

# MAXIM

## 2.5Ω, Quad, SPST, CMOS Analog Switches

MAX4601/MAX4602/MAX4603

### General Description

The MAX4601/MAX4602/MAX4603 quad analog switches feature low on-resistance of 2.5Ω max. On-resistance is matched between switches to 0.5Ω max and is flat (0.5Ω max) over the specified signal range. Each switch can handle Rail-to-Rail® analog signals. The off-leakage current is only 2.5nA maximum at T<sub>A</sub> = +85°C. These analog switches are ideal in low-distortion applications and are the preferred solution over mechanical relays in automatic test equipment or applications where current switching is required. They have low power requirements, require less board space, and are more reliable than mechanical relays.

The MAX4601 has four normally closed (NC) switches, the MAX4602 has four normally open (NO) switches, and the MAX4603 has two NC and two NO switches.

These switches operate from a single supply of +4.5V to +36V or from dual supplies of ±4.5V to ±20V. All digital inputs have +0.8V and +2.4V logic thresholds, ensuring TTL/CMOS-logic compatibility when using ±15V or a single +12V supply.

### Applications

- Reed Relay Replacement
- Test Equipment
- Communication Systems
- PBX, PABX Systems
- Audio-Signal Routing
- Avionics

### Features

- ♦ **Low On-Resistance (2.5Ω max)**
- ♦ **Guaranteed R<sub>ON</sub> Match Between Channels (0.5Ω max)**
- ♦ **Guaranteed R<sub>ON</sub> Flatness over Specified Signal Range (0.5Ω max)**
- ♦ **Rail-to-Rail Signal Handling**
- ♦ **Guaranteed ESD Protection > 2000V per Method 3015.7**
- ♦ **Single-Supply Operation: +4.5V to +36V**  
**Dual-Supply Operation: ±4.5V to ±20V**
- ♦ **TTL/CMOS-Compatible Control Inputs**

### Ordering Information

| PART       | TEMP. RANGE    | PIN-PACKAGE    |
|------------|----------------|----------------|
| MAX4601CAE | 0°C to +70°C   | 16 SSOP        |
| MAX4601CWE | 0°C to +70°C   | 16 Wide SO     |
| MAX4601CPE | 0°C to +70°C   | 16 Plastic DIP |
| MAX4601EAE | -40°C to +85°C | 16 SSOP        |
| MAX4601EWE | -40°C to +85°C | 16 Wide SO     |
| MAX4601EPE | -40°C to +85°C | 16 Plastic DIP |

Ordering Information continued at end of data sheet.

### Pin Configurations/Functional Diagrams/Truth Tables



Rail-to-Rail is a registered trademark of Nippon Motorola, Ltd.



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## ABSOLUTE MAXIMUM RATINGS

|   |                             |  |
|---|-----------------------------|--|
| V+ to GND .....                           | -0.3V to +44V               | Continuous Power Dissipation (TA = +70°C)            |
| V- to GND .....                           | +0.3V to -44V               | 16 SSOP (derate 7.1mW/°C above +70°C) .....          |
| V+ to V- .....                            | -0.3V to +44V               | 16 Wide SO (derate 9.52mW/°C above +70°C) .....      |
| VL to GND .....                           | (GND - 0.3V) to (V+ + 0.3V) | 16 Plastic DIP (derate 10.53mW/°C above +70°C) ..... |
| All Other Pins to DGND (Note 1) .....     | (V- - 0.3V) to (V+ + 0.3V)  | Operating Temperature Ranges                         |
| Continuous Current (COM_, NO_, NC_) ..... | ±200mA                      | MAX460_C_E .....                                     |
| Peak Current (COM_, NO_, NC_) .....       | ±300mA                      | MAX460_E_E .....                                     |
| (pulsed at 1ms, 10% duty cycle) .....     | ±300mA                      | Storage Temperature Range .....                      |
|   |                             | Lead Temperature (soldering, 10sec) .....            |

**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.

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, VIN\_H = 2.4V, VIN\_L = 0.8V, TA = TMIN to TMAX, unless otherwise noted. Typical values are at TA = +25°C.)

