

REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED
A	Under Table I, V <sub>DD</sub> = 3 V test conditions, Power requirements section, delete 5.5 V and replace with 3.3 V. Under Figure 1, make correction to note 2, delete MO-15-AB3 and replace with MO-178-AB. Under paragraph 6.3, add Mode of transportation and quantity column. - ro	18-06-06	C. SAFFLE



Prepared in accordance with ASME Y14.24

Vendor item drawing

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REV STATUS OF PAGES	REV	A	A	A	A	A	A	A	A	A	A	A	A	A						
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PMIC N/A	PREPARED BY Phu H. Nguyen	DLA LAND AND MARITIME COLUMBUS, OHIO 43218-3990 <a href="http://www.dla.mil/landandmaritime">http://www.dla.mil/landandmaritime</a>	
Original date of drawing YY-MM-DD  12-11-20	CHECKED BY Phu H. Nguyen	TITLE MICROCIRCUIT, DIGITAL-LINEAR, CMOS 1.8 V TO 5.5 V, 2.5 Ω, 2:1 MUX/SPDT SWITCH, MONOLITHIC SILICON	
	APPROVED BY Thomas M. Hess	DWG NO.  <b>V62/12650</b>	
	SIZE <b>A</b>	CODE IDENT. NO. <b>16236</b>	PAGE 1 OF 12
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DISTRIBUTION STATEMENT A. Approved for public release. Distribution is unlimited.

1. SCOPE

1.1 Scope. This drawing documents the general requirements of a high performance complementary metal oxide semiconductor (CMOS) 1.8 V to 5.5 V, 2.5 Ω, 2:1 multiplexer/single pole double throw (Mux/SPDT) switch microcircuit, with an operating temperature range of -55°C to +125°C.

1.2 Vendor Item Drawing Administrative Control Number. The manufacturer's PIN is the item of identification. The vendor item drawing establishes an administrative control number for identifying the item on the engineering documentation:

<u>V62/12650</u>	-	<u>01</u>	<u>X</u>	<u>E</u>
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(s).

<u>Device type</u>	<u>Generic</u>	<u>Circuit function</u>
01	ADG719-EP	CMOS 1.8 V to 5.5 V, 2.5 Ω, 2:1 Mux/SPDT switch

1.2.2 Case outline(s). The case outline(s) are as specified herein.

<u>Outline letter</u>	<u>Number of pins</u>	<u>JEDEC PUB 95</u>	<u>Package style</u>
X	6	JEDEC MO-178-AB	Small outline transistor package

1.2.3 Lead finishes. The lead finishes are as specified below or other lead finishes as provided by the device manufacturer:

<u>Finish designator</u>	<u>Material</u>
A	Hot solder dip
B	Tin-lead plate
C	Gold plate
D	Palladium
E	Gold flash palladium
F	Tin-lead alloy (BGA/CGA)
Z	Other

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1.3 Absolute maximum ratings. 1/

V <sub>DD</sub> to GND .....	-0.3 V to +7.0 V
Analog, Digital inputs .....	-0.3 V to V <sub>DD</sub> + 0.3 V or 30 mA, whichever occurs first 2/
Peak current, S or D .....	100 mA (pulsed at 1 ms, 10% duty cycle max)
Continuous current, S or D .....	30 mA
Operating temperature range: .....	-55°C to +125°C
Storage temperature range .....	-65°C to 150°C
Junction temperature .....	150°C
Case outline X, $\theta_{JA}$ Thermal impedance .....	186.45°C/W 3/
Lead soldering:	
Reflow, peak temperature .....	260(+0/-5) °C
Time at peak temperature .....	20 seconds to 40 seconds
Electrostatic discharge (ESD) .....	1 kV

2. APPLICABLE DOCUMENTS

JEDEC Solid State Technology Association

JEDEC PUB 95 – Registered and Standard Outlines for Semiconductor Devices

(Applications for copies should be addressed to the JEDEC – Solid State Technology Association, 3103 North 10th Street, Suite 240–S, Arlington, VA 22201-2107. or online at <https://www.jedec.org>).

- 1/ Stresses beyond those listed under “absolute maximum ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under “recommended operating conditions” is not implied. Exposure to absolute maximum rated conditions for extended periods may affect device reliability.
- 2/ Over voltages at IN, S, or D will be clamped by internal diodes. Current should be limited to the maximum ratings given.
- 3/ Measured on a 4-layer board.

