

# FSA2267 / FSA2267A

## 0.35Ω Low-Voltage Dual-SPDT Analog Switch

### Features

- ? Typical 0.35Ω On Resistance ( $R_{ON}$ ) for +2.7V Supply
- ? FSA2267A Features  $<10\mu A$   $I_{CCT}$  Current when S Input is Lower than  $V_{CC}$
- ?  $R_{ON}$  Fatness for +2.7V Supply: 0.25Ω Maximum
- ? 1.6mm x 2.1mm 10-Lead MicroPak™ Package
- ? Broad  $V_{CC}$  Operating Range
- ? Low THD (0.02% Typical for 32Ω Load)
- ? High Current Handling Capability (350mA Continuous Current  $<3.3V$  Supply)

### Applications

- ? Cell phone
- ? PDA
- ? Portable Media Player

### Description

The FSA2267 and FSA2267A are Dual Single Pole Double Throw (SPDT) analog switches. The FSA2267 operates from a single 1.65V to 3.6V supply, while the FSA2267A operates from a single 2.3V to 4.3V supply. Each features an ultra-low On Resistance of 0.35Ω at a +2.7V supply and 25°C. Both devices are fabricated with sub-micron CMOS technology to achieve fast switching speeds and designed for break-before-make operation.

FSA2267A features very low quiescent current, even when the control voltage is lower than the  $V_{CC}$  supply. This feature services the mobile handset applications very well, allowing for the direct interface with baseband processor general-purpose I/Os.

### Ordering Information

| Order Number | Top Mark  | Package Description                                                   | Packing Method              |
|--------------|-----------|-----------------------------------------------------------------------|-----------------------------|
| FSA2267L10X  | FC        | 10-Lead MicroPak, 1.6 x 2.1mm, JEDEC MO-255                           | 5000 Units on Tape and Reel |
| FSA2267AL10X | FD        | 10-Lead MicroPak, 1.6 x 2.1mm, JEDEC MO-255                           | 5000 Units on Tape and Reel |
| FSA2267AMUX  | FSA 2267A | 10-Lead Molded Small Outline Package (MSOP), JEDEC MO-187, 3.0mm Wide | 4000 Units on Tape and Reel |

