



# Precision, Quad, SPST Analog Switches

## General Description

The MAX351/MAX352/MAX353 are precision, quad, single-pole single-throw (SPST) analog switches. The MAX351 has four normally closed (NC), and the MAX352 has four normally open (NO) switches. The MAX353 has two NO and two NC switches. All three parts offer low on resistance (less than  $35\Omega$ ), guaranteed to match within  $2\Omega$  between channels and to remain flat over the analog signal range ( $\Delta 3\Omega$  max). They also offer low leakage (less than 250pA at +25°C and less than 6nA at +85°C) and fast switching (turn-on time less than 175ns and turn-off time less than 145ns).

The MAX351/MAX352/MAX353 are fabricated with Maxim's new improved 44V silicon-gate process. Design improvements guarantee extremely low charge injection (10pC), low power consumption (35μW), and electrostatic discharge (ESD) greater than 2000V. The 44V maximum breakdown voltage allows rail-to-rail analog signal handling.

These monolithic switches operate with a single positive supply (+10V to +30V) or with split supplies ( $\pm 4.5V$  to  $\pm 20V$ ) while retaining CMOS-logic input compatibility and fast switching. CMOS inputs provide reduced input loading.

## Applications

|                              |                          |
|------------------------------|--------------------------|
| Sample-and-Hold Circuits     | Military Radios          |
| Guidance and Control Systems | Communications Systems   |
| Heads-Up Displays            | Battery-Operated Systems |
| Test Equipment               | PBX, PABX                |

## Features

- ◆ Low On Resistance <  $22\Omega$  Typical ( $35\Omega$  Max)
- ◆ Guaranteed Matched On Resistance Between Channels <  $2\Omega$
- ◆ Guaranteed Flat On Resistance Over Analog Signal Range  $\Delta 3\Omega$  Max
- ◆ Guaranteed Charge Injection < 10pC
- ◆ Guaranteed Off-Channel Leakage < 6nA at +85°C
- ◆ ESD Guaranteed > 2000V per Method 3015.7
- ◆ Single-Supply Operation (+10V to +30V)  
Bipolar-Supply Operation ( $\pm 4.5V$  to  $\pm 20V$ )
- ◆ TTL-/CMOS-Logic Compatibility
- ◆ Rail-to-Rail Analog Signal Handling Capability

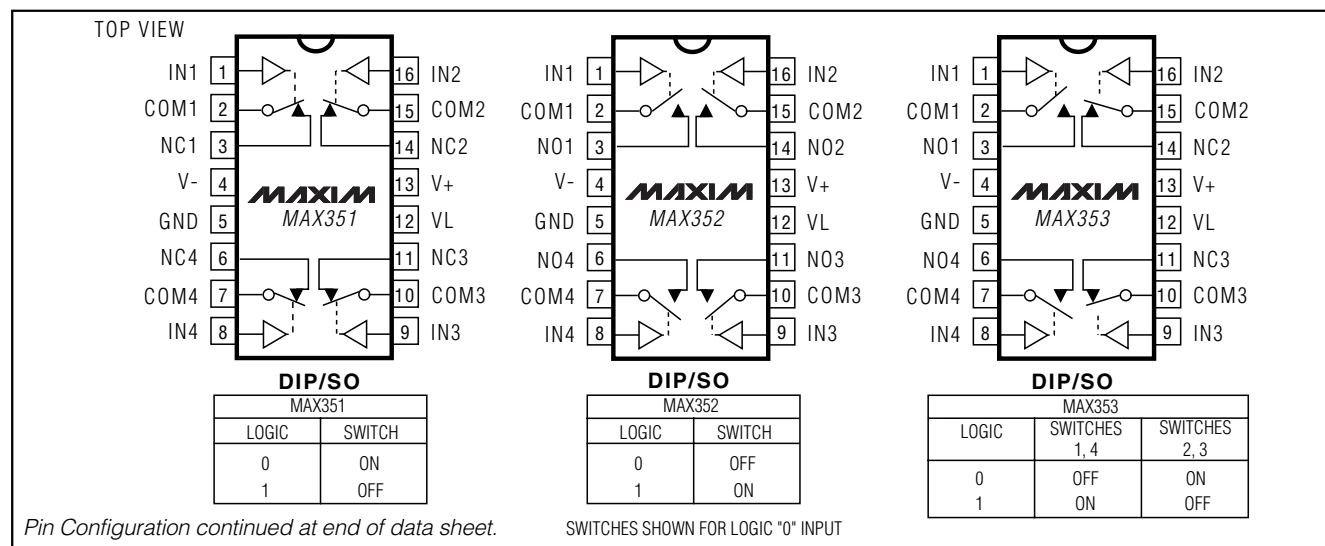
## Ordering Information

| PART      | TEMP RANGE      | PIN-PACKAGE    |
|-----------|-----------------|----------------|
| MAX351CPE | 0°C to +70°C    | 16 Plastic DIP |
| MAX351CSE | 0°C to +70°C    | 16 Narrow SO   |
| MAX351C/D | 0°C to +70°C    | Dice*          |
| MAX351EGE | -40°C to +85°C  | 16 QFN         |
| MAX351EPE | -40°C to +85°C  | 16 Plastic DIP |
| MAX351ESE | -40°C to +85°C  | 16 Narrow SO   |
| MAX351EJE | -40°C to +85°C  | 16 CERDIP      |
| MAX351MJE | -55°C to +125°C | 16 CERDIP      |

Ordering Information continued at end of data sheet.

\*Contact factory for availability and processing to MIL-STD-883.

## Pin Configurations/Functional Diagrams/Truth Tables



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## ABSOLUTE MAXIMUM RATINGS

Voltage Referenced to V-

|                                                                       |                                  |
|-----------------------------------------------------------------------|----------------------------------|
| V+ .....                                                              | 44V                              |
| GND .....                                                             | 25V                              |
| VL .....                                                              | (GND - 0.3V) to (V+ + 0.3V)      |
| Digital Inputs, VCOM, VNC, VNO (Note 1) .....                         | (V- - 2V) to (V+ + 2V)           |
| .....                                                                 | or 30mA (whichever occurs first) |
| Current (any terminal) .....                                          | 30mA                             |
| Peak Current COM_, NO_, NC_ (pulsed at 1ms, 10% duty cycle max) ..... | 100mA                            |
| ESD per Method 3015.7 .....                                           | >2000V                           |

Continuous Power Dissipation (TA = +70°C) (Note 2)

|                                                   |        |
|---------------------------------------------------|--------|
| Plastic DIP (derate 10.53mW/°C above +70°C) ..... | 842mW  |
| Narrow SO (derate 8.70mW/°C above +70°C) .....    | 696mW  |
| QFN (derate 19.2mW/°C above +70°C) .....          | 1538mW |
| CERDIP (derate 10.00mW/°C above +70°C) .....      | 800mW  |

Operating Temperature Ranges:

|                                         |                 |
|-----------------------------------------|-----------------|
| MAX35_C_ .....                          | 0°C to +70°C    |
| MAX35_E_ .....                          | -40°C to +85°C  |
| MAX35_MJE .....                         | -55°C to +125°C |
| Storage Temperature Range .....         | -65°C to +150°C |
| Lead Temperature (soldering, 10s) ..... | +300°C          |

**Note 1:** Signals on NC\_, NO\_, COM\_, or IN\_ exceeding V+ or V- will be clamped by internal diodes. Limit forward diode current to maximum current rating.