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### 3. REQUIREMENTS

3.1 Marking. Parts shall be permanently and legibly marked with the manufacturer's part number as shown in 6.3 herein and as follows:

- A. Manufacturer's name, CAGE code, or logo
- B. Pin 1 identifier
- C. ESDS identification (optional)

3.2 Unit container. The unit container shall be marked with the manufacturer's part number and with items A and C (if applicable) above.

3.3 Electrical characteristics. The maximum and recommended operating conditions and electrical performance characteristics are as specified in 1.3, 1.4, and table I herein.

3.4 Design, construction, and physical dimension. The design, construction, and physical dimensions are as specified herein.

#### 3.5 Diagrams.

3.5.1 Case outline. The case outline shall be as shown in 1.2.2 and figure 1.

3.5.2 Terminal connections. The terminal connections shall be as shown in figure 2.

3.5.3 Terminal function. The terminal function shall be as shown in figure 3.

3.5.4 Truth table. The truth table shall be as shown in figure 4.

3.5.5 Functional block diagram. The functional block diagram shall be as shown in figure 5.

3.5.6 On resistance. The On resistance shall be as shown in figure 6.

3.5.7 Off leakage. The Off leakage shall be as shown in figure 7.

3.5.8 On leakage. The On leakage shall be as shown in figure 8.

3.5.9 Switching times. The switching times shall be as shown in figure 9.

3.5.10 Break before make time delay,  $t_D$ . The break before make time delay,  $t_D$  shall be as shown in figure 10.

3.5.11 Off isolation. The Off isolation shall be as shown in figure 11.

3.5.12 Channel to Channel crosstalk. The Channel to Channel crosstalk shall be as shown in figure 12.

3.5.13 Bandwidth. The Bandwidth shall be as shown in figure 13.

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TABLE I. Electrical performance characteristics. 1/

Test	Symbol	Test conditions $V_{DD} = 5\text{ V} \pm 10\%$ , $GND = 0\text{ V}$ unless otherwise noted	Limits						Unit
			+25°C			-55°C to +125°C			
			Min	Typ	Max	Min	Typ	Max	
<b>Analog switch</b>									
Analog signal range							0	$V_{DD}$	V
On Resistance	$R_{ON}$	$V_S = 0\text{ V to }V_{DD}$ , $I_S = -10\text{ mA}$ See FIGURE 6		2.5					$\Omega$
On resistance match between channels	$\Delta R_{ON}$	$V_S = 0\text{ V to }V_{DD}$ , $I_S = -10\text{ mA}$		0.1	4			7	$\Omega$
On resistance Flatness	$R_{FLAT(ON)}$	$V_S = 0\text{ V to }V_{DD}$ , $I_S = -10\text{ mA}$		0.75				1.5	$\Omega$
<b>Leakage current <math>I_S</math> (Off) (<math>V_{DD} = 5.5\text{ V}</math>)</b>									
Source off leakage	$I_S$ (Off)	$V_S = 4.5\text{ V/1 V}$ , $V_D = 1\text{ V/4.5 V}$ ; See FIGURE 7		$\pm 0.01$	$\pm 0.25$			1	nA
Channel On leakage	$I_D$ , $I_S$ (ON)	$V_S = V_D = 1\text{ V}$ or $V_S = V_D = 4.5\text{ V}$ See FIGURE 8		$\pm 0.01$	$\pm 0.25$			5	nA
<b>Digital inputs</b>									
Input high voltage	$V_{IH}$						2.4		V
Input low voltage	$V_{IL}$							0.8	V
Input current	$I_{NL}$ or $I_{NH}$	$V_{IN} = V_{INL}$ or $V_{INH}$		0.005				$\pm 0.1$	$\mu\text{A}$
<b>Dynamic characteristics 2/</b>									
Switching time, ON	$t_{ON}$	$R_L = 300\ \Omega$ , $C_L = 35\text{ pF}$ , $V_S = 3\text{ V}$ , See FIGURE 9		7				12	ns
Switching time, OFF	$t_{OFF}$			3				6	ns
Break before Make time delay	$t_D$	$R_L = 300\ \Omega$ , $C_L = 35\text{ pF}$ , $V_{S1} = V_{S2} = 3\text{ V}$ , See FIGURE 10		8		1			ns
Off Isolation		$R_L = 50\ \Omega$ , $C_L = 5\text{ pF}$ , $f = 10\text{ MHz}$ , See FIGURE 11		-67					dB
		$R_L = 50\ \Omega$ , $C_L = 5\text{ pF}$ , $f = 1\text{ MHz}$ , See FIGURE 11		-87					dB
Channel to channel crosstalk		$R_L = 50\ \Omega$ , $C_L = 5\text{ pF}$ , $f = 10\text{ MHz}$ , See FIGURE 12		-62					dB
		$R_L = 50\ \Omega$ , $C_L = 5\text{ pF}$ , $f = 1\text{ MHz}$ , See FIGURE 12		-82					dB
Bandwidth -3 dB		$R_L = 50\ \Omega$ , $C_L = 5\text{ pF}$ , See FIGURE 13		200					MHz
$C_S$ (Off)				7					pF
$C_D$ , $C_S$ (ON)				27					pF
<b>Power requirements (<math>V_{DD} = 5.5\text{ V}</math>, Digital inputs = 0 V or 5.5 V)</b>									
Supply current	$I_{DD}$			0.001				1.0	$\mu\text{A}$