| PARAMETER  | SYMBOL            | CONDITIONS                                    | MIN               | TYP<br>(Note 2) | MAX   | UNITS |
|--|-------------------|---|-------------------|-----------------|-------|-------|
| <b>ANALOG SWITCH</b>   |                   |   |                   |                 |       |       |
| Input Voltage Range  | VCOM_, VNO_, VNC_ | (Note 3)                                      | V-                |                 | V+    | V     |
| COM_ to NO or NC_ On-Resistance                                  | RON               | ICOM_ = 10mA, VNO_ or VNC_ = ±10V             |                   | 1.7             | 2.5   | Ω     |
|  |                   |   | TA = TMIN to TMAX |                 | 2.7   |       |
| COM_ to NO_ or NC_ On-Resistance Match Between Channels (Note 4) | ΔRON              | ICOM_ = 10mA, VNO_ or VNC_ = ±10V             |                   | 0.1             |       | Ω     |
|  |                   |   | TA = TMIN to TMAX |                 | 0.5   |       |
| COM_ to NO_ or NC_ On-Resistance Flatness (Note 5)               | RFLAT(ON)         | ICOM_ = 10mA; VNO_ or VNC_ = -5V, 0, 5V       |                   | 0.1             | 0.4   | Ω     |
|  |                   |   | TA = TMIN to TMAX |                 | 0.5   |       |
| Off-Leakage Current (NO_ or NC_) (Note 6)                        | INO_, INC_        | VCOM_ = ±10V, VNO_ or VNC_ = ±10V             |                   | -0.5            | 0.01  | nA    |
|  |                   |   | TA = TMIN to TMAX | -2.5            | 2.5   |       |
| COM Off-Leakage Current (Note 6)                                 | ICOM(OFF)         | VCOM_ = ±10V, VNO_ or VNC_ = ±10V             |                   | -0.5            | 0.01  | nA    |
|  |                   |   | TA = TMIN to TMAX | -2.5            | 2.5   |       |
| COM On-Leakage Current (Note 6)                                  | ICOM(ON)          | VCOM_ = ±10V, VNO_ or VNC_ = ±10V or floating |                   | -1              | 0.2   | nA    |
|  |                   |   | TA = TMIN to TMAX | -10             | 10    |       |
| <b>LOGIC INPUT</b>   |                   |   |                   |                 |       |       |
| Input Current with Input Voltage High                            | IIN_H             | IN_ = 2.4V, all others = 0.8V                 | -0.500            | 0.001           | 0.500 | μA    |
| Input Current with Input Voltage Low                             | IIN_L             | IN_ = 0.8V, all others = 2.4V                 | -0.500            | 0.001           | 0.500 | μA    |
| Logic Input High Voltage   | VIN_H             |   | 2.4               | 1.7             |       | V     |
| Logic Input Low Voltage  | VIN_L             |   |                   | 1.7             | 0.8   | V     |

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### ELECTRICAL CHARACTERISTICS—Dual Supplies (continued)

(V+ = +15V, V- = -15V, VL = 5V, VIN\_H = 2.4V, VIN\_L = 0.8V, TA = TMIN to TMAX, unless otherwise noted. Typical values are at TA = +25°C.)

| PARAMETER                             | SYMBOL | CONDITIONS  | MIN               | TYP  | MAX   | UNITS |    |
|---------------------------------------|--------|---|-------------------|------|-------|-------|----|
| <b>POWER SUPPLY</b>                   |        |   |                   |      |       |       |    |
| Power-Supply Range                    |        |   | ±4.5              |      | ±20.0 | V     |    |
| Positive Supply Current               | I+     | All channels on or off,<br>VIN = 0 or 5V                | TA = +25°C        | -0.5 | 0.001 | 0.5   | μA |
|                                       |        |   | TA = TMIN to TMAX | -5   |       | 5     |    |
| Negative Supply Current               | I-     | All channels on or off,<br>VIN = 0 or 5V                | TA = +25°C        | -0.5 | 0.001 | 0.5   | μA |
|                                       |        |   | TA = TMIN to TMAX | -5   |       | 5     |    |
| Logic Supply Current                  | IL     | All channels on or off,<br>VIN = 0 or 5V                | TA = +25°C        | -0.5 | 0.001 | 0.5   | μA |
|                                       |        |   | TA = TMIN to TMAX | -5   |       | 5     |    |
| Ground Current                        | IGND   | All channels on or off,<br>VIN = 0 or 5V                | TA = +25°C        | -0.5 | 0.001 | 0.5   | μA |
|                                       |        |   | TA = TMIN to TMAX | -5   |       | 5     |    |
| <b>SWITCH DYNAMIC CHARACTERISTICS</b> |        |   |                   |      |       |       |    |
| Turn-On Time                          | tON    | Figure 2, VCOM_ = ±10V, TA = +25°C                      |                   | 160  | 250   | ns    |    |
| Turn-Off Time                         | tOFF   | Figure 2, VCOM_ = ±10V, TA = +25°C                      |                   | 190  | 350   | ns    |    |
| Charge Injection                      | Q      | CL = 1.0nF, VGEN = 0, RGEN = 0, Figure 3,<br>TA = +25°C |                   | 120  |       | pC    |    |
| Off-Isolation (Note 7)                | VISO   | RL = 50Ω, CL = 5pF, f = 1MHz, Figure 4,<br>TA = +25°C   |                   | -56  |       | dB    |    |
| Crosstalk (Note 8)                    | VCT    | RL = 50Ω, CL = 5pF, f = 1MHz, Figure 5,<br>TA = +25°C   |                   | -59  |       | dB    |    |
| NC_ or NO_ Capacitance                | C(OFF) | f = 1MHz, Figure 6, TA = +25°C                          |                   | 55   |       | pF    |    |
| COM Off-Capacitance                   | C(COM) | f = 1MHz, Figure 6, TA = +25°C                          |                   | 55   |       | pF    |    |
| On-Capacitance                        | C(COM) | f = 1MHz, Figure 7, TA = +25°C                          |                   | 250  |       | pF    |    |

