

REVISIONS

LTR	DESCRIPTION	DATE (YR-MO-DA)	APPROVED
A	Add vendor CAGE 01295 for case outlines C and Z. Add case outline 2. Delete vendor CAGE 18714. Editorial changes throughout	91-02-26	M. A. Frye
B	Update boilerplate. Change V _{CC} range in 1.3. Add source of supply – jak.	00-07-18	Monica L. Poelking
C	Add vendor cage Code 3V146. Update the boilerplate paragraphs to current MIL-PRF-38535 requirements. – MAA.	09-02-10	Charles F. Saffle



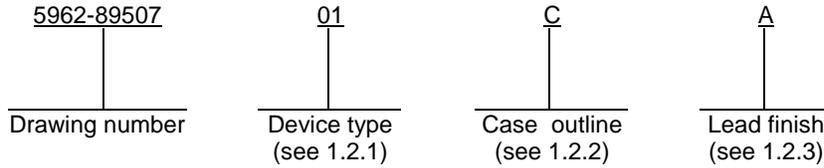
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REV STATUS OF SHEETS	REV	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
	SHEET	1	2	3	4	5	6	7	8	9	10	11	12	13	14			

PMIC N/A	PREPARED BY Marcia B. Kelleher	<p align="center">DEFENSE SUPPLY CENTER COLUMBUS COLUMBUS, OHIO 43218-3990 http://www.dscc.dla.mil</p>															
<p align="center">STANDARD MICROCIRCUIT DRAWING</p> <p>THIS DRAWING IS AVAILABLE FOR USE BY ALL DEPARTMENTS AND AGENCIES OF THE DEPARTMENT OF DEFENSE</p> <p align="center">AMSC N/A</p>	CHECKED BY Thomas J. Ricciuti																
	APPROVED BY Michael A. Frye	<p>MICROCIRCUIT, LINEAR, HIGH SPEED CMOS, QUAD BILATERAL SWITCH, MONOLITHIC SILICON</p>															
	DRAWING APPROVAL DATE 89-11-02																
	REVISION LEVEL C	<table border="1"> <tr> <td>SIZE A</td> <td>CAGE CODE 67268</td> <td>5962-89507</td> </tr> </table>	SIZE A	CAGE CODE 67268	5962-89507												
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1. SCOPE

1.1 Scope. This drawing describes device requirements for MIL-STD-883 compliant, non-JAN class level B microcircuits in accordance with MIL-PRF-38535, appendix A.

1.2 PIN. The PIN is as shown in the following examples.



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

<u>Device type</u>	<u>Generic number</u>	<u>Circuit function</u>
01	54HC4066	Quad bilateral switch

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

<u>Outline letter</u>	<u>Descriptive designator</u>	<u>Terminals</u>	<u>Package style</u>
C	GDIP1-T14 or CDIP2-T14	14	Dual-in-line package
2	CQCC1-N20	20	Square leadless chip carrier

1.2.3 Lead finish. The lead finish is as specified in MIL-PRF-38535, appendix A.

1.3 Absolute maximum ratings. 1/ 2/ 3/

Supply voltage range (V_{CC}).....	-0.5 V dc to +10.5 V dc
DC input voltage range (V_{IN}).....	-0.5 V dc to $V_{CC} + 0.5$ V dc
DC output voltage range (V_{OUT}).....	-0.5 V dc to $V_{CC} + 0.5$ V dc
Input clamp current (I_{IK}) ($V_{IN} < 0.0$ or $V_{IN} > V_{CC}$).....	± 20 mA
Output clamp current (I_{OK}) ($V_{OUT} < 0.0$ or $V_{OUT} > V_{CC}$).....	± 20 mA
Continuous output current (I_{OUT}) ($V_{OUT} = 0.0$ or V_{CC}).....	± 25 mA
Continuous current through V_{CC} or GND.....	± 50 mA
Storage temperature range (T_{STG}).....	-65°C to +150°C
Maximum power dissipation (P_D):.....	500 mW 4/
Lead temperature (soldering, 10 seconds).....	+260°C
Thermal resistance, junction-to-case (θ_{JC}).....	See MIL-STD-1835
Junction temperature (T_J).....	+175°C 5/

- 1/ Stresses above the absolute maximum rating may cause permanent damage to the device. Extended operation at the maximum levels may degrade performance and affect reliability..
- 2/ Unless otherwise noted, all voltages are referenced to GND.
- 3/ The limits for the parameters specified herein shall apply over the full specified VCC range and case temperature range of -55°C to +125°C.
- 4/ For $T_C = +100^\circ\text{C}$ to +125°C, derate linearly at 12 mW/°C.
- 5/ Maximum junction temperature shall not be exceeded except for allowable short duration burn-in screening conditions in accordance with method 5004 of MIL-STD-883.

