

0.5 Ω R_{ON} , ± 20 V, +36 V, Dual SPDT Switch
FEATURES

- ▶ Low R_{ON} : 0.5 Ω
- ▶ High continuous current of up to 847 mA
- ▶ Flat R_{ON} across signal range: 0.003 Ω
- ▶ THD of -109 dB at 1 kHz
- ▶ Improved balance between on resistance and on capacitance
 - ▶ Low R_{ON} (0.5 Ω) and C_{ON} (95 pF)
- ▶ 1.8 V, 3.3 V, and 5 V logic compatibility
- ▶ 16-lead, 4 mm \times 4 mm LFCSP
 - ▶ Pin to pin compatible with the [ADG5436](#) and [ADG5436F](#)
- ▶ Fully specified at ± 20 V and +36 V
- ▶ Operational with asymmetric power supplies
- ▶ V_{SS} to $V_{DD} - 2$ V analog signal range

APPLICATIONS

- ▶ Automatic test equipment
- ▶ Data acquisition
- ▶ Instrumentation
- ▶ Avionics
- ▶ Audio and video switching
- ▶ Communication systems
- ▶ Relay replacement

GENERAL DESCRIPTION

The ADG6436 is an analog multiplexer containing two independently selectable single-pole, double throw (SPDT) switches. An EN input is used to disable all of the switches. For use in multiplexer applications, both switches exhibit break-before-make switching action.

Each channel conducts equally well in both directions when on, and each switch has an input signal range that extends from V_{SS} to $V_{DD} - 2$ V. When switches are disabled, the signal levels up to the supplies are blocked.

The digital inputs are compatible with 5 V, 3.3 V, and 1.8 V logic inputs without the requirement for a separate digital logic supply pin.

The on-resistance profile is exceptionally flat over the full analog input range, which ensures good linearity and low distortion when switching audio signals.

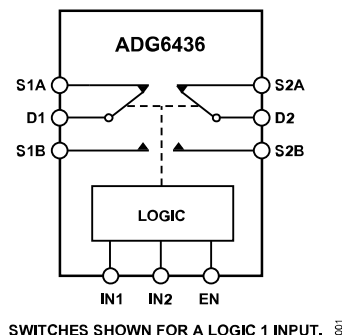
FUNCTIONAL BLOCK DIAGRAM


Figure 1. Functional Block Diagram

PRODUCT HIGHLIGHTS

1. Low R_{ON} of 0.5 Ω .
2. High continuous current carrying capability, see [Table 4](#) to [Table 5](#).
3. Dual-supply operation. For applications where the analog signal is bipolar, the ADG6436 can be operated from dual supplies up to ± 22 V.
4. Single-supply operation. For applications where the analog signal is unipolar, the ADG6436 can be operated from a single rail power supply up to 40 V.
5. 1.8 V logic compatible digital inputs: $V_{INH} = 1.3$ V, $V_{INL} = 0.8$ V.
6. No V_L logic power supply required.

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REVISION HISTORY

7/2024—Revision 0: Initial Version

SPECIFICATIONS

OPERATING SUPPLY VOLTAGES

Table 1. Operating Supply Voltages

Supply Voltage	Min	Max	Unit
Dual Supply	±4.5	±22	V
Single Supply	+5	+40	V

±20 V DUAL SUPPLY

$V_{DD} = +20\text{ V} \pm 10\%$, $V_{SS} = -20\text{ V} \pm 10\%$, and $GND = 0\text{ V}$, unless otherwise noted.

Table 2. ±20 V Dual-Supply Specifications

Parameter	+25°C	-40°C to +85°C	-40°C to +125°C	Unit	Test Conditions/Comments
ANALOG SWITCH					
Analogue Signal Range			$V_{DD} - 2\text{ V to } V_{SS}$	V	$V_{DD} = +18\text{ V}$ and $V_{SS} = -18\text{ V}$
On Resistance (R_{ON})	0.50			Ω typ	Source voltage (V_S) = -18 V to +14.5 V and source current (I_S) = -100 mA (see Figure 25)
	0.65	0.8	0.95	Ω max	
	0.54			Ω typ	$V_S = -18\text{ V to } +15.5\text{ V}$ and $I_S = -100\text{ mA}$
	0.7	0.85	1.0	Ω max	
On-Resistance Match Between Channels (ΔR_{ON})	0.003			Ω typ	$V_S = -18\text{ V to } +15.5\text{ V}$ and $I_S = -100\text{ mA}$
	0.085	0.1	0.1	Ω max	
On-Resistance Flatness ($R_{FLAT(ON)}$)	0.003			Ω typ	$V_S = -18\text{ V to } +14.5\text{ V}$ and $I_S = -100\text{ mA}$
	0.035	0.035	0.035	Ω max	
	0.04			Ω typ	$V_S = -18\text{ V to } +15.5\text{ V}$ and $I_S = -100\text{ mA}$
	0.08	0.1	0.1	Ω max	
LEAKAGE CURRENTS					
Source Off Leakage (I_S (Off))	±5			nA typ	$V_{DD} = +22\text{ V}$ and $V_{SS} = -22\text{ V}$ $V_S = \pm 15\text{ V}$ and drain current (V_D) = ±15 V (see Figure 28)
	±12.5	+90/-14	+400/-14	nA max	
Drain Off Leakage (I_D (Off))	±10			nA typ	$V_S = \pm 15\text{ V}$ and $V_D = \pm 15\text{ V}$ (see Figure 28)
	±25	+175/-28	+792/-28	nA max	
Channel On Leakage (I_D (On)) and (I_S (On))	±4.7			nA typ	$V_S = V_D = \pm 15\text{ V}$ (see Figure 24)
	±13.8	+91/-17.0	+428/-17	nA max	
DIGITAL INPUTS					
Input High Voltage (V_{INH})			1.3	V min	Input voltage (V_{IN}) = GND voltage (V_{GND}) or 5 V
Input Low Voltage (V_{INL})			0.8	V max	
Input Current (I_{INL}) or (I_{INH})	0.01			μA typ	
			±0.15	μA max	
Digital Input Capacitance (C_{IN})	4.6			pF typ	
DYNAMIC CHARACTERISTICS					
Transition Time ($t_{TRANSITION}$)	343			ns typ	Load resistance (R_L) = 300 Ω , load capacitance (C_L) = 35 pF
	415	455	499	ns max	$V_S = 10\text{ V}$ (see Figure 34)
On Time ($t_{ON(EN)}$)	333			ns typ	Load resistance (R_L) = 300 Ω , load capacitance (C_L) = 35 pF
	397	438	484	ns max	$V_S = 10\text{ V}$ (see Figure 22)
Off Time ($t_{OFF(EN)}$)	193			ns typ	$R_L = 300\text{ } \Omega$ and $C_L = 35\text{ pF}$

SPECIFICATIONS

Table 2. ± 20 V Dual-Supply Specifications (Continued)