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## ELECTRICAL CHARACTERISTICS—Single +12V Supply

(V+ = 12V, V- = 0, VL = 5V, VIN\_H = 2.4V, VIN\_L = 0.8V, TA = TMIN to TMAX, unless otherwise noted. Typical values are at TA = +25°C.)

| PARAMETER  | SYMBOL                               | CONDITIONS   | MIN               | TYP<br>(Note 2) | MAX   | UNITS |    |
|--|--------------------------------------|--|-------------------|-----------------|-------|-------|----|
| <b>ANALOG SWITCH</b>   |                                      |  |                   |                 |       |       |    |
| Input Voltage Range  | VCOM_, VNO_,<br>VNC_                 | (Note 3)   | GND               |                 | V+    | V     |    |
| COM_ to NO_ or NC_<br>On-Resistance                                    | RON                                  | ICOM_ = 10mA,<br>VNO_ or VNC_ = 10V                        | TA = +25°C        | 3               | 4     | Ω     |    |
|  |                                      |  | TA = TMIN to TMAX |                 | 5     |       |    |
| COM_ to NO_ or NC_<br>On-Resistance Match Between<br>Channels (Note 4) | ΔRON                                 | ICOM_ = 10mA, VNO_<br>or VNC_ = 10V                        | TA = +25°C        | 0.03            | 0.4   | Ω     |    |
|  |                                      |  | TA = TMIN to TMAX |                 | 0.5   |       |    |
| COM_ to NO_ or NC_<br>On-Resistance Flatness<br>(Note 5)               | RFLAT(ON)                            | ICOM_ = 10mA; VNO_<br>or VNC_ = 3V, 6V, 9V                 | TA = +25°C        | 0.1             | 0.4   | Ω     |    |
|  |                                      |  | TA = TMIN to TMAX |                 | 0.5   |       |    |
| Off-Leakage Current<br>(NO_ or NC_) (Notes 6, 9)                       | I <sub>NO_</sub><br>I <sub>NC_</sub> | VCOM_ = 1V, 10V;<br>VNO_ or VNC_ = 10V,<br>1V              | TA = +25°C        | -0.5            | 0.01  | 0.5   | nA |
|  |                                      |  | TA = TMIN to TMAX | -2.5            |       | 2.5   |    |
| COM Off-Leakage Current<br>(Notes 6, 9)                                | ICOM(OFF)                            | VNO_ or VNC_ = 10V,<br>1V; VCOM_ = 1V, 10V                 | TA = +25°C        | -0.5            | 0.01  | 0.5   | nA |
|  |                                      |  | TA = TMIN to TMAX | -2.5            |       | 2.5   |    |
| COM On-Leakage Current<br>(Notes 6, 9)                                 | ICOM(ON)                             | VCOM_ = 1V, 10V;<br>VNO_ or VNC_ = 1V,<br>10V, or floating | TA = +25°C        | -1              | 0.01  | 1     | nA |
|  |                                      |  | TA = TMIN to TMAX | -10             |       | 10    |    |
| <b>LOGIC INPUT</b>   |                                      |  |                   |                 |       |       |    |
| Input Current with Input Voltage<br>High                               | IIN_H                                | IN_ = 2.4V, all others = 0.8V                              |                   | -0.500          | 0.001 | 0.500 | μA |
| Input Current with Input Voltage<br>Low                                | IIN_L                                | IN_ = 0.8V, all others = 2.4V                              |                   | -0.500          | 0.001 | 0.500 | μA |
| Logic Input High Voltage   | VIN_H                                |  |                   | 2.4             |       |       | V  |
| Logic Input Low Voltage  | VIN_L                                |  |                   |                 |       | 0.8   | V  |
| <b>POWER SUPPLY</b>  |                                      |  |                   |                 |       |       |    |
| Power-Supply Range   |                                      |  |                   | 4.5             |       | 36.0  | V  |
| Positive Supply Current  | I+                                   | All channels on or off,<br>VIN = 0 or 5V                   | TA = +25°C        | -0.5            | 0.001 | 0.5   | μA |
|  |                                      |  | TA = TMIN to TMAX | -5              |       | 5     |    |
| Logic Supply Current   | IL                                   | All channels on or off,<br>VIN = 0 or 5V                   | TA = +25°C        | -0.5            | 0.001 | 0.5   | μA |
|  |                                      |  | TA = TMIN to TMAX | -5              |       | 5     |    |
| Ground Current   | IGND                                 | VIN = 0 or 5V  | TA = +25°C        | -0.5            | 0.001 | 0.5   | μA |
|  |                                      |  | TA = TMIN to TMAX | -5              |       | 5     |    |

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MAX4601/MAX4602/MAX4603

## ELECTRICAL CHARACTERISTICS—Single +12V Supply (continued)

(V<sub>+</sub> = 12V, V<sub>-</sub> = 0, V<sub>L</sub> = 5V, V<sub>IN\_H</sub> = 2.4V, V<sub>IN\_L</sub> = 0.8V, T<sub>A</sub> = T<sub>MIN</sub> to T<sub>MAX</sub>, unless otherwise noted. Typical values are at T<sub>A</sub> = +25°C.)