**Note 2:** All leads are soldered or welded to PC board.

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

## ELECTRICAL CHARACTERISTICS—Dual Supplies

(V+ = 15V, V- = -15V, VL = 5V, GND = 0V, VINH = 2.4V, VINL = 0.8V, TA = TMIN to TMAX, unless otherwise noted.)

| PARAMETER                                     | SYMBOL                                                        | CONDITIONS                                                                                                 |                                                          |      | MIN   | TYP<br>(Note 3) | MAX  | UNITS |
|-----------------------------------------------|---------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|------|-------|-----------------|------|-------|
| SWITCH                                        |                                                               |                                                                                                            |                                                          |      |       |                 |      |       |
| Analog Signal Range                           | V <sub>COM_</sub> ,<br>V <sub>NO_</sub> ,<br>V <sub>NC_</sub> | (Notes 1, 4)                                                                                               |                                                          |      | V-    |                 | V+   | V     |
| On Resistance                                 | R <sub>ON</sub>                                               | I <sub>COM</sub> = -10mA,<br>V <sub>NO_</sub> or V <sub>NC_</sub> = ±8.5V,<br>V+ = 13.5V,<br>V- = -13.5V   | T <sub>A</sub> = +25°C                                   | C, E | 17    |                 | 35   | Ω     |
|                                               |                                                               |                                                                                                            |                                                          | M    | 17    | 30              |      |       |
|                                               |                                                               |                                                                                                            | T <sub>A</sub> = T <sub>MIN</sub> to T <sub>MAX</sub>    |      | 45    |                 |      |       |
| On Resistance Match Between Channels (Note 5) | R <sub>ON</sub>                                               | I <sub>COM</sub> = -10mA,<br>V <sub>NO_</sub> or V <sub>NC_</sub> = ±10V,<br>V+ = 15V, V- = -15V           | T <sub>A</sub> = +25°C                                   |      |       |                 | 2    | Ω     |
|                                               |                                                               |                                                                                                            | T <sub>A</sub> = T <sub>MIN</sub> to T <sub>MAX</sub>    |      |       |                 | 4    |       |
| On Resistance Flatness (Note 5)               | R <sub>ON</sub>                                               | I <sub>COM</sub> = -10mA,<br>V <sub>NO_</sub> or V <sub>NC_</sub> = ±5V,<br>V+ = 15V, V- = -15V            | T <sub>A</sub> = +25°C                                   |      |       |                 | 3    | Ω     |
|                                               |                                                               |                                                                                                            | T <sub>A</sub> = T <sub>MIN</sub> to T <sub>MAX</sub>    |      |       |                 | 5    |       |
| Off Leakage Current<br>(NO_ or NC_)           | I <sub>NO</sub><br>I <sub>NC</sub>                            | V <sub>COM</sub> = -15.5V,<br>V <sub>NO_</sub> or V <sub>NC_</sub> = 15.5V,<br>V+ = 16.5V,<br>V- = -16.5V  | T <sub>A</sub> = +25°C                                   |      | -0.25 | -0.10           | 0.25 | nA    |
|                                               |                                                               |                                                                                                            | T <sub>A</sub> = T <sub>MIN</sub><br>to T <sub>MAX</sub> | C, E | -6    |                 | 6    |       |
|                                               |                                                               |                                                                                                            |                                                          | M    | -20   |                 | 20   |       |
| COM_ Off Leakage Current                      | I <sub>NC</sub> (OFF)                                         | V <sub>COM</sub> = -15.5V,<br>V <sub>NO_</sub> or V <sub>NC_</sub> = 15.5V,<br>V+ = 16.5V,<br>V- = -16.5V  | T <sub>A</sub> = +25°C                                   |      | -0.25 | -0.10           | 0.25 | nA    |
|                                               |                                                               |                                                                                                            | T <sub>A</sub> = T <sub>MIN</sub><br>to T <sub>MAX</sub> | C, E | -6    |                 | 6    |       |
|                                               |                                                               |                                                                                                            |                                                          | M    | -20   |                 | 20   |       |
| COM_ On Leakage Current                       | I <sub>COM</sub> (ON)                                         | V <sub>COM</sub> = ±15.5V,<br>V <sub>NO_</sub> or V <sub>NC_</sub> = ±15.5V,<br>V+ = 16.5V,<br>V- = -16.5V | T <sub>A</sub> = +25°C                                   |      | -0.4  | -0.1            | 0.4  | nA    |
|                                               |                                                               |                                                                                                            | T <sub>A</sub> = T <sub>MIN</sub><br>to T <sub>MAX</sub> | C, E | -10   |                 | 10   |       |
|                                               |                                                               |                                                                                                            |                                                          | M    | -40   |                 | 40   |       |

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MAX351/MAX352/MAX353

## ELECTRICAL CHARACTERISTICS—Dual Supplies (continued)

(V+ = 15V, V- = -15V, VL = 5V, GND = 0V, VINH = 2.4V, VINL = 0.8V, TA = TMIN to TMAX, unless otherwise noted.)

| PARAMETER                             | SYMBOL             | CONDITIONS                                                                                                  |                                                       | MIN    | TYP<br>(Note 3) | MAX   | UNITS |
|---------------------------------------|--------------------|-------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|--------|-----------------|-------|-------|
| INPUT                                 |                    |                                                                                                             |                                                       |        |                 |       |       |
| Input Current with Input Voltage High | I <sub>INH</sub>   | I <sub>N-</sub> = 2.4V, all others = 0.8V                                                                   |                                                       | -0.500 | 0.005           | 0.500 | μA    |
| Input Current with Input Voltage Low  | I <sub>INL</sub>   | I <sub>N-</sub> = 0.8V, all others = 2.4V                                                                   |                                                       | -0.500 | 0.005           | 0.500 | μA    |
| SUPPLY                                |                    |                                                                                                             |                                                       |        |                 |       |       |
| Power-Supply Range                    |                    |                                                                                                             |                                                       | ±4.5   |                 | ±20.0 | V     |
| Positive Supply Current               | I <sub>+</sub>     | All channels on or off,<br>V <sub>IN</sub> = 0V or 5V,<br>V <sub>+</sub> = 16.5V<br>V <sub>-</sub> = -16.5V | T <sub>A</sub> = +25°C                                | -1     | 0.0001          | 1     | μA    |
|                                       |                    |                                                                                                             | T <sub>A</sub> = T <sub>MIN</sub> to T <sub>MAX</sub> | -5     |                 | 5     |       |
| Negative Supply Current               | I <sub>-</sub>     | All channels on or off,<br>V <sub>IN</sub> = 0V or 5V,<br>V <sub>+</sub> = 16.5V<br>V <sub>-</sub> = -16.5V | T <sub>A</sub> = +25°C                                | -1     | -0.0001         | 1     | μA    |
|                                       |                    |                                                                                                             | T <sub>A</sub> = T <sub>MIN</sub> to T <sub>MAX</sub> | -5     |                 | 5     |       |
| Logic Supply Current                  | I <sub>L</sub>     | All channels on or off,<br>V <sub>IN</sub> = 0V or 5V,<br>V <sub>+</sub> = 16.5V<br>V <sub>-</sub> = -16.5V | T <sub>A</sub> = +25°C                                | -1     | 0.0001          | 1     | μA    |
|                                       |                    |                                                                                                             | T <sub>A</sub> = T <sub>MIN</sub> to T <sub>MAX</sub> | -5     |                 | 5     |       |
| Ground Current                        | I <sub>IGND</sub>  | All channels on or off,<br>V <sub>IN</sub> = 0V or 5V,<br>V <sub>+</sub> = 16.5V<br>V <sub>-</sub> = -16.5V | T <sub>A</sub> = +25°C                                | -1     | -0.0001         | 1     | μA    |
|                                       |                    |                                                                                                             | T <sub>A</sub> = T <sub>MIN</sub> to T <sub>MAX</sub> | -5     |                 | 5     |       |
| DYNAMIC                               |                    |                                                                                                             |                                                       |        |                 |       |       |
| Turn-On Time                          | t <sub>ON</sub>    | Figure 2,<br>V <sub>COM</sub> = ±10V                                                                        | T <sub>A</sub> = +25°C                                |        | 110             | 175   | ns    |
|                                       |                    |                                                                                                             | T <sub>A</sub> = T <sub>MIN</sub> to T <sub>MAX</sub> |        |                 | 220   |       |
| Turn-Off Time                         | t <sub>OFF</sub>   | Figure 2,<br>V <sub>COM</sub> = ±10V                                                                        | T <sub>A</sub> = +25°C                                |        | 100             | 145   | ns    |
|                                       |                    |                                                                                                             | T <sub>A</sub> = T <sub>MIN</sub> to T <sub>MAX</sub> |        |                 | 160   |       |
| Break-Before-Make Time Delay          | t <sub>D</sub>     | MAX353 only, Figure 3,<br>R <sub>L</sub> = 300Ω,<br>C <sub>L</sub> = 35pF                                   | T <sub>A</sub> = +25°C                                |        | 25              |       | ns    |
| Charge Injection                      | Q                  | C <sub>L</sub> = 1.0nF,<br>V <sub>GEN</sub> = 0V,<br>R <sub>GEN</sub> = 0Ω, Figure 4                        | T <sub>A</sub> = +25°C                                |        | 5               | 10    | pC    |
| Off Isolation (Note 6)                | OIRR               | R <sub>L</sub> = 50Ω,<br>C <sub>L</sub> = 5pF,<br>f = 1MHz, Figure 5                                        | T <sub>A</sub> = +25°C                                |        | 68              |       | dB    |
| Crosstalk (Note 7)                    |                    | R <sub>L</sub> = 50Ω,<br>C <sub>L</sub> = 5pF,<br>f = 1MHz, Figure 6                                        | T <sub>A</sub> = +25°C                                |        | 85              |       | dB    |
| NC or NO Capacitance                  | C <sub>(OFF)</sub> | f = 1MHz, Figure 7                                                                                          | T <sub>A</sub> = +25°C                                |        | 9               |       | pF    |
| COM Off Capacitance                   | C <sub>(COM)</sub> | f = 1MHz, Figure 7                                                                                          | T <sub>A</sub> = +25°C                                |        | 9               |       | pF    |
| On Capacitance                        | C <sub>(COM)</sub> | f = 1MHz, Figure 8                                                                                          | T <sub>A</sub> = +25°C                                |        | 35              |       | pF    |

