REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED
D	Convert to military drawing format. Added vendor CAGE no. 50088 to drawing. Changed code ident. no. to 67268.	12 NOV 87	R.P. Evans

CURRENT CAGE CODE 67268

REV																										
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REV STATUS OF PAGES	REV	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D									
	PAGES	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16									

Defense Electronics Supply Center
Dayton, Ohio

Original date of drawing:
14 March 1979

AMSC N/A

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SIZE: A
CODE IDENT. NO.: 14933
REV: D

MILITARY DRAWING

This drawing is available for use by all Departments and Agencies of the Department of Defense

TITLE: MICROCIRCUITS, DIGITAL, BIPOLAR MICROPROGRAM CONTROLLER, MONOLITHIC SILICON

DWG NO. 78017

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5962-E632

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

DESC FORM 193
MAY 86

1. SCOPE

1.1 Scope. This drawing describes device requirements for class B microcircuits in accordance with 1.2.1 of MIL-STD-883, "Provisions for the use of MIL-STD-883 in conjunction with compliant non-JAN devices".

1.2 Part number. The complete part number shall be as shown in the following example:

78017	01	Q	X
Drawing number	Device type (1.2.1)	Case outline (1.2.2)	Lead finish per MIL-M-38510

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

Device type	Generic number	Circuit function
01	2910	Microprogram controller
02	2910A	Microprogram controller

1.2.2 Case outlines. The case outlines shall be as designated in appendix C of MIL-M-38510, and as follows:

Outline letter	Case outline
Q	D-5 (40-lead, 0.6" x 2.0"), dual-in-line package
Z	Figure 2 (42-lead, 0.6" x 1.0"), flat-package

1.3 Absolute maximum ratings.

Supply voltage to ground potential	-0.5 V dc to +7.0 V dc
Input voltage range	-0.5 V dc to +5.5 V dc
Storage temperature range	-65°C to +150°C
Maximum power dissipation (P_D) 1/	1.9 W
Lead temperature (soldering, 10 seconds)	+300°C
Thermal resistance, junction-to-case (θ_{JC}):	
Case Q	See MIL-M-38510, appendix C
Case Z	25°C/W
Junction temperature (T_J)	+200°C
Output current, into outputs	30 mA dc
Input current	-30 mA dc to +5.0 mA dc

1.4 Recommended operating conditions.

Supply voltage (V_{CC})	4.5 V dc minimum to 5.5 V dc maximum

1/ Must withstand the added P_D due to short circuit test (e.g., I_{OS}).

2. APPLICABLE DOCUMENTS

2.1 Government specification and standard. Unless otherwise specified, the following specification and standard, of the issue listed in that issue of the Department of Defense Index of Specifications and Standards specified in the solicitation, form a part of this drawing to the extent specified herein.

SPECIFICATION

MILITARY

MIL-M-38510 - Microcircuits, General Specification for.

STANDARD

MILITARY

MIL-STD-883 - Test Methods and Procedures for Microelectronics.

(Copies of specification and standard required by manufacturers in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting activity.)

2.2 Order of precedence. In the event of a conflict between the text of this drawing and the references cited herein, the text of this drawing shall take precedence.

3. REQUIREMENTS

3.1 Item requirements. The individual item requirements shall be in accordance with 1.2.1 of MIL-STD-883, "Provisions for the use of MIL-STD-883 in conjunction with compliant non-JAN devices" and as specified herein.

3.2 Design, construction, and physical dimensions. The design, construction, and physical dimensions shall be as specified in MIL-M-38510 and herein.

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

3.2.2 Case outlines. The case outlines shall be in accordance with 1.2.2 herein.

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

3.4 Marking. Marking shall be in accordance with MIL-STD-883 (see 3.1 herein). The part shall be marked with the part number listed in 1.2 herein. In addition, the manufacturer's part number may also be marked as listed in 6.4 herein.

3.5 Certificate of compliance. A certificate of compliance shall be required from a manufacturer in order to be listed as an approved source of supply in 6.4. The certificate of compliance submitted to DESC-ECS prior to listing as an approved source of supply shall state that the manufacturer's product meets the requirements of MIL-STD-883 (see 3.1 herein) and the requirements herein.

TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions 1/		Device type	Group A subgroups	Limits Min	Limits Max	Unit
High level output voltage	V_{OH}	V_{CC} = min, I_{OH} = -1.6 mA V_{IN} = V_{IH} or V_{IL}		All	1,2,3	2.4		V
Low level output voltage	V_{OL}	V_{CC} = min V_{IN} = V_{IH} or V_{IL}	Y_{0-11}, I_{OL} = 12 mA	All	1,2,3		0.5	V
			$\overline{PE}$, $\overline{VECT}$, $\overline{MAP}$, $\overline{FULL}$ I_{OL} = 8 mA	All				
Input clamp voltage	V_{IC}	V_{CC} = min, I_{IN} = -18 mA		All	1,2,3		-1.5	V
Low level input current	I_{IL}	V_{CC} = max V_{IN} = 0.5 V	D_{0-11}	All	1,2,3		-0.87	mA
			CI, $\overline{CCEN}$	All			-0.54	
			I_{0-3}, $\overline{OE}$, $\overline{RLD}$	All			-0.72	
			$\overline{CC}$	All			-1.31	
			$\overline{CP}$	All			-2.14	
High level input current	I_{IH}	V_{CC} = max V_{IN} = 2.7 V	D_{0-11}	All	1,2,3		80	µA
			CI, $\overline{CCEN}$	All			30	
			I_{0-3}, $\overline{OE}$, $\overline{RLD}$	All			40	
			$\overline{CC}$	All			50	
			CP	All			100	
Input current at maximum input voltage	I_I	V_{CC} = max, V_{IN} = 5.5 V		All	1,2,3		1.0	mA

See footnotes at end of table.

TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions 1/		Device types	Group A subgroups	Limits Min	Limits Max	Unit
Output short circuit current 2/	I_{OS}	V_{CC} = max		All	1,2,3	-30	-85	mA
Offstate output current, low level voltage applied	I_{OZL}	V_{CC} = max, V_{OUT} = 0.5 V $\overline{OE}$ = 2.4 V		All	1,2,3		-50	µA
Offstate current, high level voltage applied	I_{OZH}	V_{CC} = max, $\overline{OE}$ = V_{OUT} = 2.4 V		All	1,2,3		50	µA
Supply current	I_{CC}	V_{CC} = max	T_C = +25°C	All	1,2,3		340	mA
			T_C = -55°C	All			340	
			T_C = +125°C	All			280	
Direct input to register/counter setup time	t_{DR}	C_L = 50 pF 3/		01 02	9,10,11		28 16	ns
Direct input to microprogram address counter setup time	t_{DPC}			01 02	9,10,11		62 30	ns
Instruction setup time	t_I			01 02	9,10,11		110 38	ns
Condition code setup time	$t_{\overline{CC1}}$			01 02	9,10,11		86 35	ns
Condition code enable setup time	$t_{\overline{CCEN1}}$			01 02	9,10,11		86 35	ns
Carryin setup time	t_{CI}			01 02	9,10,11		58 18	ns

See footnotes at end of table.

TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions 1/		Device types	Group A subgroups	Limits Min	Limits Max	Unit
Register load to setup time	$t_{\overline{RLD}}$	C_L = 50 pF 3/		01 02	9,10,11		42 20	ns
Direct input to address output	t_{DY}			All	9,10,11		25	ns
Instruction input to address output	t_{IY}			01 02	9,10,11		75 40	ns
Condition code to any output	$t_{\overline{CC2}}$			01 02	9,10,11		48 36	ns
Condition code enable to any output	$t_{\overline{CCEN2}}$			01 02	9,10,11		50 36	ns
Clock pulse to any output	t_{CP}		I = 8, 9, 15 4/	01 02	9,10,11		130 106 46	ns
			All other I	01 02			61 46	
Enable/disable input to any output 5/	t_{OE}		Enable	01 02	9,10,11		40 25	ns
			Disable	01 02			30 30	
Clock LOW time	t_{CLKL}	C_L = 50 pF 6/		01 02	9,10,11	58 25		ns
Clock HIGH time	t_{CLKH}	C_L = 50 pF 6/		01 02	9,10,11	42 25		ns

See footnotes at end of table.

