Rochester Electronics

Datasheet

PART NUMBER

54F191^QFA

Rochester Electronics Manufactured Components

Rochester branded components are manufactured using either die/wafers purchased from the original suppliers or Rochester wafers recreated from the original IP. All re-creations are done with the approval of the Original Component Manufacturer. (OCM)

Parts are tested using original factory test programs or Rochester developed test solutions to guarantee product meets or exceeds the OCM data sheet.

Quality Overview

- ISO-9001
- AS9120 certification
- Qualified Manufacturers List (QML) MIL-PRF-38535
    - Class Q Military
    - Class V Space Level

Qualified Suppliers List of Distributors (QSLD)

- Rochester is a critical supplier to DLA and meets all industry and DLA standards.

Rochester Electronics, LLC is committed to supplying products that satisfy customer expectations for quality and are equal to those originally supplied by industry manufacturers.

The original manufacturer's datasheet accompanying this document reflects the performance and specifications of the Rochester manufactured version of this device. Rochester Electronics guarantees the performance of its semiconductor products to the original OCM specifications. 'Typical' values are for reference purposes only. Certain minimum or maximum ratings may be based on product characterization, design, simulation, or sample testing.

REVISIONS			
LTR	DESCRIPTION	DATE (YR-MO-DA)	APPROVED

REV																			
SHEET																			
REV																			
SHEET																			

REV STATUS OF SHEETS	REV														
	SHEET	1	2	3	4	5	6	7	8	9	10	11	12	13	14

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
92-12-15

REVISION LEVEL

DEFENSE ELECTRONICS SUPPLY CENTER
DAYTON, OHIO 45444

MICROCIRCUIT, DIGITAL, BIPOLAR, ADVANCED SCHOTTKY TTL, UP/DOWN BINARY COUNTER WITH PRESET AND RIPPLE CLOCK, MONOLITHIC SILICON

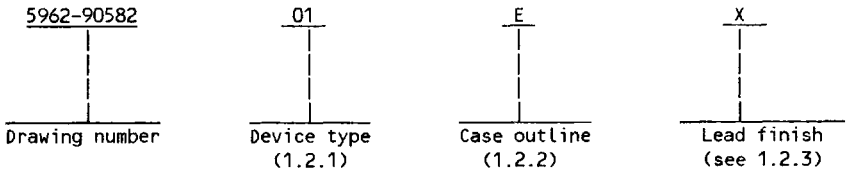
SIZE	CAGE CODE	5962-90582
A	67268	

SHEET 1 OF 14

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 or Identifying Number (PIN). The complete PIN shall be as shown in the following example:



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

Device type	Generic number	Circuit function
01	54F191	Up/down binary counter with preset and ripple clock

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

Outline letter	Descriptive designator	Terminals	Package style
E	GDIP1-T16	16	dual-in-line package
F	GDFP2-F16	16	flat package
2	CQCC1-N20	20	square chip carrier package

1.2.3 Lead finish. The lead finish shall be as specified in MIL-M-38510. Finish letter "X" shall not be marked on the microcircuit or its packaging. The "X" designation is for use in specifications when lead finishes A, B, and C are considered acceptable and interchangeable without preference.

1.3 Absolute maximum ratings.

Supply voltage range	-0.5 V dc to +7.0 V dc
D€ input voltage range	-0.5 V dc to +7.0 V dc
Input current range	-30 mA to +5.0 mA
Voltage applied to output in high state (with V_{CC} = 0 V)	-0.5 V dc to V_{CC}
Storage temperature range	-65°C to +150°C
Ambient temperature range under bias	-55°C to +125°C
Maximum power dissipation (P_D) 1/	500 mW
Lead temperature (soldering, 10 seconds)	+300°C
Thermal resistance, junction-to-case (θ_{JC})	See MIL-STD-1835
Junction temperature (T_J)	+175°C

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

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
Minimum setup time, high or low, P_n to PL ($t_s(H)$, $t_s(L)$)	6.0 ns
Minimum hold time, high or low, P_n to PL ($t_h(H)$, $t_h(L)$)	2.0 ns
Minimum setup time, low, CE to CP ($t_s(L)$)	10.5 ns
Minimum hold time, low, CE to CP ($t_h(L)$)	0 ns
Minimum setup time, high or low, U/D to CP ($t_s(H)$, $t_s(L)$)	12.0 ns
Minimum hold time, high or low, U/D to CP ($t_h(H)$, $t_h(L)$)	0 ns
Minimum PL pulse width, low ($t_w(L)$)	8.5 ns
Minimum CP pulse width, low ($t_w(L)$)	7.0 ns
Minimum recovery time PL to CP (t_{rec})	7.5 ns
Case operating temperature range (T_C)	-55°C to +125°C

2. APPLICABLE DOCUMENTS

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

STANDARDS

MILITARY

MIL-STD-883 - Test Methods and Procedures for Microelectronics.
MIL-STD-1835 - Microcircuit Case Outlines.