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## ELECTRICAL CHARACTERISTICS—Single Supply

(V<sub>+</sub> = 12V, V<sub>-</sub> = 0V, V<sub>L</sub> = 5V, GND = 0V, V<sub>INH</sub> = 2.4V, V<sub>INL</sub> = 0.8V, T<sub>A</sub> = T<sub>MIN</sub> to T<sub>MAX</sub>, unless otherwise noted.)

| PARAMETER                    | SYMBOL                                                       | CONDITIONS                                                                              |                                                       | MIN | TYP<br>(Note 3) | MAX | UNITS |
|------------------------------|--------------------------------------------------------------|-----------------------------------------------------------------------------------------|-------------------------------------------------------|-----|-----------------|-----|-------|
| SWITCH                       |                                                              |                                                                                         |                                                       |     |                 |     |       |
| Analog Signal Range          | V <sub>COM_</sub> ,<br>V <sub>NO_</sub> ,<br>V <sub>NC</sub> | (Notes 1, 4)                                                                            |                                                       | 0   |                 | V+  | V     |
| Channel On Resistance        | R <sub>ON</sub>                                              | I <sub>COM</sub> = -10mA,<br>V <sub>NC_</sub> or V <sub>NO_</sub> = 3.8V,<br>V+ = 10.8V | T <sub>A</sub> = +25°C                                | 40  | 80              | 100 | Ω     |
|                              |                                                              |                                                                                         | T <sub>A</sub> = T <sub>MIN</sub> to T <sub>MAX</sub> |     |                 |     |       |
| SUPPLY                       |                                                              |                                                                                         |                                                       |     |                 |     |       |
| Positive Supply Current      | I+                                                           | V+ = 13.2V,<br>all channels on or off,<br>V <sub>IN</sub> = 0V or 5V                    | T <sub>A</sub> = +25°C                                | -1  | 0.0001          | 1   | μA    |
|                              |                                                              |                                                                                         | T <sub>A</sub> = T <sub>MAX</sub>                     | -5  |                 | 5   |       |
| Negative Supply Current      | I-                                                           | V+ = 13.2V,<br>all channels on or off,<br>V <sub>IN</sub> = 0V or 5V                    | T <sub>A</sub> = +25°C                                | -1  | 0.0001          | 1   | μA    |
|                              |                                                              |                                                                                         | T <sub>A</sub> = T <sub>MAX</sub>                     | -5  |                 | 5   |       |
| Logic Supply Current         | I <sub>L</sub>                                               | V <sub>L</sub> = 5.25V,<br>all channels on or off,<br>V <sub>IN</sub> = 0V or 5V        | T <sub>A</sub> = +25°C                                | -1  | 0.0001          | 1   | μA    |
|                              |                                                              |                                                                                         | T <sub>A</sub> = T <sub>MAX</sub>                     | -5  |                 | 5   |       |
| Ground Current               | I <sub>GND</sub>                                             | V <sub>L</sub> = 5.25V,<br>all channels on or off,<br>V <sub>IN</sub> = 0V or 5V        | T <sub>A</sub> = +25°C                                | -1  | -0.0001         | 1   | μA    |
|                              |                                                              |                                                                                         | T <sub>A</sub> = T <sub>MAX</sub>                     | -5  |                 | 5   |       |
| DYNAMIC                      |                                                              |                                                                                         |                                                       |     |                 |     |       |
| Turn-On Time                 | t <sub>ON</sub>                                              | Figure 2,<br>V <sub>NO_</sub> or V <sub>NC_</sub> = 8V                                  | T <sub>A</sub> = +25°C                                | 175 | 250             | 315 | ns    |
|                              |                                                              |                                                                                         | T <sub>A</sub> = T <sub>MIN</sub> to T <sub>MAX</sub> |     |                 |     |       |
| Turn-Off Time                | t <sub>OFF</sub>                                             | Figure 2,<br>V <sub>NO_</sub> or V <sub>NC_</sub> = 8V                                  | T <sub>A</sub> = +25°C                                | 95  | 125             | 140 | ns    |
|                              |                                                              |                                                                                         | T <sub>A</sub> = T <sub>MIN</sub> to T <sub>MAX</sub> |     |                 |     |       |
| Break-Before-Make Time Delay | t <sub>D</sub>                                               | MAX353 only, Figure 3,<br>R <sub>L</sub> = 300Ω,<br>C <sub>L</sub> = 35pF               | T <sub>A</sub> = +25°C                                | 25  |                 |     | ns    |
| Charge Injection             | Q                                                            | Figure 8,<br>C <sub>L</sub> = 1.0nF,<br>V <sub>GEN</sub> = 0V,<br>R <sub>GEN</sub> = 0V | T <sub>A</sub> = +25°C                                | 5   | 10              |     | pC    |

**Note 3:** The algebraic convention, where the most negative value is a minimum and the most positive value a maximum, is used in this data sheet.

**Note 4:** Guaranteed by design.

**Note 5:** ΔR<sub>ON</sub> = ΔR<sub>ON</sub> max - ΔR<sub>ON</sub> min. On-resistance match between channels and flatness are guaranteed only with bipolar-supply operation.

**Note 6:** See Figure 5. Off Isolation = 20 log<sub>10</sub> [ V<sub>COM</sub> / (V<sub>NC</sub> or V<sub>NO</sub>) ], V<sub>COM</sub> = output, V<sub>NC</sub> or V<sub>NO</sub> = input to off switch.

