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LTR	DESCRIPTION	DATE (YR-MO-DA)	APPROVED													

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REV STATUS OF SHEETS	REV SHEET	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

PMIC N/A	PREPARED BY <i>Marcia B Kelleher</i>	DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	
<b>STANDARDIZED MILITARY DRAWING</b>  THIS DRAWING IS AVAILABLE FOR USE BY ALL DEPARTMENTS AND AGENCIES OF THE DEPARTMENT OF DEFENSE  AMSC N/A	CHECKED BY <i>Wm Johnson</i>	MICROCIRCUITS, LINEAR, 4-CHANNEL DIFFERENTIAL JFET ANALOG MULTIPLEXER, MONOLITHIC SILICON	
	APPROVED BY <i>[Signature]</i>		
	DRAWING APPROVAL DATE 09 DECEMBER 1988	SIZE <b>A</b>	CAGE CODE <b>67268</b>
REVISION LEVEL	SHEET 1 OF 15		

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SEP 87

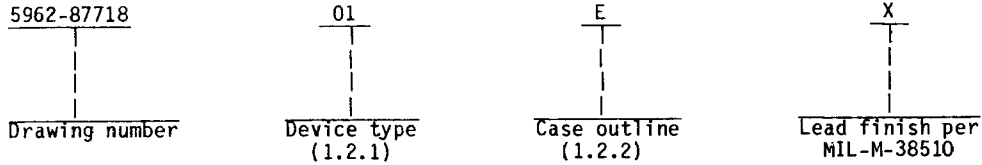
U.S. GOVERNMENT PRINTING OFFICE: 1987 - 748-129/60911  
5962-E574

DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.

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 types. The device types shall identify the circuit function as follows:

Device type	Generic number	Circuit function
01	MUX-24A	4-channel differential JFET analog multiplexer
02	MUX-24B	4-channel differential JFET analog multiplexer

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

Outline letter	Case outline
E	D-2 (16-lead, .840" x .310" x .200"), dual-in-line package

1.3 Absolute maximum ratings.

Positive supply voltage ( $V_{CC}$ )	-----	+18 V dc
Negative supply voltage ( $V_{EE}$ )	-----	-18 V dc
Logic input voltage	-----	(-4 V or $V_{EE}$ ) to $V_{CC}$
Analog input voltage	-----	$V_{EE}$ -20 V to $V_{CC}$ +20 V
Maximum current through any pin	-----	25 mA
Storage temperature range	-----	-65°C to +150°C
Power dissipation ( $P_D$ ) <sup>1/</sup>	-----	500 mW
Lead temperature (soldering, 60 seconds)	-----	+300°C
Junction temperature ( $T_J$ )	-----	+150°C
Thermal resistance, junction-to-case ( $\theta_{JC}$ )	-----	See MIL-M-38510, appendix C
Thermal resistance, junction-to-ambient ( $\theta_{JA}$ ):		
Case E	-----	91°C/W

1.4 Recommended operating conditions.

Positive supply voltage ( $V_{CC}$ )	-----	+15 V
Negative supply voltage ( $V_{EE}$ )	-----	-15 V
Ambient operating temperature range ( $T_A$ )	-----	-55°C to +125°C
Digital "1" input voltage ( $V_{IH}$ )	-----	2.0 V minimum
Digital "0" input voltage ( $V_{IL}$ )	-----	0.8 V maximum
Analog voltage range ( $V_A$ )	-----	±10 V maximum

<sup>1/</sup> Derate above +100°C, 10 mW/°C.

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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.

3.2.4 Case outline. The case outline 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 ambient 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.

