

## High-Speed Quad Monolithic SPST CMOS Analog Switch

### Features

- Fast Switching  $t_{ON}$ : 55 ns
- Low Charge Injection: 9 pC
- Low  $r_{DS(on)}$ : 32  $\Omega$
- TTL Compatible
- Low Leakage: 50 pA

### Benefits

- Fast Settling Times
- Reduced Switching Glitches
- High Precision

### Applications

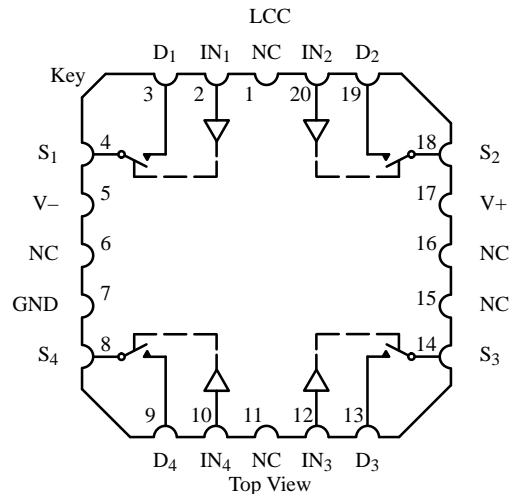
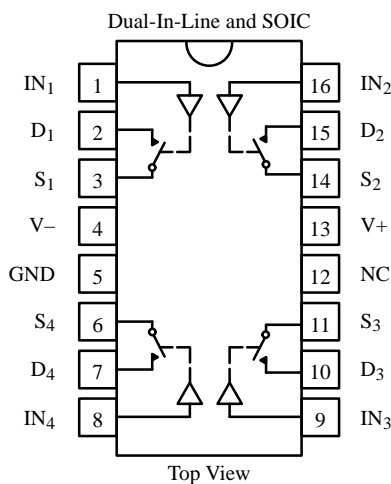
- High Speed Switching
- Sample/Hold
- Digital Filters
- Op Amp Gain Switching
- Flight Control Systems

### Description

The DG271 high speed quad single-pole single-throw analog switch is intended for applications that require low on-resistance, low leakage currents, and fast switching speeds.

Built on Siliconix' proprietary high voltage silicon gate process to achieve superior on/off performance, each switch conducts equally well in both directions when on, and blocks up to the supply voltage when off. An epitaxial layer prevents latchup.

### Functional Block Diagram and Pin Configuration



#### Ordering Information

Temp Range	Package	Part Number
0 to 70°C	16-Pin Plastic DIP	DG271CJ
-40 to 85°C	16-Pin Narrow SOIC	DG271DY
-55 to 125°C	16-Pin CerDIP	DG271AK
		DG271AK/883
		5962-8671602MEA
	LCC-20	DG271AZ/883
		5962-8671602M2A

#### Truth Table

Logic	Switch
0	ON
1	OFF

Logic "0"  $\leq 0.8$  V  
 Logic "1"  $\geq 2$  V

Switches Shown for Logic "0" Input

Switches Shown for Logic "0" Input

# DG271

## Absolute Maximum Ratings

V+ to V-	44 V
GND to V-	25 V
Digital Inputs <sup>a</sup> V <sub>S</sub> , V <sub>D</sub>	(V-) -2 V to (V+) +2 V or 20 mA, whichever occurs first
Current, Any Terminal Except S or D	30 mA
Continuous Current, S or D	20 mA
Peak Current, S or D (Pulsed at 1 ms, 10% duty cycle max)	100 mA
Storage Temperature (AK, AZ, DY Suffix)	-65 to 150°C
(CJ Suffix)	-65 to 125°C
Power Dissipation (Package) <sup>b</sup>	
16-Pin Plastic DIP <sup>c</sup>	470 mW
16-Pin Plastic Narrow SOIC <sup>d</sup>	600 mW
16-Pin CerDIP <sup>e</sup>	900 mW
LCC-20 <sup>f</sup>	750 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 6.5 mW/°C above 75°C
- Derate 7.6 mW/°C above 75°C
- Derate 12 mW/°C above 75°C
- Derate 10 mW/°C above 75°C