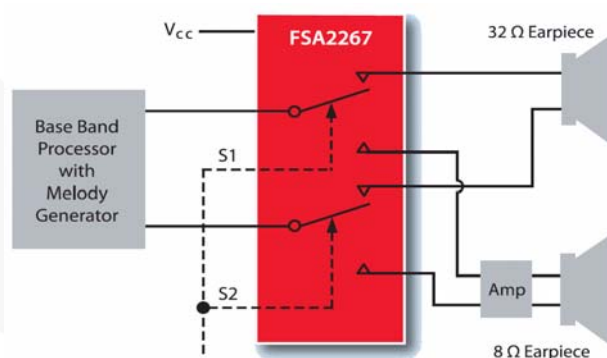


Figure 1. Application Diagram

## Analog Symbols

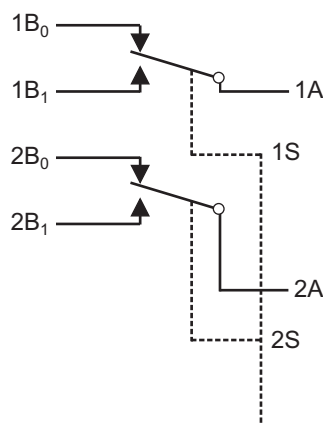


Figure 2. Analog Symbol

## Connections Diagram

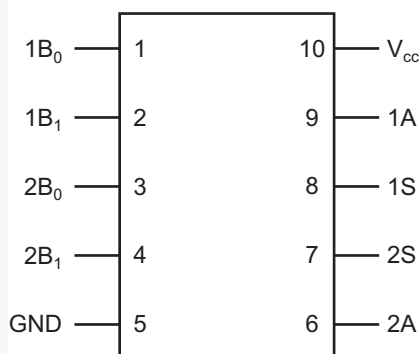


Figure 3. 10-Lead MSOP

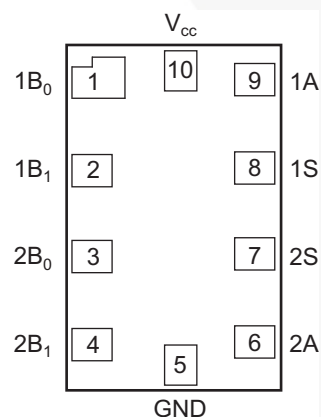


Figure 4. 10-Lead Micropak

## Truth Table

| Control Input(s) | Function                      |
|------------------|-------------------------------|
| LOW Logic Level  | B <sub>0</sub> Connected to A |
| HIGH Logic Level | B <sub>1</sub> Connected to A |

## Pin Descriptions

| Pin              | Name                                                                           | Function       |
|------------------|--------------------------------------------------------------------------------|----------------|
| 1, 2, 3, 4, 6, 9 | 1B <sub>0</sub> , 1B <sub>1</sub> , 2B <sub>0</sub> , 2B <sub>1</sub> , 2A, 1A | Data Ports     |
| 8, 7             | 1S, 2S                                                                         | Control Input  |
| 10               | VCC                                                                            | Supply Voltage |
| 5                | GND                                                                            | Ground         |

## 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                                                   | -0.5 | +5.5           | V    |
| $V_S$        | Switch Voltage <sup>(1)</sup>                                    | -0.5 | $V_{CC} + 0.5$ | V    |
| $V_{IN}$     | Control Input Voltage <sup>(1)</sup>                             | -0.5 | 5.5            | V    |
| $I_{IK}$     | Input Diode Current <sup>(2)</sup>                               | -50  |                | mA   |
| $I_{SW}$     | Switch Current                                                   |      | 350            | mA   |
| $I_{SWPEAK}$ | Peak Switch Current<br>(Pulsed at 1ms Duration, <10% Duty Cycle) |      | 500            | mA   |
| $T_{STG}$    | Storage Temperature Range                                        | -65  | +150           | °C   |
| $T_J$        | Maximum Junction Temperature                                     |      | +150           | °C   |
| $T_L$        | Lead Temperature (Soldering, 10 Seconds)                         |      | +260           | °C   |
| ESD          | Human Body Model: FSA2267                                        |      | 7500           | V    |
|              | Human Body Model, JESD22-A114:FSA2267A                           |      | 7000           | V    |
|              | Charged Device Model, JESD22-C101:<br>FSA2267/FSA2267A           |      | 1000           | V    |

### Notes:

1. The input and output negative voltage ratings may be exceeded if the input and output diode current ratings are observed.
2. Minimums define the acceptable range of current. Negative current should not exceed minimum negative values.

## 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. Fairchild does not recommend exceeding them or designing to absolute maximum ratings.

| Symbol   | Parameter                            | Min. | Max.     | Unit |
|----------|--------------------------------------|------|----------|------|
| $V_{CC}$ | Supply Voltage                       |      |          | V    |
|          | FSA2267                              | 1.65 | 3.6      | V    |
|          | FSA2267A                             | 2.3  | 4.3      |      |
| $V_{IN}$ | Control Input Voltage <sup>(3)</sup> | 0    | $V_{CC}$ | V    |
| $V_{SW}$ | Switch Input Voltage                 | 0    | $V_{CC}$ | V    |
| $T_A$    | Operating Temperature                | -40  | +85      | °C   |

### Note:

3. Unused inputs must be held HIGH or LOW. They may not float.

## ESD Protection

### ESD Performance of the FSA2267/FSA2267A

#### FSA2267

? HBM all pins 7.0kV

? CDM all pins 1.0kV

#### FSA2267A

? HBM all pins 7.5kV

? CDM all pins 1.0kV

### Human Body Model

Figure 5 shows the schematic representation of the Human Body Model ESD event. Figure 6 is the ideal waveform representation of the Human Body Model. The device is tested to JEDEC: JESD22-A114 Human Body Model.

