

# DATA/AUDIO Low-Voltage Dual DPDT Analog Switch

## FSA2466

### Description

The FSA2466 is a dual Double-Pole, Double-Throw (DPDT) analog switch. The FSA2466 operates from a single 1.65 V to 4.45 V supply and features an ultra-low on resistance of 2  $\Omega$  at a +2.7 V supply and  $T_A = 25^\circ\text{C}$ . This device is fabricated with sub-micron CMOS technology to achieve fast switching speeds and is designed for break-before-make operation.

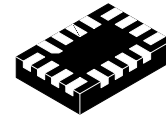
FSA2466 features very low quiescent current even when the control voltage is lower than the  $V_{CC}$  supply. This allows mobile handset applications direct interface with the baseband processor general-purpose I/Os.

### Features

|                      |                                                   |
|----------------------|---------------------------------------------------|
| Switch Type          | DPDT (2x)                                         |
| Input Type           | Data / Audio Switch                               |
| Input Signal Range   | 0 to $V_{CC}$                                     |
| $V_{CC}$             | 1.65 to 4.45 V                                    |
| $R_{ON}$             | 2.5 $\Omega$ at 2.7 V                             |
| $R_{FLAT}$           | 0.8 $\Omega$ at 2.7 V                             |
| ESD                  | 8 kV HBM                                          |
| Bandwidth            | 245 MHz                                           |
| $C_{ON}$ at 240 MHz  | 16 pF                                             |
| $C_{OFF}$ at 240 MHz | 6.0 pF                                            |
| Features             | Low $I_{CTT}$                                     |
| Package              | 16-Lead UMLP 1.80 x 2.60 x 0.55 mm, 0.40 mm pitch |
| Top Mark             | KA                                                |
| Ordering Information | FSA2466UMX                                        |

### Applications

- MP3 Portable Media Players
- Cellular Phones, Smartphones



UQFN16 1.8x2.6, 0.4P  
CASE 523BF

### MARKING DIAGRAM



KA = Specific Device Code  
 &K = 2-Digits Lot Run Traceability Code  
 &2 = 2-Digit Date Code  
 &Z = Assembly Plant Code

### ORDERING INFORMATION

See detailed ordering and shipping information on page 2 of this data sheet.

## FSA2466

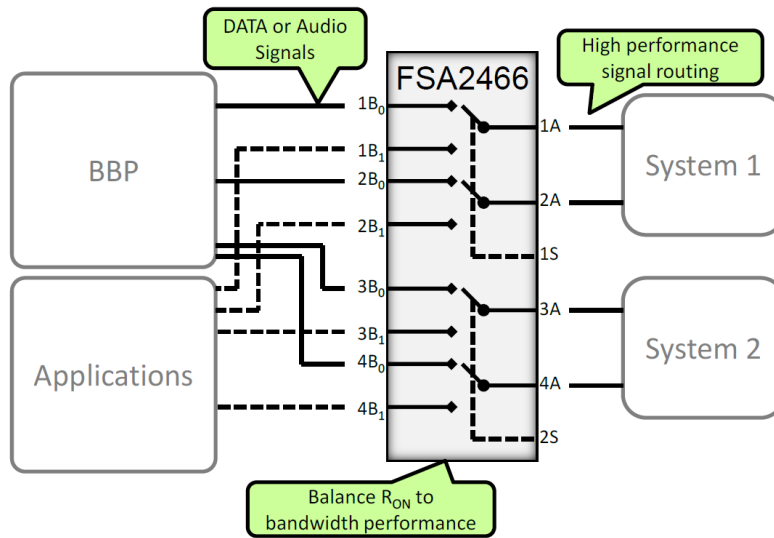


Figure 1. Typical Mobile Phone Application

### ORDERING INFORMATION

| Part Number | Top Mark | Operating Temperature Range | Package                                                               | Shipping <sup>†</sup> |
|-------------|----------|-----------------------------|-----------------------------------------------------------------------|-----------------------|
| FSA2466UMX  | KA       | -40 to 85°C                 | 16-Lead, Quad, Ultrathin Molded Leadless Package (UMLP), 1.8 x 2.6 mm | 5000 / Tape & Reel    |