See footnote at end of table.

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TABLE I. Electrical performance characteristics - Continued. 1/

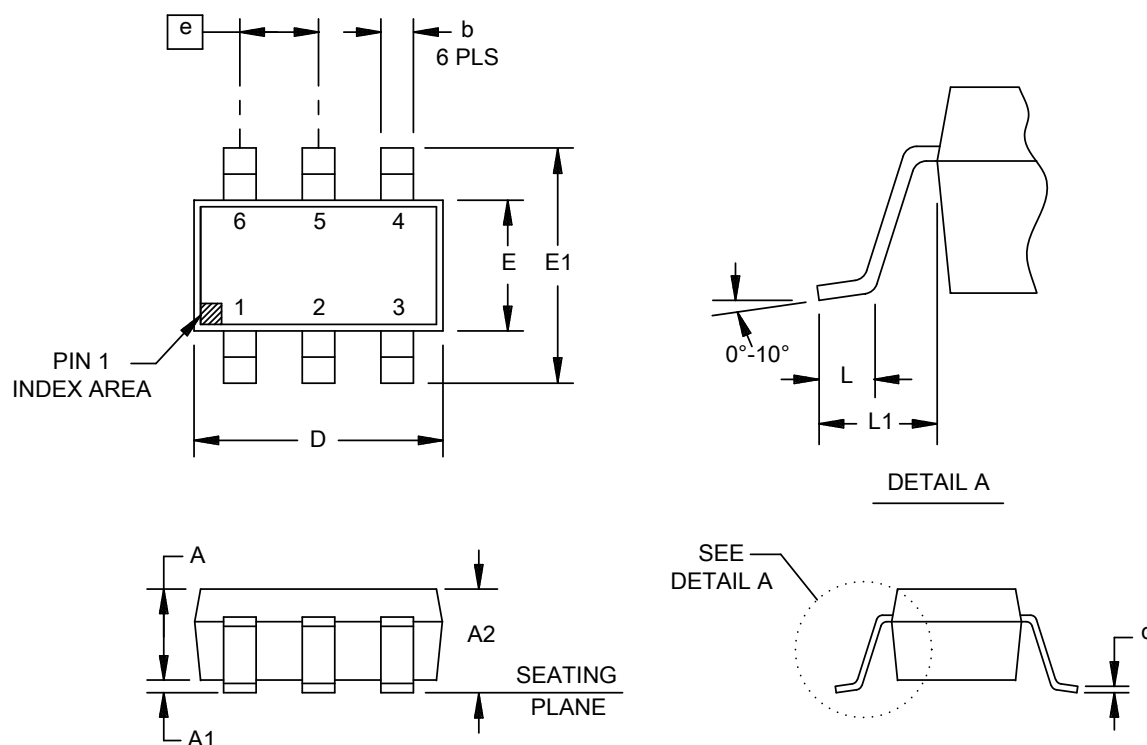
Test	Symbol	Test conditions $V_{DD} = 3\text{ V} \pm 10\%$ , $GND = 0\text{ V}$ unless otherwise noted	Limits						Unit
			+25°C			-55°C to +125°C			
			Min	Typ	Max	Min	Typ	Max	
<b>Analog switch</b>									
Analog signal range						0		$V_{DD}$	V
On Resistance	$R_{ON}$	$V_S = 0\text{ V to }V_{DD}$ , $I_S = -10\text{ mA}$ See FIGURE 6		6				12	$\Omega$
On resistance match between channels	$\Delta R_{ON}$	$V_S = 0\text{ V to }V_{DD}$ , $I_S = -10\text{ mA}$		0.1				0.4	$\Omega$
On resistance Flatness	$R_{FLAT(ON)}$	$V_S = 0\text{ V to }V_{DD}$ , $I_S = -10\text{ mA}$					2.5		$\Omega$
<b>Leakage current <math>I_S</math> (Off) (<math>V_{DD} = 3.3\text{ V}</math>)</b>									
Source off leakage	$I_S$ (Off)	$V_S = 3\text{ V}/1\text{ V}$ , $V_D = 1\text{ V}/3\text{ V}$ ; See FIGURE 7		$\pm 0.01$	$\pm 0.25$			1	nA
Channel On leakage	$I_D$ , $I_S$ (ON)	$V_S = V_D = 1\text{ V}$ or $V_S = V_D = 3\text{ V}$ See FIGURE 8		$\pm 0.01$	$\pm 0.25$			5	nA
<b>Digital inputs</b>									
Input high voltage	$V_{IH}$					2.0			V
Input low voltage	$V_{IL}$							0.8	V
Input current	$I_{NL}$ or $I_{NH}$	$V_{IN} = V_{INL}$ or $V_{INH}$		0.005				$\pm 0.1$	$\mu\text{A}$
<b>Dynamic characteristics 2/</b>									
Switching time, ON	$t_{ON}$	$R_L = 300\ \Omega$ , $C_L = 35\text{ pF}$ ,		10				15	ns
Switching time, OFF	$t_{OFF}$	$V_S = 2\text{ V}$ , See FIGURE 9		4				8	ns
