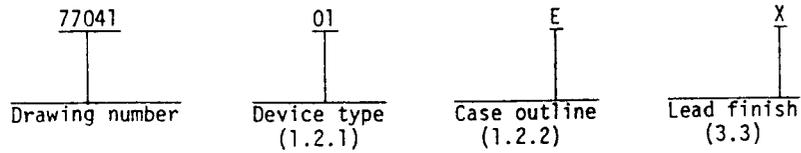




1. SCOPE

1.1 Scope. This drawing describes the requirements for monolithic silicon, low-power Schottky TTL, oscillator microcircuits. This drawing provides for a level of microcircuit quality and reliability assurance for procurement 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:

Device type	Generic number	Circuit
01	54LS124	Dual voltage-controlled oscillators

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

Outline letter	Case outline
E	D-2 (16-pin, 1/4" X 7/8" dual-in-line)
F	F-5 (16-pin, 1/4" X 3/8" flat pack)

1.3 Absolute maximum ratings.

Supply voltage range - - - - -	-0.5 to 7.0 Vdc
Input voltage range - - - - -	-1.5 Vdc at -18 mA to 5.5 Vdc
Storage temperature range - - - - -	-65°C to 150°C
Maximum power dissipation, $P_D$ <sup>1/</sup> - - - - -	190 mWdc
Lead temperature (soldering 10 seconds) - - - - -	300°C
Thermal resistance, junction to case - - - - -	$\theta_{JC}$ = 0.09°C/mW for flat pack 0.08°C/mW for dual-in-line
Junction temperature - - - - -	$T_J$ = 175°C

1.4 Recommended operating conditions.

Supply voltage - - - - -	4.5 Vdc minimum to 5.5 Vdc maximum
Minimum high level input voltage - - - - -	2.0 Vdc
Maximum low level input voltage - - - - -	0.7 Vdc
Ambient operating temperature range - - - - -	-55°C to 125°C

<sup>1/</sup> Must withstand the added  $P_D$  due to short circuit conditions (e.g.  $I_{OS}$ ) at one output for 5 seconds.

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2. APPLICABLE DOCUMENTS

2.1 The following documents, of the issue in effect on date of invitation for bids or request for proposal, 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 specifications, standards, drawings, and publications required by suppliers in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

3. REQUIREMENTS

3.1 Detail specifications. The individual item requirements shall be in accordance with MIL-M-38510, 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 Design documentation. The design documentation shall be in accordance with MIL-M-38510 and, unless otherwise specified in the contract or purchase order, shall be retained by the manufacturer but be available for review by the procuring activity or contractor upon request.

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

3.2.3 Case outline. The case outline shall be in accordance with 1.2.2.

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

3.4 Electrical performance characteristics. The electrical performance characteristics are as specified in table I and apply over the full recommended ambient operating temperature range, unless otherwise specified.

3.5 Marking. Marking shall be in accordance with MIL-M-38510 except the part number shall be in accordance with 1.2 herein. The M38510/XXX part number, and the "JAN" or "J" mark shall not be used.

3.6 Product 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 inspection requirements.

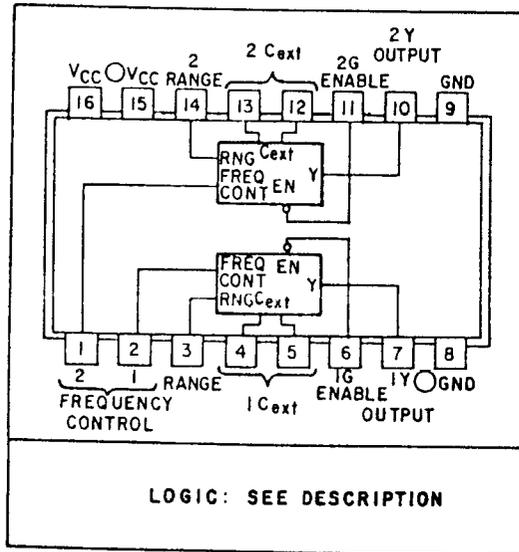
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TABLE I. Electrical characteristics.