### Charged Device Model

In manufacturing test and handling environments, a more useful model is the Charged Device Model and the FSA2267/FSA2267A has a very good ESD immunity to this model. The device is tested to JEDEC: JESD22-C101 Charged Device Model.

### IEC 61000-4-2

The IEC 61000-4-2 standard covers ESD testing and performance of finished equipment and evaluates the equipment in its entirety for ESD immunity. Fairchild Semiconductor has evaluated this device using the IEC 6100-4-2 representative system model depicted in Figure 7.

ESD values measured via the IEC 61000-4-2 evaluation method are influenced by the specific board layout, board size, and many other factors of the manufacturer's product application. Measured system ESD values cannot be guaranteed by Fairchild Semiconductor to exactly correlate to a manufacturer's in-house testing due to these application environment variables. Fairchild Semiconductor has been able to determine that, for ultra-portable applications, an enhanced ESD immunity, relative to the IEC 61000-4-2 specification, can be achieved with the inclusion of a 100Ω-series resistor in the  $V_{CC}$  supply path to the analog switch (see Figure 8). Typical improvements of between 3-6kV of ESD immunity (I/O to GND) have been measured with the inclusion of the resistor with the IEC 61000-4-2 representative model. For more information on ESD testing methodologies, please refer to:

AN-6019 Fairchild Analog Switch Products ESD Test Methodology Overview

<http://www.fairchildsemi.com/an/AN/AN-6019.pdf>.

### Additional ESD Test Conditions

For information regarding test methodologies and performance levels, please contact Fairchild Semiconductor.

