



# Triple DPDT, Low-Capacitance Data Switches

## General Description

The MAX4996/MAX4996L triple DPDT analog switches operate from a single +2.5V to +5.5V supply, and feature 2.0Ω (typ) on-resistance, low 6pF (typ) on-capacitance, and low power-supply current consumption. The MAX4996/MAX4996L combine the low capacitance and low resistance necessary for high-frequency switching applications in portable electronics.

The MAX4996/MAX4996L have three logic inputs to control the switches in pairs. The MAX4996 has an active-high enable input (EN) to disable the switches, while the MAX4996L has an active-low enable input ( $\overline{\text{EN}}$ ) to disable the switches. The enable input decreases the supply current and also places the COM\_ outputs in a high-impedance state.

The MAX4996/MAX4996L feature a 5μA (max) supply-current consumption when the logic inputs are not rail-to-rail. This feature is especially valuable in applications where direct interface to low-voltage processors is necessary.

The MAX4996/MAX4996L are available in a space-saving 24-pin (3.5mm x 3.5mm) TQFN package and operate over the -40°C to +85°C temperature range.

## Applications

SD Card Switching  
USB Signal Switching  
UART Signal Switching  
Cell Phones  
PDAs  
GPS  
Portable Media Players (PMP)

## Ordering Information

| PART         | PIN-PACKAGE | PACKAGE CODE |
|--------------|-------------|--------------|
| MAX4996ETG+  | 24 TQFN-EP* | T243A3-1     |
| MAX4996LETG+ | 24 TQFN-EP* | T243A3-1     |

**Note:** All devices operate over the -40°C to +85°C extended temperature range.

+Denotes a lead-free package.

\*EP = Exposed paddle.

Typical Operating Circuit appears at end of data sheet.

## Features

- ◆ Multiplex SD2.0/SDIO Interfaces
- ◆ Low Power Consumption (2μA max)
- ◆ +2.5V to +5.5V Supply Voltage Range
- ◆ Rail-to-Rail Signal Handling
- ◆ Low-Capacitance Switches, 6pF (typ)
- ◆ Low On-Resistance, 2Ω (typ)
- ◆ Excellent On-Resistance Flatness Over the Range of 0V to V<sub>CC</sub>
- ◆ Wide -3dB Bandwidth, 670MHz
- ◆ Small 24-Pin TQFN (3.5mm x 3.5mm)

## Pin Configuration/Truth Tables

TOP VIEW

**TQFN**  
3.5mm x 3.5mm

( $\overline{\text{EN}}$ ) FOR MAX4996L ONLY.  
\*CONNECT EXPOSED PADDLE TO GROUND.

**TRUTH TABLES**

**MAX4996/MAX4996L**

| CB12 | NO1/NO2 | NC1/NC2 |
|------|---------|---------|
| LOW  | OFF     | ON      |
| HIGH | ON      | OFF     |

| CB34 | NO3/NO4 | NC3/NC4 |
|------|---------|---------|
| LOW  | OFF     | ON      |
| HIGH | ON      | OFF     |

| CB56 | NO5/NO6 | NC5/NC6 |
|------|---------|---------|
| LOW  | OFF     | ON      |
| HIGH | ON      | OFF     |

**MAX4996**

| EN   | CB_  | NO_ | NC_ |
|------|------|-----|-----|
| HIGH | LOW  | OFF | ON  |
| HIGH | HIGH | ON  | OFF |
| LOW  | X    | OFF | OFF |

**MAX4996L**

| $\overline{\text{EN}}$ | CB_  | NO_ | NC_ |
|------------------------|------|-----|-----|
| LOW                    | LOW  | OFF | ON  |
| LOW                    | HIGH | ON  | OFF |
| HIGH                   | X    | OFF | OFF |

MAX4996/MAX4996L

# Triple DPDT, Low-Capacitance Data Switches

## ABSOLUTE MAXIMUM RATINGS

|                                                                   |                                      |
|-------------------------------------------------------------------|--------------------------------------|
| V <sub>CC</sub> to GND                                            | .....-0.3V to +6.0V                  |
| EN, $\overline{\text{EN}}$ , CB                                   | .....-0.3V to +6.0V                  |
| All Other Pins to GND                                             | .....-0.3V to V <sub>CC</sub> + 0.3V |
| Continuous Current                                                |                                      |
| NO <sub>-</sub> , NC <sub>-</sub> , COM <sub>-</sub>              | .....±150mA                          |
| Peak Current NO <sub>-</sub> , NC <sub>-</sub> , COM <sub>-</sub> |                                      |
| (pulsed at 1ms, 50% Duty Cycle)                                   | .....±300mA                          |
| (pulsed at 1ms, 10% Duty Cycle)                                   | .....±450mA                          |
| ESD per Human Body Model                                          | .....±2kV                            |

|                                                       |                      |
|-------------------------------------------------------|----------------------|
| Continuous Power Dissipation (T <sub>A</sub> = +70°C) |                      |
| 24-Pin TQFN (derate 20.8mW/°C                         |                      |
| above +70°C)                                          | .....1228mW          |
| Thermal Resistance (Note 1)                           |                      |
| θ <sub>JA</sub>                                       | .....65.1°C/W        |
| θ <sub>JC</sub>                                       | .....5.4°C/W         |
| Operating Temperature Range                           | .....-40°C to +85°C  |
| Junction Temperature                                  | .....+150°C          |
| Storage Temperature Range                             | .....-65°C to +150°C |
| Lead Temperature (soldering)                          | .....+300°C          |

**Note 1:** Package thermal resistances were obtained using the method described in JEDEC specification JESD51-7, using a four-layer board. For detailed information on package thermal considerations see [www.maxim-ic.com/thermal-tutorial](http://www.maxim-ic.com/thermal-tutorial).