Test	Symbol	Conditions	Device type	Limits		Units	
				Min	Max		
High-level output voltage <u>4/</u>	V <sub>OH</sub>	V <sub>CC</sub> = 4.5 V; V <sub>IN</sub> = 2.0 V I <sub>OH</sub> = -400 μA	01	2.5	---	Volts	
Low-level output voltage <u>4/</u>	V <sub>OL</sub>	V <sub>CC</sub> = 4.5 V; V <sub>IN</sub> = 0.7 V I <sub>OL</sub> = 4 mA	01	---	0.4	Volts	
Input clamp voltage <u>5/</u>	V <sub>IC</sub>	V <sub>CC</sub> = 4.5 V; I <sub>IN</sub> = -18 mA T <sub>A</sub> = 25°C	01	---	-1.5	Volts	
High-level input current <u>4/</u>	I <sub>IHI</sub>	V <sub>CC</sub> = 5.5 V; V <sub>IH</sub> = 2.7 V <u>2/</u>	01	---	20	μA	
Low-level input current <u>4/</u>	I <sub>IL</sub>	V <sub>CC</sub> = 5.5 V; V <sub>IL</sub> = 0.4 V <u>1/</u>	01	-.03	-.40	mA	
Short-circuit output current <u>4/</u>	I <sub>OS</sub>	V <sub>CC</sub> = 5.5 V <u>3/</u>	01	-40	-225	mA	
Current supply <u>4/</u>	I <sub>CC</sub>	V <sub>CC</sub> = 5.5 V	01	---	50	mA	
Functional tests <u>7/</u>		See 4.4.1(c)	01				
Maximum clock frequency <u>6/ 8/</u>	F <sub>MAX</sub>	V <sub>CC</sub> = 5.0 V R <sub>L</sub> = 280Ω ±5%	T <sub>A</sub> = 25°C C <sub>L</sub> = 15 pF ±10%	01	25	---	MHz
			T <sub>A</sub> = -55°C, 125°C C <sub>L</sub> = 15 pF ±10%	01	20	---	MHz
			T <sub>A</sub> = 25°C C <sub>L</sub> = 50 pF ±10%	01	20	---	MHz
			T <sub>A</sub> = -55°C, 125°C C <sub>L</sub> = 50 pF ±10%	01	15	---	MHz
			T <sub>A</sub> = 25°C C <sub>L</sub> = 50 pF ±10%	01	2	70	ns
Propagation delay time, high-to-low-level <u>6/ 3/</u> output from enable	t <sub>PHL1</sub>	V <sub>CC</sub> = 5.0 V R <sub>L</sub> = 280Ω ±5%	T <sub>A</sub> = 25°C C <sub>L</sub> = 15 pF ±10%	01	2	70	ns
			T <sub>A</sub> = -55°C, 125°C C <sub>L</sub> = 15 pF ±10%	01	2	98	ns
			T <sub>A</sub> = 25°C C <sub>L</sub> = 50 pF ±10%	01	2	75	ns
			T <sub>A</sub> = -55°C, 125°C C <sub>L</sub> = 50 pF ±10%	01	2	105	ns
			T <sub>A</sub> = 25°C C <sub>L</sub> = 50 pF ±10%	01	2	105	ns
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Device type 01

SN54LS124, SN54S124 ... J OR W PACKAGE  
SN74LS124, SN74S124 ... J OR N PACKAGE  
(TOP VIEW)



logic: While the enable input is low, the output is enabled. While the enable input is high, the output is high.

Cases E and F

FIGURE 1. Terminal connections (top view).

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3.6.1 Screening. Screening shall be in accordance with method 5004, class B, of MIL-STD-883 and 4.3 herein. The 100 percent final electrical screening for off the shelf devices shall consist of the normal 100 percent DC tests at 25°C with 10 percent PDA, high and low temperature DC tests, and 25°C AC tests followed by normal sampling and LTPD's at group A lot acceptance.

3.6.2 Qualification. Qualification inspection 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 must 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 procurement to this drawing is to apply).

#### 4. PRODUCT 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 Qualification inspection. Qualification inspection shall not be required.

4.3 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 D or E, each circuit must be driven with an appropriate signal to simulate circuit applications and each circuit shall have maximum load applied.
  - (2)  $T_A = 125^\circ\text{C}$  minimum.
- b. Interim and final electrical test parameters shall be as specified in table II, except interim electrical parameters test prior to burn-in is optional at the discretion of the manufacturer.
- c. Percent defective allowable (PDA) - The PDA is specified as 10 percent based on failures from group A, subgroup 1, test after cooldown as final electrical test in accordance with method 5004 of MIL-STD-883, and with no intervening electrical measurements. If interim electrical parameter tests are performed prior to burn-in, failures resulting from pre burn-in screening may be excluded from the PDA. If interim electrical parameter tests prior to burn-in are omitted, then all screening failures shall be included in the PDA. The verified failures of group A, subgroup 1, after burn-in divided by the total number of devices submitted for burn-in in that lot shall be used to determine the percent defective for the lot.