| PARAMETER                             | SYMBOL             | CONDITIONS   | MIN | TYP<br>(Note 2) | MAX | UNITS |
|---------------------------------------|--------------------|--|-----|-----------------|-----|-------|
| <b>SWITCH DYNAMIC CHARACTERISTICS</b> |                    |  |     |                 |     |       |
| Turn-On Time                          | t <sub>ON</sub>    | Figure 2, V <sub>COM_</sub> = 10V, T <sub>A</sub> = +25°C  |     | 160             |     | ns    |
| Turn-Off Time                         | t <sub>OFF</sub>   | Figure 2, V <sub>COM_</sub> = 10V, T <sub>A</sub> = +25°C  |     | 170             |     | ns    |
| Charge Injection                      | Q                  | C <sub>L</sub> = 1.0nF, V <sub>GEN</sub> = 0, R <sub>GEN</sub> = 0, Figure 3, T <sub>A</sub> = +25°C |     | 20              |     | pC    |
| Crosstalk (Note 8)                    | V <sub>CT</sub>    | R <sub>L</sub> = 50Ω, C <sub>L</sub> = 5pF, f = 1MHz, Figure 5, T <sub>A</sub> = +25°C               |     | -60             |     | dB    |
| NC_ or NO_ Capacitance                | C <sub>(OFF)</sub> | f = 1MHz, Figure 6, T <sub>A</sub> = +25°C   |     | 85              |     | pF    |
| COM Off-Capacitance                   | C <sub>(COM)</sub> | f = 1MHz, Figure 6, T <sub>A</sub> = +25°C   |     | 85              |     | pF    |
| On-Capacitance                        | C <sub>(COM)</sub> | f = 1MHz, Figure 7, T <sub>A</sub> = +25°C   |     | 140             |     | pF    |

**Note 2:** 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 3:** Guaranteed by design.

**Note 4:**  $\Delta R_{ON} = R_{ON(MAX)} - R_{ON(MIN)}$ .

**Note 5:** Flatness is defined as the difference between the maximum and minimum value of on-resistance as measured over the specified analog signal range.

**Note 6:** Leakage parameters are 100% tested at maximum-rated hot temperature and guaranteed by correlation at +25°C.

**Note 7:** Off-isolation =  $20 \log_{10} [V_{COM} / (V_{NC} \text{ or } V_{NO})]$ , V<sub>COM</sub> = output, V<sub>NC</sub> or V<sub>NO</sub> = input to off switch.

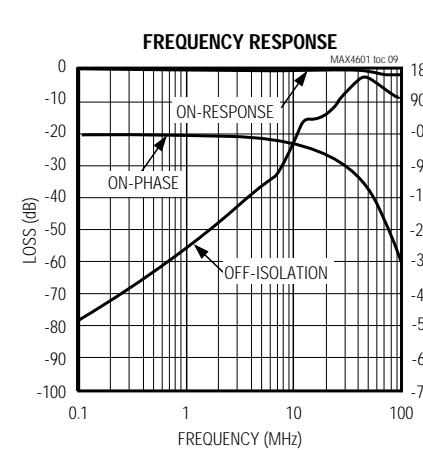
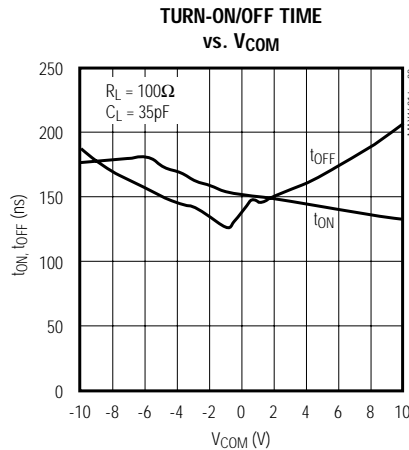
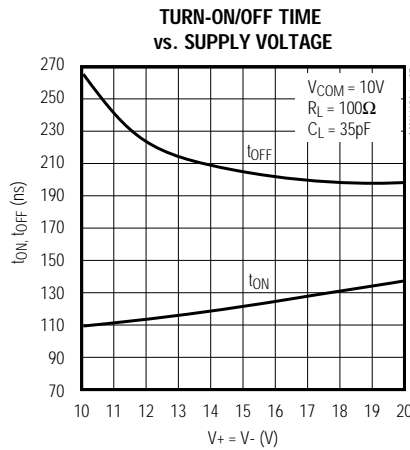
**Note 8:** Between any two switches.

