# ON Semiconductor

# Is Now

**To learn more about onsemi™, please visit our website at**
**www.onsemi.com**

ON Semiconductor®

# FSA2466
# DATA / AUDIO Low-Voltage Dual DPDT Analog Switch

## 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 Ω at 2.7 V |
| $R_{FLAT}$ | 0.8 Ω at 2.7 V |
| ESD | 8 kV HBM |
| Bandwidth | 245 MHz |
| $C_{ON}$ at 240MHz | 16 pF |
| $C_{OFF}$ at 240MHz | 6.0 pF |
| Features | Low $I_{CCT}$ |
| Package | 16- Lead UMLP 1.80 x 2.60 x 0.55 mm, 0.40 mm pitch |
| Top Mark | KA |
| Ordering Information | FSA2466UMX |

## 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 Ω at a +2.7 V supply and $T_A$=25°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.

## Applications

- MP3 Portable Media Players
- Cellular Phones, Smartphones

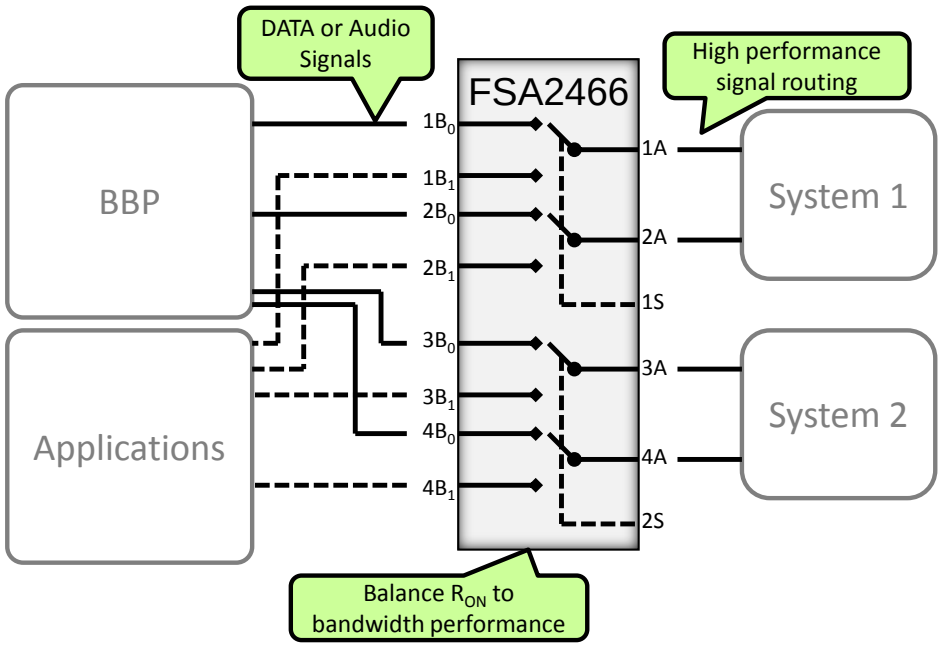



**Figure 1. Typical Mobile Phone Application**


December-2017, Rev. 2

Publication Order Number:
FSA2466/D

## Pin Configuration

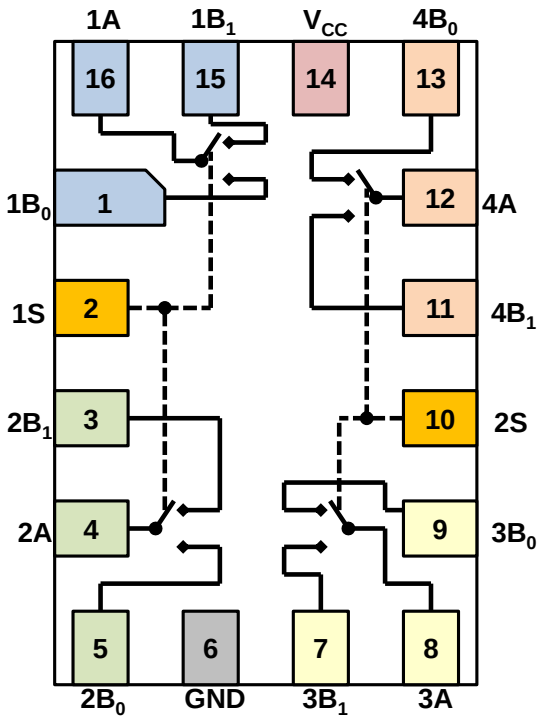



**Figure 2. FSA2466UMX (Top View)**

## Pin Descriptions

| Pin # | Name | Type | Description | | |
|---|---|---|---|---|---|
| 1 | $1B_0$ | I/O | Data / Audio Port | | |
| 2 | 1S | Input | Control Input for Data & Common Ports 1 & 2 | 0 | $1B_0$ = 1A & $2B_0$ = 2A |
| | | | | 1 | $1B_1$ = 1A & $2B_1$ = 2A |
| 3 | $2B_1$ | I/O | Data / Audio Port | | |
| 4 | 2A | I/O | Data / Audio Common Port | | |
| 5 | $2B_0$ | I/O | Data / Audio Port | | |
| 6 | GND | GND | | | |
| 7 | $3B_1$ | I/O | Data / Audio Port | | |
| 8 | 3A | I/O | Data / Audio Common Port | | |
| 9 | $3B_0$ | I/O | Data / Audio Port | | |
| 10 | 2S | Input | Control Input for Data & Common Ports 3 & 4 | 0 | $3B_0$ = 3A & $4B_0$ = 4A |
| | | | | 1 | $3B_1$ = 3A & $4B_1$ = 4A |
| 11 | $4B_1$ | I/O | Data / Audio Port | | |
| 12 | 4A | I/O | Data / Audio Common Port | | |
| 13 | $4B_0$ | I/O | Data / Audio Port | | |
| 14 | $V_{CC}$ | Supply | Voltage supply | | |
| 15 | $1B_1$ | I/O | Data / Audio Port | | |
| 16 | 1A | I/O | Data / Audio Common Port | | |

## Absolute Maximum Ratings

Stresses exceeding the absolute maximum ratings may damage the device. The device may not function or be operable above the recommended operating conditions and stressing the parts to these levels is not recommended. In addition, extended exposure to stresses above the recommended operating conditions may affect device reliability. The absolute maximum ratings are stress ratings only.

| Symbol | Parameter | | Min. | Max. | Unit |
|---|---|---|---|---|---|
| $V_{CC}$ | Supply Voltage | | -0.50 | 5.25 | V |
| $V_S$ | Switch Voltage | | -0.5 | $V_{CC}$+0.3 | V |
| $V_{IN}$ | Input Voltage | | -0.5 | 5.0 | V |
| $I_{IK}$ | Input Diode Current | | -50 | | mA |
| $I_{SW}$ | Switch Current | | | 350 | mA |
| $I_{SWPEAK}$ | Peak Switch Current (Pulsed at 1ms Duration, <10% Duty Cycle) | | | 500 | mA |
| $T_{STG}$ | Storage Temperature Range | | -65 | +150 | °C |
| $T_J$ | Junction Temperature | | | +150 | °C |
| $T_L$ | 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 | |
| | Charge Device Model, JEDEC: JESD22-C101 | | | 2 | |

## Recommended Operating Conditions

The Recommended Operating Conditions table defines the conditions for actual device operation. Recommended operating conditions are specified to ensure optimal performance to the datasheet specifications. ON Semiconductor does not recommend exceeding them or designing to Absolute Maximum Ratings.