Break before Make time delay	$t_D$	$R_L = 300\ \Omega$ , $C_L = 35\text{ pF}$ , $V_{S1} = V_{S2} = 2\text{ V}$ , See FIGURE 10		8		1			ns
Off Isolation		$R_L = 50\ \Omega$ , $C_L = 5\text{ pF}$ , $f = 10\text{ MHz}$ , See FIGURE 11		-67					dB
		$R_L = 50\ \Omega$ , $C_L = 5\text{ pF}$ , $f = 1\text{ MHz}$ , See FIGURE 11		-87					dB
Channel to channel crosstalk		$R_L = 50\ \Omega$ , $C_L = 5\text{ pF}$ , $f = 10\text{ MHz}$ , See FIGURE 12		-62					dB
		$R_L = 50\ \Omega$ , $C_L = 5\text{ pF}$ , $f = 1\text{ MHz}$ , See FIGURE 12		-82					dB
Bandwidth -3 dB		$R_L = 50\ \Omega$ , $C_L = 5\text{ pF}$ , See FIGURE 13		200					MHz
$C_S$ (Off)				7					pF
$C_D$ , $C_S$ (ON)				27					pF
<b>Power requirements (<math>V_{DD} = 3.3\text{ V}</math>, Digital inputs = 0 V or 3.3 V)</b>									
Supply current	$I_{DD}$			0.001	1.0				$\mu\text{A}$

1/ Testing and other quality control techniques are used to the extent deemed necessary to assure product performance over the specified temperature range. Product may not necessarily be tested across the full temperature range and all parameters may not necessarily be tested. In the absence of specific parametric testing, product performance is assured by characterization and/or design.

2/ Guaranteed by design, not subject to production test.

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Case X



Dimensions					
Symbol	Millimeters		Symbol	Millimeters	
	Min	Max		Min	Max
A	0.90	1.30	E	1.50	1.70
A1	0.05	0.15	E1	2.60	3.00
A2	0.95	1.45	e	0.95 BSC	
b	0.30	0.50	L	0.35	0.55
D	2.80	3.00	L1	0.60 BSC	

NOTES:

1. All linear dimensions are in millimeters.
2. Falls within JEDEC MO-178-AB.

FIGURE 1. Case outline.