BULLETIN

MILITARY

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

(Copies of the specification, standards, 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 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 and mode select tables. The truth and mode select tables shall be as specified on figure 2.

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

3.2.5 Test circuit and switching waveforms. The test circuit and switching waveforms shall be as specified on figure 4.

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.

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 PIN listed in 1.2 herein. In addition, the manufacturer's PIN 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-EC 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-EC 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. 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.

TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions $-55°C \le T_C \le +125°C$ unless otherwise specified		Group A subgroups	Limits		Unit
					Min	Max	
High level output voltage	V_{OH}	V_{CC} = 4.5 V, I_{OH} = -1 mA 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		1,2,3		0.5	V
Input clamp diode voltage	V_{CD}	V_{CC} = 4.5 V, I_{IN} = -18 mA		1,2,3		-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 (except $\overline{CE}$)	1,2,3		-0.6	mA
			V_{IN} = 0.5 V($\overline{CE}$)	1,2,3		-1.8	mA
Short-circuit output current	I_{OS}	V_{CC} = 5.5 V, V_{OUT} = 0 V 1/		1,2,3	-60	-150	mA
High level output leakage current	I_{CEX}	V_{CC} = 5.5 V, V_{OUT} = 5.5 V		1,2,3		250	µA
Supply current	I_{CC}	V_{CC} = 5.5 V		1,2,3		55	mA
Functional tests		See 4.3.1c 2/ V_{CC} = 4.5 V, 5.5 V		7,8			
Maximum count frequency	f_{MAX}	R_L = 500Ω C_L = 50 pF See figure 4		9 10, 11	100 75		MHz
Propagation delay time, CP to Qn	t_{PLH1}		V_{CC} = 5.0 V	9	3.0	7.5	ns
			V_{CC} = 4.5 V, 5.5 V	10, 11	3.0	9.5	
	t_{PHL1}		V_{CC} = 5.0 V	9	5.0	11.0	
			V_{CC} = 4.5 V, 5.5 V	10, 11	5.0	13.5	

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	Limits		Unit
					Min	Max	
Propagation delay time, CP to TC	t_{PLH2}	$R_L = 500\Omega$ $C_L = 50$ pF See figure 4	V_{CC} = 5.0 V	9	6.0	13.0	ns
			V_{CC} = 4.5 V, 5.5 V	10, 11	6.0	16.5	
	t_{PHL2}		V_{CC} = 5.0 V	9	5.0	11.0	
			V_{CC} = 4.5 V, 5.5 V	10, 11	5.0	13.5	
Propagation delay time, CP to $\overline{RC}$	t_{PLH3}		V_{CC} = 5.0 V	9	3.0	7.5	ns
			V_{CC} = 4.5 V, 5.5 V	10, 11	3.0	9.5	
	t_{PHL3}		V_{CC} = 5.0 V	9	3.0	7.0	
			V_{CC} = 4.5 V, 5.5 V	10, 11	3.0	9.0	
Propagation delay time, CE to $\overline{RC}$	t_{PLH4}		V_{CC} = 5.0 V	9	3.0	7.0	ns
			V_{CC} = 4.5 V, 5.5 V	10, 11	3.0	9.0	
	t_{PHL4}		V_{CC} = 5.0 V	9	3.0	7.0	
			V_{CC} = 4.5 V, 5.5 V	10, 11	3.0	9.0	
Propagation delay time $\overline{U/D}$ to $\overline{RC}$	t_{PLH5}		V_{CC} = 5.0 V	9	7.0	18	ns
			V_{CC} = 4.5 V, 5.5 V	10, 11	7.0	22	
	t_{PHL5}		V_{CC} = 5.0 V	9	5.5	12.0	
			V_{CC} = 4.5 V, 5.5 V	10, 11	5.5	14.0	