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1.4 Recommended operating conditions. 1/ 2/

Supply voltage range (V_{CC}).....	+2.0 V dc to +10.0 V dc
DC input voltage range (V_{IN}).....	0.0 V dc to V_{CC}
Analog switch voltage range (V_{IN}).....	0.0 V dc to V_{CC}
Case operating temperature range (T_C)	-55°C to +125°C
Input rise or fall time (t_r, t_f):	
$V_{CC} = 2.0$ V	0 to 1000 ns
$V_{CC} = 4.5$ V	0 to 500 ns
$V_{CC} = 6.0$ V	0 to 400 ns
Control input rise or fall time ($V_{CC} = 10.0$ V)	0 to 250 ns

2. APPLICABLE DOCUMENTS

2.1 Government specification, standards, and handbooks. The following specification, standards, and handbooks form a part of this drawing to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

DEPARTMENT OF DEFENSE SPECIFICATION

MIL-PRF-38535 - Integrated Circuits, Manufacturing, General Specification for.

DEPARTMENT OF DEFENSE STANDARDS

MIL-STD-883 - Test Method Standard Microcircuits.
MIL-STD-1835 - Interface Standard Electronic Component Case Outlines.

DEPARTMENT OF DEFENSE HANDBOOKS

MIL-HDBK-103 - List of Standard Microcircuit Drawings.
MIL-HDBK-780 - Standard Microcircuit Drawings.

(Copies of these documents are available online at <http://assist.daps.dla.mil/quicksearch/> or from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

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 takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

1/ Unless otherwise noted, all voltages are referenced to GND.

2/ The limits for the parameters specified herein shall apply over the full specified VCC range and case temperature range of -55°C to +125°C.

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3. REQUIREMENTS

3.1 Item requirements. The individual item requirements shall be in accordance with MIL-PRF-38535, appendix A for non-JAN class level B devices and as specified herein. Product built to this drawing that is produced by a Qualified Manufacturer Listing (QML) certified and qualified manufacturer or a manufacturer who has been granted transitional certification to MIL-PRF-38535 may be processed as QML product in accordance with the manufacturers approved program plan and qualifying activity approval in accordance with MIL-PRF-38535. This QML flow as documented in the Quality Management (QM) plan may make modifications to the requirements herein. These modifications shall not affect form, fit, or function of the device. These modifications shall not affect the PIN as described herein. A "Q" or "QML" certification mark in accordance with MIL-PRF-38535 is required to identify when the QML flow option is used.

3.2 Design, construction, and physical dimensions. The design, construction, and physical dimensions shall be as specified in MIL-PRF-38535 and herein for device classes Q and V or MIL-PRF-38535, appendix A and herein for device class M.

3.2.1 Case outlines. The case outlines 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 table. The truth table 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 Switching waveforms and test circuits. The switching waveforms and test circuits shall be as specified in 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-PRF-38535, appendix A. The part shall be marked with the PIN listed in 1.2 herein. In addition, the manufacturer's PIN may also be marked. For packages where marking of the entire SMD PIN number is not feasible due to space limitations, the manufacturer has the option of not marking the "5962-" on the device.

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-HDBK-103 (see 6.6 herein). The certificate of compliance submitted to DSCC-VA prior to listing as an approved source of supply shall affirm that the manufacturer's product meets the requirements of MIL-PRF-38535, appendix A and the requirements herein.

3.7 Certificate of conformance. A certificate of conformance as required in MIL-PRF-38535, appendix A shall be provided with each lot of microcircuits delivered to this drawing.

3.8 Notification of change. Notification of change to DSCC-VA shall be required in accordance with MIL-PRF-38535, appendix A.

3.9 Verification and review. DSCC, DSCC'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.

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TABLE I. Electrical performance characteristics.