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Case outline X			
Terminal number	Terminal symbol	Terminal number	Terminal symbol
1	IN	6	S2
2	V <sub>DD</sub>	5	D
3	GND	4	S1

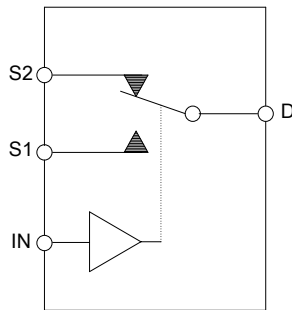
FIGURE 2. Terminal connections.

Case outline X		
Terminal		Description
Number	Mnemonic	
1	IN	Digital switch control pin.
2	V <sub>DD</sub>	Most positive power supply pin.
3	GND	Ground (0 V) reference pin.
4	S1	Source terminal. Can be used as an input or output
5	D	Drain terminal. Can be used as an input or output
6	S2	Source terminal. Can be used as an input or output

FIGURE 3. Terminal function.

Input IN	Switch S1	Switch S2
0	On	Off
1	Off	On

FIGURE 4. Truth table



NOTES:

1. Switches shown for a logic 1 input.

FIGURE 5. Functional block diagram.

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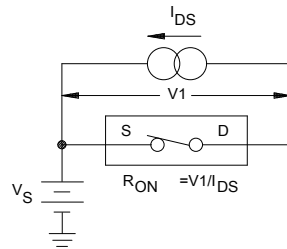


FIGURE 6. On resistance.

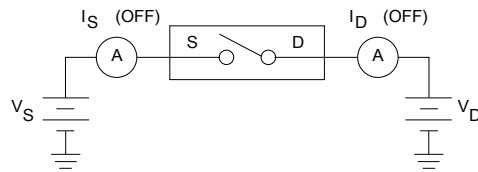


FIGURE 7. Off leakage.

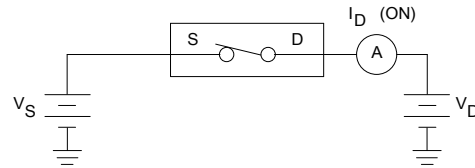


FIGURE 8. On leakage.

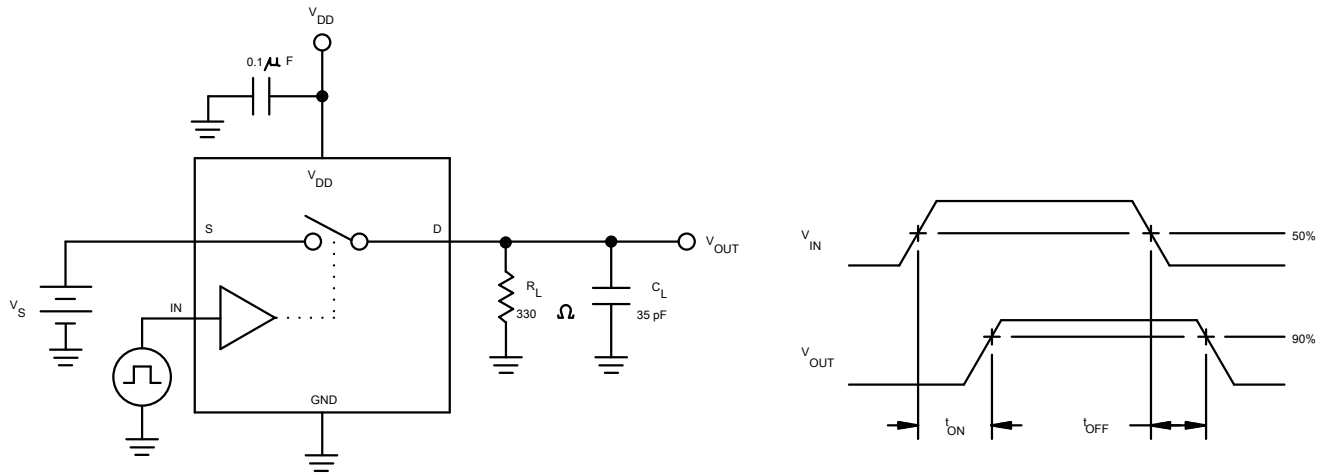


FIGURE 9. Switching times.

