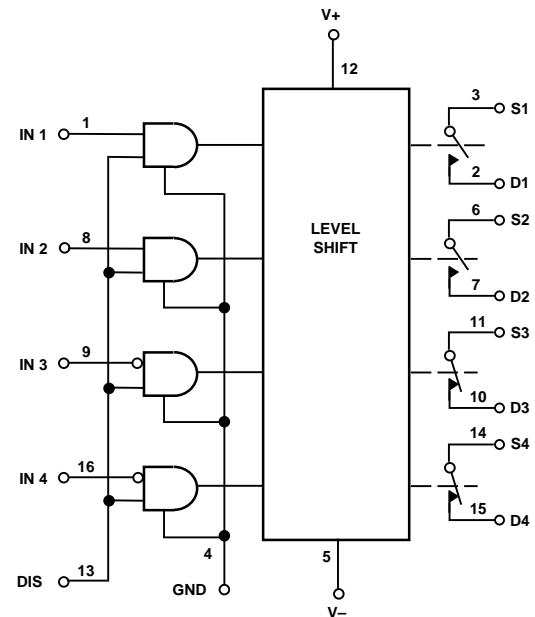


FEATURES

- Two Normally Open and Two Normally Closed SPST Switches with Disable
- Switches Can Be Easily Configured as a Dual SPDT or a DPDT
- Highly Resistant to Static Discharge Destruction
- Higher Resistance to Radiation than Analog Switches Designed with MOS Devices
- Guaranteed R_{ON} Matching: 10% max
- Guaranteed Switching Speeds
 - $T_{ON} = 500$ ns max
 - $T_{OFF} = 400$ ns max
- Guaranteed Break-Before-Make Switching
- Low "ON" Resistance: 80 Ω max
- Low R_{ON} Variation from Analog Input Voltage: 5%
- Low Total Harmonic Distortion: 0.01%
- Low Leakage Currents at High Temperature
 - $T_A = +125^\circ\text{C}$: 100 nA max
 - $T_A = +85^\circ\text{C}$: 30 nA max
- Digital Inputs TTL/CMOS Compatible and Independent of V_+
- Improved Specifications and Pin Compatible to LF-11333/13333
- Dual or Single Power Supply Operation
- Available in Die Form

FUNCTIONAL BLOCK DIAGRAM



GENERAL DESCRIPTION

The SW06 is a four channel single-pole, single-throw analog switch that employs both bipolar and ion-implanted FET devices. The SW06 FET switches use bipolar digital logic inputs which are more resistant to static electricity than CMOS devices. Ruggedness and reliability are inherent in the SW06 design and construction technology.

Increased reliability is complemented by excellent electrical specifications. Potential error sources are reduced by minimizing "ON" resistance and controlling leakage currents at high temperatures. The switching FET exhibits minimal R_{ON} variation over a 20 V analog signal range and with power supply voltage changes. Operation from a single positive power supply voltage is possible. With $V_+ = 36$ V, $V_- = 0$ V, the analog signal range will extend from ground to +32 V.

PNP logic inputs are TTL and CMOS compatible to allow the SW06 to upgrade existing designs. The logic "0" and logic "1" input currents are at microampere levels reducing loading on CMOS and TTL logic.

REV. A

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SW06–SPECIFICATIONS

ELECTRICAL CHARACTERISTICS (@ $V_+ = +15\text{ V}$, $V_- = -15\text{ V}$ and $T_A = +25^\circ\text{C}$, unless otherwise noted)

| Parameter | Symbol | Conditions | SW06B | | | SW06F | | | SW06G | | | Units |
|-------------------------------------|-----------------------------|--|-------|-----|-----|-------|-----|-----|-------|-----|------|---------------|
| | | | Min | Typ | Max | Min | Typ | Max | Min | Typ | Max | |
| “ON” RESISTANCE | R_{ON} | $V_S = 0\text{ V}$, $I_S = 1\text{ mA}$ $V_S = \pm 10\text{ V}$, $I_S = 1\text{ mA}$ | 60 | 80 | | 60 | 100 | | 100 | 150 | | Ω |
| R_{ON} MATCH BETWEEN SWITCHES | R_{ON} Match | $V_S = 0\text{ V}$, $I_S = 100\ \mu\text{A}^1$ | 5 | 10 | | 5 | 20 | | | 20 | | % |
| ANALOG VOLTAGE RANGE | V_A | $I_S = 1\text{ mA}^2$ $I_S = 1\text{ mA}^2$ | +10 | +11 | | +10 | +11 | | +10 | +11 | | V |
| ANALOG CURRENT RANGE | I_A | $V_S = \pm 10\text{ V}$ | 10 | 15 | | 7 | 12 | | 5 | 10 | | mA |
| ΔR_{ON} VS. APPLIED VOLTAGE | ΔR_{ON} | $-10\text{ V} \leq V_S \leq 10\text{ V}$, $I_S = 1.0\text{ mA}$ | 5 | 15 | | 10 | 20 | | 10 | 20 | | % |
| SOURCE CURRENT IN “OFF” CONDITION | $I_{S(OFF)}$ | $V_S = 10\text{ V}$, $V_D = -10\text{ V}^3$ | 0.3 | 2.0 | | 0.3 | 2.0 | | 0.3 | 10 | | nA |
| DRAIN CURRENT IN “OFF” CONDITION | $I_{D(OFF)}$ | $V_S = 10\text{ V}$, $V_D = -10\text{ V}^3$ | 0.3 | 2.0 | | 0.3 | 2.0 | | 0.3 | 10 | | nA |
| SOURCE CURRENT IN “ON” CONDITION | $I_{S(ON)+}$ $I_{D(ON)}$ | $V_S = V_D = \pm 10\text{ V}^3$ | 0.3 | 2.0 | | 0.3 | 2.0 | | 0.3 | 10 | | nA |
| LOGICAL “1” INPUT VOLTAGE | V_{INH} | Full Temperature Range ^{2, 4} | 2.0 | | | 2.0 | | | 2.0 | | | V |
| LOGICAL “0” INPUT VOLTAGE | V_{INL} | Full Temperature Range ^{2, 4} | | 0.8 | | | 0.8 | | | 0.8 | | V |
| LOGICAL “1” INPUT CURRENT | I_{INH} | $V_{IN} = 2.0\text{ V}$ to 15.0 V^5 | | 5 | | | 5 | | | 10 | | μA |
| LOGICAL “0” INPUT | I_{INL} | $V_{IN} = 0.8\text{ V}$ | | 1.5 | 5.0 | | 1.5 | 5.0 | | 1.5 | 10.0 | μA |
| TURN-ON TIME | t_{ON} | See Switching Time Test Circuit ^{4, 6} | | 340 | 500 | | 340 | 600 | | 340 | 700 | ns |
| TURN-OFF TIME | t_{OFF} | See Switching Time Test Circuit ^{4, 6} | | 200 | 400 | | 200 | 400 | | 200 | 500 | ns |
| BREAK-BEFORE-MAKE TIME | $t_{ON}-t_{OFF}$ | Note 7 | 50 | 140 | | 50 | 140 | | 50 | 140 | | ns |
| SOURCE CAPACITANCE | $C_{S(OFF)}$ | $V_S = 0\text{ V}^3$ | | 7.0 | | | 7.0 | | | 7.0 | | pF |
| DRAIN CAPACITANCE | $C_{D(OFF)}$ | $V_S = 0\text{ V}^3$ | | 5.5 | | | 5.5 | | | 5.5 | | pF |
| CHANNEL “ON” CAPACITANCE | $C_{D(ON)+}$ $C_{S(ON)}$ | $V_S = V_D = 0\text{ V}^3$ | | 15 | | | 15 | | | 15 | | pF |
| “OFF” ISOLATION | $I_{SO(OFF)}$ | $V_S = 5\text{ V rms}$, $R_L = 680\ \Omega$, $C_L = 7\text{ pF}$, $f = 500\text{ kHz}^3$ | | 58 | | | 58 | | | 58 | | dB |
| CROSSTALK | C_T | $V_S = 5\text{ V rms}$, $R_L = 680\ \Omega$, $C_L = 7\text{ pF}$, $f = 500\text{ kHz}^3$ | | 70 | | | 70 | | | 70 | | dB |
| POSITIVE SUPPLY CURRENT | I_+ | All Channels “OFF”, DIS = “0” ³ | | 5.0 | 6.0 | | 5.0 | 9.0 | | 6.0 | 9.0 | mA |
| NEGATIVE SUPPLY CURRENT | I_- | All Channels “OFF”, DIS = “0” ³ | | 3.0 | 5.0 | | 4.0 | 7.0 | | 4.0 | 7.0 | mA |
| GROUND CURRENT | I_G | All Channels “ON” or “OFF” ³ | | 3.0 | 4.0 | | 3.0 | 4.0 | | 3.0 | 5.0 | mA |

