

ADG758/ADG759—SPECIFICATIONS¹ ($V_{DD} = 5\text{ V} \pm 10\%$, $V_{SS} = 0\text{ V}$, $GND = 0\text{ V}$, unless otherwise noted.)

Parameter	B Version		Unit	Test Conditions/Comments
	+25°C	–40°C to +85°C		
ANALOG SWITCH				
Analog Signal Range		0 V to V _{DD}	V	
ON Resistance (R _{ON})	3		Ω typ	V _S = 0 V to V _{DD} ; I _{DS} = 10 mA; Test Circuit 1
	4.5	5	Ω max	
ON Resistance Match Between Channels (ΔR _{ON})		0.4	Ω typ	
		0.8	Ω max	V _S = 0 V to V _{DD} ; I _{DS} = 10 mA
ON Resistance Flatness (R _{FLAT(ON)})	0.75		Ω typ	V _S = 0 V to V _{DD} ; I _{DS} = 10 mA
		1.2	Ω max	
LEAKAGE CURRENTS				
Source OFF Leakage I _S (OFF)	±0.01		nA typ	V _{DD} = 5.5 V
	±0.1	±0.3	nA max	V _D = 4.5 V/1 V, V _S = 1 V/4.5 V; Test Circuit 2
Drain OFF Leakage I _D (OFF)	±0.01		nA typ	V _D = 4.5 V/1 V, V _S = 1 V/4.5 V;
	±0.1	±0.75	nA max	Test Circuit 3
Channel ON Leakage I _D , I _S (ON)	±0.01		nA typ	V _D = V _S = 1 V, or 4.5 V, Test Circuit 4
	±0.1	±0.75	nA max	
DIGITAL INPUTS				
Input High Voltage, V _{INH}		2.4	V min	
Input Low Voltage, V _{INL}		0.8	V max	
Input Current I _{INL} or I _{INH}	0.005		μA typ	V _{IN} = V _{INL} or V _{INH}
		±0.1	μA max	
C _{IN} , Digital Input Capacitance	2		pF typ	
DYNAMIC CHARACTERISTICS ²				
t _{TRANSITION}	14		ns typ	R _L = 300 Ω, C _L = 35 pF; Test Circuit 5
		25	ns max	V _{S1} = 3 V/0 V, V _{S8} = 0 V/3 V
Break-Before-Make Time Delay, t _D	8		ns typ	R _L = 300 Ω, C _L = 35 pF
		1	ns min	V _S = 3 V; Test Circuit 6
t _{ON} (EN)	14		ns typ	R _L = 300 Ω, C _L = 35 pF
		25	ns max	V _S = 3 V; Test Circuit 7
t _{OFF} (EN)	7		ns typ	R _L = 300 Ω, C _L = 35 pF
		12	ns max	V _S = 3 V; Test Circuit 7
Charge Injection	±3		pC typ	V _S = 2.5 V, R _S = 0 Ω, C _L = 1 nF; Test Circuit 8
Off Isolation	–60		dB typ	R _L = 50 Ω, C _L = 5 pF, f = 10 MHz
	–80		dB typ	R _L = 50 Ω, C _L = 5 pF, f = 1 MHz; Test Circuit 9
Channel-to-Channel Crosstalk	–60		dB typ	R _L = 50 Ω, C _L = 5 pF, f = 10 MHz
	–80		dB typ	R _L = 50 Ω, C _L = 5 pF, f = 1 MHz; Test Circuit 10
–3 dB Bandwidth	55		MHz typ	R _L = 50 Ω, C _L = 5 pF; Test Circuit 11
C _S (OFF)	13		pF typ	f = 1 MHz
C _D (OFF)				
ADG758	85		pF typ	f = 1 MHz
ADG759	42		pF typ	f = 1 MHz
C _D , C _S (ON)				
ADG758	96		pF typ	f = 1 MHz
ADG759	48		pF typ	f = 1 MHz
POWER REQUIREMENTS				
I _{DD}	0.001		μA typ	V _{DD} = 5.5 V
		1.0	μA max	Digital Inputs = 0 V or 5.5 V

NOTES

¹Temperature range is as follows: B Version: –40°C to +85°C.

²Guaranteed by design, not subject to production test.

Specifications subject to change without notice.

SPECIFICATIONS¹(V_{DD} = 3 V ± 10%, V_{SS} = 0 V, GND = 0 V, unless otherwise noted.)