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

(V<sub>CC</sub> = +2.5V to +5.5V, T<sub>A</sub> = -40°C to +85°C, unless otherwise noted. Typical values are at V<sub>CC</sub> = 2.8V, T<sub>A</sub> = +25°C.) (Notes 2, 3)

| PARAMETER                            | SYMBOL                                                  | CONDITIONS                                                                                                                            | MIN  | TYP  | MAX             | UNITS |
|--------------------------------------|---------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|------|------|-----------------|-------|
| <b>ANALOG SWITCH</b>                 |                                                         |                                                                                                                                       |      |      |                 |       |
| Analog Signal Range                  | V <sub>COM</sub> ,<br>V <sub>NO</sub> , V <sub>NC</sub> |                                                                                                                                       | 0    |      | V <sub>CC</sub> | V     |
| On-Resistance                        | R <sub>ON</sub>                                         | V <sub>COM</sub> = 0 to V <sub>CC</sub> , I <sub>COM</sub> = 25mA                                                                     |      | 2    | 4               | Ω     |
| On-Resistance Match Between Channels | ΔR <sub>ON</sub>                                        | V <sub>CC</sub> = 2.8V, I <sub>COM</sub> = 25mA;<br>V <sub>NO</sub> = 1.5V or V <sub>NC</sub> = 1.5V (Note 4)                         |      | 0.1  | 0.2             | Ω     |
| On-Resistance Flatness               | R <sub>FLAT</sub>                                       | V <sub>CC</sub> = 2.5V, I <sub>COM</sub> = 25mA;<br>V <sub>COM</sub> = 0 to V <sub>CC</sub> (Note 5)                                  |      | 0.2  | 0.5             | Ω     |
| Off-Leakage Current                  | I <sub>COM</sub><br>(OFF)                               | V <sub>CC</sub> = 4V, V <sub>COM</sub> = 0, 4V;<br>V <sub>NO</sub> , V <sub>NC</sub> = 4V, 0                                          | -250 |      | +250            | nA    |
|                                      |                                                         | V <sub>CC</sub> = 5.5V, V <sub>COM</sub> = 5.5V;<br>V <sub>NO</sub> , V <sub>NC</sub> with 50μA sink current to GND                   |      |      | 180             | μA    |
| On-Leakage Current                   | I <sub>COM</sub> (ON)                                   | V <sub>CC</sub> = 5.5V, V <sub>COM</sub> = 0, 5.5V;<br>V <sub>NO</sub> , V <sub>NC</sub> unconnected                                  | -250 |      | +250            | nA    |
| -3dB Bandwidth                       | BW                                                      | R <sub>L</sub> = R <sub>S</sub> = 50Ω, C <sub>L</sub> = 5pF, Figure 4                                                                 |      | 670  |                 | MHz   |
| Off-Isolation                        | V <sub>ISO</sub>                                        | f = 1MHz, V <sub>NO</sub> , V <sub>NC</sub> = 0;<br>C <sub>L</sub> = 5pF, R <sub>L</sub> = R <sub>S</sub> = 50Ω,<br>Figure 4 (Note 6) |      | -60  |                 | dB    |
| Crosstalk                            | V <sub>CT</sub>                                         | f = 1MHz, V <sub>NO</sub> , V <sub>NC</sub> = 0;<br>R <sub>L</sub> = R <sub>S</sub> = 50Ω, Figure 4 (Note 7)                          |      | -120 |                 | dB    |
| <b>LOGIC INPUTS</b>                  |                                                         |                                                                                                                                       |      |      |                 |       |
| Input Logic High                     | V <sub>IH</sub>                                         |                                                                                                                                       | 1.4  |      |                 | V     |
| Input Logic Low                      | V <sub>IL</sub>                                         |                                                                                                                                       |      |      | 0.5             | V     |
| Input Leakage Current                | I <sub>LEAK</sub>                                       | 0 ≤ V ≤ V <sub>IL</sub> and V <sub>IH</sub> ≤ V ≤ V <sub>CC</sub> ;<br>V <sub>CC</sub> = 5.5V                                         | -250 |      | +250            | nA    |

# Triple DPDT, Low-Capacitance Data Switches

## ELECTRICAL CHARACTERISTICS (continued)

( $V_{CC} = +2.5V$  to  $+5.5V$ ,  $T_A = -40^{\circ}C$  to  $+85^{\circ}C$ , unless otherwise noted. Typical values are at  $V_{CC} = 2.8V$ ,  $T_A = +25^{\circ}C$ .) (Notes 2, 3)

| PARAMETER                                                   | SYMBOL                               | CONDITIONS                                                                                                                                | MIN             | TYP     | MAX | UNITS   |
|-------------------------------------------------------------|--------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|-----------------|---------|-----|---------|
| <b>SWITCH DYNAMICS</b>                                      |                                      |                                                                                                                                           |                 |         |     |         |
| Turn-On Time                                                | $t_{ON}$                             | $V_{CC} = 2.7V$ , $V_{NO\_}$ or $V_{NC\_} = 1.5V$ ;<br>$R_L = 50\Omega$ , $C_L = 35pF$ , Figure 1                                         |                 |         | 100 | $\mu s$ |
| Turn-Off Time                                               | $t_{OFF}$                            | $V_{CC} = 2.7V$ , $V_{NO\_}$ or $V_{NC\_} = 1.5V$ ;<br>$R_L = 50\Omega$ , $C_L = 35pF$ , Figure 1                                         |                 |         | 6   | $\mu s$ |
| Break-Before-Make Interval                                  | $t_{BBM}$                            | $V_{CC} = 2.7V$ ; $V_{NO\_}$ or $V_{NC\_} = 1.5V$ ;<br>$R_L = 50\Omega$ , $C_L = 35pF$ , Figure 2                                         |                 | 10      |     | $\mu s$ |
| Output Skew Between Switches                                | $t_{SKEW}$                           | $R_L = R_S = 50\Omega$ , Figure 3                                                                                                         |                 | 40      |     | Ps      |
| NO or NC Off-Capacitance                                    | $C_{NO\_ (OFF)}$<br>$C_{NC\_ (OFF)}$ | $f = 10MHz$ , $V_{BIAS} = 0V$ ,<br>signal = 500mV <sub>P-P</sub> , Figure 5                                                               |                 | 2.5     |     | pF      |
| COM Off-Capacitance                                         | $C_{COM\_ (OFF)}$                    | $f = 10MHz$ , $V_{BIAS} = 0V$ ,<br>signal = 500mV <sub>P-P</sub> , Figure 5                                                               |                 | 4       |     | pF      |
| COM On-Capacitance                                          | $C_{COM\_ (ON)}$                     | $f = 10MHz$ , $V_{BIAS} = 0V$ ,<br>signal = 500mV <sub>P-P</sub> , Figure 5                                                               |                 | 6       |     | pF      |
| Operating Power-Supply Range                                | $V_{CC}$                             |                                                                                                                                           | 2.5             |         | 5.5 | V       |
| Shutdown Supply Current                                     |                                      | $V_{EN} = 0$ (MAX4996), $\overline{V_{EN}} = V_{CC}$<br>(MAX4996L)                                                                        |                 | 0.1     | 0.5 | $\mu A$ |
| $V_{CC}$ Supply Current                                     | $I_{CC}$                             | $V_{CB\_} = 0$ or $V_{CC}$ ;<br>$V_{EN} = V_{CC}$ (MAX4996);<br>$\overline{V_{EN}} = 0$ (MAX4996L)                                        | $V_{CC} = 2.8V$ | 1       | 2   | $\mu A$ |
|                                                             |                                      |                                                                                                                                           | $V_{CC} = 5.5V$ | 5       | 10  |         |
| Increase in Supply Current with $V_{CB\_} / V_{EN}$ Voltage |                                      | $0 \leq V_{CB\_} \leq V_{IL}$ or $V_{IH} \leq V_{CB\_} \leq V_{CC}$<br>or $0 \leq V_{EN} \leq V_{IL}$ or $V_{IH} \leq V_{EN} \leq V_{CC}$ |                 |         | 5   | $\mu A$ |
| ESD Protection                                              |                                      | Human Body Model                                                                                                                          |                 | $\pm 2$ |     | kV      |

**Note 2:** The algebraic convention is used. The most negative value is shown in the minimum column.

**Note 3:** Parts are 100% tested at  $T_A = +25^{\circ}C$ . Limits across the full temperature range are guaranteed by correlation and 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 ranges.

