REVISIONS			
LTR	DESCRIPTION	DATE (YR-MO-DA)	APPROVED
A	Added a new vendor, National Semiconductor with CAGE code 27014. Change F_{MAX} for subgroups 10 and 11 from 70 MHz to 60 MHz in table I. Changed test conditions of I_{OD} from V_{IN} = 5.5 V to V_{IN} = GND. Editorial changes throughout.	1989 NOV 3	Wheckman

REV																								
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REV STATUS OF SHEETS	REV	A		A	A	A			A	A														
	SHEET	1	2	3	4	5	6	7	8	9														

PMIC N/A

STANDARDIZED MILITARY DRAWING

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

AMSC N/A

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DRAWING APPROVAL DATE: 23 AUGUST 1988

REVISION LEVEL: A

DEFENSE ELECTRONICS SUPPLY CENTER
DAYTON, OHIO 45444

MICROCIRCUITS, DIGITAL, BIPOLAR, ADVANCED SCHOTTKY, D-TYPE REGISTER, MONOLITHIC SILICON

SIZE	CAGE CODE	
A	67268	5962-88555

SHEET 1

DESC FORM 193
SEP 87

* U.S. GOVERNMENT PRINTING OFFICE: 1987 — 748-129/60911

5962-E1452-1

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:

5962-88555	01	F	X
Drawing number	Device type (1.2.1)	Case outline (1.2.2)	Lead finish per MIL-M-38510

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

Device type	Generic number	Circuit function
01	54F378	Hex parallel D-type register with enable

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
E	D-2 (16-lead, .840" x .310" x .200"), dual-in-line package
F	F-5 (16-lead, .440" x .285" x .085"), flat package
2	C-2 (20-terminal, .358" x .358" x .100"), square chip carrier package

1.3 Absolute maximum ratings.

Supply voltage range	-0.5 V dc minimum to +7.0 V dc maximum
Input voltage range	-1.2 V dc at -18 mA to +7.0 V dc
Storage temperature range	-65°C to +150°C
Maximum power dissipation, (P_D) 1/	247 mW
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 (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})	0.8 V dc
Case operating temperature range (T_C)	-55°C to +125°C
Minimum width of clock pulse high:	
T_C = +25°C	4.0 ns
T_C = -55°C, +125°C	5.0 ns
Minimum width of clock pulse low:	
T_C = +25°C	6.0 ns
T_C = -55°C, +125°C	7.5 ns
Minimum setup time, D high to clock pulse:	
T_C = +25°C	4.0 ns
T_C = -55°C, +125°C	5.0 ns
Minimum setup time, D low to clock pulse:	
T_C = +25°C	4.0 ns
T_C = -55°C, +125°C	5.0 ns

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

Minimum hold time, D high to clock pulse:
T_C = +25°C, +125°C, -55°C - - - - - - - - - - - - 2.0 ns
Minimum hold time, D low to clock pulse:
T_C = +25°C, +125°C, -55°C - - - - - - - - - - - - 2.0 ns

2. APPLICABLE DOCUMENTS

2.1 Government specification, standard, and bulletin. Unless otherwise specified, the following specification, standard, and bulletin 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.

BULLETIN

MILITARY

MIL-BUL-103 - List of Standardized Military Drawing (SMD's).

(Copies of the specification, standard, and bulletin 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 Truth table. The truth table shall be as specified on figure 2.

3.2.3 Test circuit and switching waveforms. The test circuit and switching waveforms shall be as specified on figure 3.

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

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 operating temperature range.

TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions $-55°C < T_C < +125°C$ unless otherwise specified	Group A subgroups	Limits Min	Limits Max	Unit
High level output voltage	V_{OH}	V_{CC} = 4.5 V, I_{OH} = -1.0 mA, V_{IL} = 0.8 V, V_{IH} = 2.0 V	1, 2, 3	2.5		V
Low level output voltage	V_{OL}	V_{CC} = 4.5 V, I_{OL} = 20 mA, V_{IL} = 0.8 V, V_{IH} = 2.0 V	1, 2, 3		0.5	V
Input clamp voltage	V_{IC}	V_{CC} = 4.5 V, I_{IN} = -18 mA, T_C = +25°C	1		-1.2	V
High level input current	I_{IH1}	V_{CC} = 5.5 V, V_{IN} = 2.7 V	1, 2, 3		20	µA
	I_{IH2}	V_{CC} = 5.5 V, V_{IN} = 7.0 V	1, 2, 3		100	µA
Low level input current	I_{IL}	V_{CC} = 5.5 V, V_{IN} = 0.5 V	1, 2, 3		-0.6	mA
Supply current	I_{CC}	V_{CC} = 5.5 V, V_{IN} = 0.0 V	1, 2, 3		45	mA
Short circuit output current	I_{OS}	V_{CC} = 5.5 V, V_{OUT} = 0.0 V 1/	1, 2, 3	-60	-150	mA
Output drive current	I_{OD}	V_{OUT} = 2.5 V, V_{CC} = 4.5 V, V_{IN} = GND	1, 2, 3	60		mA
Functional tests		See 4.3.1c	7, 8			
Maximum clock frequency	f_{MAX}	V_{CC} = 5.0 V, R_L = 500Ω ±5%, C_L = 50 pF ±10%	9	80		MHz
			10, 11	60		
Propagation delay time, CP to Q	t_{PLH}		9	2.0	9.5	ns
			10, 11	2.0	10.0	
	t_{PHL}		9, 10, 11	2.5	10.5	ns

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.

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-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 MIL-BUL-103 (see 6.6 herein).

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-BUL-103 (see 6.6 herein). The certificate of compliance submitted to DESC-ECC prior to listing as an approved source of supply shall affirm that the manufacturer's product meets the requirements of MIL-STD-883 (see 3.1 herein) and the requirements herein.

3.7 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.

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

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 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 3.6 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. Subgroups 7 and 8 tests shall verify the truth table as specified on figure 2 herein.

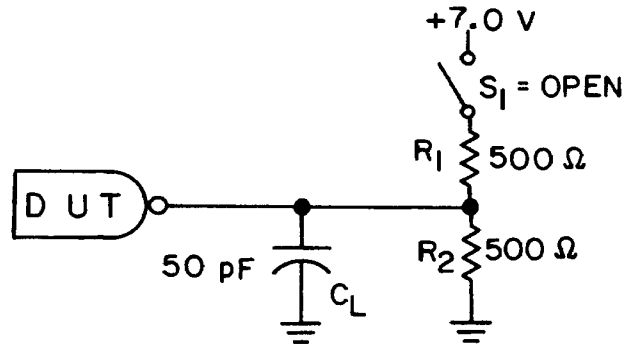
Device type	01	
Case outlines	E, F	2
Terminal number	Terminal symbol	
1	$\overline{E}$	NC
2	Q0	$\overline{E}$
3	D0	Q0
4	D1	D0
5	Q1	D1
6	D2	NC
7	Q2	Q1
8	GND	D2
9	CP	Q2
10	Q3	GND
11	D3	NC
12	Q4	CP
13	D4	Q3
14	D5	D3
15	Q5	Q4
16	V_{CC}	NC
17	---	D4
18	---	D5
19	---	Q5
20	---	V_{CC}

FIGURE 1. Terminal connections.

