



# Monolithic General-Purpose CMOS Analog Switch

### FEATURES

- ± 15-V Input Range
- On-Resistance: <50 Ω
- Break-Before-Make Switching
- TTL and CMOS Compatible

### BENEFITS

- Improved Signal Headroom
- Reduced Switching Errors
- No Shorting of Inputs
- Simple Interfacing

### APPLICATIONS

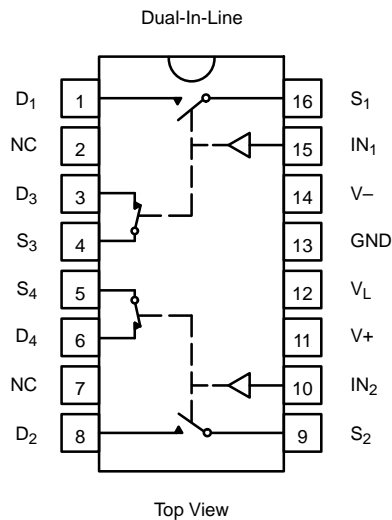
- Audio Switching
- Instrumentation
- Battery Powered Systems

### DESCRIPTION

The DG5043 solid state analog switch is recommended for general purpose applications in instrumentation, and process control. Built on the Vishay Siliconix PLUS-40 high voltage CMOS process, this device provides ease-of-use and performance advantages to the system designer. Key performance features of the DG5043 are 1-μs switching, low

power supply requirements, and break-before-make switching. Each switch conducts equally well in either direction, when on, and blocks up to 30 V peak-to-peak when off. Off leakage current is 1-nA maximum. An epitaxial layer prevents latch up. For new designs, DG403 is recommended.

## FUNCTIONAL BLOCK DIAGRAM AND PIN CONFIGURATION



TRUTH TABLE		
Logic	SW <sub>1</sub> , SW <sub>2</sub>	SW <sub>3</sub> , SW <sub>4</sub>
0	OFF	ON
1	ON	OFF

Logic "0" = ≤ 0.8 V  
 Logic "1" = ≥ 2 V

ORDERING INFORMATION		
Temp Range	Package	Part Number
0 to 70°C	16-Pin Plastic DIP	DG5043CJ

### ABSOLUTE MAXIMUM RATINGS

V+ to V- ..... 44 V  
 GND to V- ..... 25 V  
 V<sub>L</sub> ..... (GND - 0.3 V) to 44 V  
 Digital Inputs<sup>a</sup> V<sub>S</sub>, V<sub>D</sub> ..... (V-) -2 V to (V+ plus 2 V)  
 or 30 mA, whichever occurs first  
 Current (Any Terminal) Continuous ..... 30 mA  
 Current, S or D (Pulsed 1 ms 10% duty) ..... 100 mA  
 Storage Temperature ..... -65 to 125°C

Power Dissipation (Package)<sup>b</sup>  
 16-Pin Plastic DIP<sup>c</sup> ..... 470 mW

- Notes:
- Signals on S<sub>X</sub>, D<sub>X</sub>, or IN<sub>X</sub> 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