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	Limits		Unit
					Min	Max	
Propagation delay time, U/D to TC	t_{PLH6}	$R_L = 500\Omega$ $C_L = 50$ pF See figure 4	$V_{CC} = 5.0$ V	9	4.0	10.0	ns
			$V_{CC} = 4.5$ V, 5.5 V	10, 11	4.0	13.5	
	t_{PHL6}		$V_{CC} = 5.0$ V	9	4.0	10.0	
			$V_{CC} = 4.5$ V, 5.5 V	10, 11	4.0	12.5	
Propagation delay time, Pn to Qn	t_{PLH7}		$V_{CC} = 5.0$ V	9	3.0	7.0	ns
			$V_{CC} = 4.5$ V, 5.5 V	10, 11	3.0	9.0	
	t_{PHL7}		$V_{CC} = 5.0$ V	9	6.0	13.0	
			$V_{CC} = 4.5$ V, 5.5 V	10, 11	6.0	16.0	
Propagation delay time, PL to Qn	t_{PLH8}		$V_{CC} = 5.0$ V	9	5.0	11.0	ns
			$V_{CC} = 4.5$ V, 5.5 V	10, 11	5.0	13.0	
	t_{PHL8}		$V_{CC} = 5.0$ V	9	5.5	12.0	
			$V_{CC} = 4.5$ V, 5.5 V	10, 11	5.5	14.5	

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/ Functional tests shall be conducted at input test conditions of $GND \le V_{IL} \le V_{OL}$ and $V_{OH} \le V_{IH} \le V_{CC}$.

Device type	01	
Case outlines	E and F	2
Terminal number	Terminal symbols	
1	P_1	NC
2	Q_1	P_1
3	Q_0	Q_1
4	$\overline{CE}$	Q_0
5	$\overline{U}/D$	$\overline{CE}$
6	Q_2	NC
7	Q_3	$\overline{U}/D$
8	GND	Q_2
9	P_3	Q_3
10	P_2	GND
11	$\overline{PL}$	NC
12	TC	P_3
13	$\overline{RC}$	P_2
14	CP	$\overline{PL}$
15	P_0	TC
16	V_{CC}	NC
17	---	$\overline{RC}$
18	---	CP
19	---	P_0
20	---	V_{CC}

FIGURE 1. Terminal connections.

Mode select table.

Inputs				Mode
$\overline{PL}$	$\overline{CE}$	$\overline{U}/D$	CP	
H	L	L	⌐⌐	Count up
H	L	H	⌐⌐	Count down
L	X	X	X	Preset (Asynchronous)
H	H	X	X	No change (Hold)

$\overline{RC}$ Truth table

Inputs			Outputs
$\overline{CE}$	TC*	CP	$\overline{RC}$
L	H	⌐⌐	⌐⌐
H	X	X	H
X	L	X	H

H = High voltage level.
L = Low voltage level.
* TC is generated internally.
X = Irrelevant.
⌐⌐ = Transition from low-to-high level.
⌐⌐ = One low level pulse.

FIGURE 2. Truth and mode select tables.