Parameter	+25°C	-40°C to +85°C	-40°C to +125°C	Unit	Test Conditions/Comments
Break-Before-Make Time Delay (t_D)	224	228	229	ns max	$V_S = 10$ V (see Figure 22)
	219			ns typ	$R_L = 300\ \Omega$ and $C_L = 35$ pF
	170	202	243	ns min	$V_S = 10$ V (see Figure 32)
Charge Injection (Q_{INJ})	-2.1			nC typ	$V_S = 0$ V, $R_S = 0\ \Omega$, and $C_L = 1$ nF (see Figure 35)
Off Isolation	-77.9			dB typ	$R_L = 50\ \Omega$, $C_L = 5$ pF, and frequency = 100 kHz (see Figure 27)
Channel-to-Channel Crosstalk	-84			dB typ	$R_L = 50\ \Omega$, $C_L = 5$ pF, and frequency = 100 kHz (see Figure 26)
Total Harmonic Distortion + Noise (THD + N)	0.007			% typ	$R_L = 1$ k Ω , 20 V p-p, and frequency = 20 Hz to 20 kHz (see Figure 30)
Total Harmonic Distortion (THD)	-109			dB typ	$R_L = 1$ k Ω , 20 V p-p, and frequency = 1 kHz
	-83			dB typ	$R_L = 1$ k Ω , 20 V p-p, and frequency = 20 kHz
	-69			dB typ	$R_L = 1$ k Ω , 20 V p-p, and frequency = 100 kHz
-3 dB Bandwidth	84			MHz typ	$R_L = 50\ \Omega$, $C_L = 5$ pF, and signal = 0 dBm (see Figure 31)
Insertion Loss	-0.06			dB typ	$R_L = 50\ \Omega$, $C_L = 5$ pF, and frequency = 1 MHz (see Figure 31)
Source Off Capacitance (C_S (Off))	67			pF typ	$V_S = 0$ V and frequency = 1 MHz
Drain Off Capacitance (C_D (Off))	134			pF typ	$V_S = 0$ V and frequency = 1 MHz
Drain On Capacitance (C_D (On)) and Source On Capacitance (C_S (On))	91			pF typ	$V_S = 0$ V and frequency = 1 MHz
Match On Capacitance ($C_{MATCH}(On)$)	0.39			pF typ	$V_S = 0$ V and frequency = 1 MHz
POWER REQUIREMENTS					$V_{DD} = +22$ V and $V_{SS} = -22$ V
Power Supply Current (I_{DD})	170			μ A typ	Digital inputs = 0 V or 5 V
	260		260	μ A max	
	225			μ A typ	Digital inputs = 1.3 V
	330		330	μ A max	
Negative Supply Current (I_{SS})	85			μ A typ	Digital inputs = 0 V or 5 V
	140		140	μ A max	

36 V SINGLE SUPPLY

$V_{DD} = 36$ V \pm 10%, $V_{SS} = 0$ V, and GND = 0 V, unless otherwise noted.

Table 3. 36 V Single-Supply Specifications

Parameter	+25°C	-40°C to +85°C	-40°C to +125°C	Unit	Test Conditions/Comments
ANALOG SWITCH					$V_{DD} = 32.4$ V and $V_{SS} = 0$ V
Analogue Signal Range			0 V to $V_{DD} - 2$ V	V	
On Resistance (R_{ON})	0.50			Ω typ	Source voltage (V_S) = 0 V to 28.9 V and source current (I_S) = -100 mA (see Figure 25)
	0.65	0.8	0.95	Ω max	
	0.54			Ω typ	$V_S = 0$ V to 29.9 V and $I_S = -100$ mA
On-Resistance Match Between Channels (ΔR_{ON})	0.7	0.85	1.0	Ω max	
	0.003			Ω typ	$V_S = 0$ V to 29.9 V and $I_S = -100$ mA

SPECIFICATIONS

Table 3. 36 V Single-Supply Specifications (Continued)

Parameter	+25°C	-40°C to +85°C	-40°C to +125°C	Unit	Test Conditions/Comments
On-Resistance Flatness (R _{FLAT(ON)})	0.085	0.1	0.1	Ω max	V _S = 0 V to 28.9 V and I _S = -100 mA
	0.003			Ω typ	
	0.035	0.035	0.035	Ω max	V _S = 0 V to 29.9 V and I _S = -100 mA
	0.04			Ω typ	
	0.08	0.1	0.1	Ω max	
LEAKAGE CURRENTS					
Source Off Leakage (I _S (Off))	±5			nA typ	V _{DD} = 39.6 V and V _{SS} = 0 V V _S = 1 V/30 V and drain voltage (V _D) = 30 V/1 V (see Figure 28)
Drain Off Leakage (I _D (Off))	±12.5	+90/-14	+400/-14	nA max	V _S = 1 V/30 V and V _D = 30 V/1 V (see Figure 28)
	±10			nA typ	
Channel On Leakage (I _D (On)) and (I _S (On))	±25	+175/-28	+792/-28	nA max	V _S = V _D = 1 V/30 V (see Figure 24)
	±4.7			nA typ	
	±13.8	+91/-17	+428/-17	nA max	
DIGITAL INPUTS					
Input High Voltage (V _{INH})			1.3	V min	Input voltage (V _{IN}) = GND voltage (V _{GND}) or 5 V
Input Low Voltage (V _{INL})			0.8	V max	
Input Current (I _{INL}) or (I _{INH})	0.01		±0.15	μA typ	
				μA max	
Digital Input Capacitance (C _{IN})	4.6			pF typ	
DYNAMIC CHARACTERISTICS					
Transition Time (t _{TRANSITION})	356				Load resistance (R _L) = 300 Ω and load capacitance (C _L) = 35 pF V _S = 18 V (see Figure 34)
On Time (t _{ON(EN)})	431	442	460	ns typ	Load resistance (R _L) = 300 Ω and load capacitance (C _L) = 35 pF V _S = 18 V (see Figure 22)
	202				
Off Time (t _{OFF(EN)})	240	261	288	ns max	R _L = 300 Ω and C _L = 35 pF V _S = 18 V (see Figure 22)
	309			ns typ	
	359	367	374	ns max	
Break-Before-Make Time Delay (t _D)	88			ns typ	R _L = 300 Ω and C _L = 35 pF V _S = 18 V (see Figure 32)
	92.5	109.2	130.2	ns min	
Charge Injection (Q _{INJ})	-1.79			nC typ	V _S = 18 V, R _S = 0 Ω, and C _L = 1 nF (see Figure 35)
Off Isolation	-64			dB typ	R _L = 50 Ω, C _L = 5 pF, and frequency = 100 kHz (see Figure 27)
Channel-to-Channel Crosstalk	-70			dB typ	R _L = 50 Ω, C _L = 5 pF, and frequency = 100 kHz (see Figure 26)
Total Harmonic Distortion + Noise (THD + N)	0.006			% typ	R _L = 1 kΩ, 18 V p-p, and frequency = 20 Hz to 20 kHz (see Figure 30)
Total Harmonic Distortion (THD)	-107			dB typ	R _L = 1 kΩ, 18 V p-p, and frequency = 1 kHz
	-84			dB typ	R _L = 1 kΩ, 18 V p-p, and frequency = 20 kHz
	-70			dB typ	R _L = 1 kΩ, 18 V p-p, and frequency = 100 kHz

SPECIFICATIONS

Table 3. 36 V Single-Supply Specifications (Continued)