TABLE I. Electrical performance characteristics - Continued.

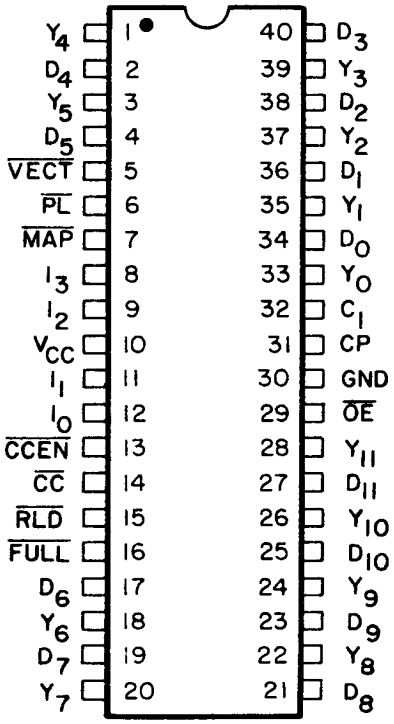
Test	Symbol	Conditions 1/	Device types	Group A subgroups	Limits Min	Limits Max	Unit
Instruction input to PL, VECT, MAP outputs	t_{IPVM}	C_L = 50 pF 3/	01	9,10,11		58	ns
			02			35	
Clock pulse to FULL for all instructions	t_{CPF}		01	9,10,11		67	ns
			02			35	
Register load to hold time 7/	t_{HRLD}		01	9,10,11		6	ns
			02			0	
Direct input to register/counter hold time 7/	t_{HDR}		01	9,10,11		6	ns
			02			0	
Direct input to microprogram address counter hold time 7/	t_{HDPC}		01	9,10,11		4	ns
			02			0	
Instruction hold time 7/	t_{HI}		01	9,10,11		0	ns
			02			0	
Condition code hold time 7/	$t_{\overline{HCCI}}$		01	9,10,11		0	ns
			02			0	
Condition code enable hold time 7/	$t_{\overline{HCCEN1}}$		01	9,10,11		0	ns
			02			0	
Carryin hold time 7/	$t_{\overline{HCI}}$		01	9,10,11		5	ns
			02			0	

1/ Unless otherwise specified, T_C = -55°C to +125°C and V_{CC} = 4.5 V dc to 5.5 V dc.
2/ Not more than one output should be shorted at a time. Duration of the short circuit test should not exceed one second.
3/ See figure 3.
4/ For device 01 only, these instructions are conditional on the counter. Use the shorter specified delay time if the previous instruction could produce no change in the counter or could only decrement the counter. Use the longer delays from CP to outputs if the instruction prior to the clock was 4 or 12 or RLD was low.
5/ Enable/disable: Disable times measured to 0.5 V change on output voltage level with C_L = 5.0 pF.
6/ Clock periods for other instructions are determined by external conditions.
7/ Guaranteed by design if not tested.

Device types 01 and 02

Case Q

DUAL-IN-LINE



Case Z

FLAT PACKAGE

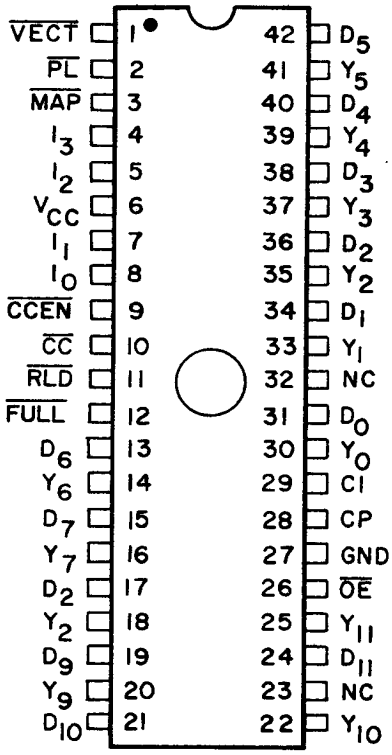


FIGURE 1. Terminal connections (top view).

