REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED
A	Convert to military drawing format. Add vendors CAGE 27014 and 18714. Changed min. hold times, prop delay times and terminal connections for case 2. Editorial changes throughout.	12 SEPT 86	MCK

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

Defense Electronics Supply Center
Dayton, Ohio

Original date of drawing:
12 NOVEMBER 1985

AMSC N/A

PREPARED BY: Jeffery Trunbull

CHECKED BY: DAD i Cenzo

APPROVED BY: MCK

SIZE: A

CODE IDENT. NO.: 14933

REV A

MILITARY DRAWING

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

TITLE: MICROCIRCUITS, DIGITAL HIGH-SPEED CMOS 8-BIT ADDRESSABLE LATCH, MONOLITHIC SILICON

DWG NO. 85519

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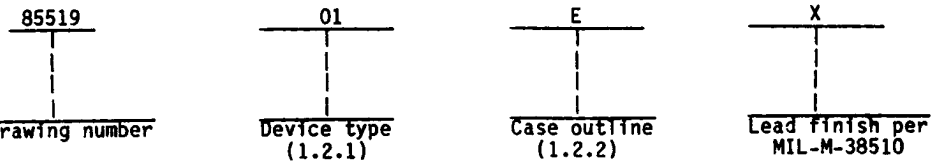
5962-E071

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:



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

Device type	Generic number	Circuit function
01	54HC259	8-Bit addressable latch

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

Outline letter	Case outline
E	D-2 (16-lead, 1/4" x 7/8"), dual-in-line package
F	F-5 (16-lead, 1/4" x 3/8"), flat package
2	C-2 (20-terminal, .350" x .350"), square chip carrier package

1.3 Absolute maximum ratings. 1/

Supply voltage range 2/	-0.5 V dc to 7.0 V dc
DC input voltage	-0.5 V dc to V_{CC} +0.5 V dc
DC output voltage	-0.5 V dc to V_{CC} +0.5 V dc
Clamp diode current	±20 mA
DC output currents (per pin)	±25 mA
DC V_{CC} or GND current (per pin)	±50 mA
Storage temperature range	-65°C to +150°C
Maximum power dissipation, (P_D) 1/	500 mW 3/
Lead temperature (soldering 10 seconds)	260°C
Thermal resistance, junction to case (θ_{JC}):	
Case outline E and F	See MIL-M-38510, appendix C
Case outline 2	60°C/W 4/
Junction temperature (T_J)	175°C

1/ Must withstand the added P_D due to short circuit test (e.g., I_{OS}).
2/ Unless otherwise specified, all voltages are referenced to ground.
3/ For T_C = +100 to +125°C, derate linearly at 12 mW/°C.
4/ When a thermal resistance for this case is published in MIL-M-38510, Appendix C, that value shall supersede the value indicated herein.

1.4 Recommended operating conditions.

Supply voltage range (V_{CC})	+2.0 V dc to +6.0 V dc
Case operating temperature range (T_C)	-55°C to +125°C
Input rise or fall time:	
V_{CC} = 2.0 V	0 to 1000 ns
V_{CC} = 4.5 V	0 to 500 ns
V_{CC} = 6.0 V	0 to 400 ns
Minimum set up time, data to address before $\overline{G}$:	
T_C = 25°C:	
V_{CC} = 2.0 V	100 ns
V_{CC} = 4.5 V	20 ns
V_{CC} = 6.0 V	17 ns
T_C = -55°C/+125°C:	
V_{CC} = 2.0 V	150 ns
V_{CC} = 4.5 V	30 ns
V_{CC} = 6.0 V	26 ns
Minimum hold time, data to address after $\overline{G}$:	
T_C = 25°C:	
V_{CC} = 2.0 V	25 ns
V_{CC} = 4.5 V	5 ns
V_{CC} = 6.0 V	5 ns
T_C = -55°C/+125°C:	
V_{CC} = 2.0 V	40 ns
V_{CC} = 4.5 V	8 ns
V_{CC} = 6.0 V	7 ns
Minimum pulse width $\overline{CLR}$ or $\overline{G}$:	
T_C = 25°C:	
V_{CC} = 2.0 V	80 ns
V_{CC} = 4.5 V	16 ns
V_{CC} = 6.0 V	14 ns
T_C = -55°C/+125°C:	
V_{CC} = 2.0 V	120 ns
V_{CC} = 4.5 V	24 ns
V_{CC} = 6.0 V	20 ns

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 the 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 Truth tables. The truth tables shall be as specified on figure 2.

