REVISIONS			
LTR	DESCRIPTION	DATE (YR-MO-DA)	APPROVED
E	Changed code ident. no. to 67268. Correct vendor part number. Editorial changes throughout. Change drawing to military drawing format. Case 2 inactivated for new design.	7 DEC 1987	M. A. Frye
F	Add device type 02. Update boilerplate. Editorial changes throughout.	96-07-10	M. A. Frye

THE ORIGINAL FIRST PAGE OF THIS DRAWING HAS BEEN REPLACED.

CURRENT CAGE CODE 67268

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

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
Christopher A. Rauch

CHECKED BY
D. A. DiCenzo

APPROVED BY
Michael A. Frye

DRAWING APPROVAL DATE
12 DECEMBER 1978

REVISION LEVEL
F

DEFENSE ELECTRONICS SUPPLY CENTER
DAYTON, OHIO 45444

MICROCIRCUIT, DIGITAL, LOW POWER SCHOTTKY, TTL, OCTAL FLIP-FLOP, MONOLITHIC SILICON

SIZE	CAGE CODE	
A	**14933**	**78011**

SHEET 1 OF 11

DESC FORM 193
JUL 94

5962-E496-96

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

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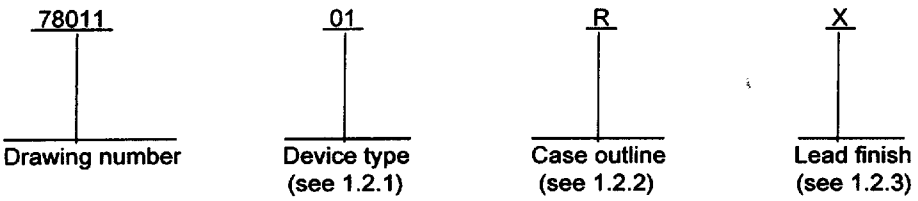
1. SCOPE

1.1 Scope. This drawing describes device requirements for MIL-STD-883 compliant, non-JAN class level B microcircuits in accordance with MIL-PRF-38535, appendix A.

1.2 Part or Identifying Number (PIN). The complete PIN is as shown in the following example:



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

Device type	Generic number	Circuit function
01	54LS374	Octal D-type positive, edge-triggered flip-flop with three-state outputs
02	54LS374	Octal D-type positive, edge-triggered flip-flop with three-state outputs

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

Outline letter	Descriptive designator	Terminals	Package style
R	GDIP1-T20 or CDIP2-T20	20	Dual-in-line
S	GDFP2-F20 or CDFP3-F20	20	Flat pack
2	CQCC1-N20	20	Square leadless chip carrier

1.2.3 Lead finish. The lead finish is as specified in MIL-PRF-38535, appendix A.

1.3 Absolute maximum ratings.

Supply voltage range ..... -0.5 V dc to +7.0 V dc
Input voltage range ..... -1.5 V dc at -18 mA to 5.5 V dc
Storage temperature ..... -65°C to +150°C
Maximum power dissipation (P_D) 1/ ..... 31 mW
Lead temperature (soldering, 10 seconds) ..... +300°C
Thermal resistance, junction-to-case (O_{JC}) ..... See MIL-STD-1835
Junction temperature (T_J) ..... +175°C

1.4 Recommended operating conditions.

Supply voltage range (V_{CC} ..... 4.5 V dc minimum to 5.5 V dc maximum
Minimum high level input voltage (V_{IH}) ..... 2.0 V dc
Maximum low level input voltage (V_{IL}) ..... 0.7 V dc
Case operating temperature range (T_C) ..... -55°C to +125°C
High level output current (I_{OH}) ..... -1 mA
Low level output current (I_{OL}) ..... 12 mA
Width of clock pulse (T_W) ..... 15 ns minimum
Data input
  Set-up time (Tsu) ..... 20 ns minimum
  Data hold time (Th) ..... 0 ns minimum
Clock frequency (Fclock) ..... 0 to 35 MHz

