TEMIC

Siliconix

DG271

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 Ω
- TTL Compatible
- Low Leakage: 50 pA

Benefits

- Fast Settling Times
- Reduced Switching Glitches
- High Precision

Applications

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

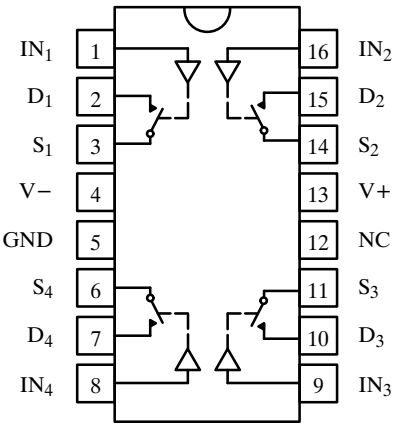
Description

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.

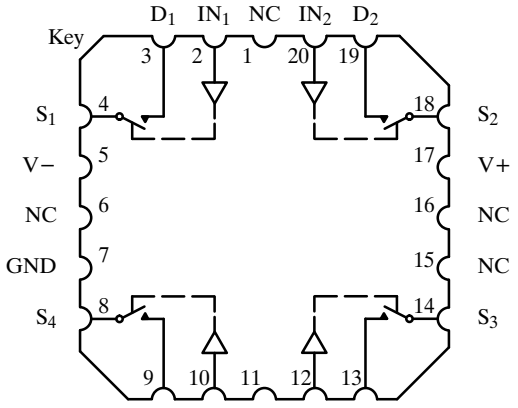
Functional Block Diagram and Pin Configuration

Dual-In-Line and SOIC



Top View

LCC



Top View

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" ≤ 0.8 V
Logic "1" ≥ 2 V

DG271

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 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)[b]
16-Pin Plastic DIP[c] ..... 470 mW
16-Pin Plastic Narrow SOIC[d] ..... 600 mW
16-Pin CerDIP[e] ..... 900 mW
LCC-20[f] ..... 750 mW

Notes:
a. 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.
b. All leads welded or soldered to PC Board.
c. Derate 6.5 mW/°C above 75°C
d. Derate 7.6 mW/°C above 75°C
e. Derate 12 mW/°C above 75°C
f. Derate 10 mW/°C above 75°C

Specifications[a]

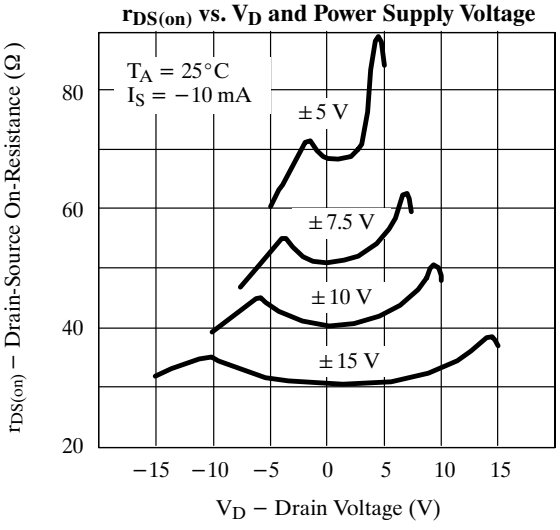
Parameter	Symbol	Conditions Unless Otherwise Specified V+ = 15 V, V− = −15 V V_{IN} = 2 V, 0.8 V[f]	Temp[b]	Typ[c]	A Suffix −55 to 125°C		C, D Suffix 0 to 70°C −40 to 85°C		Unit
					Min[d]	Max[d]	Min[d]	Max[d]	
Analog Switch									
Analog Signal Range[e]	V_{ANALOG}		Full		−15	15	−15	15	V
Drain-Source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