<p align="center"><b>DLA LAND AND MARITIME COLUMBUS, OHIO</b></p>	<p align="center"><b>SIZE A</b></p>	<p align="center"><b>CODE IDENT NO. 16236</b></p>	<p align="center"><b>DWG NO. V62/12650</b></p>
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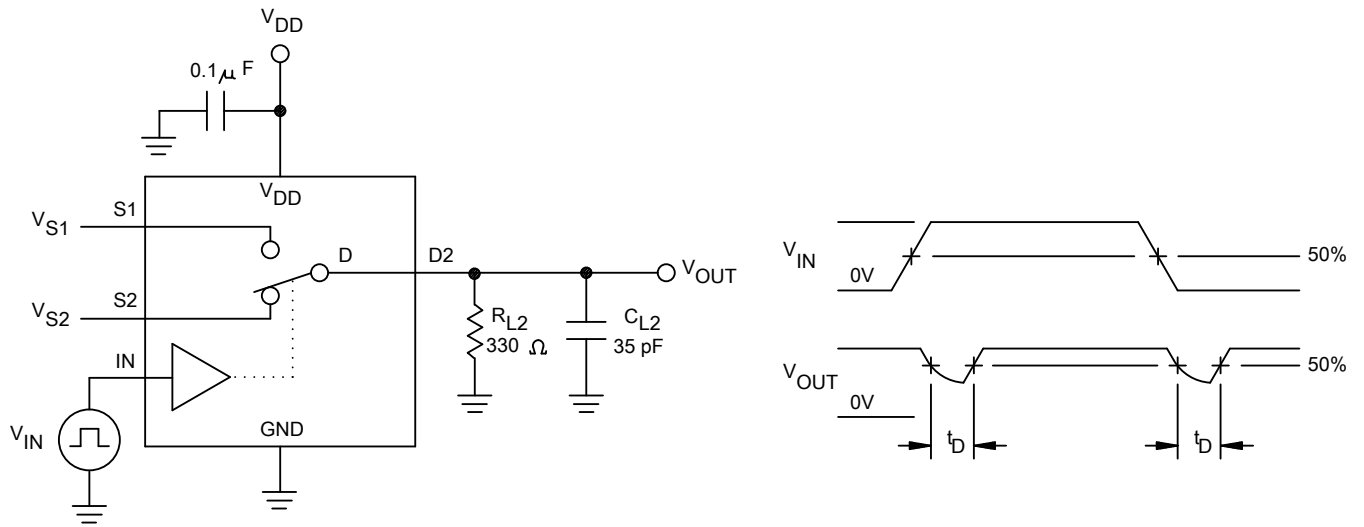


FIGURE 10. Break before make time delay,  $t_D$ .

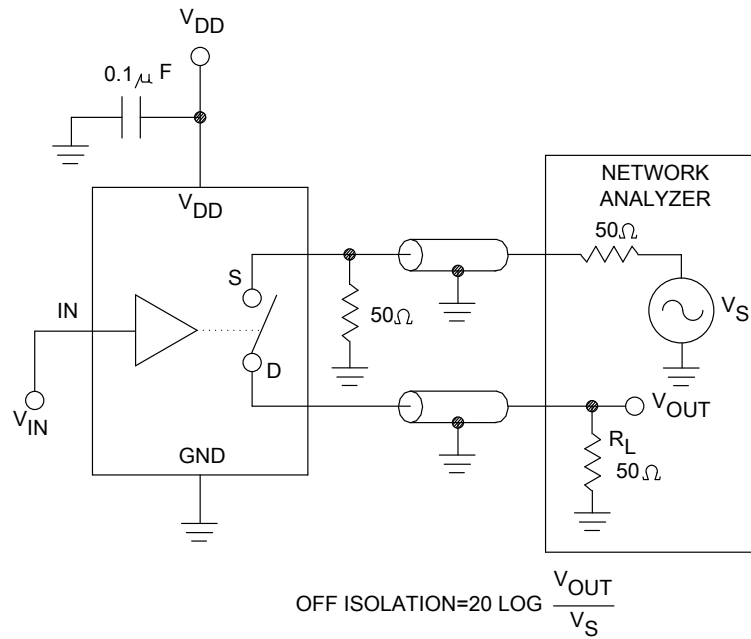


FIGURE 11. Off isolation.