ELECTRICAL CHARACTERISTICS

(@ $V_+ = +15\text{ V}$, $V_- = -15\text{ V}$, $-55^\circ\text{C} \leq T_A \leq +125^\circ\text{C}$ for SW06BQ, $-40^\circ\text{C} \leq T_A \leq +85^\circ\text{C}$ for SW06FQ and $-40^\circ\text{C} \leq T_A \leq +85^\circ\text{C}$ for SW06GP/GS, unless otherwise noted)

| Parameter | Symbol | Conditions | SW06B | | | SW06F | | | SW06G | | | Units |
|--|-----------------------------|---|-------|-----|------|-------|------|-----|-------|------|-----|------------------|
| | | | Min | Typ | Max | Min | Typ | Max | Min | Typ | Max | |
| TEMPERATURE RANGE | T_A | Operating | -55 | | +125 | -25 | | +85 | 0 | | 70 | $^\circ\text{C}$ |
| "ON" RESISTANCE | R_{ON} | $V_S = 0\text{ V}$, $I_S = 1.0\text{ mA}$ $V_S = \pm 10\text{ V}$, $I_S = 1.0\text{ mA}$ | 75 | 110 | | 75 | 125 | | 75 | 175 | | Ω |
| | | | 80 | 110 | | 80 | 125 | | 80 | 175 | | |
| ΔR_{ON} MATCH BETWEEN SWITCHES | R_{ON} Match | $V_S = 0\text{ V}$, $I_S = 100\ \mu\text{A}$ ¹ | 6 | 20 | | 6 | 25 | | 10 | | | % |
| ANALOG VOLTAGE RANGE | V_A | $I_S = 1.0\text{ mA}$ ² $I_S = 1.0\text{ mA}$ ² | +10 | +11 | | +10 | +11 | | +10 | +11 | | V |
| | | | -10 | -15 | | -10 | -15 | | -10 | -15 | | |
| ANALOG CURRENT RANGE | I_A | $V_S = \pm 10\text{ V}$ | 7 | 12 | | 5 | 11 | | 11 | | | mA |
| ΔR_{ON} WITH APPLIED VOLTAGE | ΔR_{ON} | $-10\text{ V} \leq V_S \leq 10\text{ V}$, $I_S = 1.0\text{ mA}$ | 10 | | | 12 | | | 15 | | | % |
| SOURCE CURRENT IN "OFF" CONDITION | $I_{S(OFF)}$ | $V_S = 10\text{ V}$, $V_D = -10\text{ V}$ $T_A = \text{Max Operating Temp}$ ^{3, 9} | | 60 | | | 30 | | | 60 | | nA |
| DRAIN CURRENT IN "OFF" CONDITION | $I_{D(OFF)}$ | $V_S = 10\text{ V}$, $V_D = -10\text{ V}$ $T_A = \text{Max Operating Temp}$ ^{3, 9} | | 60 | | | 30 | | | 60 | | nA |
| LEAKAGE CURRENT IN "ON" CONDITION | $I_{S(ON)+}$ $I_{D(ON)}$ | $V_S = V_D = \pm 10\text{ V}$ $T_A = \text{Max Operating Temp}$ ^{3, 9} | | 100 | | | 30 | | | 60 | | nA |
| LOGICAL "1" INPUT CURRENT | I_{INH} | $V_{IN} = 2.0\text{ V to } 15.0\text{ V}$ ⁵ | | 10 | | | 10 | | | 15 | | μA |
| LOGICAL "0" INPUT CURRENT | I_{INL} | $V_{IN} = 0.8\text{ V}$ | 4 | 10 | | 4 | 10 | | 5 | 15 | | μA |
| TURN-ON TIME | t_{ON} | See Switching Time Test Circuit ^{4, 8} | 440 | 900 | | 500 | 900 | | | 1000 | | ns |
| TURN-OFF TIME | t_{OFF} | See Switching Time Test Circuit ^{4, 8} | 300 | 500 | | 330 | 500 | | | 500 | | ns |
| BREAK-BEFORE-MAKE TIME | $t_{ON-t_{OFF}}$ | Note 7 | 70 | | | 70 | | | 50 | | | ns |
| POSITIVE SUPPLY CURRENT | I+ | All Channels "OFF," DIS = "0" ³ | | 9.0 | | | 13.5 | | | 13.5 | | mA |
| NEGATIVE SUPPLY CURRENT | I- | All Channels "OFF," DIS = "0" ³ | | 7.5 | | | 10.5 | | | 10.5 | | mA |
| GROUND CURRENT | I_G | All Channels "ON" or "OFF" ³ | | 6.0 | | | 7.5 | | | 7.5 | | mA |

NOTES

¹ $V_S = 0\text{ V}$, $I_S = 100\ \mu\text{A}$. Specified as a percentage of $R_{AVERAGE}$ where: $R_{AVERAGE} = \frac{R_{ON1} + R_{ON2} + R_{ON3} + R_{ON4}}{4}$.

