REVISIONS			
LTR	DESCRIPTION	DATE (YR-MO-DA)	APPROVED
A	Change footenote 1/ in 1.4. Change limits for I_{CC}. Change conditions and limits for propagation delays and transition times. Change figures 3, 5, and 6 for load capacitance. Delete subgroups 10 and 11 from table I and table II.	92-02-10	M. A. Frye
B	Changes in accordance with NOR 5962-R039-95.	94-11-29	M. A. Frye
C	Changes in accordance with NOR 5962-R194-96	96-08-21	Raymond Monnin
D	Incorporate revisions B and C N.O.R.'s. Update drawing to current requirements. Editorial changes throughout. - drw	01-08-10	Raymond Monnin

THE ORIGINAL FIRST PAGE OF THIS DRAWING HAS BEEN REPLACED

REV																			
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SHEET																			

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

PMIC N/A

PREPARED BY
Larry T. Gauder

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APPROVED BY
D. A. DiCenzo

DRAWING APPROVAL DATE
88-08-17

REVISION LEVEL
D

DEFENSE SUPPLY CENTER COLUMBUS
COLUMBUS, OHIO 43216
http://www.dscc.dla.mil

STANDARD MICROCIRCUIT DRAWING

THIS DRAWING IS AVAILABLE FOR USE BY ALL DEPARTMENTS AND AGENCIES OF THE DEPARTMENT OF DEFENSE

AMSC N/A

MICROCIRCUIT, DIGITAL, BIPOLAR, ADVANCED LOW POWER SCHOTTKY, QUADRUPLE DIFFERENTIAL LINE DRIVER, MONOLITHIC SILICON

SIZE	CAGE CODE	
A	**67268**	**5962-88648**

SHEET 1 OF 13

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

5962-88648	01	E	A
Drawing number	Device type (see 1.2.1)	Case outline (see 1.2.2)	Lead finish (see 1.2.3)

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

Device type	Generic number	Circuit function
01	54ALS194	Quadruple differential line driver with three-state outputs

1.2.2 Case outlines. The case outlines are as designated in MIL-STD-1835 and as follows:

Outline letter	Descriptive designator	Terminals	Package style
E	GDIP1-T16 or CDIP2-T16	16	dual-in-line
F	GDFP2-F16 or CDFP3-F16	16	flat pack
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.

Supply voltage range	-0.5 V dc minimum to +7.0 V dc maximum
Input voltage range	-1.5 V dc at –18 mA to +5.5 V dc
Maximum power dissipation (P_D) 1/	1380 mW
Lead temperature (soldering, 10 seconds)	+300°C
Thermal resistance, junction-to-case (θ_{JC})	See MIL-STD-1835
Junction temperature (T_J)	+150°C

1.4 Recommended operating conditions.

Supply voltage range (V_{CC})	4.5 V dc minimum to 5.5 V dc maximum
Minimum high level input voltage (V_{IH}):	
Data inputs	2.0 V dc
Enable T_C = +25°C	2.0 V dc
Enable T_C = -55°C, +125°C	2.1 V dc
Maximum low level input voltage (V_{IL}):	
T_C = -55°C, +25°C	0.8 V
T_C = +125°C	0.7 V
Maximum high level output current (I_{OH})	-20.0 mA
Maximum low level output current (I_{OL}):	
T_C = +25°C	48.0 mA
T_C = -55°C, +125°C	20.0 mA
Case operating temperature range (T_C)	-55°C to +125°C

1/ For operation above 25°C free-air temperature, derate linearly at 11.0 mW/°C.

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 listed in the issue of the Department of Defense Index of Specifications and Standards (DoDISS) and supplement thereto, cited in the solicitation.

SPECIFICATION

DEPARTMENT OF DEFENSE

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

STANDARDS

DEPARTMENT OF DEFENSE

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

HANDBOOKS

DEPARTMENT OF DEFENSE

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

(Unless otherwise indicated, copies of the specification, standards, and handbooks are available 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.

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, appendix A and herein.

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 diagrams. The logic diagrams shall be as specified on figure 3.

3.2.5 Driver V_{OD} and V_{OC}. The driver V_{OD} and V_{OC} 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-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 as listed in MIL-HDBK-103 (see 6.6 herein). 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.

