

Monolithic Dual SPST CMOS Analog Switch

Features

- ± 15 V Input Signal Range
- 44-V Maximum Supply Ranges
- On-Resistance: 45Ω
- TTL and CMOS Compatibility

Benefits

- Wide Dynamic Range
- Simple Interfacing
- Reduced External Component Count

Applications

- Servo Control Switching
- Programmable Gain Amplifiers
- Audio Switching
- Programmable Filters

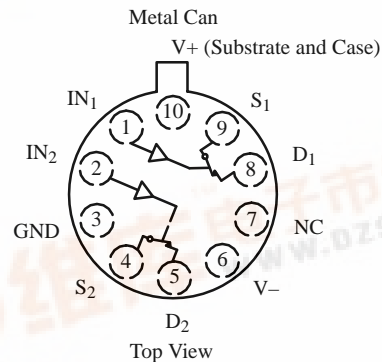
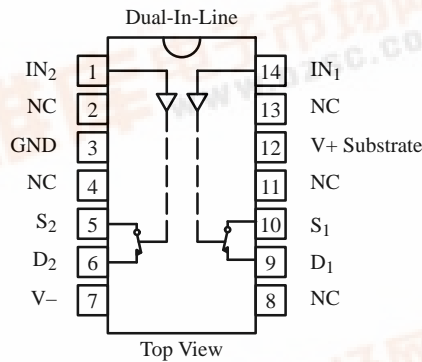
Description

The DG200A is a dual, single-pole, single-throw analog switch designed to provide general purpose switching of analog signals. This device is ideally suited for designs requiring a wide analog voltage range coupled with low on-resistance.

Each switch conducts equally well in both directions when on, and blocks up to 30 V peak-to-peak when off. In the on condition, this bi-directional switch introduces no offset voltage of its own.

The DG200A is designed on Siliconix' improved PLUS-40 CMOS process. An epitaxial layer prevents latchup.

Functional Block Diagram and Pin Configuration



Truth Table

Logic	Switch
0	ON
1	OFF

Logic "0" ≤ 0.8 V
Logic "1" ≥ 2.4 V

Ordering Information

Temp Range	Package	Part Number
0 to 70°C	14-Pin Plastic DIP	DG200ACJ
-25 to 85°C	14-Pin CerDIP	DG200ABK
	10-Pin Metal Can	DG200ABA
-55 to 125°C	14-Pin CerDIP	DG200AAK
		DG200AAK/883, JM38510/12301BCA
	10-Pin Metal Can	DG200AAA
		DG200AAA/883, JM38510/12301BIC
		14-Pin Sidebrazed

Absolute Maximum Ratings

V+ to V-	44 V
GND to V-	25 V
Digital Inputs ^a , V _S , V _D	(V-) -2 V to (V+) +2 V or 30 mA, whichever occurs first
Current (Any Terminal) Continuous	30 mA
Current S or D (Pulsed at 1 ms, 10% Duty Cycle Max)	100 mA
Storage Temperature (AX, BX Suffix)	-65 to 150°C
(CJ Suffix)	-65 to 125°C

Power Dissipation (Package) ^b	
10-Pin Metal Can ^c	450 mW
14-Pin CerDIP ^d	825 mW
14-Pin Plastic DIP ^e	470 mW

Notes:

- Signals on S_X, D_X, or IN_X exceeding V+ or V- will be clamped by internal diodes. Limit forward diode current to maximum current ratings.
- All leads welded or soldered to PC Board.
- Derate 6 mW/°C above 75°C
- Derate 11 mW/°C above 75°C
- Derate 6.5 mW/°C above 25°C

Schematic Diagram (Typical Channel)