| Symbol | Parameter | Min. | Max. | Unit |
|---|---|---|---|---|
| $V_{CC}$ | Supply Voltage(1) | 1.65 | 4.45 | V |
| $V_{IN}$ | Control Input Voltage(2) | 0 | $V_{CC}$ | V |
| $V_S$ | Switch Input Voltage | 0 | $V_{CC}$ | V |
| $T_A$ | Operating Temperature | -40 | +85 | °C |

**Note:**

1. For 4.45 V operation, SEL frequency (pins 1S & 2S) should not exceed 100Hz and 100ns 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°C unless otherwise specified.

| Symbol | Parameter | Condition | $V_{CC}$ (V) | $T_A$=+25°C | | | $T_A$=-40 to +85°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 V to $V_{CC}$ | 1.65 to 4.30 | | | | -0.5 | 0.5 | µA |
| $I_{NO(OFF)}$ $I_{NC(OFF)}$ | Off Leakage Current of Port $nB_0$ and $nB_1$ | nA=0.3 V, $V_{CC}$-0.3 V | 1.95 to 4.30 | -10 | | 10 | -50 | 50 | nA |
| | | $nB_0$ or $nB_1$=0.3 V, $V_{CC}$-0.3 V or Floating | | | | | | | |
| $I_{A(ON)}$ | On Leakage Current of Port A | nA=0.3 V, $V_{CC}$-0.3V | 1.95 to 4.30 | -10 | | 10 | -50 | 50 | nA |
| | | $nB_0$ or $nB_1$=0.3 V, $V_{CC}$-0.3 V or Floating | | | | | | | |
| $R_{ON}$ | Switch On Resistance(3) | $I_{OUT}$=100 mA | 4.30 | | 1.6 | | | 2.0 | Ω |
| | | $I_{OUT}$=100 mA, $nB_0$ or $nB_1$=0 V, 0.7 V, 1.2 V, $V_{CC}$ | 2.70 | | 2.0 | | | 2.5 | |
| | | | 2.30 | | 2.2 | | | 2.7 | |
| | | $I_{OUT}$=100mA, $nB_0$ or $nB_1$=0.7 V | 1.80 | | 4.3 | | | 6.0 | |
| $\Delta R_{ON}$ | On Resistance Matching Between Channels(4) | $I_{OUT}$=100 mA, $nB_0$ or $nB_1$=0.8 V | 2.70 | | 0.04 | | | 0.20 | Ω |
| | | $I_{OUT}$=100 mA, $nB_0$ or $nB_1$=0.7 V | 2.30 | | 0.03 | | | 0.30 | |
| $R_{FLAT(ON)}$ | On Resistance Flatness(5) | $I_{OUT}$=100 mA, $nB_0$ or $nB_1$ = 0V -> $V_{CC}$ | 2.70 | | 0.60 | | | 0.8 | Ω |
| | | | 2.30 | | 0.75 | | | 0.9 | |
| $I_{CC}$ | Quiescent Supply Current | $V_{IN}$=0 V to $V_{CC}$, $I_{OUT}$=0 V | 4.30 | -100 | | 100 | -500 | 500 | nA |
| $I_{CCT}$ | Increase in $I_{CC}$ Current per Control Voltage | $V_{IN}$=1.8 V | 4.30 | | 7 | 12 | | 15 | µA |
| | | $V_{IN}$=2.6 V | 4.30 | | 3 | 6 | | 7 | |

**Notes:**

3. On resistance is determined by the voltage drop between the A and B pins at the indicated current through the switch.
4. $\Delta R_{ON}=R_{ON\ max} - R_{ON\ min}$ 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 $T_A$=25ºC unless otherwise specified.