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TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions -55°C < T <sub>A</sub> < +125°C V <sub>CC</sub> = +15 V, V <sub>EE</sub> = -15 V unless otherwise specified	Device types	Group A subgroups	Limits		Unit
					Min	Max	
Positive supply current	I <sub>CC</sub>		A11	1		12	mA
				2, 3		15	
Negative supply current	I <sub>EE</sub>		A11	1	-3.8		
				2, 3	-5		
Digital input current	I <sub>IN</sub>	V <sub>IN</sub> = 0.4 V to 15 V	A11	1		±10	μA
				2, 3		±20	
Digital "0" enable current	I <sub>IN(EN)</sub>	V <sub>IN(EN)</sub> = 0.4 V	A11	1		±10	
				2, 3		±20	
"ON" resistance	R <sub>ON</sub>	-10 V ≤ V <sub>SOURCE</sub> ≤ +10 V, I <sub>SOURCE</sub> = 200 μA	01	1		300	Ω
			02			400	
			01	2, 3		400	
			02			500	
"ON" resistance change with change in source voltage	ΔR <sub>ON</sub> / ΔV <sub>SOURCE</sub>	-10 V ≤ V <sub>SOURCE</sub> ≤ +10 V, I <sub>SOURCE</sub> = 200 μA 1/	01	1		5	%
				2		7	
				3		6	
			02	1		7	
				2		8	
				3		8	
R <sub>ON</sub> MATCH between switches	R <sub>ON</sub> MATCH	V <sub>SOURCE</sub> = 0 V, I <sub>SOURCE</sub> = 200 μA 1/ 2/	01	1		15	%
				2		20	
				3		18	
			02	1		20	
				2		23	
				3		23	

See footnotes at end of table.

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TABLE 1. Electrical performance characteristics - Continued.

Test	Symbol	Conditions -55°C < T <sub>A</sub> < +125°C V <sub>CC</sub> = +15 V, V <sub>EE</sub> = -15 V unless otherwise specified	Device types	Group A subgroups	Limits		Unit
					Min	Max	
Analog voltage range	V <sub>A</sub>	1/	A11	1, 2, 3		±10	V
Source current (switch "OFF")	I <sub>SOURCE</sub> (OFF)	V <sub>SOURCE</sub> = 10 V V <sub>DRAIN</sub> = -10 V 3/	01	1, 3		±1	nA
				2		±25	
			02	1		±2	
				2		±50	
				3		±25	
Drain current (switch "OFF")	I <sub>DRAIN</sub> (OFF)	V <sub>IH</sub> = 2 V, V <sub>SOURCE</sub> = V <sub>DRAIN</sub> = +10 V 3/	01	1, 3		±1	
				2		±100	
			02	1		±2	
				2		±500	
				3		±100	
Leakage current (switch "ON")	I <sub>DRAIN(ON)</sub> <sup>+</sup>	V <sub>IH</sub> = 2 V, V <sub>SOURCE</sub> = V <sub>DRAIN</sub> = +10 V 3/	01	1		±1	
				2		±100	
				3		±1	
	02		1		±2		
			2		±500		
			3		±100		
Digital "0" input voltage	V <sub>IL</sub>	1/	A11	1, 3		0.8	V
				2		0.7	

See footnotes at end of table.

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TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions -55°C < T <sub>A</sub> < +125°C V <sub>CC</sub> = +15 V, V <sub>EE</sub> = -15 V unless otherwise specified	Device types	Group A subgroups	Limits		Unit
					Min	Max	
Digital "1" input voltage	V <sub>IH</sub>	1/	A11	1, 2, 3	2.0		V
Functional tests	4/	See 4.3.1c	A11	1, 2, 3			
Switching time	t <sub>PHL</sub> , t <sub>PLH</sub>	V <sub>S1</sub> = +10 V, V <sub>S4</sub> = -10 V R <sub>L</sub> = 10 MΩ, C <sub>L</sub> = 10 pF, See figures 4 and 5	A11	9		2.1	μs
				10, 11 1/		3.5	
Enable delay "ON"	t <sub>ON(EN)</sub>	V <sub>S1</sub> = -1.0 V, C <sub>L</sub> = 10 pF R <sub>L</sub> = 1 kΩ, See figures 5 and 6	A11	9		2.0	
				10, 11 1/		3.0	
Enable delay "OFF"	t <sub>OFF(EN)</sub>			01	9	0.5	
				02		0.6	
			A11	10, 11 1/		1.0	
Break-before-make delay	t <sub>open</sub>	V <sub>S1A</sub> = V <sub>S4A</sub> = -1 V T <sub>A</sub> = +25°C See figures 5 and 7	A11	9	0.1		

1/ Guaranteed, if not tested, to the specified limits.