Device types 01 and 02

Pin names

Abbreviation	Name
D_0 thru D_{11}	Direct input
I_0 thru I_3	Instruction
$\overline{CC}$	Condition code
$\overline{CCEN}$	Condition code enable
CI	Carry-in
$\overline{RLD}$	Register load
$\overline{OE}$	Output enable
CP	Clock pulse
V_{CC}	+5 volts
GND	Ground
Y_0 thru Y_{11}	Microprogram address
$\overline{FULL}$	Full
$\overline{PL}$	Pipeline address enable
$\overline{MAP}$	Map address enable
$\overline{VECT}$	Vector address enable

FIGURE 1. Terminal connections (top view) - Continued.

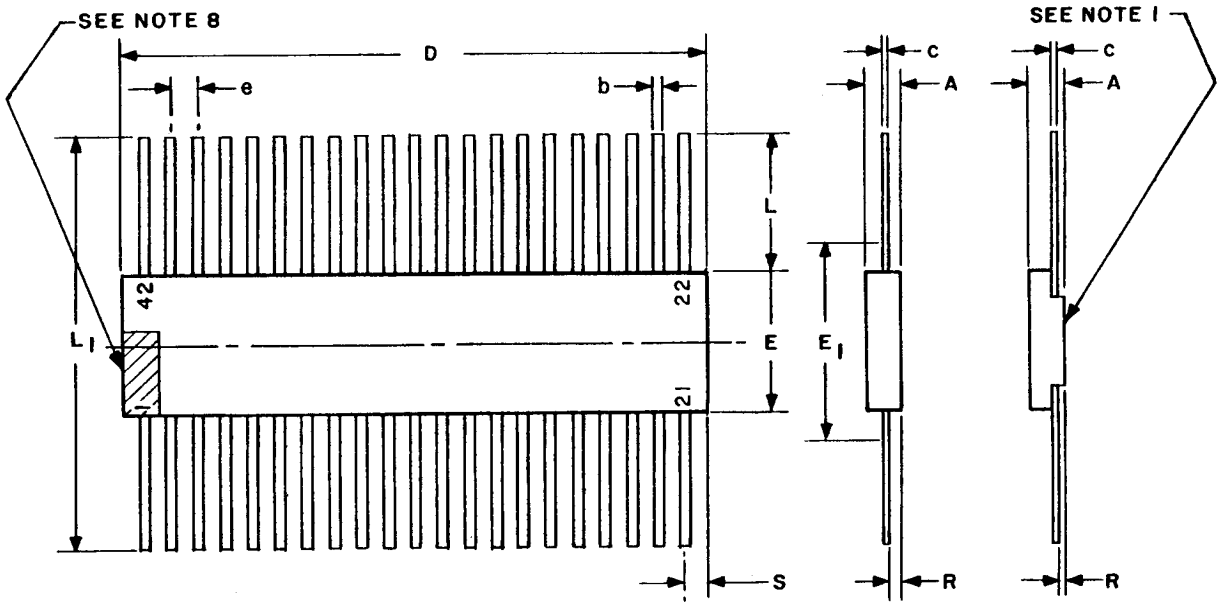


FIGURE 2. Case outline Z (42-lead, 0.6" x 1.0").

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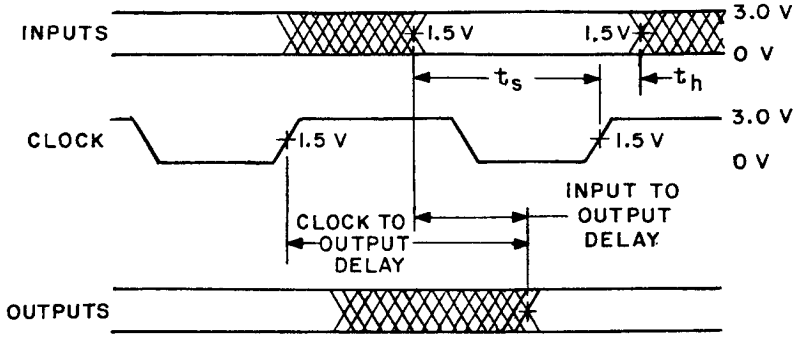
Symbol	Inches		Millimeters		Notes
	Min	Max	Min	Max	
A	.070	.115	1.78	2.92	
b	.017	.023	0.43	0.58	5
c	.006	.012	0.15	0.30	5
D	1.030	1.090	26.16	27.69	
E	.600	.660	15.24	16.76	
E_1	-----	.690		17.53	3
e	.045	.055	1.14	1.40	4, 6
L	.250	.370	6.35	9.40	
L_1	1.280	1.370	33.02	34.80	
R	.020	.060	0.51	1.14	2
S	.005			1.02	7