Parameter	B Version		Unit	Test Conditions/Comments
	+25°C	−40°C to +85°C		
ANALOG SWITCH				
Analog Signal Range		0 V to V _{DD}	V	V _S = 0 V to V _{DD} , I _{DS} = 10 mA; Test Circuit 1 V _S = 0 V to V _{DD} , I _{DS} = 10 mA
ON Resistance (R _{ON})	8		Ω typ	
	11	12	Ω max	
ON Resistance Match Between Channels (ΔR _{ON})		0.4	Ω typ	
		1.2	Ω max	
LEAKAGE CURRENTS				
Source OFF Leakage I _S (OFF)	±0.01		nA typ	V _{DD} = 3.3 V
	±0.1	±0.3	nA max	V _S = 3 V/1 V, V _D = 1 V/3 V;
Drain OFF Leakage I _D (OFF)	±0.01		nA typ	Test Circuit 2
	±0.1	±0.75	nA max	V _S = 3 V/1 V, V _D = 1 V/3 V;
Channel ON Leakage I _D , I _S (ON)	±0.01		nA typ	Test Circuit 3
	±0.1	±0.75	nA max	V _S = V _D = 1 V or 3 V; Test Circuit 4
DIGITAL INPUTS				
Input High Voltage, V _{INH}		2.0	V min	V _{IN} = V _{INL} or V _{INH}
Input Low Voltage, V _{INL}		0.8	V max	
Input Current				
I _{INL} or I _{INH}	0.005	±0.1	μA typ	
			μA max	
C _{IN} , Digital Input Capacitance	2		pF typ	
DYNAMIC CHARACTERISTICS ²				
t _{TRANSITION}	18		ns typ	R _L = 300 Ω, C _L = 35 pF; Test Circuit 5
		30	ns max	
Break-Before-Make Time Delay, t _D	8		ns typ	V _{S1} = 2 V/0 V, V _{S2} = 0 V/2 V
		1	ns min	R _L = 300 Ω, C _L = 35 pF
t _{ON} (EN)	18		ns typ	V _S = 2 V; Test Circuit 6
		30	ns max	R _L = 300 Ω, C _L = 35 pF
t _{OFF} (EN)	8		ns typ	V _S = 2 V; Test Circuit 7
		15	ns max	R _L = 300 Ω, C _L = 35 pF
Charge Injection	±3		pC typ	V _S = 2 V; Test Circuit 7
				V _S = 1.5 V, R _S = 0 Ω, C _L = 1 nF;
Off Isolation	−60		dB typ	Test Circuit 8
	−80		dB typ	R _L = 50 Ω, C _L = 5 pF, f = 10 MHz
				R _L = 50 Ω, C _L = 5 pF, f = 1 MHz;
Channel-to-Channel Crosstalk	−60		dB typ	Test Circuit 9
	−80		dB typ	R _L = 50 Ω, C _L = 5 pF, f = 10 MHz
				R _L = 50 Ω, C _L = 5 pF, f = 1 MHz;
−3 dB Bandwidth	55		MHz typ	Test Circuit 10
C _S (OFF)	13		pF typ	R _L = 50 Ω, C _L = 5 pF; Test Circuit 11
C _D (OFF)				f = 1 MHz
ADG758	85		pF typ	f = 1 MHz
ADG759	42		pF typ	f = 1 MHz
C _D , C _S (ON)				
ADG758	96		pF typ	f = 1 MHz
ADG759	48		pF typ	f = 1 MHz
POWER REQUIREMENTS				
I _{DD}	0.001		μA typ	V _{DD} = 3.3 V
		1.0	μA max	Digital Inputs = 0 V or 3.3 V

NOTES

¹Temperature ranges are as follows: B Version: –40°C to +85°C.²Guaranteed by design, not subject to production test.

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ADG758/ADG759—SPECIFICATIONS¹

DUAL SUPPLY ($V_{DD} = +2.5\text{ V} \pm 10\%$, $V_{SS} = -2.5\text{ V} \pm 10\%$, $GND = 0\text{ V}$, unless otherwise noted.)

Parameter	B Version		Unit	Test Conditions/Comments
	+25°C	–40°C to +85°C		
ANALOG SWITCH				
Analog Signal Range		V_{SS} to V_{DD}	V	
ON Resistance (R_{ON})	2.5		Ω typ	$V_S = V_{SS}$ to V_{DD} , $I_{DS} = 10\text{ mA}$; Test Circuit 1
	4.5	5	Ω max	
ON Resistance Match Between Channels (ΔR_{ON})		0.4	Ω typ	$V_S = V_{SS}$ to V_{DD} , $I_{DS} = 10\text{ mA}$
		0.8	Ω max	$V_S = V_{SS}$ to V_{DD} , $I_{DS} = 10\text{ mA}$
ON Resistance Flatness ($R_{FLAT(ON)}$)	0.6		Ω typ	$V_S = V_{SS}$ to V_{DD} , $I_{DS} = 10\text{ mA}$
		1.0	Ω max	
LEAKAGE CURRENTS				
Source OFF Leakage I_S (OFF)	± 0.01		nA typ	$V_{DD} = +2.75\text{ V}$, $V_{SS} = -2.75\text{ V}$
	± 0.1	± 0.3	nA max	$V_S = +2.25\text{ V}/-1.25\text{ V}$, $V_D = -1.25\text{ V}/+2.25\text{ V}$; Test Circuit 2
Drain OFF Leakage I_D (OFF)	± 0.01		nA typ	$V_S = +2.25\text{ V}/-1.25\text{ V}$, $V_D = -1.25\text{ V}/+2.25\text{ V}$; Test Circuit 3
	± 0.1	± 0.75	nA max	
Channel ON Leakage I_D , I_S (ON)	± 0.01		nA typ	$V_S = V_D = +2.25\text{ V}/-1.25\text{ V}$; Test Circuit 4
	± 0.1	± 0.75	nA max	
DIGITAL INPUTS				
Input High Voltage, V_{INH}		1.7	V min	
Input Low Voltage, V_{INL}		0.7	V max	
Input Current				
I_{INL} or I_{INH}	0.005		μA typ	$V_{IN} = V_{INL}$ or V_{INH}
		± 0.1	μA max	
C_{IN} , Digital Input Capacitance	2		pF typ	
DYNAMIC CHARACTERISTICS²				
$t_{TRANSITION}$	14		ns typ	$R_L = 300\ \Omega$, $C_L = 35\text{ pF}$; Test Circuit 5
		25	ns max	$V_S = 1.5\text{ V}/0\text{ V}$; Test Circuit 5
Break-Before-Make Time Delay, t_D	8		ns typ	$R_L = 300\ \Omega$, $C_L = 35\text{ pF}$
		1	ns min	$V_S = 1.5\text{ V}$; Test Circuit 6
t_{ON} (EN)	14		ns typ	$R_L = 300\ \Omega$, $C_L = 35\text{ pF}$
		25	ns max	$V_S = 1.5\text{ V}$; Test Circuit 7
t_{OFF} (EN)	8		ns typ	$R_L = 300\ \Omega$, $C_L = 35\text{ pF}$
		15	ns max	$V_S = 1.5\text{ V}$; Test Circuit 7
Charge Injection	± 3		pC typ	$V_S = 0\text{ V}$, $R_S = 0\ \Omega$, $C_L = 1\text{ nF}$; Test Circuit 8
Off Isolation	–60		dB typ	$R_L = 50\ \Omega$, $C_L = 5\text{ pF}$, $f = 10\text{ MHz}$
	–80		dB typ	$R_L = 50\ \Omega$, $C_L = 5\text{ pF}$, $f = 1\text{ MHz}$; Test Circuit 9
Channel-to-Channel Crosstalk	–60		dB typ	$R_L = 50\ \Omega$, $C_L = 5\text{ pF}$, $f = 10\text{ MHz}$
	–80		dB typ	$R_L = 50\ \Omega$, $C_L = 5\text{ pF}$, $f = 1\text{ MHz}$; Test Circuit 10
–3 dB Bandwidth	55		MHz typ	$R_L = 50\ \Omega$, $C_L = 5\text{ pF}$; Test Circuit 11
C_S (OFF)	13		pF typ	$f = 1\text{ MHz}$
C_D (OFF)				
ADG758	85		pF typ	$f = 1\text{ MHz}$
ADG759	42		pF typ	$f = 1\text{ MHz}$
C_D , C_S (ON)				
ADG758	96		pF typ	$f = 1\text{ MHz}$
ADG759	48		pF typ	$f = 1\text{ MHz}$
POWER REQUIREMENTS				
I_{DD}	0.001		μA typ	$V_{DD} = +2.75\text{ V}$
		1.0	μA max	Digital Inputs = 0 V or 2.75 V
I_{SS}	0.001		μA typ	$V_{SS} = -2.75\text{ V}$
		1.0	μA max	Digital Inputs = 0 V or 2.75 V