<sup>†</sup>For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

# FSA2466

## Pin Configuration

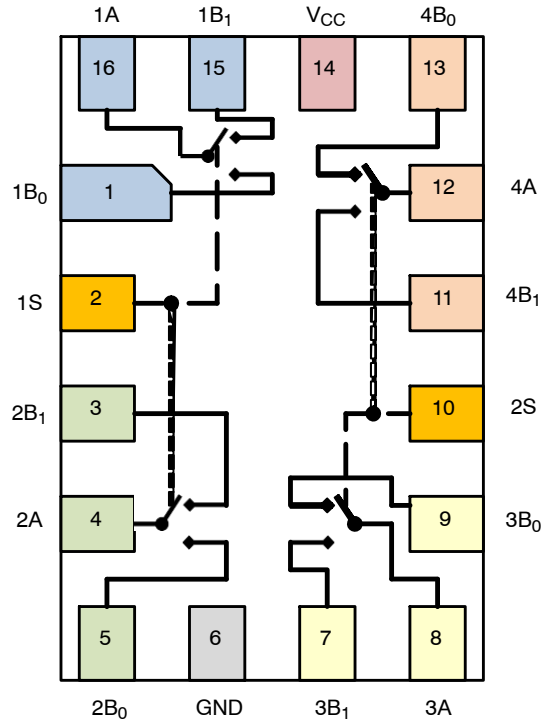


Figure 2. FSA2466UMX (Top View)

## PIN DESCRIPTIONS

| Pin # | Name            | Type   | Description                                 |   |                                             |
|-------|-----------------|--------|---------------------------------------------|---|---------------------------------------------|
| 1     | 1B <sub>0</sub> | I/O    | Data / Audio Port                           |   |                                             |
| 2     | 1S              | Input  | Control Input for Data & Common Ports 1 & 2 | 0 | 1B <sub>0</sub> = 1A & 2B <sub>0</sub> = 2A |
|       |                 |        |                                             | 1 | 1B <sub>1</sub> = 1A & 2B <sub>1</sub> = 2A |
| 3     | 2B <sub>1</sub> | I/O    | Data / Audio Port                           |   |                                             |
| 4     | 2A              | I/O    | Data / Audio Common Port                    |   |                                             |
| 5     | 2B <sub>0</sub> | I/O    | Data / Audio Port                           |   |                                             |
| 6     | GND             | GND    |                                             |   |                                             |
| 7     | 3B <sub>1</sub> | I/O    | Data / Audio Port                           |   |                                             |
| 8     | 3A              | I/O    | Data / Audio Common Port                    |   |                                             |
| 9     | 3B <sub>0</sub> | I/O    | Data / Audio Port                           |   |                                             |
| 10    | 2S              | Input  | Control Input for Data & Common Ports 3 & 4 | 0 | 3B <sub>0</sub> = 3A & 4B <sub>0</sub> = 4A |
|       |                 |        |                                             | 1 | 3B <sub>1</sub> = 3A & 4B <sub>1</sub> = 4A |
| 11    | 4B <sub>1</sub> | I/O    | Data / Audio Port                           |   |                                             |
| 12    | 4A              | I/O    | Data / Audio Common Port                    |   |                                             |
| 13    | 4B <sub>0</sub> | I/O    | Data / Audio Port                           |   |                                             |
| 14    | VCC             | Supply | Voltage supply                              |   |                                             |
| 15    | 1B <sub>1</sub> | I/O    | Data / Audio Port                           |   |                                             |
| 16    | 1A              | I/O    | Data / Audio Common Port                    |   |                                             |

**ABSOLUTE MAXIMUM RATINGS**

| Symbol              | Parameter                                                      |                | Min   | Max                   | Unit |
|---------------------|----------------------------------------------------------------|----------------|-------|-----------------------|------|
| V <sub>CC</sub>     | Supply Voltage                                                 |                | -0.50 | 5.25                  | V    |
| V <sub>S</sub>      | Switch Voltage                                                 |                | -0.5  | V <sub>CC</sub> + 0.3 | V    |
| V <sub>IN</sub>     | Input Voltage                                                  |                | -0.5  | 5.0                   | V    |
| I <sub>IK</sub>     | Input Diode Current                                            |                | -50   |                       | mA   |
| I <sub>SW</sub>     | Switch Current                                                 |                |       | 350                   | mA   |
| I <sub>SWPEAK</sub> | Peak Switch Current (Pulsed at 1 ms Duration, <10% Duty Cycle) |                |       | 500                   | mA   |
| T <sub>STG</sub>    | Storage Temperature Range                                      |                | -65   | +150                  | °C   |
| T <sub>J</sub>      | Junction Temperature                                           |                |       | +150                  | °C   |
| T <sub>L</sub>      | Lead Temperature, Soldering 10 seconds                         |                |       | +260                  | °C   |
| ESD                 | Human Body Model, JESD22-A114                                  | I/O to GND     |       | 8                     | kV   |
|                     |                                                                | Power to GND   |       | 8                     |      |
|                     |                                                                | All Other Pins |       | 8                     |      |
|                     | Charged Device Model, JEDEC: JESD22-C101                       |                |       | 2                     |      |