²Guaranteed by R_{ON} and leakage tests. For normal operation maximum analog signal voltages should be restricted to less than $(V_+) - 4\text{ V}$.

³Switch being tested ON or OFF as indicated, $V_{INH} = 2.0\text{ V}$ or $V_{INL} = 0.8\text{ V}$, per logic truth table.

⁴Also applies to disable pin.

⁵Current tested at $V_{IN} = 2.0\text{ V}$. This is worst case condition.

⁶Sample tested.

⁷Switch is guaranteed by design to provide break-before-make operation.

⁸Guaranteed by design.

⁹Parameter tested only at $T_A = +125^\circ\text{C}$ for military grade device.

Specifications subject to change without notice.

SW06

WAFER TEST LIMITS (@ $V_+ = +15\text{ V}$, $V_- = -15\text{ V}$, $T_A = +25^\circ\text{C}$, unless otherwise noted)

| Parameter | Symbol | Conditions | SW06N Limit | SW06G Limit | Units |
|---------------------------------|-----------------|---|-------------|-------------|-------------------|
| “ON” RESISTANCE | R_{ON} | $-10\text{ V} \leq V_A \leq 10\text{ V}$, $I_S \leq 1\text{ mA}$ | 80 | 100 | Ω max |
| R_{ON} MATCH BETWEEN SWITCHES | R_{ON} Match | $V_A = 0\text{ V}$, $I_S \leq 100\ \mu\text{A}$ | 15 | 20 | % max |
| ΔR_{ON} VS. V_A | ΔR_{ON} | $-10\text{ V} \leq V_A \leq 10\text{ V}$, $I_S \leq 1\text{ mA}$ | 10 | 20 | % max |
| POSITIVE SUPPLY CURRENT | I_+ | Note 1 | 6.0 | 9.0 | mA max |
| NEGATIVE SUPPLY CURRENT | I_- | Note 1 | 5.0 | 7.0 | mA max |
| GROUND CURRENT | I_G | Note 1 | 4.0 | 4.0 | mA max |
| ANALOG VOLTAGE RANGE | V_A | $I_S = 1\text{ mA}$ | ± 10.0 | ± 10.0 | V min |
| LOGIC “1” INPUT VOLTAGE | V_{INH} | Note 2 | 2.0 | 2.0 | V min |
| LOGIC “0” INPUT VOLTAGE | V_{INL} | Note 2 | 0.8 | 0.8 | V max |
| LOGIC “0” INPUT CURRENT | I_{INL} | $0\text{ V} \leq V_{IN} \leq 0.8\text{ V}$ | 5.0 | 5.0 | μA max |
| LOGIC “1” INPUT CURRENT | I_{INH} | $2.0\text{ V} \leq V_{IN} \leq 15\text{ V}^3$ | 5 | 5 | μA max |
| ANALOG CURRENT RANGE | I_A | $V_S = \pm 10\text{ mV}$ | 10 | 7 | mA min |

NOTE

Electrical tests are performed at wafer probe to the limits shown. Due to variations in assembly methods and normal yield loss, yield after packaging is not guaranteed for standard product dice. Consult factory to negotiate specifications based on dice lot qualification through sample lot assembly and testing.

TYPICAL ELECTRICAL CHARACTERISTICS (@ $V_+ = +15\text{ V}$, $V_- = -15\text{ V}$, $T_A = +25^\circ\text{C}$, unless otherwise noted)

| Parameter | Symbol | Conditions | SW06N Typical | SW06G Typical | Units |
|----------------------------------|---------------|---|---------------|---------------|----------|
| “ON” RESISTANCE | R_{ON} | $-10\text{ V} \leq V_A \leq 10\text{ V}$, $I_S \leq 1\text{ mA}$ | 60 | 60 | Ω |
| TURN-ON TIME | t_{ON} | | 340 | 340 | ns |
| TURN-OFF TIME | t_{OFF} | | 200 | 200 | ns |
| DRAIN CURRENT IN “OFF” CONDITION | $I_{D(OFF)}$ | $V_S = 10\text{ V}$, $V_D = -10\text{ V}$ | 0.3 | 0.3 | nA |
| “OFF” ISOLATION | $I_{SO(OFF)}$ | $f = 500\text{ kHz}$, $R_L = 680\ \Omega$ | 58 | 58 | dB |
| CROSSTALK | C_T | $f = 500\text{ kHz}$, $R_L = 680\ \Omega$ | 70 | 70 | dB |

NOTES

¹Power supply and ground current specified for switch “ON” or “OFF.”

²Guaranteed by R_{ON} and leakage tests.

³Current tested at $V_{IN} = 2.0\text{ V}$. This is worst case condition.

ABSOLUTE MAXIMUM RATINGS¹

Operating Temperature Range
 SW06BQ, BRC -55°C to +125°C
 SW06FQ -40°C to +85°C
 SW06GP, GS -40°C to +85°C
 Storage Temperature Range -65°C to +150°C
 Lead Temperature (Soldering, 60 sec) +300°C
 Maximum Junction Temperature +150°C
 V+ Supply to V- Supply +36 V
 V+ Supply to Ground +36 V
 Logic Input Voltage (-4 V or V-) to V+ Supply
 Analog Input Voltage Range
 Continuous V- Supply to V+ Supply +20 V
 Maximum Current Through
 Any Pin Including Switch 30 mA

| Package Type | θ_{JA} ² | θ_{JC} | Units |
|-------------------------|----------------------------|---------------|-------|
| 16-Pin Hermetic DIP (Q) | 100 | 16 | °C/W |
| 16-Pin Plastic DIP (P) | 82 | 39 | °C/W |
| 20-Contact LCC (RC) | 98 | 38 | °C/W |
| 16-Pin SOL (S) | 98 | 30 | °C/W |

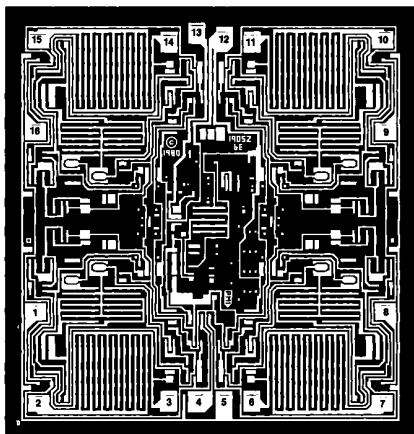
NOTES

¹Absolute maximum ratings apply to both DICE and packaged parts, unless otherwise noted.

² θ_{JA} is specified for worst case mounting conditions, i.e., θ_{JA} is specified for device in socket for Cerdip, P-DIP, and LCC packages; θ_{JA} is specified for device soldered to printed circuit board for SO package.

