



## High-Speed Quad Monolithic SPST CMOS Analog Switch

### FEATURES

- Fast Switching  $t_{ON}$ : 55 ns
- Low Charge Injection: 5 pC
- Low  $r_{DS(on)}$ : 32  $\Omega$
- TTL/CMOS Compatible
- Low Leakage: 50 pA

### BENEFITS

- Fast Settling Times
- Reduced Switching Glitches
- High Precision

### APPLICATIONS

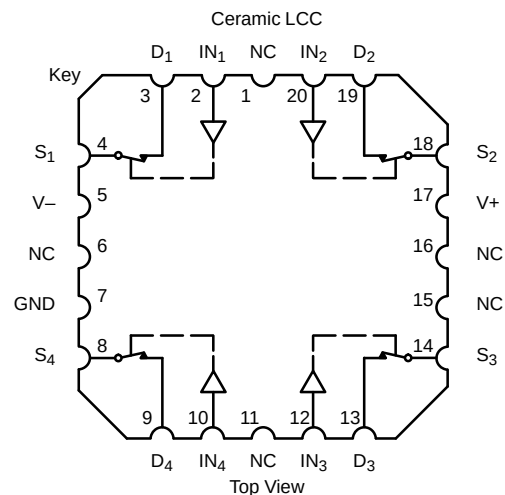
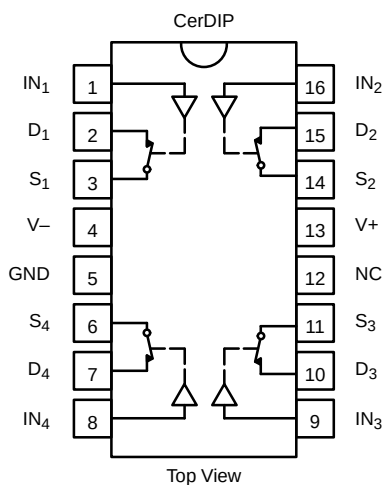
- High-Speed Switching
- Sample/Hold
- Digital Filters
- Op Amp Gain Switching
- Flight Control Systems
- Automatic Test Equipment
- Choppers
- Communication Systems

### 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.

The military version of the DG271 is manufactured using the Vishay Siliconix high voltage metal gate wafer fabrication process. The military version of the DG271 shares the same performance of the commercial DG271B, which uses the high voltage silicon gate process.

### FUNCTIONAL BLOCK DIAGRAM AND PIN CONFIGURATION



### TRUTH TABLE

| Logic | Switch |
|-------|--------|
| 0     | ON     |
| 1     | OFF    |

Logic "0"  $\leq 0.8$  V  
Logic "1"  $\geq 2.4$  V

| ORDERING INFORMATION |               |                 |
|----------------------|---------------|-----------------|
| Temp Range           | Package       | Part Number     |
| -55 to 125°C         | 16-Pin CerDIP | DG271AK         |
|                      |               | DG271AK/883     |
|                      |               | 5962-8671602MEA |
|                      | LCC-20        | DG271AZ/883     |
|                      |               | 5962-8671602M2A |

## 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<br>20 mA, whichever occurs first |
| Current, Any Terminal                                        | 30 mA                                                      |
| Peak Current, S or D<br>(Pulsed at 1 ms, 10% duty cycle max) | 100 mA                                                     |
| Storage Temperature (AK and AZ Suffix)                       | -65 to 150°C                                               |

|                                          |        |
|------------------------------------------|--------|
| Power Dissipation (Package) <sup>b</sup> |        |
| 16-Pin CerDIP <sup>c</sup>               | 900 mW |
| LCC-20 <sup>d</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 12 mW/°C above 75°C
- Derate 10 mW/°C above 75°C