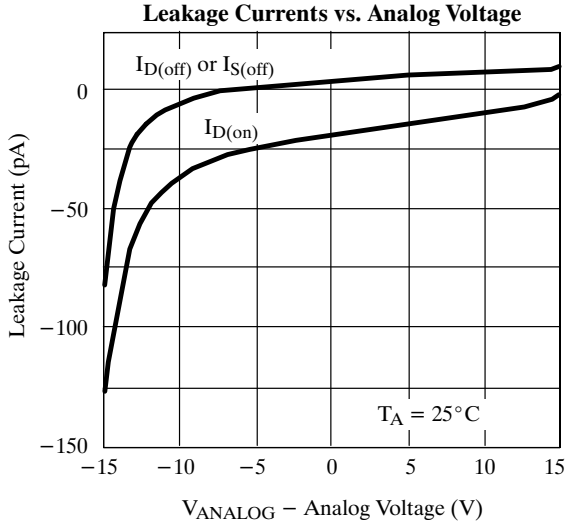
Specifications[a]

Parameter	Symbol	Conditions Unless Otherwise Specified V+ = 15 V, V− = −15 V V_{IN} = 2 V, 0.8 V[f]	Temp[b]	Typ[c]	A Suffix −55 to 125°C Min[d]	A Suffix −55 to 125°C Max[d]	C, D Suffix 0 to 70°C, −40 to 85°C Min[d]	C, D Suffix 0 to 70°C, −40 to 85°C Max[d]	Unit
Dynamic Characteristics (Cont'd)									
Source Off Capacitance	$C_{S(off)}$	V_S = 0 V, V_{IN} = 5 V f = 1 MHz	Room	6					pF
Drain Off Capacitance	$C_{D(off)}$		Room	8					
Channel On Capacitance	$C_{D(on)}$	$V_D = V_S$ = 0 V, V_{IN} = 0 V	Room	24					
Off Isolation	OIRR	R_L = 50 Ω, f = 1 MHz	Room	75					dB
Crosstalk	X_{TALK}		R o o m	9 5					
Supply									
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:
a. Refer to PROCESS OPTION FLOWCHART (Section 5 of the 1994 Data Book or FaxBack number 7103).
b. Room = 25°C, Full = as determined by the operating temperature suffix.
c. Typical values are for DESIGN AID ONLY, not guaranteed nor subject to production testing.
d. The algebraic convention whereby the most negative value is a minimum and the most positive a maximum, is used in this data sheet.
e. Guaranteed by design, not subject to production test.
f. V_{IN} = input voltage to perform proper function.

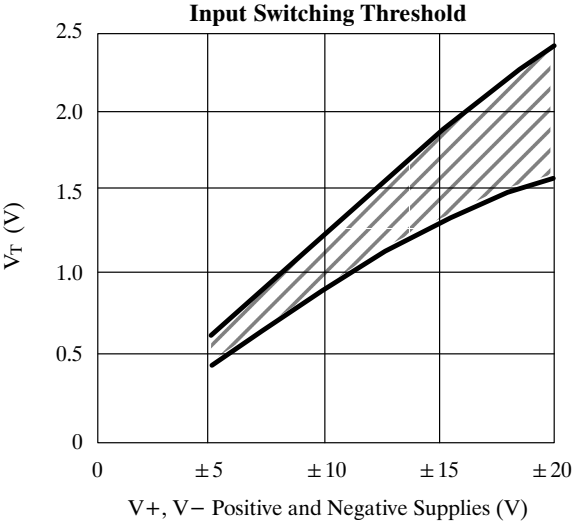
Typical Characteristics



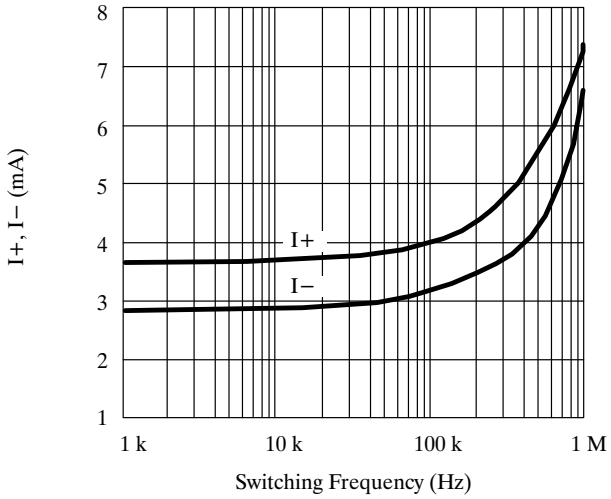


Typical Characteristics (Cont'd)