DICE CHARACTERISTICS

Die Size 0.101 × 0.097 inch, 9797 sq. mils
 (2.565 × 2.464 mm, 6320 sq. mm)



ORDERING GUIDE

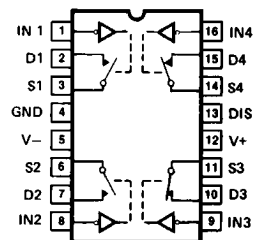
| Model | Temperature Range | Package Description | Package Option |
|---------|-------------------|---------------------|----------------|
| SW06BQ | -55°C to +125°C | Cerdip | Q-16 |
| SW06BRC | -55°C to +125°C | LCC | E-20A |
| SW06FQ | -40°C to +85°C | Cerdip | Q-16 |
| SW06GP | -40°C to +85°C | Plastic DIP | N-16 |
| SW06GS | -40°C to +85°C | SOL | R-16 |

TRUTH TABLE

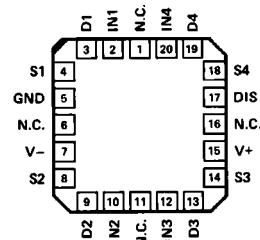
| Disable Input | Logic Input | Switch State | |
|---------------|-------------|----------------|----------------|
| | | Channels 1 & 2 | Channels 3 & 4 |
| 0 | X | OFF | OFF |
| 1 or NC | 0 | OFF | ON |
| 1 or NC | 1 | ON | OFF |

PIN CONNECTIONS

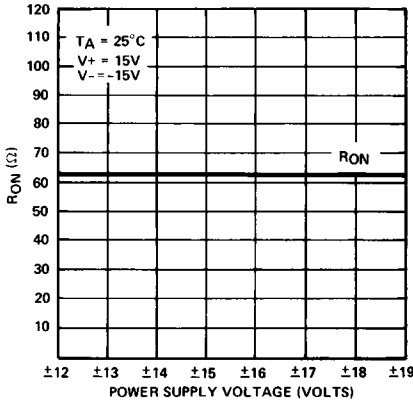
16-Pin DIP (Q or P-Suffix)
16-Pin SOL (S-Suffix)



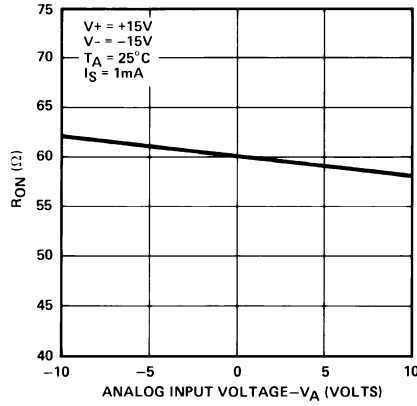
SW06BRC/883
LCC Package
(RC-Suffix)



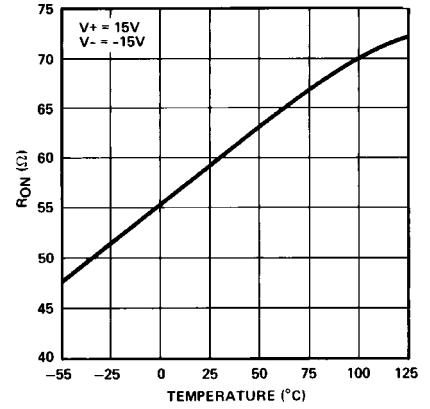
SW06—Typical Performance Characteristics



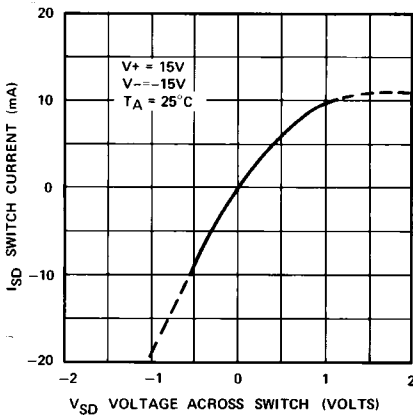
"ON" Resistance vs. Power Supply Voltage