3.5.1 Certification/compliance mark. A compliance indicator “C” shall be marked on all non-JAN devices built in compliance to MIL-PRF-38535, appendix A. The compliance indicator “C” shall be replaced with a "Q" or "QML" certification mark in accordance with MIL-PRF-38535 to identify when the QML flow option is used.

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.

4. QUALITY ASSURANCE PROVISIONS

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 B 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	Device type	Limits		Unit
					Min	Max	
High level output voltage	V_{OH}	V_{CC} = 4.5 V, V_{IL} = see 1.4 herein, I_{OH} = -20 mA, V_{IH} = see 1.4	1, 2, 3	All	2.4		V
Low level output voltage	V_{OL}	I_{OL} = maximum, see 1.4 V_{CC} = 4.5 V, V_{IL} = see 1.4 herein, V_{IH} = see 1.4	1, 2, 3	All		0.5	V
Input clamp voltage	V_{IC}	V_{CC} = 4.5 V, I_{IN} = -18 mA	1, 2, 3	All		-1.5	V
Output voltage	V_{OUT}	V_{CC} = 4.5 V to 5.5 V, I_{OUT} = 0.0 mA	1, 2, 3	All	0	6	V
Differential output voltage (absolute magnitude)	$\|V_{OD1}\|$	V_{CC} = 4.5 V to 5.5 V, I_{OUT} = 0.0 mA	1, 2, 3	All	2	6	V
	$\|V_{OD2}\|$	V_{CC} = 4.5 V to 5.5 V, 1/ R_L = 100Ω, I_{OUT} = 0.0 mA	1, 2, 3	All	2		V
Change in magnitude of differential output voltage (absolute magnitude)	$\Delta\|V_{OD}\|$	V_{CC} = 4.5 V to 5.5 V, 2/ R_L = 100Ω, I_{OUT} = 0.0 mA, See figure 4	1, 2, 3	All		±0.4	V
Common-mode output voltage	V_{OC}		1, 2, 3	All		±3.0	V
Change in magnitude of common-mode output voltage (absolute magnitude)	$\Delta\|V_{OC}\|$		1, 2, 3	All		±0.4	V
Output current with power off	I_O	V_{OUT} = 6.0 V, V_{CC} = 0.0 V	1, 2, 3	All		100	µA
		V_{OUT} = -0.25 V, V_{CC} = 0.0 V				-100	
Output current, high impedance state	I_{OZ}	V_{CC} = 5.0 V, Output enables = 0.8 V; V_{OUT} = 2.7 V	1, 2, 3	All		100	µA
		V_{OUT} = 0.5 V				-100	
High level input current	I_{IH1}	V_{IN} = 5.5 V, V_{CC} = 5.5 V	1, 2, 3	All		100	µA
	I_{IH2}	V_{IN} = 2.7 V, V_{CC} = 5.5 V				50	
Low level input current	I_{IL}	V_{IN} = 0.5 V, V_{CC} = 5.5 V	1, 2, 3	All		-200	µA
Short circuit output current	I_{OS}	V_{IN} = 2.0 V, V_{CC} = 5.5 V, V_{OUT} = 0.0 V 3/	1, 2, 3	All	-40	-140	mA
Supply current (all drivers)	I_{CC}	All outputs disabled V_{CC} = 5.5 V	1, 2, 3	All		45	mA
Functional tests		See 4.3.1c	7, 8	All			

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	Device type	Limits		Unit
					Min	Max	
Propagation delay time, Input to output	t_{PLH}	V_{CC} = 5.0 V, C_L = 50 pF 4/ R_L = 200Ω, T_C = +25°C, See figure 6	9	All		14	ns
	t_{PHL}		9	All		22	ns
Output-to-output skew	t_{SK}		9	All		6	ns
Differential output transition time	t_{TD}	V_{CC} = 5.0 V, C_L = 50 pF 4/ R_L = 100Ω, T_C = +25°C, See figure 5	9	All		22	ns
Output enable time, Input to output	t_{PZH}	V_{CC} = 5.0 V, C_L = 50 pF 4/ R_L = 200Ω, T_C = +25°C, See figure 6	9	All		15	ns
	t_{PZL}		9	All		21	ns
Output disable time, Input to output	t_{PHZ}		9	All		17	ns
	t_{PLZ}		9	All		19	ns

1/ $|V_{OD2}| = ½ |V_{OD1}|$, but cannot be < 2 V.

