

Monolithic General-Purpose CMOS Analog Switch

Features

- $\pm 15\text{-V}$ Input Range
- On-Resistance: $<50\ \Omega$
- Break-Before-Make Switching
- TTL and CMOS Compatible

Benefits

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

Applications

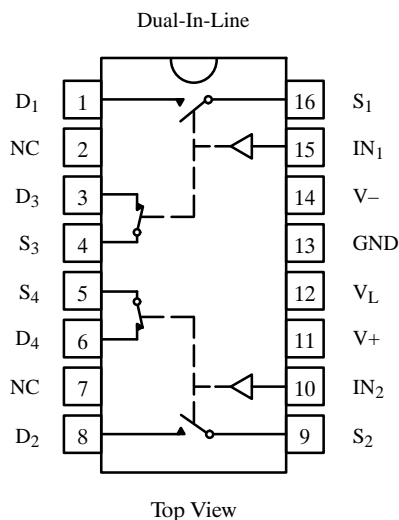
- Audio Switching
- Instrumentation
- Battery Powered Systems

Description

The DG5043 solid state analog switch is recommended for general purpose applications in instrumentation, and process control. Built on the 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 ₁ , SW ₂	SW ₃ , SW ₄
0	OFF	ON
1	ON	OFF

Logic "0" = $\leq 0.8\text{ V}$
Logic "1" = $\geq 2\text{ V}$

Ordering Information

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

Updates to this data sheet may be obtained via facsimile by calling Siliconix FaxBack, 1-408-970-5600. Please request FaxBack document #70059.

Absolute Maximum Ratings

V+ to V-	44 V
GND to V-	25 V
V _L	(GND - 0.3 V) to 44 V
Digital Inputs ^a V _S , V _D	(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) ^b	
16-Pin Plastic DIP ^c	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

Specifications

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

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 ^a	C Suffix 0 to 70°C			Unit
				Min ^c	Typ ^b	Max ^c	
Power Supplies							
Positive Supply Current	I+	$V_{IN} = 0\text{ or }2.4\text{ V}$	Full			300	μA
Negative Supply Current	I-		Full	-300			
Logic Supply Current	I _L		Full			300	
Ground Current	I _{GND}	Full	-300				

Notes:

- 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.

Test Circuits

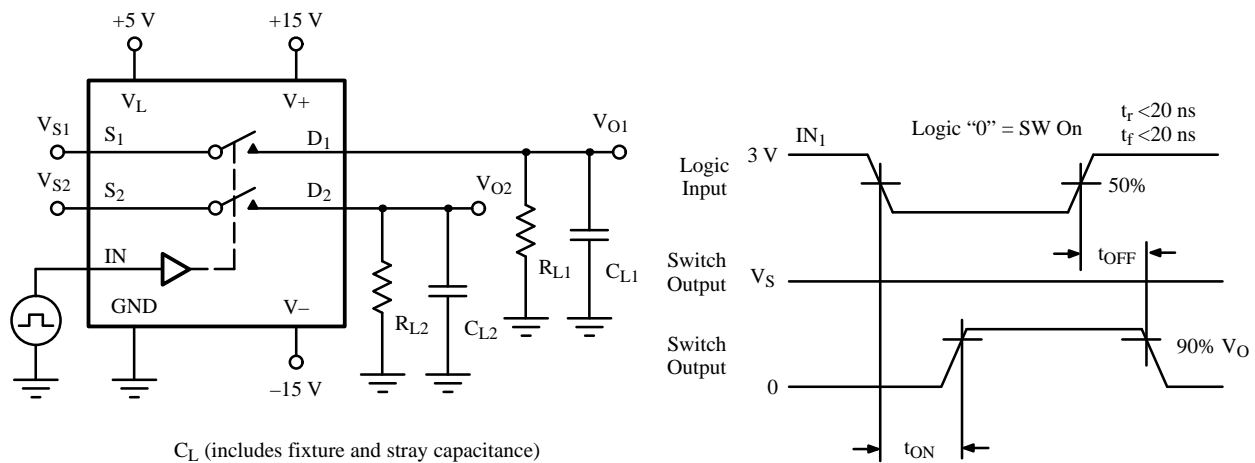


Figure 1. Switching Time

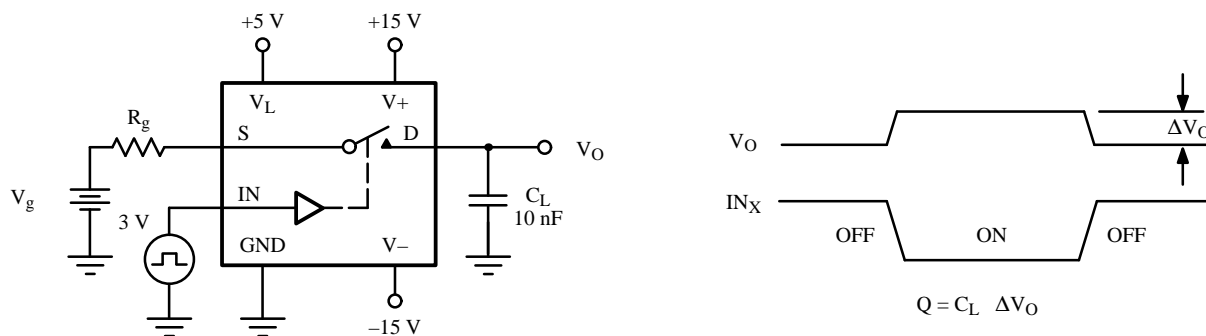


Figure 2. Charge Injection