## Specifications<sup>a</sup>

Parameter	Symbol	Conditions Unless Otherwise Specified V+ = 15 V, V- = -15 V V <sub>IN</sub> = 2 V, 0.8 V <sup>f</sup>	Temp <sup>b</sup>	Typ <sup>c</sup>	A Suffix -55 to 125°C		C, D Suffix 0 to 70°C -40 to 85°C		Unit
					Min <sup>d</sup>	Max <sup>d</sup>	Min <sup>d</sup>	Max <sup>d</sup>	
<b>Analog Switch</b>									
Analog Signal Range <sup>e</sup>	V <sub>ANALOG</sub>		Full		-15	15	-15	15	V
Drain-Source On-Resistance	r <sub>DS(on)</sub>	I <sub>S</sub> = 1 mA, V <sub>D</sub> = ±10 V	Room Full	32		50 75		50 75	Ω
Switch Off Leakage Current	I <sub>S(off)</sub>	V <sub>D</sub> = ±14 V, V <sub>S</sub> = ∓14 V	Room Full	±0.05	-1 -100	1 100	-1 -100	1 100	nA
	I <sub>D(off)</sub>		Room Full	±0.05	-1 -100	1 100	-1 -100	1 100	
Channel On Leakage Current	I <sub>D(on)</sub> + I <sub>S(on)</sub>	V <sub>S</sub> = V <sub>D</sub> = ±14 V	Room Full	±0.05	-1 -200	1 200	-1 -200	1 200	
<b>Digital Control</b>									
Input Current with Voltage High	I <sub>INH</sub>	V <sub>IN</sub> = 2 V	Room Full	0.010	-1 -10		-1 -10		μA
		V <sub>IN</sub> = 15 V	Room Full	0.010		1 10		1 10	
Input Current with Voltage Low	I <sub>INL</sub>	V <sub>IN</sub> = 0 V	Room Full	0.010	-1 -10		-1 -10		
<b>Dynamic Characteristics</b>									
Turn-On Time	t <sub>ON</sub>	V <sub>S</sub> = ±10 V See Figure 2	Room Full	55		65 80		65 80	ns
Turn-Off Time	t <sub>OFF</sub>		Room Full	50		65 80		65 80	
Charge Injection	Q	C <sub>L</sub> = 100 pF, V <sub>gen</sub> = 0 V R <sub>gen</sub> = 0 Ω	Room	9					pC

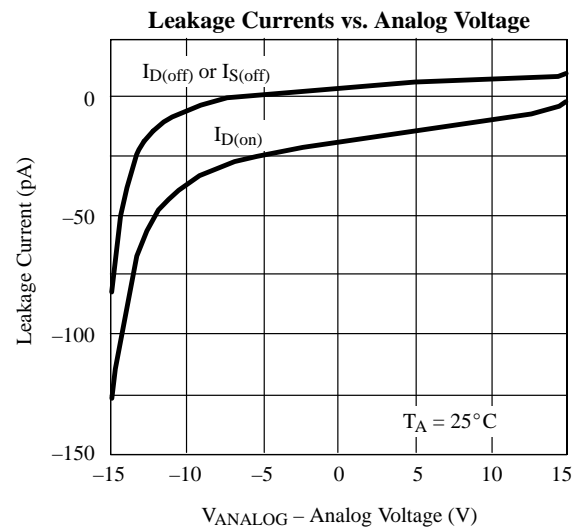
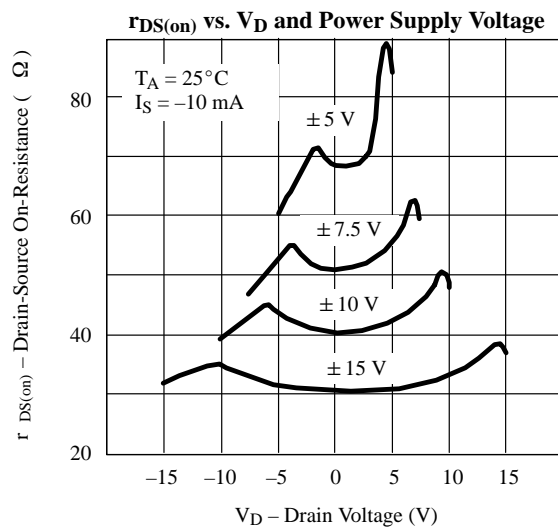
### Specifications<sup>a</sup>