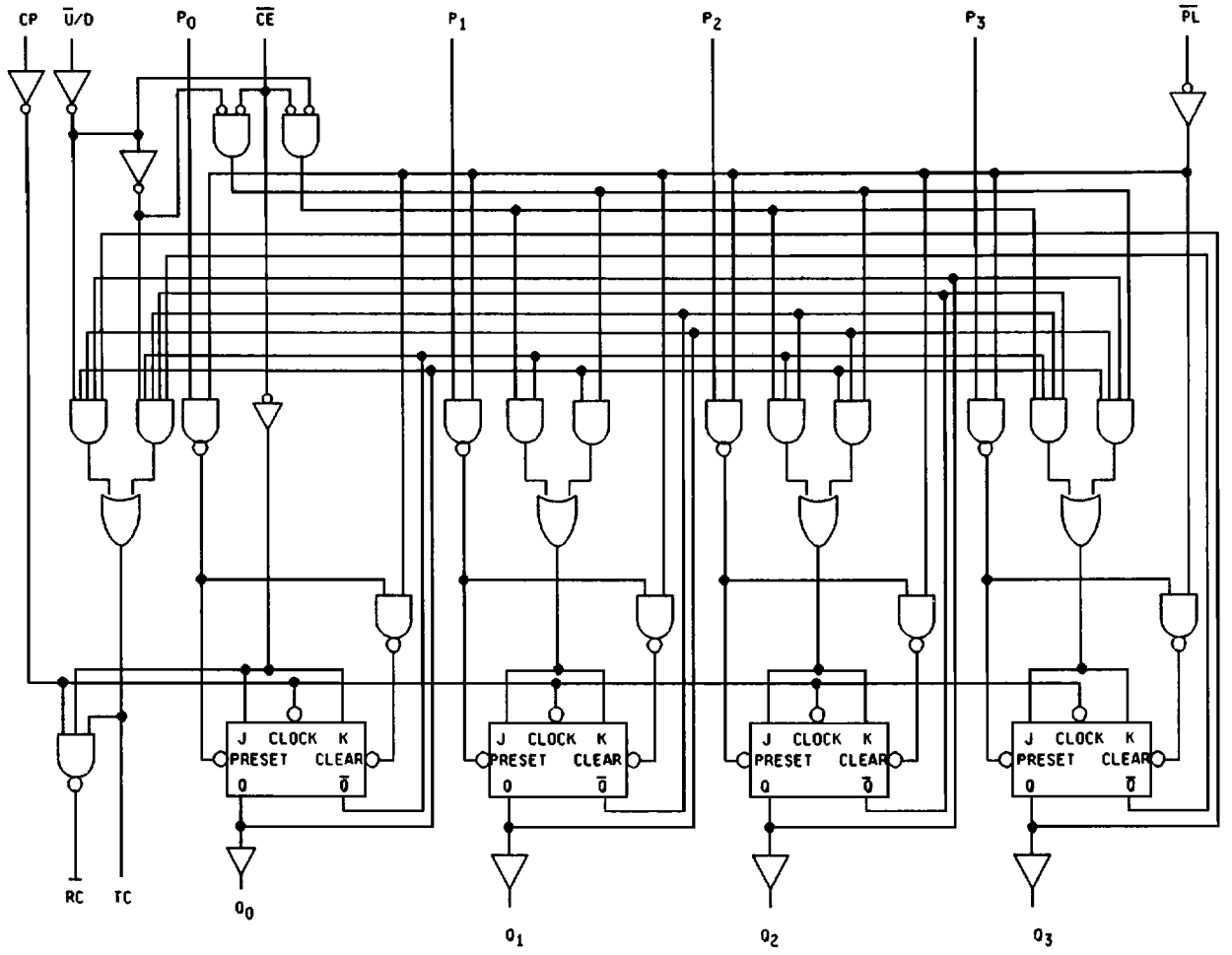
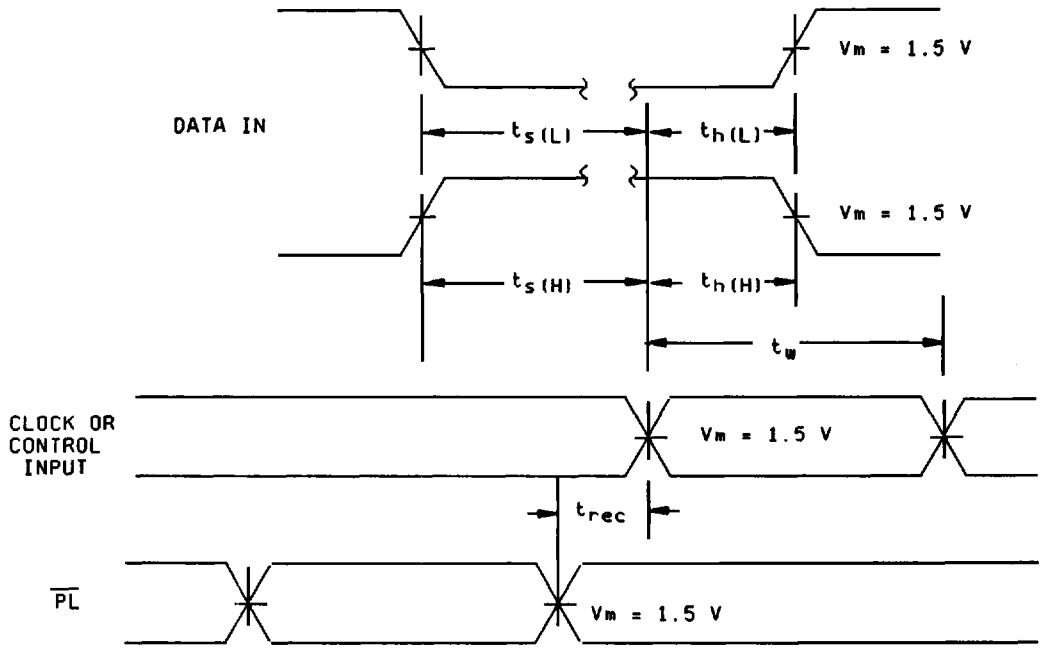