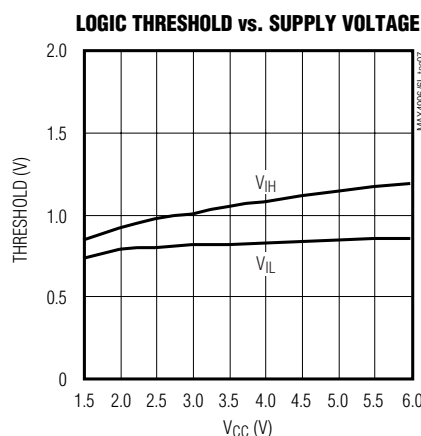
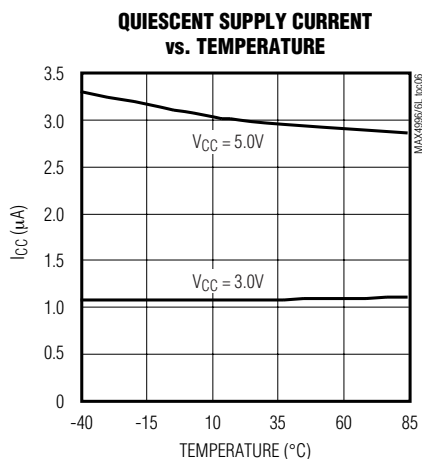
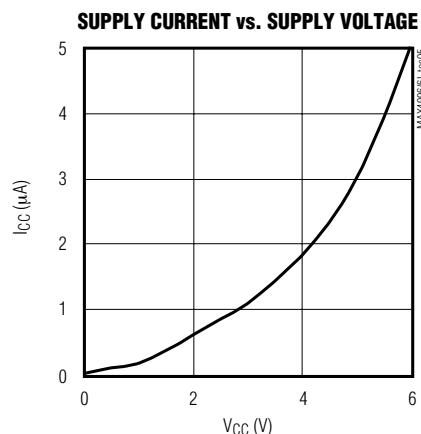
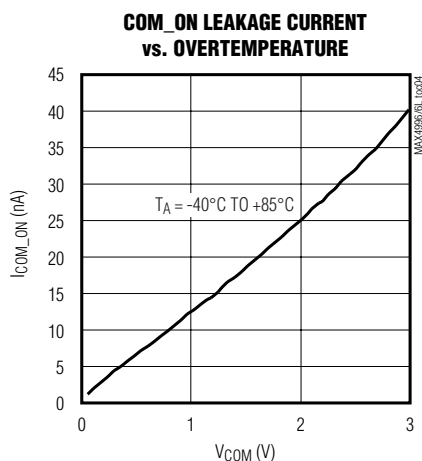
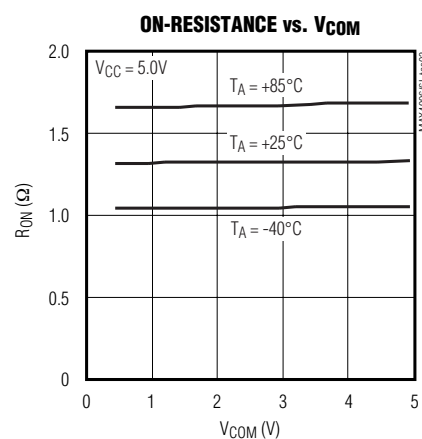
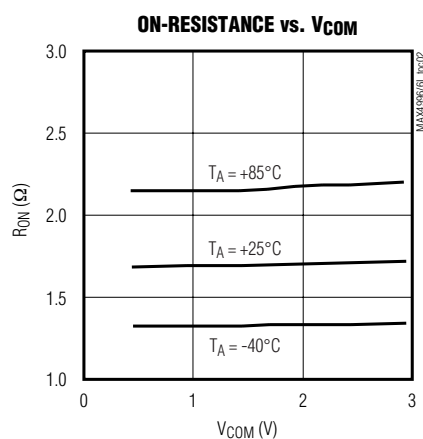
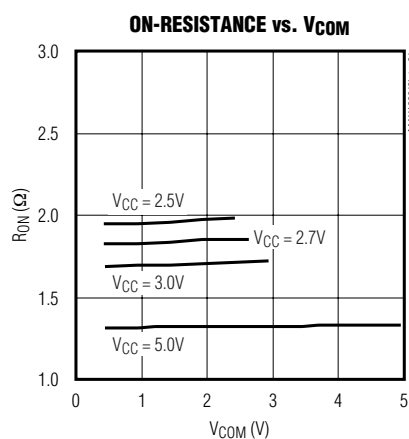
**Note 6:** Off-isolation =  $20\log_{10} [V_{COM\_} / (V_{NO\_} \text{ or } V_{NC\_})]$ ,  $V_{COM\_}$  = output,  $V_{NO\_}$  or  $V_{NC\_}$  = input to off switch.

