 and 4 as applicable. 7/	8/	01	12		ns
				02	7		
Read operation, address read cycle time (32 X 1)	T_{RCT}		8/	01	15		ns
				02	10		
Read operation data valid after address change (no write enable) (16 X 2)	T_{ILO}		8/	01		10	ns
				02		6	
Read operation data valid after address change (no write enable) (32 X 1)	T_{IHO}		8/	01		14	ns
				02		8	
Read during write, clocking data into flip flop address setup time before clock K (16 X 2)	T_{ICK}		8/	01	11		ns
				02	6		
Read during write, clocking data into flip flop address setup time before clock K (32 X 1)	T_{IHCK}		8/	01	15		ns
				02	8		
Read during write, data valid after WE going active (16 X 2)	T_{WO}		8/	01		15	ns
				02		12	
Read during write, (DIN stable before WE) (32 X 1)	T_{WOT}		8/	01		27	ns
				02		15	
Read during write, data valid after DIN (16 X 2)	T_{DO}		8/	01		19	ns
				02		11	
Read during write, (DIN change during WE) (32 X 1)	T_{DOT}		8/	01		22	ns
				02		14	
Read during write, clocking data into flip flop, WE setup time before clock K (16 X 2)	T_{WCK}		8/	01	15		ns
				02	12		

See footnotes at end of table.

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	
CLB SWITCHING CHARACTERISTICS (RAM OPTION) - Continued.							
Read during write, clocking data into flip flop, WE setup time before clock K (32 X 1)	T_{WCKT}	See figures 3 and 4 as applicable 7/	8/	01	27		ns
				02	15		
Read during write, clocking data into flip flop, data setup time before clock K (16 X 2)	T_{DCK}		8/	01	19		ns
				02	11		
Read during write, clocking data into flip flop, data setup time before clock K (32 X 1)	T_{DCKT}		8/	01	22		ns
				02	14		
Write operation, address write cycle time (16 X 2)	T_{WC}		8/	01	16		ns
				02	9		
Write operation, address write cycle time (32 X 1)	T_{WCT}		8/	01	16		ns
				02	9		
Write operation, write enable pulse width (high) (16 X 2)	T_{WP}		8/	01	12		ns
				02	5		
Write operation, write enable pulse width (high) (32 X 1)	T_{WPT}		8/	01	12		ns
				02	5		
Write operation, address setup time before beginning of WE (16 X 2)	T_{AS}		8/	All	2		ns
Write operation, address setup time before beginning of WE (32 X 1)	T_{AST}		8/	All	2		ns
Write operation, address hold time after end of WE (16 X 2)	T_{AH}		8/	All	2		ns
Write operation, address hold time after end of WE (32 X 1)	T_{AHT}		8/	All	2		ns
Write operation, DIN setup time before end of WE (16 X 2)	T_{DS}		8/	All	4		ns
Write operation, DIN setup time before end of WE (32 X 1)	T_{DST}		8/	All	5		ns
Write operation, DIN hold time after end of WE	T_{DHT}		8/	All	2		ns

See footnotes at end of table.

TABLE I. Electrical Performance Characteristics - continued.

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	
IOB SWITCHING CHARACTERISTICS							
Input propagation delay, pad to I1, I2	T_{PID}	See figures 3 and 4 as applicable. 9/ 10/	5/	All		4	ns
Input propagation delay, pad to I1, I2, via transparent latch (fast)	T_{PLI}		4/	01		13	ns
				02		8	
Input propagation delay, pad to I1, I2, via transparent latch (with delay)	T_{PDLI}		4/	01		30	ns
				02		26	
Input propagation delay, clock (IK) to I1, I2, (flip-flop)	T_{IKRI}		4/	01		8.5	ns
				02		8	
Input propagation delay, clock (IK) to I1, I2, (latch enable)	T_{IKLI}		4/	01		9	ns
				02		8	
Setup time, pad to clock (IK), fast	T_{PICK}	See figures 3 and 4 as applicable. 9/ 10/ 11/	4/	01	9		ns
				02	7		
Setup time, pad to clock (IK), with delay	T_{PICKD}		4/	01	35		ns
				02	25		
Hold time, pad to clock (IK), fast	T_{IKPI}		4/	All		1	ns
Hold time, pad to clock (IK), with delay	T_{IKPID}		4/	All		negative	ns
Output propagation delay clock (OK) to pad, (fast)	T_{OKPOF}	See figures 3 and 4 as applicable. 9/ 10/	4/	01		11	ns
				02		7.5	
Output propagation delay output (O) to pad (fast)	T_{OPF}		4/	01		10	ns
				02		9	
Output propagation delay 3-state to pad begin hi-Z (fast)	T_{TSHZF}		4/	01		10	ns
				02		9	
Output propagation delay 3-state to pad active and valid (fast)	T_{TSONF}		4/	01		15	ns
				02		13	
Additional delay, for medium fast outputs			4/	01		2.5	ns
				02		2	
Additional delay, for medium slow outputs			4/	01		5	ns
				02		4	
Additional delay, for slow outputs			4/	01		7.5	ns
				02		6	

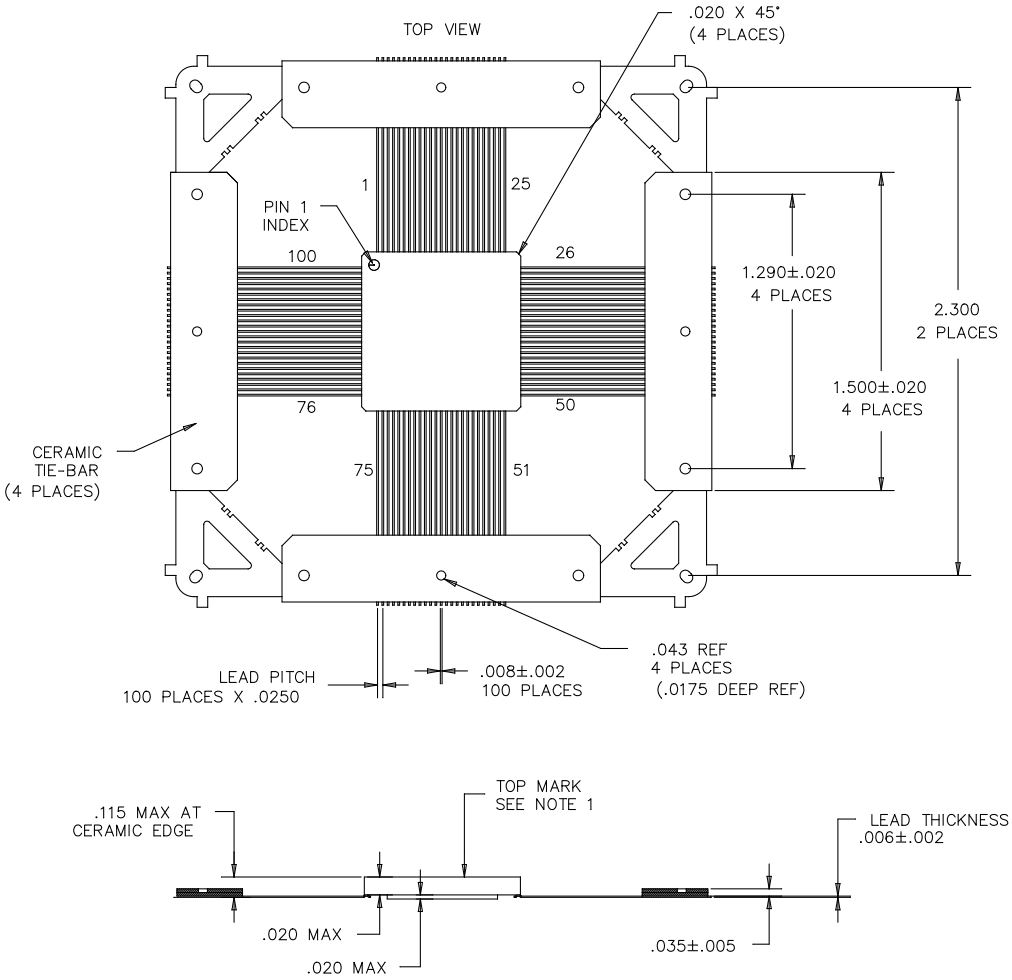
See footnotes at end of table.