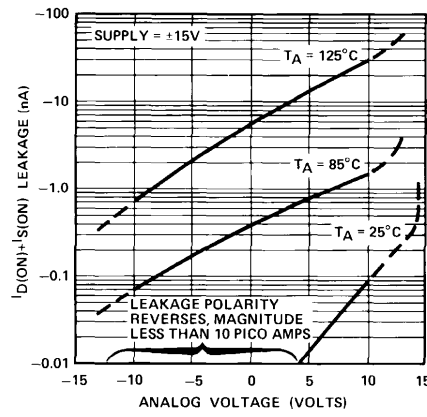
"ON" Resistance vs. Analog Voltage



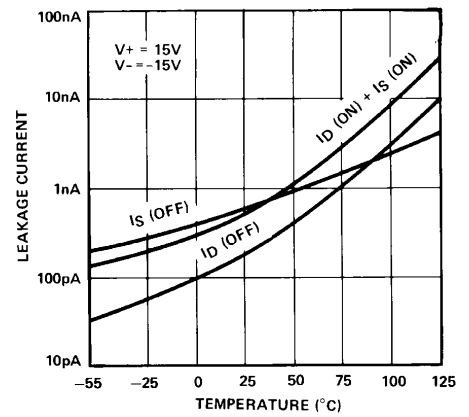
R_{ON} vs. Temperature



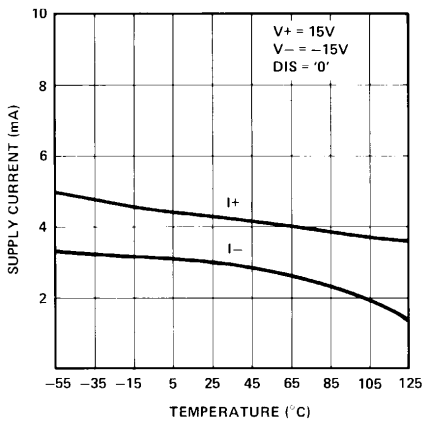
Switch Current vs. Voltage



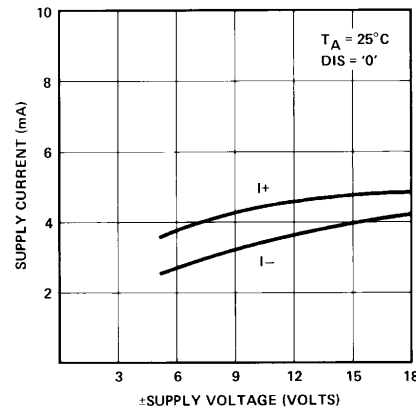
Leakage Current vs. Analog Voltage



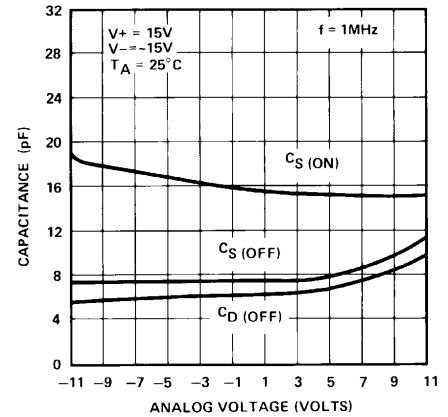
Leakage Current vs. Temperature



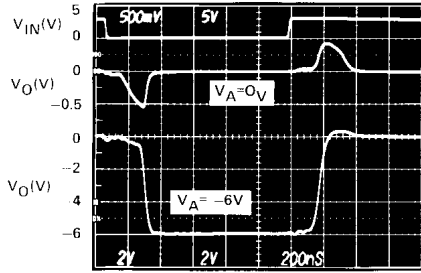
Supply Current vs. Temperature



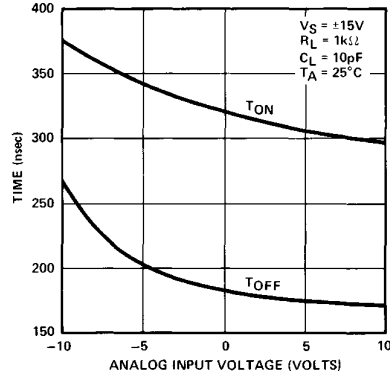
Supply Current vs. Supply Voltage



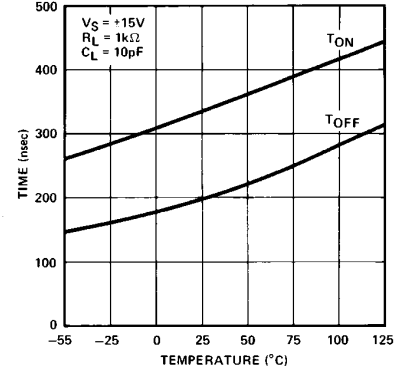
Switch Capacitance vs. Analog Voltage



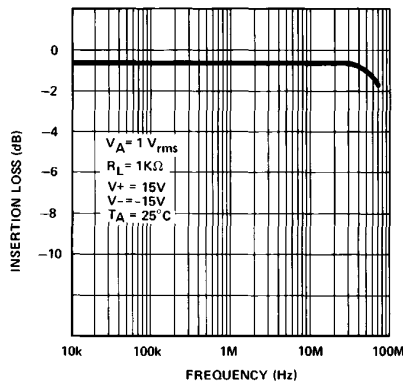
T_{ON}/T_{OFF} Switching Response



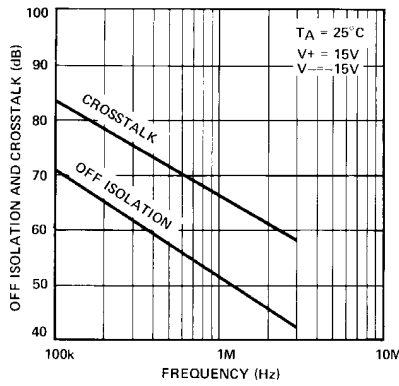
Switching Time vs. Analog Voltage



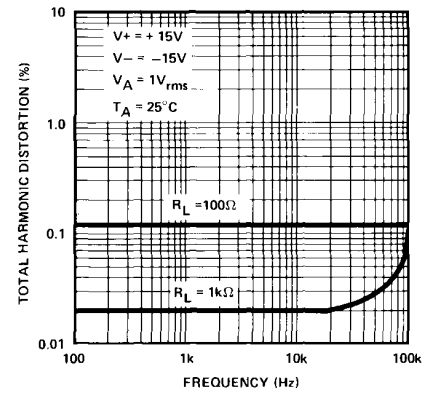
Switching Time vs. Temperature



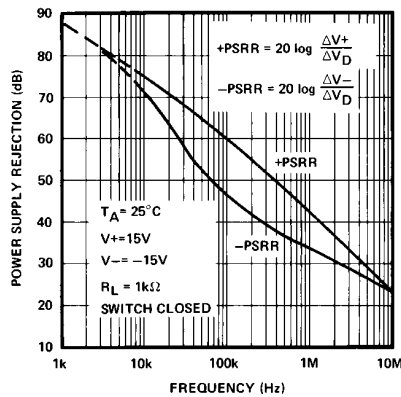
Insertion Loss vs. Frequency



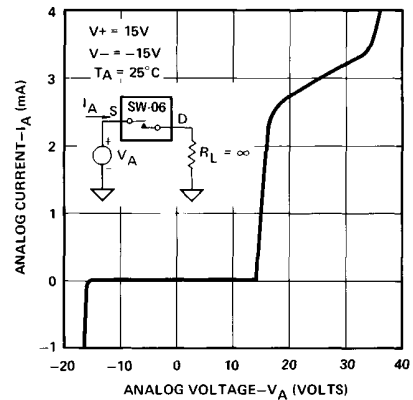
Crosstalk and "OFF" Isolation vs. Frequency



Total Harmonic Distortion



Power Supply Rejection vs. Frequency

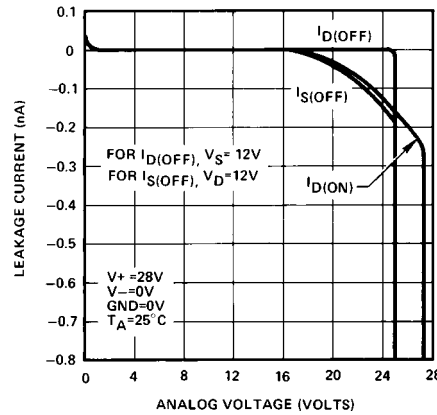


Overvoltage Characteristics

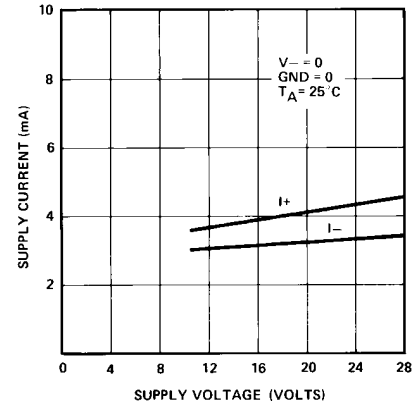
SW06—Typical Performance Characteristics (Operating and Single Supply)