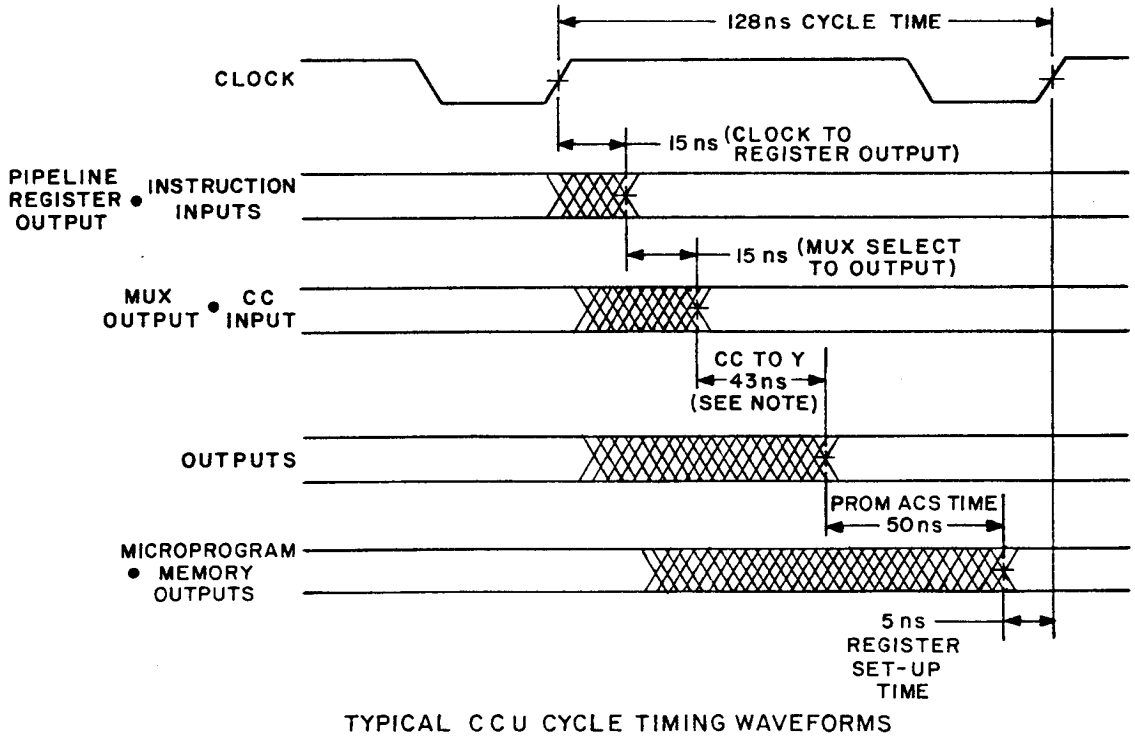
NOTES:
1. Index area: a notch or a pin one identification mark shall be located adjacent to pin one and shall be within the shaded area shown. The manufacturer's identification shall not be used as a pin one identification mark.
2. Dimension R shall be measured at the point of exit of the lead from the body.
3. This dimension allows for off-center lid, meniscus and glass overrun.
4. The basic pin spacing is .050 (1.27 mm) between centerlines. Each pin centerline shall be located within ±.005 (0.13 mm) of its exact logitudinal position relative to pins 1 and 42.
5. All leads - increase maximum limit by .003 (0.08 mm) measured at the center of the flat, when lead finish A is applied.
6. Forty spaces.
7. Applies to all four corners (leads number 1, 21, 22, and 42).
8. Optional configuration. If this configuration is used, no organic or polymeric materials shall be molded to the bottom of the package to cover the leads.

FIGURE 2. Case outline Z (42-lead, 0.6" x 1.0") - Continued.