**Note 7:** Between any two switches. See Figure 6.

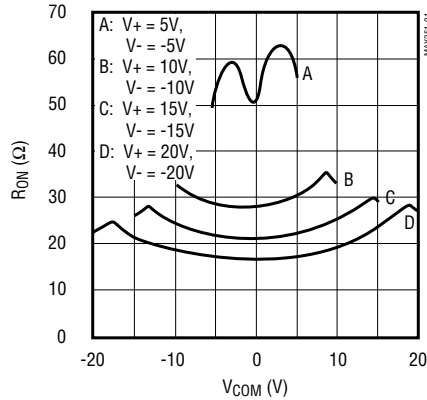
# Precision, Quad, SPST Analog Switches

## Typical Operating Characteristics

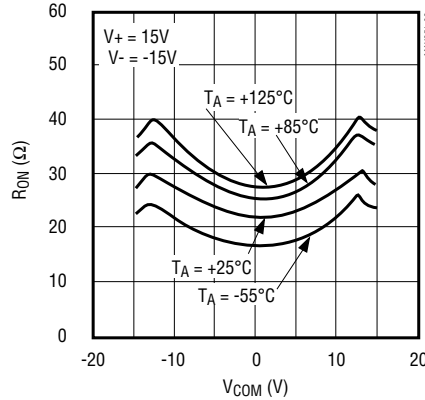
( $T_A = +25^\circ\text{C}$ , unless otherwise noted.)

MAX351/MAX352/MAX353

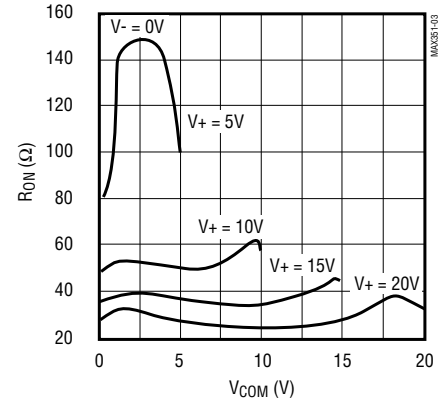
**ON RESISTANCE vs.  $V_{\text{COM}}$  AND POWER-SUPPLY VOLTAGE**



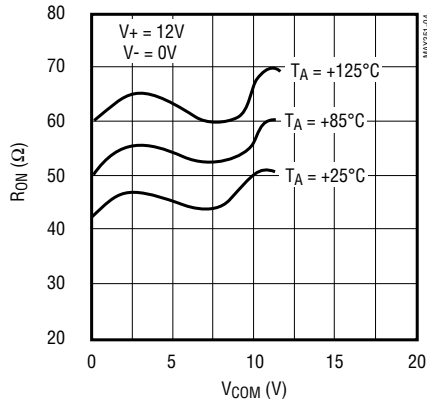
**ON RESISTANCE vs.  $V_{\text{COM}}$  AND TEMPERATURE**



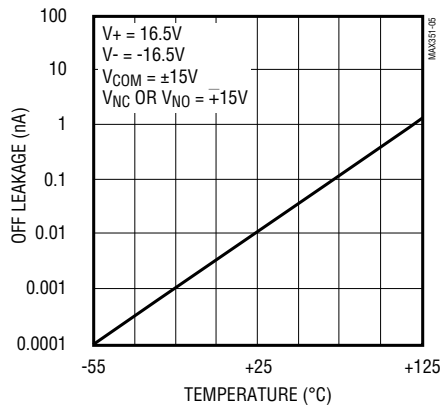
**ON RESISTANCE vs.  $V_{\text{COM}}$  AND TEMPERATURE**



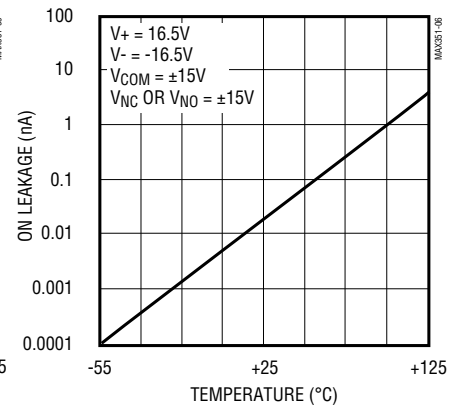
**ON RESISTANCE vs.  $V_{\text{COM}}$  (SINGLE-SUPPLY)**



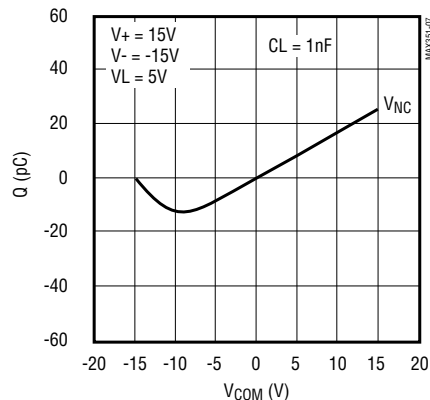
**OFF LEAKAGE CURRENTS vs. TEMPERATURE**



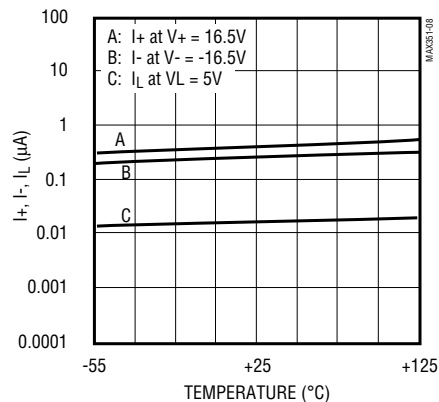
**ON LEAKAGE CURRENTS vs. TEMPERATURE**



**CHARGE INJECTION vs. ANALOG VOLTAGE**



**SUPPLY CURRENT vs. TEMPERATURE**



# Precision, Quad, SPST Analog Switches

## Pin Description

| PIN          |              | NAME           | FUNCTION                                             |
|--------------|--------------|----------------|------------------------------------------------------|
| DIP/SO       | QFN          |                |                                                      |
| 1, 16, 9, 8  | 15, 14, 7, 6 | IN1–N4         | Logic Control Input                                  |
| 2, 15, 10, 7 | 16, 13, 8, 5 | COM1–COM4      | Analog Switch Common Terminal                        |
| 3, 15, 11, 6 | 1, 12, 9, 4  | NO or NC       | Analog Switch NO or NC Terminal                      |
| 4            | 2            | V-             | Negative-Supply Voltage Input                        |
| 5            | 3            | GND            | Ground                                               |
| 12           | 10           | V <sub>L</sub> | Logic Supply Voltage                                 |
| 13           | 11           | V+             | Positive-Supply Voltage Input—Connected To Substrate |

## Applications Information

### Operation with Supplies Other than $\pm 15\text{V}$

The main limitation of supply voltages other than  $\pm 15\text{V}$  is reduced analog-signal range. The MAX351/MAX352/MAX353 operate with  $\pm 5\text{V}$  to  $\pm 20\text{V}$  bipolar supplies. The *Typical Operating Characteristics* graphs show typical on resistance ( $R_{\text{ON}}$ ) for  $\pm 15\text{V}$ ,  $\pm 10\text{V}$ , and  $\pm 5\text{V}$  supplies. (Switching times increase by a factor of two or more for operation at  $\pm 5\text{V}$ .) The MAX351/MAX352/MAX353 can operate from  $+10\text{V}$  to  $+30\text{V}$  unipolar supplies. Each device can also be powered from unbalanced supplies such as  $+24\text{V}$  and  $-5\text{V}$ . Connect V- to  $0\text{V}$  when operating with a single supply. V<sub>L</sub> must be connected to  $+5\text{V}$  to be TTL compatible or to V+ for CMOS-logic input levels.

### Overvoltage Protection

Proper power-supply sequencing is recommended for all CMOS devices. Do not exceed the absolute maximum ratings because stresses beyond the listed ratings may cause permanent damage to the devices. Always sequence V+ first, followed by V<sub>L</sub>, V-, and logic inputs. If power-supply sequencing is not possible, add two small signal diodes in series with the supply pins for overvoltage protection (Figure 1). Adding diodes reduces the analog signal range to  $1\text{V}$  below V+ and  $1\text{V}$  below V-, but low switch resistance and low-leakage characteristics are unaffected. Device operation is unchanged, and the difference between V+ to V- should not exceed  $+44\text{V}$ .