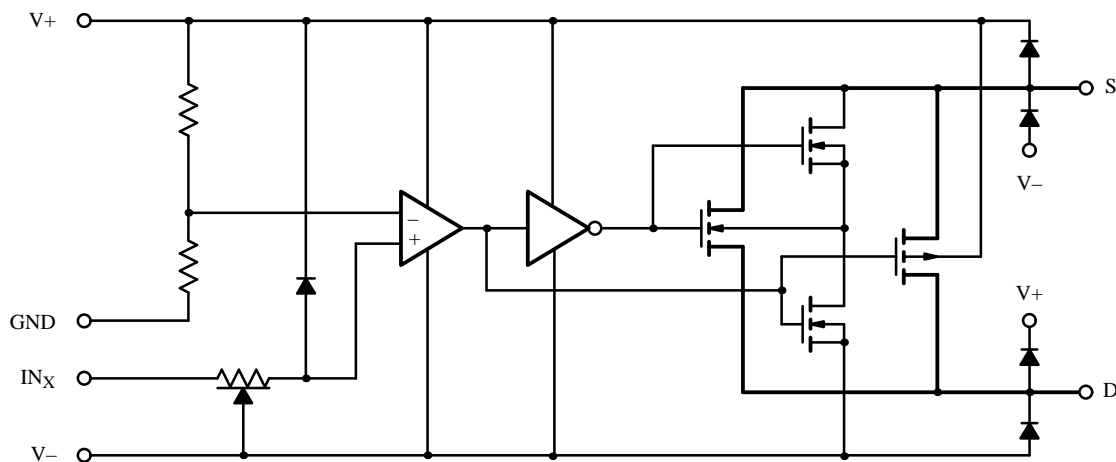


Figure 1.

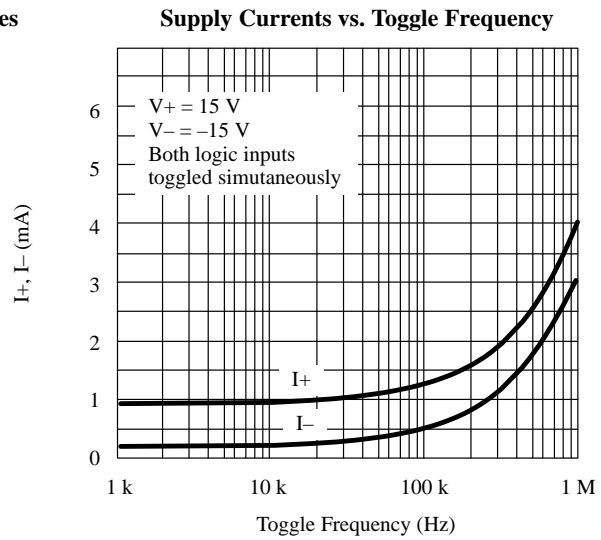
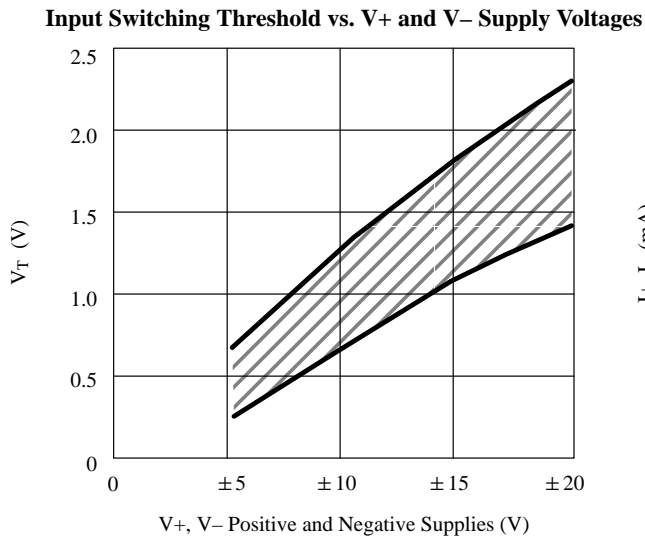
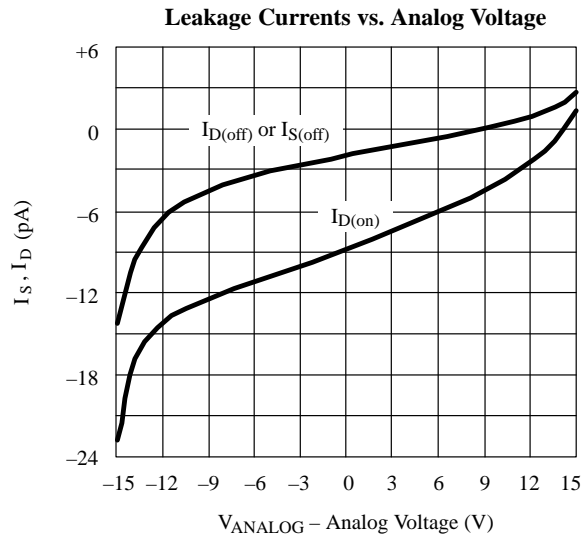
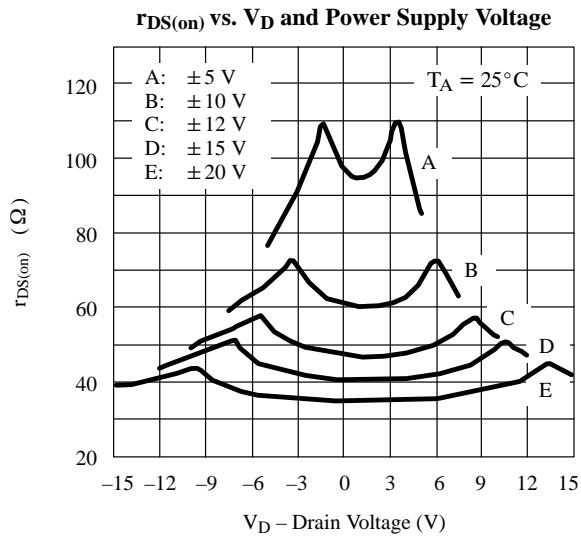
Specifications^a