TABLE I. Electrical Performance Characteristics - continued.

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	
IOB SWITCHING CHARACTERISTICS - continued							
Setup time, output (O) to clock (OK)	T_{OOK}	See figures 3 and 4 as applicable. 9/ 10/	4/	01	13		ns
				02	8		
Hold time, output (O) to clock (OK)	T_{OKO}		4/	All		0	ns
Clock high or low time	T_{CH}/ T_{CL}		4/	01	6		ns
				02	5		
Global set/reset delay from GSR net through Q to I1, I2	T_{RRI}		4/	01		20	ns
				02		14.5	
Global set/reset delay from GSR net to pad	T_{RPO}		4/	01		23	ns
				02		18	
Global set/reset GSR width	T_{MRW}		4/	All	21		ns

1/ With 50 percent of the outputs simultaneously sinking 8 mA.
2/ With no output current loads, no active input or long line pull-resistors, all package pins at V_{CC} or GND, and the LCA configured with a MakeBits "tie" option.
3/ These delays are specified from the decoder input to the decoder output. For pad-to-pad delays, add the input delay (T_{PID}) and output delay (T_{OPF} or T_{OPS}).
4/ Parameter is not tested but is guaranteed by characterization data which is taken at initial device introduction, prior to the introduction of significant changes, and at least twice yearly.
5/ Parameter is not directly tested. Devices are first 100 percent functionality tested. Benchmark patterns (t_{B1} - t_{B13}) are then used to determine the compliance of this parameter. Characterization data is taken initially and after any design or process change which may affect this parameter.
6/ Benchmark patterns (t_{B1} - t_{B13}) are used to determine compliance to this parameter.
7/ Timing for the 16 X 1 RAM option is identical to 16 X 2 RAM timing.
8/ Values indicated are guaranteed by characterization data if application note, provided by manufacturer, is followed. If application note is not followed, indicated values are typical only.
9/ Timing is measured at pin threshold, with 50 pF external capacitive loads including test fixture. Slew rate limited output rise/fall times are approximately two times longer than fast output rise/fall times. A maximum total external capacitive load for simultaneous fast mode switching in the same direction is 200 pF per power/ground pin pair. For slew rate limited outputs this total is two times larger. Exceeding this maximum capacitive load can result in ground bounce of greater than 1.5 V amplitude, less than 5 ns duration, which might cause problems when the LCA drives clocks and other asynchronous signals.
10/ Voltage levels of unused (bonded and unbonded) pads must be valid logic levels. Each can be configured with the internal pull-up or pull-down resistor or alternatively configured as a driven output or be driven from an external source.
11/ Input pad setup times and hold times are specified with respect to the internal clock (IK). To calculate system setup time, subtract clock delay (clock pad to IK) from the specified input pad setup time value, but do not subtract below zero. "Negative" hold time means that the delay in the input data is adequate for the external system hold time to be zero, provided the input clock uses the global signal distribution from pad to IK.

Case Y

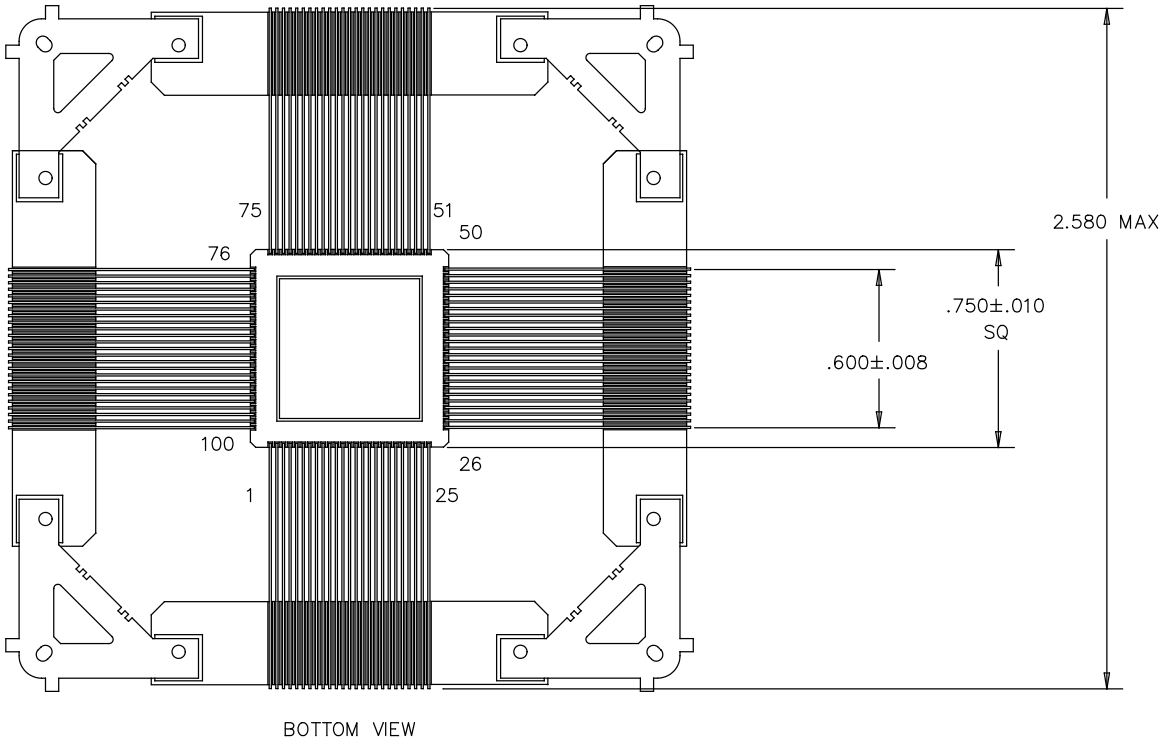


NOTES:

1. Top side mark location, product mark is located on the nonlid side of package; i.e., lid side facing down. When mounted in this position, the pin out is clockwise.
2. Dimensions are in inches.
3. The US government 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.
4. 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.

FIGURE 1. Case outline.