**Note 7:** Between any two switches.

# Triple DPDT, Low-Capacitance Data Switches

## Typical Operating Characteristics

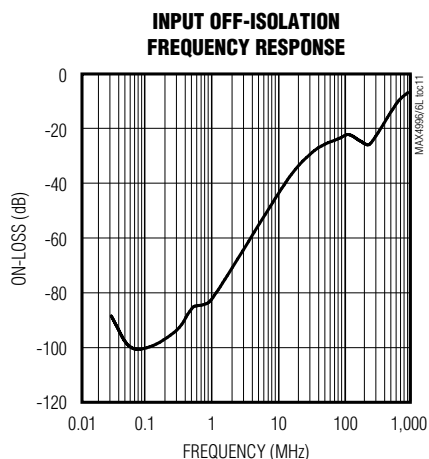
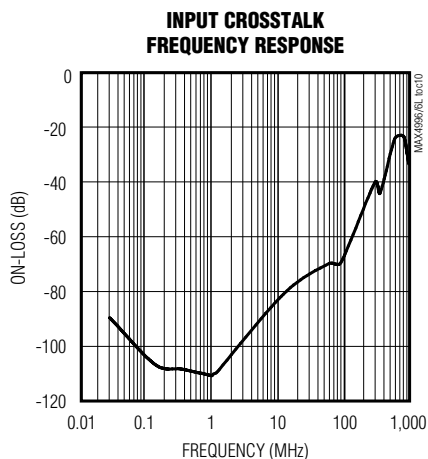
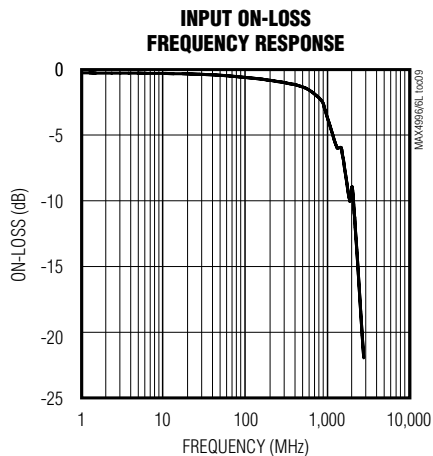
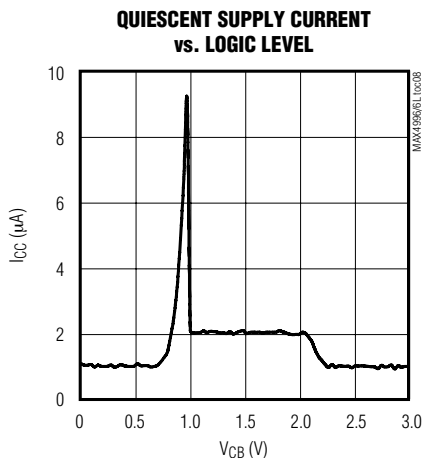
( $V_{CC} = 3V$ ,  $T_A = +25^\circ C$ , unless otherwise noted.)



# Triple DPDT, Low-Capacitance Data Switches

## Typical Operating Characteristics (continued)

( $V_{CC} = 3V$ ,  $T_A = +25^\circ C$ , unless otherwise noted.)



MAX4996/MAX4996L

# Triple DPDT, Low-Capacitance Data Switches

## Pin Description

| PIN | NAME                       | FUNCTION                                                                                                                                                                                                                                                                                                                                                         |
|-----|----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1   | CB12                       | Digital Control Input for Analog Switches 1 and 2. Drive CB12 low to connect COM1 to NC1 and COM2 to NC2. Drive CB12 high to connect COM1 to NO1 and COM2 to NO2.                                                                                                                                                                                                |
| 2   | CB34                       | Digital Control Input for Analog Switches 3 and 4. Drive CB34 low to connect COM3 to NC3 and COM4 to NC4. Drive CB34 high to connect COM3 to NO3 and COM4 to NO4.                                                                                                                                                                                                |
| 3   | CB56                       | Digital Control Input for Analog Switches 5 and 6. Drive CB56 low to connect COM5 to NC5 and COM6 to NC6. Drive CB56 high to connect COM5 to NO5 and COM6 to NO6.                                                                                                                                                                                                |
| 4   | COM4                       | Analog Switch 4—Common Terminal                                                                                                                                                                                                                                                                                                                                  |
| 5   | COM5                       | Analog Switch 5—Common Terminal                                                                                                                                                                                                                                                                                                                                  |
| 6   | COM6                       | Analog Switch 6—Common Terminal                                                                                                                                                                                                                                                                                                                                  |
| 7   | NC6                        | Analog Switch 6—Normally Closed Terminal                                                                                                                                                                                                                                                                                                                         |
| 8   | NC5                        | Analog Switch 5—Normally Closed Terminal                                                                                                                                                                                                                                                                                                                         |
| 9   | NC4                        | Analog Switch 4—Normally Closed Terminal                                                                                                                                                                                                                                                                                                                         |
| 10  | NC3                        | Analog Switch 3—Normally Closed Terminal                                                                                                                                                                                                                                                                                                                         |
| 11  | NC2                        | Analog Switch 2—Normally Closed Terminal                                                                                                                                                                                                                                                                                                                         |
| 12  | NC1                        | Analog Switch 1—Normally Closed Terminal                                                                                                                                                                                                                                                                                                                         |
| 13  | GND                        | Ground                                                                                                                                                                                                                                                                                                                                                           |
| 14  | V <sub>CC</sub>            | Positive Supply Voltage. Bypass V <sub>CC</sub> to GND with a 0.1μF ceramic capacitor as close as possible to the device.                                                                                                                                                                                                                                        |
| 15  | EN, $\overline{\text{EN}}$ | Enable Logic Input. For the MAX4996, drive EN high to enable all the switches. Drive EN low to disable all switches. For the MAX4996L, drive $\overline{\text{EN}}$ low to enable all the switches. Drive $\overline{\text{EN}}$ high to disable all switches. COM_ is high impedance when the switch is disabled. (See <i>Pin Configuration/Truth Tables</i> .) |
| 16  | COM3                       | Analog Switch 3—Common Terminal                                                                                                                                                                                                                                                                                                                                  |
| 17  | COM2                       | Analog Switch 2—Common Terminal                                                                                                                                                                                                                                                                                                                                  |
| 18  | COM1                       | Analog Switch 1—Common Terminal                                                                                                                                                                                                                                                                                                                                  |
| 19  | NO1                        | Analog Switch 1—Normally Open Terminal                                                                                                                                                                                                                                                                                                                           |
| 20  | NO2                        | Analog Switch 2—Normally Open Terminal                                                                                                                                                                                                                                                                                                                           |
| 21  | NO3                        | Analog Switch 3—Normally Open Terminal                                                                                                                                                                                                                                                                                                                           |
| 22  | NO4                        | Analog Switch 4—Normally Open Terminal                                                                                                                                                                                                                                                                                                                           |
| 23  | NO5                        | Analog Switch 5—Normally Open Terminal                                                                                                                                                                                                                                                                                                                           |
| 24  | NO6                        | Analog Switch 6—Normally Open Terminal                                                                                                                                                                                                                                                                                                                           |
| —   | EP                         | Exposed Paddle. Internally connected to GND. Connect to a large ground plane to maximize thermal performance; not intended as an electrical connection point.                                                                                                                                                                                                    |