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

**RECOMMENDED OPERATING CONDITIONS**

| Symbol          | Parameter                      |  | Min  | Max             | Unit |
|-----------------|--------------------------------|--|------|-----------------|------|
| V <sub>CC</sub> | Supply Voltage (Note 1)        |  | 1.65 | 4.45            | V    |
| V <sub>IN</sub> | Control Input Voltage (Note 2) |  | 0    | V <sub>CC</sub> | V    |
| V <sub>S</sub>  | Switch Input Voltage           |  | 0    | V <sub>CC</sub> | V    |
| T <sub>A</sub>  | Operating Temperature          |  | -40  | +85             | °C   |

Functional operation above the stresses listed in the Recommended Operating Ranges is not implied. Extended exposure to stresses beyond the Recommended Operating Ranges limits may affect device reliability.

1. For 4.45 V operation, SEL frequency (pins 1S & 2S) should not exceed 100 Hz and 100 ns edge rate.
2. Unused inputs must be held HIGH or LOW. They may not float.

**DC ELECTRICAL CHARACTERISTICS**(Typical values are at  $T_A = 25^\circ\text{C}$  unless otherwise specified.)

| Symbol                         | Parameter                                        | Condition                                                                       | $V_{CC}$ (V) | $T_A = +25^\circ\text{C}$ |      |      | $T_A = -40 \text{ to } +85^\circ\text{C}$ |      | Unit          |
|--------------------------------|--------------------------------------------------|---------------------------------------------------------------------------------|--------------|---------------------------|------|------|-------------------------------------------|------|---------------|
|                                |                                                  |                                                                                 |              | Min.                      | Typ. | Max. | Min.                                      | Max. |               |
| $V_{IH}$                       | Input Voltage High                               |                                                                                 | 4.30         |                           |      |      | 1.4                                       |      | V             |
|                                |                                                  |                                                                                 | 2.70 to 3.60 |                           |      |      | 1.3                                       |      |               |
|                                |                                                  |                                                                                 | 2.30 to 2.70 |                           |      |      | 1.1                                       |      |               |
|                                |                                                  |                                                                                 | 1.65 to 1.95 |                           |      |      | 0.9                                       |      |               |
| $V_{IL}$                       | Input Voltage Low                                |                                                                                 | 4.30         |                           |      |      |                                           | 0.7  | V             |
|                                |                                                  |                                                                                 | 2.70 to 3.60 |                           |      |      |                                           | 0.5  |               |
|                                |                                                  |                                                                                 | 2.30 to 2.70 |                           |      |      |                                           | 0.4  |               |
|                                |                                                  |                                                                                 | 1.65 to 1.95 |                           |      |      |                                           | 0.4  |               |
| $I_{IN}$                       | Control Input Leakage                            | $V_{IN} = 0 \text{ V to } V_{CC}$                                               | 1.65 to 4.30 |                           |      |      | -0.5                                      | 0.5  | $\mu\text{A}$ |
| $I_{NO(OFF)}$<br>$I_{NC(OFF)}$ | Off Leakage Current of Port nB0 and nB1          | nA=0.3 V, $V_{CC}$ -0.3V<br>nB0 or nB1=0.3 V,<br>$V_{CC}$ -0.3V or Floating     | 1.95 to 4.30 | -10                       |      | 10   | -50                                       | 50   | nA            |
| $I_{A(ON)}$                    | On Leakage Current of Port A                     | nA = 0.3 V, $V_{CC}$ -0.3V<br>nB0 or nB1 = 0.3 V,<br>$V_{CC}$ -0.3V or Floating | 1.95 to 4.30 | -10                       |      | 10   | -50                                       | 50   | nA            |
| $R_{ON}$                       | Switch On Resistance (Note 3)                    | $I_{OUT}=100 \text{ mA}$                                                        | 4.30         |                           | 1.6  |      |                                           | 2.0  | $\Omega$      |
|                                |                                                  | $I_{OUT}=100 \text{ mA}$ , nB0 or nB1=0 V, 0.7 V, 1.2 V, $V_{CC}$               | 2.70         |                           | 2.0  |      |                                           | 2.5  |               |
|                                |                                                  |                                                                                 | 2.30         |                           | 2.2  |      |                                           | 2.7  |               |
|                                |                                                  | $I_{OUT}=100\text{mA}$ , nB0 or nB1=0.7 V                                       | 1.80         |                           | 4.3  |      |                                           | 6.0  |               |
| $\Delta R_{ON}$                | On Resistance Matching Between Channels (Note 4) | $I_{OUT}=100 \text{ mA}$ , nB0 or nB1=0.8 V                                     | 2.70         |                           | 0.04 |      |                                           | 0.20 | $\Omega$      |
|                                |                                                  | $I_{OUT}=100 \text{ mA}$ , nB0 or nB1=0.7 V                                     | 2.30         |                           | 0.03 |      |                                           | 0.30 |               |
| $R_{FLAT(ON)}$                 | On Resistance Flatness (Note 5)                  | $I_{OUT}=100 \text{ mA}$ , nB0 or nB1 = 0V $\rightarrow V_{CC}$                 | 2.70         |                           | 0.60 |      |                                           | 0.8  | $\Omega$      |
|                                |                                                  |                                                                                 | 2.30         |                           | 0.75 |      |                                           | 0.9  |               |
| $I_{CC}$                       | Quiescent Supply Current                         | $V_{IN}=0 \text{ V to } V_{CC}$ ,<br>$I_{OUT}=0 \text{ V}$                      | 4.30         | -100                      |      | 100  | -500                                      | 500  | nA            |
| $I_{CCT}$                      | Increase in $I_{CC}$ Current per Control Voltage | $V_{IN}=1.8 \text{ V}$                                                          | 4.30         |                           | 7    | 12   |                                           | 15   | $\mu\text{A}$ |
|                                |                                                  | $V_{IN}=2.6 \text{ V}$                                                          | 4.30         |                           | 3    | 6    |                                           | 7    |               |