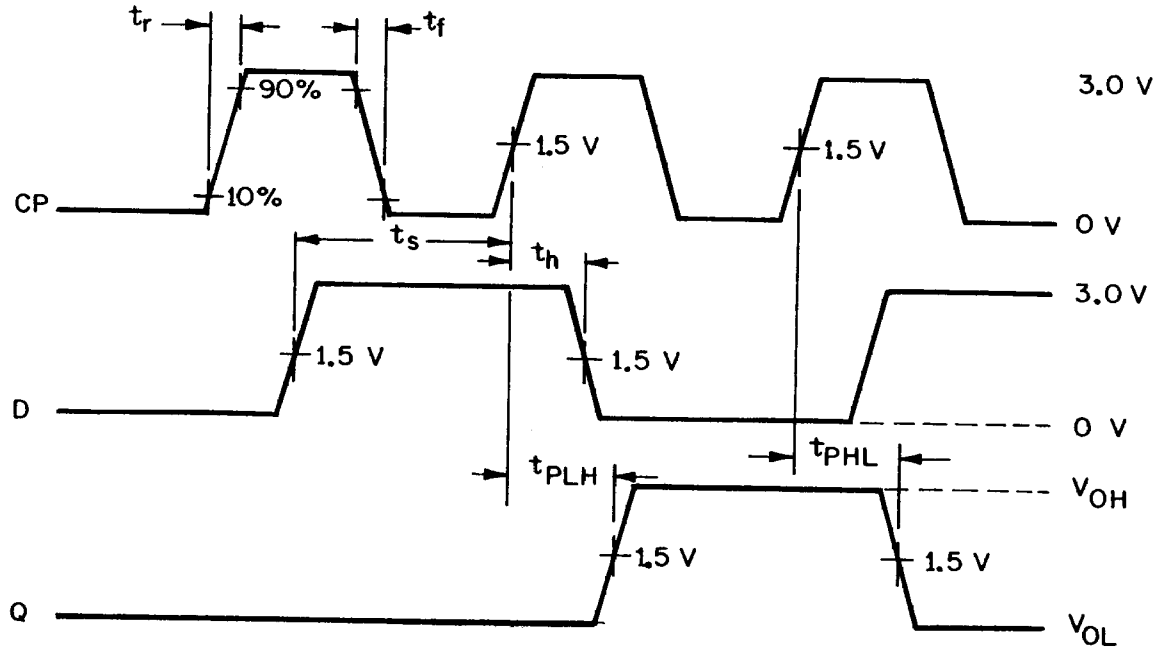
Inputs			Outputs
$\overline{E}$	CP	D	Q
H	⌐	X	No change
L	⌐	H	H
L	⌐	L	L

H = High voltage level
L = Low voltage level
X = Irrelevant
⌐ = Clock pulse (active rising edge)

FIGURE 2. Truth table.



Test circuit.



Propagation delay times

NOTES:
1. C_L includes probe and jig capacitance.
2. The clock input pulse has the following characteristics: $t_r = t_f = 2.5$ ns, duty cycle = 50%, and PRR $\leq$ 1 MHz.

FIGURE 3. Test circuit and switching waveforms.

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 using the circuit submitted with the certificate of compliance (see 3.6 herein).

(2) T_A = +125°C, minimum.

(3) Test duration: 1,000 hours, except as permitted by 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)	---
Final electrical test parameters (method 5004)	1*, 2, 3, 7, 8, 9
Group A test requirements (method 5005)	1, 2, 3, 7, 8, 9, 10, 11
Groups C and D end-point electrical parameters (method 5005)	1, 2, 3

* PDA applies to subgroup 1.

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. Replaceability is determined as follows:

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

b. When a QPL source is established, the part numbered device specified in this drawing will be replaced by the microcircuit identified as part number M38510/34108B--.

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-481 using DD Form 1693, Engineering Change Proposal (Short Form).

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-ECC, telephone (513) 296-6022.

6.5 Comments. Comments on this drawing should be directed to DESC-ECC, Dayton, Ohio 45444, or telephone 513-296-8525.

6.6 Approved sources of supply. Approved sources of supply are listed in MIL-BUL-103. Additional sources will be added to MIL-BUL-103 as they become available. The vendors listed in MIL-BUL-103 have agreed to this drawing and a certificate of compliance (see 3.6 herein) has been submitted to and accepted by DESC-ECC. The approved sources of supply listed below are for information purposes only and are current only to the date of the last action of this document.

Military drawing part number	Vendor CAGE number	Vendor similar part number 1/	Replacement military specification part number
5962-8855501EX	04713 27014	54F378/BEAJC 54F378DMQB	M38510/34108BEX
5962-8855501FX	04713 27014	54F378/BFAJC 54F378FMQB	M38510/34108BFX
5962-88555012X	04713 27014	54F378M/B2AJC 54F378LMQB	M38510/34108B2X

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

Vendor CAGE number	Vendor name and address
04713	Motorola, Incorporated 7402 South Price Road Tempe, AZ 85283
27014	National Semiconductor 333 Western Avenue South Portland,ME 04106