Parameter	Symbol	Conditions Unless Otherwise Specified $V_+ = 15\text{ V}, V_- = -15\text{ V}$ $V_{IN} = 2\text{ V}, 0.8\text{ V}^f$	Temp <sup>b</sup>	Typ <sup>c</sup>	A Suffix -55 to 125°C		C, D Suffix 0 to 70°C -40 to 85°C		Unit
					Min <sup>d</sup>	Max <sup>d</sup>	Min <sup>d</sup>	Max <sup>d</sup>	
<b>Dynamic Characteristics (Cont'd)</b>									
Source Off Capacitance	$C_{S(off)}$	$V_S = 0\text{ V}, V_{IN} = 5\text{ V}$ $f = 1\text{ MHz}$	Room	6					pF
Drain Off Capacitance	$C_{D(off)}$		Room	8					
Channel On Capacitance	$C_{D(on)}$	$V_D = V_S = 0\text{ V}, V_{IN} = 0\text{ V}$	Room	24					
Off Isolation	OIRR	$R_L = 50\ \Omega, f = 1\text{ MHz}$	Room	75					dB
Crosstalk	$X_{TALK}$		Room	95					
<b>Supply</b>									
Positive Supply Current	$I_+$	All Channels On or Off	Room Full	4.3		7.5 11		7.5 11	mA
Negative Supply Current	$I_-$		Room Full	-3.4	-6 -10		-6 -10		

Notes:

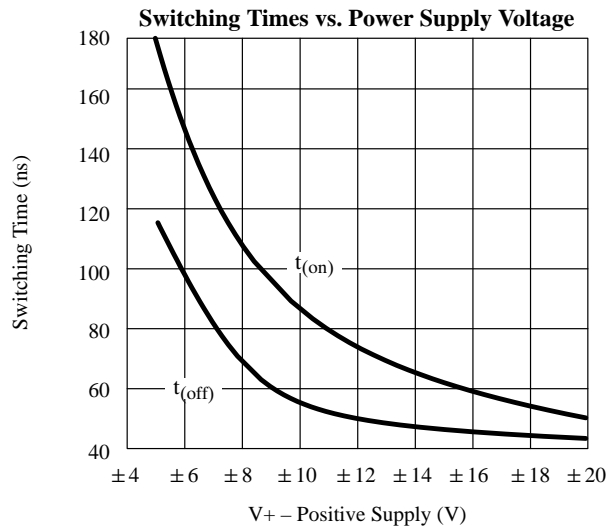
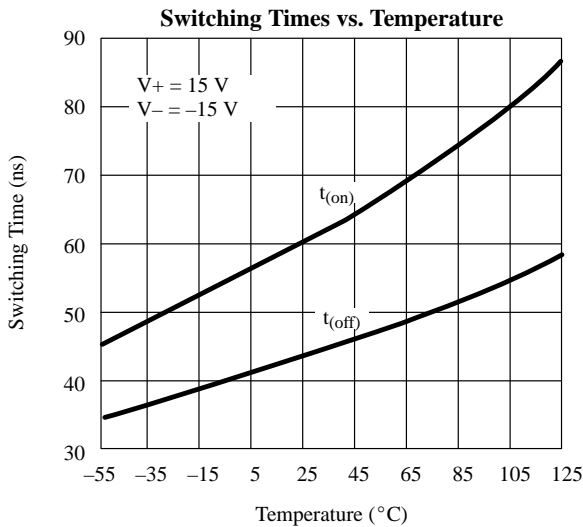
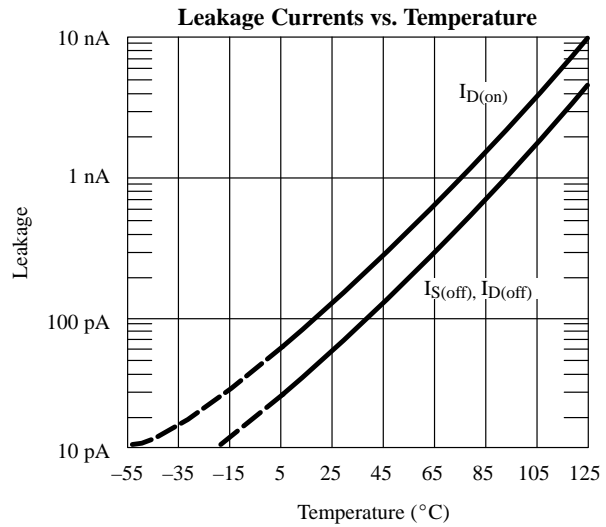
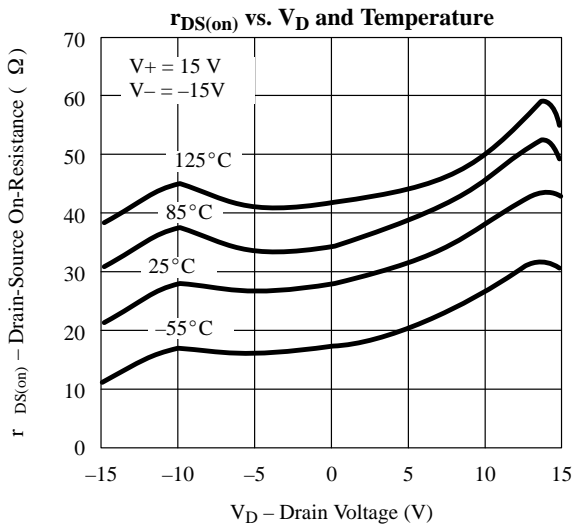
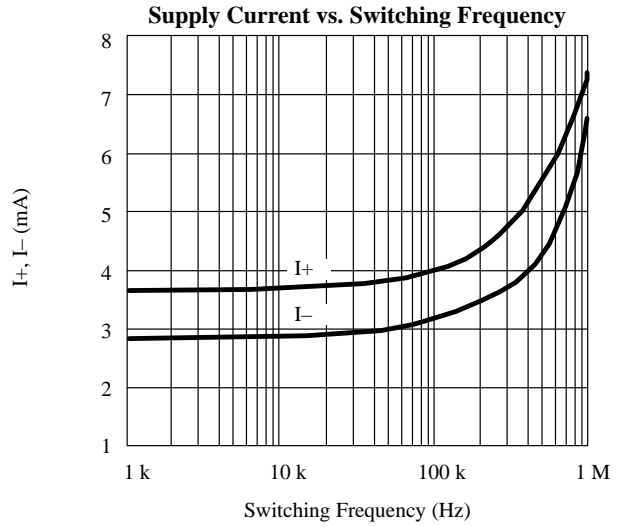
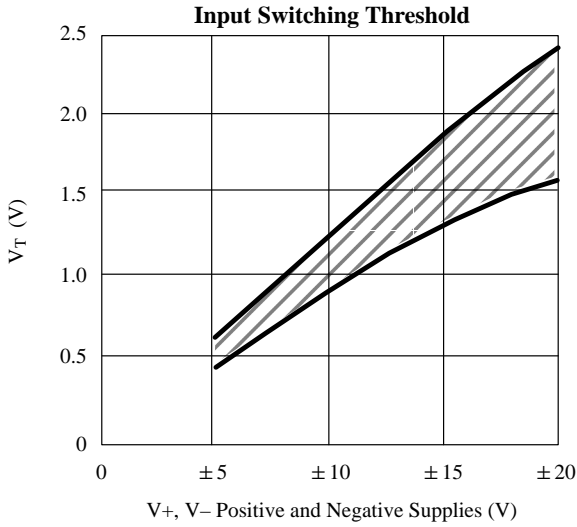
- Refer to PROCESS OPTION FLOWCHART (Section 5 of the 1994 Data Book or FaxBack number 7103).
- Room = 25°C, Full = as determined by the operating temperature suffix.
- Typical values are for DESIGN AID ONLY, not guaranteed nor subject to production testing.
- The algebraic convention whereby the most 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