NOTES

¹Temperature range is as follows: B Version: –40°C to +85°C.

²Guaranteed by design, not subject to production test.

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ABSOLUTE MAXIMUM RATINGS

$T_A = 25^\circ\text{C}$, unless otherwise noted.

Parameter	Rating
V_{DD} to V_{SS}	7 V
V_{DD} to GND	-0.3 V to +7 V
V_{SS} to GND	+0.3 V to -3.5 V
Analog Inputs ¹	$V_{SS} - 0.3\text{ V}$ to $V_{DD} + 0.3\text{ V}$ or 30 mA, Whichever Occurs First
Digital Inputs ¹	-0.3 V to $V_{DD} + 0.3\text{ V}$ or 30 mA, Whichever Occurs First
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	
Industrial (B Version)	-40°C to +85°C
Storage Temperature Range	-65°C to +150°C
Junction Temperature	150°C
Chip Scale Package, θ_{JA} Thermal Impedance	32°C/W
Lead Temperature, Soldering	
Vapor Phase (60 sec)	215°C
Infrared (15 sec)	220°C

¹ Overvoltages at EN, A, S, or D will be clamped by internal diodes. Current should be limited to the maximum ratings given.

ESD CAUTION

ESD (electrostatic discharge) sensitive device. Electrostatic charges as high as 4000 V readily accumulate on the human body and test equipment and can discharge without detection. Although this product features proprietary ESD protection circuitry, permanent damage may occur on devices subjected to high energy electrostatic discharges. Therefore, proper ESD precautions are recommended to avoid performance degradation or loss of functionality.



Table I. ADG758 Truth Table

A2	A1	A0	EN	Switch Condition
X	X	X	0	NONE
0	0	0	1	1
0	0	1	1	2
0	1	0	1	3
0	1	1	1	4
1	0	0	1	5
1	0	1	1	6
1	1	0	1	7
1	1	1	1	8

X = Don't Care

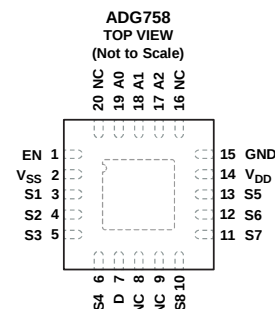
Table II. ADG759 Truth Table

A1	A0	EN	ON Switch Pair
X	X	0	NONE
0	0	1	1
0	1	1	2
1	0	1	3
1	1	1	4

X = Don't Care

Stresses above those listed under Absolute Maximum Ratings may cause permanent damage to the device. This is a stress rating only; functional operation of the device at these or any other conditions above those indicated in the operational section of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

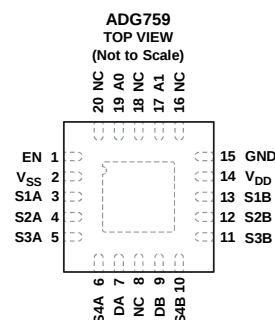
PIN CONFIGURATIONS



NOTES

1. NC = NO CONNECT.
2. EXPOSED PAD TIED TO SUBSTRATE, V_{SS} .

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NOTES

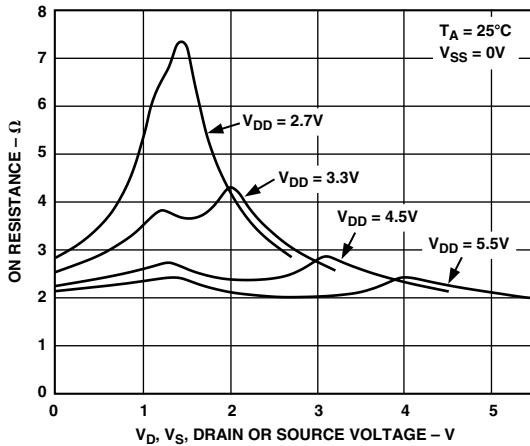
1. NC = NO CONNECT.
2. EXPOSED PAD TIED TO SUBSTRATE, V_{SS} .