Test	Symbol	Test conditions -55°C ≤ T _C ≤ +125°C unless otherwise specified		Group A subgroups	Limits		Unit
					Min	Max	
High level input voltage	V _{IH}		V _{CC} = 2.0 V <u>1/</u>	1, 2, 3	1.5		V
			V _{CC} = 4.5 V		3.15		
			V _{CC} = 9.0 V <u>1/</u>		6.3		
Low level input voltage	V _{IL}		V _{CC} = 2.0 V <u>1/</u>	1, 2, 3		0.5	V
			V _{CC} = 4.5 V			1.35	
			V _{CC} = 9.0 V <u>1/</u>			2.7	
On resistance	R _{ON}	V _{IN} = V _{CC} V _{IS} = V _{CC} to GND I _O = 1.0 mA	V _{CC} = 4.5 V	1		95	Ω
				2, 3		142	
			V _{CC} = 6.0 V <u>1/</u>	1		84	
				2, 3		126	
			V _{CC} = 9.0 V	1		70	
		2, 3			105		
		V _{IN} = V _{CC} V _{IS} = V _{CC} or GND I _O = 1.0 mA	V _{CC} = 4.5 V <u>1/</u>	1		80	Ω
				2, 3		128	
			V _{CC} = 6.0 V <u>1/</u>	1		75	
				2, 3		113	
V _{CC} = 9.0 V <u>1/</u>	1			60			
	2, 3		95				
Switch off leakage current	I _{OZ}	V _{IN} = V _{IL} , V _{IS} = V _{CC} or GND V _{CC} = 10.0 V	1		±0.1	μA	
			2, 3		±1.0		
Input leakage current	I _{IL} , I _{IH}	V _{IN} = V _{CC} or GND V _{CC} = 10.0 V	1		±0.1	μA	
			2, 3		±1.0		

See footnotes at end of table.

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TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Test conditions -55°C ≤ T _C ≤ +125°C unless otherwise specified		Group A subgroups	Limits		Unit
					Min	Max	
Quiescent device current	I _{CC}	V _{IN} = V _{CC} or GND	V _{CC} = 6.0 V <u>1/</u>	1		2	μA
				2, 3		40	
		V _{CC} = 10.0 V <u>1/</u>	1		16	μA	
			2, 3		320		
Input control Capacitance	C _{IN}	See 4.3.1c		4		10.0	pF
Functional tests		See 4.3.1d		7, 8			
Propagation delay time, Switch In to Out	t _{PLH} t _{PHL} <u>2/</u>	C _L = 50 pF See figure 4, Configuration A	V _{CC} = 2.0 V	9		60	ns
				10, 11		90	
			V _{CC} = 4.5 V	9		12	ns
				10, 11		18	
			V _{CC} = 9.0 V	9		8	ns
				10, 11		13	
Switch turn-on, nE to nZ	t _{PZH} t _{PZL}	C _L = 50 pF R _L = 1kΩ See figure 4, Configuration B	V _{CC} = 2.0 V <u>1/</u>	9		100	ns
				10, 11		150	
			V _{CC} = 4.5 V	9		20	ns
				10, 11		30	
			V _{CC} = 9.0 V <u>1/</u>	9		12	ns
				10, 11		18	
Switch turn-off, nE to nZ	t _{PHZ} t _{PLZ}	C _L = 50 pF R _L = 1kΩ See figure 4, Configuration B	V _{CC} = 2.0 V <u>1/</u>	9		150	ns
				10, 11		225	
			V _{CC} = 4.5 V	9		30	ns
				10, 11		45	
			V _{CC} = 9.0 V <u>1/</u>	9		24	ns
				10, 11		36	

See footnotes at end of table.

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TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Test conditions ^{1/} -55°C ≤ T _C ≤ +125°C unless otherwise specified	Group A subgroups	Limits		Unit
				Min	Max	
Switch frequency response bandwidth at -3 dB	<u>3/</u>	Adjust input level for 0 dBm at output, f = 1 MHz, V _{IS} is centered at V _{CC} /2, V _{CC} = 4.5 V, see figure 4, configuration C	9	200		MHz
Crosstalk between any two switches	<u>3/</u>	Adjust input level for 0 dBm at V _{IS} , V _{IS} is centered at V _{CC} /2, V _{CC} = 4.5 V, see figure 4, configuration D	1		-72	dB
Switch off signal feedthrough	<u>3/</u>	Adjust input level for 0 dBm at V _{IS} , V _{IS} is centered at V _{CC} /2, V _{CC} = 4.5 V, see figure 4, configuration E	1		-72	dB
Total harmonic distortion	<u>3/</u>	V _{CC} = 4.5 V, V _{IS} = 4 V _{P-P} , f = 1 kHz, see figure 4, configuration F	1		0.022	%
		V _{CC} = 9.0 V, V _{IS} = 8 V _{P-P} , f = 1 kHz, see figure 4, configuration F			0.008	
Switch input capacitance	C _S	<u>3/</u>	4		5	pF

^{1/} This parameter is guaranteed, if not tested, to the limits specified in table I.