Parameter	+25°C	−40°C to +85°C	−40°C to +125°C	Unit	Test Conditions/Comments
−3 dB Bandwidth	81			MHz typ	$R_L = 50\ \Omega$, $C_L = 5\ \text{pF}$, and signal = 0 dBm (see Figure 31)
Insertion Loss	−0.06			dB typ	$R_L = 50\ \Omega$, $C_L = 5\ \text{pF}$, and frequency = 1 MHz (see Figure 31)
Source Off Capacitance (C_S (Off))	69			pF typ	$V_S = 18\ \text{V}$ and frequency = 1 MHz
Drain Off Capacitance (C_D (Off))	139			pF typ	$V_S = 18\ \text{V}$ and frequency = 1 MHz
Drain On Capacitance (C_D (On)) and Source On Capacitance (C_S (On))	95			pF typ	$V_S = 18\ \text{V}$ and frequency = 1 MHz
Match On Capacitance ($C_{\text{MATCH}}(\text{On})$)	0.24			pF typ	$V_S = 18\ \text{V}$ and frequency = 1 MHz
POWER REQUIREMENTS					
Power Supply Current (I_{DD})	170			μA typ	$V_{DD} = 39.6\ \text{V}$
	260		260	μA max	Digital inputs = 0 V or 5 V
	225			μA typ	Digital inputs = 1.3 V
	330		330	μA max	
Negative Supply Current (I_{SS})	85			μA typ	Digital inputs = 0 V or 5 V
	140		140	μA max	

SPECIFICATIONS

CONTINUOUS CURRENT PER CHANNEL, SX OR DX

Table 4. One Channel On, Per Channel Specifications

Parameter	25°C	85°C	125°C	Unit	Test Conditions/Comments
CONTINUOUS CURRENT, Sx OR Dx $V_{DD} = +20\text{ V}$ and $V_{SS} = -20\text{ V}$ LFCSP ($\theta_{JA} = 44^\circ\text{C/W}$)	847	325	123	mA maximum	$V_S = V_{SS}$ to $V_{DD} - 3.5\text{ V}$
$V_{DD} = 36\text{ V}$ and $V_{SS} = 0\text{ V}$ LFCSP ($\theta_{JA} = 44^\circ\text{C/W}$)	847	325	123	mA maximum	$V_S = V_{SS}$ to $V_{DD} - 3.5\text{ V}$

Table 5. Two Channels On, Per Channel Specifications

Parameter	25°C	85°C	125°C	Unit	Test Conditions/Comments
CONTINUOUS CURRENT, Sx OR Dx $V_{DD} = +20\text{ V}$ and $V_{SS} = -20\text{ V}$ LFCSP ($\theta_{JA} = 44^\circ\text{C/W}$)	646	289	120	mA maximum	$V_S = V_{SS}$ to $V_{DD} - 3.5\text{ V}$
$V_{DD} = 36\text{ V}$ and $V_{SS} = 0\text{ V}$ LFCSP ($\theta_{JA} = 44^\circ\text{C/W}$)	646	289	120	mA maximum	$V_S = V_{SS}$ to $V_{DD} - 3.5\text{ V}$

ABSOLUTE MAXIMUM RATINGS

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

Table 6. Absolute Maximum Ratings

Parameter	Rating
V_{DD} to V_{SS}	46 V
V_{DD} to GND	-0.3 V to +46 V
V_{SS} to GND	+0.3 V to -46 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	GND - 0.3 V to +6 V or 30 mA, whichever occurs first
Peak Current, Sx or Dx Pins ²	2.6 A (pulsed at 1 ms and 10% duty cycle maximum)
Continuous Current, Sx or Dx ²	Data (see Table 4 to Table 5) + 15%
Temperature	
Operating Range	-40°C to +125°C
Storage Range	-65°C to +150°C
Junction	150°C
Reflow Soldering Peak, Pb-Free	As per JEDEC J-STD-020

¹ Overvoltages at the INx, Sx, and Dx pins are clamped by internal diodes. Limit current to the maximum ratings given.

² Sx refers to the S1A, S1B, S2A, and S2B pins, and Dx refers to the D1 and D2 pins.

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

Only one absolute maximum rating can be applied at any one time.

THERMAL RESISTANCE

Thermal performance is directly linked to printed circuit board (PCB) design and operating environment. Careful attention to PCB thermal design is required.

θ_{JA} is the natural convection junction-to-ambient thermal resistance measured in a one cubic foot sealed enclosure, and θ_{JCB} is the junction to the bottom of the case value.

Table 7. Thermal Resistance

Package Type	θ_{JA}	θ_{JCB}	Unit
CP-16-17 ¹	44	17.4	°C/W

¹ Thermal impedance simulated values are based on JEDEC 2S2P thermal test board without thermal vias. See JEDEC JESD-51.

ELECTROSTATIC DISCHARGE (ESD) RATINGS

The following ESD information is provided for handling of ESD-sensitive devices in an ESD protected area only.

Human body model (HBM) per ANSI/ESDA/JEDEC JS-001.

Field induced charged-device model (FICDM) per ANSI/ESDA/JEDEC JS-002.

ESD Ratings for the ADG6436

Table 8. ADG6436, 16-Lead LFCSP

ESD Model	Withstand Threshold (V)	Class
HBM	±4000	3A
FICDM	±1250	C3

ESD CAUTION



ESD (electrostatic discharge) sensitive device. Charged devices and circuit boards can discharge without detection. Although this product features patented or proprietary protection circuitry, damage may occur on devices subjected to high energy ESD. Therefore, proper ESD precautions should be taken to avoid performance degradation or loss of functionality.