# Triple DPDT, Low-Capacitance Data Switches

## Timing Circuits/Timing Diagrams

MAX4996/MAX4996L

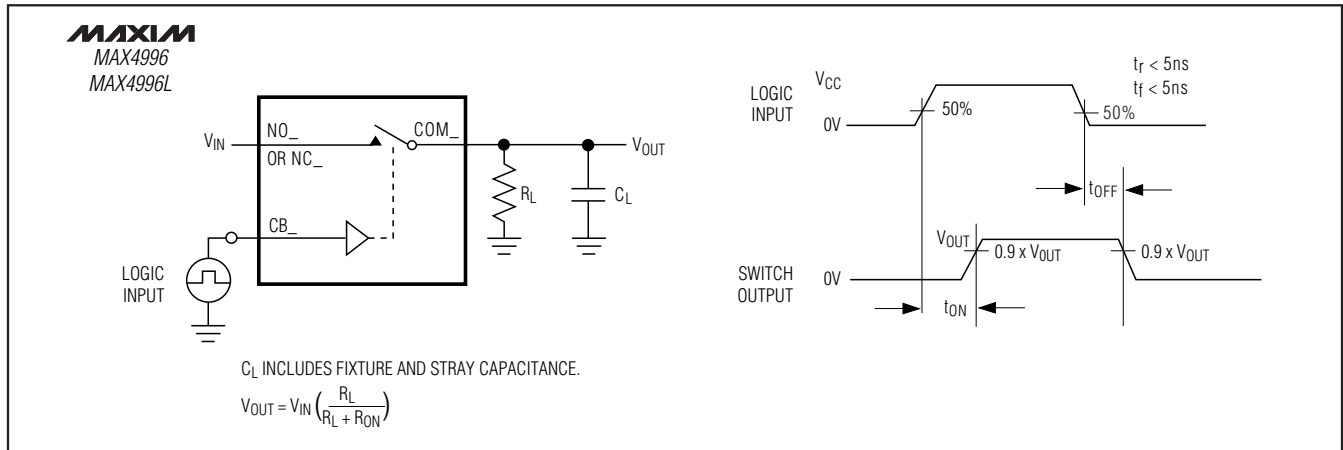


Figure 1. Switching Time

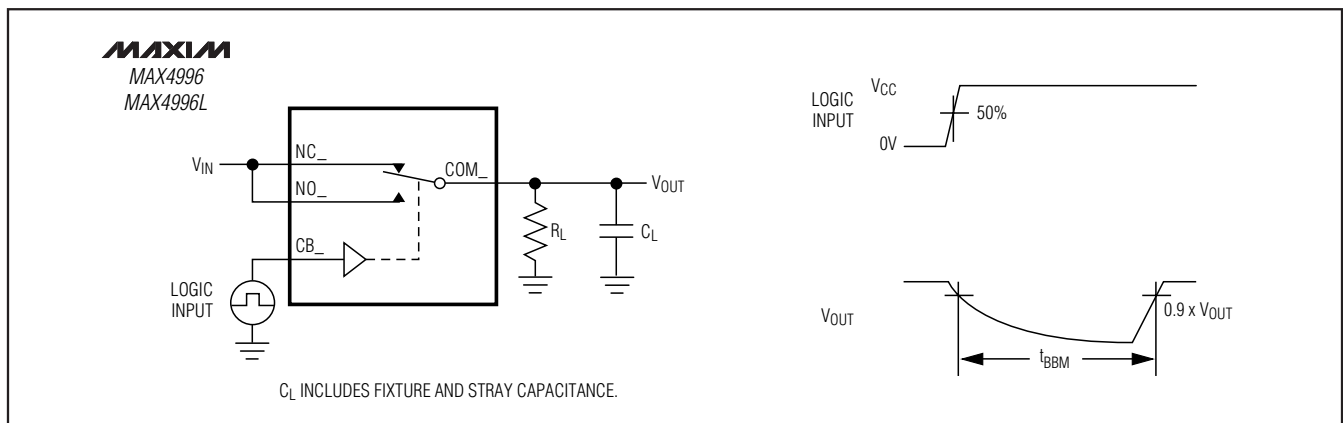


Figure 2. Break-Before-Make Interval

# Triple DPDT, Low-Capacitance Data Switches

## Timing Circuits/Timing Diagrams (continued)

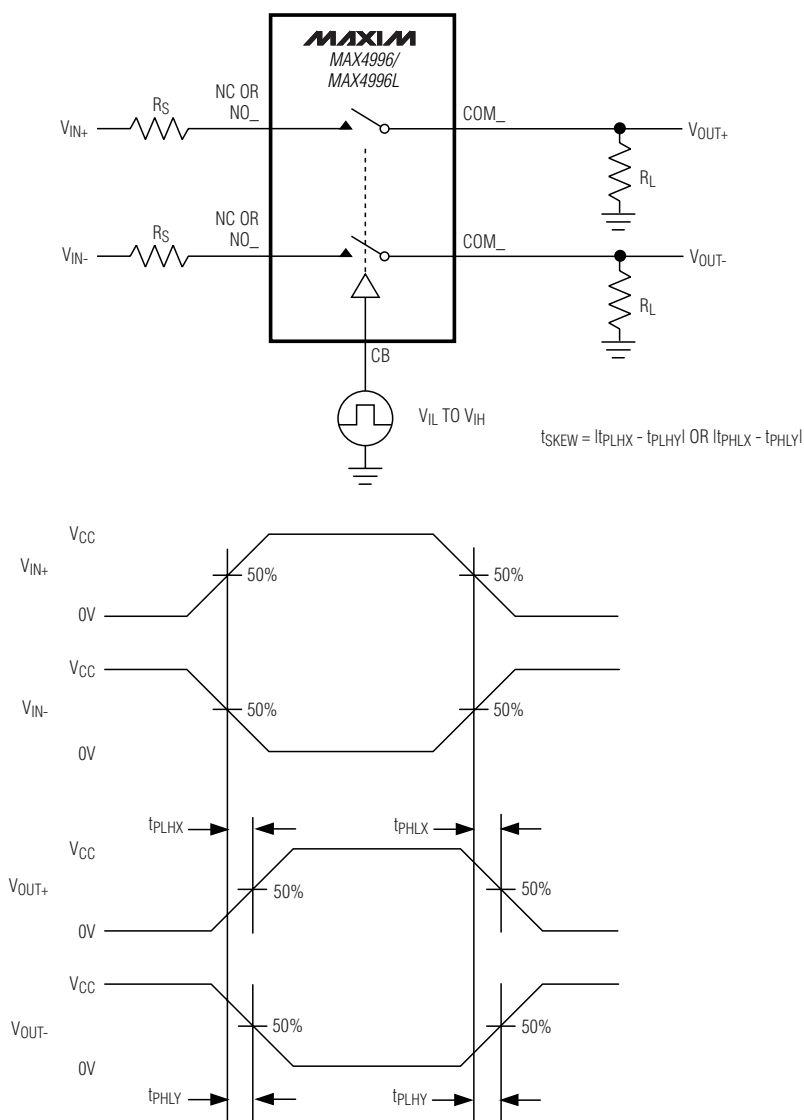


Figure 3. Input/Output Skew Timing Diagram



# Triple DPDT, Low-Capacitance Data Switches

## Timing Circuits/Timing Diagrams (continued)

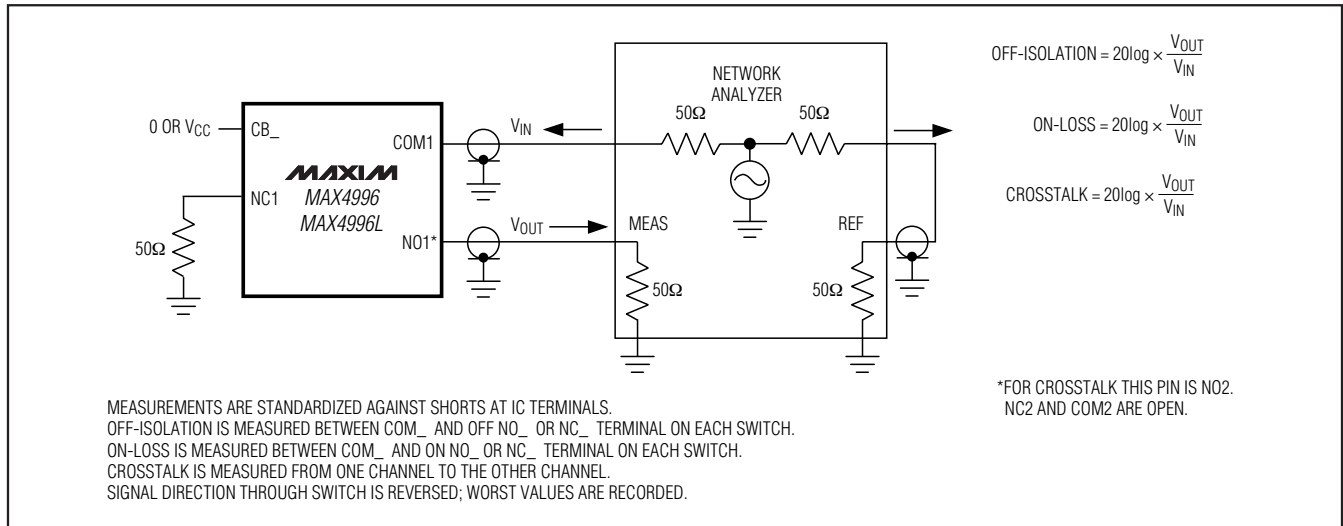


Figure 4. On-Loss, Off-Isolation, and Crosstalk

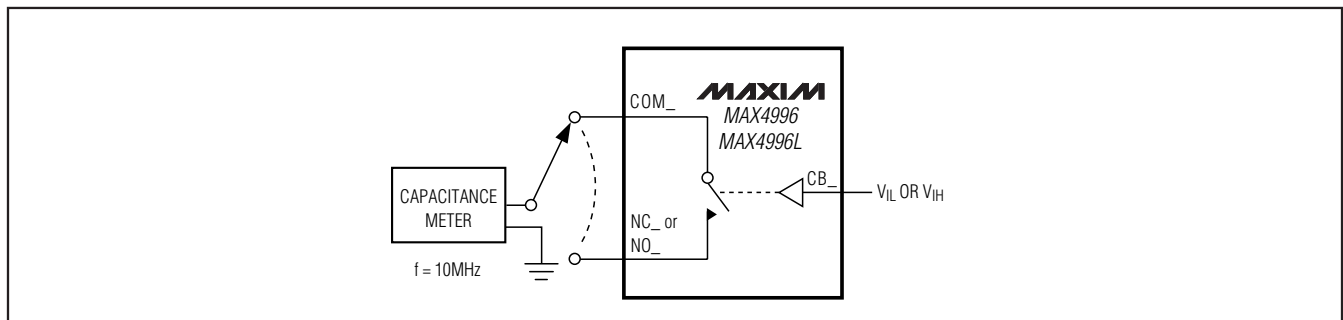


Figure 5. Channel On-/Off-Capacitance

# Triple DPDT, Low-Capacitance Data Switches

## Detailed Description

The MAX4996/MAX4996L triple DPDT analog switches operate from a single +2.5V to +5.5V supply and feature  $2.0\Omega$  (typ) on-resistance, low 6pF (typ) on-capacitance, and low power-supply current consumption. The combination of low resistance and low capacitance make this switch ideal for high-frequency applications.

The MAX4996 has an active-high enable input (EN) to disable the switches, while the MAX4996L has an active-low enable input ( $\overline{\text{EN}}$ ) to disable the switches. The enable input decreases the supply current and also places the COM\_ outputs in a high-impedance state.

## Digital Control Inputs

Each pair of switches feature a digital-control logic input: CB\_. CB\_ controls the position of the switches as shown in the *Pin Configuration/Truth Tables*. The MAX4996/MAX4996L also feature an enable input to turn all switches on or off. Drive EN low on the MAX4996, or  $\overline{\text{EN}}$  high on the MAX4996L, to disable the switches. While disabled, the switches are high-impedance and the supply current drops to 0.1 $\mu$ A (typ). To enable all switches, drive EN high on the MAX4996 or  $\overline{\text{EN}}$  low on the MAX4996L.

Driving all digital inputs (CB\_, EN,  $\overline{\text{EN}}$ ) rail-to-rail minimizes supply current.

## Analog Signal Levels

The on-resistance of the MAX4996/MAX4996L are very low and stable as the analog input signals are swept from ground to V<sub>CC</sub> (see the *Typical Operating Characteristics*). These switches are bidirectional, allowing NO\_, NC\_, and COM\_ to be configured as either inputs or outputs.