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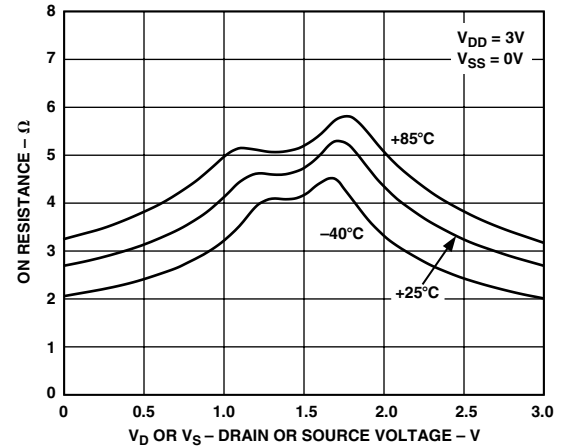
TERMINOLOGY

V_{DD}	Most Positive Power Supply Potential
V_{SS}	Most Negative Power Supply in a dual-supply application. In single-supply applications, this should be tied to ground at the device.
GND	Ground (0 V) Reference
S	Source Terminal. May be an input or output.
D	Drain Terminal. May be an input or output.
IN	Logic Control Input
R_{ON}	Ohmic Resistance between D and S
$R_{FLAT(ON)}$	Flatness is defined as the difference between the maximum and minimum value of ON resistance as measured over the specified analog signal range.
I_S (OFF)	Source Leakage Current with the Switch OFF
I_D (OFF)	Drain leakage Current with the Switch OFF
I_D, I_S (ON)	Channel Leakage current with the Switch ON
V_D (V_S)	Analog Voltage on Terminals D, S
C_S (OFF)	OFF Switch Source Capacitance. Measured with reference to ground.
C_D (OFF)	OFF Switch Drain Capacitance. Measured with reference to ground.
C_D, C_S (ON)	ON Switch Capacitance. Measured with reference to ground.
C_{IN}	Digital Input Capacitance
$t_{TRANSITION}$	Delay Time measured between the 50% and 90% points of the digital inputs and the switch ON condition when switching from one address state to another.
t_{ON} (EN)	Delay Time between the 50% and 90% points of the EN digital input and the switch ON condition.
t_{OFF} (EN)	Delay Time between the 50% and 90% points of the EN digital input and the switch OFF condition.
t_{OPEN}	OFF Time measured between the 80% points of both switches when switching from one address state to another.
Off Isolation	A measure of unwanted signal coupling through an OFF switch.
Crosstalk	A measure of unwanted signal which is coupled through from one channel to another as a result of parasitic capacitance.
Charge Injection	A measure of the glitch impulse transferred from the digital input to the analog output during switching.
On Response	The Frequency Response of the ON Switch.
On Loss	The Loss Due to the ON Resistance of the Switch
V_{INL}	Maximum Input Voltage for Logic “0”
V_{INH}	Minimum Input Voltage for Logic “1”
I_{INL} (I_{INH})	Input Current of the Digital Input
I_{DD}	Positive Supply Current
I_{SS}	Negative Supply Current

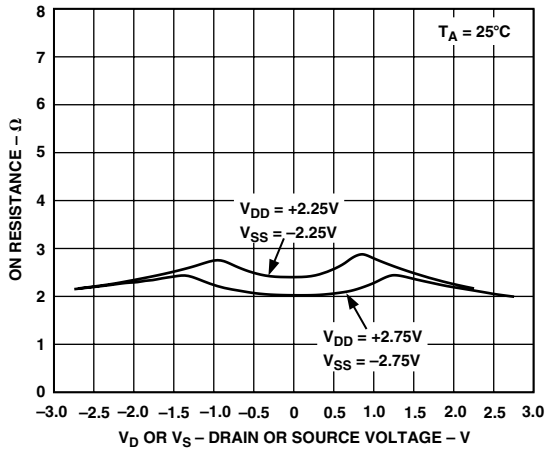
Typical Performance Characteristics—ADG758/ADG759



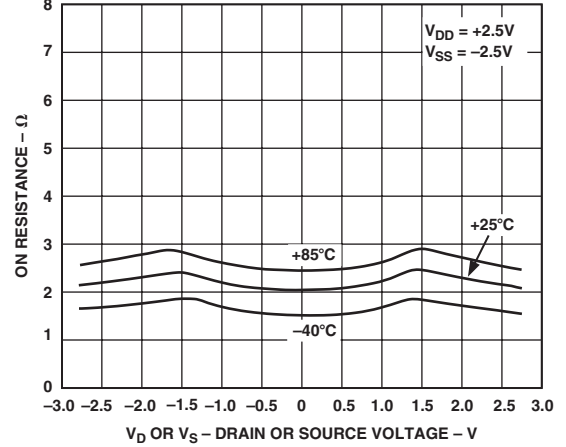
TPC 1. ON Resistance as a Function of V_D (V_S) for Single Supply