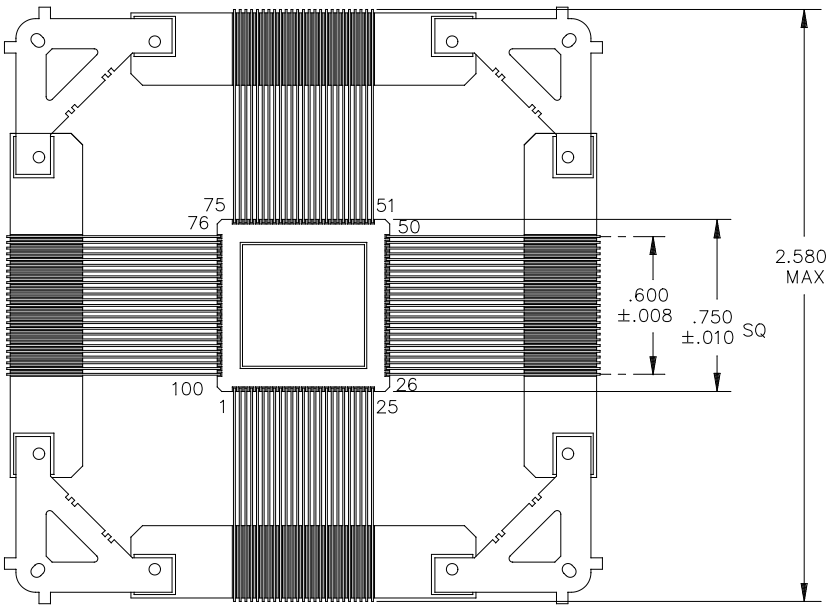
Case Y – continued



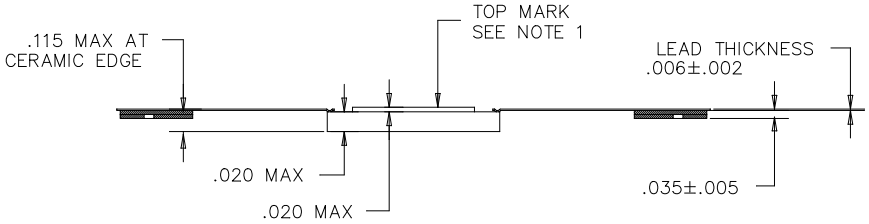
Inches	mm		Inches	mm
.002	0.05		.043	1.09
.005	0.12		.115	2.92
.006	0.15		.2580	6.55
.008	0.20		.600	15.24
.010	0.25		.750	19.05
.0175	0.44		1.290	32.76
.020	0.50		1.500	38.10
.025	0.63		2.300	58.42
.035	0.88			

FIGURE 1. Case outline - Continued.

Case Z



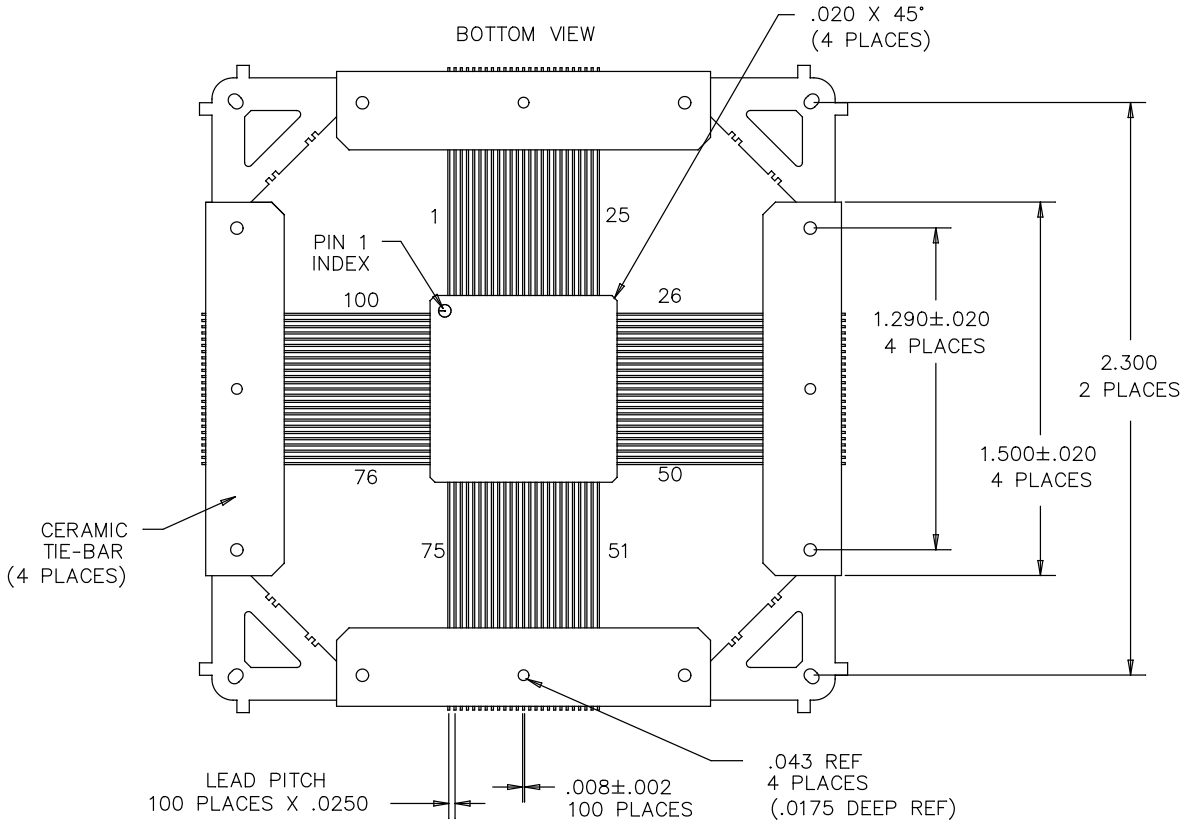
TOP VIEW



NOTES:

1. Top side mark location, product mark is located on the nonlid side of package; i.e., lid side facing down. When mounted in this position, the pin out is clockwise.
2. Dimensions are in inches.
3. The US government 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.
4. 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.

FIGURE 1. Case outline - Continued.



Inches	mm		Inches	mm
.002	0.05		.043	1.09
.005	0.12		.115	2.92
.006	0.15		.2580	6.55
.008	0.20		.600	15.24
.010	0.25		.750	19.05
.0175	0.44		1.290	32.76
.020	0.50		1.500	38.10
.025	0.63		2.300	58.42
.035	0.88			

FIGURE 1. Case outline - Continued.