3.2.3 Logic diagram. The logic diagram 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, 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.

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 3.5 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.

TABLE I. Electrical peformance characteristics - Continued.

Test	Symbol	Conditions $-55°C \le T_C \le +125°C$ 1/		Group A Subgroups	Limits Min	Limits Max	Unit
High-level output voltage	V_{OH}	$V_{IN} = V_{IH}$ or V_{IL}	$V_{CC} = 2.0$ V	1, 2, 3	1.9	---	V
		$\lvert I_O \rvert \le -20$ µA	$V_{CC} = 4.5$ V		4.4	---	
			$V_{CC} = 6.0$ V		5.9	---	
		$\lvert I_O \rvert = \le -4$ mA	$V_{CC} = 4.5$ V		3.7	---	
		$\lvert I_O \rvert = \le -5.2$ mA	$V_{CC} = 6.0$ V		5.2	---	
Low-level output voltage	V_{OL}	$V_{IN} = V_{IH}$ or V_{IL}	$V_{CC} = 2.0$ V	1, 2, 3	---	0.1	V
		$\lvert I_O \rvert \le 20$ µA	$V_{CC} = 4.5$ V		---	0.1	
			$V_{CC} = 6.0$ V		---	0.1	
		$\lvert I_O \rvert = \le 4$ mA	$V_{CC} = 4.5$ V		---	0.4	
		$\lvert I_O \rvert = \le 5.2$ mA	$V_{CC} = 6.0$ V		---	0.4	
High-level input voltage 2/	V_{IH}		$V_{CC} = 2.0$ V	1, 2, 3	1.5	---	V
			$V_{CC} = 4.5$ V		3.15	---	
			$V_{CC} = 6.0$ V		4.2	---	
Low-level input voltage 2/	V_{IL}		$V_{CC} = 2.0$ V	1, 2, 3	---	0.3	V
			$V_{CC} = 4.5$ V		---	0.9	
			$V_{CC} = 6.0$ V		---	1.2	
Input capacitance	C_{IN}	$V_{IN} = 0$ V See 4.3.1c	$T_C = 25°C$	4	---	10	pF
Quiescent current	I_{CC}	$V_{CC} = 6.0$ V, $V_{IN} = V_{CC}$ or GND		1, 2, 3	---	160	µA
Input leakage current	I_{IN}	$V_{CC} = 6.0$ V, $V_{IN} = V_{CC}$ or GND		1, 2, 3	---	±1	µA
Functional tests		See 4.3.1(d)		7	---	---	

See footnotes at end of table.

TABLE I. Electrical peformance characteristics - Continued.

Test	Symbol	Conditions $-55°C \le T_C \le +125°C$ 1/		Group A Subgroups	Limits Min	Limits Max	Unit
Propagation delay Data to Q or $\overline{Q}$ 3/	t_{PHL1}, t_{PLH1}	T_C = 25°C, C_L = 50 pF ±10%	V_{CC} = 2.0 V	9	---	185	ns
			V_{CC} = 4.5 V		---	37	
			V_{CC} = 6.0 V		---	31	
		T_C = -55°C 125°C, C_L = 50 pF ±10%	V_{CC} = 2.0 V	10, 11	---	280	ns
			V_{CC} = 4.5 V		---	56	
			V_{CC} = 6.0 V		---	48	
Propagation delay Address to Q or $\overline{Q}$ 3/	t_{PHL2}, t_{PLH2}	T_C = 25°C, C_L = 50 pF ±10%	V_{CC} = 2.0 V	9	---	215	ns
			V_{CC} = 4.5 V		---	43	
			V_{CC} = 6.0 V		---	37	
		T_C = -55°C 125°C, C_L = 50 pF ±10%	V_{CC} = 2.0 V	10, 11	---	325	ns
			V_{CC} = 4.5 V		---	65	
			V_{CC} = 6.0 V		---	55	
Propagation delay $\overline{G}$ to Q or $\overline{Q}$ 3/	t_{PHL3}, t_{PLH3}	T_C = 25°C, C_L = 50 pF ±10%	V_{CC} = 2.0 V	9	---	200	ns
			V_{CC} = 4.5 V		---	40	
			V_{CC} = 6.0 V		---	34	
		T_C = -55°C 125°C, C_L = 50 pF ±10%	V_{CC} = 2.0 V	10, 11	---	300	ns
			V_{CC} = 4.5 V		---	60	
			V_{CC} = 6.0 V		---	51	

See footnotes at end of table.