Device type 01



SWITCHING WAVEFORM

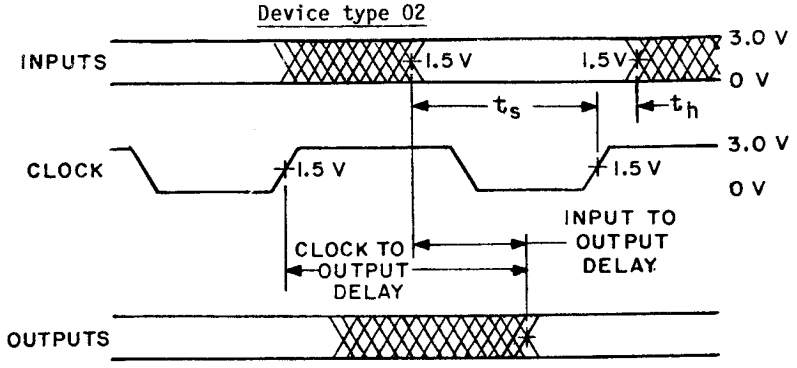


TYPICAL C C U CYCLE TIMING WAVEFORMS

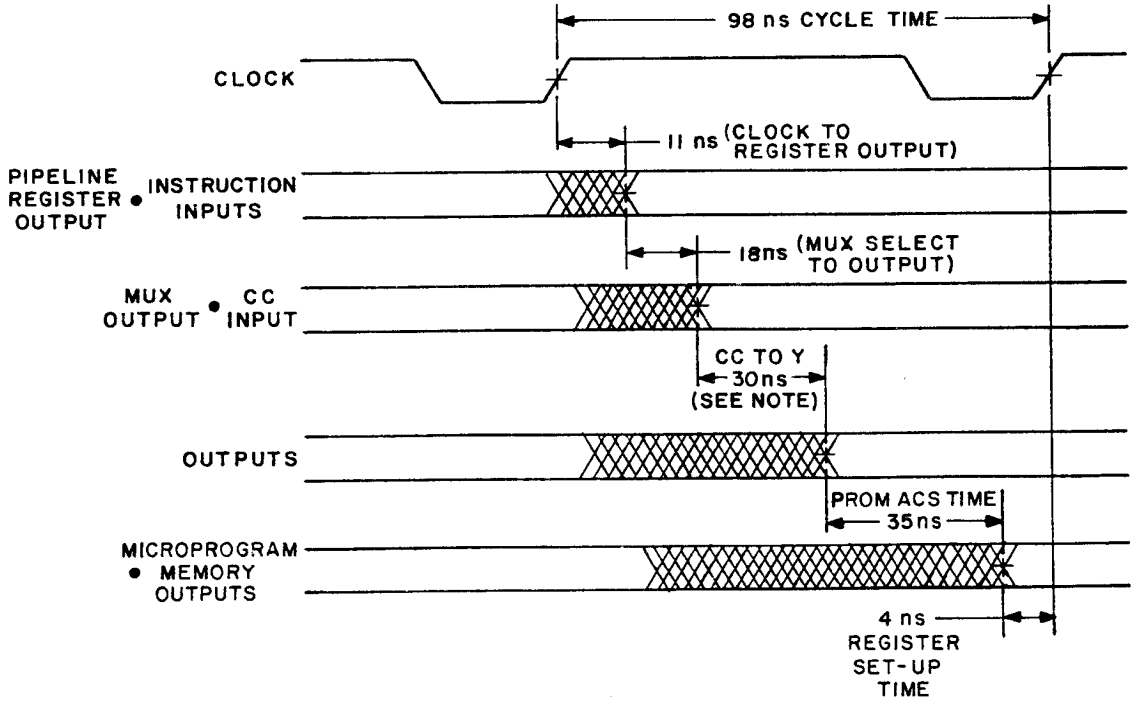
NOTE: 50 ns figure is an estimate of what worst case delay will be for the $\overline{CC}$ to Y path.

FIGURE 3. Switching and timing waveforms.

Device type 02



SWITCHING WAVEFORM



TYPICAL CCU CYCLE TIMING WAVEFORMS

NOTE: 30 ns figure is an estimate of what worst case delay will be for the $\overline{CC}$ to Y path.

FIGURE 3. Switching and timing waveforms - Continued.