Case outline X

Device type	All	Device type	All	Device type	All
Terminal number	Terminal symbol	Terminal number	Terminal symbol	Terminal number	Terminal symbol
A1	NC	D11	V_{CC}	L2	I/O (A0, $\overline{WS}$)
A2	NC	D12	I/O	L3	V_{CC}
A3	NC	D13	I/O	L4	CCLK
A4	I/O	E1	I/O	L5	NC
A5	I/O	E2	NC	L6	I/O (D2)
A6	I/O	E3	NC	L7	GND
A7	I/O	E11	NC	L8	I/O
A8	I/O	E12	I/O	L9	NC
A9	I/O	E13	I/O	L10	V_{CC}
A10	I/O	F1	I/O (A9)	L11	DONE
A11	I/O	F2	I/O	L12	SGCK3 (I/O)
A12	SGCK2 (I/O)	F3	I/O (A10)	L13	I/O
A13	I/O (HDC)	F11	I/O	M1	NC
B1	NC	F12	I/O	M2	O (TDO)
B2	PGCK1 (A16, I/O)	F13	I/O ($\overline{ERR}$, $\overline{INIT}$)	M3	SGCK4 (DOUT, I/O)
B3	I/O (A17)	G1	I/O (A8)	M4	NC
B4	I/O (TCK)	G2	GND	M5	I/O (D1)
B5	I/O(TMS)	G3	V_{CC}	M6	I/O
B6	I/O	G11	GND	M7	V_{CC}
B7	GND	G12	V_{CC}	M8	I/O (D4)
B8	I/O	G13	I/O	M9	I/O (D5)
B9	I/O	H1	I/O (A7)	M10	I/O (D6)
B10	NC	H2	I/O (A6)	M11	I/O (D7)
B11	O (M1)	H3	I/O	M12	$\overline{PROG}$
B12	I (M2)	H11	I/O	M13	I/O
B13	NC	H12	I/O	N1	PGCK4 (A1, I/O)
C1	I/O (A12)	H13	I/O	N2	I/O (D0, DIN)
C2	I/O (A14)	J1	I/O	N3	I/O (RCLK-$\overline{BUSY}$/RDY)
C3	V_{CC}	J2	I/O (A4)	N4	I/O
C4	GND	J3	NC	N5	I/O
C5	I/O (TDI)	J11	NC	N6	I/O ($\overline{RS}$)
C6	I/O	J12	I/O	N7	I/O (D3)
C7	V_{CC}	J13	I/O	N8	I/O
C8	I/O	K1	I/O (A5)	N9	I/O
C9	I/O	K2	I/O (CS1), (A2)	N10	I/O ($\overline{CS0}$)
C10	GND	K3	GND	N11	I/O
C11	I (M0)	K11	GND	N12	NC
C12	PGCK2 (I/O)	K12	NC	N13	PGCK3 (I/O)
C13	I/O ($\overline{LDC}$)	K13	I/O		
D1	I/O (A11)	L1	I/O (A3)		
D2	I/O (A13)				
D3	SGCK1 (A15, I/O)				

FIGURE 2. Terminal connections.

Case outline Y and Z

Device type	All	Device type	All	Device type	All
Terminal number	Terminal symbol	Terminal number	Terminal symbol	Terminal number	Terminal symbol
1	GND	35	I/O	70	I/O (D1)
2	PGCK1 (A16, I/O)	36	I/O ($\overline{ERR}$, $\overline{INIT}$)	71	I/O (RCLK-$\overline{BUSY}$/RDY)
3	I/O (A17)	37	V_{CC}	72	I/O (D0, DIN)
4	I/O (TDI)	38	GND	73	SGCK4 (DOUT, I/O)
5	I/O (TCK)	39	I/O	74	CCLK
6	I/O (TMS)	40	I/O	75	V_{CC}
7	I/O	41	I/O	76	I/OO (TDO)
8	I/O	42	I/O	77	GND
9	I/O	43	I/O	78	I/O (A0, $\overline{WS}$)
10	I/O	44	I/O	79	PGCK4 (A1, I/O)
11	GND	45	I/O	80	I/O (CS1, A2)
12	V_{CC}	46	I/O	81	I/O (A3)
13	I/O	47	I/O	82	I/O (A4)
14	I/O	48	SGCK3 (I/O)	83	I/O (A5)
15	I/O	49	GND	84	I/O
16	I/O	50	DONE	85	I/O
17	I/O	51	V_{CC}	86	I/O (A6)
18	I/O	52	$\overline{PROG}$	87	I/O (A7)
19	I/O	53	I/O (D7)	88	GND
20	I/O	54	PGCK3 (I/O)	89	V_{CC}
21	SGCK2 (I/O)	55	I/O (D6)	90	I/O (A8)
22	O (M1)	56	I/O	91	I/O (A9)
23	GND	57	I/O (D5)	92	I/O
24	I (MO)	58	I/O ($\overline{CS0}$)	93	I/O
25	V_{CC}	59	I/O	94	I/O (A10)
26	I (M2)	60	I/O	95	I/O (A11)
27	PGCK2 (I/O)	61	I/O (D4)	96	I/O (A12)
28	I/O (HDC)	62	I/O	97	I/O (A13)
29	I/O	63	V_{CC}	98	I/O (A14)
30	I/O ($\overline{LDC}$)	64	GND	99	SGCK1 (A15, I/O)
31	I/O	65	I/O (D3)	100	V_{CC}
32	I/O	66	I/O ($\overline{RS}$)		
33	I/O	67	I/O		
34	V_{CC}	68	I/O (D2)		
		69	I/O		

FIGURE 2. Terminal connections - Continued.

I/O Block.

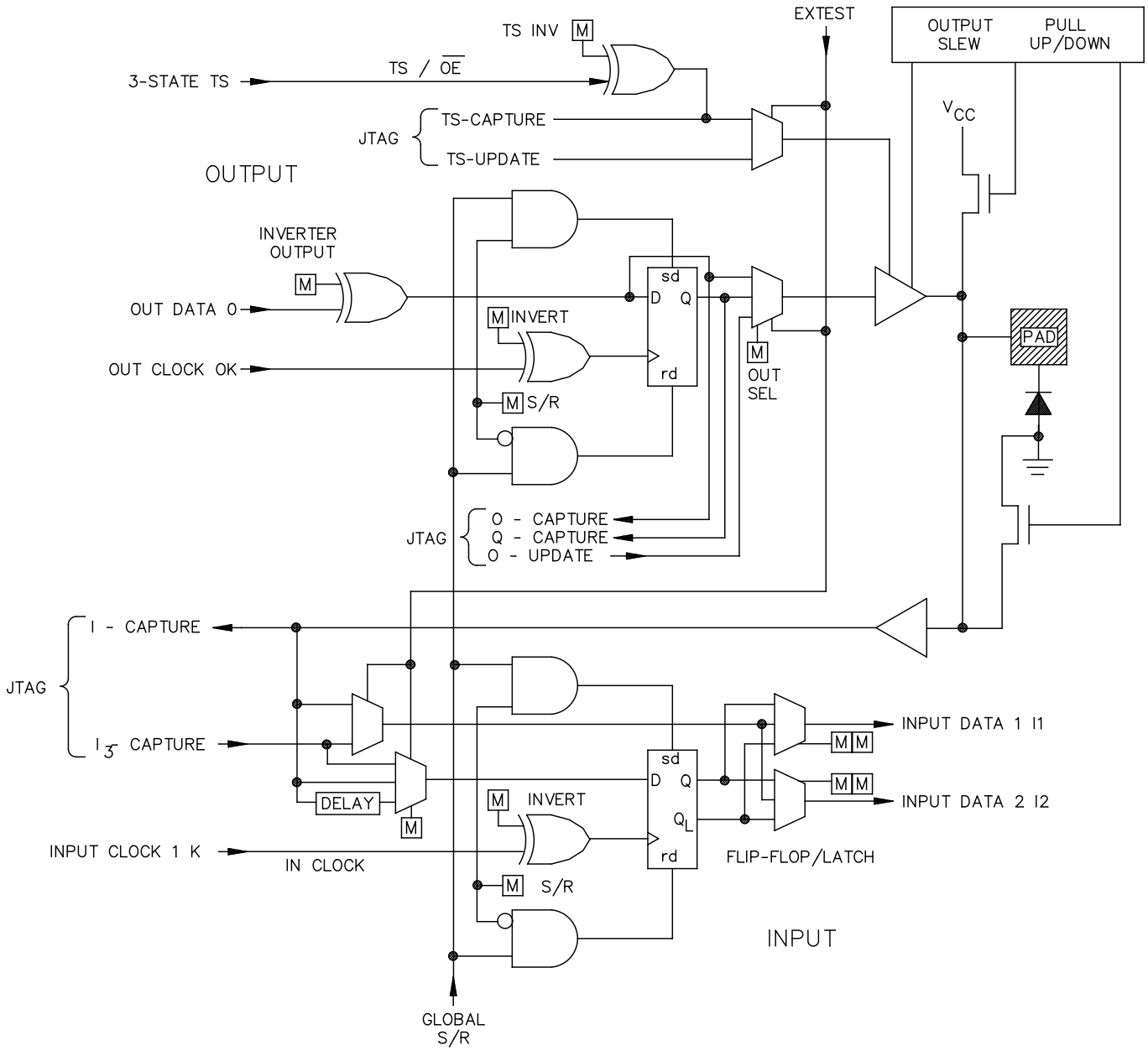


FIGURE 3. Logic block diagrams.