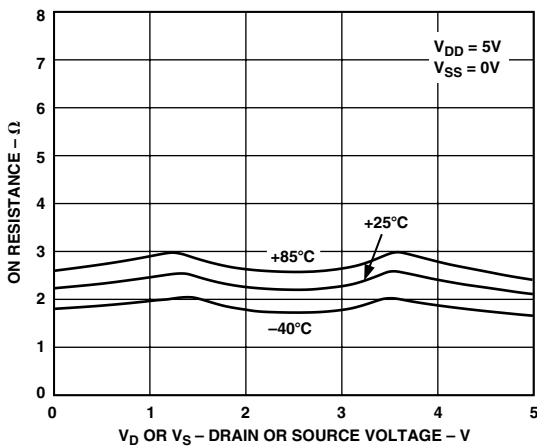
TPC 4. ON Resistance as a Function of V_D (V_S) for Different Temperatures, Single Supply



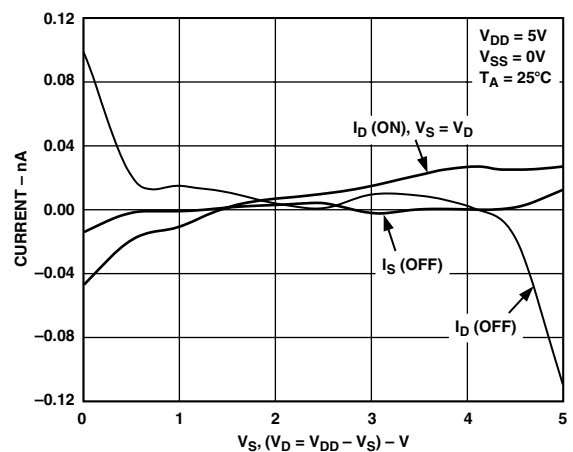
TPC 2. ON Resistance as a Function of V_D (V_S) for Dual Supply



TPC 5. ON Resistance as a Function of V_D (V_S) for Different Temperatures, Dual Supply

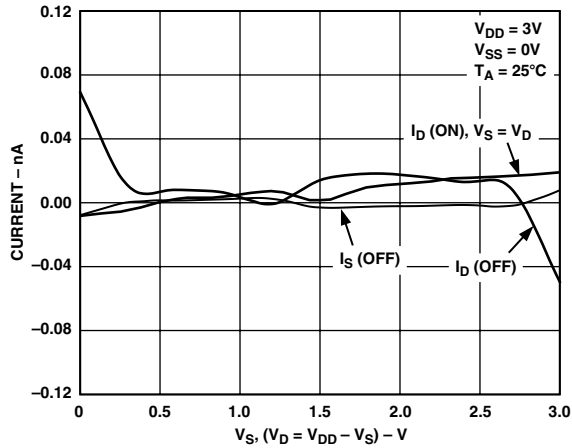


TPC 3. ON Resistance as a Function of V_D (V_S) for Different Temperatures, Single Supply

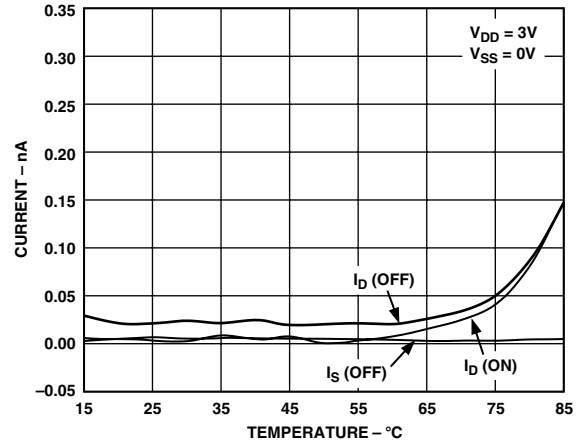


TPC 6. Leakage Currents as a Function of V_D (V_S)

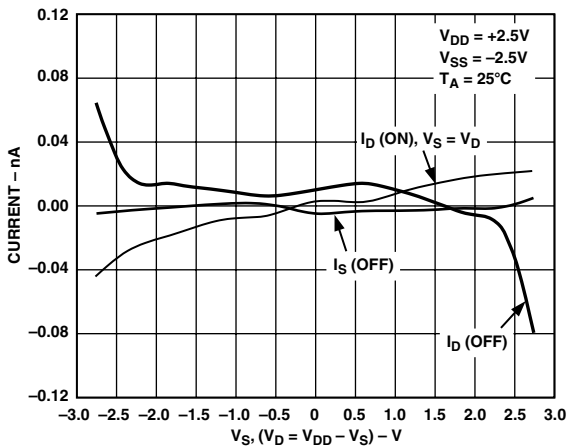
ADG758/ADG759



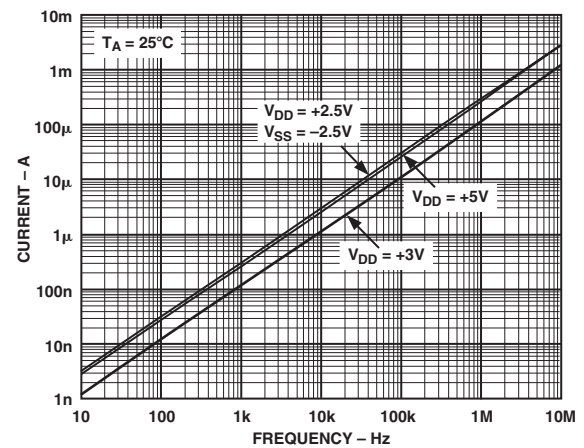
TPC 7. Leakage Currents as a Function of V_D (V_S)