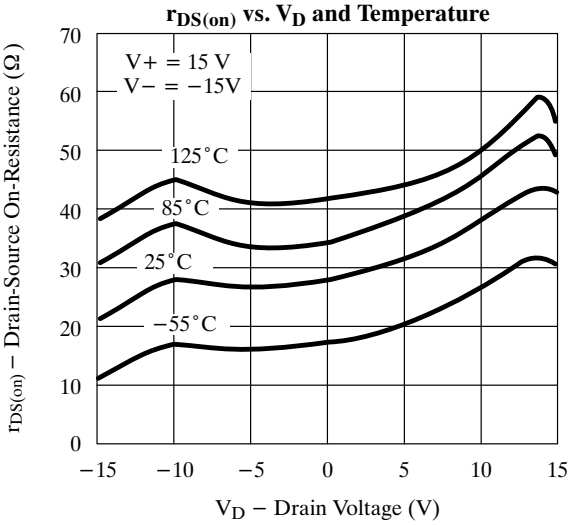
Input Switching Threshold



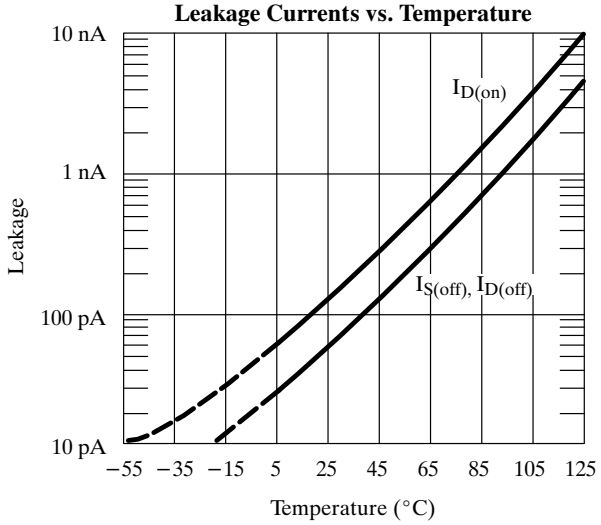
Supply Current vs. Switching Frequency



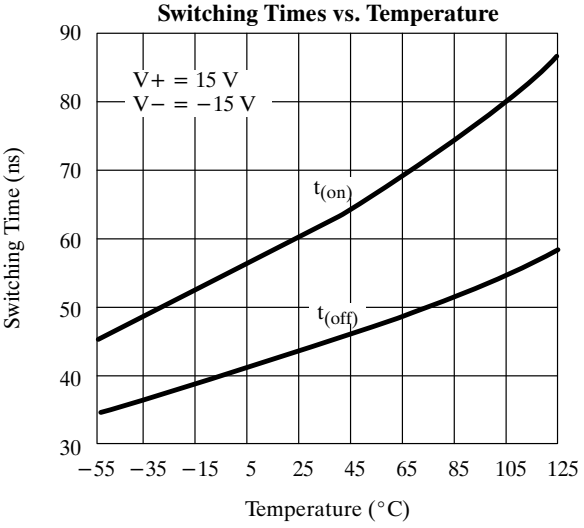
$r_{DS(on)}$ vs. V_D and Temperature



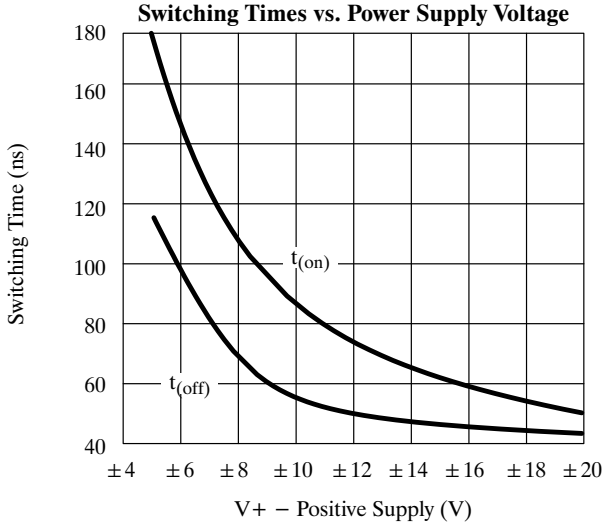
Leakage Currents vs. Temperature



Switching Times vs. Temperature



Switching Times vs. Power Supply Voltage



Schematic Diagram (Typical Channel)