PIN CONFIGURATIONS AND FUNCTION DESCRIPTIONS

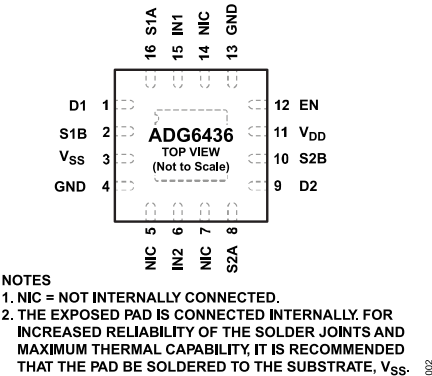


Figure 2. Pin Configuration

Table 9. Pin Function Descriptions

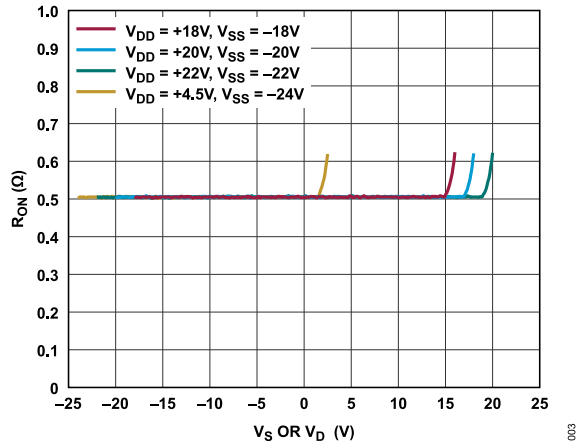
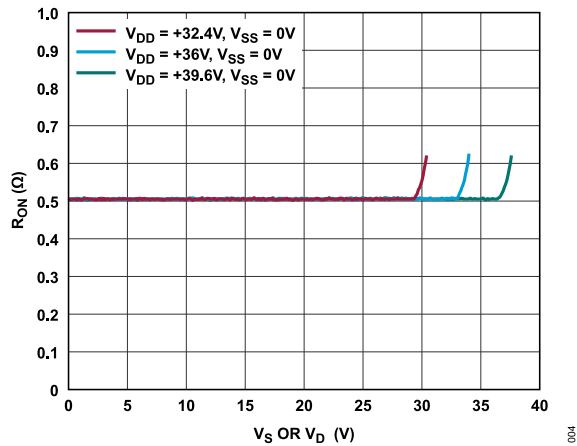
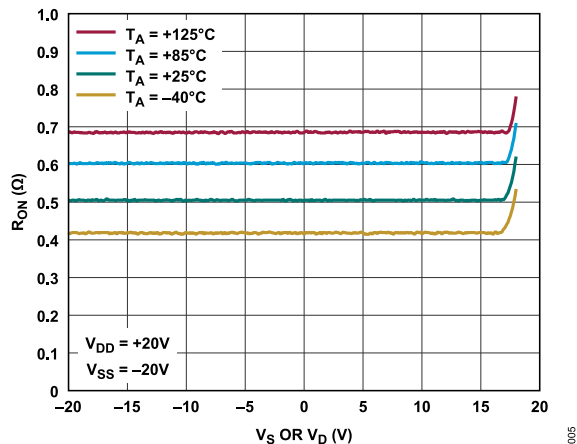
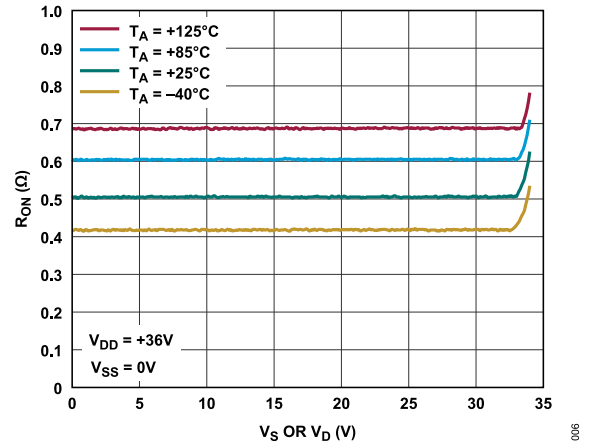
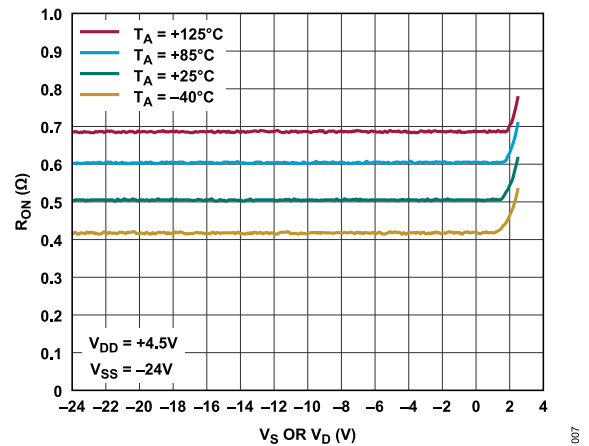
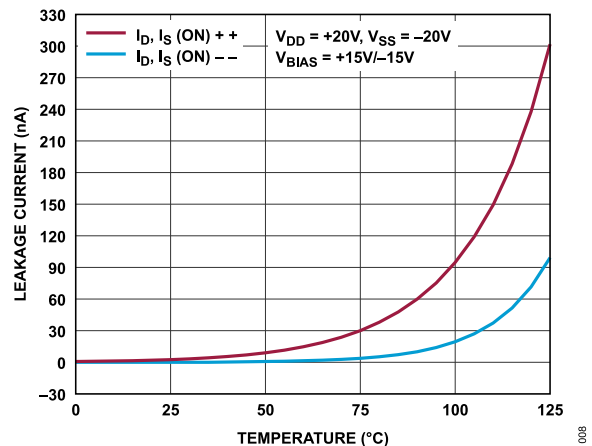
Pin Number	Mnemonic	Description
1	D1	Drain Terminal 1. The D1 pin can be an input or output.
2	S1B	Source Terminal 1B. The S1B pin can be an input or output.
3	V _{SS}	Most Negative Power Supply Voltage.
4, 13	GND	Ground (0 V) Reference.
5, 7, 14	NIC	Not Internally Connected.
6	IN2	Logic Control Input 2.
8	S2A	Source Terminal 2A. The S2A pin can be an input or output.
9	D2	Drain Terminal 2. The D2 pin can be an input or output.
10	S2B	Source Terminal 2B. The S2B pin can be an input or output.
11	V _{DD}	Most Positive Power Supply.
12	EN	Active High Digital Input. When the EN pin is low, the device is disabled, and all switches are off. When the EN pin is high, INx logic inputs determine the on switches.
15	IN1	Logic Control Input 1.
16	S1A EP	Source Terminal 1A. The S1A pin can be an input or output. Exposed Pad. The exposed pad is connected internally. For increased reliability of the solder joints and maximum thermal capability, it is recommended that the pad be soldered to the substrate, V _{SS} .

Table 10. ADG6436 Truth Table

EN	INx	SxA	SxB
0	X ¹	Off	Off
1	0	Off	On
1	1	On	Off

¹ X is don't care.

TYPICAL PERFORMANCE CHARACTERISTICS

Figure 3. R_{ON} as a Function of V_S , V_D (Dual Supply)Figure 4. R_{ON} as a Function of V_S , V_D (Single Supply)Figure 5. R_{ON} as a Function of V_S (V_D) for Different Temperatures, ± 20 V Dual SupplyFigure 6. R_{ON} as a Function of V_S (V_D) for Different Temperatures, 36 V Single SupplyFigure 7. R_{ON} as a Function of V_S (V_D) for Different Temperatures, Asymmetric Single SupplyFigure 8. On Leakage Currents vs. Temperature, ± 20 V Dual Supply