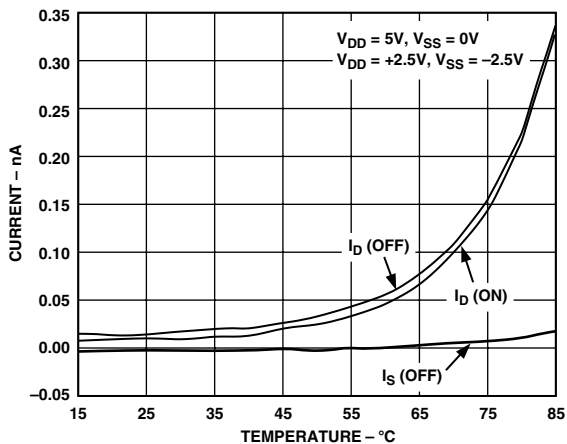
TPC 10. Leakage Currents as a Function of Temperature



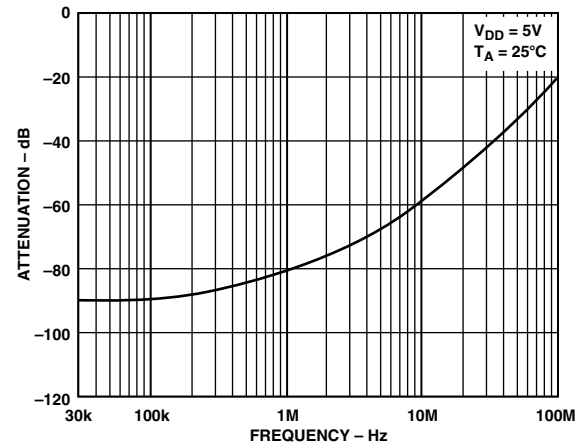
TPC 8. Leakage Currents as a Function of V_D (V_S)



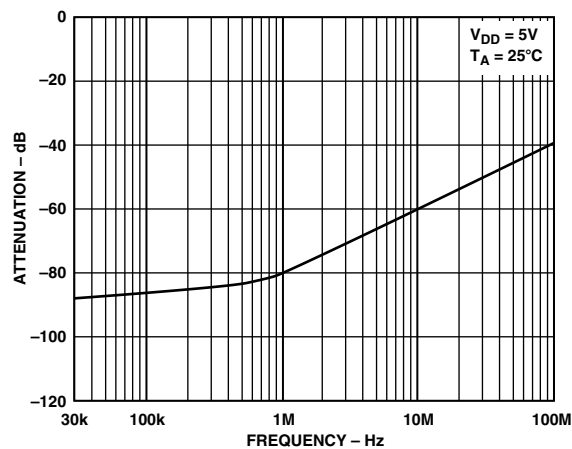
TPC 11. Supply Current vs. Input Switching Frequency



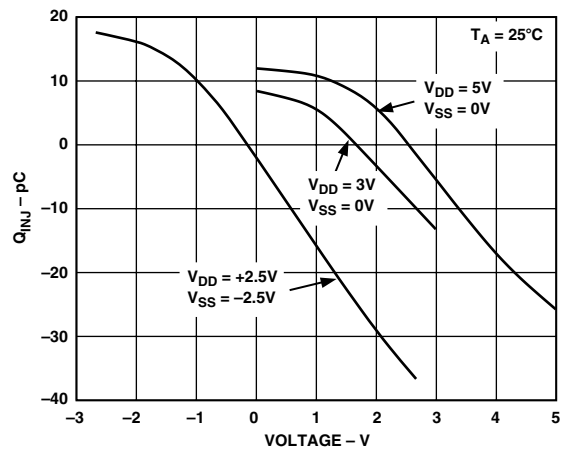
TPC 9. Leakage Currents as a Function of Temperature



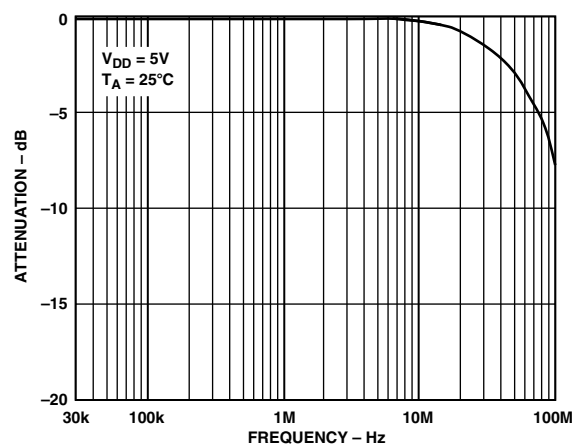
TPC 12. OFF Isolation vs. Frequency



TPC 13. Crosstalk vs. Frequency



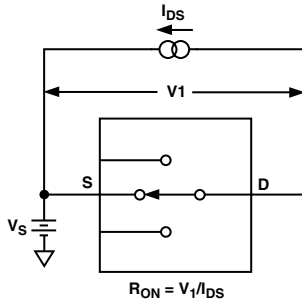
TPC 15. Charge Injection vs. Source Voltage



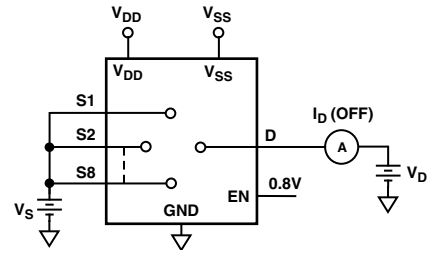
TPC 14. ON Response vs. Frequency

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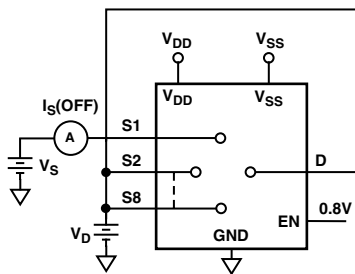
Test Circuits