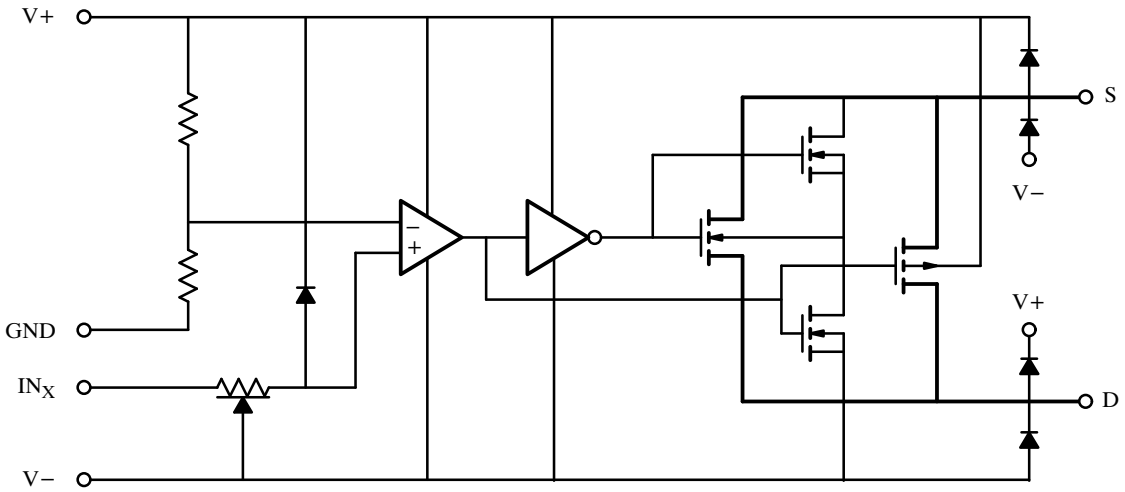


Figure 1.

Test Circuits

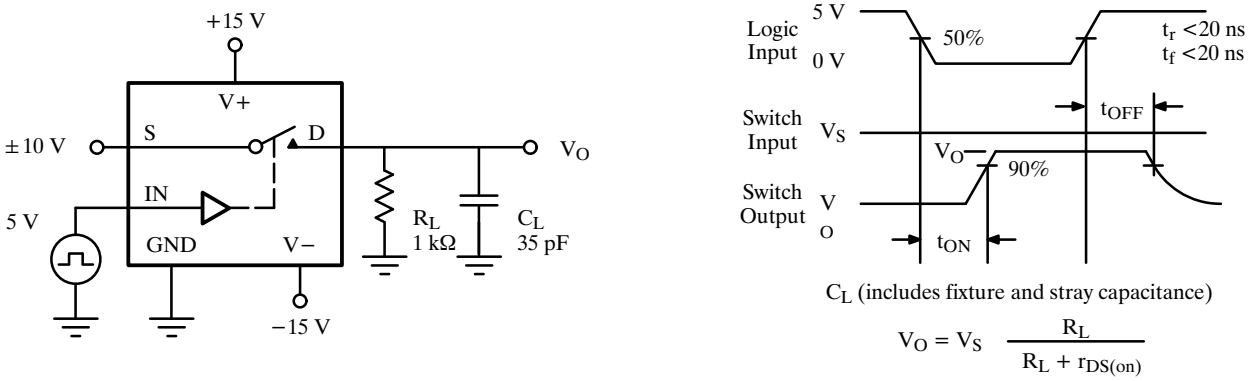


Figure 2. Switching Time