Parameter	Symbol	Test Conditions Unless Otherwise Specified $V_+ = 15\text{ V}, V_- = -15\text{ V}$ $V_{IN} = 2.4\text{ V}, 0.8\text{ V}^f$	Temp ^b	Typ ^c	A Suffix -55 to 125°C		B, C Suffix		Unit
					Min ^d	Max ^d	Min ^d	Max ^d	
Analog Switch									
Analog Signal Range ^e	V_{ANALOG}		Full		-15	15	-15	15	V
Drain-Source On-Resistance	$r_{DS(on)}$	$V_D = \pm 10\text{ V}, I_S = -1\text{ mA}$	Room Full	45		70 100		80 100	Ω
Source Off Leakage Current	$I_{S(off)}$	$V_S = \pm 14\text{ V}, V_D = \mp 14\text{ V}$	Room Full	± 0.01	-2 -100	2 100	-5 -100	5 100	nA
Drain Off Leakage Current	$I_{D(off)}$	$V_D = \pm 14\text{ V}, V_S = \mp 14\text{ V}$	Room Full	± 0.01	-2 -100	2 100	-5 -100	5 100	
Channel On Leakage Current ^f	$I_{D(on)}$	$V_S = V_D = \pm 14\text{ V}$	Room Full	± 0.1	-2 -200	2 200	-5 -200	5 200	
Digital Control									
Input Current with Input Voltage High	I_{INH}	$V_{IN} = 2.4\text{ V}$	Room Full	0.0009	-0.5 -1		-1 -10		μA
		$V_{IN} = 15\text{ V}$	Room Full	0.005		0.5 1		1 10	
Input Current with Input Voltage Low	I_{INL}	$V_{IN} = 0\text{ V}$	Room Full	-0.0015	-0.5 -1		-1 -10		
Dynamic Characteristics									
Turn-On Time	t_{ON}	See Switching Time Test Circuit	Room	440		1000		1000	ns
Turn-Off Time	t_{OFF}		Room	340		425		425	
Charge Injection	Q	$C_L = 1000\text{ pF}, V_g = 0\text{ V}$ $R_g = 0\ \Omega$	Room	-10					pC
Source-Off Capacitance	$C_{S(off)}$	$f = 140\text{ kHz}$ $V_{IN} = 5\text{ V}$	Room	9					pF
Drain-Off Capacitance	$C_{D(off)}$		$V_D = 0\text{ V}$	Room	9				
Channel-On Capacitance	$C_{D(on)} + C_{S(on)}$	$V_D = V_S = 0\text{ V}, V_{IN} = 0\text{ V}$	Room	25					
Off Isolation	OIRR	$V_{IN} = 5\text{ V}, R_L = 75\ \Omega$ $V_S = 2\text{ V}, f = 1\text{ MHz}$	Room	75					dB
Crosstalk (Channel-to-Channel)	X _{TALK}		Room	90					
Power Supplies									
Positive Supply Current	I ⁺	Both Channels On or Off $V_{IN} = 0\text{ V}$ and 2.4 V	Room	0.8		2		2	mA
Negative Supply Current	I ⁻		Room	-0.23	-1		-1		