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

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 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 shall be in accordance with MIL-PRF-38535, appendix A for non-JAN class level B devices and as specified herein. Product built to this drawing that is produced by a Qualified Manufacturer Listing (QML) certified and qualified manufacturer or a manufacturer who has been granted transitional certification to MIL-PRF-38535 may be processed as QML product in accordance with the manufacturers approved program plan and qualifying activity approval in accordance with MIL-PRF-38535. This QML flow as documented in the Quality Management (QM) plan may make modifications to the requirements herein. These modifications shall not affect form, fit, or function of the device. These modifications shall not affect the PIN as described herein. A "Q" or "QML" certification mark in accordance with MIL-PRF-38535 is required to identify when the QML flow option is used.

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

3.2.1 Case outline(s). The case outline(s) shall be in accordance with 1.2.2 herein.

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

3.2.3 Truth table(s). The truth table(s) shall be as specified on figure 2.

3.2.4 Logic diagram(s). The logic diagram(s) shall be as specified on figure 3.

3.3 Electrical performance characteristics. Unless otherwise specified herein, the electrical performance characteristics are as specified in table I and shall apply over the full (case or ambient) operating temperature range.

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

3.5 Marking. Marking shall be in accordance with MIL-PRF-38535, appendix A. 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 (see 6.6 herein). 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.

3.6 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 MIL-HDBK-103 (see 6.6 herein). The certificate of compliance submitted to DESC-EC prior to listing as an approved source of supply shall affirm that the manufacturer's product meets the requirements of MIL-PRF-38535, appendix A and the requirements herein.

3.7 Certificate of conformance. A certificate of conformance as required in MIL-PRF-38535, appendix A shall be provided with each lot of microcircuits delivered to this drawing.

3.8 Notification of change. Notification of change to DESC-EC shall be required in accordance with MIL-PRF-38535, appendix A.

3.9 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 MIL-PRF-38535, appendix A.

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. The test circuit shall be maintained by the manufacturer under document revision level control and shall be made available to the preparing or acquiring activity upon request. The test circuit shall specify the inputs, outputs, biases, and power dissipation, as applicable, in accordance with the intent specified in test method 1015 of MIL-STD-883.

(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.

TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions $-55°C \le T_C \le +125°C$ 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} = 0.7 V, I_{OH} = -1 mA, V_{IH} = 2.0 V		1, 2, 3	All	2.4		V
Low-level output voltage	V_{OL}	V_{CC} = 4.5 V, V_{IL} = 0.7 V, I_{OH} = 12 mA, V_{IH} = 2.0 V		1, 2, 3	All		0.4	V
Input clamp voltage	V_{IC}	V_{CC} = 4.5 V, I_{IN} = -18 mA, T_C = +25°C		1	All		-2	V
High level input current	I_{IH1}	V_{CC} = 5.5 V, V_{IN} = 2.7 V		1, 2, 3	All		20	µA
	I_{IH2}	V_{CC} = 5.5 V, V_{IN} = 5.5 V		1, 2, 3	All		100	
Low-level input current	I_{IL}	V_{CC} = 5.5 V, V_{IN} = 0.4 V	Output control	1, 2, 3	All		-400	µA
			Data	1, 2, 3	01		-250	
					02		-400	
			Clock	1, 2, 3	All		-400	
Off-state output current - high level	I_{OZH}	V_{CC} = 5.5 V, V_{IN} = 2.7 V		1, 2, 3	All		20	µA
	I_{OZL}	V_{CC} = 5.5 V, V_{IN} = 0.4 V		1, 2, 3	All		20	
Short-circuit output current	I_{OS}	V_{CC} = 5.5 V, V_{IN} = GND 1/		1, 2, 3	All	-15	-130	mA
Supply current	I_{CC}	V_{CC} = 5.5 V, V_{IN} = 5.0 V		1, 2, 3	01		45	mA
		V_{CC} = 5.5 V, Output control = 4.5 V, for all other inputs V_{IN} = 2.7 V		1, 2, 3	02		45	
Functional tests		See 4.3.1c		7	All			
Maximum clock frequency	f_{MAX}	V_{CC} = 5.0 V 2/	R_L =667Ω ± 5%, C_L = 45 pF ± 10%	9	All	35		Mhz
				10, 11	01	26		
					02	21		
			R_L =110Ω ± 5%, C_L = 50 pF ± 10%	9	All	35		
				10,11	01	26		
					02	21		

See footnotes at end of table.