**Note 9:** Leakage testing at single supply is guaranteed by testing with dual supplies.

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## Typical Operating Characteristics

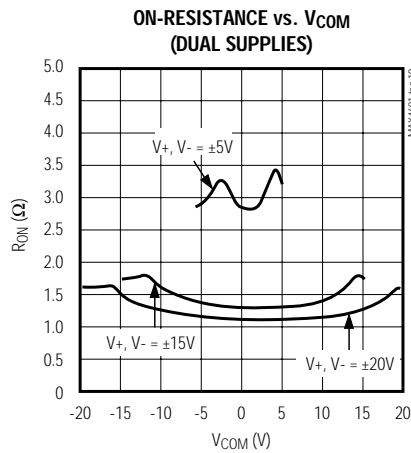
( $T_A = +25^\circ\text{C}$ , unless otherwise noted.)



# 2.5Ω, Quad, SPST, CMOS Analog Switches

## Typical Operating Characteristics (continued)

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



## Pin Description

| PIN          |              |              | NAME                   | FUNCTION  |
|--------------|--------------|--------------|------------------------|---|
| MAX4601      | MAX4602      | MAX4603      |                        |   |
| 1, 16, 9, 8  | 1, 16, 9, 8  | 1, 16, 9, 8  | IN1, IN2, IN3, IN4     | Logic-Control Digital Inputs  |
| 2, 15, 10, 7 | 2, 15, 10, 7 | 2, 15, 10, 7 | COM1, COM2, COM3, COM4 | Analog Switch Common Terminals  |
| 3, 14, 11, 6 | —            | —            | NC1, NC2, NC3, NC4     | Analog Switch Normally Closed Terminals   |
| —            | 3, 14, 11, 6 | —            | NO1, NO2, NO3, NO4     | Analog Switch Normally Open Terminals   |
| —            | —            | 3, 6         | NO1, NO4               | Analog Switch Normally Open Terminals   |
| —            | —            | 14, 11       | NC2, NC3               | Analog Switch Normally Closed Terminals   |
| 4            | 4            | 4            | $V^-$                  | Negative Analog Supply-Voltage Input. Connect to GND for single-supply operation. |
| 5            | 5            | 5            | GND                    | Ground  |
| 12           | 12           | 12           | $V_L$                  | Logic-Supply Input  |
| 13           | 13           | 13           | $V^+$                  | Positive Analog Supply Input  |

MAX4601/MAX4602/MAX4603

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## Applications Information

### 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 can cause permanent damage to the devices. Always sequence V+ on first, then V-, followed by the logic inputs, NO, or COM. If power-supply sequencing is not possible, add two small signal diodes (D1, D2) in series with the supply pins for overvoltage protection (Figure 1). Adding diodes reduces the analog signal range to one diode drop below V+ and one diode drop above V-, but does not affect the devices' low switch resistance and low leakage characteristics. Device operation is unchanged, and the difference between V+ and V- should not exceed 44V. These protection diodes are not recommended when using a single supply.

### Off-Isolation at High Frequencies

In 50Ω systems, the high-frequency on-response of these parts extends from DC to above 100MHz with a typical loss of -2dB. When the switch is turned off, however, it behaves like a capacitor, and off-isolation decreases with increasing frequency. (Above 300MHz, the switch actually passes more signal turned off than turned on.) This effect is more pronounced with higher source and load impedances.

Above 5MHz, circuit board layout becomes critical, and it becomes difficult to characterize the response of the

switch independent of the circuit. The graphs shown in the *Typical Operating Characteristics* were taken using a 50Ω source and load connected with BNC connectors to a circuit board deemed "average;" that is, designed with isolation in mind, but not using strip-line or other special RF circuit techniques. For critical applications above 5MHz, use the MAX440, MAX441, and MAX442, which are fully characterized up to 160MHz.

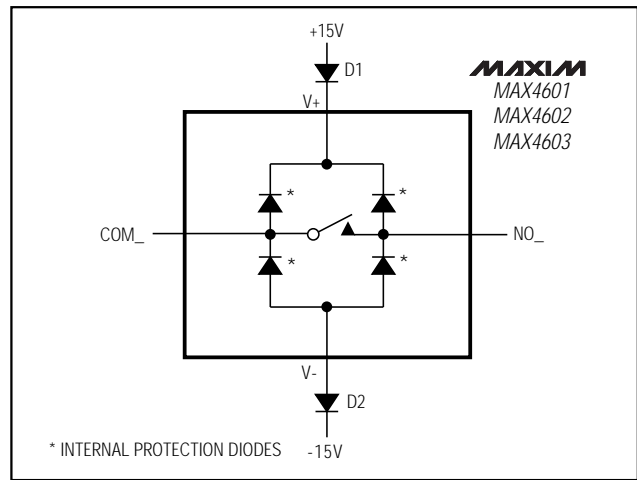


Figure 1. Overvoltage Protection Using External Blocking Diodes

## Timing Diagrams/Test Circuits



Figure 2. Switching-Time Test Circuit



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Timing Diagrams/Test Circuits (continued)