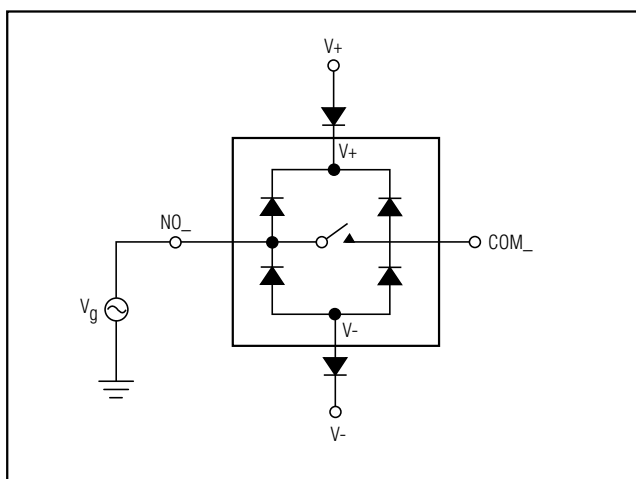


Figure 1. Overvoltage Protection Using External Blocking Diodes

# Precision, Quad, SPST Analog Switches

## Test Circuits/Timing Diagrams

MAX351/MAX352/MAX353

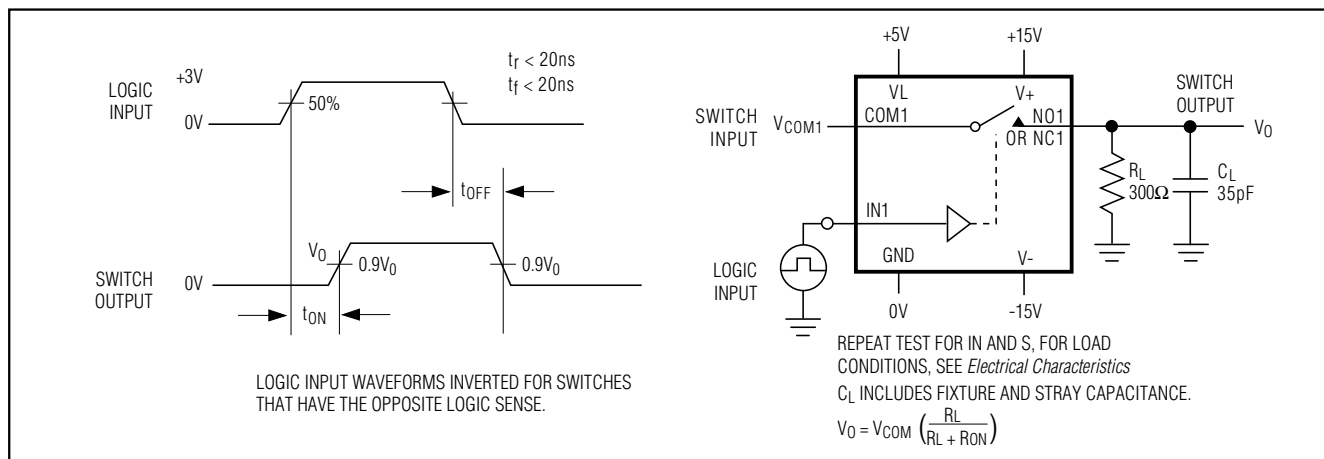


Figure 2. Switching-Time Test Circuit

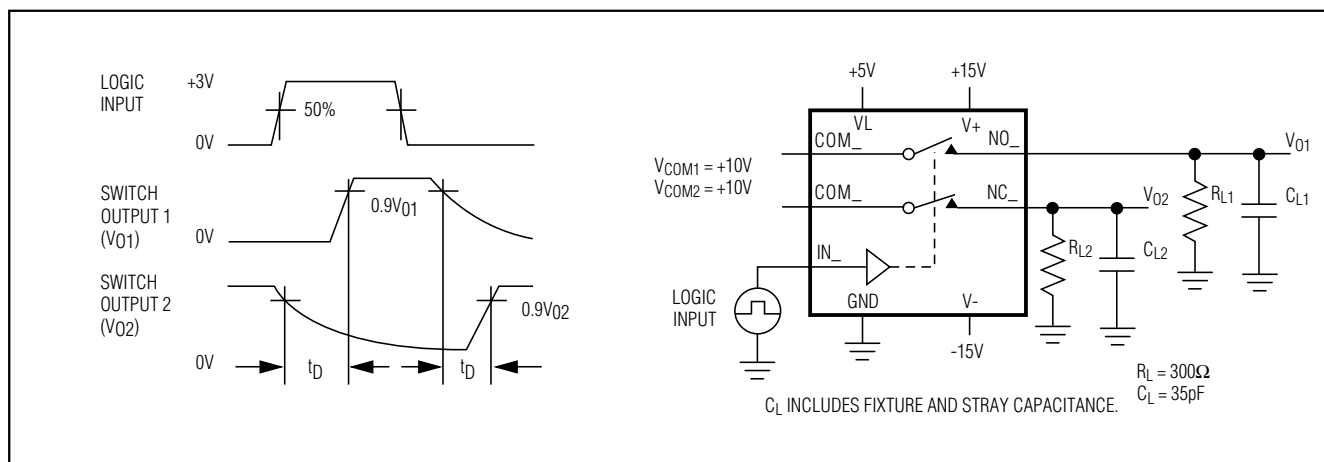
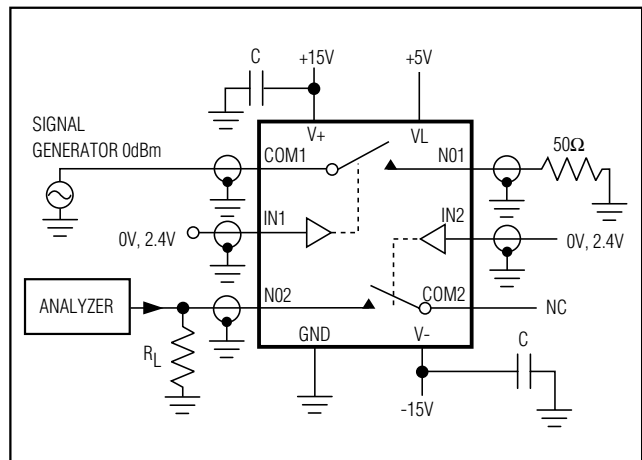
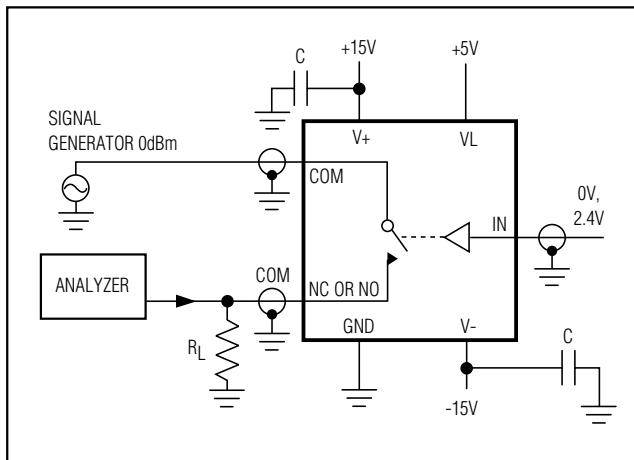
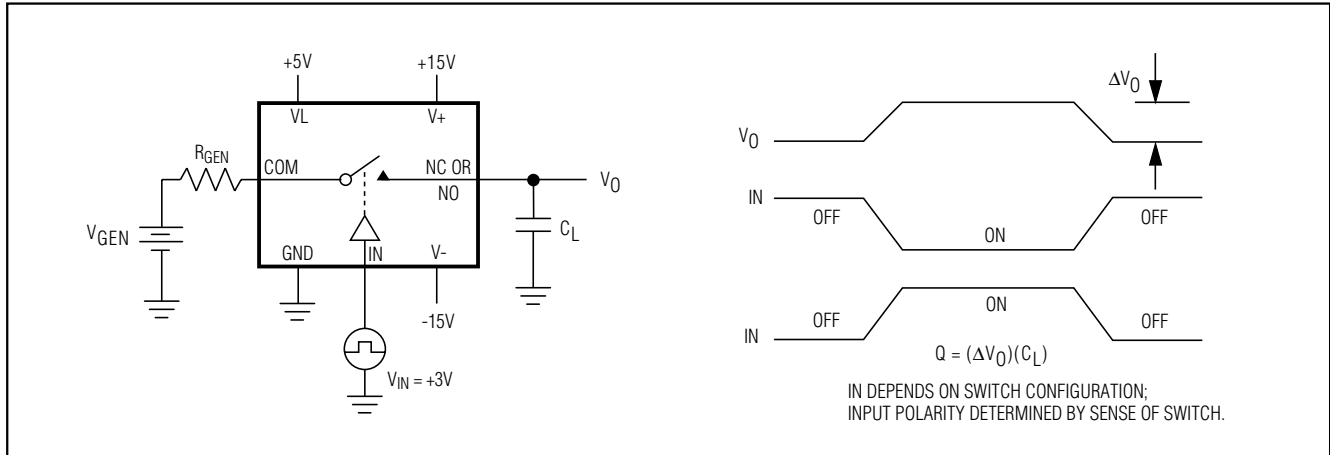