2/ $\Delta|V_{OD}|$ and $\Delta|V_{OC}|$ are the changes in magnitude of V_{OD} and V_{OC}, respectively, that occur when the input is changed from a high level to a low level.

3/ Not more than one output should be shorted at one time, and the duration of the short circuit condition shall not exceed one second.

4/ Propagation delay time testing may be performed using either C_L = 15 pF or C_L = 50 pF. However, the manufacturers must certify and guarantee that the microcircuit meets the switching test limits specified for 50 pF load.

Device type	01	
Case outlines	E and F	2
Terminal number	Terminal symbol	
1	1A	NC
2	1Y	1A
3	1Z	1Y
4	1, 2EN	1Z
5	2Z	1, 2EN
6	2Y	NC
7	2A	2Z
8	GND	2Y
9	3A	2A
10	3Y	GND
11	3Z	NC
12	3, 4EN	3A
13	4Z	3Y
14	4Y	3Z
15	4A	3, 4EN
16	V_{CC}	NC
17	- - -	4Z
18	- - -	4Y
19	- - -	4A
20	- - -	V_{CC}

NC = No connection

FIGURE 1. Terminal connections.

Input	Output enable	Outputs	
		Y	Z
H	H	H	L
L	H	L	H
X	L	High impedance	High impedance

H = TTL high level, L = TTL low level, X = irrelevant

FIGURE 2. Truth table.

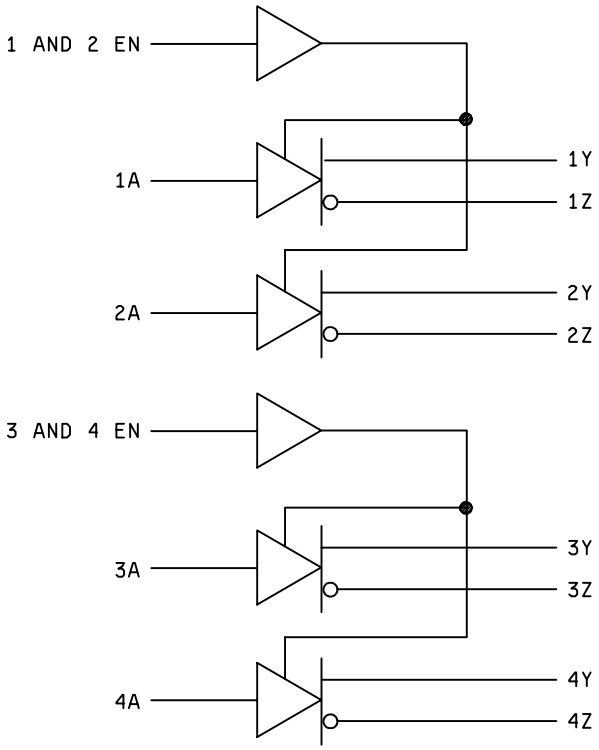


FIGURE 3. Logic diagram.

