

REVISIONS

LTR	DESCRIPTION	DATE (YR-MO-DA)	APPROVED

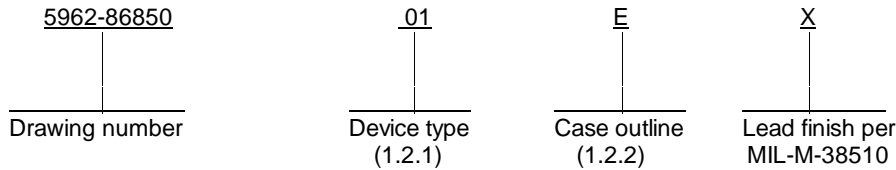
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<p><b>Defense Electronics Supply Center Dayton, Ohio</b></p> <p><b>Original date of drawing:</b> 26 June 1987</p> <p><b>AMSC N/A</b></p>	<p><b>PREPARED BY</b> Joe A. Kerby</p>	<p align="center"><b>MILITARY DRAWING</b></p> <p align="center">This drawing is available for use by all Departments and Agencies of the Department of Defense</p>	
	<p><b>CHECKED BY</b> D A Di Cenzo</p>		<p><b>TITLE:</b> MICROCIRCUITS, DIGITAL, ADVANCED SCHOTTKY TTL, 4-BIT BIDIRECTIONAL UNIVERSAL SHIFT REGISTER, MONOLITHIC SILICON</p>
	<p><b>APPROVED BY</b> N A Hauck</p>	<p><b>DWG NO.</b> <b>5962-86850</b></p>	
	<p><b>SIZE</b> <b>A</b></p>	<p><b>CODE IDENT. NO.</b> <b>14933</b></p>	<p><b>PAGE 1 OF 12</b></p>
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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:

<u>Device type</u>	<u>Generic number</u>	<u>Circuit function</u>
01	54F194	4-bit bidirectional universal shift register, cascadable

1.2.2 Case outlines. The case outlines 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	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.

Supply voltage range .....	-0.5 V dc to +7.0 V dc
Input voltage range .....	-1.5 V dc at -18 mA to +7.0 V dc
Storage temperature .....	-65° C to +150° C
Maximum power dissipation (P <sub>D</sub> ) per device <u>1/</u> .....	253 mW
Lead temperature (soldering, 10 seconds) .....	+300° C
Thermal resistance, junction-to-case (θ <sub>JC</sub> ):	
Case E and F .....	(See MIL-M-38510, appendix C)
Case 2 .....	80° C/W <u>2/</u>
Junction temperature (T <sub>J</sub> ) <u>3/</u> .....	+175° C

1/ Must withstand the added P<sub>D</sub> due to short-circuit test (e.g., I<sub>OS</sub>).

2/ When a thermal resistance for this case is specified in MIL-M-38510, appendix C, that value shall supersede the value specified herein.

3/ Maximum junction temperature shall not be exceeded except for allowable short duration burn-in screening condition in accordance with method 5004 of MIL-STD-883.

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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
Width of clock pulse low $t_{PW}(CPL)$	6.0 ns minimum
Width of clock pulse high $t_{PW}(CPH)$	6.0 ns minimum
Width of master reset pulse low $t_{PW}(MRL)$	5.0 ns minimum
Setup time, data high to clock pulse $t_{SD}(H)$	6.0 ns minimum
Setup time, data low to clock pulse $t_{SD}(L)$	4.0 ns minimum
Hold time, data high to clock pulse $t_{HD}(H)$	2.0 ns minimum
Hold time, data low to clock pulse $t_{HD}(L)$	1.0 ns minimum
Setup time, select high to clock pulse $t_{SS}(H)$	10.5 ns minimum
Setup time, select low to clock pulse $t_{SS}(L)$	8.0 ns minimum
Hold time, select high to clock pulse $t_{HS}(H)$	0.0 ns minimum
Hold time, select low to clock pulse $t_{HS}(L)$	0.0 ns minimum
Recovery time, master reset to clock pulse $t_{rec}(MR/CP)$	9.0 ns minimum
Input clock frequency $f_{(CLOCK)}$	0 to 80 MHz
Case operating temperature range ( $T_C$ )	-55° C to +125° C

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 table. The truth table shall be as specified on figure 2.

