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REVISIONS

LTR	DESCRIPTION	DATE	APPROVED
A	Complete revision; Added four sources - FSCM 07263, 04713, 27014, and 31019; Removed one source - FSCM 34371.	22 Sep 81	<i>M. A. Hauck</i>
B	3-State propagation delay times (t_{PHZ}) (t_{PZH}) changed to 1 K ohm. Update document boilerplate. Case outline "F" inactive for new design.	5 Sept. 1984	<i>M. A. Hauck</i>

Prepared in accordance with DoD-STD-100

Selected item drawing

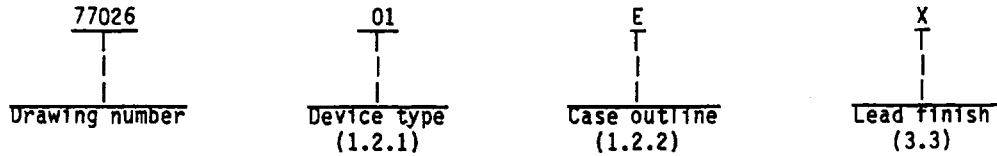
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REV STATUS	REV	B	B	B	A	B	B	-	B	B	B											
OF PAGES	PAGES	1	2	3	4	5	6	7	8	9	10											

Original Date of Drawing 13 September 1977	PREPARED BY <i>A. J. Foley 6 Sept 77</i>		DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO			
	CHECKED BY <i>C. R. Jackson 9-13-77</i>		TITLE Microcircuits, Digital CMOS, Quad 3-State R/S Latches, Monolithic Silicon			
	APPROVED BY <i>M. A. Hauck 13 Sep 77</i>					
	SIZE A	CODE IDENT. NO. 14933		DWG NO. 77026		
	REV B		PAGE 1 OF 10			

1. SCOPE

1.1 Scope. This drawing describes the requirements for monolithic silicon, CMOS, quad 3-state R/S latches, microcircuits. This drawing provides a level of microcircuit quality and reliability assurance for acquisition of microcircuits in accordance with MIL-M-38510.

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



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

<u>Device type</u>	<u>Generic number</u>	<u>Circuit</u>
01	4044B	Quad 3-state R/S latches

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

<u>Outline letter</u>	<u>Case outline</u>
E	D-2 (16-lead, 1/4" X 7/8"), dual-in-line package
F	D-5 (16-lead, 1/4" X 3/8"), flat package

1.3 Absolute maximum ratings.

Supply voltage range - - - - -	-0.5 V dc to +18 V dc
Input voltage range - - - - -	-0.5 V dc to V_{DD} +0.5 V dc
Storage temperature - - - - -	-65°C to +150°C
Maximum power dissipation, P_D - - - - -	500 mW dc <u>1/</u>
Lead temperature (soldering 10 seconds) - - - - -	+300°C
Thermal resistance, junction to case (θ_{JC}) - - -	(See MIL-M-38510, appendix C)
Junction temperature (T_J) - - - - -	+175°C

1.4 Recommended operating conditions.

Supply voltage - - - - -	+3.0 V dc to +15 V dc
Minimum high level input voltage - - - - -	+3.5 V dc
Maximum low level input voltage - - - - -	+1.5 V dc
Case operating temperature range (T_C) - - - - -	-55°C to +125°C

1/ For $T_C = +100^\circ\text{C}$ to $+125^\circ\text{C}$, derate linearly at 12 mW/°C to 200 mW.

DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO	SIZE A	CODE IDENT. NO. 14933	DWG NO. 77026
		REV B	PAGE 2

2. APPLICABLE DOCUMENTS

2.1 Government specifications and standards. Unless otherwise specified, the following specifications and standards, 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 specification 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 specifications, standards, handbooks, drawings, and publications required by manufacturers in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting officer.)

3. REQUIREMENTS

3.1 Item requirements. The individual item requirements shall be in accordance with MIL-M-38510 and as specified herein. The country of manufacturer requirement of MIL-M-38510 does not apply.