## DG271

### Typical Characteristics (Cont'd)



## Schematic Diagram (Typical Channel)

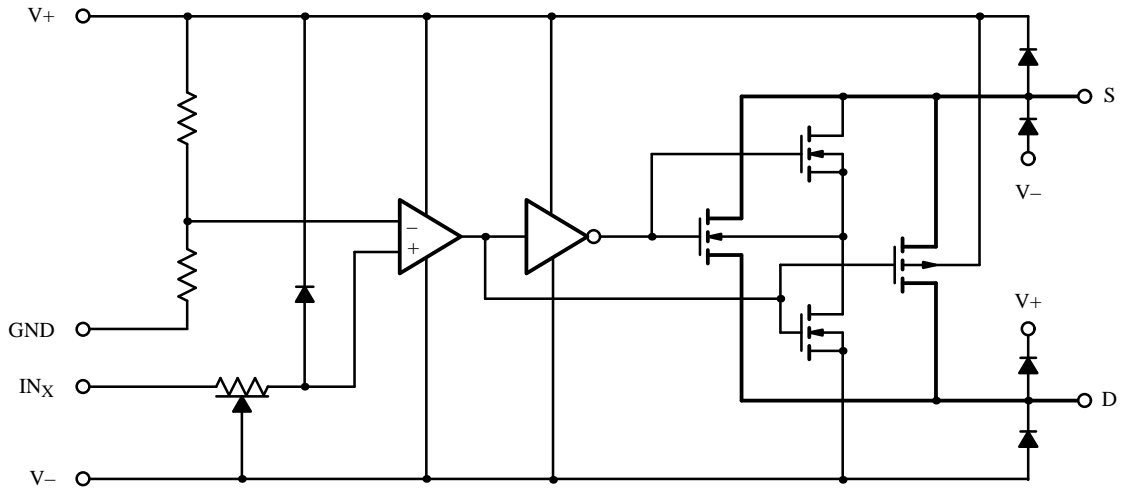


Figure 1.

## Test Circuits

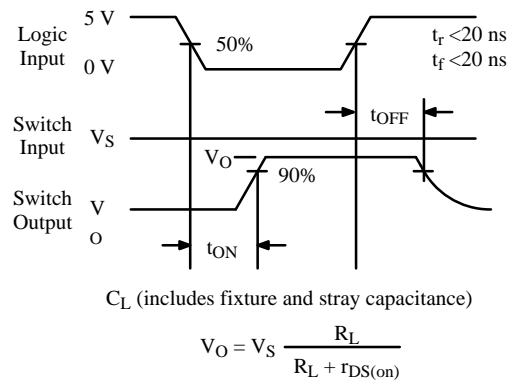
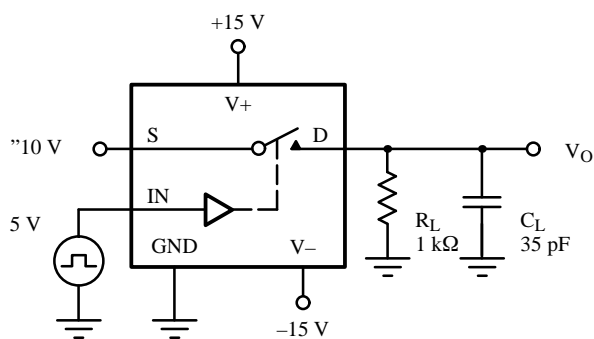


Figure 2. Switching Time