^{2/} This parameter is guaranteed through the R_{ON} tests.

^{3/} The analog channel characteristics are for information only and are not tested.

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Device type	01	
Case outline	C	2
Terminal number	Terminal symbol	Terminal symbol
1	1Y	NC
2	1Z	1Y
3	2Z	1Z
4	2Y	2Z
5	2E	NC
6	3E	2Y
7	GND	NC
8	3Y	2E
9	3Z	3E
10	4Z	GND
11	4Y	NC
12	4E	3Y
13	1E	3Z
14	V _{cc}	4Z
15		NC
16		4Y
17		NC
18		4E
19		1E
20		V _{cc}

NC = No internal connection

FIGURE 1. Terminal connections.

nE Input	Switch
L	Off
H	On

H = High voltage level (steady state)
L = Low voltage level (steady state)

FIGURE 2. Truth table.

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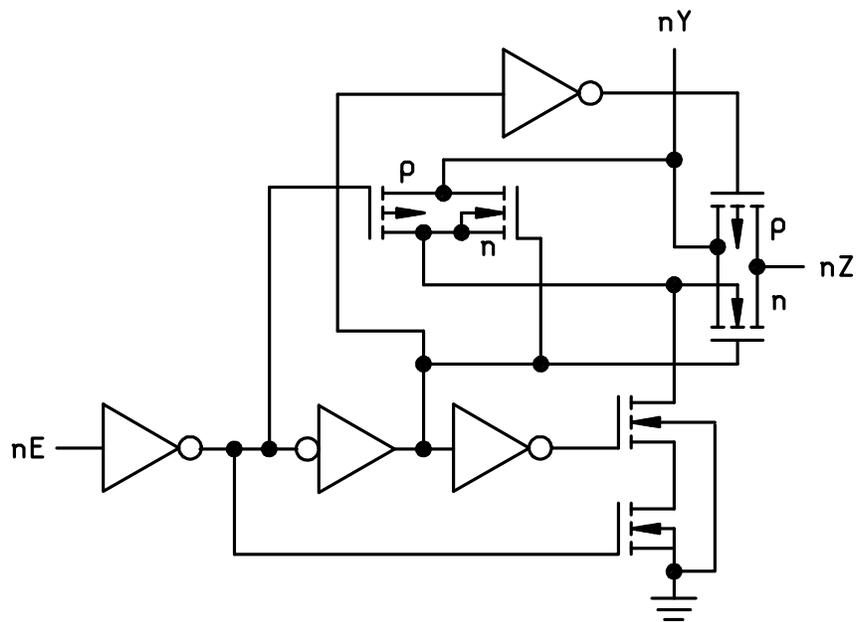


FIGURE 3. Logic diagram.

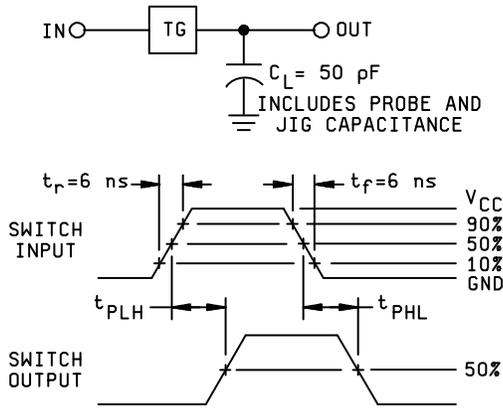
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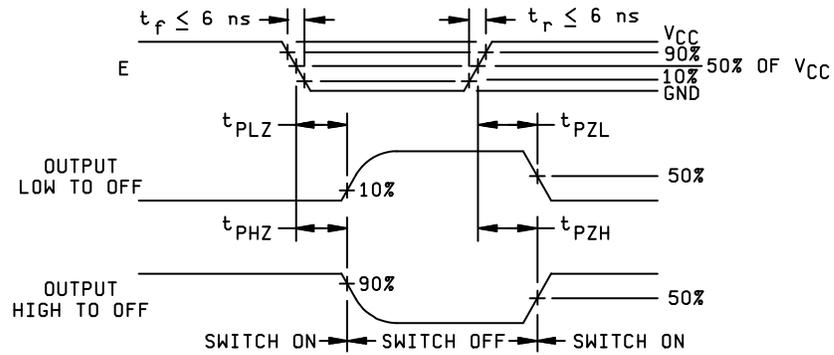
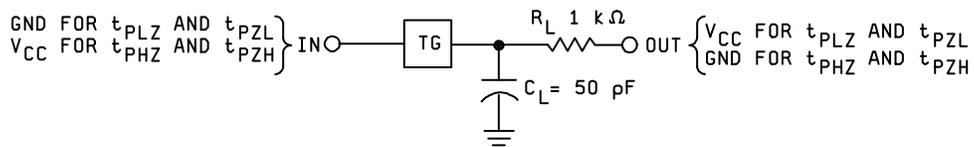
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CONFIGURATION A - SWITCH-IN TO SWITCH-OUT TEST CIRCUIT AND PROPAGATION DELAY TIMES