| Symbol | Parameter | Condition | $V_{CC}$ | $T_A$=+25ºC | | | $T_A$=-40 to +85ºC | | Unit | Figure |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Min. | Typ. | Max. | Min. | Max. | | |
| $t_{ON}$ | Turn-On Time | $nB_0$ or $nB_1$=1.5 V<br>$R_L$=50 Ω, $C_L$=35 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 V<br>$R_L$=50 Ω, $C_L$=35 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(6) | $nB_0$ or $nB_1$=1.5 V<br>$R_L$=50 Ω, $C_L$=35 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 pF,<br>$V_{GEN}$=0 V, $R_{GEN}$=0 Ω | 3.6 to 4.3 | | 8 | | | | pC | Figure 6 |
| | | $C_L$=100 pF,<br>$V_{GEN}$=0 V, $R_{GEN}$=0 Ω | 2.7 to 3.6 | | 6 | | | | | |
| | | $C_L$=100 pF,<br>$V_{GEN}$=0 V, $R_{GEN}$=0 Ω | 2.3 to 2.7 | | 3 | | | | | |
| OIRR | Off Isolation | f=100 KHz, $R_L$=50 Ω,<br>$C_L$=5 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 KHz, $R_L$=50 Ω,<br>$C_L$=5 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 Ω | 2.3 to 4.3 | | 245 | | | | MHZ | Figure 8 |
| THD | Total Harmonic Distortion | $R_L$=32 Ω, $V_{IN}$=2$V_{PP}$,<br>f=20 to 20 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 Ω,<br>$V_{IN}$=2 $V_{PP}$,<br>f=20 to 20 kHZ | 3.6 to 4.3 | | 0.01 | | | | | |
| | | | 2.7 to 3.6 | | 0.008 | | | | | |
| | | | 2.3. to 2.7 | | 0.012 | | | | | |