2/ RON MATCH specified as a percentage of R<sub>AVERAGE</sub> where:

$$R_{AVERAGE} = \frac{1}{N} \sum_{i=1}^N R_i \text{ with } N = \text{number of channels, } R_i = \text{each channel's "ON" resistance.}$$

3/ Conditions applied to leakage tests insure worst case leakages. All channels are tested.

4/ Verified by leakage tests.

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Device types	01 and 02
Case outline	E
Terminal number	Terminal symbol
1	A <sub>0</sub>
2	ENABLE
3	V <sub>EE</sub>
4	S1A
5	S2A
6	S3A
7	S4A
8	DRAIN A
9	DRAIN B
10	S4B
11	S3B
12	S2B
13	S1B
14	V <sub>CC</sub>
15	GND
16	A <sub>1</sub>

FIGURE 1. Terminal connections.

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A <sub>1</sub>	A <sub>0</sub>	ENABLE	"On" Channel
X	X	L	None
L	L	H	1
L	H	H	2
H	L	H	3
H	H	H	4

FIGURE 2. Truth table.

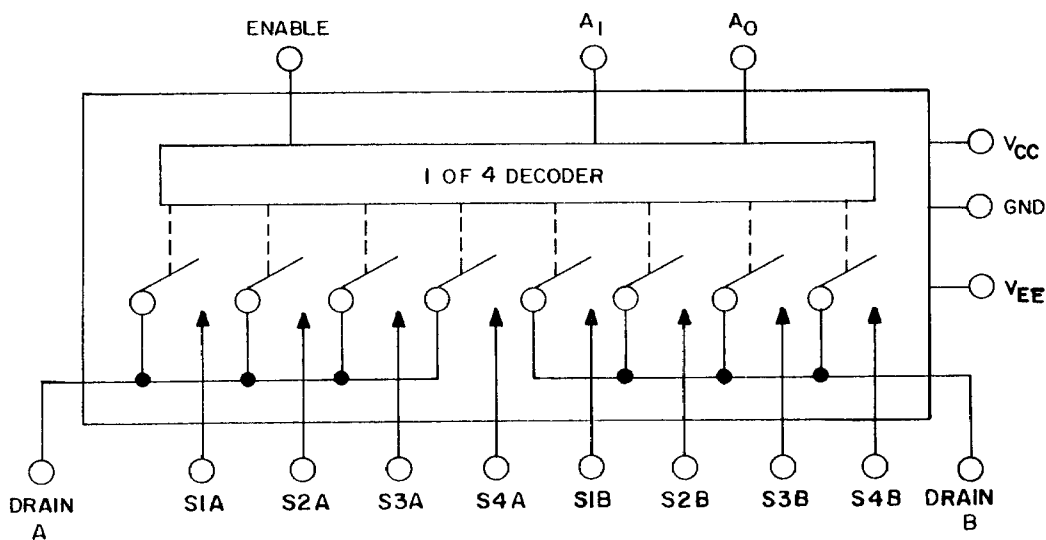


FIGURE 3. Logic diagram.