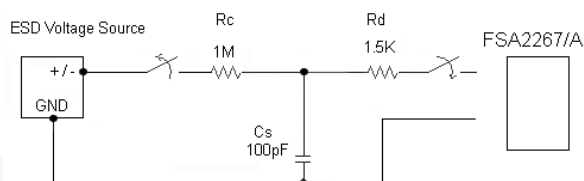


Figure 5. Human Body ESD Test Model

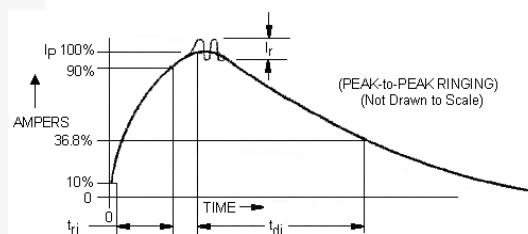


Figure 6. HBM Current Waveform

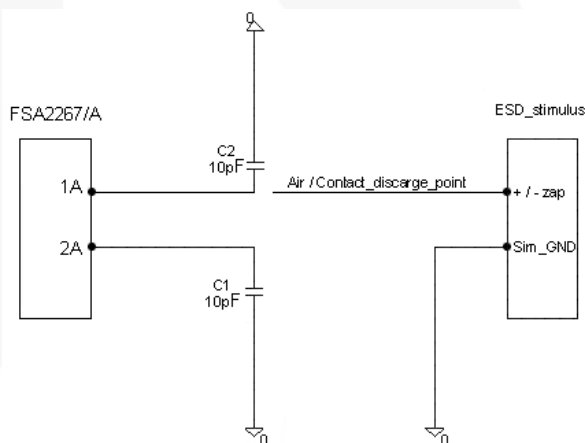


Figure 7. IEC 61000-4-2 ESD Test Model

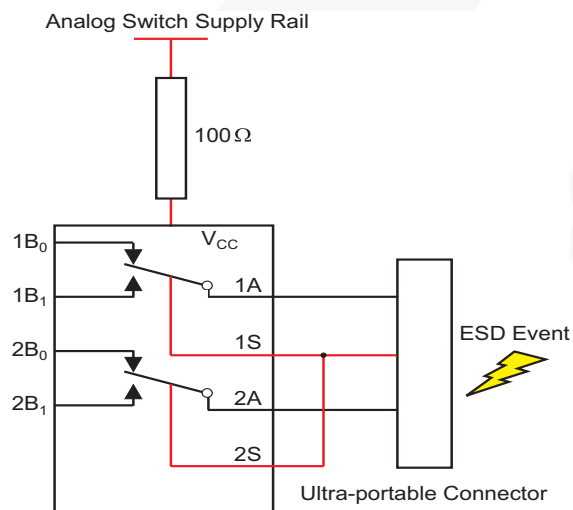


Figure 8. ESD Immunity with 100Ω Resistor

## FSA2267 DC Electrical Characteristics

All typical values are at 25°C unless otherwise specified.

| Symbol                                         | Parameter                                                       | Conditions                                                                           | V <sub>CC</sub> | T <sub>A</sub> = +25°C |       |      | T <sub>A</sub> = -40 to +85°C |                      | Units |
|------------------------------------------------|-----------------------------------------------------------------|--------------------------------------------------------------------------------------|-----------------|------------------------|-------|------|-------------------------------|----------------------|-------|
|                                                |                                                                 |                                                                                      | (V)             | Min.                   | Typ.  | Max. | Min.                          | Max.                 |       |
| V <sub>IH</sub>                                | Input Voltage High                                              |                                                                                      | 2.7 to 3.6      |                        |       |      | 2.0                           |                      | V     |
|                                                |                                                                 |                                                                                      | 2.3 to 2.7      |                        |       |      | 1.7                           |                      |       |
|                                                |                                                                 |                                                                                      | 1.65 to 1.95    |                        |       |      | 0.65 V <sub>CC</sub>          |                      |       |
| V <sub>IL</sub>                                | Input Voltage Low                                               |                                                                                      | 2.7 to 3.6      |                        |       |      |                               | 0.8                  | V     |
|                                                |                                                                 |                                                                                      | 2.3 to 2.7      |                        |       |      |                               | 0.7                  |       |
|                                                |                                                                 |                                                                                      | 1.65 to 1.95    |                        |       |      |                               | 0.35 V <sub>CC</sub> |       |
| I <sub>IN</sub>                                | Control Input Leakage                                           | V <sub>IN</sub> = 0V to V <sub>CC</sub>                                              | 1.65 to 3.6     |                        |       |      | -0.5                          | 0.5                  | μA    |
| I <sub>NO(OFF)</sub> ,<br>I <sub>NC(OFF)</sub> | Off-Leakage Current of Port nB <sub>0</sub> and nB <sub>1</sub> | nA = 0.3V, 3.3V, nB <sub>0</sub> or nB <sub>1</sub> = 0.3V, 3.3V or floating         | 3.6             | -5.0                   |       | 5.0  | -50                           | 50                   | nA    |
|                                                |                                                                 | nA = 0.3V, 2.4V, nB <sub>0</sub> or nB <sub>1</sub> = 0.3V, 2.4V or floating         | 2.7             | -5.0                   |       | 5.0  | -50                           | 50                   |       |
|                                                |                                                                 | nA = 0.3V, 1.65V, nB <sub>0</sub> or nB <sub>1</sub> = 0.3V, 1.65V or floating       | 1.95            | -5.0                   |       | 5.0  | -50                           | 50                   |       |
| I <sub>A(ON)</sub>                             | On Leakage Current of Port 1A and 2A                            | nA = 0.3V, 3.3V, nB <sub>0</sub> or nB <sub>1</sub> = 0.3V, 3.3V or floating         | 3.6             | -5.0                   |       | 5.0  | -50                           | 50                   | nA    |
|                                                |                                                                 | nA = 0.3V, 2.4V, nB <sub>0</sub> or nB <sub>1</sub> = 0.3V, 2.4V or floating         | 2.7             | -5.0                   |       | 5.0  | -50                           | 50                   |       |
|                                                |                                                                 | nA = 0.3V, 1.65V, nB <sub>0</sub> or nB <sub>1</sub> = 0.3V, 1.65V or floating       | 1.95            | -5.0                   |       | 5.0  | -50                           | 50                   |       |
| R <sub>ON</sub>                                | Switch On Resistance <sup>(4)</sup><br>See Figure 9             | I <sub>OUT</sub> = 100mA, nB <sub>0</sub> or nB <sub>1</sub> = 0V, 0.7V, 2.0V, 2.7V  | 2.7             |                        | 0.35  |      |                               | 0.60                 | Ω     |
|                                                |                                                                 | I <sub>OUT</sub> = 100mA, nB <sub>0</sub> or nB <sub>1</sub> = 0V, 0.7V, 1.6V, 2.3V  | 2.3             |                        | 0.45  |      |                               | 0.75                 |       |
|                                                |                                                                 | I <sub>OUT</sub> = 100mA, nB <sub>0</sub> or nB <sub>1</sub> = 0.8V                  | 1.65            |                        | 1.0   |      |                               | 3.9                  |       |
| ΔR <sub>ON</sub>                               | On Resistance Matching Between Channels <sup>(5)</sup>          | I <sub>OUT</sub> = 100mA, nB <sub>0</sub> or nB <sub>1</sub> = 0.7V                  | 2.7             |                        | 0.040 |      |                               | 0.075                | Ω     |
|                                                |                                                                 |                                                                                      | 2.3             |                        | 0.040 |      |                               | 0.080                |       |
|                                                |                                                                 |                                                                                      | 1.65            |                        | 0.1   |      |                               |                      |       |
| R <sub>FLAT(ON)</sub>                          | On Resistance Flatness <sup>(6)</sup>                           | I <sub>OUT</sub> = 100mA, nB <sub>0</sub> or nB <sub>1</sub> = 0V to V <sub>CC</sub> | 2.7             |                        |       |      |                               | 0.25                 | Ω     |
|                                                |                                                                 |                                                                                      | 2.3             |                        |       |      |                               | 0.3                  |       |
|                                                |                                                                 |                                                                                      | 1.65            |                        | 0.3   |      |                               |                      |       |
| I <sub>CC</sub>                                | Quiescent Supply Current                                        | V <sub>IN</sub> = 0V or V <sub>CC</sub> , I <sub>OUT</sub> = 0A                      | 3.6             | -100                   |       | 100  | -500                          | 500                  | nA    |