3.6 Certificate of conformance. A certificate of conformance as required in MIL-STD-883 (see 3.1 herein) shall be provided with each lot of microcircuits delivered to this drawing.

3.7 Notification of change. Notification of change to DESC-ECS shall be required in accordance with MIL-STD-883 (see 3.1 herein).

3.8 Verification and review. DESC, DESC's agent, and the acquiring activity retain the option to review the manufacturer's facility and applicable required documentation. Offshore documentation shall be made available onshore at the option of the reviewer.

4. QUALITY ASSURANCE PROVISIONS

4.1 Sampling and inspection. Sampling and inspection procedures shall be in accordance with section 4 of MIL-M-38510 to the extent specified in MIL-STD-883 (see 3.1 herein).

4.2 Screening. Screening shall be in accordance with method 5004 of MIL-STD-883, and shall be conducted on all devices prior to quality conformance inspection. The following additional criteria shall apply:

a. Burn-in test (method 1015 of MIL-STD-883).

(1) Test condition A, B, C, or D using the circuit submitted with the certificate of compliance (see 3.4 herein).

(2) T_A = +125°C, minimum.

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

4.3 Quality conformance inspection. Quality conformance inspection shall be in accordance with method 5005 of MIL-STD-883 including groups A, B, C, and D inspections. The following additional criteria shall apply.

4.3.1 Group A inspection.

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

b. Subgroups 4, 5, and 6 in table I, method 5005 of MIL-STD-883 shall be omitted.

c. Subgroup 4 (C_{IN} measurement) shall be measured only for the initial test and after process or design changes which may affect input capacitance.

4.3.2 Groups C and D inspections.

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

b. Steady-state life test (method 1005 of MIL-STD-883) conditions:

(1) Test condition A, B, C, or D using the circuit submitted with the certificate of compliance (see 3.5 herein).

(2) T_A = +125°C, minimum.

(3) Test duration: 1,000 hours, except as permitted by appendix B of MIL-M-38510 and method 1005 of MIL-STD-883.

TABLE II. Electrical test requirements.

MIL-STD-883 test requirements	Subgroups (per method 5005, table I)
Interim electrical parameters (method 5004)	1
Final electrical test parameters (method 5004)	1*,2,3,7,8,9
Group A test requirements (method 5005)	1,2,3,8,9, 10,11**
Groups C and D end-point electrical parameters (method 5005)	1,2,3
Additional electrical subgroups for group C periodic inspections	

*PDA applies to subgroup 1.
**Subgroups 10 and 11, if not tested, shall be guaranteed to the specified limits in table I.

5. PACKAGING

5.1 Packaging requirements. The requirements for packaging shall be in accordance with MIL-M-38510.

6. NOTES

6.1 Intended use. Microcircuits conforming to this drawing are intended for use when military specifications do not exist and qualified military devices that will perform the required function are not available for OEM application. When a military specification exists and the product covered by this drawing has been qualified for listing on QPL-38510, the device specified herein will be inactivated and will not be used for new design. The QPL-38510 product shall be the preferred item for all applications.

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

6.3 Comments. Comments on this drawing should be directed to DESC-ECS, Dayton, Onio 45444, or telephone 513-296-5375.

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

Military drawing part number	Vendor CAGE number	Vendor similar part number 1/	Replacement military specification part number
7801701ZX	34335	AM2910FMB	2/
7801701QX	34335 50088 50088	AM2910DMB TS2910MCB/C TS2910MJB/C	2/
7801702QX 7801702ZX	34335 34335	AM2910ADMB AM2910AFMB	3/ 3/

1/ Caution. Do not use this number for item acquisition. Items acquired to this number may not satisfy the performance requirements of this drawing.
2/ MIL-M-38510/44501 previously listed has been discontinued.
3/ Device types 01 and 02 are pin to pin compatible. However, device type 02 has a 9 deep stack while device 01 has a 5 deep stack. Since the depth of stack is different, the $\overline{\text{FULL}}$ signal will function differently.

Vendor CAGE number	Vendor name and address
34335	Advanced Micro Devices, Incorporated 901 Thompson Place P.O. Box 3453 Sunnyvale, CA 94086
50088	Thomson Components-MOSTEK-Corporation 1310 Electronics Drive Carrollton, TX 75006