Configurable Logic Block (CLB)

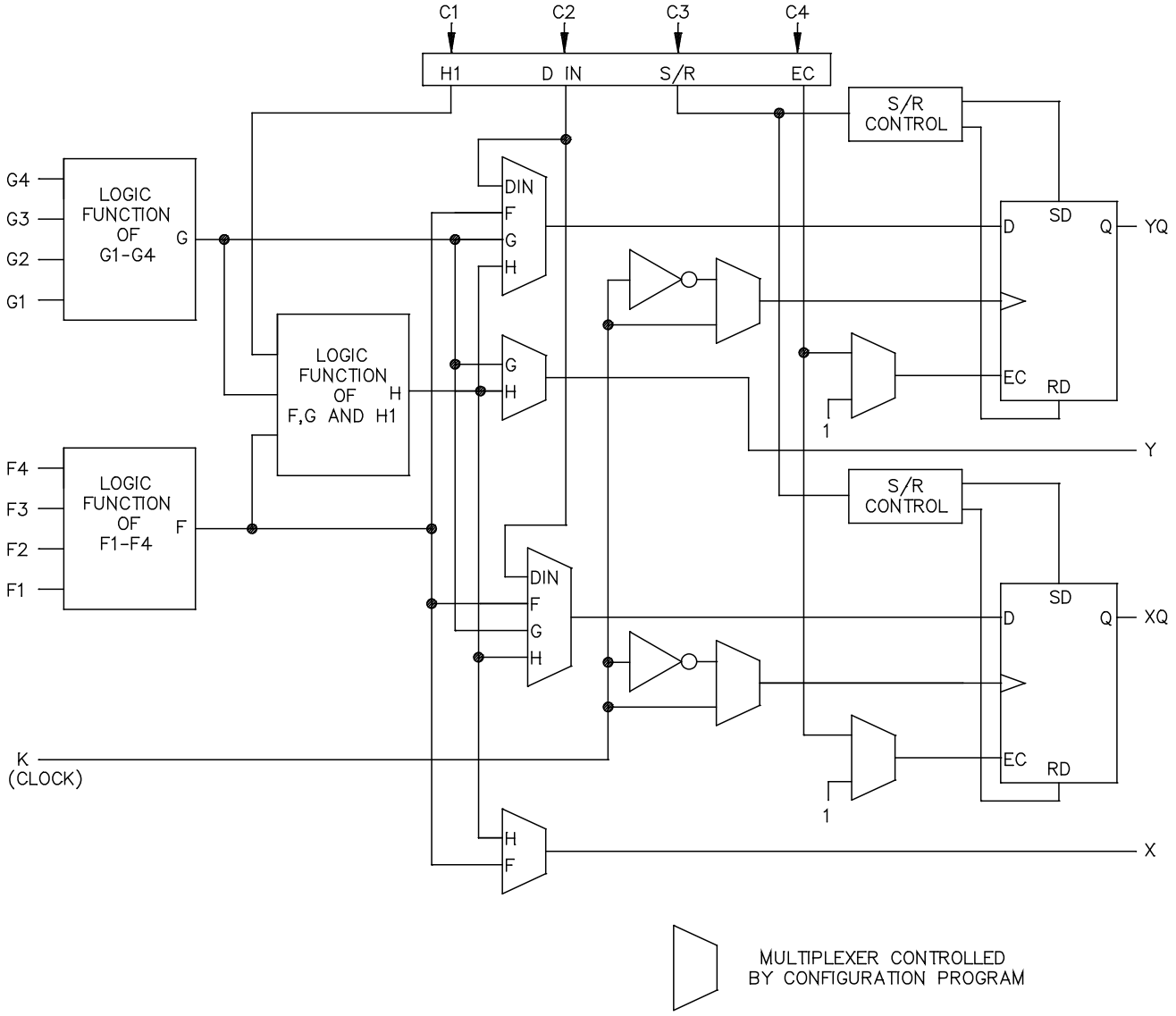


FIGURE 3. Logic block diagrams - Continued.