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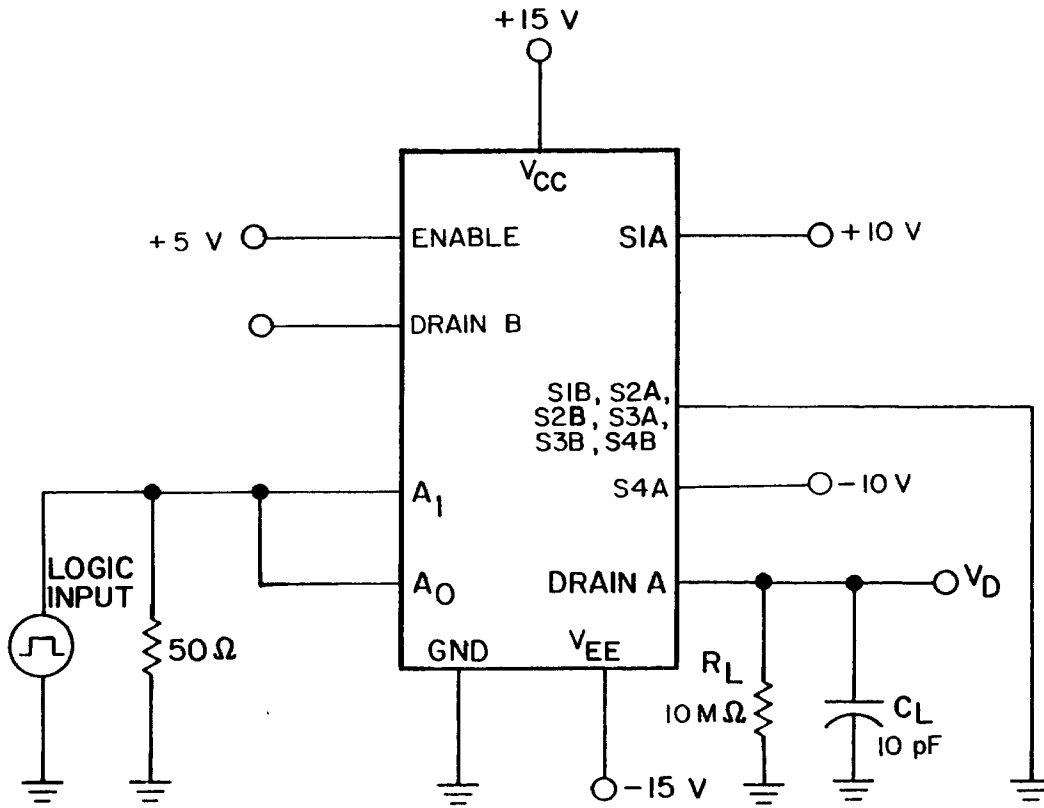


FIGURE 4. Switching time test circuit.

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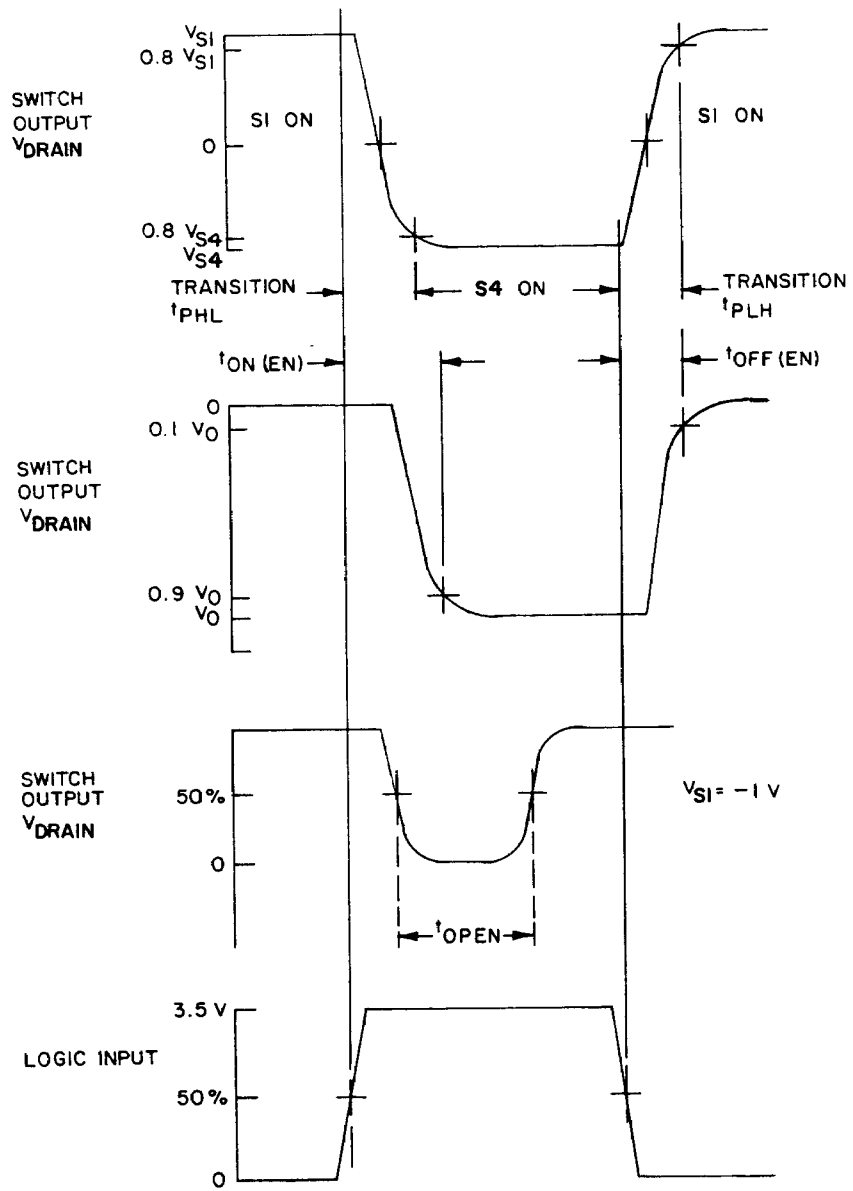


FIGURE 5. Switching time waveforms.