## SCHEMATIC DIAGRAM (TYPICAL CHANNEL)

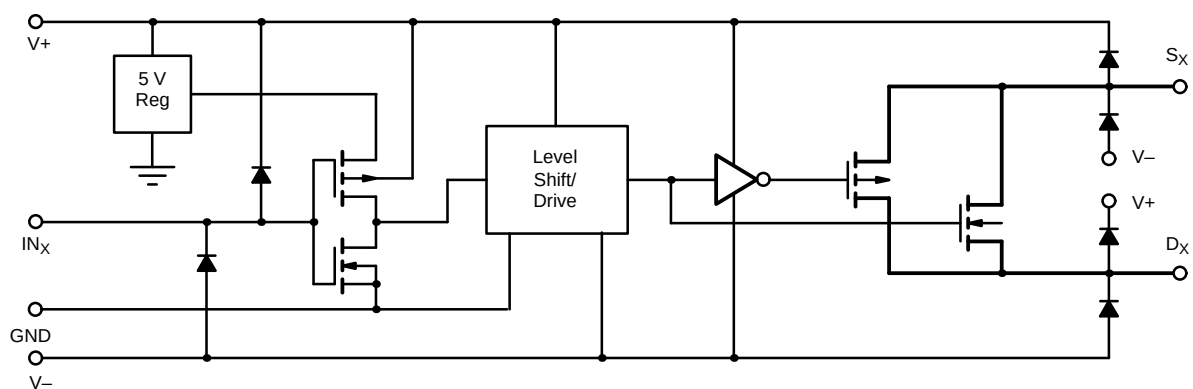


FIGURE 1.