TABLE I. Electrical peformance characteristics - Continued.

Test	Symbol	Conditions $-55°C \le T_C \le +125°C$ unless otherwise specified 1/		Group A Subgroups	Limits Min	Limits Max	Unit
Propagation delay $\overline{CLR}$ to Q or $\overline{Q}$ 3/	t_{PHL4}	T_C = 25°C, C_L = 50 pF ±10%	V_{CC} = 2.0 V	9	---	155	ns
			V_{CC} = 4.5 V		---	31	
			V_{CC} = 6.0 V		---	26	
		T_C = -55°C 125°C, C_L = 50 pF ±10%	V_{CC} = 2.0 V	10, 11	---	235	ns
			V_{CC} = 4.5 V		---	47	
			V_{CC} = 6.0 V		---	40	
Transition time high to low, low to high 4/	t_{THL}, t_{TLH}	T_C = 25°C, C_L = 50 pF ±10%	V_{CC} = 2.0 V	9	---	75	ns
			V_{CC} = 4.5 V		---	15	
			V_{CC} = 6.0 V		---	13	
		T_C = -55°C 125°C, C_L = 50 pF ±10%	V_{CC} = 2.0 V	10, 11	---	110	ns
			V_{CC} = 4.5 V		---	22	
			V_{CC} = 6.0 V		---	19	

1/ For a power supply of 5 V ±10%, the worst case output voltages (V_{OH} and V_{OL}) occur for HC at 4.5 V. Thus, the 4.5 V values should be used when designing with this supply. Worst case V_{IH} and V_{IL} occur at V_{CC} = 5.5 V and 4.5 V, respectively. (The V_{IH} value at 5.5 V is 3.85 V.) The worst case leakage currents (I_{IN}, I_{CC} and I_{OZ}) occur for CMOS at the higher voltage and so the 6.0 V values should be used. Power dissipation capacitance (C_{PD}), typically 80 pF, determines the no load dynamic power consumption, $P_D = C_{PD} V_{CC} 2f + I_{CC} V_{CC}$, and the no load dynamic current consumption, $I_S = C_{PD} V_{CC} f + I_{CC}$.

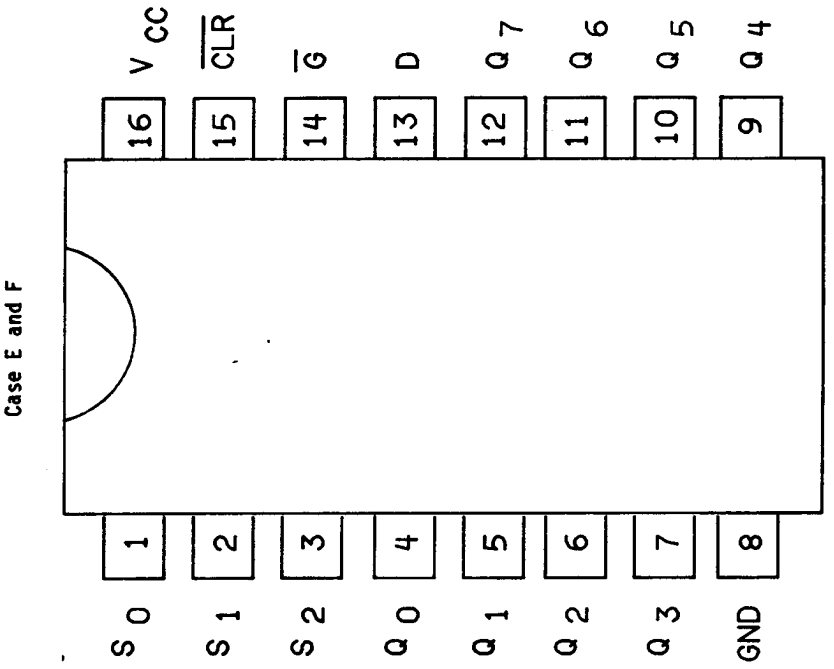
2/ V_{IH} and V_{IL} tests not required if applied as a forcing function for V_{OH} and V_{OL}.