TYPICAL PERFORMANCE CHARACTERISTICS

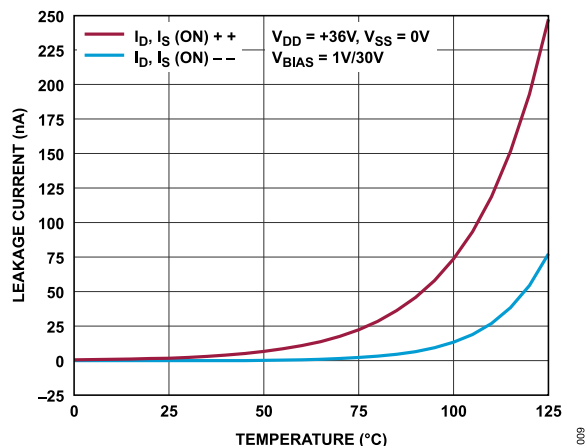


Figure 9. On Leakage Currents vs. Temperature, +36 V Single Supply

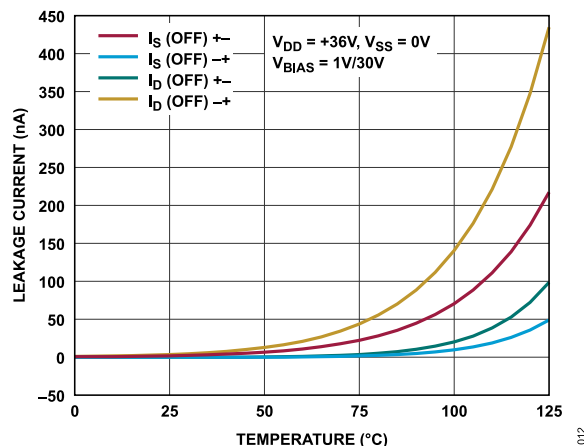


Figure 12. Off Leakage Currents vs. Temperature, +36 V Single Supply

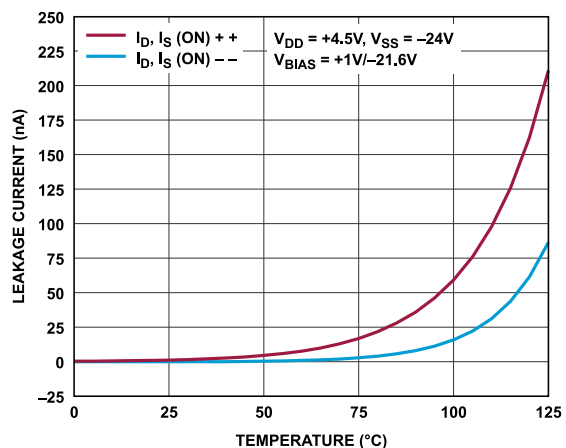


Figure 10. On Leakage Currents vs. Temperature, +4.5 V, -24 V Dual Supply

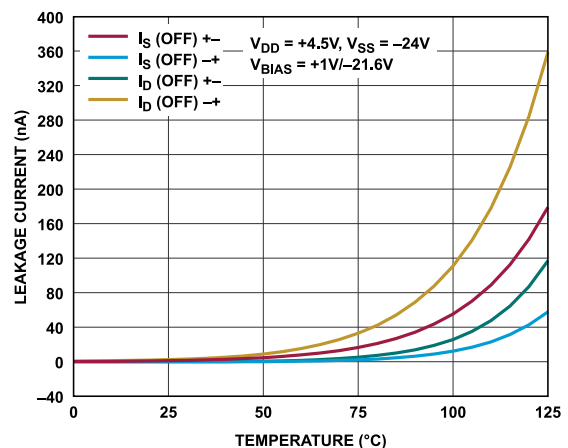


Figure 13. Off Leakage Currents vs. Temperature, +4.5 V, -24 V Dual Supply

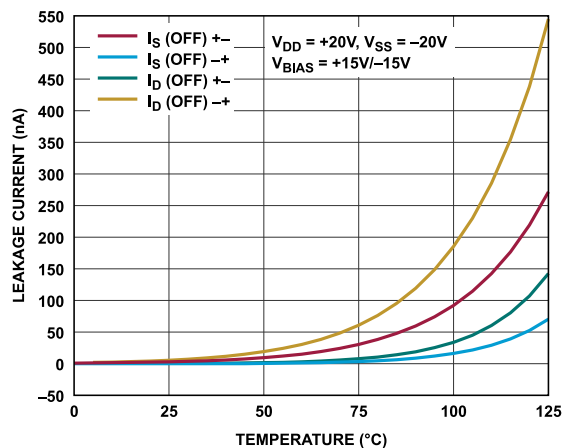


Figure 11. Off Leakage Currents vs. Temperature, ±20 V Dual Supply

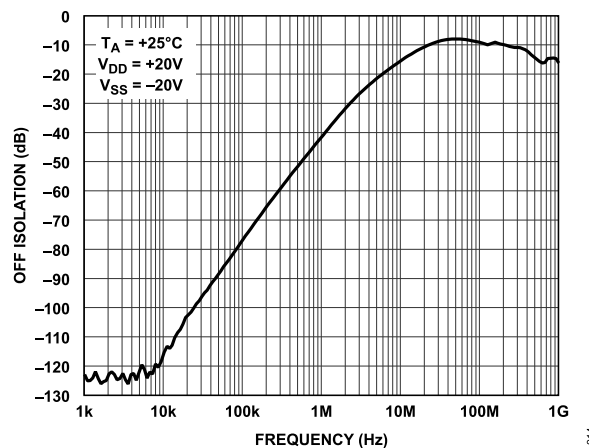
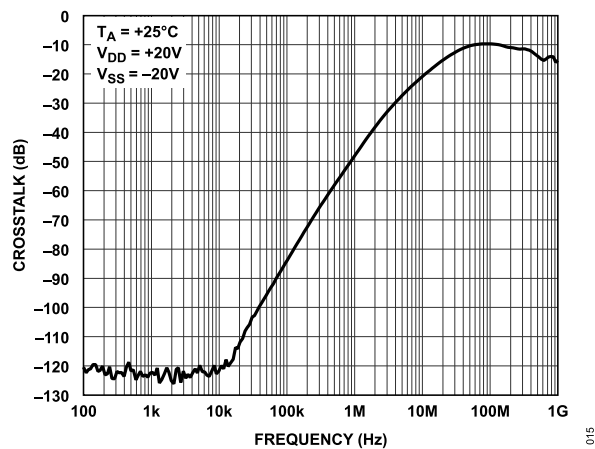
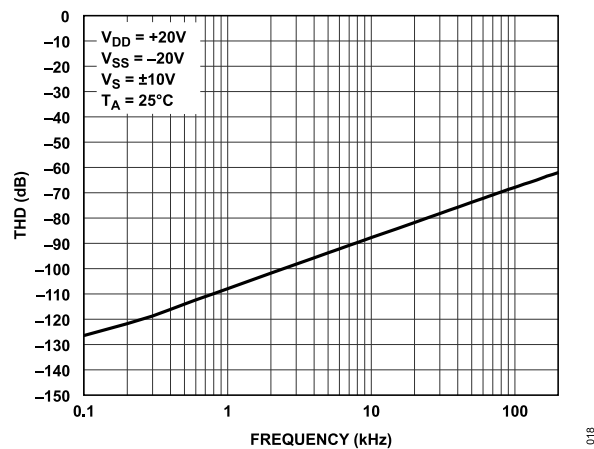
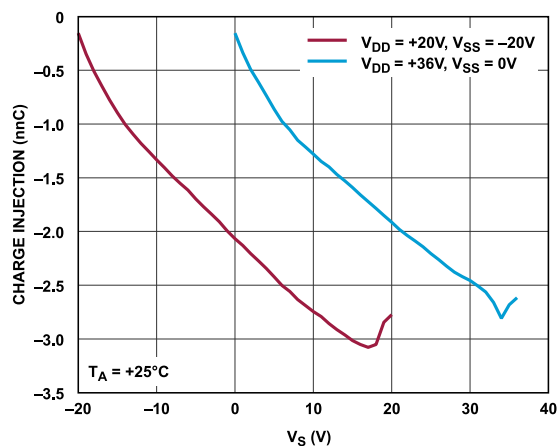
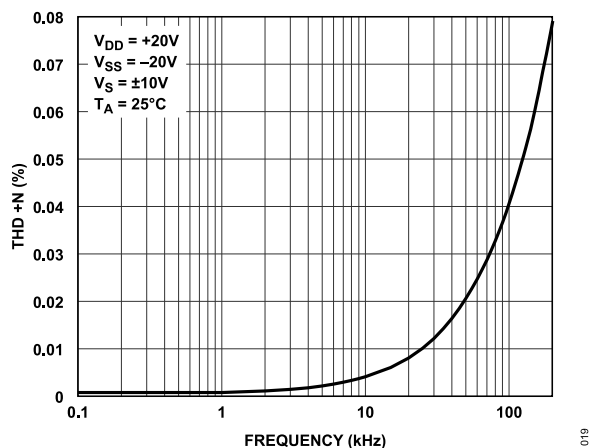
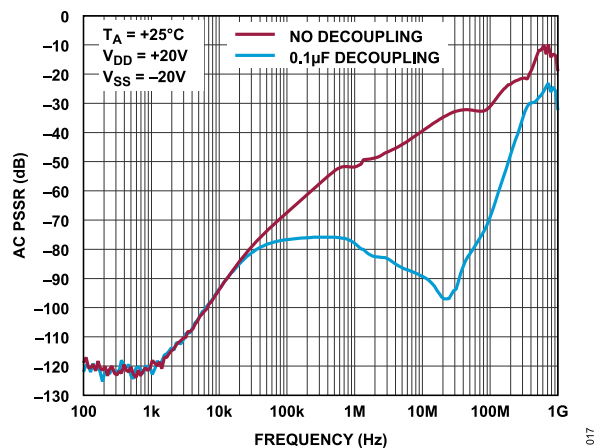
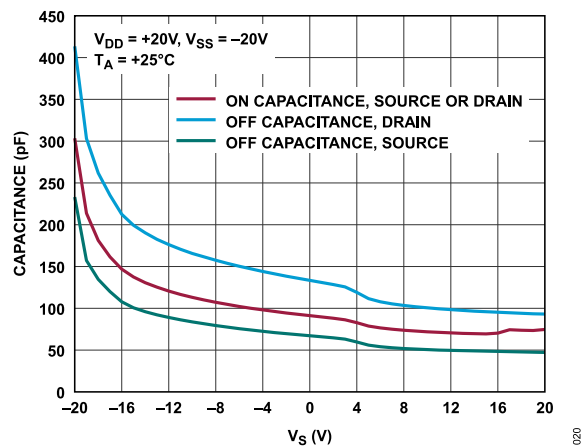