3.2.3 Logic diagram. The logic diagram shall be as specified on figure 3.

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TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions $-55^{\circ}\text{C} \leq T_C \leq +125^{\circ}\text{C}$	Group A subgroups	Limits		Unit
				Min	Max	
High level output voltage	$V_{OH}$	$V_{CC} = 4.5\text{ V}; I_{OH} = -1\text{ mA};$ $V_{IL} = 0.8\text{ V}; V_{IH} = 2.0\text{ V}$	1, 2, 3	2.5		V
Low level output voltage	$V_{OL}$	$V_{CC} = 4.5\text{ V}; I_{OH} = 20\text{ mA};$ $V_{IL} = 0.8\text{ V}; V_{IH} = 2.0\text{ V}$	1, 2, 3		0.5	V
Input clamp voltage	$V_{IC}$	$V_{CC} = 4.5\text{ V}; I_{IN} = -18\text{ mA};$ $T_C = +25^{\circ}\text{C}$	1, 2, 3		-1.2	V
High level input current	$I_{IH1}$	$V_{CC} = 5.5\text{ V}; V_{IH} = 2.7\text{ V}$	1, 2, 3		20	$\mu\text{A}$
	$I_{IH2}$	$V_{CC} = 5.5\text{ V}; V_{IH} = 7.0\text{ V}$	1, 2, 3		100	$\mu\text{A}$
Low level input current	$I_{IL1}$	$V_{CC} = 5.5\text{ V}; V_{IL} = 0.5\text{ V}$	1, 2, 3		-0.60	mA
Short-circuit output current	$I_{OS}$	$V_{CC} = 5.5\text{ V}; V_{OS} = 0.0\text{ V}$ <sup>1/</sup>	1, 2, 3	-60	-150	mA
Supply current	$I_{CC}$	$V_{CC} = 5.5\text{ V}$	1, 2, 3		46	mA
Propagation delay time, low to high level, CP to Q	$t_{PLH1}$	$V_{CC} = 5.0\text{ V}$ $C_L = 50\text{ pF} \pm 10\%$ See figure 4	9, 10, 11		8.5	ns
Propagation delay time, high to low level, CP to Q	$t_{PHL1}$		9, 10, 11		8.5	ns
Propagation delay time, high to low level, MR to Q	$t_{PHL2}$		9, 10, 11		14.5	ns
Maximum frequency	$f_{MAX}$		9, 10, 11	80		MHz

<sup>1/</sup> Not more than one output shorted at one time, and the duration of the short-circuit condition should not exceed one second.

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3.2.4 Switching time waveforms. The switching time waveforms shall be as specified on figure 4.

3.2.5 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)  $T_A = +125^\circ\text{C}$ , 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.

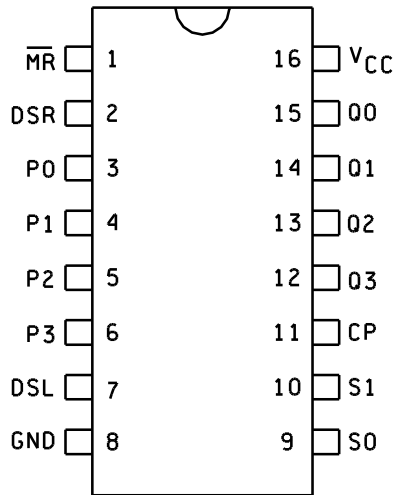
a. Tests shall be as specified in table II herein.

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

c. Subgroup 7 tests shall verify the truth table.

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CASES E AND F



CASES 2

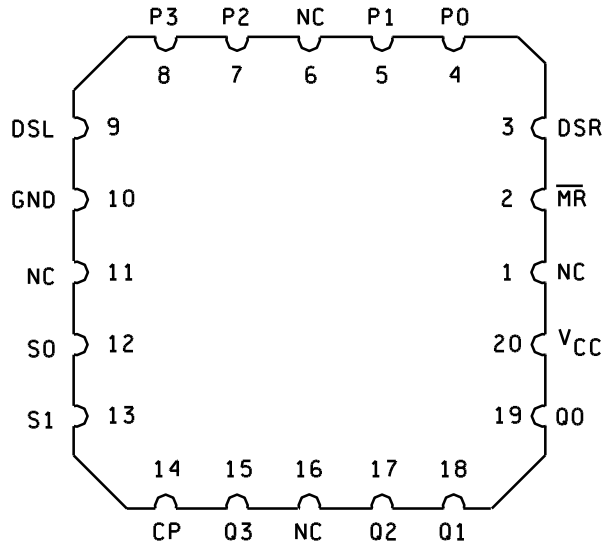


FIGURE 1. Terminal connections.