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 Design documentation. The design documentation shall be in accordance with MIL-M-38510 and, unless otherwise specified in the acquisition document, shall be retained by the manufacturer but be available for review by the acquiring activity or contractor upon request.

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

3.2.3 Truth table and logic diagram. The truth table and logic diagram shall be as specified on figure 2.

3.2.4 Case outlines. The case outlines shall be in accordance with 1.2.2.

3.3 Lead material and finish. The lead material and finish shall be in accordance with MIL-M-38510.

3.4 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.

3.5 Marking. Marking shall be in accordance with 1.2 herein. The vendor similar part number may also be marked in accordance with 6.9 herein. Both part numbers, when used, shall be printed on the same surface. The "M38510/XXX" part number and the "JAN" or "J" mark shall not be used. Lead finish letter "X" is used only as specified in MIL-M-38510 and shall not be marked on the microcircuit or its packaging. The country of origin shall be marked on the microcircuit.

3.6 Quality assurance requirements. Microcircuits furnished under this drawing shall have been subjected to, and passed all the requirements, tests, and inspections detailed herein including screening and quality conformance inspections.

DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO	SIZE A	CODE IDENT. NO. 14933	DWG NO. 77026
		REV . B	PAGE 3

TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions	Group A subgroups	Limits		Unit
				Min	Max	
High-level output voltage	V _{OH}	V _{DD} = 5.0 V dc; V _{IN} = V _{DD} or 0 V _{DD} = 10 V dc V _{DD} = 15 V dc I _O < 1 μA	1, 2, 3	4.95 9.95 14.95		V
Low-level output voltage	V _{OL}	V _{DD} = 5.0 V dc V _{IN} = V _{DD} or 0 V _{DD} = 10 V dc V _{DD} = 15 V dc I _O < 1 μA	1, 2, 3		.05 .05 .05	V
High-level input voltage	V _{IH}	V _O = 0.5 or 4.5 V dc; V _{DD} = 5 V dc V _O = 1.0 or 9.0 V dc; V _{DD} = 10 V dc V _O = 1.5 or 13.5 V dc; V _{DD} = 15 V dc I _O < 1 μA	1, 2, 3	3.5 7.0 11.0		V
Low-level input voltage	V _{IL}	V _O = 0.5 or 4.5 V dc; V _{DD} = 5.0 V dc V _O = 1.0 or 9.0 V dc; V _{DD} = 10 V dc V _O = 1.5 or 13.5 V dc; V _{DD} = 15 V dc I _O < 1 μA	1, 2, 3		1.5 3.0 4.0	V
High-level output current	I _{OH}	V _{DD} = 5 V dc T _C = -55°C V _{OH} = 4.6 V dc T _C = 25°C V _{IN} = 0 or 5 V dc T _C = 125°C	1, 2, 3	-0.25 -0.2 -0.14		mA
		V _{DD} = 10 V dc T _C = -55°C V _O = 9.5 V dc T _C = 25°C V _{IN} = 0 or 10 V dc T _C = 125°C		-0.62 -0.5 -0.35		
		V _{DD} = 15 V dc T _C = -55°C V _O = 13.5 V dc T _C = 25°C V _{IN} = 0 or 15 V dc T _C = 125°C		-1.8 -1.5 -1.1		
Low-level output current	I _{OL}	V _{DD} = 5 V dc T _C = -55°C V _O = 0.4 V dc T _C = 25°C V _{IN} = 0 or 5 V dc T _C = 125°C	1, 2, 3	0.64 0.51 0.36		mA
		V _{DD} = 10 V dc T _C = -55°C V _O = 0.5 V dc T _C = 25°C V _{IN} = 0 or 10 V dc T _C = 125°C		1.6 1.3 0.9		
		V _{DD} = 15 V dc T _C = -55°C V _O = 1.5 V dc T _C = 25°C V _{IN} = 0 or 15 V dc T _C = 125°C		4.2 3.4 2.4		

DEFENSE ELECTRONICS SUPPLY CENTER
DAYTON, OHIO

SIZE

A

CODE IDENT. NO.