Figure 14. Off Isolation vs. Frequency, ±20 V Dual Supply

TYPICAL PERFORMANCE CHARACTERISTICS

Figure 15. Crosstalk vs. Frequency, ± 20 V Dual SupplyFigure 18. THD vs. Frequency, ± 20 V Dual SupplyFigure 16. Charge Injection vs. V_S Figure 19. THD + N vs. Frequency, ± 20 V Dual SupplyFigure 17. AC Power Supply Rejection Ratio (PSRR) vs. Frequency, ± 20 V Dual SupplyFigure 20. Capacitance vs. V_S , ± 20 V Dual Supply

TYPICAL PERFORMANCE CHARACTERISTICS

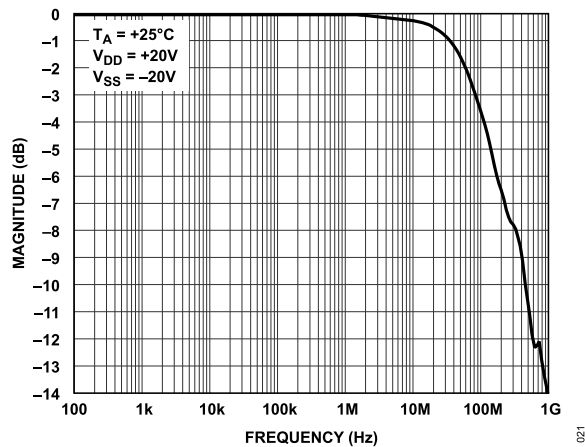


Figure 21. Insertion Loss vs. Frequency

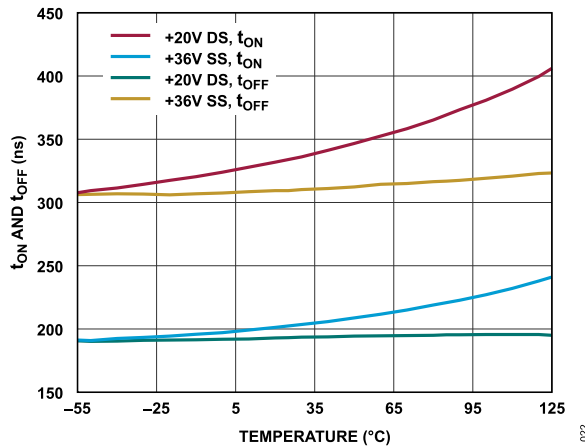


Figure 22. t_{ON} , t_{OFF} Times vs. Temperature

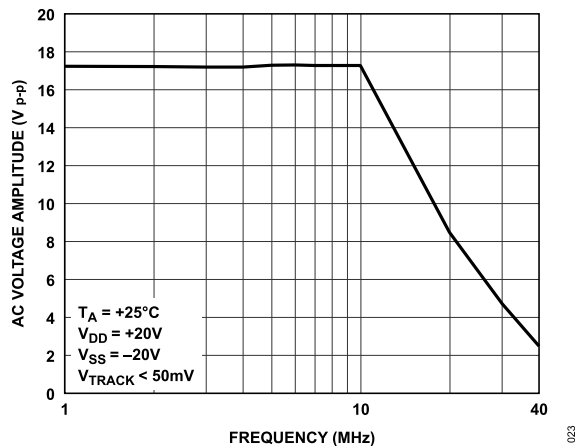


Figure 23. Large AC Signal Voltage vs. Frequency

TEST CIRCUITS

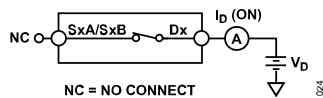


Figure 24. On Leakage

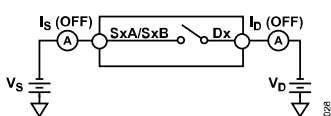


Figure 28. Off Leakage

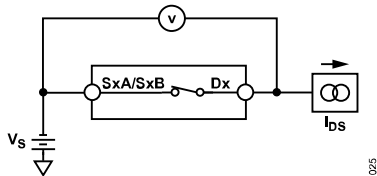
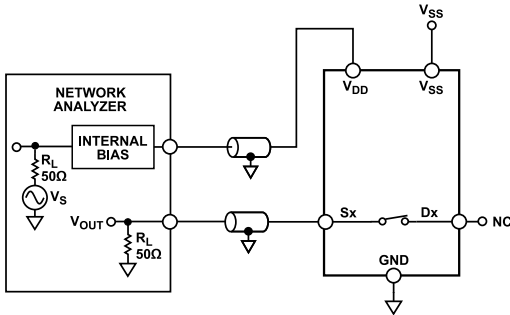


Figure 25. On Resistance



$$AC\ PSRR = 20\log\frac{V_{OUT}}{V_S}$$

NOTE:
1. BOARD AND COMPONENT EFFECTS ARE NOT DE-EMBEDDED FROM THE AC PSRR MEASUREMENT.
2. NC = NO CONNECT.