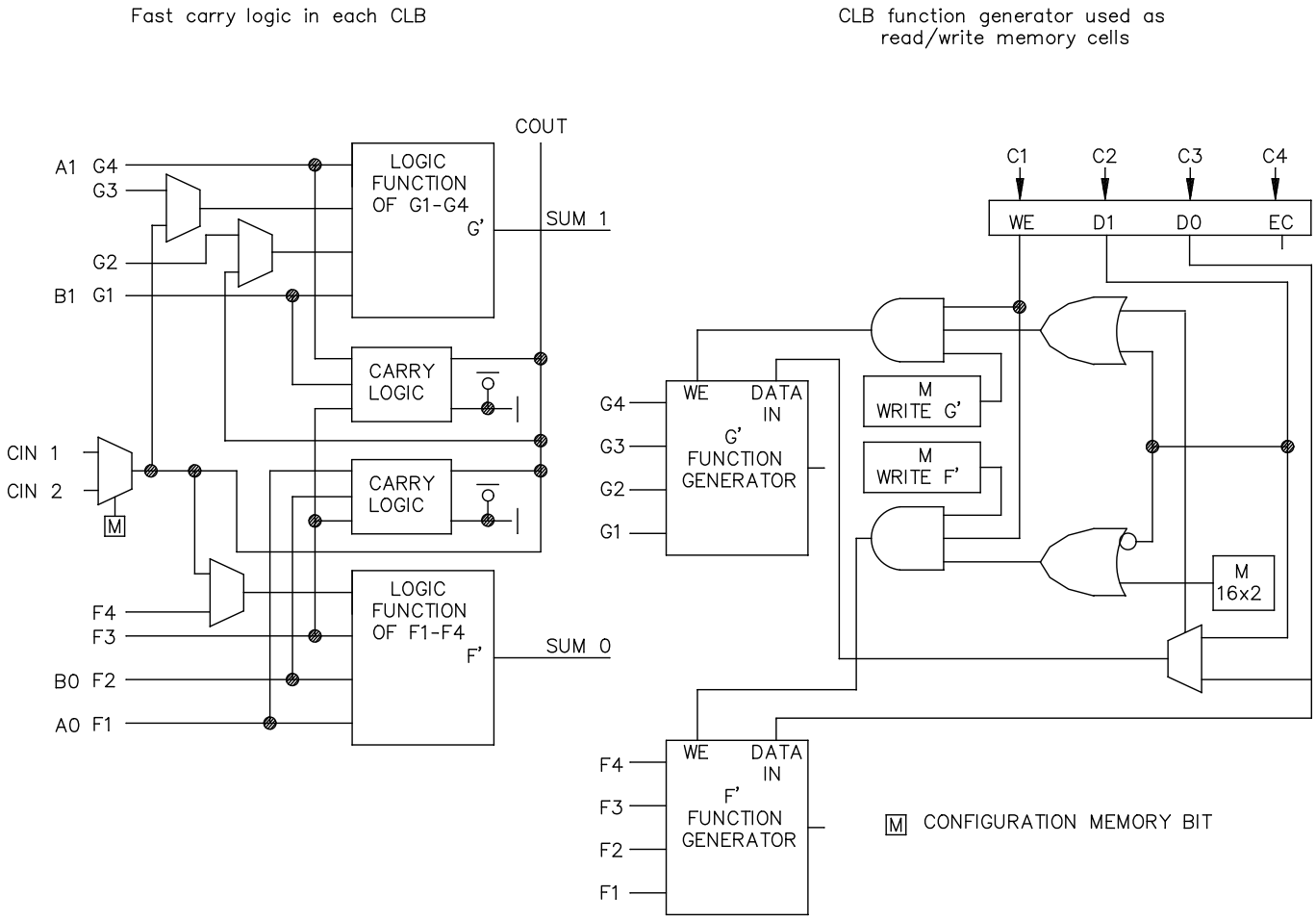


FIGURE 3. Logic block diagrams - Continued.

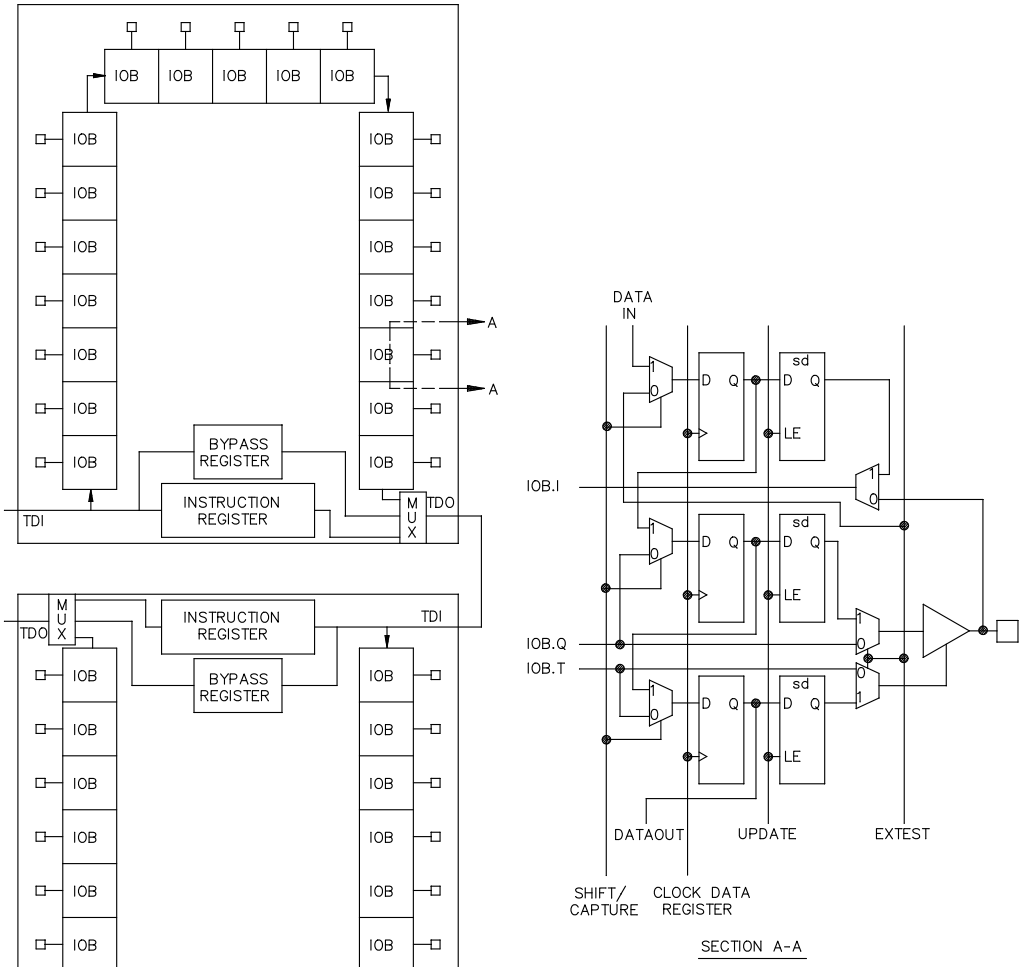


FIGURE 3. Logic block diagrams - Continued.