CONFIGURATION B - SWITCH TURN-ON AND SWITCH TURN-OFF TEST CIRCUIT AND PROPAGATION DELAY TIMES

FIGURE 4. Switching waveforms and test circuits.

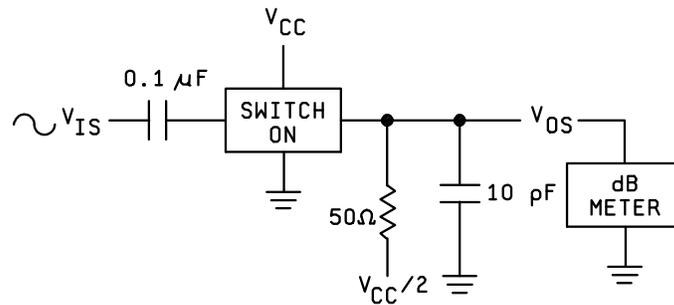
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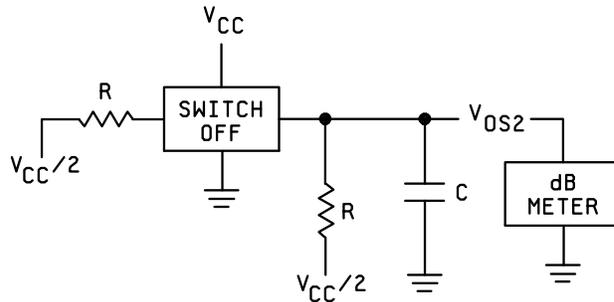
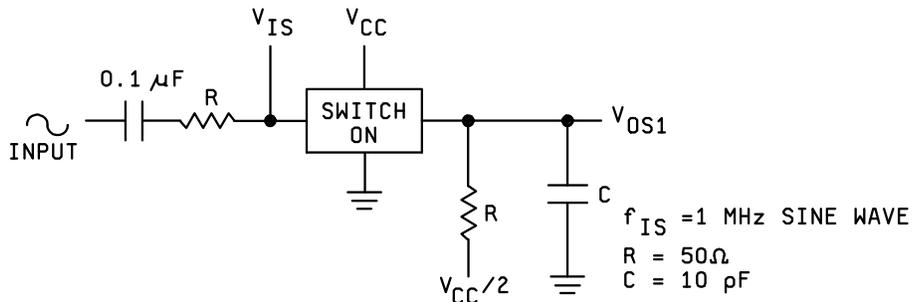
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CONFIGURATION C - FREQUENCY RESPONSE TEST CIRCUIT



CONFIGURATION D - CROSSTALK BETWEEN TWO SWITCHES TEST CIRCUIT

FIGURE 4. Switching waveforms and test circuits – Continued.