14933

DWG NO.

77026

REV

A

PAGE

4

TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions	Group A subgroups	Limits		Unit
				Min	Max	
Input current	I _{IN}	V _{IN} = 0 or 15 V dc T _C = -55°C T _C = 25°C T _C = 125°C	1, 3		±0.1	μA
			2		±1.0	
Input capacitance	C _{IN}	V _{IN} = 0; T _C = 25°C	4		7.5	pF
Functional tests		See 4.4.1(d)	7			
Quiescent current	I _{DD}	V _{DD} = 5 V dc V _{IN} = 0V or V _{DD} T _C = -55°C T _C = 25°C T _C = 125°C	1, 2, 3		1	μA
					30	
					2	
					60	
Quiescent current	I _{DD}	V _{DD} = 10 V dc V _{IN} = 0V or V _{DD} T _C = -55°C T _C = 25°C T _C = 125°C	1, 2, 3		2	μA
					60	
					4	
					120	
Propagation delay time: Set-or-reset to Q	t _{PHL} t _{PLH}	V _{DD} = 5 V dc C _L = 50 pF ±10% R _L = 200 kΩ T _C = 25°C	9	20	350	ns
		V _{DD} = 5 V dc C _L = 50 pF ±10% R _L = 200 kΩ T _C = -55°C, 125°C	10, 11	25	525	ns
3-state propagation delay time: enable to Q	t _{PHZ} t _{PZH}	V _{DD} = 5 V dc C _L = 50 pF ±10% R _L = 1 kΩ T _C = 25°C	9	10	200	ns
		V _{DD} = 5 V dc C _L = 50 pF ±10% R _L = 1 kΩ T _C = -55°C, 125°C	10, 11	15	300	ns

DEFENSE ELECTRONICS SUPPLY CENTER
DAYTON, OHIO

SIZE
A

CODE IDENT. NO.
14933

DWG NO.

77026

REV B

PAGE 5

TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions	Group A subgroups	Limits		Unit
				Min	Max	
Transition time	t _{THL} t _{TLH}	V _{DD} = 5 V dc C _L = 50 pF ±10% R _L = 200 kΩ T _C = 25°C	9	10	200	ns
		V _{DD} = 5 V dc C _L = 50 pF ±10% R _L = 200 kΩ T _C = -55°C, 125°C	10, 11	15	300	ns

3.6.1 Screening. Screening shall be in accordance with method 5004, class B, of MIL-STD-883 and 4.2 herein.

3.6.2 Qualification. Qualification inspection for the device types specified herein shall not be required.

3.6.3 Quality conformance inspection. Quality conformance inspection shall be in accordance with MIL-M-38510 and 4.4 herein.

3.7 Manufacturer eligibility. To be eligible to supply microcircuits to this drawing, a manufacturer shall have manufacturer certification in accordance with MIL-M-38510 for at least one line and have part I listing on Qualified Products List QPL-38510 for at least one device type (not necessarily the one for which the acquisition of this drawing is to apply).

3.8 Certificate of compliance. A certificate of compliance shall be required from a manufacturer in order to be listed as an approved source of supply (see 6.8 and 6.9).

4. QUALITY ASSURANCE PROVISIONS

4.1 Sampling and inspection. Sampling and inspection procedures shall be in accordance with MIL-M-38510 and method 5005 of MIL-STD-883, except as modified 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 or D.
 - (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.

DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO	SIZE A	CODE IDENT. NO. 14933	DWG NO. 77026
		REV B	PAGE 6

Device type U1

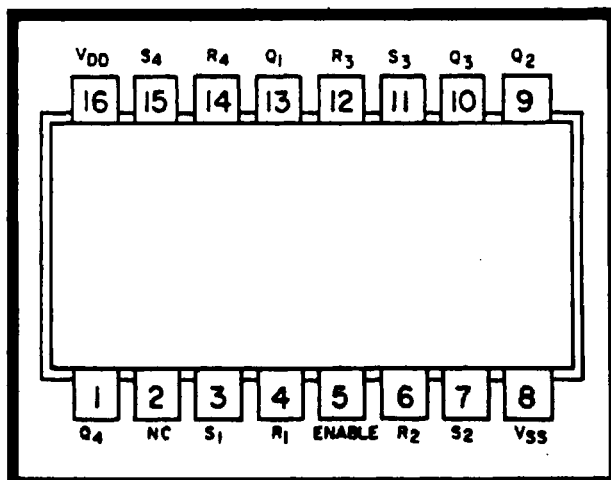
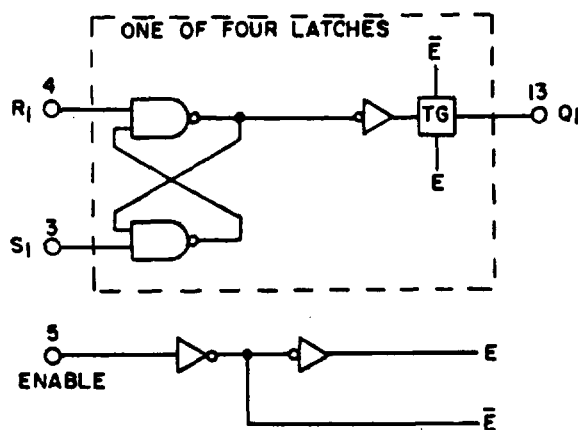


FIGURE 1. Terminal connections (top view).

Device type 01



S	R	E	Q
X	X	0	OC*
1	1	1	NC+
0	1	1	1
1	0	1	0
0	0	1	ΔΔ

* Open circuit
 + No change
 ΔΔ Dominated by R = 0 input

FIGURE 2. Truth table and logic diagram.

DEFENSE ELECTRONICS SUPPLY CENTER
 DAYTON, OHIO

SIZE
 A

CODE IDENT. NO.
 14933

DWG NO.

77026

REV

PAGE 7

c. The percent defective allowable (PDA) shall be as specified in MIL-M-38510.

4.3 Qualification inspection. Qualification inspection for the device types specified herein shall not be required.

4.4 Quality conformance inspection. Quality conformance inspection shall be in accordance with MIL-M-38510 and method 5005 of MIL-STD-883. Group A and B inspections shall be performed on each inspection lot or as specified in method 5005 of MIL-STD-883. Groups C and D shall be performed on a periodic basis in accordance with MIL-M-38510. Generic test data (see 6.5) may be used to satisfy the requirements for groups C and D inspections. Manufacturers shall keep lot records for 5 years (minimum), monitor for compliance to the prescribed procedures, and observe that satisfactory manufacturing conditions and records on lots are maintained for these devices. The records, including as a minimum, an attributes summary of all screening and quality conformance inspections conducted on each lot shall be available for review by customers at all times.

TABLE II. Electrical test requirements.

MIL-STD-883 test requirements	Subgroups (per method 5005, table I)
Interim electrical parameters (pre burn-in) (method 5004)	---
Final electrical test parameters (method 5004)	1*, 2, 3, 9
Group A test requirements (method 5005)	1, 2, 3, 4, 7, 9
Groups C and D end-point electrical parameters (method 5005)	1, 2, 3
Additional electrical subgroups for group C periodic inspections	10, 11

*PDA applies to subgroup 1 (see 4.2c).

4.4.1 Group A inspection. Group A inspection shall consist of the test subgroups and LTPD values shown in table I of method 5005 of MIL-STD-883, class B, and as follows:

- a. Tests shall be as specified in table II herein.
- b. Subgroups 5, 6, and 8 of table I of method 5005 of MIL-STD-883 shall be omitted.
- c. Subgroup 4 (C_{IN} measurement) shall be measured only after process or design changes which may affect input capacitance. Generic test data (see 6.5) may be used to satisfy the subgroup 4 requirement.
- d. Subgroup 7 tests sufficiently to verify the truth table.

DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO	SIZE A	CODE IDENT. NO. 14933	DWG NO. 77026
		REV B	PAGE 8

4.4.2 Groups C and D inspections. Groups C and D inspections shall consist of the test subgroups and LTPD values shown in tables III and IV, method 5005 of MIL-STD-883, class B, and as follows:

- 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 or D.
 - (2) $T_A = 125^\circ\text{C}$, minimum.
 - (3) Test duration: 1,000 hours.

5. PACKAGING

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

6. NOTES

6.1 Notes. Only 6.4 of the notes specified in MIL-M-38510 shall apply to this drawing.

6.2 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. This drawing is intended exclusively to prevent the proliferation of unnecessary duplicate specifications, drawings, and stock catalog listings. When a military specification exists and the product covered by this drawing has been qualified for listing on QPL-38510, this drawing becomes obsolete and will not be used for new design. The QPL-38510 product shall be the preferred item for all applications.

6.3 Ordering data. The acquisition document should specify the following:

- a. Complete part number (see 1.2).
- b. Requirements for delivery of one copy of the quality conformance inspection data pertinent to the device inspection lot to be supplied with each shipment by the device manufacturer, if applicable.
- c. Requirements for certificate of compliance, if applicable.
- d. Requirements for notification of change of product or process to procuring activity, if applicable.
- e. Requirements for special carriers, lead lengths, or lead forming, if applicable. These requirements shall not affect the part number. Unless otherwise specified, these requirements will not apply to direct shipment to the Government.

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

DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO	SIZE A	CODE IDENT. NO. 14933	DWG NO. 77026
		REV B	PAGE 9

6.5 Generic test data. Generic test data may be used to satisfy the requirements of 4.4.3. Group C generic test data shall be on date codes no more than 1 year old and on a die in the same microcircuit group (see appendix E of MIL-M-38510) with the same material, design and process and from the same plant as the die represented. Group D generic data shall be on date codes no more than 1 year old and on the same package type (terms, definitions, and symbols of MIL-M-38510) and from the same plant as the package represented. The vendor is required to retain the generic data for a period of not less than 5 years from the date of shipment.

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

6.7 Handling. MOS devices must be handled with certain precautions to avoid damage due to accumulation of static charge. Input protection devices have been designed in the chip to minimize the effect of this static buildup. However, the following handling practices are recommended:

- a. Devices should be handled on benches with conductive and grounded surfaces.
- b. Ground test equipment and tools.
- c. Do not handle devices by the leads.
- d. Store devices in conductive foam or carriers.
- e. Avoid use of plastic, rubber, or silk in MOS areas.
- f. Maintain relative humidity above 50 percent, if practical.

6.8 Submission of certificate of compliance. The certificate of compliance submitted to DESC-ECS, prior to listing as an approved source of supply in 6.9, shall state that the manufacturer's product meets the provisions for MIL-STD-883 compliant devices and the requirements herein.

6.9 Approved source of supply. An approved source of supply is listed herein. Additional sources will be added as they become available. The vendor listed herein has agreed to this drawing and a certificate of compliance (see 3.8) has been submitted to DESC-ECS.

DESC drawing part number	Vendor FSCM number	Vendor similar part number
7702601EX 7702601FX	31019 <u>1/</u>	883C4044ABC

Vendor FSCM number

31019

Vendor name and address

Solid State Scientific, Inc.
3900 Welsh Road
Willow Grove, PA 19090

1/ Inactive for new design in case outline "F" only. Not available from an approved source of supply.

DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO	SIZE A	CODE IDENT. NO. 14933	DWG NO. 77026
		REV B	PAGE 10

DESC FORM 144A
APR 83