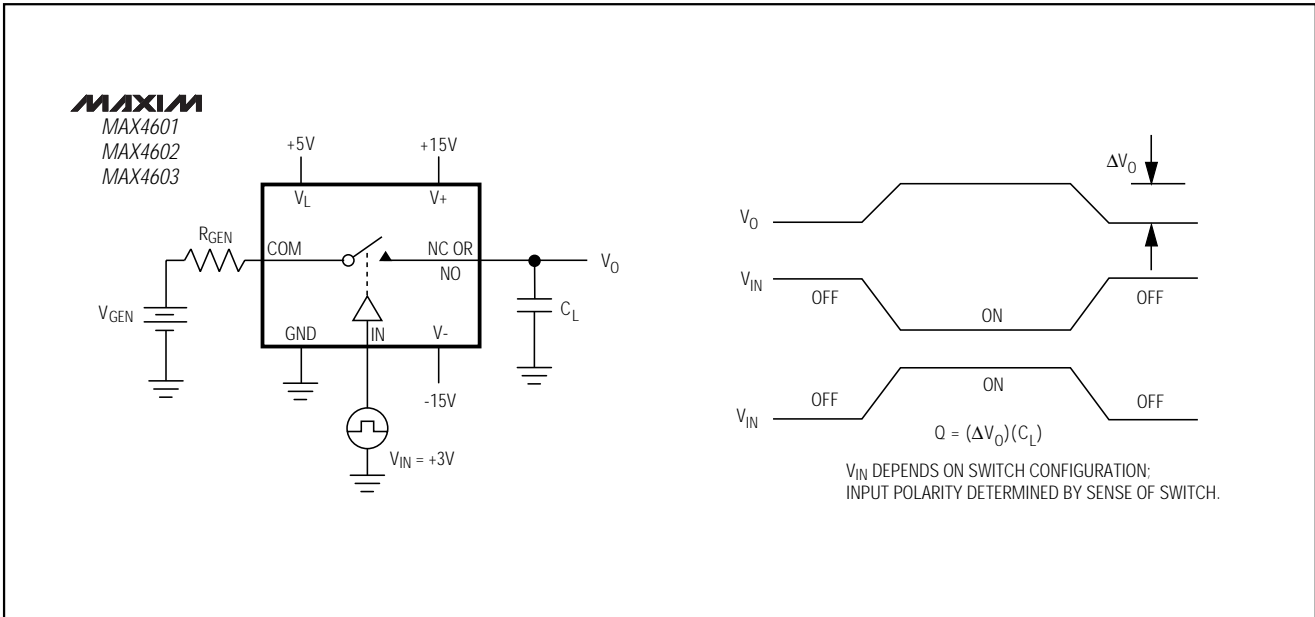


Figure 3. Charge-Injection Test Circuit

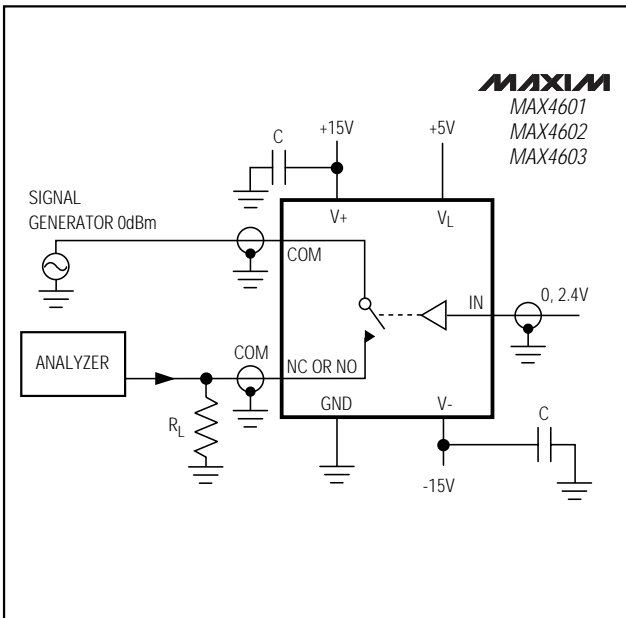


Figure 4. Off-Isolation Test Circuit

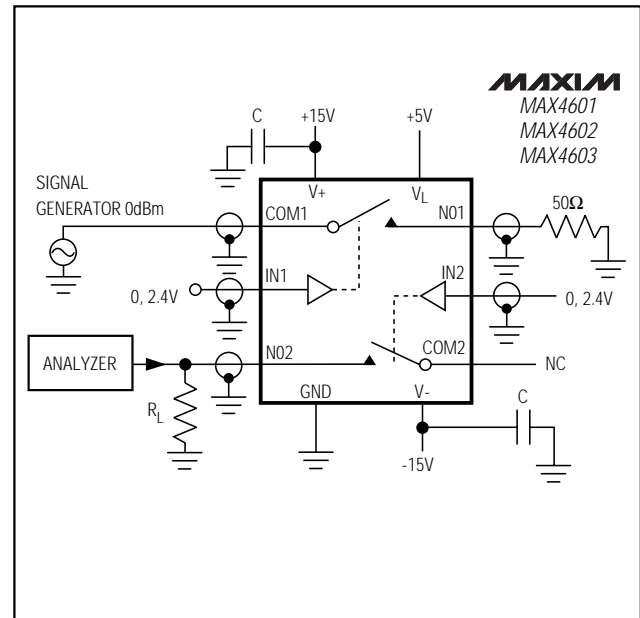


Figure 5. Crosstalk Test Circuit

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## Timing Diagrams/Test Circuits (continued)