Figure 3. Break-Before-Make Test Circuit (MAX353 only)

# Precision, Quad, SPST Analog Switches

## Test Circuits/Timing Diagrams (continued)



# Precision, Quad, SPST Analog Switches

## Test Circuits/Timing Diagrams (continued)

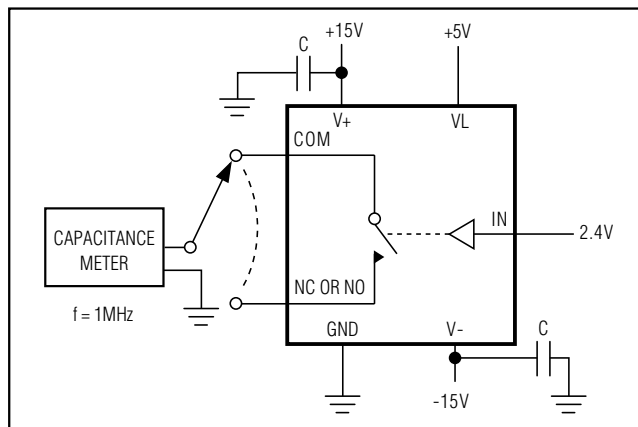


Figure 7. Channel-Off Capacitance

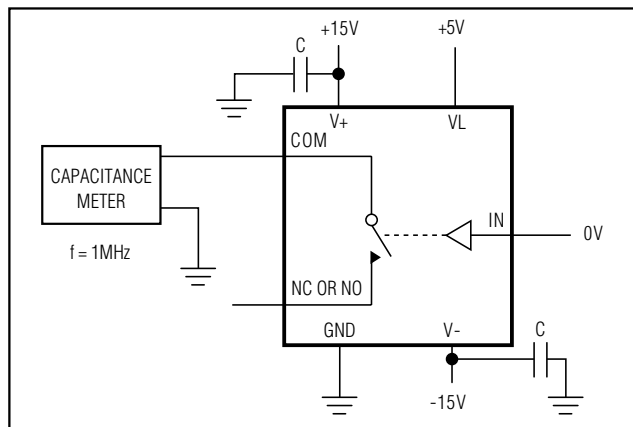
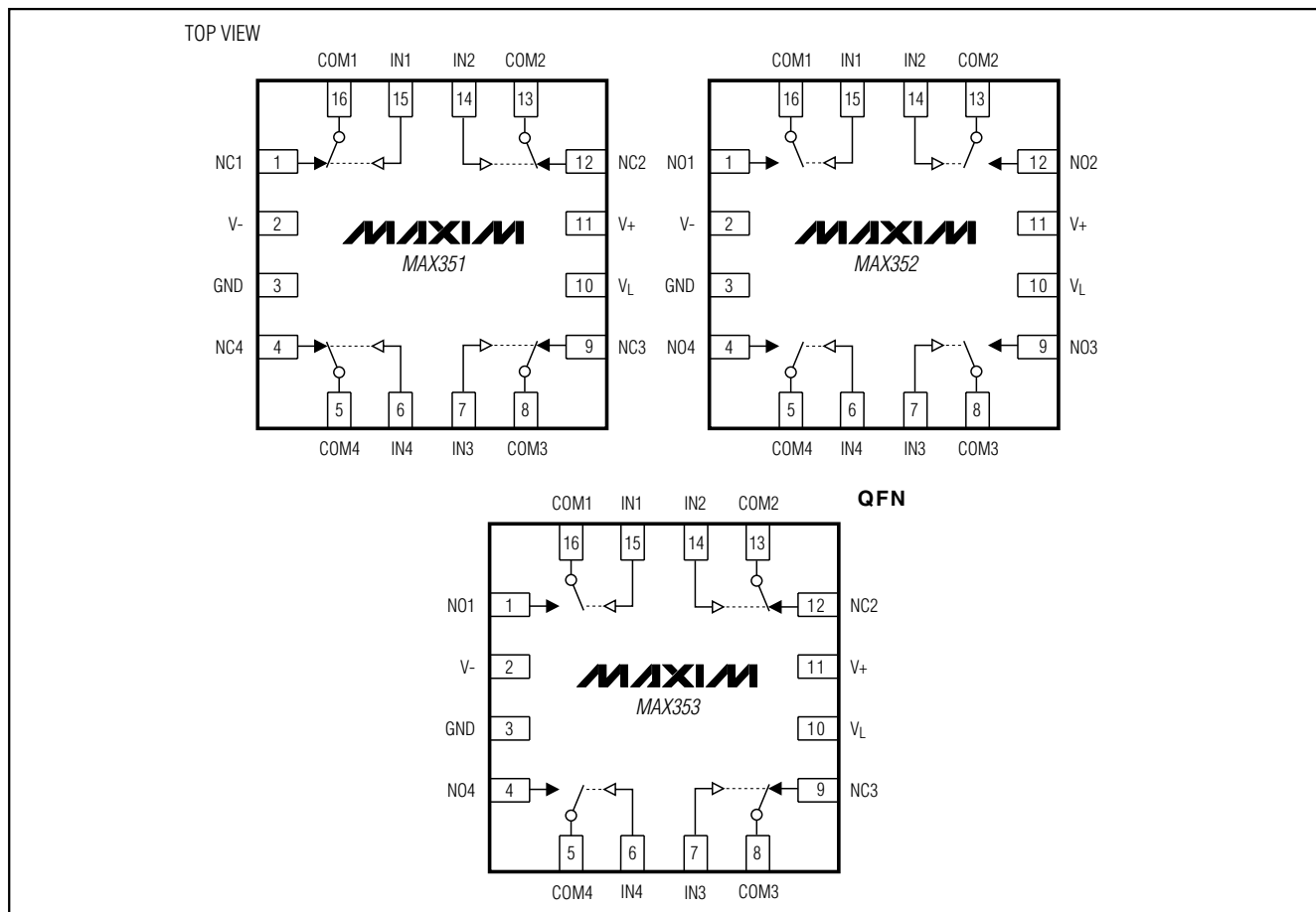