TABLE I. Electrical performance characteristics - continued.

Test	Symbol	Conditions $-55°C \le T_C \le +125°C$ unless otherwise specified		Group A subgroups	Device Type	Limits		Unit
						Min	Max	
Propagation delay time, high to low level, clock to Q	t_{PHL}	V_{CC} = 5.0 V 2/	R_L =667Ω ± 5% C_L = 45 pF ± 10%	9	All		34	ns
				10, 11	All		45	
			R_L =110Ω ± 5% C_L = 50 pF ± 10%	9	All		28	
				10,11	01		37	
					02		40	
Propagation delay time, low to high level, clock to Q	t_{PLH}		R_L =667Ω ± 5% C_L = 45 pF ± 10%	9	All		28	ns
				10, 11	01		37	
					02		40	
			R_L =110Ω ± 5% C_L = 50 pF ± 10%	9	All		28	
				10,11	01		37	
					02		40	
Propagation delay time, output enable	t_{PZH}		R_L =667Ω ± 5% C_L = 45 pF ± 10%	9	All		28	ns
				10, 11	All		37	
			R_L =110Ω ± 5% C_L = 50 pF ± 10%	9	All		28	
				10,11	All		37	
	t_{PZL}		R_L =667Ω ± 5% C_L = 45 pF ± 10%	9	All		34	ns
				10, 11	All		45	
			R_L =110Ω ± 5% C_L = 50 pF ± 10%	9	All		28	
				10,11	01		37	
					02		40	

See footnotes at end of table.

TABLE I. Electrical performance characteristics - continued.

Test	Symbol	Conditions $-55°C \le T_C \le +125°C$ unless otherwise specified		Group A subgroups	Device Type	Limits		Unit
						Min	Max	
Propagation delay time, output disable	t_{PHZ}	V_{CC} = 5.0 V 2/	R_L =667Ω ± 5% C_L = 5 pF ± 10%	9	01		20	ns
					02		28	
				10, 11	01		25	
					02		39	
			R_L =110Ω ± 5% C_L = 5 pF ± 10%	9	All		36	
				10, 11	All		47	
	t_{PLZ}		R_L =667Ω ± 5% C_L = 5 pF ± 10%	9	All		25	ns
				10, 11	All		32	
			R_L =110Ω ± 5% C_L = 5 pF ± 10%	9	All		30	
				10, 11	All		39	

1/ Not more than one output should be shorted at a time, and the duration of the short circuit condition should not exceed one second.

2/ Propagation delay time testing and maximum clock frequency testing may be performed using either C_L = 5 pF, C_L = 45 pF or C_L = 50 pF. However, the manufacturer must certify and guarantee that the microcircuits meet the switching test limits specified for a 50 pF load.

Device types	All
Case outlines	R, S, and 2
Terminal number	Terminal symbol
1	Output control
2	1Q
3	1D
4	2D
5	2Q
6	3Q
7	3D
8	4D
9	4Q
10	GND
11	Clock
12	5Q
13	5D
14	6D
15	6Q
16	7Q
17	7D
18	8D
19	8Q
20	V_{CC}

FIGURE 1. Terminal connections.

Inputs			Output
Output control	Clock	D	
L	↑	H	H
L	↑	L	L
L	L	X	Q_O
H	X	X	Z

H = High level (steady state)
L = Low level (steady state)
X = Irrelevant
↑ = Transition from low to high level
Q_O = The level of Q before the indicated steady state input conditions were established
Z = High impedance state

FIGURE 2. Truth table.