Figure 6. Switch Off-Capacitance Test Circuit

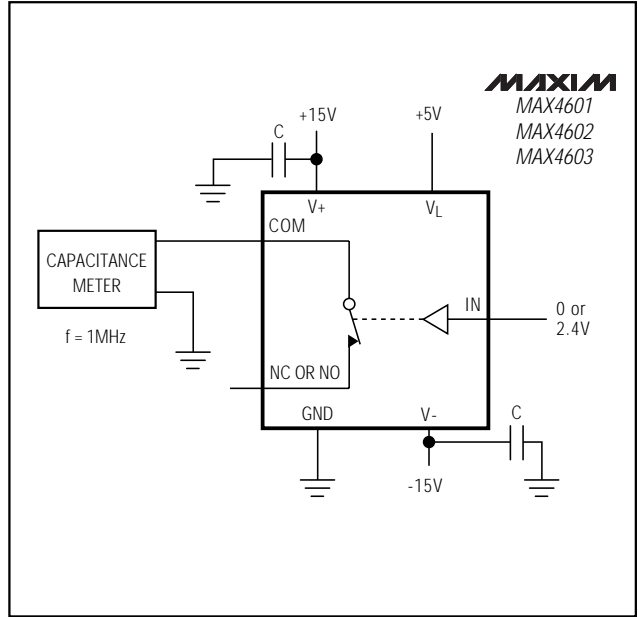


Figure 7. Switch On-Capacitance Test Circuit

## Ordering Information (continued)

| PART               | TEMP. RANGE    | PIN-PACKAGE    |
|--------------------|----------------|----------------|
| <b>MAX4602</b> CAE | 0°C to +70°C   | 16 SSOP        |
| MAX4602CWE         | 0°C to +70°C   | 16 Wide SO     |
| MAX4602CPE         | 0°C to +70°C   | 16 Plastic DIP |
| MAX4602EAE         | -40°C to +85°C | 16 SSOP        |
| MAX4602EWE         | -40°C to +85°C | 16 Wide SO     |
| MAX4602EPE         | -40°C to +85°C | 16 Plastic DIP |
| <b>MAX4603</b> CAE | 0°C to +70°C   | 16 SSOP        |
| MAX4603CWE         | 0°C to +70°C   | 16 Wide SO     |
| MAX4603CPE         | 0°C to +70°C   | 16 Plastic DIP |
| MAX4603EAE         | -40°C to +85°C | 16 SSOP        |
| MAX4603EWE         | -40°C to +85°C | 16 Wide SO     |
| MAX4603EPE         | -40°C to +85°C | 16 Plastic DIP |

## Chip Information

TRANSISTOR COUNT: 100

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## Package Information

MAX4601/MAX4602/MAX4603

| DIM | INCHES         |       | MILLIMETERS |      |
|-----|----------------|-------|-------------|------|
|     | MIN            | MAX   | MIN         | MAX  |
| A   | 0.068          | 0.078 | 1.73        | 1.99 |
| A1  | 0.002          | 0.008 | 0.05        | 0.21 |
| B   | 0.010          | 0.015 | 0.25        | 0.38 |
| C   | 0.004          | 0.008 | 0.09        | 0.20 |
| D   | SEE VARIATIONS |       |             |      |
| E   | 0.205          | 0.209 | 5.20        | 5.38 |
| e   | 0.0256         | BSC   | 0.65        | BSC  |
| H   | 0.301          | 0.311 | 7.65        | 7.90 |
| L   | 0.025          | 0.037 | 0.63        | 0.95 |
| α   | 0°             | 8°    | 0°          | 8°   |

| D | INCHES |       | MILLIMETERS |       |     |
|---|--------|-------|-------------|-------|-----|
|   | MIN    | MAX   | MIN         | MAX   |     |
| D | 0.239  | 0.249 | 6.07        | 6.33  | 14L |
| D | 0.239  | 0.249 | 6.07        | 6.33  | 16L |
| D | 0.278  | 0.289 | 7.07        | 7.33  | 20L |
| D | 0.317  | 0.328 | 8.07        | 8.33  | 24L |
| D | 0.397  | 0.407 | 10.07       | 10.33 | 28L |

NOTES:

- D&E DO NOT INCLUDE MOLD FLASH.
- MOLD FLASH OR PROTRUSIONS NOT TO EXCEED .15mm (.006")
- CONTROLLING DIMENSION: MILLIMETER

|  |                                     |                    |                    |
|--|-------------------------------------|--------------------|--------------------|
| <b>MAXIM</b>                           |                                     |                    |                    |
| <small>PROPRIETARY INFORMATION</small> |                                     |                    |                    |
| <small>TITLE:</small>                  |                                     |                    |                    |
| PACKAGE OUTLINE, SSOP, 5.3X.65mm       |                                     |                    |                    |
| <small>APPROVAL</small>                | <small>DOCUMENT CONTROL NO.</small> | <small>REV</small> | <small>1/1</small> |
|  | 21-0056                             | A                  |                    |