3/ AC testing at V_{CC} = 2.0 V and V_{CC} = 6.0 V shall be guaranteed, if not tested, to the specified parameters.

4/ Transition times if not tested shall be guaranteed to the specified parameters.

Device type 01

Case E and F



Case 2

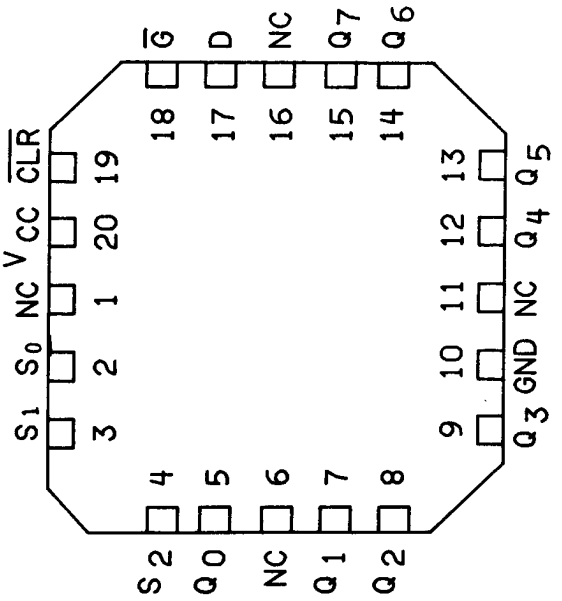


FIGURE 1. Terminal connections (top view).