3. On resistance is determined by the voltage drop between the A and B pins at the indicated current through the switch.

4.  $\Delta R_{ON}=R_{ON \text{ max}} - R_{ON \text{ min}}$  measured at identical  $V_{CC}$ , temperature, and voltage.

5. Flatness is defined as the difference between the maximum and minimum value of on resistance over the specified range of conditions.

**AC ELECTRICAL CHARACTERISTICS**(Typical values are at  $T_A = 25^\circ\text{C}$  unless otherwise specified.)

| Symbol    | Parameter                          | Condition                                                                        | $V_{CC}$    | $T_A = +25^\circ\text{C}$ |       |      | $T_A = -40 \text{ to } +85^\circ\text{C}$ |      | Unit | Figure   |
|-----------|------------------------------------|----------------------------------------------------------------------------------|-------------|---------------------------|-------|------|-------------------------------------------|------|------|----------|
|           |                                    |                                                                                  |             | Min.                      | Typ.  | Max. | Min.                                      | Max. |      |          |
| $t_{ON}$  | Turn-On Time                       | $nB_0$ or $nB_1=1.5\text{ V}$<br>$R_L=50\ \Omega$ , $C_L=35\text{ pF}$           | 3.6 to 4.3  |                           |       | 50   |                                           | 60   | ns   | Figure 3 |
|           |                                    |                                                                                  | 2.7 to 3.6  |                           |       | 65   |                                           | 75   |      |          |
|           |                                    |                                                                                  | 2.3 to 2.7  |                           |       | 80   |                                           | 90   |      |          |
| $t_{OFF}$ | Turn-Off Time                      | $nB_0$ or $nB_1=1.5\text{ V}$<br>$R_L=50\ \Omega$ , $C_L=35\text{ pF}$           | 3.6 to 4.3  |                           |       | 32   |                                           | 40   | ns   | Figure 3 |
|           |                                    |                                                                                  | 2.7 to 3.6  |                           |       | 42   |                                           | 50   |      |          |
|           |                                    |                                                                                  | 2.3 to 2.7  |                           |       | 52   |                                           | 60   |      |          |
| $t_{BBM}$ | Break-Before-Make Time<br>(Note 6) | $nB_0$ or $nB_1=1.5\text{ V}$<br>$R_L=50\ \Omega$ , $C_L=35\text{ pF}$           | 3.6 to 4.3  |                           | 15    |      |                                           |      | ns   | Figure 4 |
|           |                                    |                                                                                  | 2.7 to 3.6  |                           | 15    |      |                                           |      |      |          |
|           |                                    |                                                                                  | 2.3 to 2.7  |                           | 15    |      |                                           |      |      |          |
| Q         | Charge Injection                   | $C_L=100\text{ pF}$ ,<br>$V_{GEN}=0\text{ V}$ , $R_{GEN}=0\ \Omega$              | 3.6 to 4.3  |                           | 8     |      |                                           |      | pC   | Figure 6 |
|           |                                    | $C_L=100\text{ pF}$ ,<br>$V_{GEN}=0\text{ V}$ , $R_{GEN}=0\ \Omega$              | 2.7 to 3.6  |                           | 6     |      |                                           |      |      |          |
|           |                                    | $C_L=100\text{ pF}$ ,<br>$V_{GEN}=0\text{ V}$ , $R_{GEN}=0\ \Omega$              | 2.3 to 2.7  |                           | 3     |      |                                           |      |      |          |
