



# 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

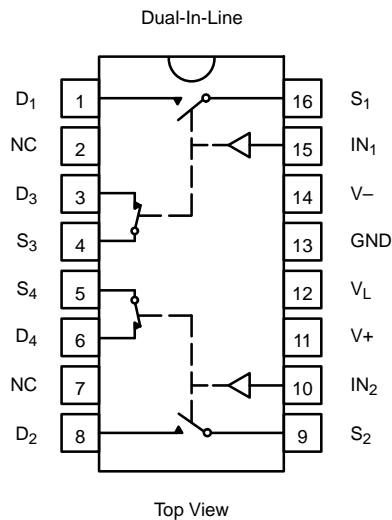
- Audio Switching
- Instrumentation
- Battery Powered Systems

## 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  
 VL ..... (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

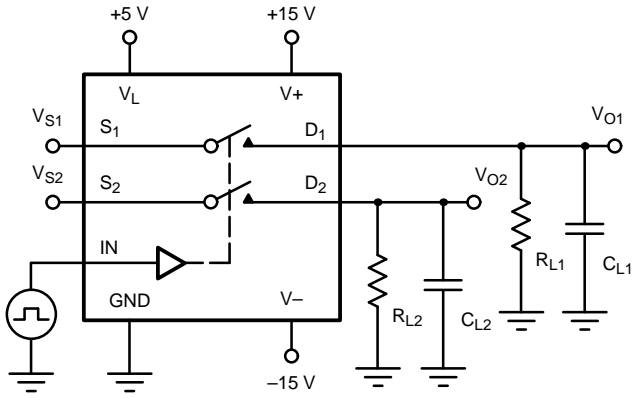


SPECIFICATIONS							
Parameter	Symbol	Test Conditions Unless Otherwise Specified $V_+ = 15\text{ V}, V_- = -15\text{ V}$ $V_L = 5\text{ V}, V_{IN} = 2\text{ V}, 0.8\text{ V}^e$	Temp <sup>a</sup>	C Suffix 0 to 70°C			Unit
				Min <sup>c</sup>	Typ <sup>b</sup>	Max <sup>c</sup>	
<b>Analog Switch</b>							
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	nA
		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)

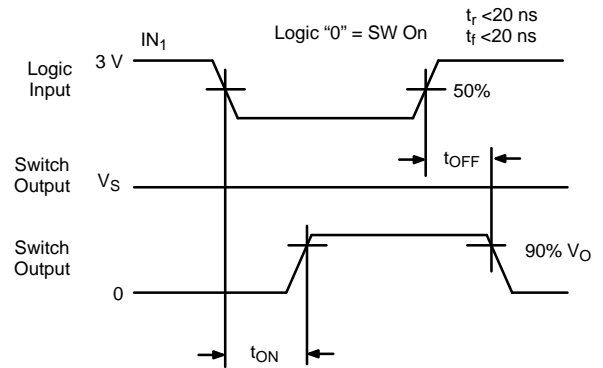


FIGURE 1. Switching Time

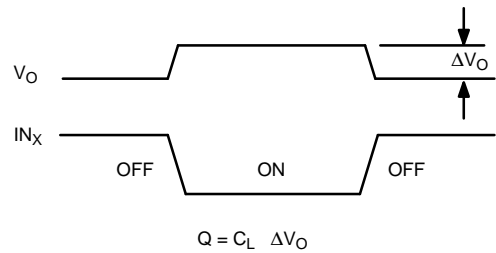
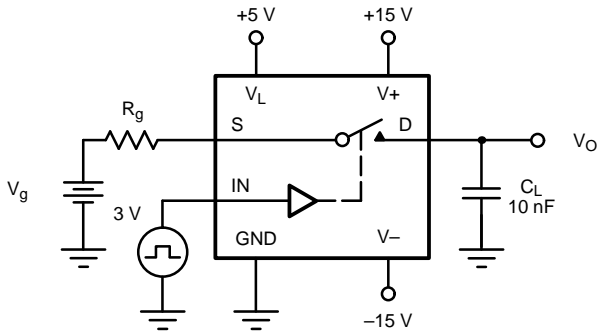


FIGURE 2. Charge Injection



LittleDiode supplies new, hard to find or obsolete electronic components and semiconductors all over the world.

With over two million different components listed you are sure to find the part you need.

Feel free to visit us today at our online store:

**[LittleDiode.com](http://LittleDiode.com)**

Looking forward to providing you with the best possible service.