## Applications Information

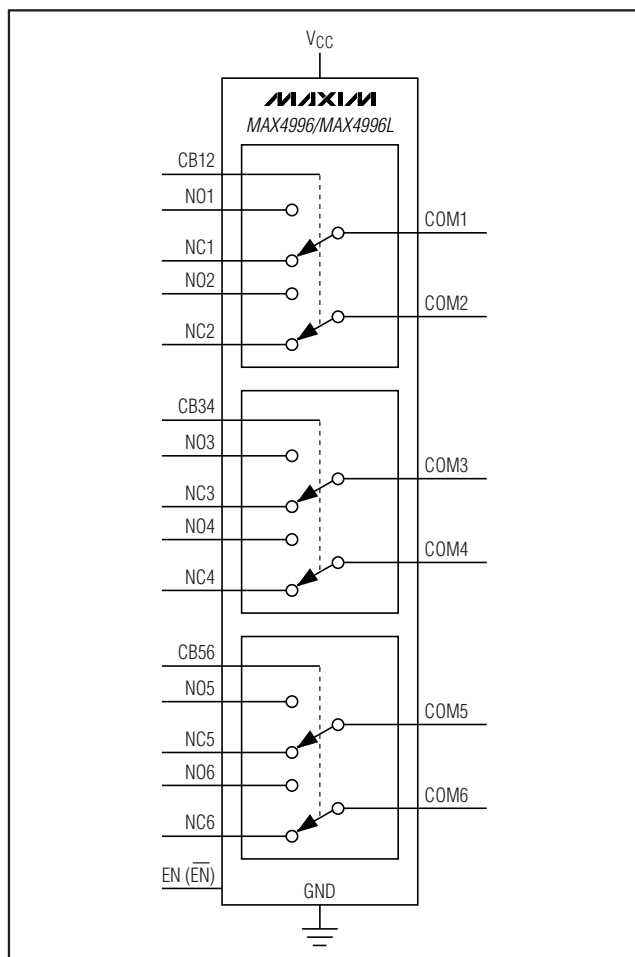
### Power-Supply Bypassing

Power-supply bypassing improves noise margin and prevents switching noise from propagating from the V<sub>CC</sub> supply to other components. A 0.1 $\mu$ F ceramic capacitor connected from V<sub>CC</sub> to GND is adequate for most applications.

### Power-Supply Sequencing

Always apply V<sub>CC</sub> before the analog signals.