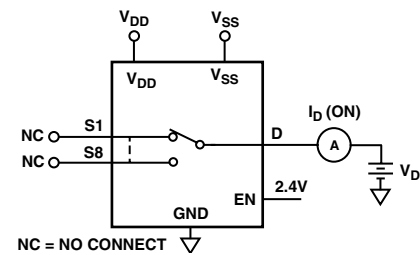
Test Circuit 1. ON Resistance



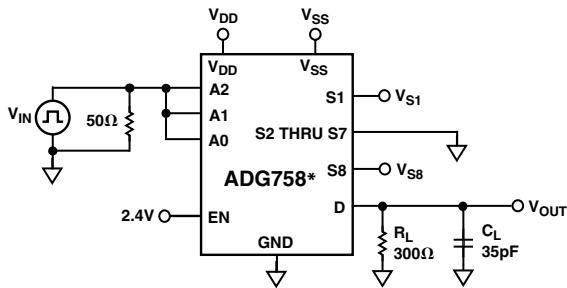
Test Circuit 3. I_D (OFF)



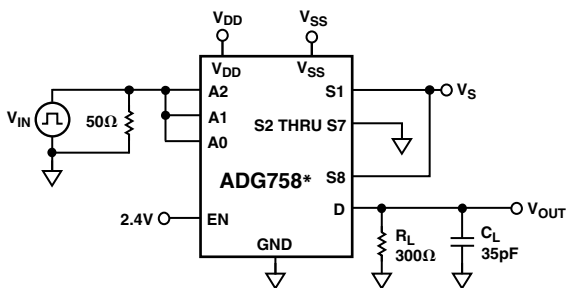
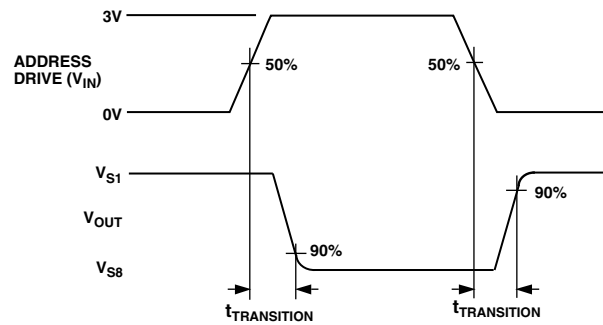
Test Circuit 2. I_S (OFF)



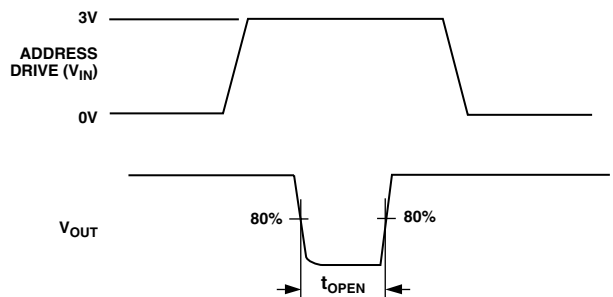
Test Circuit 4. I_D (ON)

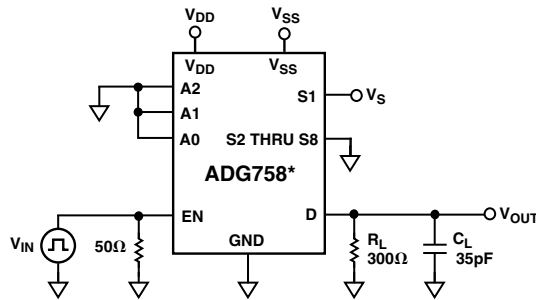


Test Circuit 5. Switching Time of Multiplexer, $t_{TRANSITION}$



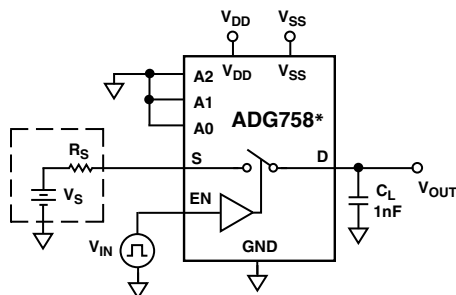
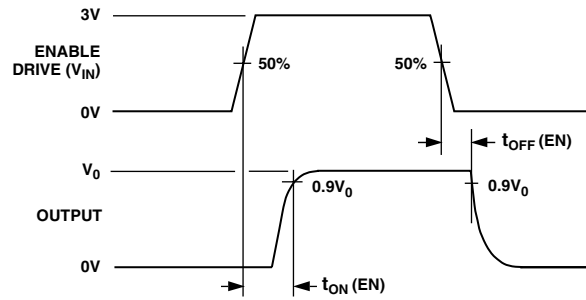
Test Circuit 6. Break-Before-Make Delay, t_{OPEN}





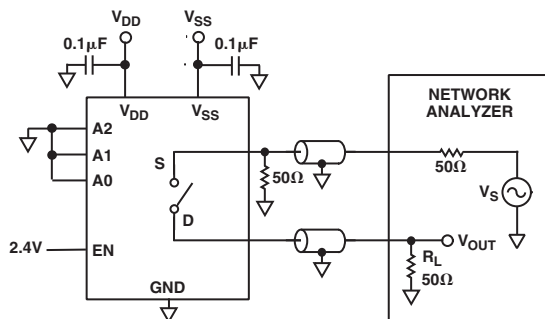
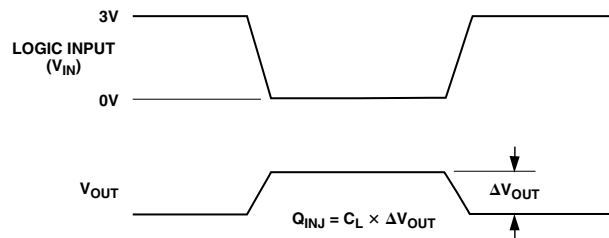
*SIMILAR CONNECTION FOR ADG759