**Note:**
6. Guaranteed by characterization, not production tested.

## Capacitance

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

## AC Loadings and Waveforms

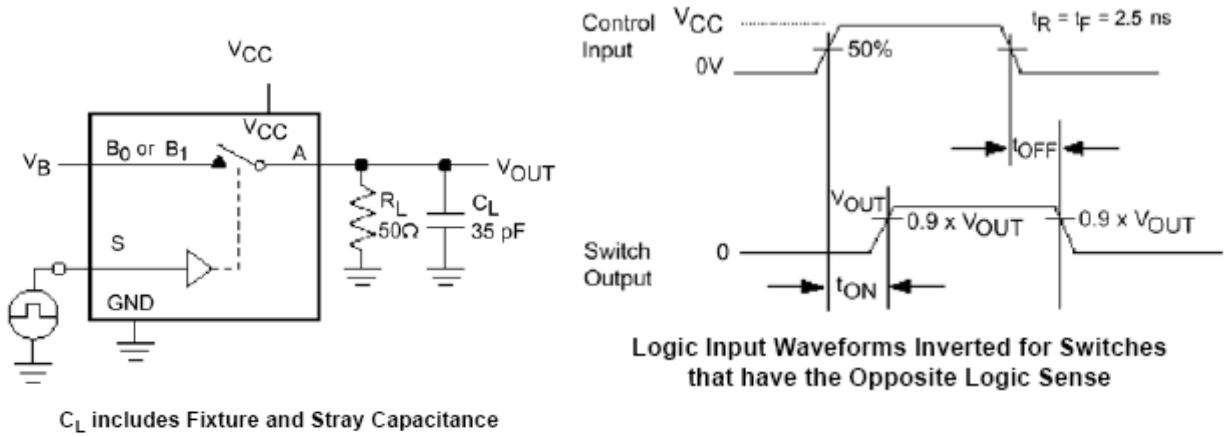



**Figure 3. Turn-On / Turn-Off Timing**

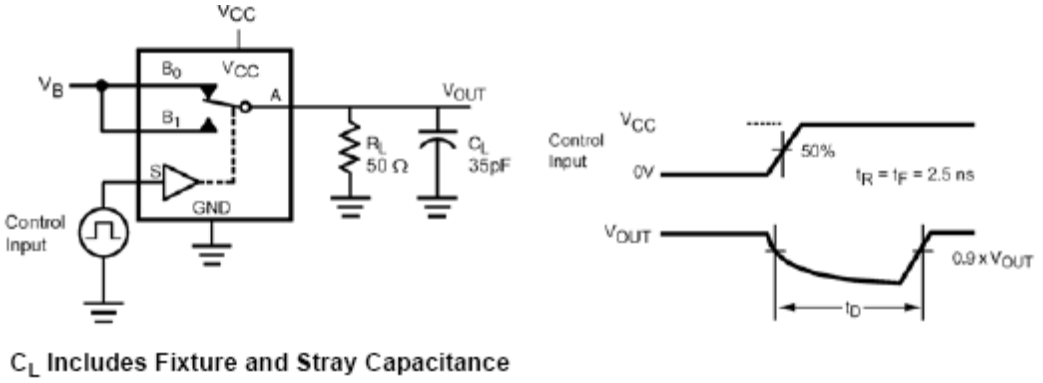