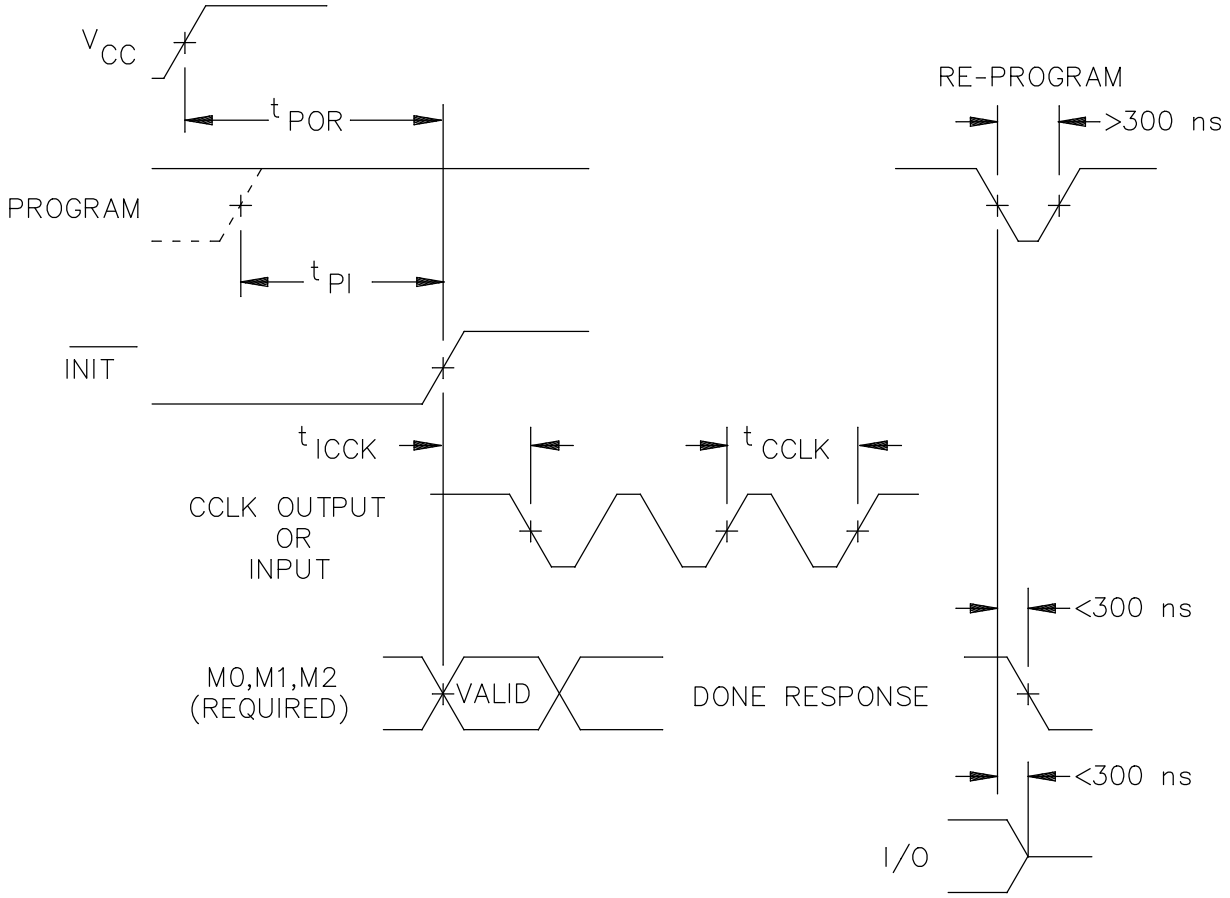


FIGURE 4. Timing diagrams and switching characteristics.

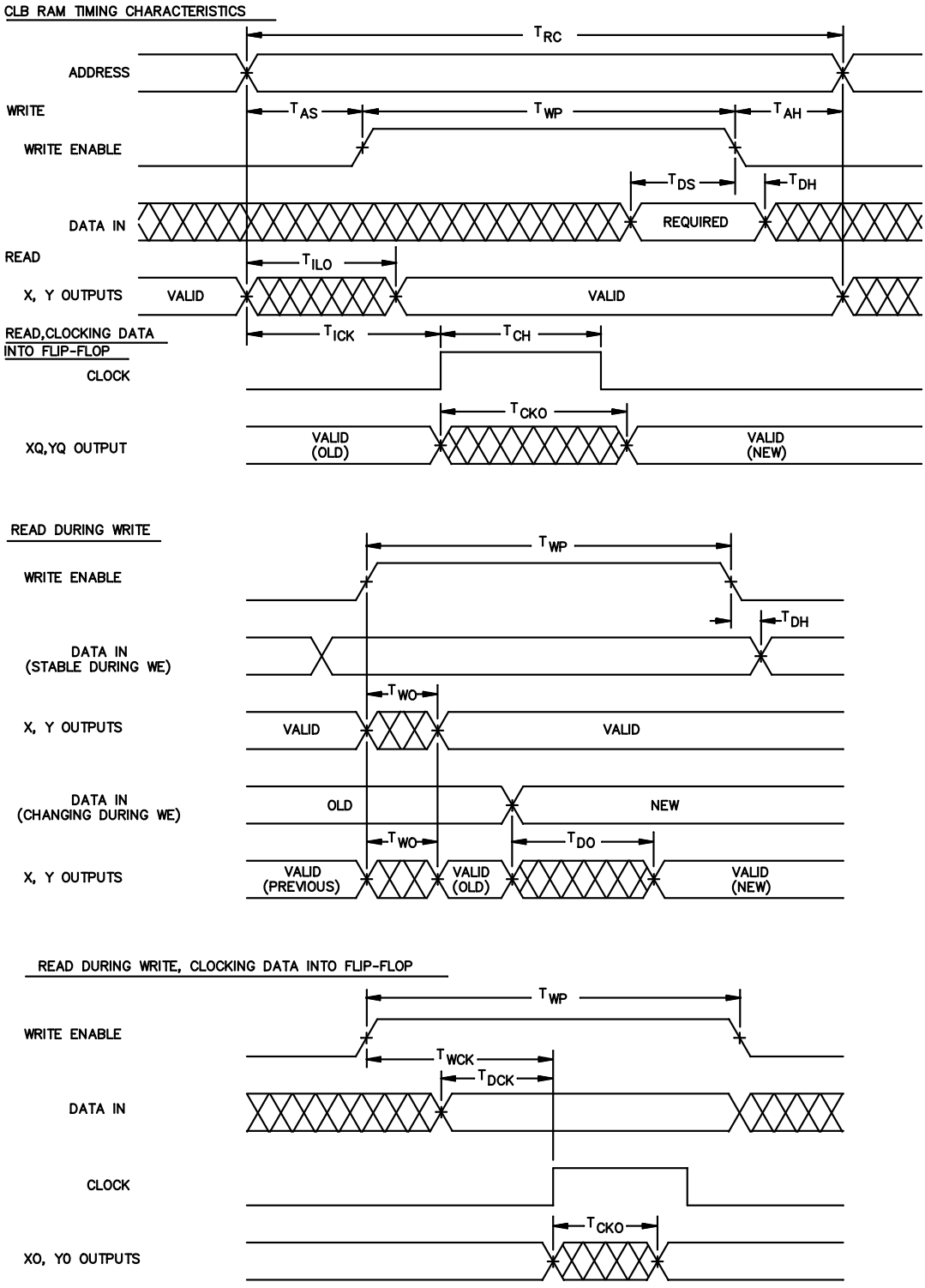


FIGURE 4. Timing diagrams and switching characteristics - Continued.