Test Circuit 7. Enable Delay, $t_{ON}(EN)$, $t_{OFF}(EN)$



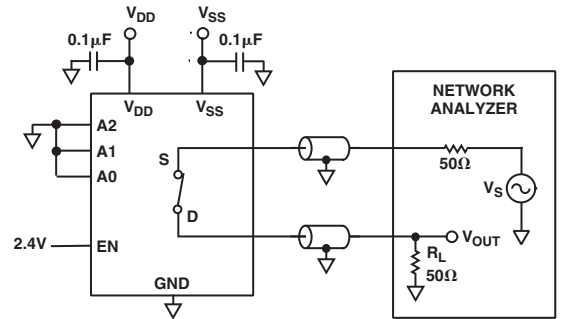
*SIMILAR CONNECTION FOR ADG759

Test Circuit 8. Charge Injection



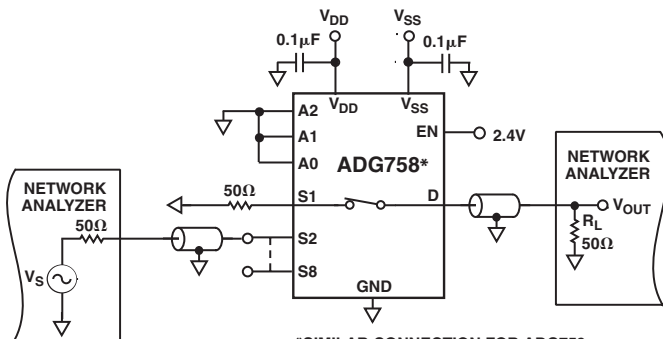
$$\text{OFF ISOLATION} = 20 \log \frac{V_{OUT}}{V_S}$$

Test Circuit 9. OFF Isolation



$$\text{INSERTION LOSS} = 20 \log \frac{V_{OUT \text{ WITH SWITCH}}}{V_{OUT \text{ WITHOUT SWITCH}}}$$

Test Circuit 11. Bandwidth



*SIMILAR CONNECTION FOR ADG759
CHANNEL-TO-CHANNEL

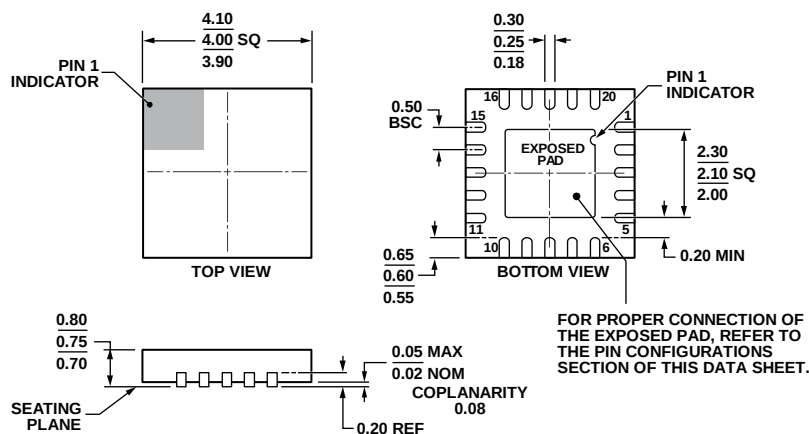
$$\text{CROSSTALK} = 20 \log \frac{V_{OUT}}{V_S}$$

Test Circuit 10. Channel-to-Channel Crosstalk

Power-Supply Sequencing

When using CMOS devices, care must be taken to ensure correct power-supply sequencing. Incorrect power-supply sequencing can result in the device being subjected to stresses beyond the maximum ratings listed in the data sheet. Digital and analog inputs should always be applied after power supplies and ground. For single-supply operation, V_{SS} should be tied to GND as close to the device as possible.

OUTLINE DIMENSIONS



COMPLIANT TO JEDEC STANDARDS MO-220-WGGD-1.

20-Lead Lead Frame Chip Scale Package [LFCSP_WQ]

4 mm × 4 mm Body, Very Very Thin Quad

(CP-20-6)

Dimensions shown in millimeters

09-16-2010-B

ORDERING GUIDE

Model ¹	Temperature Range	Package Description	Package Option
ADG758BCPZ	-40°C to +85°C	20-Lead Lead Frame Chip Scale Package (LFCSP_WQ)	CP-20-6
ADG758BCPZ-REEL7	-40°C to +85°C	20-Lead Lead Frame Chip Scale Package (LFCSP_WQ)	CP-20-6
ADG759BCPZ	-40°C to +85°C	20-Lead Lead Frame Chip Scale Package (LFCSP_WQ)	CP-20-6
ADG759BCPZ-REEL	-40°C to +85°C	20-Lead Lead Frame Chip Scale Package (LFCSP_WQ)	CP-20-6
ADG759BCPZ-REEL7	-40°C to +85°C	20-Lead Lead Frame Chip Scale Package (LFCSP_WQ)	CP-20-6

¹ Z = RoHS Compliant Part.

REVISION HISTORY

3/13—Rev. A to Rev. B

Updated Outline Dimensions..... 12

Changes to Ordering Guide..... 12

5/02—Rev. 0 to Rev. A

Edits to General Description section..... 1

Updated Outline Drawings..... 12