| OIRR      | Off Isolation                      | $f=100\text{ KHz}$ , $R_L=50\ \Omega$ ,<br>$C_L=5\text{ pF}$                     | 3.6 to 4.3  |                           | -90   |      |                                           |      | dB   | Figure 5 |
|           |                                    |                                                                                  | 2.7 to 3.6  |                           | -90   |      |                                           |      |      |          |
|           |                                    |                                                                                  | 2.3 to 2.7  |                           | -90   |      |                                           |      |      |          |
| Xtalk     | Crosstalk                          | $f=100\text{ KHz}$ , $R_L=50\ \Omega$ ,<br>$C_L=5\text{ pF}$                     | 3.6 to 4.3  |                           | -90   |      |                                           |      | dB   | Figure 5 |
|           |                                    |                                                                                  | 2.7 to 3.6  |                           | -90   |      |                                           |      |      |          |
|           |                                    |                                                                                  | 2.3 to 2.7  |                           | -90   |      |                                           |      |      |          |
| BW        | -3dB Bandwidth                     | $R_L=50\ \Omega$                                                                 | 2.3 to 4.3  |                           | 245   |      |                                           |      | MHz  | Figure 8 |
| THD       | Total Harmonic Distortion          | $R_L=32\ \Omega$ , $V_{IN}=2V_{PP}$ ,<br>$f=20\text{ to }20\text{ kHz}$          | 3.6 to 4.3  |                           | 0.21  |      |                                           |      | %    | Figure 9 |
|           |                                    |                                                                                  | 2.7 to 3.6  |                           | 0.17  |      |                                           |      |      |          |
|           |                                    |                                                                                  | 2.3. to 2.7 |                           | 0.26  |      |                                           |      |      |          |
|           |                                    | $R_L=600\ \Omega$ , $V_{IN}=2\text{ V}_{PP}$ ,<br>$f=20\text{ to }20\text{ kHz}$ | 3.6 to 4.3  |                           | 0.01  |      |                                           |      |      |          |
|           |                                    |                                                                                  | 2.7 to 3.6  |                           | 0.008 |      |                                           |      |      |          |
|           |                                    |                                                                                  | 2.3. to 2.7 |                           | 0.012 |      |                                           |      |      |          |

6. Guaranteed by characterization, not production tested.

**CAPACITANCE**

| Symbol    | Parameter                     | Condition            | $V_{CC}$ | $T_A = +25^\circ\text{C}$ Typical | Unit | Figure   |
|-----------|-------------------------------|----------------------|----------|-----------------------------------|------|----------|
| $C_{IN}$  | Control Pin Input Capacitance | $f = 1\text{ MHz}$   | 0        | 1.3                               | pF   | Figure 3 |
| $C_{OFF}$ | B Port Off Capacitance        | $f = 1\text{ MHz}$   | 3.3      | 6.0                               | pF   | Figure 3 |
|           |                               | $f = 240\text{ MHz}$ | 3.3      | 6.0                               |      |          |
| $C_{ON}$  | A Port On Capacitance         | $f = 1\text{ MHz}$   | 3.3      | 21.0                              | pF   | Figure 3 |
|           |                               | $f = 240\text{ MHz}$ | 3.3      | 16.0                              |      |          |