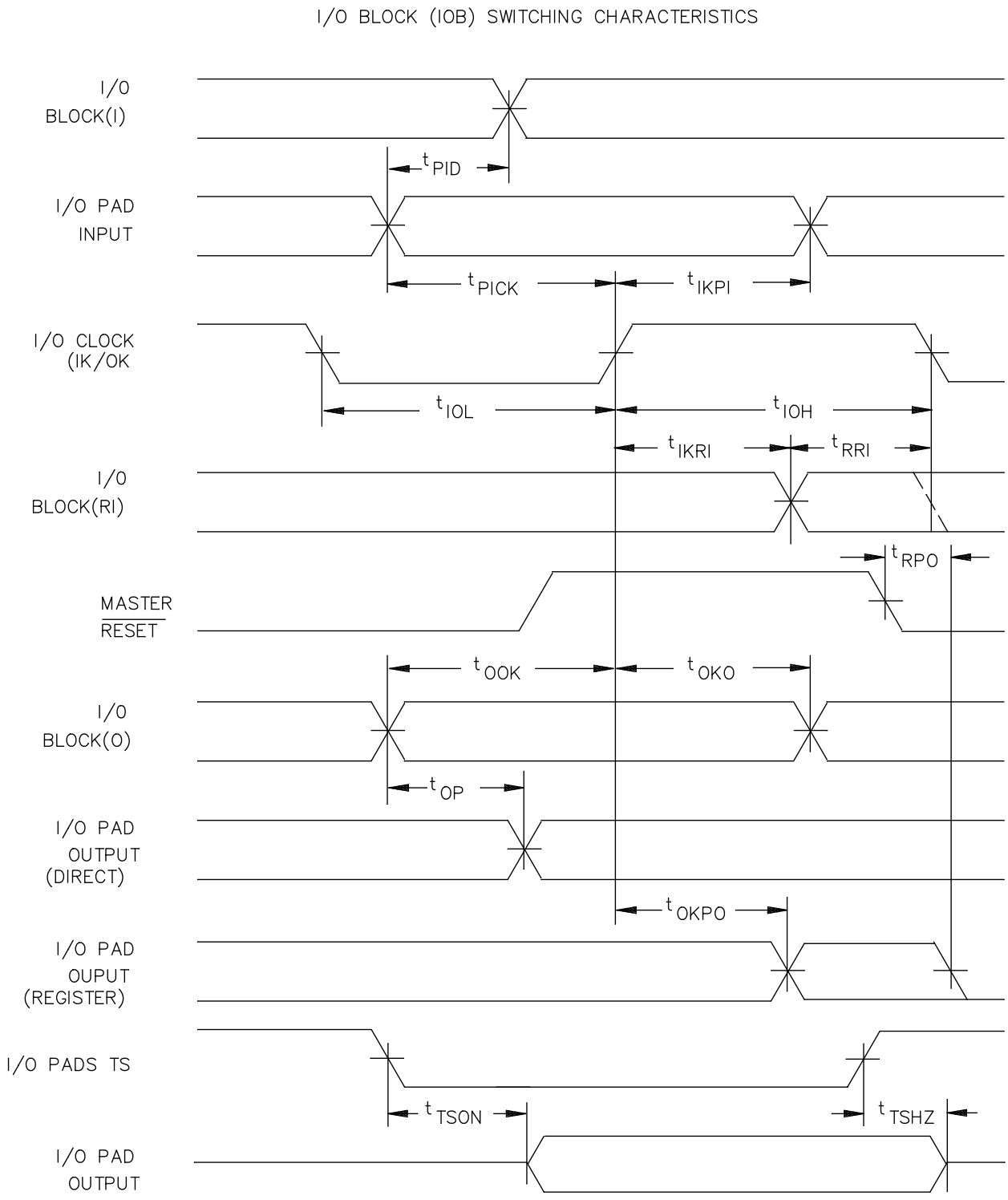
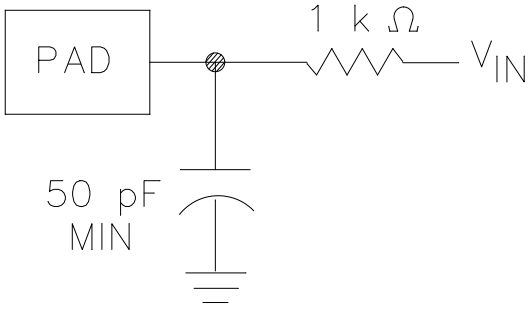
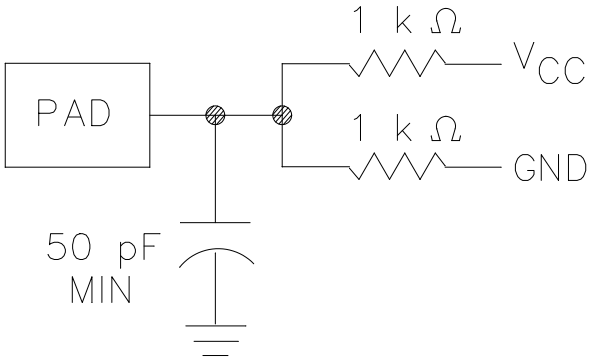


FIGURE 4. Timing diagrams and switching characteristics - Continued.



CIRCUIT A



CIRCUIT B

FIGURE 5. Load circuit

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-PRF-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 (method 1015)	Required	Required	Required
3	Same as line 1			1* 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 Δ	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 functionality of the device.
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 +25ºC.

Parameter 1/	Device types
	All
I_{CCO} standby	±1 mA of specified limit in table I.
I_{IL}	±1 µA 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.

4.4.2 Group C inspection. The group C inspection end-point electrical parameters shall be as specified in table IIA 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 method 1005 of MIL-STD-883.

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 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).

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.

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, subgroups 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.

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 using DD Form 1692, Engineering Change Proposal.

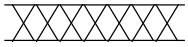
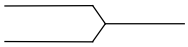
6.3 Record of users. Military and industrial users should inform DLA Land and Maritime when a system application requires configuration control and which SMD's are applicable to that system. DLA Land and Maritime will maintain a record of users and this list will be used for coordination and distribution of changes to the drawings. Users of drawings covering microelectronic devices (FSC 5962) should contact DLA Land and Maritime-VA, telephone (614) 692-8108.

6.4 Comments. Comments on this drawing should be directed to DLA Land and Maritime-VA , Columbus, Ohio 43218-3990, or telephone (614) 692-0540.

6.5 Abbreviations, symbols, and definitions. The abbreviations, symbols, and definitions used herein are defined in MIL-PRF-38535 and MIL-HDBK-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, address 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 memory are specified from the device point of view. Thus, the access time is shown as a maximum since the device never provides data 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 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 and MIL-HDBK-103. The vendors listed in QML-38535 have submitted a certificate of compliance (see 3.6 herein) to DLA Land and Maritime-VA 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 DLA Land and Maritime-VA.

BUFFER SWITCHING CHARACTERISTICS

Test	Symbol	Conditions $-55^{\circ}C \le T_C \le +125^{\circ}C$ $4.5\ V \le V_{CC} \le 5.5\ V$ unless otherwise specified	Group A subgroups	Device type	Limits		Unit
					Min	Max	
TBUF driving a horizontal Longline (L.L.) I to L.L. while T is low (buffer active)	T_{IO1}	See note.	N/A	All		8.8	ns
TBUF driving a horizontal Longline (L.L.) I going low to L.L. going from resistive pull up high to active low, (TBUF configured as open drain	T_{IO2}		N/A	All		9.3	ns
T going low to L.L. active and valid	T_{ON}		N/A	All		10.7	ns
T to L.L. inactive	T_{OFF}		N/A	All		3	ns
T going high to L.L. (inactive) with single pull-up resistor	T_{PUS}		N/A	All		24	ns
T going high to L.L. (inactive) with pair of pull-up resistors	T_{PUF}		N/A	All		11	ns

NOTE:
These values are typical. They are not tested, characterized, or guaranteed but are derived from benchmark timing patterns.

STANDARD MICROCIRCUIT DRAWING BULLETIN

DATE: 14-04-04

Approved sources of supply for SMD 5962-94712 are listed below for immediate acquisition information only and shall be added to MIL-HDBK-103 and QML-38535 during the next revision. MIL-HDBK-103 and QML-38535 will be revised to include the addition or deletion of sources. The vendors listed below have agreed to this drawing and a certificate of compliance has been submitted to and accepted by DLA Land and Maritime-VA. This bulletin is superseded by the next dated revision of MIL-HDBK-103 and QML-38535.

Standard microcircuit drawing PIN 1/	Vendor CAGE number	Vendor similar PIN 2/
5962-9471201MXC	3/	XC4003-10PG120B
5962-9471201MYC	3/	XC4003-10CB100B
5962-9471201MZC	3/	XC4003-10CB100B
5962-9471202MXC	3/	XC4003-6PG120B
5962-9471202MYC	3/	XC4003-6CB120B
5962-9471202MZC	3/	XC4003-6CB120B

1/ The lead finish shown for each PIN representing a hermetic package is the most readily available from the manufacturer listed for that part. If the desired lead finish is not listed contact the vendor to determine its availability.

2/ Caution. Do not use this number for item acquisition. Items acquired to this number may not satisfy the performance requirements of this drawing.

3/ Not available from an approved source of supply. The last known source of supply listed below.

Vendor CAGE number	Vendor name and address
68994	Xilinx, Incorporated 2100 Logic Drive San Jose, CA 95124