Figure 29. AC PSRR

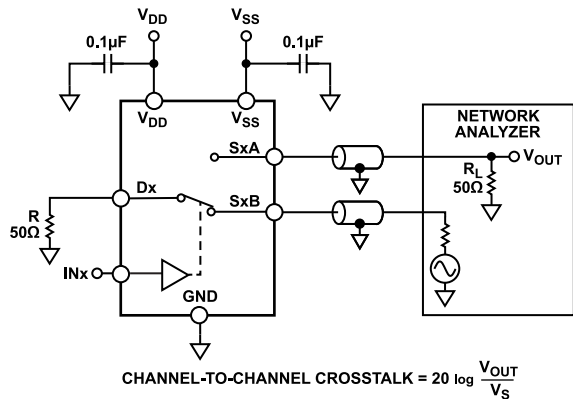


Figure 26. Channel-to-Channel Crosstalk

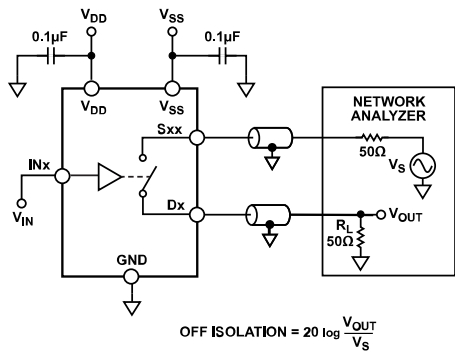


Figure 27. Off Isolation

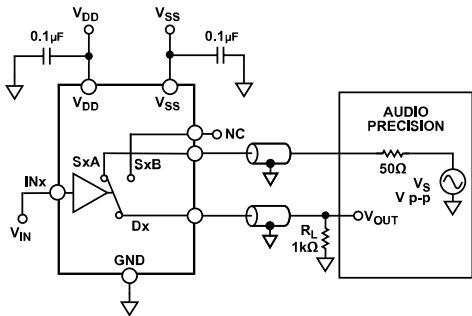


Figure 30. THD + Noise

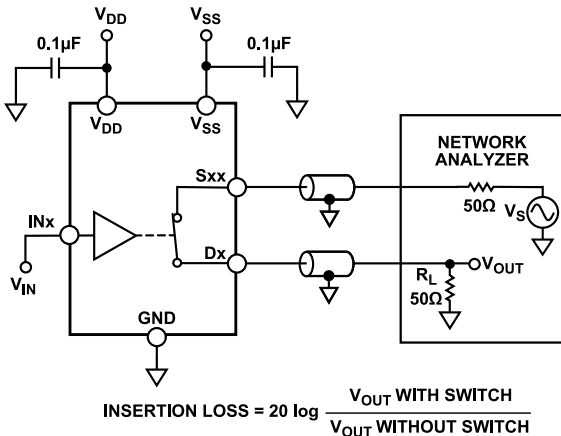


Figure 31. Bandwidth

TEST CIRCUITS

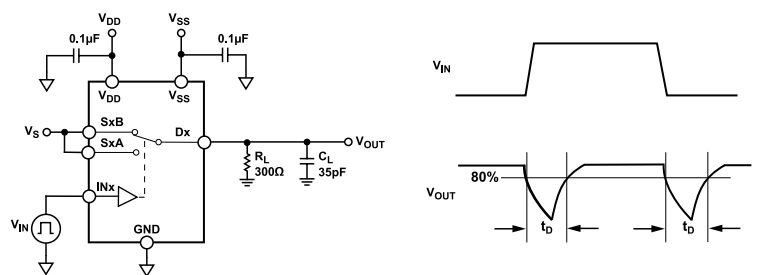
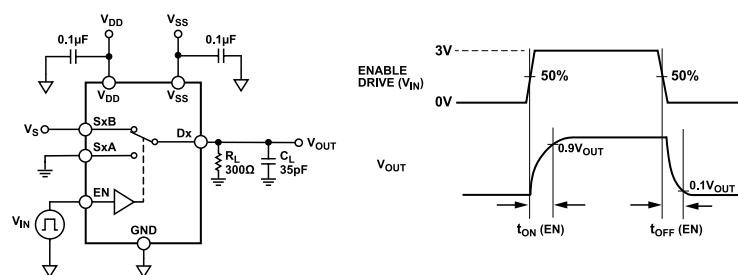
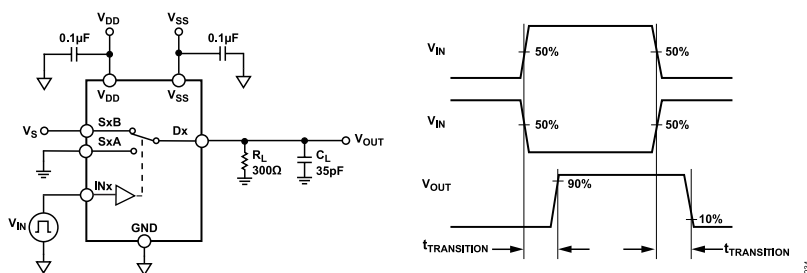
Figure 32. Break-Before-Make Time Delay, t_D Figure 33. Enable Delay, $t_{ON}(EN)$, $t_{OFF}(EN)$ 

Figure 34. Switching Times

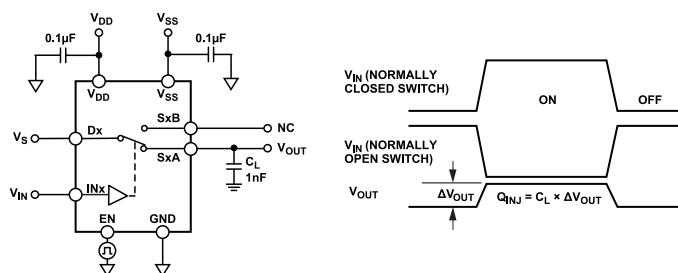


Figure 35. Charge Injection

TERMINOLOGY

I_{DD}

The positive supply current.

I_{SS}

The negative supply current.

V_D and V_S

The analog voltage on Terminal D and Terminal S, respectively.

V_{TRACK}

The difference between V_S and V_D.

R_{ON}

The ohmic resistance between Terminal D and Terminal S.

ΔR_{ON}

The difference between the R_{ON} of any two channels.

R_{FLAT(ON)}

The difference between the maximum and minimum value of on resistance measured over the specified analog signal range.

I_S (Off)

The source leakage current with the switch off.

I_D (Off)

The drain leakage current with the switch off.

I_D (On) and I_S (On)

The channel leakage current with the switch on.

V_{INL}

The maximum input voltage for Logic 0.

V_{INH}

The minimum input voltage for Logic 1.