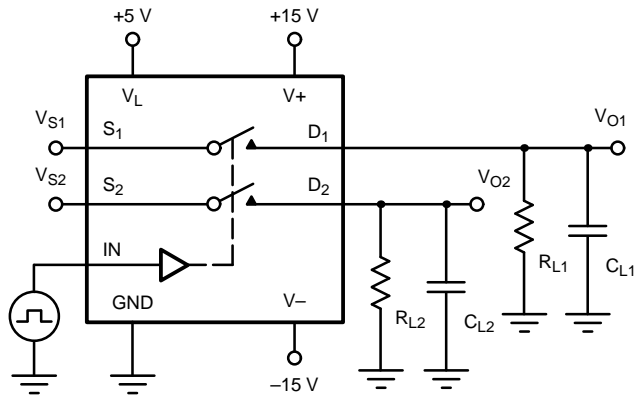


SPECIFICATIONS							
Parameter	Symbol	Test Conditions Unless Otherwise Specified $V_+ = 15\text{ V}, V_- = -15\text{ V}$ $V_L = 5\text{ V}, V_{IN} = 2\text{ V}, 0.8\text{ V}^e$	Temp <sup>a</sup>	C Suffix 0 to 70°C			Unit
				Min <sup>c</sup>	Typ <sup>b</sup>	Max <sup>c</sup>	
<b>Analog Switch</b>							
Analog Signal Range <sup>d</sup>	VANALOG		Full	-15		15	V
Drain-Source On-Resistance	r <sub>DS(on)</sub>	I <sub>S</sub> = -10 mA, V <sub>D</sub> = ±10 V	Room Full			50 75	Ω
Switch Off Leakage Current	I <sub>S(off)</sub>	V <sub>S</sub> = V <sub>D</sub> = 14 V	Room Full	-1 -100		1 100	nA
		V <sub>S</sub> = V <sub>D</sub> = -14 V	Room Full	-1 -100		1 100	
Channel On Leakage Current	I <sub>D(on)</sub>	V <sub>S</sub> = V <sub>D</sub> = 14 V	Room Full			2 200	
		V <sub>S</sub> = V <sub>D</sub> = -14 V	Room Full	-2 -200			
<b>Digital Control</b>							
Input Current with V <sub>IN</sub> Low	I <sub>IL</sub>	V <sub>IN</sub> Under Test = 0.8 V	Full	-1		1	μA
Input Current with V <sub>IN</sub> High	I <sub>IH</sub>	V <sub>IN</sub> Under Test = 2 V	Full	-1		1	
<b>Dynamic Characteristics</b>							
Turn-On Time	t <sub>ON</sub>	V <sub>S</sub> = ±10 V, R <sub>L</sub> = 1 kΩ, C <sub>L</sub> = 35 pF See Figure 1	Room			1200	ns
Turn-Off Time	t <sub>OFF</sub>		Room			700	
Charge Injection <sup>d</sup>	Q	C <sub>L</sub> = 10 nF, V <sub>gen</sub> = 0 V, R <sub>gen</sub> = 0 Ω	Room		30		pC
Off Isolation <sup>d</sup>	OIRR	R <sub>L</sub> = 75 Ω, C <sub>L</sub> = 5 pF, f = 1 MHz	Room		75		dB
Crosstalk (Channel-to-Channel) <sup>d</sup>	X <sub>TALK</sub>	R <sub>L</sub> = 75 Ω, V <sub>S</sub> = 2 V <sub>P-P</sub> , f = 1 MHz	Room		89		
Source Off Capacitance	C <sub>S(off)</sub>	V <sub>D</sub> = V <sub>S</sub> = 0 V, f = 1 MHz	Room		15		pF
Drain Off Capacitance <sup>d</sup>	C <sub>D(off)</sub>		Room		17		
Channel On Capacitance <sup>d</sup>	C <sub>D(on)</sub>		Room		45		
<b>Power Supplies</b>							
Positive Supply Current	I <sub>+</sub>	V <sub>IN</sub> = 0 or 2.4 V	Full			300	μA
Negative Supply Current	I <sub>-</sub>		Full	-300			
Logic Supply Current	I <sub>L</sub>	V <sub>IN</sub> = 0 or 2.4 V	Full			300	
Ground Current	I <sub>GND</sub>		Full	-300			

Notes:

- a. Room = 25°C, Full = as determined by the operating temperature suffix.
- b. Typical values are for DESIGN AID ONLY, not guaranteed nor subject to production testing.
- c. The algebraic convention whereby the most negative value is a minimum and the most positive a maximum, is used in this data sheet.
- d. Guaranteed by design, not subject to production test.
- e. V<sub>IN</sub> = input voltage to perform proper function.

**TEST CIRCUITS**



$C_L$  (includes fixture and stray capacitance)

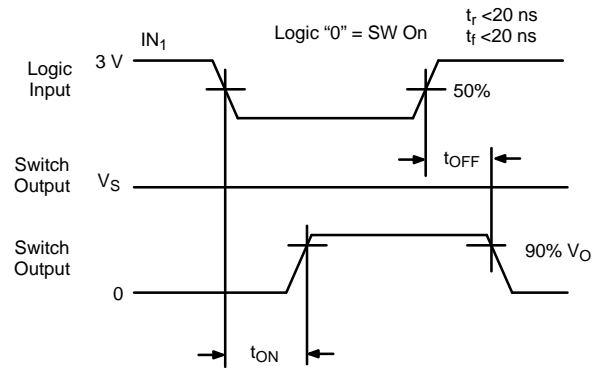


FIGURE 1. Switching Time

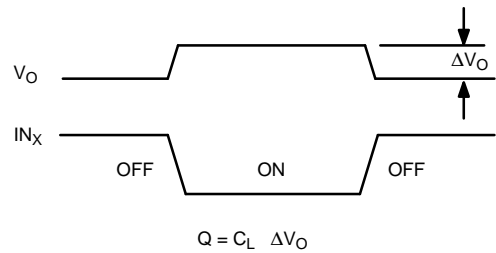
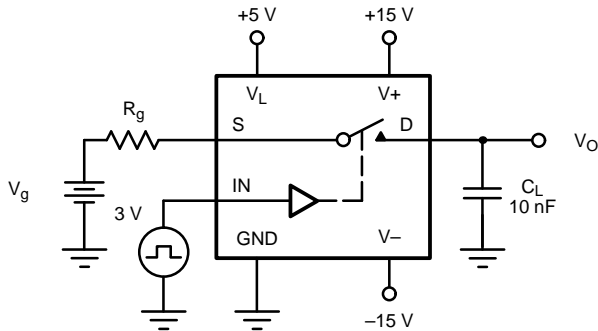


FIGURE 2. Charge Injection