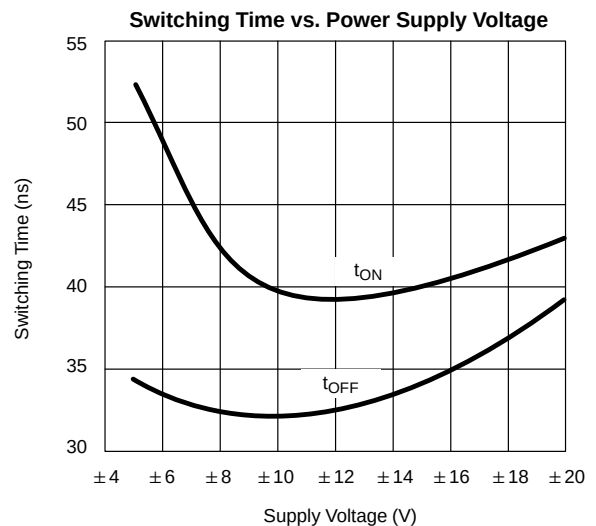
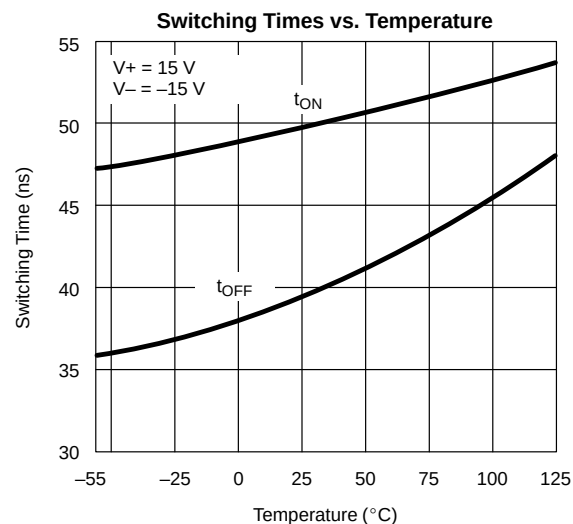
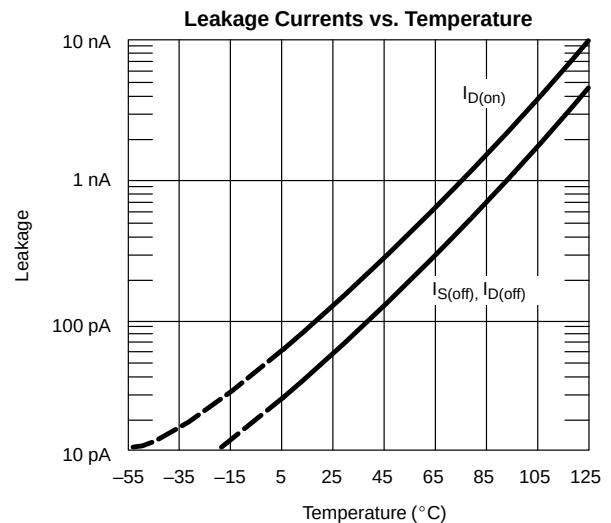
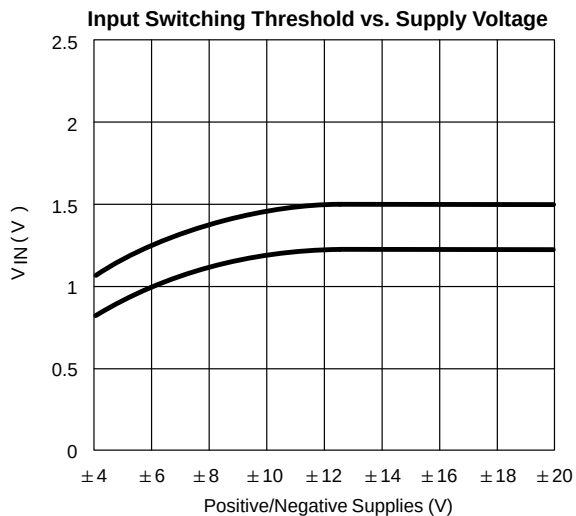
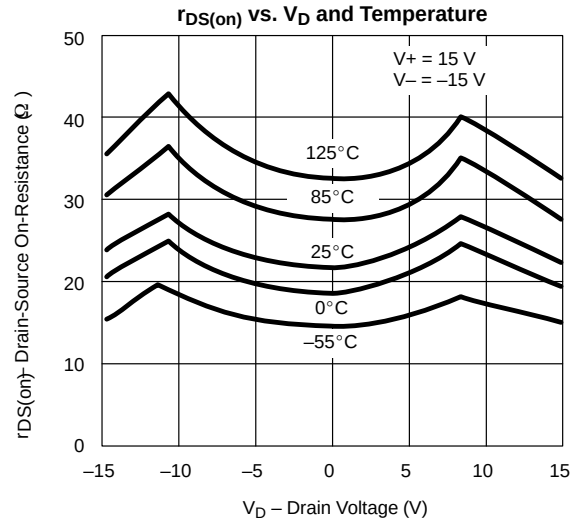
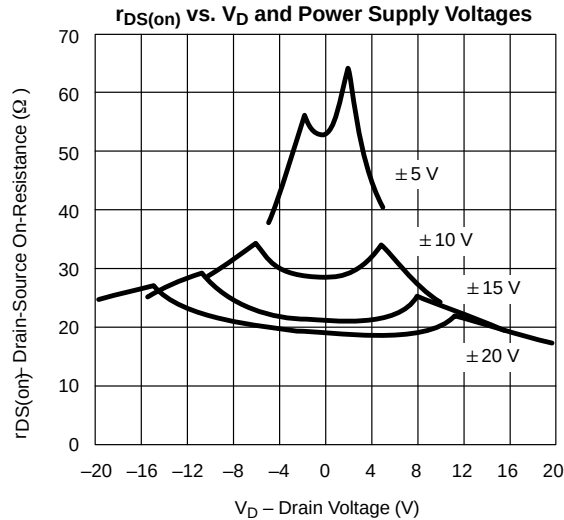
| SPECIFICATIONS <sup>a</sup>      |                                            |                                                                                                                                     |                   |                          |                  |                  |      |
|----------------------------------|--------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|-------------------|--------------------------|------------------|------------------|------|
| Parameter                        | Symbol                                     | Test Conditions<br>Unless Specified<br>V <sup>+</sup> = 15 V, V <sup>–</sup> = –15 V<br>V <sub>IN</sub> = 2.4 V, 0.8 V <sup>f</sup> | Temp <sup>b</sup> | A Suffix<br>–55 to 125°C |                  |                  | Unit |
|                                  |                                            |                                                                                                                                     |                   | Min <sup>d</sup>         | Typ <sup>c</sup> | Max <sup>d</sup> |      |
| Analog Switch                    |                                            |                                                                                                                                     |                   |                          |                  |                  |      |
| Analog Signal Range <sup>e</sup> | V <sub>ANALOG</sub>                        |                                                                                                                                     | Full              | –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<br>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         | –1<br>–60                | ±0.05            | 1<br>60          | nA   |
|                                  | I <sub>D(off)</sub>                        |                                                                                                                                     | Room Full         | –1<br>–60                | ±0.05            | 1<br>60          |      |
| Channel On Leakage Current       | I <sub>D(on)</sub> +<br>I <sub>S(on)</sub> | V <sub>S</sub> = V <sub>D</sub> = ±14 V                                                                                             | Room Full         | –1<br>–60                | ±0.05            | 1<br>60          |      |
| Digital Control                  |                                            |                                                                                                                                     |                   |                          |                  |                  |      |
| Input Current with Voltage High  | I <sub>INH</sub>                           | V <sub>IN</sub> = 2 V                                                                                                               | Full              | –1                       | 0.010            | 1                | μA   |
|                                  |                                            | V <sub>IN</sub> = 15 V                                                                                                              | Full              | –1                       | 0.010            | 1                |      |
| Input Current with Voltage Low   | I <sub>INL</sub>                           | V <sub>IN</sub> = 0 V                                                                                                               | Full              | –1                       | 0.010            | 1                |      |