I_{INL} and I_{INH}

The input current of the digital input when high or when low.

C_S (Off) and C_D (Off)

The off switch source and drain capacitance for the off condition, which is measured with reference to ground.

C_D (On) and C_S (On)

The on switch drain and source capacitance for the on condition, which is measured with reference to ground.

C_{IN}

The digital input capacitance.

t_{ON}

The delay between applying the digital control input and the output switching on.

t_{OFF}

The delay between applying the digital control input and the output switching off.

t_D

The off-time measured between the 80% point of both switches when switching from one address state to another.

Off Isolation

A measure of unwanted signal coupling through an off switch.

Charge Injection

A measure of the glitch impulse transferred from the digital input to the analog output during switching.

Channel-to-Channel Crosstalk

A measure of unwanted signal that is coupled through from one channel to another as a result of parasitic capacitance.

Bandwidth

The frequency at which the output is attenuated by 3 dB.

On Response

The frequency response of the on switch.

Insertion Loss

The loss due to the on resistance of the switch.

Total Harmonic Distortion + Noise (THD + N)

The ratio of the harmonic amplitude plus noise of the signal to the fundamental.

AC Power Supply Rejection Ratio (AC PSRR)

The ratio of the amplitude of signal on the output to the amplitude of the modulation. This is a measure of the ability of the part to avoid coupling noise and spurious signals that appear on the supply voltage pin to the output of the switch. The DC voltage on the device is modulated by a sine wave of 0.62 V p-p.

THEORY OF OPERATIONS

SWITCH ARCHITECTURE

The ADG6436 contains two independently selectable SPDT, N-channel diffused metal-oxide semiconductor (NDMOS) switches that allow for excellent R_{ON} performance. Using an NDMOS only architecture results in a reduction of signal headroom, meaning signals are limited to $V_{DD} - 2$ V. To achieve the lowest on resistance, on-resistance flatness, and total harmonic distortion, it is recommended the signal stays below $V_{DD} - 3.5$ V.

To guarantee correct operation of the ADG6436, a minimum of 0.1 μ F decoupling capacitors are required on both the V_{DD} and V_{SS} supply pins.

The ADG6436 is compatible with single-supply systems that have a V_{DD} of up to 40 V, dual-supply systems of up to ± 22 V, as well as asymmetric power supplies.

1.8 V LOGIC COMPATIBILITY

For ease of use, the ADG6436 does not have a logic reference voltage (V_L). The digital inputs are compatible with 1.8 V logic levels over the full operating supply range. The limits for 1.8 V logic are as follows: $V_{INH} = 1.3$ V and $V_{INL} = 0.8$ V. The 1.8 V logic level inputs enable the ADG6436 to be compatible with processors that have lower supply rails, eliminating the need for an external voltage translator.

If full 1.8 V and 1.2 V JEDEC compliance is required, refer to the Analog Devices, Inc., L-range part numbers, such as the [ADG1412L](#).

APPLICATIONS INFORMATION

LARGE VOLTAGE, HIGH FREQUENCY SIGNAL TRACKING

Figure 23 shows the voltage range and corresponding frequencies that the ADG6436 can reliably convey. The tracking voltage (V_{TRACK}) in the figure shows the source voltage and the drain voltage difference, which is less than 50 mV for a given amplitude and frequency. For large voltage, high frequency signals, the frequency must be kept below 10 MHz. If the required frequency is greater than 10 MHz, decrease the signal range appropriately to ensure signal integrity.

POWER SUPPLY RECOMMENDATIONS

Analog Devices has a wide range of power management products to meet the requirements of high performance signal chains.

An example of a bipolar power solution is shown in Figure 36. The LT3463 (a dual switching regulator) generates a positive and negative supply rail for the ADG6436, an amplifier, and/or a precision converter in a typical signal chain. Also, two optional low-drop-out regulators (LDOs), the ADP7142 and ADP7182 (positive and negative LDOs, respectively) are shown in Figure 36, which can reduce the output ripple of the LT3463 in ultra-low noise sensitive applications.

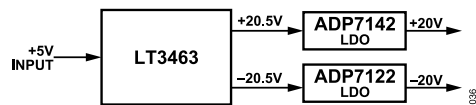


Figure 36. Bipolar Power Solution

Table 11. Recommended Power Management Devices

Product	Description
LT3463	Dual micropower, DC to DC converter with Schottky diodes
ADP7142	40 V, 200 mA, low noise, CMOS, LDO linear regulator
ADP7182	-28 V, -200 mA, low noise, LDO linear regulator

DATA ACQUISITION CALIBRATION

Figure 37 shows an example application for the ADG6436. In automated test equipment (ATE) and instrumentation applications, when using data acquisition (DAQ) systems, there is a requirement for precision and accuracy. Many factors, such as drift over time and temperature, may cause the system to lose this accuracy. The low on resistance and charge injection of the ADG6436 is ideally suited to calibrate this system in real time before taking a measurement, thus, reducing error. The break-before-make feature of the ADG6436 allows the system to switch the calibration path without shorting the inputs together.

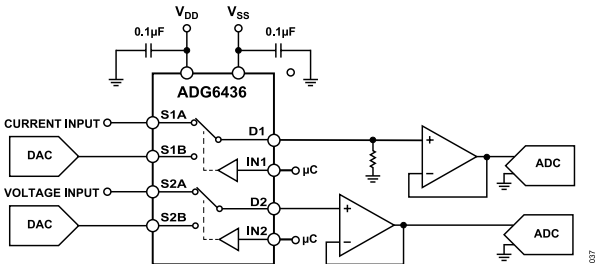


Figure 37. DAQ Calibration Application

OUTLINE DIMENSIONS

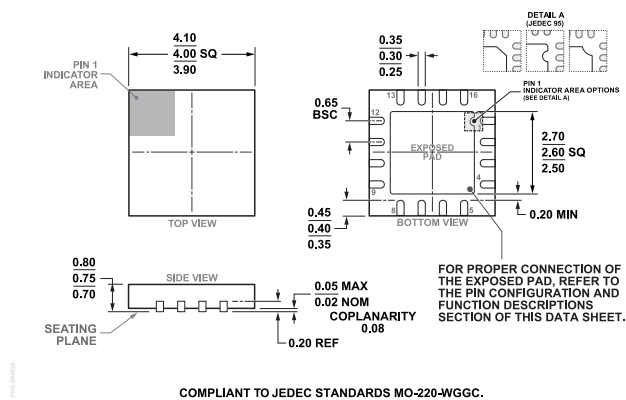


Figure 38. 16-Lead Lead Frame Chip Scale Package [LFCSP]
4 mm × 4 mm Body and 0.75 mm Package Height
(CP-16-17)
Dimensions shown in millimeters

ORDERING GUIDE

Model ¹	Temperature Range	Package Description	Packing Quantity	Package Option
ADG6436BCPZ-REEL7	−40°C to +125°C	16-Lead LFCSP	Reel, 1500	CP-16-17

¹ Z = RoHS Compliant Part.

EVALUATION BOARDS

Table 12. Evaluation Boards

Model ¹	Description
EVAL-ADG6436EBZ	Evaluation Board

¹ Z = RoHS Compliant Part.