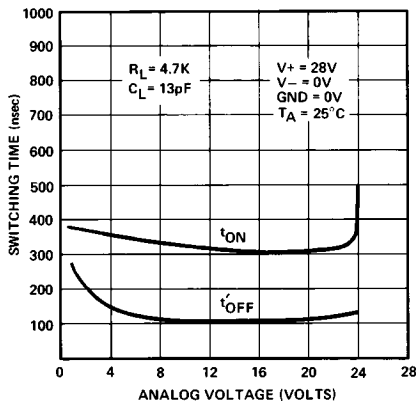
“On” Resistance vs. Analog Voltage



Leakage Current vs. V_{ANALOG}



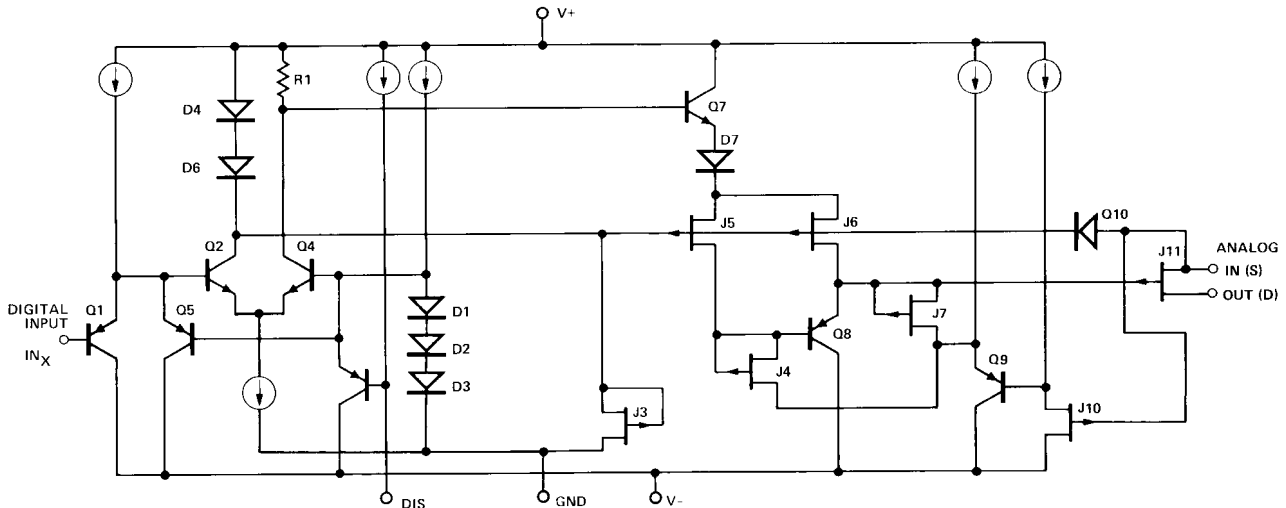
Supply Current vs. Supply Voltage



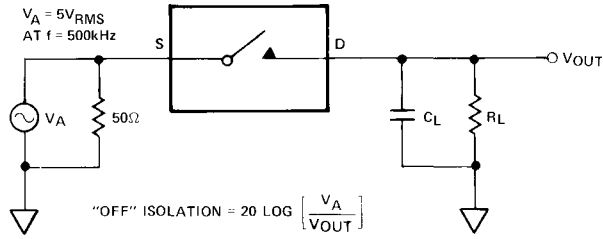
Switching Time vs. Supply Voltage

NOTE

These single-supply-operation characteristic curves are valid when the negative power supply V_- is tied to the logic ground reference pin “GND.” TTL input compatibility is still maintained when “GND” is the same potential as the TTL ground. t_{OFF} is measured from 50% of logic input waveform to 0.9 V_O . The analog voltage range extends from 0 V to $V_+ - 4$ V; the switch will no longer respond to logic control when V_A is within 4 volts of V_+ .

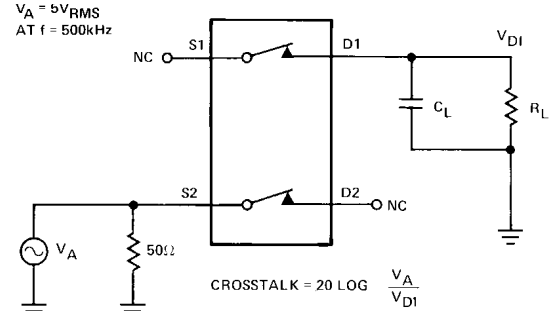


Simplified Schematic Diagram (Typical Switch)



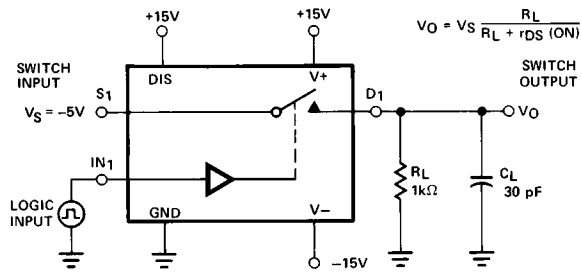
"OFF" ISOLATION = $20 \text{ LOG} \left[\frac{V_A}{V_{OUT}} \right]$

"Off" Isolation Test Circuit



CROSSTALK = $20 \text{ LOG} \left[\frac{V_A}{V_{D1}} \right]$

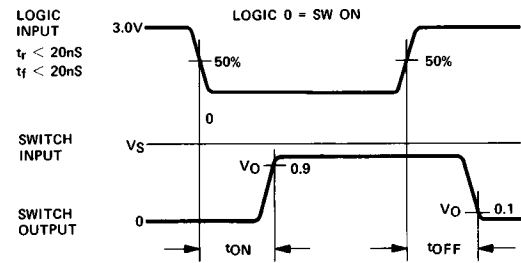
Crosstalk Test Circuit



$V_O = V_S \frac{R_L}{R_L + r_{DS(ON)}}$

REPEAT TEST FOR IN_2 , IN_3 AND IN_4 .

Switching Time Test Circuit



SWITCH OUTPUT WAVEFORM SHOWN FOR $V_S = \text{CONSTANT}$ WITH LOGIC INPUT WAVEFORM AS SHOWN. V_O IS THE STEADY STATE OUTPUT WITH SWITCH ON. LOGIC INPUT IS INVERTED FOR SWITCH 1 & 2