**Figure 4. Break-Before-Make Timing**

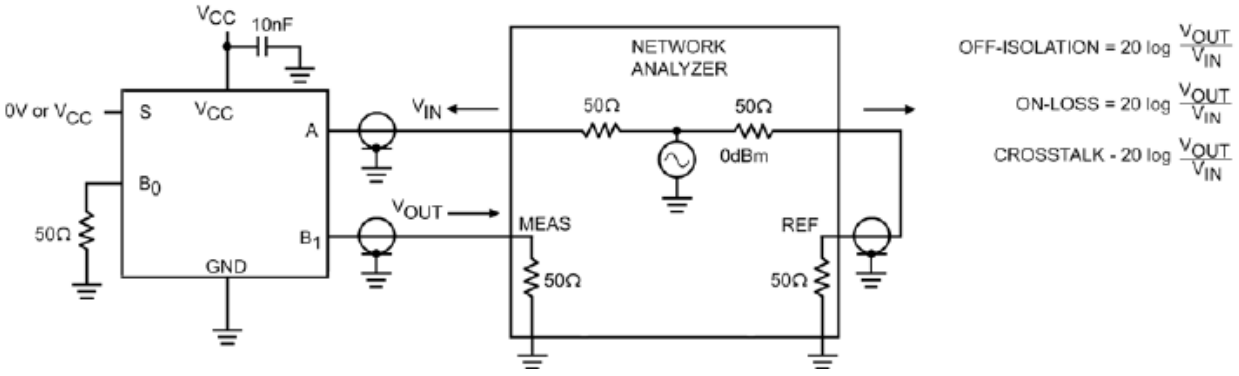



**Figure 5. Off Isolation and Crosstalk**

## AC Loadings and Waveforms (Continued)

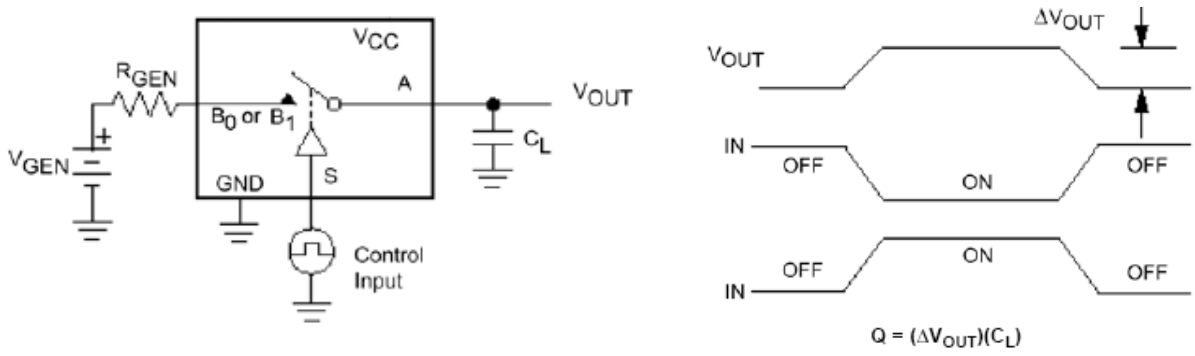