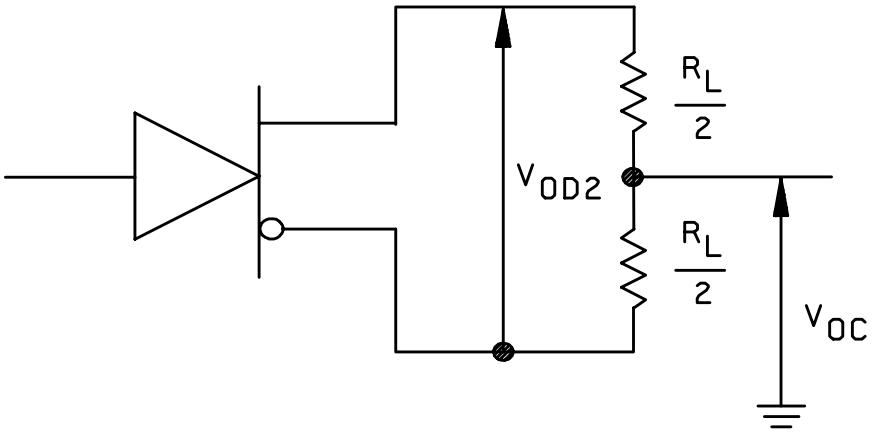
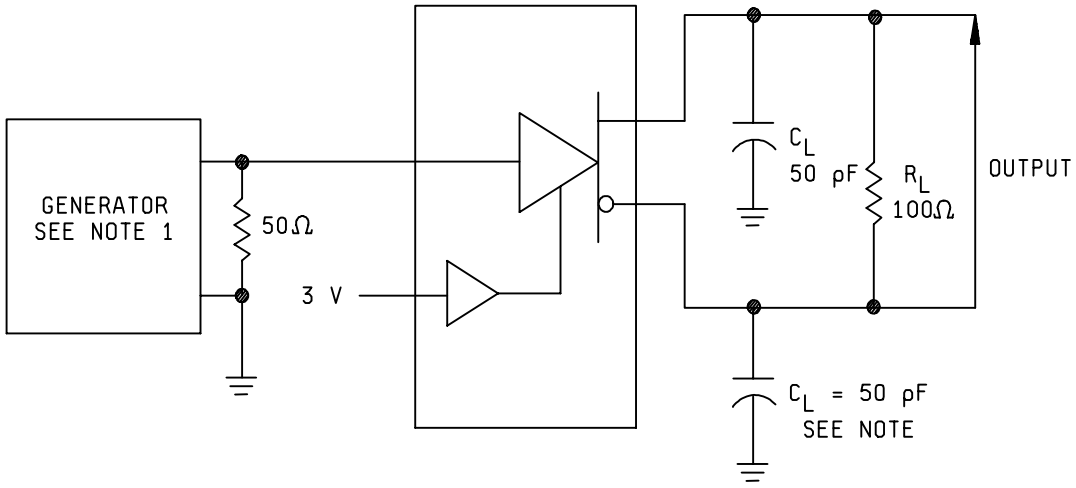


FIGURE 4. Driver V_{OD} and V_{OC}.

Test circuit



NOTE: C_L includes probe and stray capacitance.

Voltage waveforms

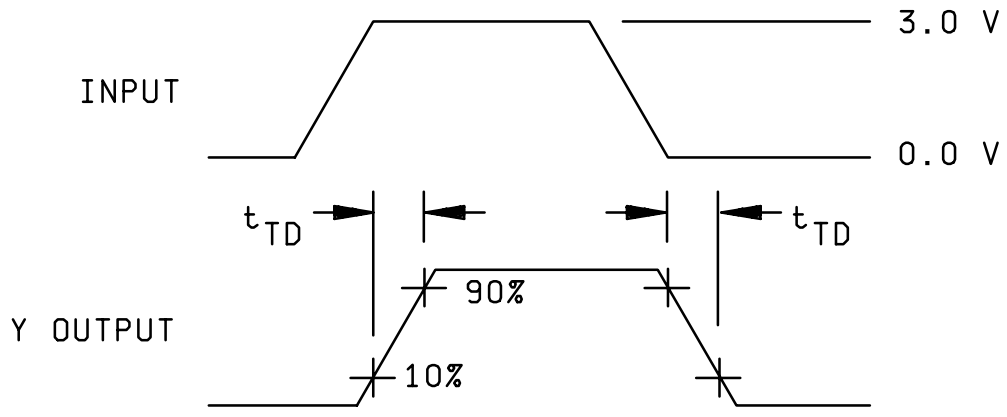
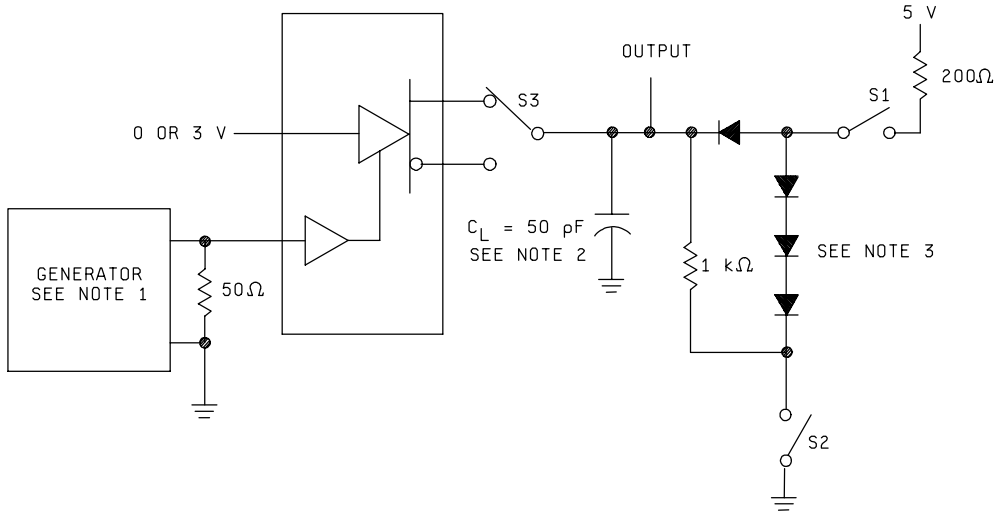