Figure 8. Channel-On Capacitance Test Circuit

## Pin Configurations (continued)



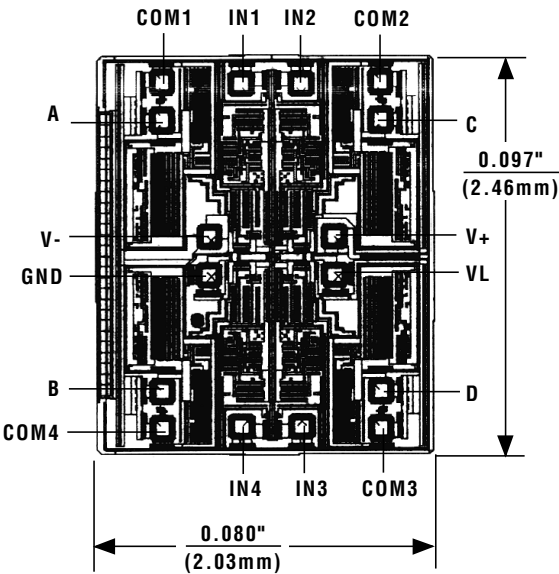
# Precision, Quad, SPST Analog Switches

## Ordering Information (continued)

| PART      | TEMP RANGE      | PIN-PACKAGE    |
|-----------|-----------------|----------------|
| MAX352CPE | 0°C to +70°C    | 16 Plastic DIP |
| MAX352CSE | 0°C to +70°C    | 16 Narrow SO   |
| MAX352C/D | 0°C to +70°C    | Dice*          |
| MAX352EGE | -40°C to +85°C  | 16 QFN         |
| MAX352EPE | -40°C to +85°C  | 16 Plastic DIP |
| MAX352ESE | -40°C to +85°C  | 16 Narrow SO   |
| MAX352EJE | -40°C to +85°C  | 16 Cerdip      |
| MAX352MJE | -55°C to +125°C | 16 Cerdip      |
| MAX353CPE | 0°C to +70°C    | 16 Plastic DIP |
| MAX353CSE | 0°C to +70°C    | 16 Narrow SO   |
| MAX353C/D | 0°C to +70°C    | Dice*          |
| MAX353EGE | -40°C to +85°C  | 16 QFN         |
| MAX353EPE | -40°C to +85°C  | 16 Plastic DIP |
| MAX353ESE | -40°C to +85°C  | 16 Narrow SO   |
| MAX353EJE | -40°C to +85°C  | 16 Cerdip      |
| MAX353MJE | -55°C to +125°C | 16 Cerdip      |

\*Contact factory for availability and processing to MIL-STD-883.

## Chip Topography



TRANSISTOR COUNT: 136  
SUBSTRATE CONNECTED TO V+

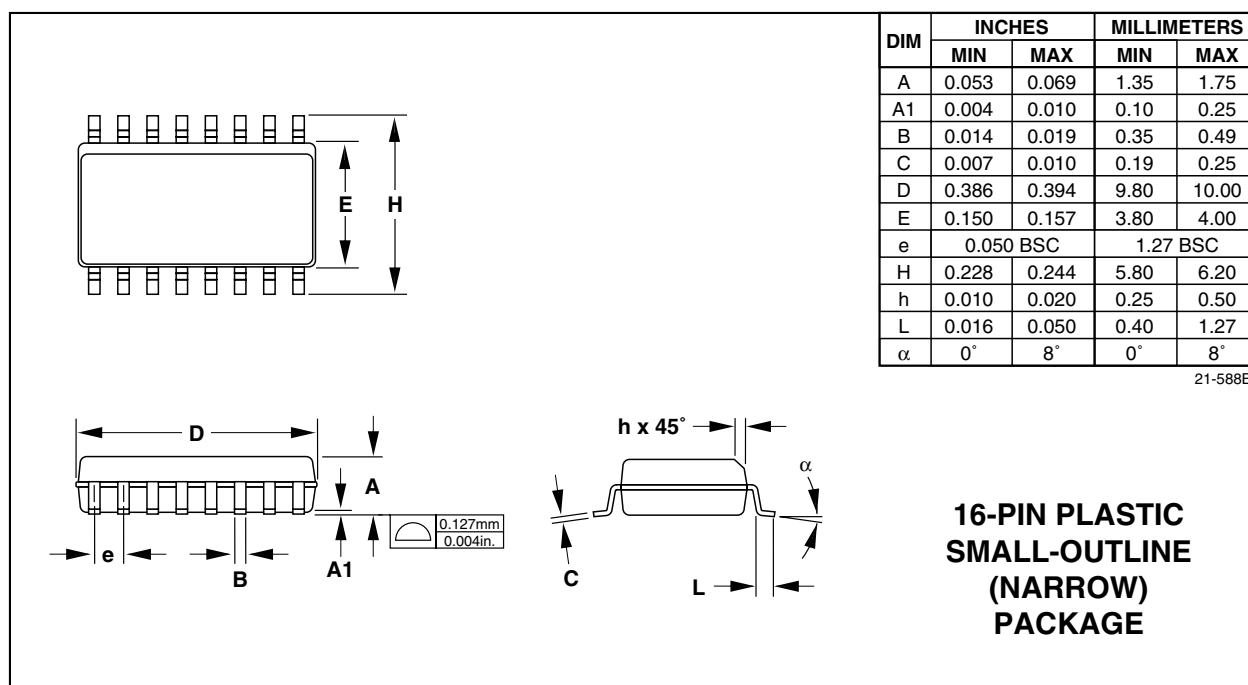
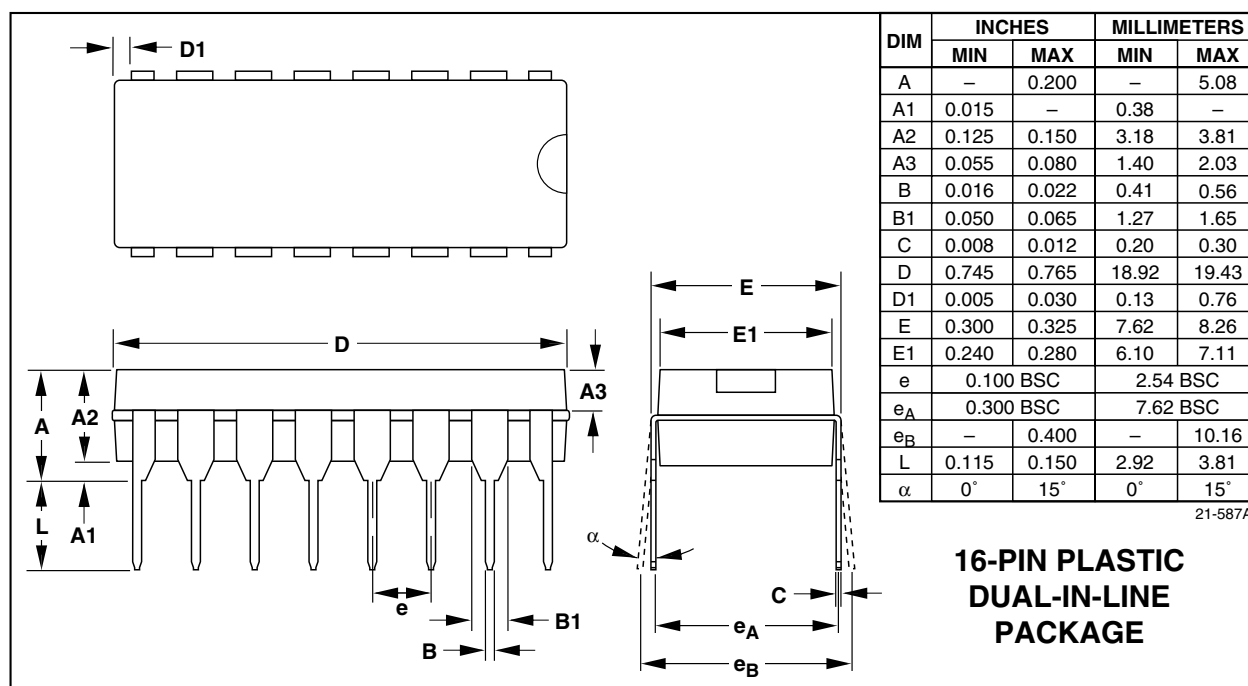
| MAX351 |      | MAX352 |      | MAX353 |      |
|--------|------|--------|------|--------|------|
| PIN    | NAME | PIN    | NAME | PIN    | NAME |
| A      | NC   | A      | NO   | A      | NO   |
| B      | NC   | B      | NO   | B      | NO   |
| C      | NC   | C      | NO   | C      | NC   |
| D      | NC   | D      | NO   | D      | NC   |

# Precision, Quad, SPST Analog Switches

## Package Information

(The package drawing(s) in this data sheet may not reflect the most current specifications. For the latest package outline information, go to [www.maxim-ic.com/packages](http://www.maxim-ic.com/packages).)