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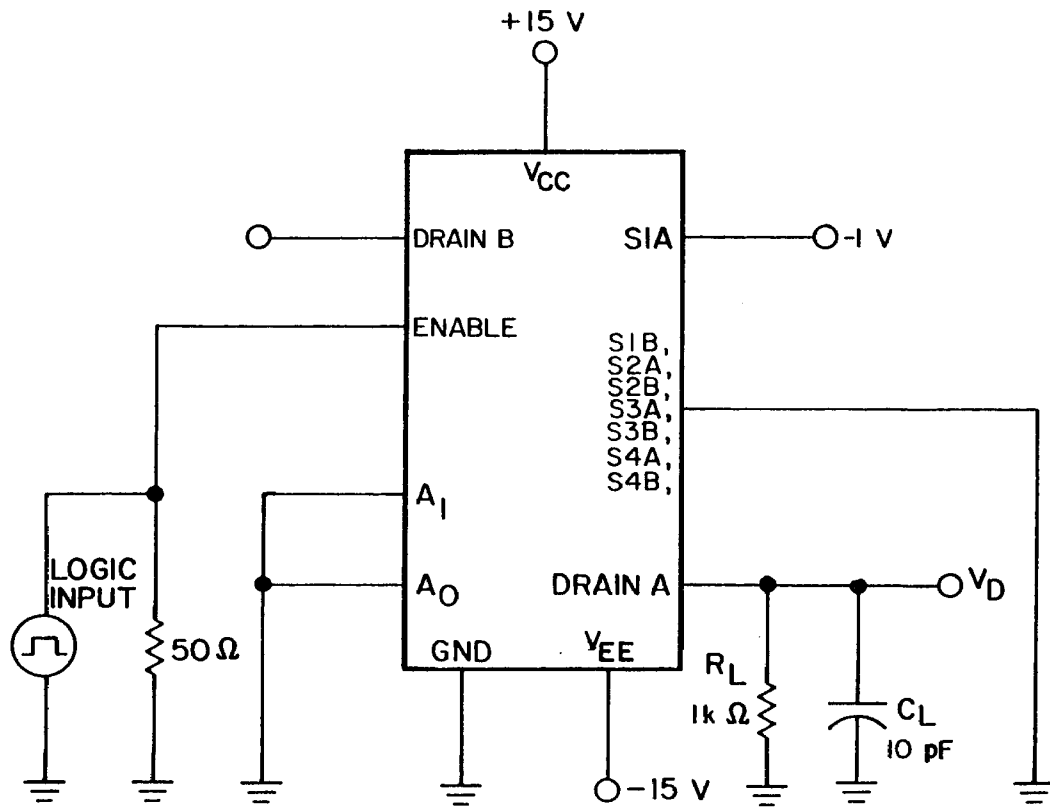


FIGURE 6. Enable delay time test circuit.