FIGURE 5. Differential output transition times.

Test circuit



Switching waveforms

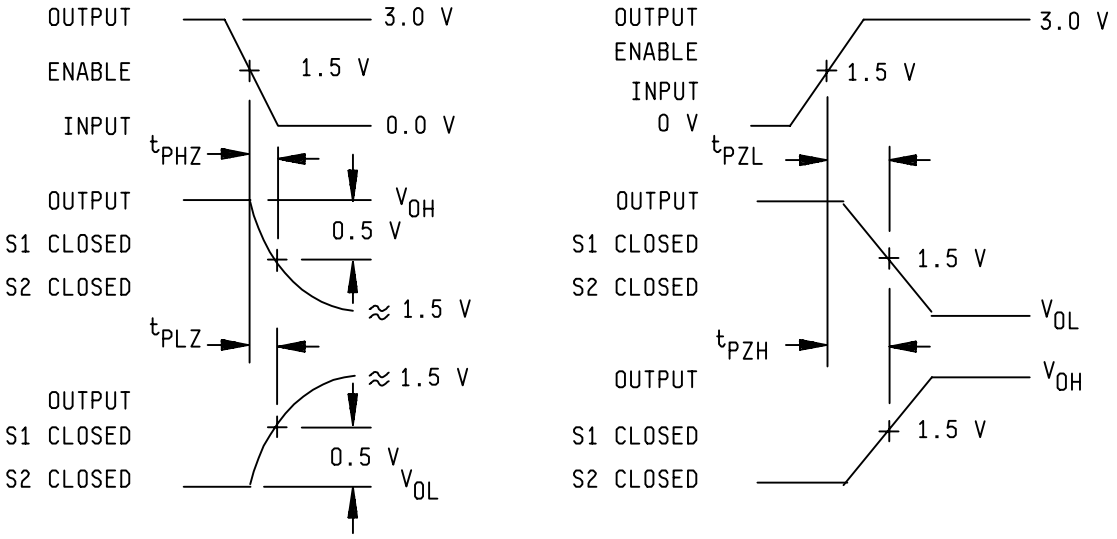
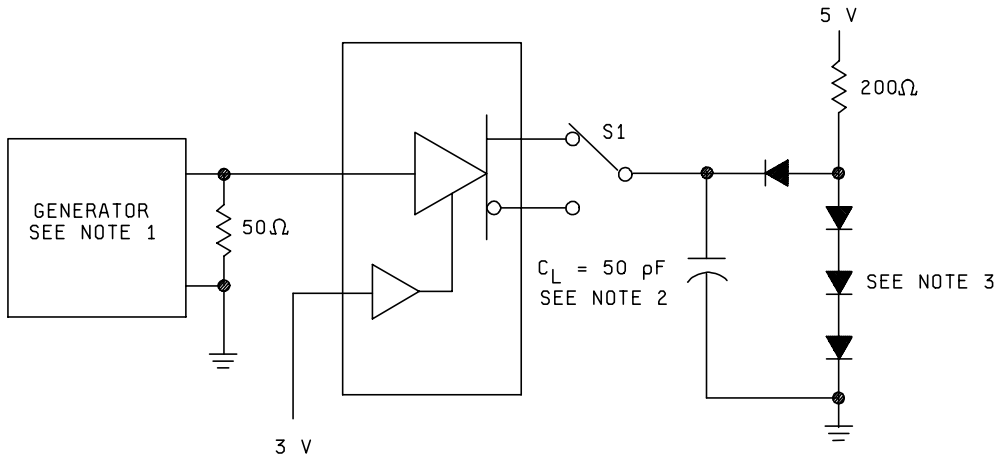
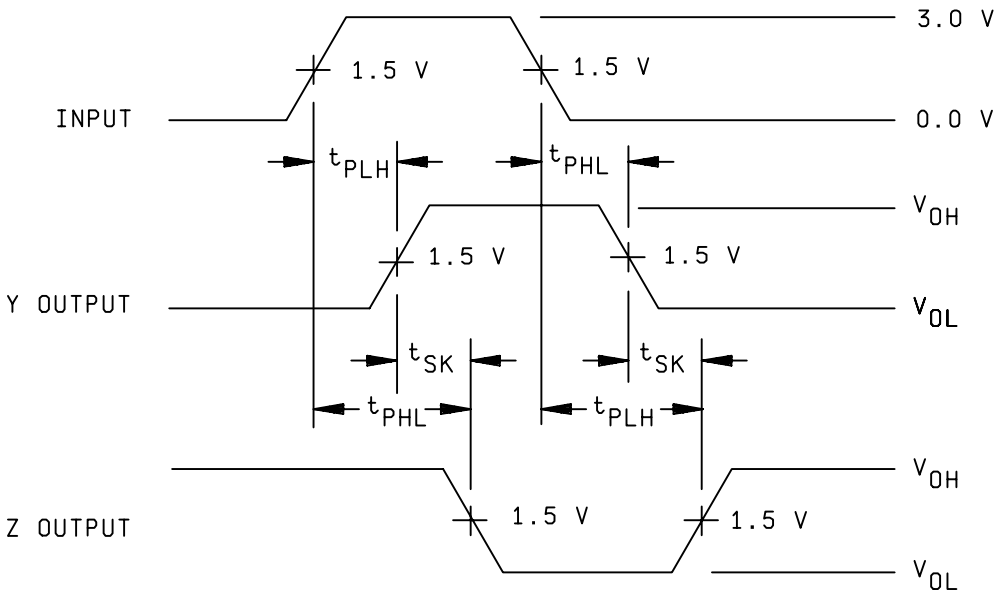