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Device type 01

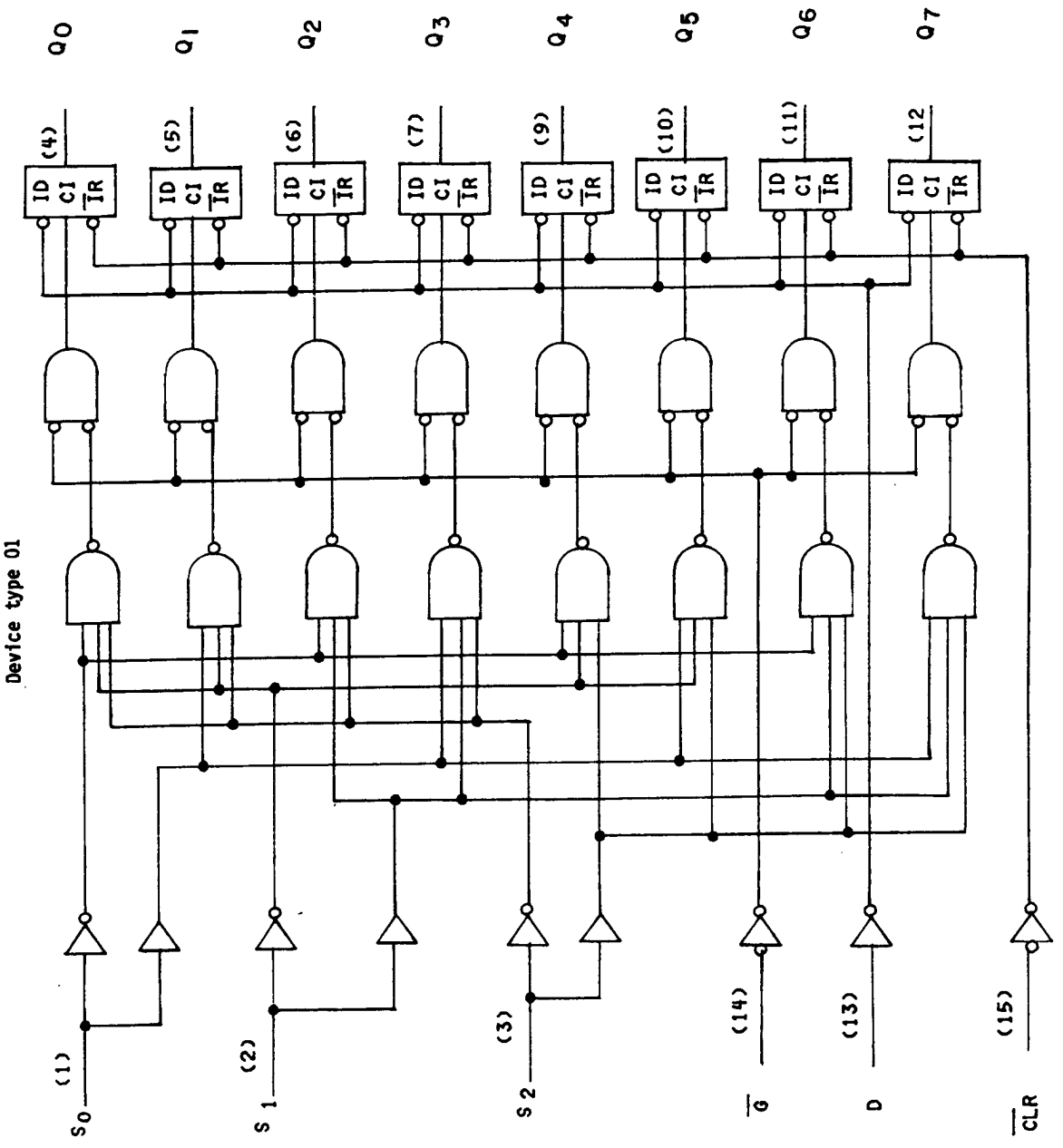
FUNCTION TABLE

INPUTS		OUTPUT OF ADDRESSED LATCH	EACH OTHER OUTPUT	FUNCTION
$\overline{CLR}$	$\overline{G}$			
H	L	D	Q_{io}	Addressable Latch
H	H	Q_{io}	Q_{io}	Memory
L	L	D	L	B-Line Demultiplexer
L	H	L	L	Clear

LATCH SELECTION TABLE

SELECT INPUTS			LATCH ADDRESSED
S2	S1	S0	
L	L	L	0
L	L	H	1
L	H	L	2
L	H	H	3
H	L	L	4
H	L	H	5
H	H	L	6
H	H	H	7

FIGURE 2. Truth tables.



Device type 01

FIGURE 3. Logic diagram.

MILITARY DRAWING DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO	SIZE A	CODE IDENT. NO. 14933	DWG NO. 85519
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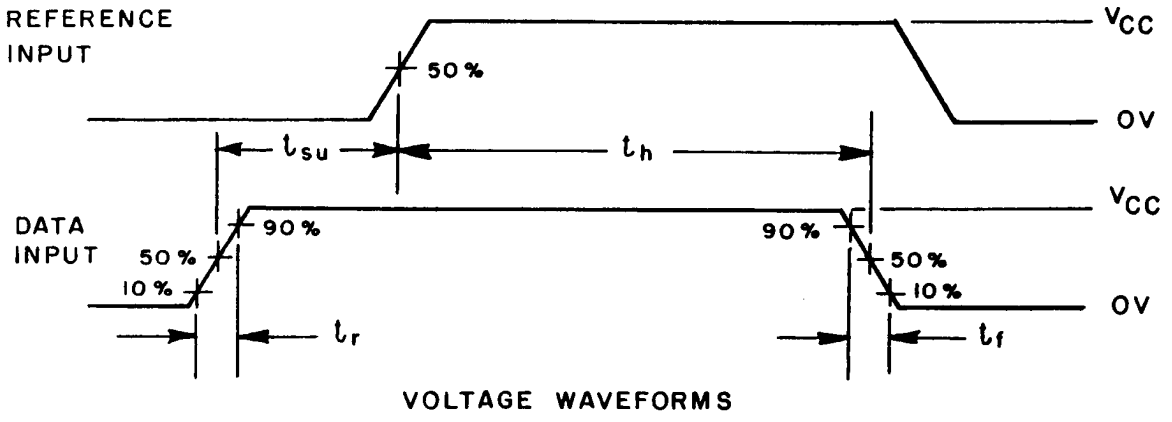
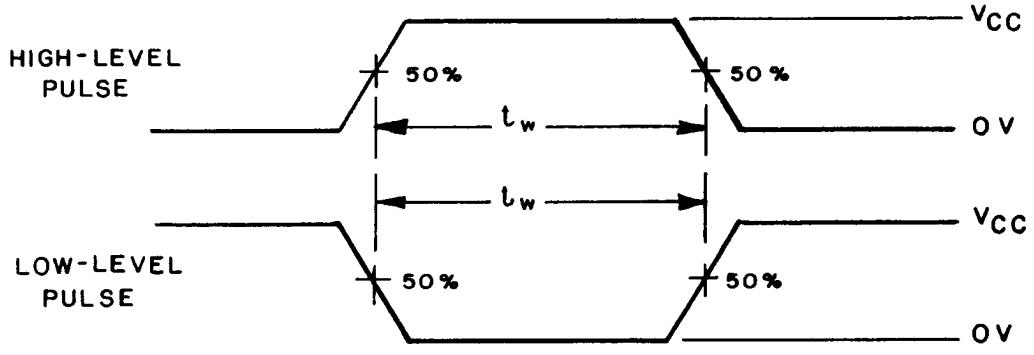