**Figure 6. Charge Injection**

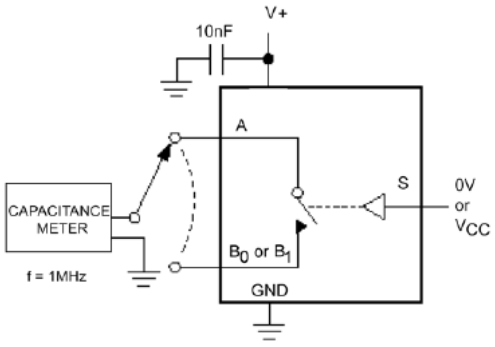



**Figure 7. On / Off Capacitance Measurement Setup**

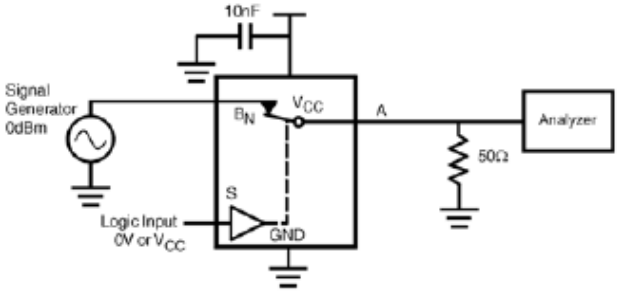



**Figure 8. Bandwidth**

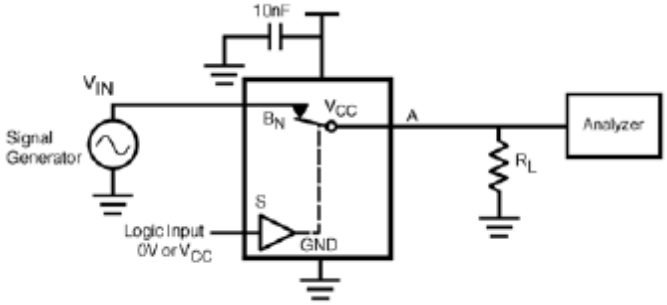
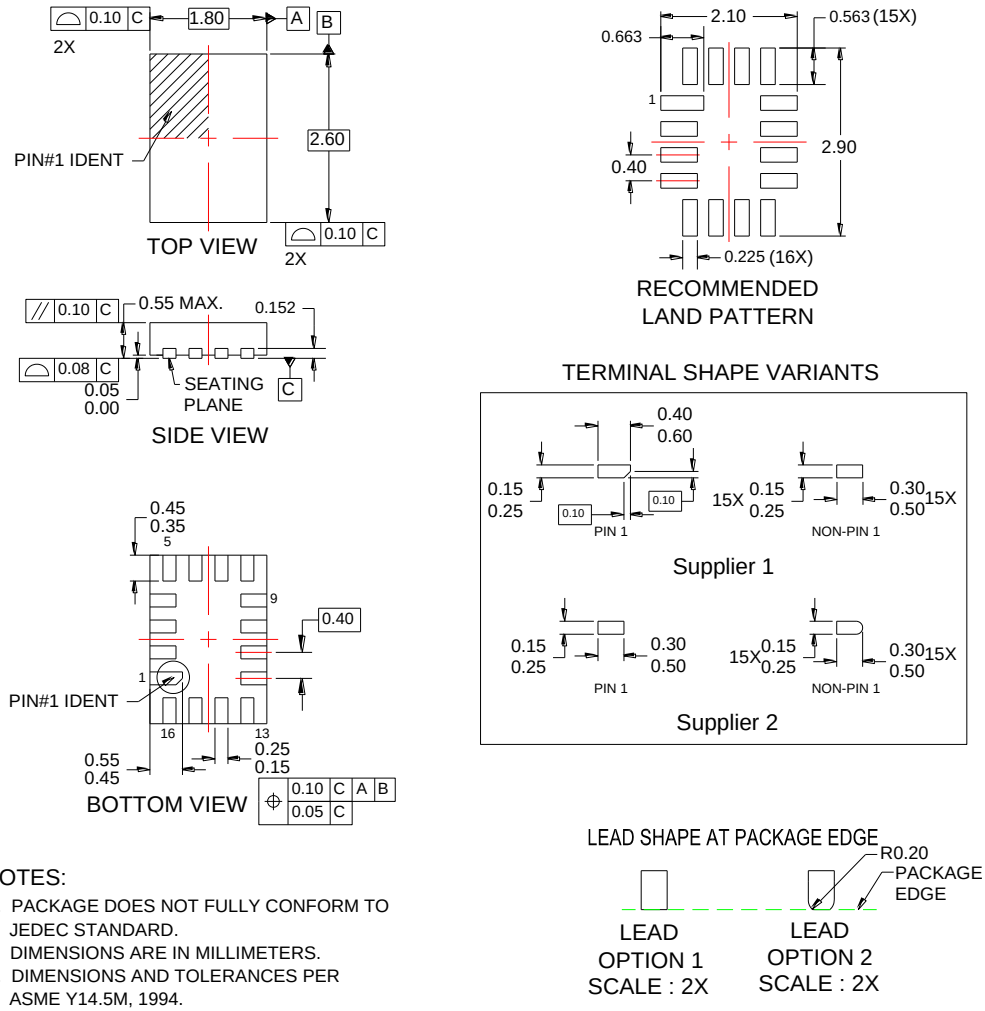