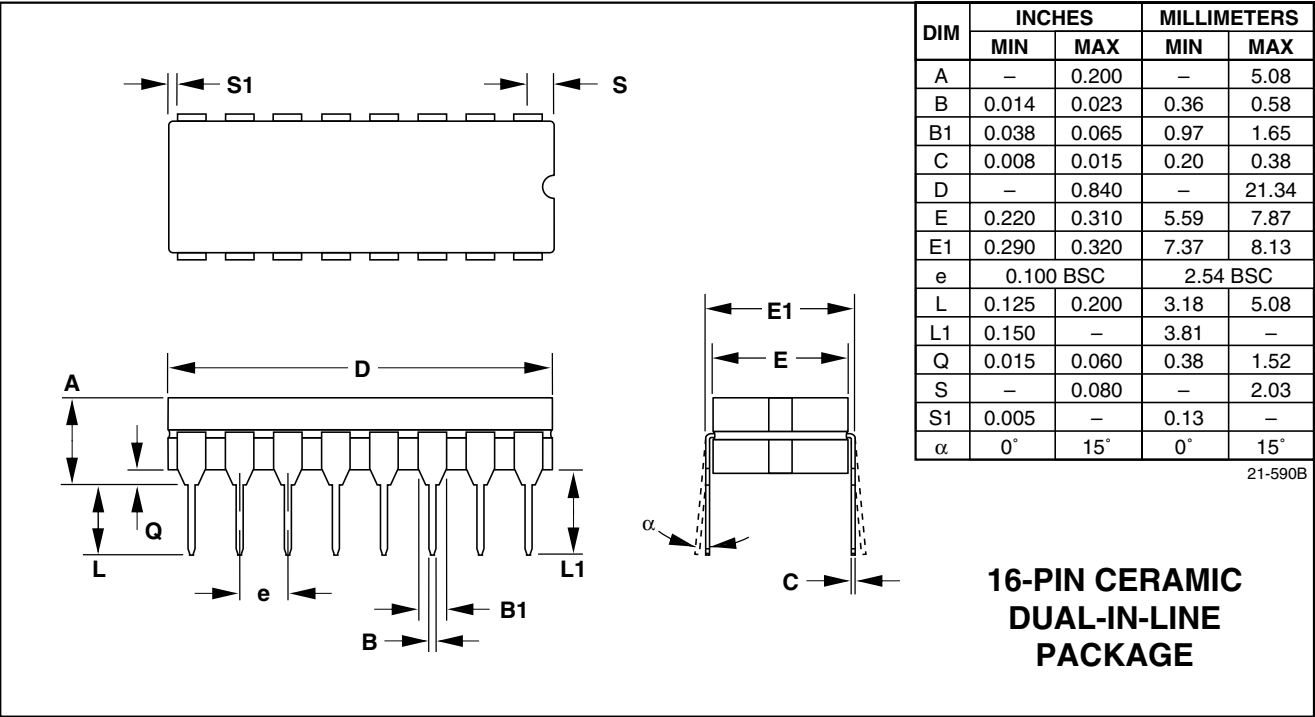
MAX351/MAX352/MAX353



# Precision, Quad, SPST Analog Switches

## Package Information (continued)

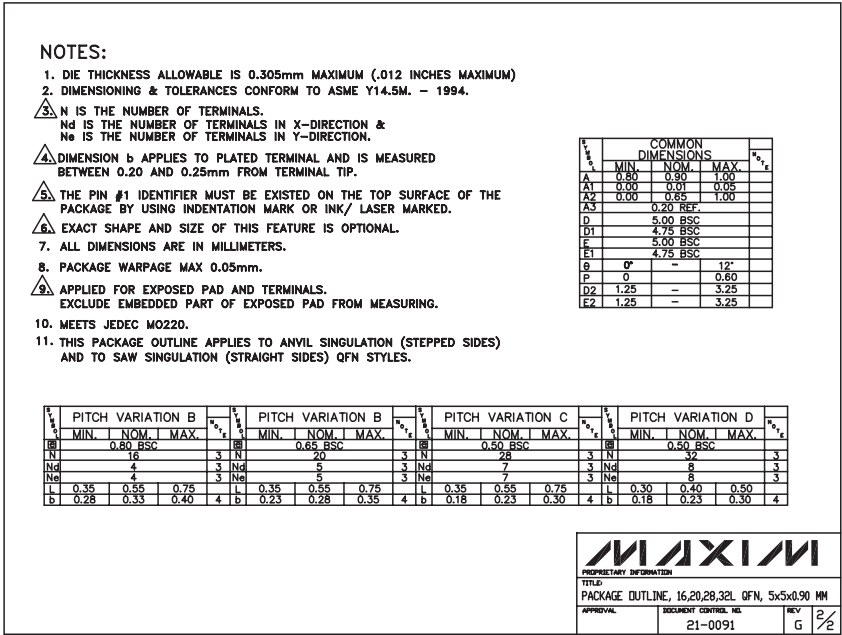
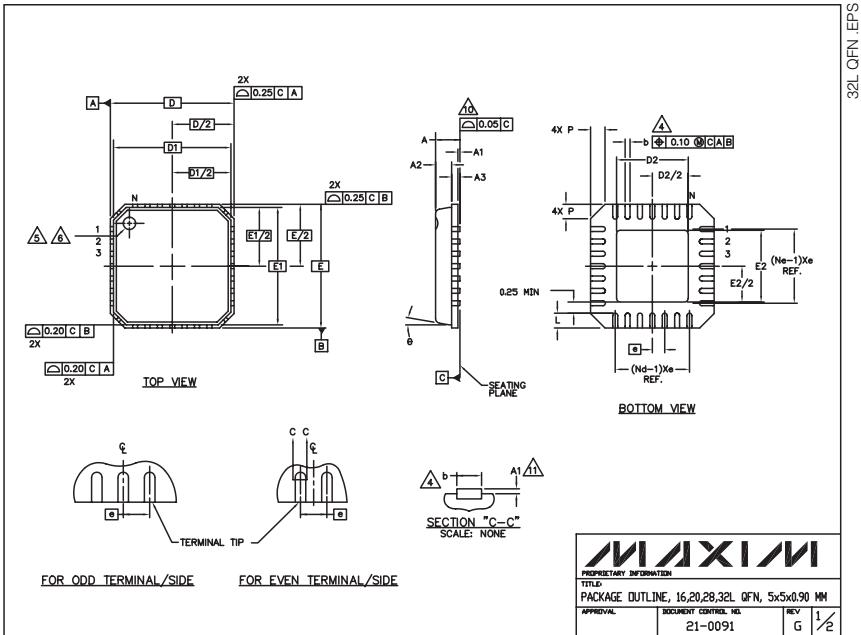
(The package drawing(s) in this data sheet may not reflect the most current specifications. For the latest package outline information, go to [www.maxim-ic.com/packages](http://www.maxim-ic.com/packages).)



# Precision, Quad, SPST Analog Switches

## Package Information (continued)

(The package drawing(s) in this data sheet may not reflect the most current specifications. For the latest package outline information, go to [www.maxim-ic.com/packages](http://www.maxim-ic.com/packages).)



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