| Dynamic Characteristics          |                                            |                                                                                                                                     |                   |                          |                  |                  |      |
| Turn-On Time                     | t <sub>ON</sub>                            | V <sub>S</sub> = ±10 V<br>See Figure 3                                                                                              | Room Full         |                          | 55               | 65<br>80         | ns   |
| Turn-Off Time                    | t <sub>OFF</sub>                           |                                                                                                                                     | Room Full         |                          | 50               | 65<br>80         |      |
| Charge Injection                 | Q                                          | C <sub>L</sub> = 1 nF, V <sub>S</sub> = 0 V<br>V <sub>gen</sub> = 0 V, R <sub>gen</sub> = 0 Ω<br>See Figure 3                       | Room              |                          | –5               |                  | pC   |
| Source Off Capacitance           | C <sub>S(off)</sub>                        | V <sub>S</sub> = 0 V, V <sub>IN</sub> = 5 V<br>f = 1 MHz                                                                            | Room              |                          | 8                |                  | pF   |
| Drain Off Capacitance            | C <sub>D(off)</sub>                        |                                                                                                                                     | Room              |                          | 8                |                  |      |
| Channel On Capacitance           | C <sub>D(on)</sub>                         | V <sub>D</sub> = V <sub>S</sub> = 0 V, V <sub>IN</sub> = 0 V                                                                        | Room              |                          | 30               |                  |      |
| Off Isolation                    | OIRR                                       | C <sub>L</sub> = 10 pF, R <sub>L</sub> = 1 kΩ<br>f = 100 kHz<br>See Figures 4 and 5                                                 | Room              |                          | 85               |                  | dB   |
| Crosstalk                        | X <sub>TALK</sub>                          |                                                                                                                                     | Room              |                          | 100              |                  |      |
| Supply                           |                                            |                                                                                                                                     |                   |                          |                  |                  |      |
| Positive Supply Current          | I <sup>+</sup>                             | All Channels On or Off<br>V <sub>IN</sub> = 5 V or 0 V                                                                              | Room Full         |                          | 5.5              | 7.5<br>9         | mA   |
| Negative Supply Current          | I <sup>–</sup>                             |                                                                                                                                     | Room Full         | –6<br>–8                 | –3.4             |                  |      |