## AC Loadings and Waveforms

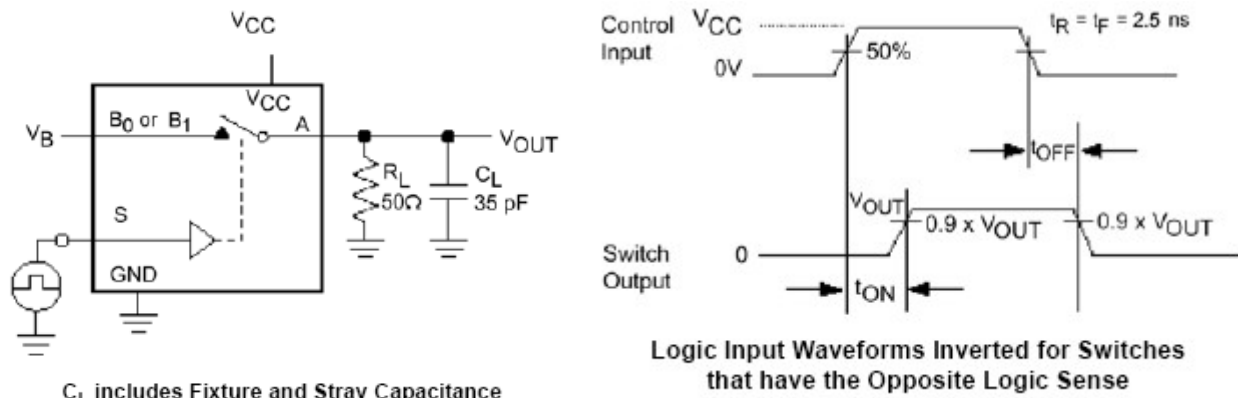


Figure 3. Turn-On / Turn-Off Timing

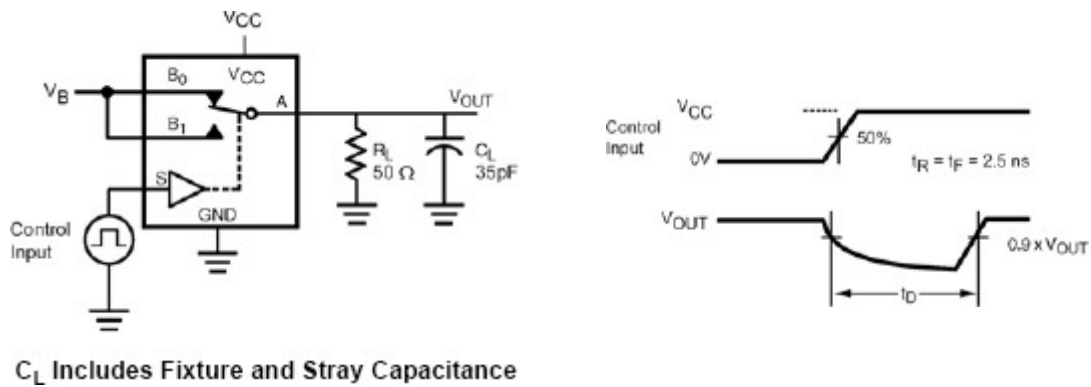


Figure 4. Break-Before-Make Timing

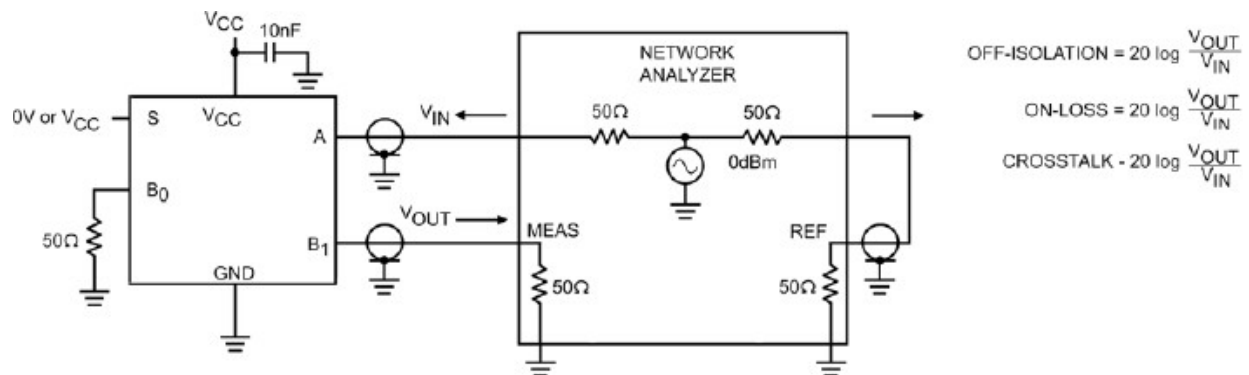


Figure 5. Off Isolation and Crosstalk

## AC Loadings and Waveforms (Continued)

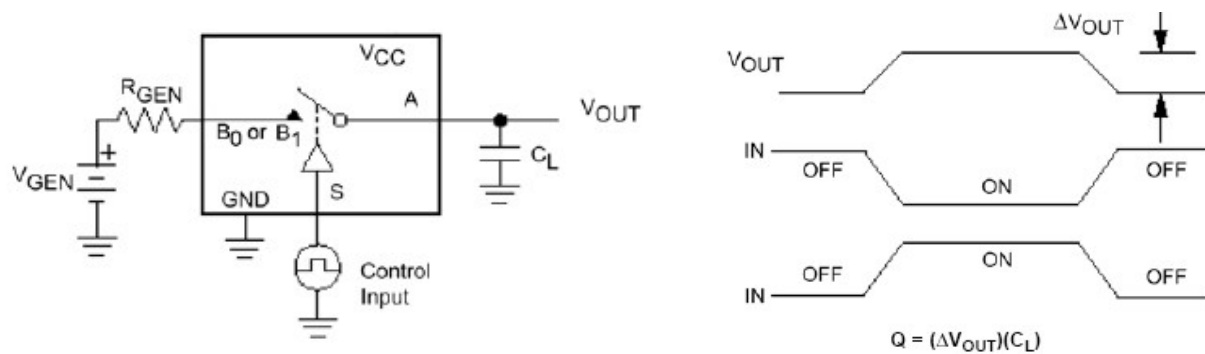