FIGURE 6. Test circuits and switching waveforms.

Test circuit



Propagation delay times



NOTES:
1. The input pulse is supplied by a generator having the following characteristics: $t_r \leq 5$ ns, $t_f \leq 5$ ns, PRR ≤ 1 MHz, duty cycle ≤ 50 percent, Z = 50 ohms.
2. C_L includes probe and stray capacitance.
3. All diodes are 1N3064 or 1N916.

FIGURE 6. Test circuits and switching waveforms - continued.

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, 7, 8, 9
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 4, 5, 6, 10, and 11 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 B 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 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-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 using DD Form 1692, Engineering Change Proposal.

6.4 Record of users. Military and industrial users shall inform Defense Supply Center Columbus 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 43216-5000, 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.

STANDARD MICROCIRCUIT DRAWING BULLETIN

DATE: 01-08-10

Approved sources of supply for SMD 5962-88648 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 bulletin is superseded by the next dated revision of MIL-HDBK-103 and QML-38535.

Standard microcircuit drawing PIN 1/	Vendor CAGE number	Vendor similar PIN 2/
5962-8864801EA	01295	SNJ54ALS194J
5962-8864801FA	01295	SNJ54ALS194W
5962-88648012A	01295	SNJ54ALS194FK

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	Vendor name and address
01295	Texas Instruments, Inc. Semiconductor Group 8505 Forest Ln. PO Box 660199 Dallas, TX 75243 Point of contact: U.S. Highway 75 South P.O. Box 84, M/S 853 Sherman, TX 75090-9493