FIGURE 3. Logic diagram.

Setup time, hold time, and recovery time waveforms



Test load

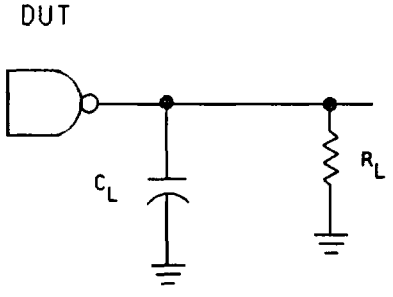
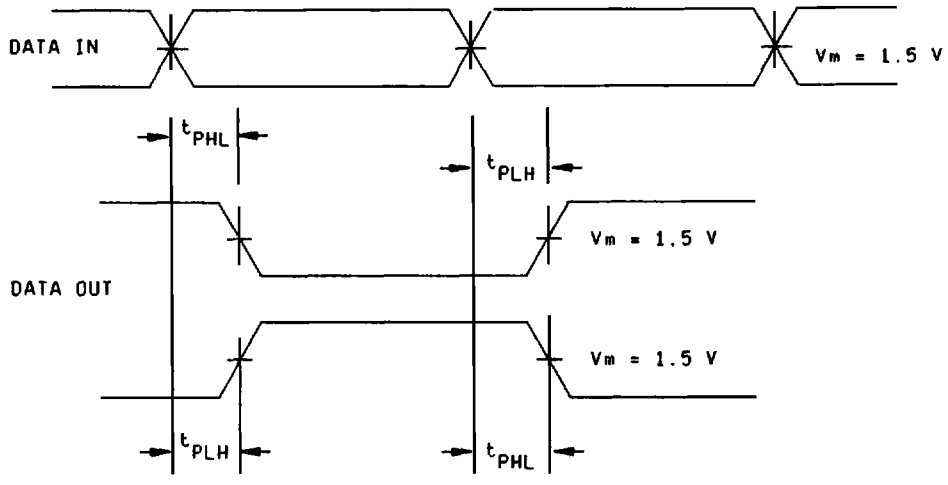


FIGURE 4. Test circuit and switching waveforms.

Propagation delay waveforms



NOTES:
1. C_L includes probe and jig capacitance.
2. All input pulses have the following characteristics: PRR = 1 MHz, $t_r = t_f = 2.5$ ns, duty cycle = 50 percent.

FIGURE 4. Test circuit and switching waveforms - Continued.

TABLE II. Electrical test requirements.

MIL-STD-883 test requirements	Subgroups (in accordance with 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 subgroups 1 and 7.

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 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 activity 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-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. 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-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-EC, telephone (513) 296-6047.

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

6.6 Approved sources of supply. Approved sources of supply are listed in MIL-BUL-103. 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-EC.

STANDARDIZED MILITARY DRAWING SOURCE APPROVAL BULLETIN

DATE: 92-12-15

Approved sources of supply for SMD 5962-90582 are listed below for immediate acquisition only and shall be added to MIL-BUL-103 during the next revision. MIL-BUL-103 will be revised to include the addition or deletion of sources. The vendors listed below have agreed to this drawing and a certificate of compliance has been submitted to and accepted by DESC-EC. This bulletin is superseded by the next dated revision of MIL-BUL-103.

Standardized military drawing PIN	Vendor CAGE number	Vendor similar PIN 1/
5962-9058201EX	27014	54F191DMQB
5962-9058201FX	27014	54F191FMQB
5962-90582012X	27014	54F191LMQB

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
27014	National Semiconductor Corporation 2900 Semiconductor Drive P. O. Box 58090 Santa Clara, CA 95052-8090 Point of contact: 333 Western Avenue South Portland, ME 04106