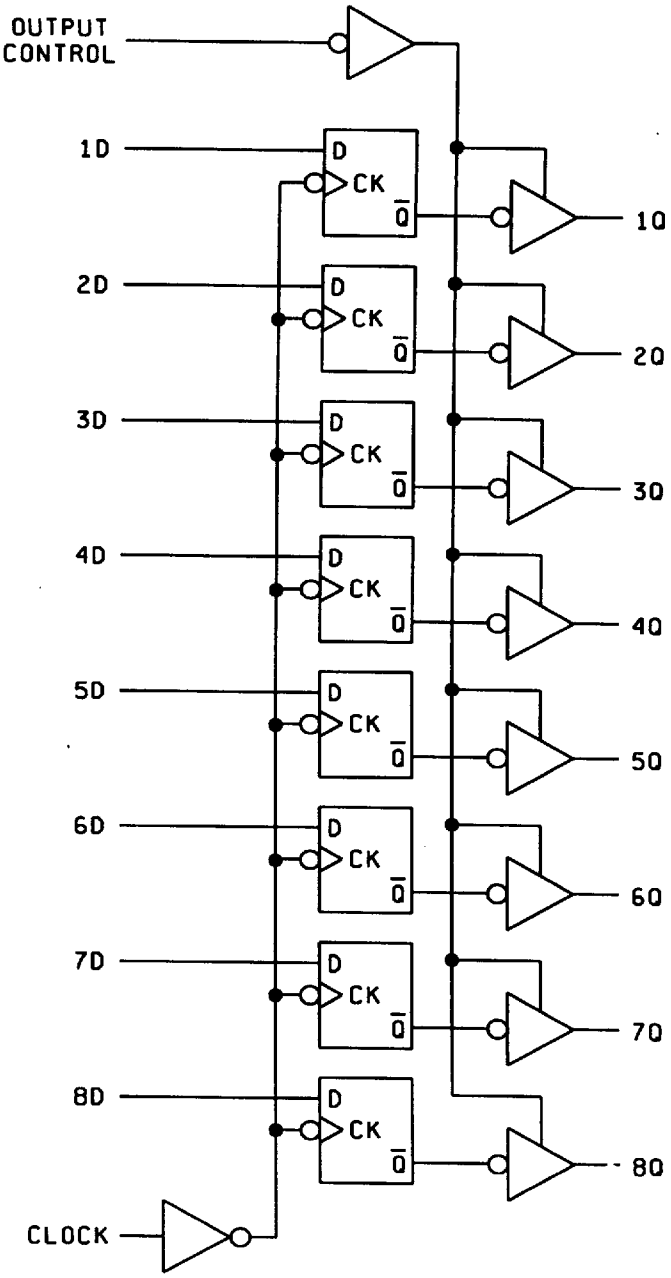


FIGURE 3. Logic diagram.

TABLE II. Electrical test requirements.

MIL-STD-883 test requirements	Subgroups (in accordance with MIL-STD-883, method 5005, table I)
Interim electrical parameters (method 5004)	
Final electrical test parameters (method 5004)	1*, 2, 3, 9
Group A test requirements (method 5005)	1, 2, 3, 7, 9, 10, 11**
Groups C and D end-point electrical parameters (method 5005)	1, 2, 3

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

4.3.1 Group A inspection.

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

b. Subgroups 4, 5, 6, and 8 in table I, method 5005 of MIL-STD-883 shall be omitted.

c. Subgroup 7 shall include verification of the truth table.

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 conditions, method 1005 of MIL-STD-883.

(1) Test condition A, B, C, or D. The test circuit shall be maintained by the manufacturer under document revision level control and shall be made available to the preparing or acquiring activity upon request. The test circuit shall specify the inputs, outputs, biases, and power dissipation, as applicable, in accordance with the intent specified in test method 1005 of MIL-STD-883.

(2) T_A = +125°C, minimum.

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

5. PACKAGING

5.1 Packaging requirements. The requirements for packaging shall be in accordance with MIL-PRF-38535, appendix A.

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.

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

6.3 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.

6.4 Record of users. Military and industrial users shall inform Defense Electronics Supply Center when a system application requires configuration control and the applicable SMD. 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 microelectronics devices (FSC 5962) should contact DESC-EC, telephone (513) 296-6047.

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

6.6 Approved sources of supply. Approved sources of supply 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.