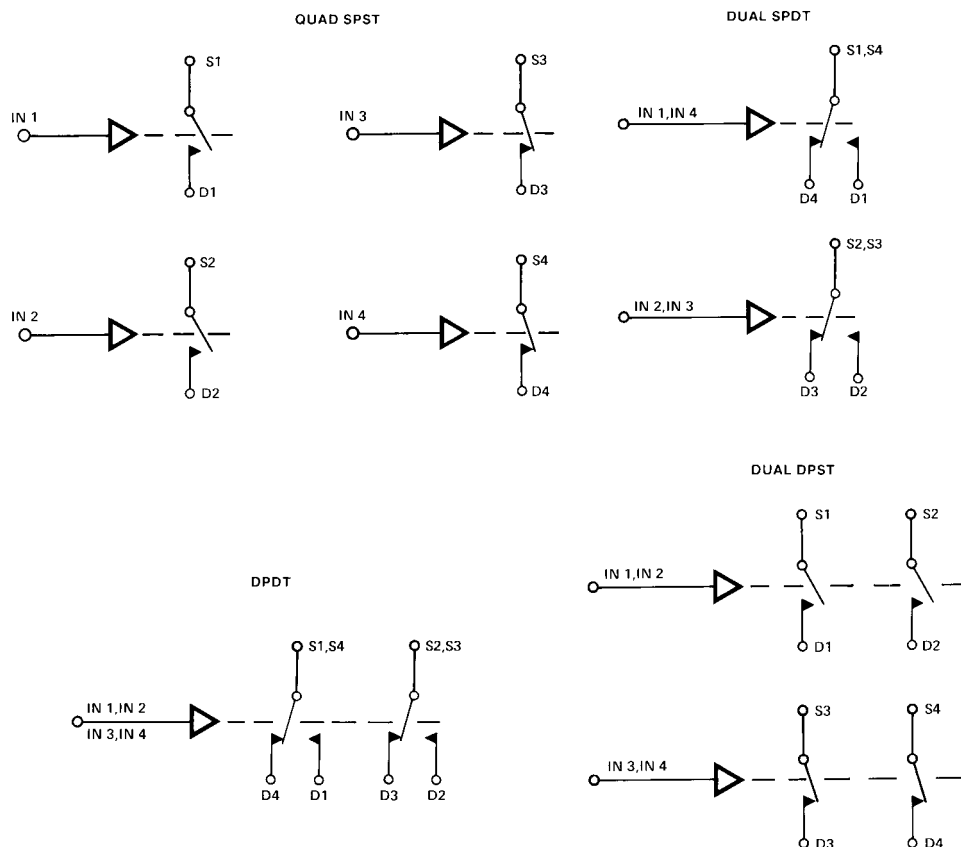


Figure 1. Functional Applications of SW06

APPLICATIONS INFORMATION

The single analog switch product configures, by appropriate pin connections, into four switch applications. As shown in Figure 1, the SW06 connects as a QUAD SPST, a DUAL SPDT, a DUAL DPST, or a DPDT analog switch. This versatility increases further when taking advantage of the disable input (DIS) which turns all switches OFF when taken active low.

Ion-implantation of the JFET analog switch achieves low ON resistance and tight channel-to-channel matching. Combining the low ON resistance and low leakage currents results in a worst case voltage error figure $V_{\text{ERROR}} @ +125^{\circ}\text{C} = I_{\text{D(ON)}} \times R_{\text{SD(ON)}} = 100 \text{ nA} \times 100 \Omega = 11 \text{ microvolts}$. This amount of error is negligible considering dissimilar-metal thermally-induced offsets will be in the 5 to 15 microvolt range.

LOGIC INPUTS

The logic inputs (IN_x) and disable input (DIS) are referenced to a TTL logic threshold value of two forward diode drops (1.4 V at $+25^{\circ}\text{C}$) above the GND terminal. These inputs use PNP transistors which draw maximum current at a logic "0" level and drops to a leakage current of a reverse biased diode as the logic input voltage raises above 1.4 volts. Any logic input voltage greater than 2.0 volts becomes logic "1," less than 0.8 volts becomes logic "0" resulting in full TTL noise immunity not available from similar CMOS input analog switches. The PNP transistor inputs require such low input current that the SW06 approaches fan-ins of CMOS input devices. These bipolar logic inputs exceed any CMOS input circuit in resistance to static voltage and radiation susceptibility. No damage will occur to the SW06 if logic high voltages are present when the SW06 power

supplies are OFF. When the V_+ and V_- supplies are OFF, the logic inputs present a reverse bias diode loading to active logic inputs. Input logic thresholds are independent of V_+ and V_- supplies making single V_+ supply operation possible by simply connecting GND and V_- together to the logic ground supply.

ANALOG VOLTAGE AND CURRENT

ANALOG VOLTAGE

These switches have constant ON resistance for analog voltages from the negative power supply (V_-) to within 4 volts of the positive power supply. This characteristic shown in the plots results in good total harmonic distortion, especially when compared to CMOS analog switches that have a 20 to 30 percent variation in ON resistance versus analog voltage. Positive analog input voltage should be restricted to 4 volts less than V_+ assuring the switch remains open circuit in the OFF state. No increase in switch ON resistance occurs when operating at supply voltages less than ± 15 volts (see plot). Small signals have a 3 dB down frequency of 70 MHz (see insertion loss versus frequency plot).

ANALOG CURRENT

The analog switches in the ON state are JFETs biased in their triode region and act as switches for analog current up to the I_A specification (see plot of I_{DS} vs V_{DS}). Some applications require pulsed currents exceeding the I_A spec. For example, an integrator reset switch discharging a shunt capacitor will produce a peak current of $I_{\text{A(PEAK)}} = V_{\text{CAP}}/R_{\text{DS(ON)}}$. In this application, it is best to connect the source to the most positive end of the capacitor, thereby achieving the lowest switch resistance and

fastest reset times. The switch can easily handle any amount of capacitor discharge current subject only to the maximum heat dissipation of the package and the maximum operating junction temperature from which repetition can be established.

SWITCHING

Switching time t_{ON} and t_{OFF} characteristics are plotted versus V_{ANALOG} and temperature. In all cases, t_{OFF} is designed faster than t_{ON} to ensure a break-before-make interval for SPDT and DPDT applications. The disable input (DIS) has the same switching times (t_{ON} and t_{OFF}) as the logic inputs (IN_X).

Switching transients occurring at the source and drain contacts results from ac coupling of the switching FET's gate-to-source and gate-to-drain coupling capacitance. The switch turn ON will cause a negative going spike to occur and the turn OFF will cause a positive spike to occur. These spikes can be reduced by additional capacitance loading, lower values of R_L , or switching an additional switch (with its extra contact floating) to the opposite state connected to the spike sensitive node.

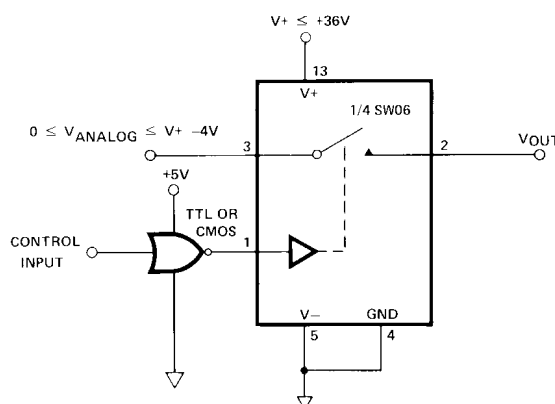
DISABLE NODE

This TTL compatible node is similar to the logic inputs IN_X but has an internal $2 \mu A$ current source pull-up. If disable is left unconnected, it will assume the logic "1" state, then the state of the switches is controlled only by the logic inputs IN_X .