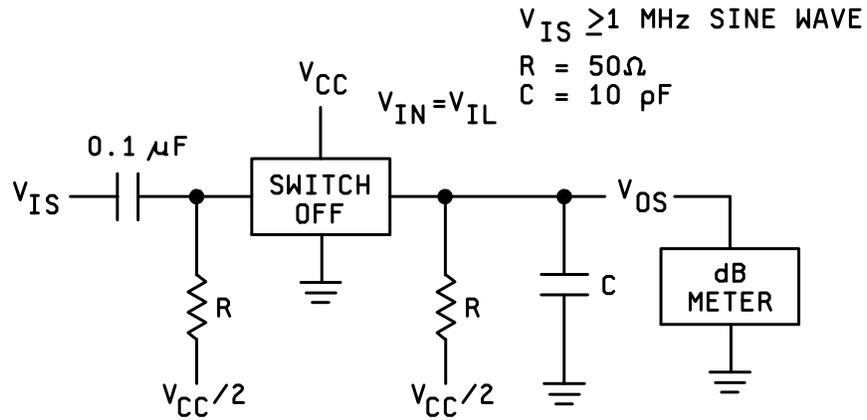
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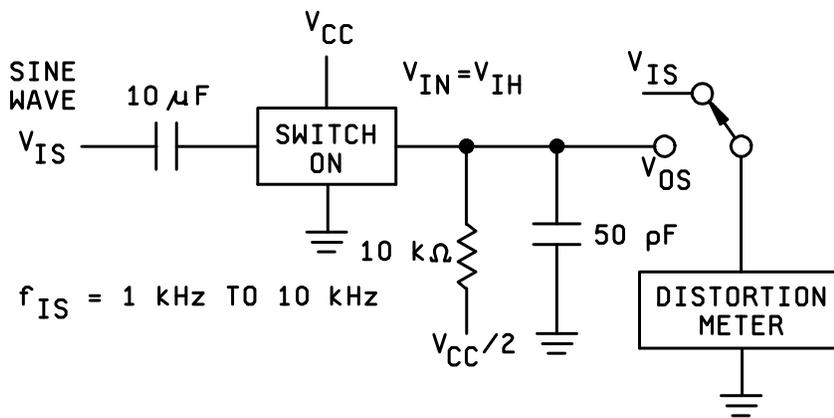
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CONFIGURATION E - SWITCH OFF SIGNAL FEEDTHROUGH



CONFIGURATION F - TOTAL HARMONIC DISTORTION TEST CIRCUIT

FIGURE 4. Switching waveforms and test circuits – Continued.

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4. VERIFICATION

4.1 Sampling and inspection. Sampling and inspection procedures shall be in accordance with MIL-PRF-38535, appendix A.

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 method 1015 of MIL-STD-883.
 - (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.

TABLE II. Electrical test requirements.

MIL-STD-883 test requirements	Subgroups (in accordance with MIL-STD-883, 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, 4, 7, 8, 9, 10, 11
Groups C and D end-point electrical parameters (method 5005)	1, 2, 3

* PDA applies to subgroup 1.

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, and 6 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. Subgroups 7 and 8 shall include verification of the truth table.

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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 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 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 method 1005 of MIL-STD-883.
 - (2) $T_A = +125^{\circ}\text{C}$, 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-PRF-38535, appendix A.

6. NOTES

6.1 Intended use. Microcircuits conforming to this drawing are intended for use for Government microcircuit applications (original equipment), design applications, and logistics purposes.

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-973 using DD Form 1692, Engineering Change Proposal.

6.4 Record of users. Military and industrial users shall inform Defense Supply Center Columbus (DSCC) when a system application requires configuration control and the applicable SMD. DSCC 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 DSCC-VA, telephone (614) 692-0544

6.5 Comments. Comments on this drawing should be directed to DSCC-VA, Columbus, Ohio 43218-3990, or telephone (614) 692-0547

6.6 Approved sources of supply. Approved sources of supply are listed in MIL-HDBK-103. The vendors listed in MIL-HDBK-103 have agreed to this drawing and a certificate of compliance (see 3.6 herein) has been submitted to and accepted by DSCC-VA.

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STANDARD MICROCIRCUIT DRAWING SOURCE APPROVAL BULLETIN

DATE: 09-02-10

Approved sources of supply for SMD 5962-89507 are listed below for immediate acquisition information only and shall be added to MIL-HDBK-103 and QML-38535 during the next revision. MIL-HDBK-103 and QML-38535 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 DSCC-VA. This information bulletin is superseded by the next dated revision of MIL-HDBK-103 and QML-38535. DSCC maintains an online database of all current sources of supply at <http://www.dscclia.mil/Programs/Smcr/>.

Standard microcircuit drawing PIN <u>1/</u>	Vendor CAGE number	Vendor similar PIN <u>2/</u>
5962-89507012A	3V146	54HC4066/B2A
5962-8950701CA	01295	CD54HC4066F3A

1/ The lead finish shown for each PIN representing a hermetic package is the most readily available from the manufacturer listed for that part. If the desired lead finish is not listed contact the Vendor to determine its availability.

2/ 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

01295

Vendor name and address

Texas Instruments Incorporated
13500 N. Central Expressway
P.O. Box 655303
Dallas, TX 75265

Point of contact: U.S. Highway 75 South
Sherman, TX 75090-0084

3V146

Rochester Electronics Inc.
16 Malcolm Hoyt Drive
Newburyport, MA 01950

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