VOLTAGE WAVEFORMS

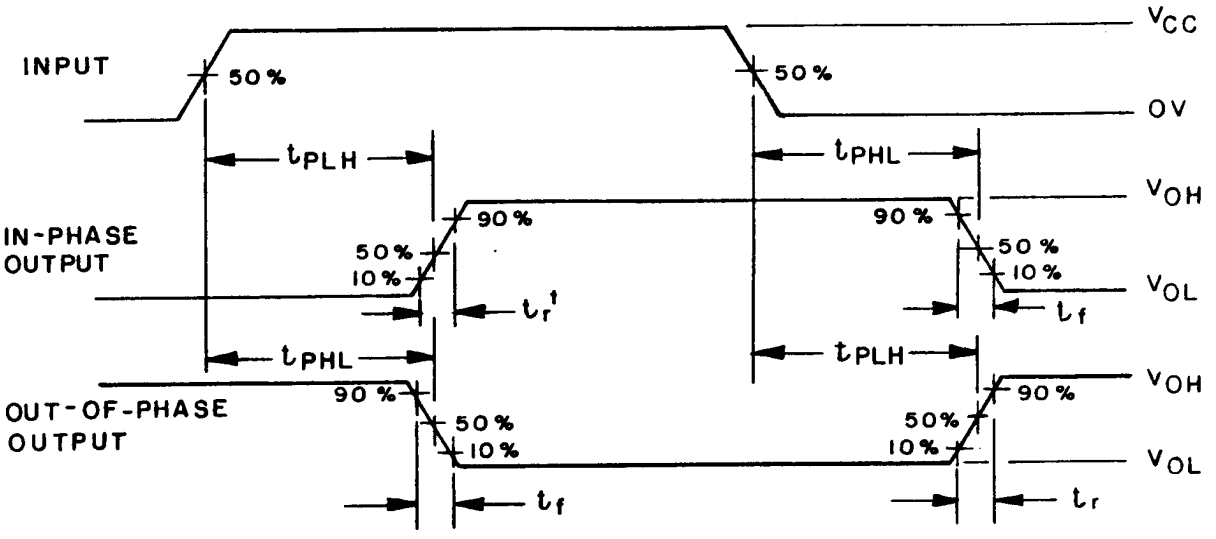
Setup and hold times, input rise and fall times (see note).



VOLTAGE WAVEFORMS

Pulse durations (see note).

FIGURE 4. Switching time waveforms.



VOLTAGE WAVEFORMS

Propagation delay times and output transition times (see note).

NOTE: Phase relationships between waveforms were chosen arbitrarily. All input pulses supplied by generators having the following characteristics: PRR $\leq$ 1 MHz, Zout = 50 ohms, t_r = 6 ns, t_f = 6 ns.

FIGURE 4. Switching time waveforms - Continued.

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 5, 6, and 8 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.

d. Subgroup 7 shall be tested sufficiently to verify 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 (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)	---
Final electrical test parameters (method 5004)	1*, 2, 9
Group A test requirements (method 5005)	1, 2, 3, 4, 7 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. 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 M38510/65402B--.

6.3 Comments. Comments on this drawing should be directed to DESC-ECS, Dayton, Ohio 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
8551901EX	27014 18714 01295 04713	MM54HC259J/883B CD54HC259F/3A SNJ54HC259J 54HC259/BEAJC	M38510/65402BEX
8551901FX	01295	SNJ54HC259W	M38510/65402BFX
85519012X	01295 04713	SNJ54HC259FK 54HC259M/B2CJC	M38510/65402B2X

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, Inc. 7402 S. Price Road Tempe, AZ 85283
27014	National Semiconductor P.O. Box 58090 Santa Clara, CA 95052-8090
18714	RCA Corporation Solid State Division Route 202 Somerville, NJ 08876
01295	Texas Instruments, Inc. P.O. Box 6448 Midland, TX 79701