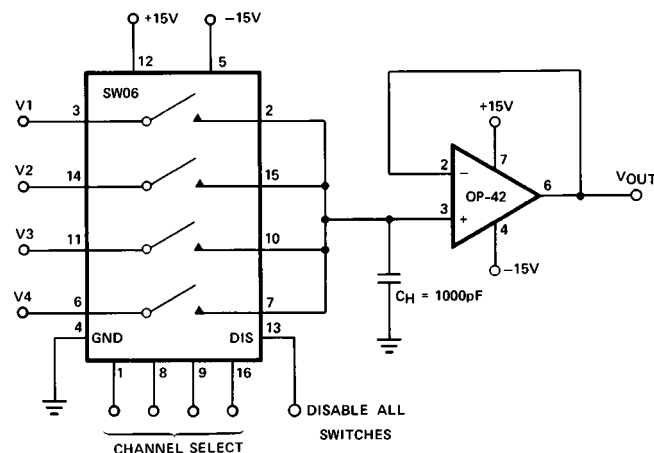
POWER SUPPLIES

This product operates with power supply voltages ranging from ± 12 to ± 18 volts; however, the specifications only guarantee device parameters with ± 15 volt $\pm 5\%$ power supplies. The power supply sensitive parameters have plots to indicate effects of supply voltages other than ± 15 volts.

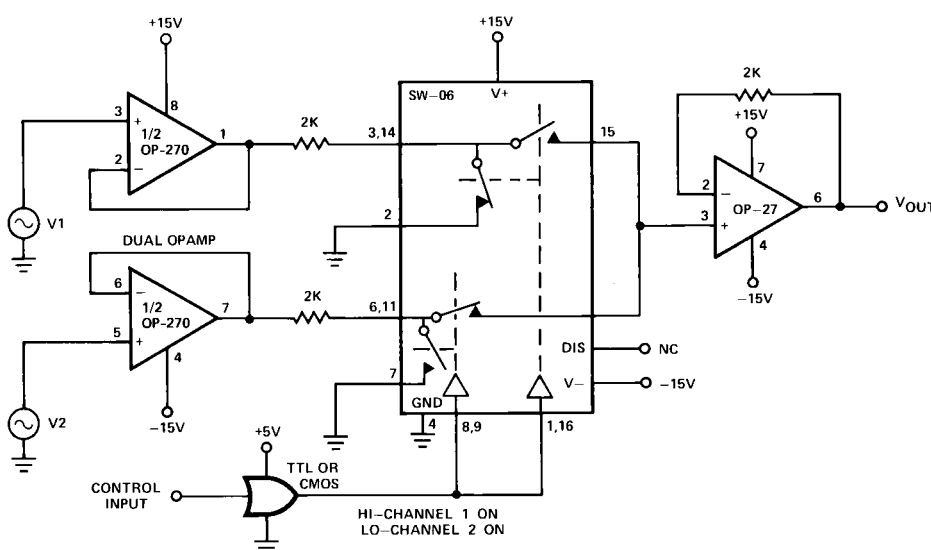
Typical Applications



Operation from Single Positive Power Supply

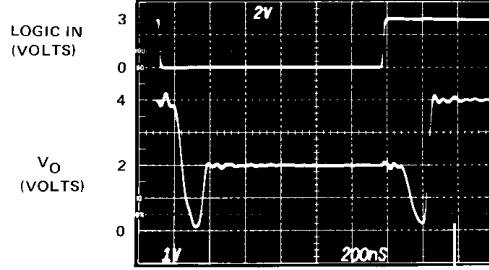
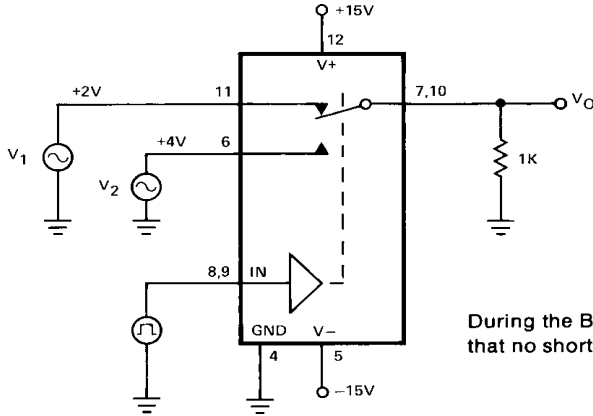


4-Channel Sample Hold Amplifier



THIS SWITCH ARRANGEMENT IMPROVES OFF ISOLATION BY 30dB

High Off Isolation Selector Switch (Shunt-Series Switch)



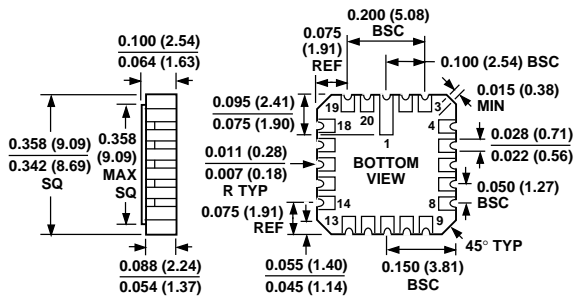
During the BBM interval the 1kΩ resistor pulls the output to ground assuring that no shorting between V₁ and V₂ occurs.

Single Pole Double Throw Selector Switch with Break-Before-Make Interval

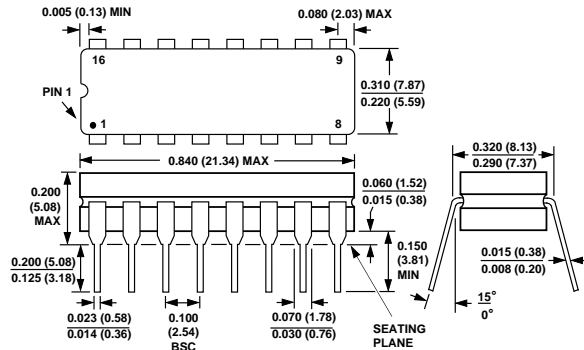
OUTLINE DIMENSIONS

Dimensions shown in inches and (mm).

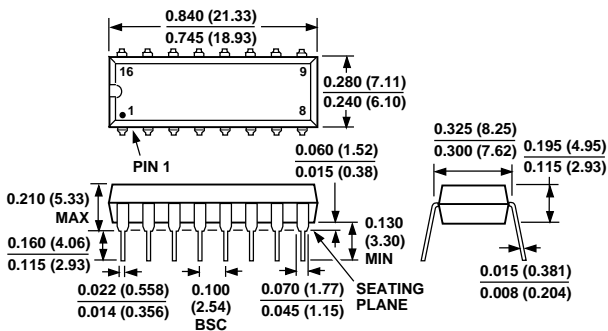
**20-Terminal Leadless Chip Carrier
(RC-Suffix)
E-20A**



**16-Lead Cerdip
(Q-Suffix)
Q-16**



**16-Lead Plastic DIP
(P-Suffix)
N-16**



**16-Lead Wide Body SOL
(S-Suffix)
R-16/SOL-16**