Notes:

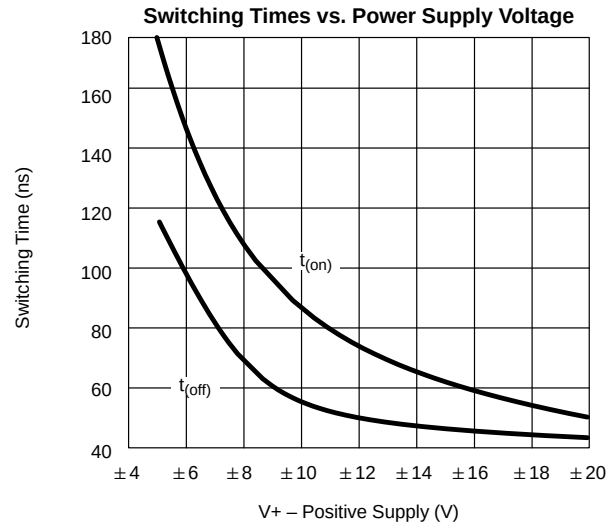
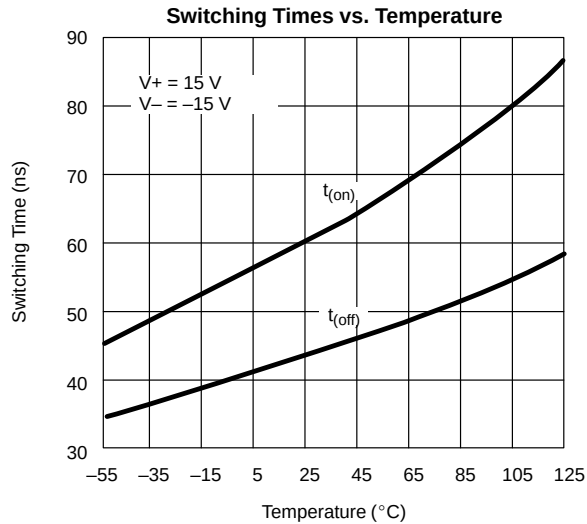
- Refer to PROCESS OPTION FLOWCHART.
- Room = 25°C, Full = as determined by the operating temperature suffix.
- Typical values are for DESIGN AID ONLY, not guaranteed nor subject to production testing.
- The algebraic convention whereby the most negative value is a minimum and the most positive a maximum, is used in this data sheet.
- Guaranteed by design, not subject to production test.
- $V_{IN}$  = input voltage to perform proper function.



**TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)**



## TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)



## TEST CIRCUITS

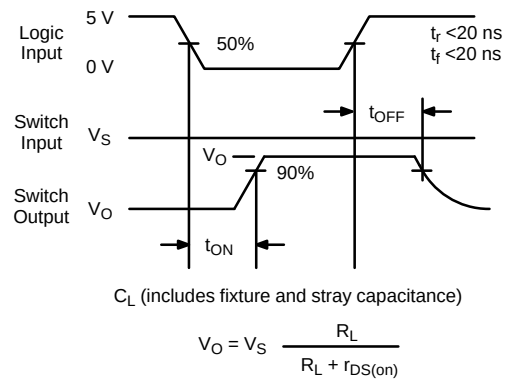
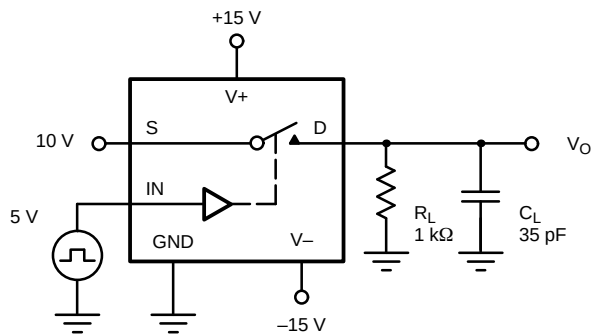


FIGURE 2. Switching Time