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Operating mode	Inputs						Outputs			
	$\overline{\text{MR}}$	S1	S0	DSR	DSL	Pn	Q0	Q1	Q2	Q3
Reset	L	X	X	X	X	X	L	L	L	L
Hold	H	l	l	X	X	X	q0	q1	q2	q3
Shift left	H	h	l	X	l	X	q1	q2	q3	L
	H	h	l	X	h	X	q1	q2	q3	H
Shift right	H	l	h	l	X	X	L	q0	q1	q2
	H	l	h	h	X	X	H	q0	q1	q2
Parallel load	H	h	h	X	X	Pn	P0	P1	P2	P3

l = Low voltage level one setup time prior to the low-to-high clock transition.

h = High voltage level one setup time prior to the low-to-high clock transition.

pn (qn) = Lower case letters indicate the state of the referenced input (or output) one setup time prior to the low-to-high clock transition.

H = High voltage level

L = Low voltage level

X = Immaterial

FIGURE 2. Truth table.

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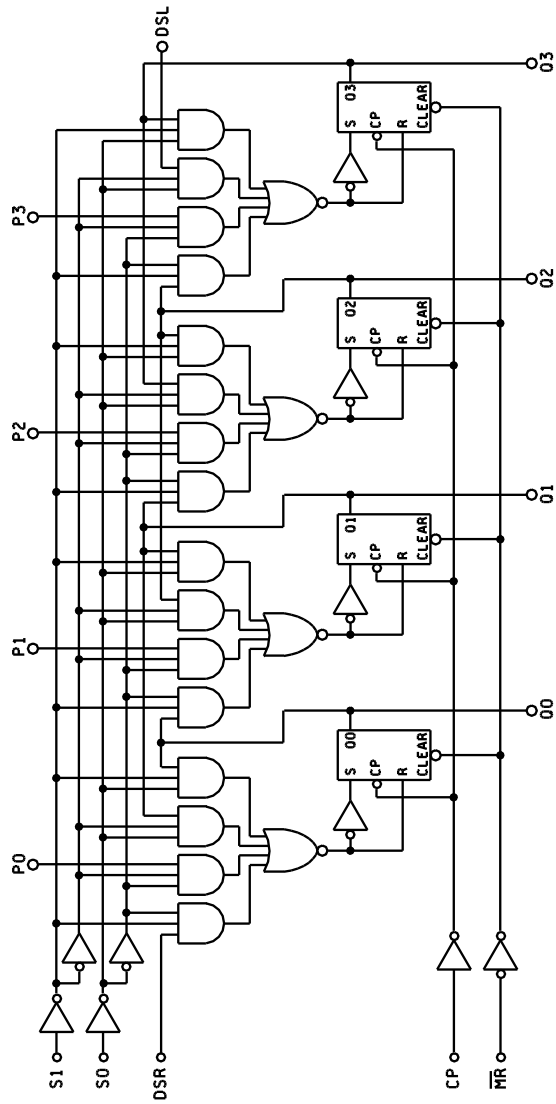


FIGURE 3. Logic diagram.

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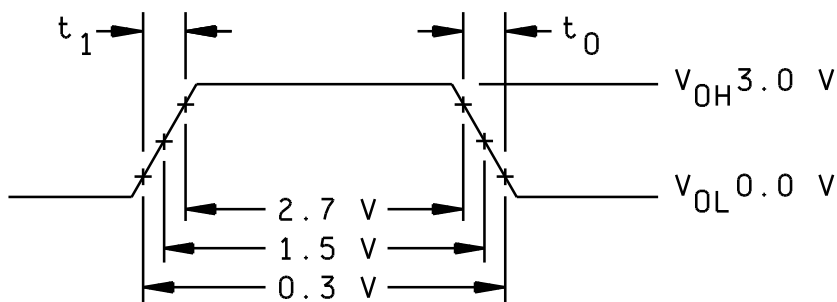
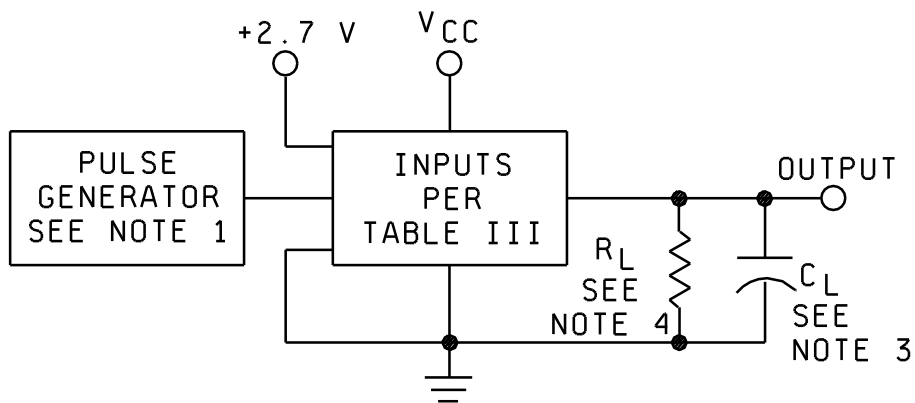
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NOTES:

1. Pulse generator has the following characteristics:  
 $t_1 = t_0 \leq 2.5 \text{ ns}$ ,  $\text{PRR} \leq 1 \text{ MHz}$ ,  $Z_{\text{OUT}} \approx 50 \Omega$ .
2. Inputs not under test are at ground.
3.  $C_L = 50 \text{ pF} \pm 10 \text{ percent}$ , including scope probe, wiring and stray capacitance without package in test fixture.
4.  $R_L = 499 \Omega \pm 5 \text{ percent}$ .
5. Voltage measurements are to be made with respect to network ground terminal.

FIGURE 4. Switching time waveforms.

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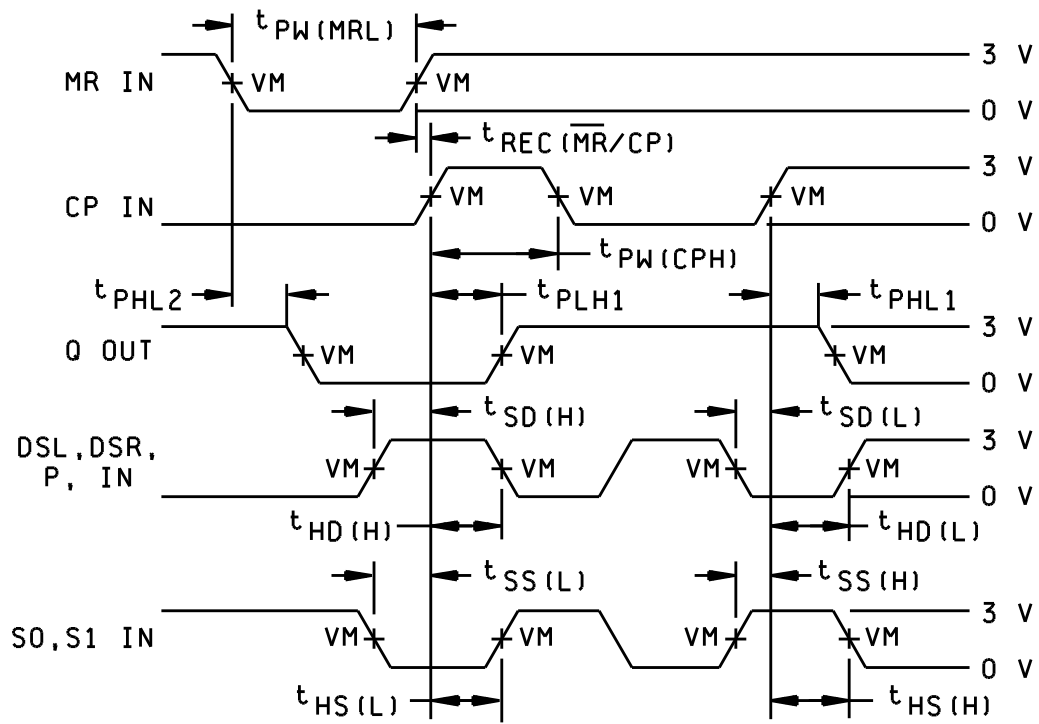


FIGURE 4. Switching time waveforms - Continued.

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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)  $T_A = +125^\circ\text{C}$ , 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, 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.

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 M38510/33601B--.

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

6.4 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 3.5 herein) has been submitted to DESC-ECS.

Military drawing part number	Vendor CAGE number	Vendor similar part number <sup>1/</sup>	Replacement military specification part number
5962-8685001EX	07263 18324	54F194DMQB 54F194BEA	M38510/33601BEX
5962-8685001FX	07263 18324	54F194FMQB 54F194BFA	M38510/33601BFX
5962-86850012X	07263 18324	54F194LMQB 54F194/B2X	M38510/33601B2X

<sup>1/</sup> 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

07263

18324

Vendor name  
and address

Fairchild Semiconductor  
333 Western Avenue  
South Portland, ME 04106

Signetics Corporation  
4130 South Market Court  
Sacramento, CA 95834

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[74HCT165D.652](#) [74HCT164D.652](#)