<p align="center"><b>DLA LAND AND MARITIME COLUMBUS, OHIO</b></p>	<p align="center"><b>SIZE A</b></p>	<p align="center"><b>CODE IDENT NO. 16236</b></p>	<p align="center"><b>DWG NO. V62/12650</b></p>
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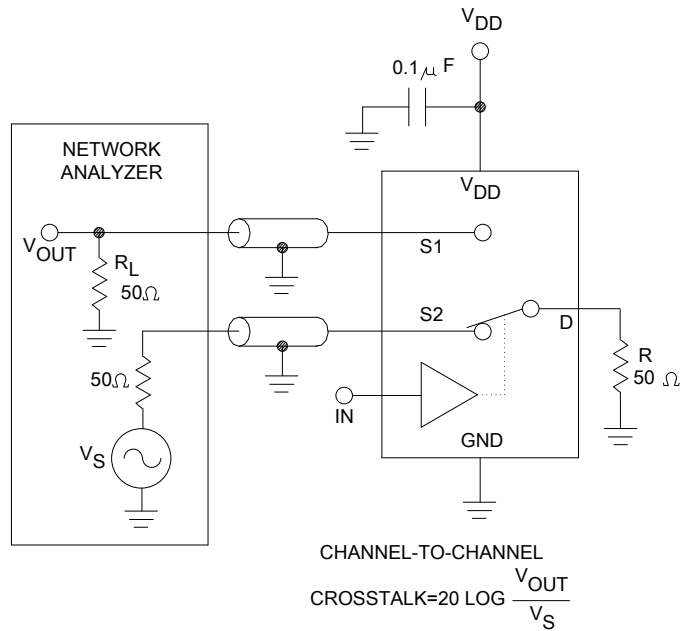


FIGURE 12. Channel to Channel crosstalk.

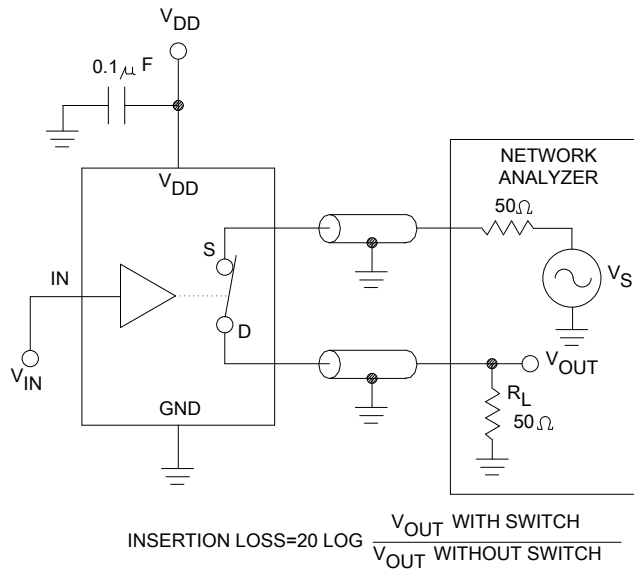


FIGURE 13. Bandwidth.

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4. VERIFICATION

4.1 Product assurance requirements. The manufacturer is responsible for performing all inspection and test requirements as indicated in their internal documentation. Such procedures should include proper handling of electrostatic sensitive devices, classification, packaging, and labeling of moisture sensitive devices, as applicable.

5. PREPARATION FOR DELIVERY

5.1 Packaging. Preservation, packaging, labeling, and marking shall be in accordance with the manufacturer's standard commercial practices for electrostatic discharge sensitive devices.

6. NOTES

6.1 ESDS. Devices are electrostatic discharge sensitive and are classified as ESDS class 1 minimum.

6.2 Configuration control. The data contained herein is based on the salient characteristics of the device manufacturer's data book. The device manufacturer reserves the right to make changes without notice. This drawing will be modified as changes are provided.

6.3 Suggested source(s) of supply. Identification of the suggested source(s) of supply herein is not to be construed as a guarantee of present or continued availability as a source of supply for the item. DLA Land and Maritime maintains an online database of all current sources of supply at <https://landandmaritimeapps.dla.mil/programs/smcr/>.

Vendor item drawing administrative control number <u>1/</u>	Device manufacturer CAGE code	Mode of transportation and quantity	Vendor part number
V62/12650-01XE	24355	Reel, 3,000 units	ADG719SRJZ-EP-RL7

1/ The vendor item drawing establishes an administrative control number for identifying the item on the engineering documentation.

CAGE code

24355

Source of supply

Analog Devices  
 Route 1 Industrial Park  
 P.O. Box 9106  
 Norwood, MA 02062  
 Point of contact: Raheen Business Park  
 Limerick, Ireland

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