## Functional Diagram



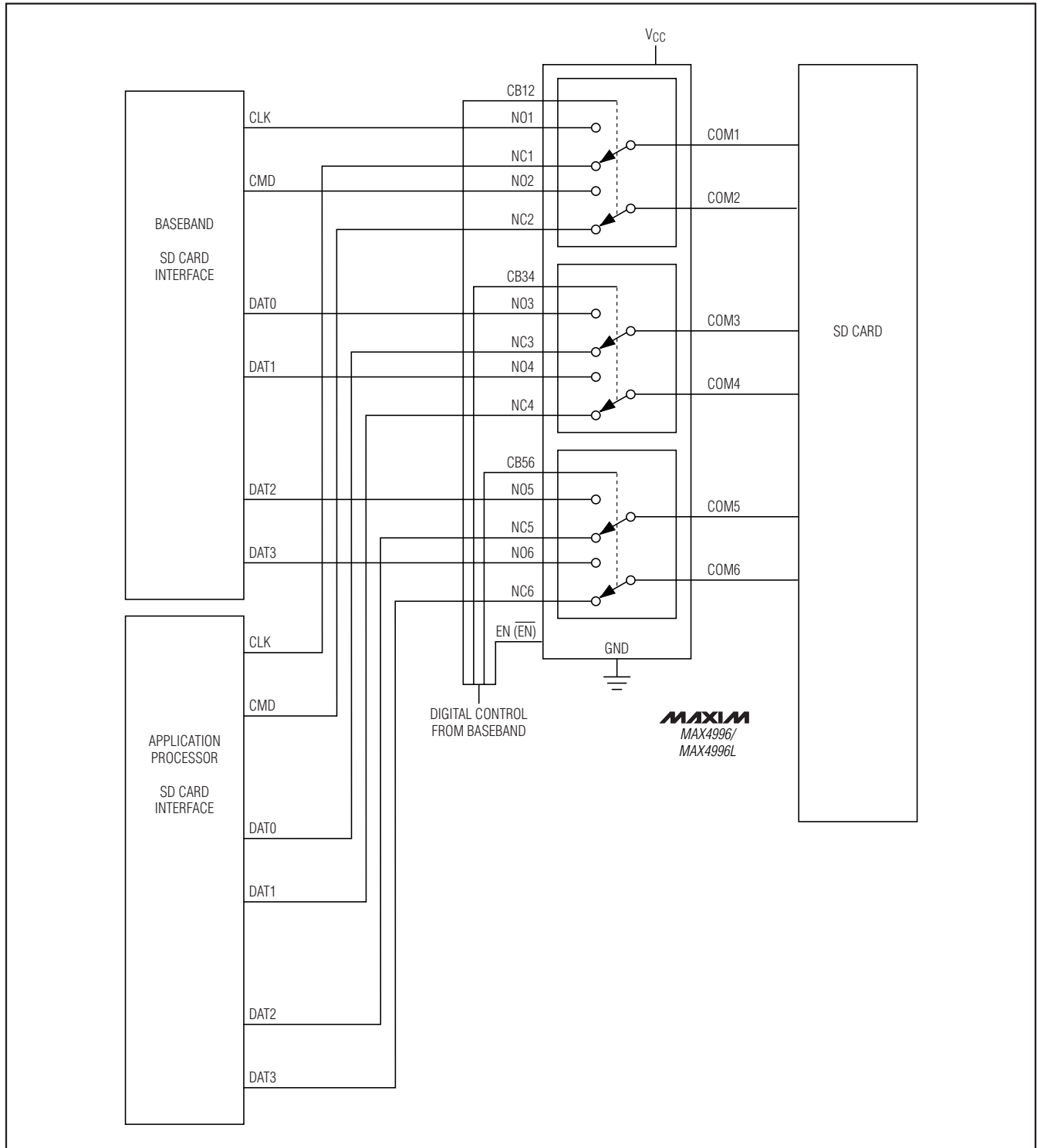
## Chip Information

PROCESS: BiCMOS

# Triple DPDT, Low-Capacitance Data Switches

## Typical Operating Circuit

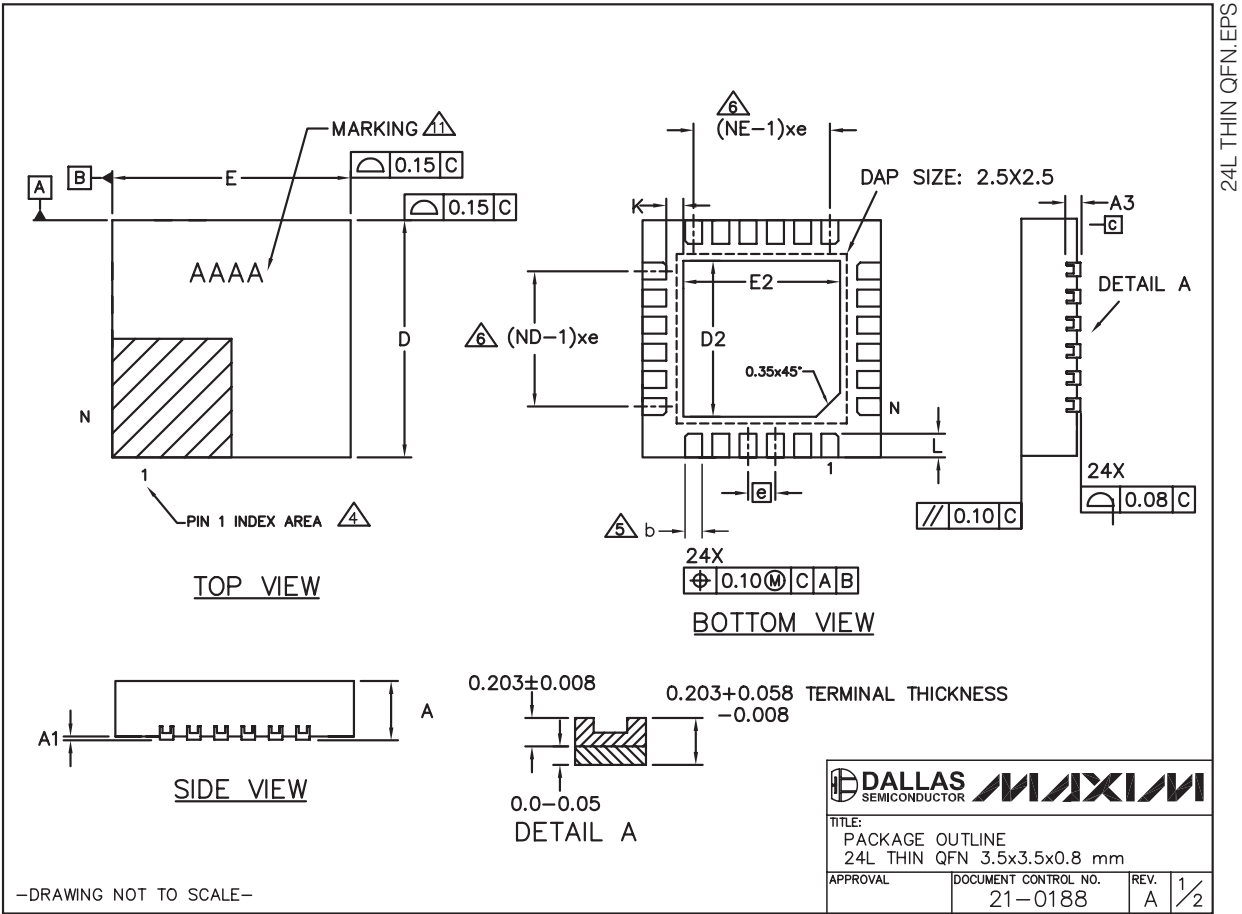
MAX4996/MAX4996L



# Triple DPDT, Low-Capacitance Data 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).)



-DRAWING NOT TO SCALE-

# Triple DPDT, Low-Capacitance Data 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).)

MAX4996/MAX4996L

### NOTES:

1. DIMENSIONING & TOLERANCING CONFORM TO ASME Y14.5M-1994.
2. ALL DIMENSIONS ARE IN MILLIMETERS. ANGLES ARE IN DEGREES.
3. N IS THE TOTAL NUMBER OF TERMINALS.
4. THE TERMINAL #1 IDENTIFIER AND TERMINAL NUMBERING CONVENTION SHALL CONFORM TO JESD 95-1 SPP-012. DETAILS OF TERMINAL #1 IDENTIFIER ARE OPTIONAL, BUT MUST BE LOCATED WITHIN THE ZONE INDICATED. THE TERMINAL #1 IDENTIFIER MAY BE EITHER A MOLD OR MARKED FEATURE.
5. DIMENSION b APPLIES TO METALLIZED TERMINAL AND IS MEASURED BETWEEN 0.25mm AND 0.30mm FROM TERMINAL TIP.
6. ND AND NE REFER TO THE NUMBER OF TERMINALS ON EACH D AND E SIDE RESPECTIVELY.
7. DEPOPULATION IS POSSIBLE IN A SYMMETRICAL FASHION.
8. COPLANARITY APPLIES TO THE EXPOSED HEAT SINK SLUG AS WELL AS THE TERMINALS.
9. REFER TO JEDEC MO-220 EXCEPT D2, E2, & L DIMENSIONS.
10. WARPAGE SHALL NOT EXCEED 0.10mm.
11. MARKING IS FOR PACKAGE ORIENTATION PURPOSE ONLY.

| COMMON DIMENSION |           |      |      | NOTE |
|------------------|-----------|------|------|------|
| REF.             | MIN.      | NOM. | MAX. |      |
| A                | 0.70      | 0.75 | 0.80 |      |
| A1               | 0         | —    | 0.05 |      |
| A3               | 0.20 REF  |      |      |      |
| b                | 0.15      | 0.20 | 0.25 |      |
| D                | 3.40      | 3.50 | 3.60 |      |
| E                | 3.40      | 3.50 | 3.60 |      |
| e                | 0.40 BSC. |      |      |      |
| K                | 0.25      | —    | —    |      |
| L                | 0.30      | 0.35 | 0.40 |      |
| N                | 24        |      |      |      |
| ND               | 6         |      |      |      |
| NE               | 6         |      |      |      |

| EXPOSED PAD VARIATIONS |      |      |      |      |      |      |
|------------------------|------|------|------|------|------|------|
|                        | D2   |      |      | E2   |      |      |
|                        | MIN. | NOM. | MAX. | MIN. | NOM. | MAX. |
| T243A3-1               | 2.20 | 2.30 | 2.40 | 2.20 | 2.30 | 2.40 |

—DRAWING NOT TO SCALE—

|                                                                                                                      |                      |                                                                                       |     |
|----------------------------------------------------------------------------------------------------------------------|----------------------|---------------------------------------------------------------------------------------|-----|
|  <b>DALLAS</b><br>SEMICONDUCTOR |                      |  |     |
| TITLE:<br>PACKAGE OUTLINE<br>24L THIN QFN 3.5x3.5x0.8 mm                                                             |                      |                                                                                       |     |
| APPROVAL                                                                                                             | DOCUMENT CONTROL NO. | REV.                                                                                  |     |
|                                                                                                                      | 21-0188              | A                                                                                     | 2/2 |

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