4.4 Quality conformance inspection. Quality conformance inspection shall be in accordance with MIL-M-38510. Groups A and B inspections shall be performed on each lot. Quality assurance shall keep lot records for 3 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 the customer at all times.

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

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4.4.2 Group B inspection. In group B inspection, each inspection lot shall be subjected to the test subgroups and LTPD values shown in table IIb of method 5005 of MIL-STD-883, class B.

4.4.3 Group C and group D inspection. Group C and group D inspections shall be as specified in method 5005 of MIL-STD-883, class B. The frequency of testing and the sample size shall be in accordance with MIL-M-38510. Generic test data (6.5) may be used to satisfy the requirements for group C and group D inspection.

- a. End point electrical parameters shall be as specified in table II.
- b. Operating life test (method 1005 of MIL-STD-883) conditions:
  - (1) Test condition D or E, each circuit must be driven with an appropriate signal to simulate circuit applications and each circuit shall have maximum load applied.
  - (2)  $T_A = 125^\circ\text{C}$ , minimum.
  - (3) Test duration: 1,000 hours.
- c. Subgroups 3 and 4 shall be added to the group C inspection requirements and shall consist of the tests, conditions, and limits specified for subgroups 10 and 11 of group A.

4.5 Inspection of preparation for delivery. Inspection of preparation for delivery shall be in accordance with MIL-M-38510, except that the rough handling test shall not apply.

TABLE II. Electrical test requirements.

MIL-STD-883 test requirements	Subgroups 1/
Interim electrical parameters (pre burn-in) (method 5004, 3.1.8)	---
Final electrical test parameters (method 5004, 3.1.14)	1*, 2, 3, 9
Group A test requirements (method 5005)	1, 2, 3, 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

1/ Subgroups per Table I, method 5005.  
\* PDA applies to subgroup 1 (see 4.3c).

## 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.

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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 contract or order 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. Requirement for certificate of compliance, if applicable.
- d. Requirements for notification of change of product or process to procuring activity, if applicable.
- e. Requirements for packaging and packing.
- f. Requirements for carrier, special 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. Replaceability is determined as follows:

- a. Microcircuits covered by this drawing will replace the same generic device covered by contractor prepared specification or drawing.
- b. When Military Specification MIL-M-38510/317 is issued, the part numbered devices specified in this drawing will be replaced by the microcircuit identified as part number M38510/31701B--.

6.5 Generic test data. Generic test data may be used to satisfy the requirements of 4.4.3. Generic test data is defined as test data from devices manufactured during the same time period, by means of the same production technique, materials, controls and design, and in the same microcircuit group (see 3.1.3(h) of MIL-M-38510) as the deliverable devices. The same time period shall be interpreted as covering a maximum span of 180 days between the generic test sample fabrication and the fabrication of deliverable devices. The vendor is required to retain generic data for a period of not less than 36 months from the date of shipment.

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6.2 Suggested source(s) of supply. 2/

DESC DRAWING PART NUMBER	VENDOR FSCM NUMBER	SIMILAR 1/ VENDOR TYPE	REPLACEMENT MILITARY SPECIFICATION PART NUMBER
7704101EX	27014 01295	54LS124/883BJ SNC54LS124J00	M38510/31701BEX
7704101FX	27014 01295	54LS124/883BW SNC54LS124W00	M38510/31701FBX

VENDOR FSCM  
NUMBER

VENDOR NAME  
AND ADDRESS

27014

National Semiconductor Corp.  
2900 Semiconductor Drive  
Santa Clara, CA 95051

01295

Texas Instruments, Inc.  
P. O. Box 5012  
Dallas, TX 75222

1/ CAUTION. DO NOT USE THIS NUMBER FOR ITEM PROCUREMENT. ITEMS PROCURED TO THE SIMILAR VENDOR TYPE ONLY MAY NOT SATISFY THE PERFORMANCE REQUIREMENTS OF THIS DRAWING.

2/ For additional suggested sources of supply or assistance in the use of this drawing, contact DESC-EC, 1507 Wilmington Pike, Dayton, OH 45444 or telephone 513-296-5375.

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