SSOP/EP

# 2.5Ω, Quad, SPST, CMOS Analog Switches

## Package Information

SOIC

|    | INCHES |       | MILLIMETERS |       |
|----|--------|-------|-------------|-------|
|    | MIN    | MAX   | MIN         | MAX   |
| A  | 0.093  | 0.104 | 2.35        | 2.65  |
| A1 | 0.004  | 0.012 | 0.10        | 0.30  |
| B  | 0.014  | 0.019 | 0.35        | 0.49  |
| C  | 0.009  | 0.013 | 0.23        | 0.32  |
| e  | 0.050  |       | 1.27        |       |
| E  | 0.291  | 0.299 | 7.40        | 7.60  |
| H  | 0.394  | 0.419 | 10.00       | 10.65 |
| h  | 0.010  | 0.030 | 0.25        | 0.75  |
| L  | 0.016  | 0.050 | 0.40        | 1.27  |

|   | INCHES |       | MILLIMETERS |       | N  | MS013 |
|---|--------|-------|-------------|-------|----|-------|
|   | MIN    | MAX   | MIN         | MAX   |    |       |
| D | 0.398  | 0.413 | 10.10       | 10.50 | 16 | AA    |
| D | 0.447  | 0.463 | 11.35       | 11.75 | 18 | AB    |
| D | 0.496  | 0.512 | 12.60       | 13.00 | 20 | AC    |
| D | 0.598  | 0.614 | 15.20       | 15.60 | 24 | AD    |
| D | 0.697  | 0.713 | 17.70       | 18.10 | 28 | AE    |

NOTES:  
 1. D&E DO NOT INCLUDE MOLD FLASH  
 2. MOLD FLASH OR PROTRUSIONS NOT TO EXCEED .15mm (.006")  
 3. LEADS TO BE COPLANAR WITHIN .102mm (.004")  
 4. CONTROLLING DIMENSION: MILLIMETER  
 5. MEETS JEDEC MS013-XX AS SHOWN IN ABOVE TABLE  
 6. N = NUMBER OF PINS

**MAXIM**  
 120 SAN GABRIEL DR. SUNNYVALE, CA 94086 408-737-7200  
 PROPRIETARY INFORMATION

PACKAGE FAMILY OUTLINE: SOIC .300"  $\frac{1}{1}$  21-0042 A  
TITLE DOCUMENT CONTROL NUMBER REV

Maxim cannot assume responsibility for use of any circuitry other than circuitry entirely embodied in a Maxim product. No circuit patent licenses are implied. Maxim reserves the right to change the circuitry and specifications without notice at any time.

12 \_\_\_\_\_ Maxim Integrated Products, 120 San Gabriel Drive, Sunnyvale, CA 94086 408-737-7600

Компания «Океан Электроники» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Поставка оригинальных импортных электронных компонентов напрямую с производств Америки, Европы и Азии, а так же с крупнейших складов мира;
- Широкая линейка поставок активных и пассивных импортных электронных компонентов (более 30 млн. наименований);
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Помощь Конструкторского Отдела и консультации квалифицированных инженеров;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Поставка электронных компонентов под контролем ВП;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- При необходимости вся продукция военного и аэрокосмического назначения проходит испытания и сертификацию в лаборатории (по согласованию с заказчиком);
- Поставка специализированных компонентов военного и аэрокосмического уровня качества (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Actel, Aeroflex, Peregrine, VPT, Syfer, Eurofarad, Texas Instruments, MS Kennedy, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Компания «Океан Электроники» является официальным дистрибьютором и эксклюзивным представителем в России одного из крупнейших производителей разъемов военного и аэрокосмического назначения «JONHON», а так же официальным дистрибьютором и эксклюзивным представителем в России производителя высокотехнологичных и надежных решений для передачи СВЧ сигналов «FORSTAR».



## JONHON

«JONHON» (основан в 1970 г.)

Разъемы специального, военного и аэрокосмического назначения:

(Применяются в военной, авиационной, аэрокосмической, морской, железнодорожной, горно- и нефтедобывающей отраслях промышленности)

«FORSTAR» (основан в 1998 г.)

ВЧ соединители, коаксиальные кабели, кабельные сборки и микроволновые компоненты:

(Применяются в телекоммуникациях гражданского и специального назначения, в средствах связи, РЛС, а так же военной, авиационной и аэрокосмической отраслях промышленности).



Телефон: 8 (812) 309-75-97 (многоканальный)

Факс: 8 (812) 320-03-32

Электронная почта: [ocean@oceanchips.ru](mailto:ocean@oceanchips.ru)

Web: <http://oceanchips.ru/>

Адрес: 198099, г. Санкт-Петербург, ул. Калинина, д. 2, корп. 4, лит. А