**Figure 9. Harmonic Distortion**

## Physical Dimensions




NOTES:

A. PACKAGE DOES NOT FULLY CONFORM TO JEDEC STANDARD.
B. DIMENSIONS ARE IN MILLIMETERS.
C. DIMENSIONS AND TOLERANCES PER ASME Y14.5M, 1994.
D. LAND PATTERN RECOMMENDATION IS BASED ON FSC DESIGN ONLY.
E. DRAWING FILENAME: MKT-UMLP16Arev4.
F. TERMINAL SHAPE MAY VARY ACCORDING TO PACKAGE SUPPLIER, SEE TERMINAL SHAPE VARIANTS.

**Figure 10. 16-Pin Ultrathin Molded Leadless Package (UMLP)**

| Order Number | Operating Temperature Range | Package Description | Packing Method |
|---|---|---|---|
| FSA2466UMX | -40 to 85°C | 16-Terminal Ultrathin Molded Leadless Package | Tape & Reel |

*Package drawings are provided as a service to customers considering ON Semiconductor components. Drawings may change in any manner without notice. Please note the revision and/or date on the drawing and contact a ON Semiconductor representative to verify or obtain the most recent revision. Package specifications do not expand the terms of ON Semiconductor's worldwide terms and conditions, specifically the warranty therein, which covers ON Semiconductor products.*

## PUBLICATION ORDERING INFORMATION

**LITERATURE FULFILLMENT:**

Literature Distribution Center for ON Semiconductor
19521 E. 32nd Pkwy, Aurora, Colorado 80011 USA
**Phone**: 303-675-2175 or 800-344-3860 Toll Free USA/Canada
Fax: 303-675-2176 or 800-344-3867 Toll Free USA/Canada
**Email**: orderlit@onsemi.com

**N. American Technical Support**: 800-282-9855 Toll Free USA/Canada.
**Europe, Middle East and Africa Technical Support**:
Phone: 421 33 790 2910
**Japan Customer Focus Center**
Phone: 81-3-5817-1050

**ON Semiconductor Website**: www.onsemi.com

**Order Literature**: http://www.onsemi.com/orderlit

For additional information, please contact your local Sales Representative

# Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

onsemi:
FSA2466UMX