Figure 6. Charge Injection

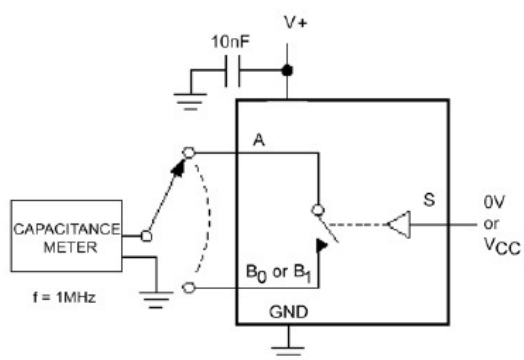


Figure 7. On / Off Capacitance Measurement Setup

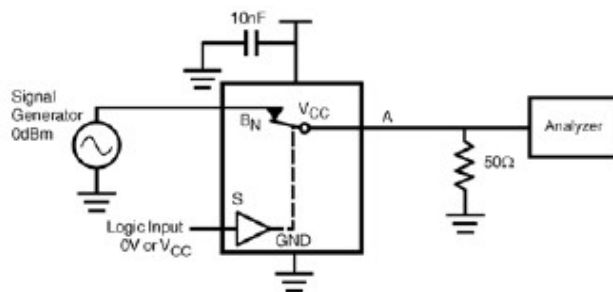


Figure 8. Bandwidth

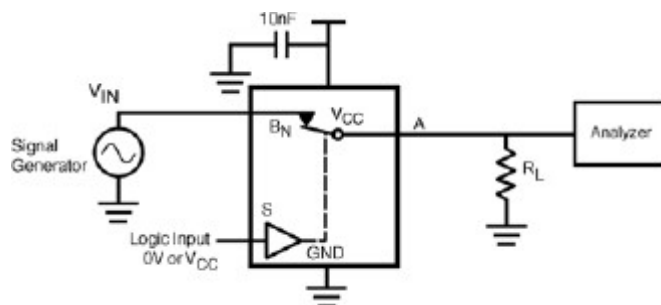
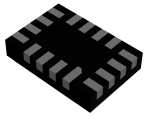
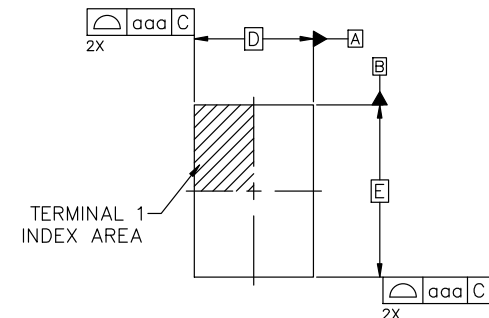