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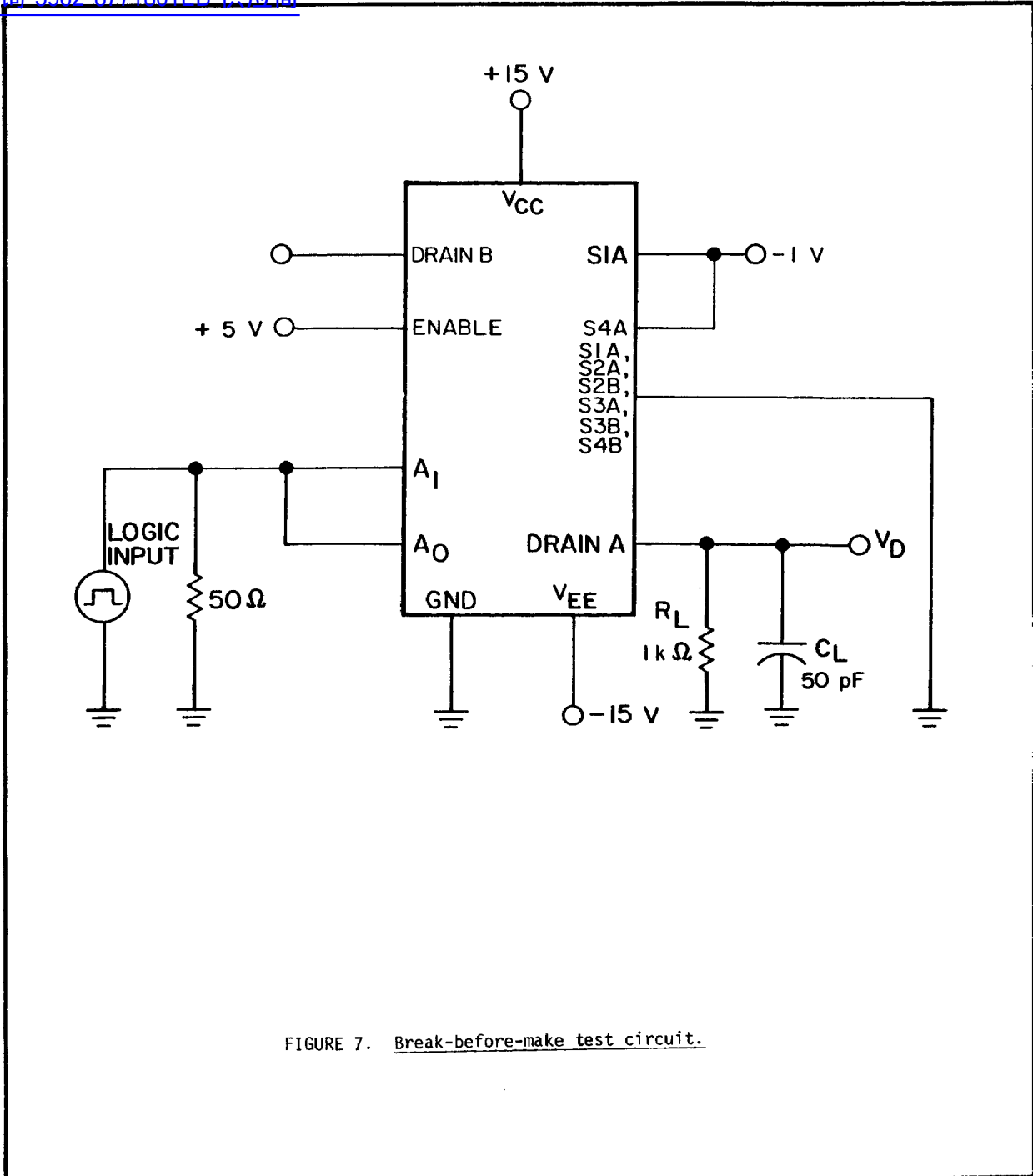


FIGURE 7. Break-before-make test circuit.

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~~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, 7, and 8 in table I, method 5005 of MIL-STD-883 shall be omitted.
- c. Leakage tests, performed on all channels, shall verify 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 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 method 1005 of MIL-STD-883.

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TABLE II. Electrical test requirements.

MIL-STD-883 test requirements	Subgroups (per method 5005, table I)
Interim electrical parameters (method 5004)	1
Final electrical test parameters (method 5004)	1*,2,3,9
Group A test requirements (method 5005)	1,2,3,9, 10**, 11**
Groups C and D end-point electrical parameters (method 5005)	1

\* PDA applies to subgroup 1.  
 \*\* Guaranteed, if not tested, to the limits as specified 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. Microcircuits covered by this drawing will replace the same generic device covered by a contractor-prepared specification or drawing.

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

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An 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 <u>1/</u>
5962-8771801EX	06665	MUX-24AQ
5962-8771802EX	06665	MUX-24BQ

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

06665

Vendor name and address

Precision Monolithics, Incorporated  
 1500 Space Park Drive  
 P.O. Box 58020  
 Santa Clara, CA 95050

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