Notes:

- Refer to PROCESS OPTION FLOWCHART.
- Room = 25°C, Full = as determined by the operating temperature suffix.
- Typical values are for DESIGN AID ONLY, not guaranteed nor subject to production testing.
- The algebraic convention whereby the most negative value is a minimum and the most positive a maximum, is used in this data sheet.
- Guaranteed by design, not subject to production test.
- V_{IN} = input voltage to perform proper function.

Typical Characteristics



Test Circuits

V_O is the steady state output with switch on. Feedthrough via gate capacitance may result in spikes at leading and trailing edge of output waveform.

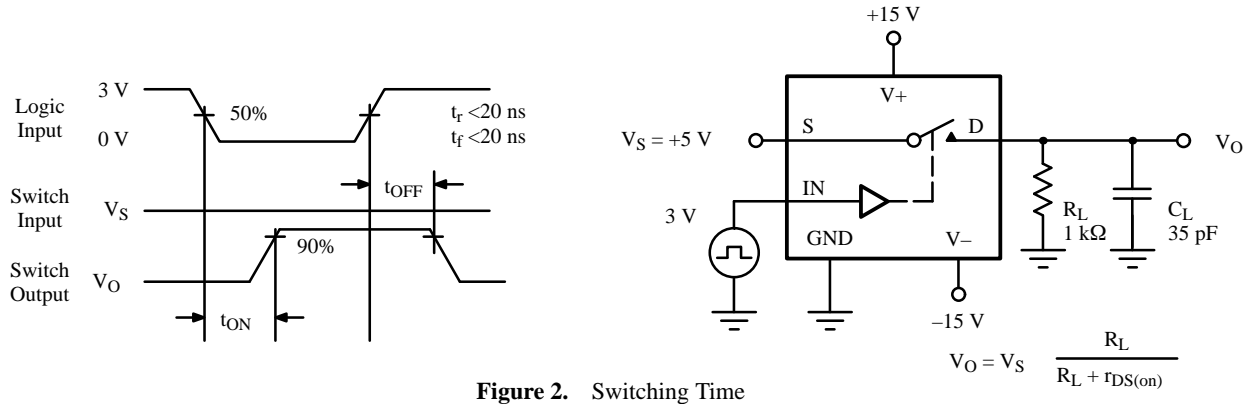
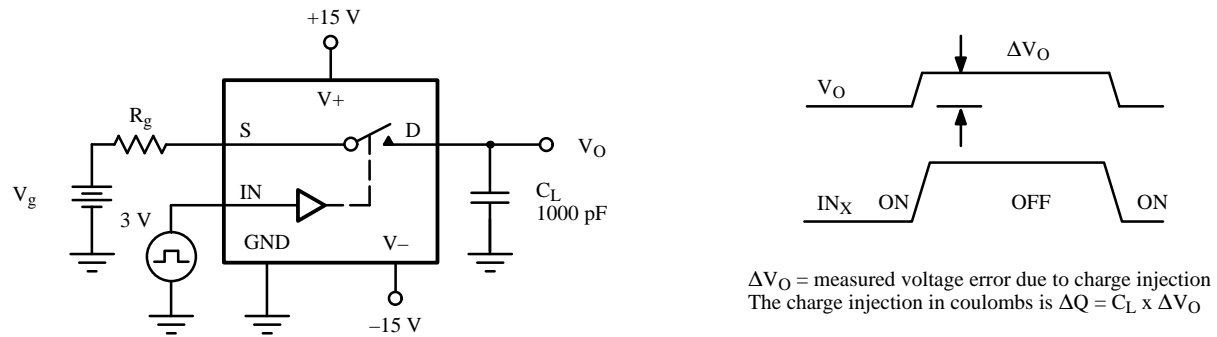
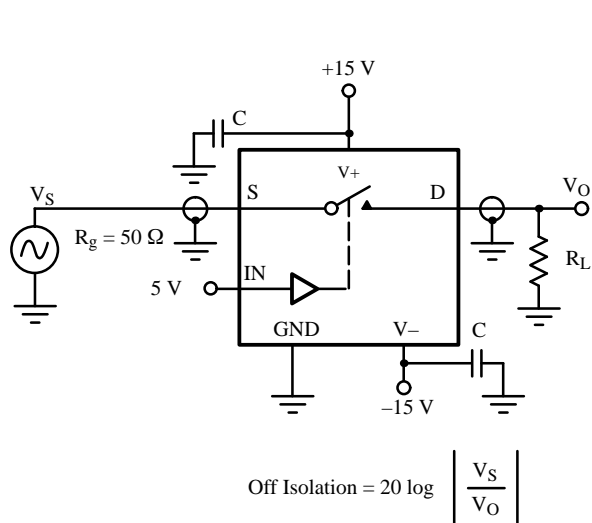


Figure 2. Switching Time



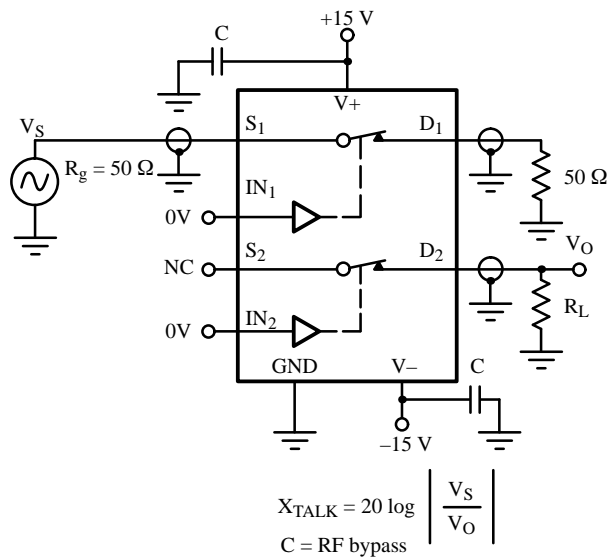
ΔV_O = measured voltage error due to charge injection
The charge injection in coulombs is $\Delta Q = C_L \times \Delta V_O$

Figure 3. Charge Injection



$$\text{Off Isolation} = 20 \log \left| \frac{V_S}{V_O} \right|$$

Figure 4. Off Isolation



$$X_{\text{TALK}} = 20 \log \left| \frac{V_S}{V_O} \right|$$

C = RF bypass

Figure 5. Channel-to-Channel Crosstalk