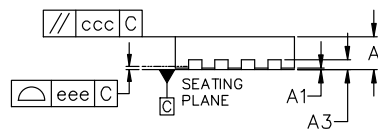
Figure 9. Harmonic Distortion


**UQFN16 1.80x2.60x0.50, 0.40P**  
**CASE 523BF**  
**ISSUE A**

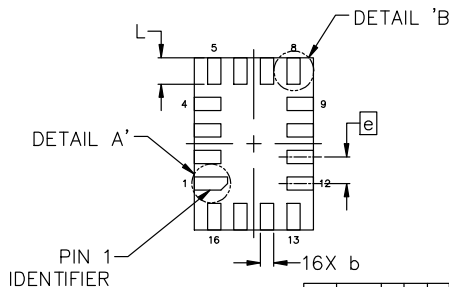
DATE 06 MAY 2024



TOP VIEW



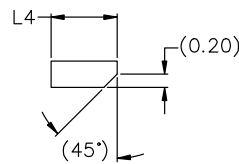
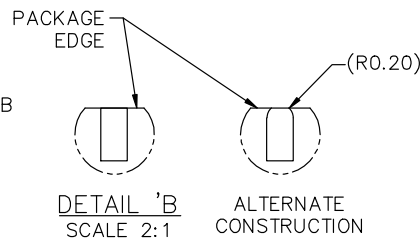
SIDE VIEW



BOTTOM VIEW

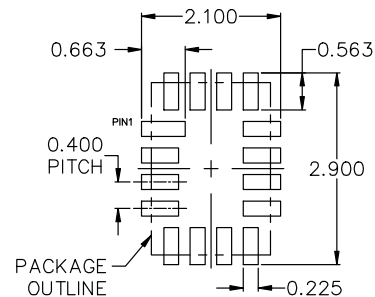
## NOTES:

1. DIMENSIONING AND TOLERANCING CONFORM TO ASME Y14.5M-2018.
2. ALL DIMENSIONS ARE IN MILLIMETERS, DEGREES IN ANGLE.
3. LAND PATTERN RECOMMENDATION IS EXISTING INDUSTRY LAND PATTERN.
4. TERMINAL SHAPE MAY VARY ACCORDING TO PACKAGE SUPPLIER, SEE TERMINAL SHAPE VARIANTS.


DETAIL 'A'  
SCALE 2:1

DETAIL 'B'  
SCALE 2:1

ALTERNATE  
CONSTRUCTION

| DIM                                  | MILLIMETERS |      |      |
|--------------------------------------|-------------|------|------|
|                                      | MIN         | NOM  | MAX  |
| A                                    | 0.45        | 0.50 | 0.55 |
| A1                                   | 0.00        | ---  | 0.05 |
| A3                                   | 0.10        | 0.15 | 0.20 |
| b                                    | 0.15        | 0.20 | 0.25 |
| D                                    | 1.80 BSC    |      |      |
| E                                    | 2.60 BSC    |      |      |
| e                                    | 0.40 BSC    |      |      |
| L                                    | 0.35        | 0.40 | 0.45 |
| L4                                   | 0.45        | 0.50 | 0.55 |
| TOLERANCES FOR FEATURE CONTROL FRAME |             |      |      |
| aaa                                  | 0.05        |      |      |
| bbb                                  | 0.10        |      |      |
| ccc                                  | 0.10        |      |      |
| ddd                                  | 0.05        |      |      |
| eee                                  | 0.05        |      |      |



## RECOMMENDED MOUNTING FOOTPRINT\*

\*FOR ADDITIONAL INFORMATION ON OUR Pb-FREE STRATEGY AND SOLDERING DETAILS, PLEASE DOWNLOAD THE ONSEMI SOLDERING AND MOUNTING TECHNIQUES REFERENCE MANUAL, SOLDERRM/D.

|                         |                                     |                                                                                                                                                                                  |
|-------------------------|-------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
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| <b>DESCRIPTION:</b>     | <b>UQFN16 1.80x2.60x0.50, 0.40P</b> | <b>PAGE 1 OF 1</b>                                                                                                                                                               |

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