### Notes:

- On resistance is determined by the voltage drop between A and B pins at the indicated current through the switch.
- ΔR<sub>ON</sub> = R<sub>ONmax</sub> - R<sub>ONmin</sub> measured at identical V<sub>CC</sub>, temperature, and voltage.
- Flatness is defined as the difference between the maximum and minimum value of R<sub>ON</sub> over the specified range of conditions.

## FSA2267A DC Electrical Characteristics

All typical values are at 25°C unless otherwise specified.

| Symbol                                         | Parameter                                                               | Conditions                                                                           | V <sub>CC</sub> | T <sub>A</sub> = +25°C |      |      | T <sub>A</sub> = -40 to +85°C |       | Units |
|------------------------------------------------|-------------------------------------------------------------------------|--------------------------------------------------------------------------------------|-----------------|------------------------|------|------|-------------------------------|-------|-------|
|                                                |                                                                         |                                                                                      | (V)             | Min.                   | Typ. | Max. | Min.                          | Max.  |       |
| V <sub>IH</sub>                                | Input Voltage High                                                      |                                                                                      | 3.6 to 4.3      |                        |      |      | 1.7                           |       | V     |
|                                                |                                                                         |                                                                                      | 2.7 to 3.6      |                        |      |      | 1.5                           |       |       |
|                                                |                                                                         |                                                                                      | 2.3 to 2.7      |                        |      |      | 1.4                           |       |       |
| V <sub>IL</sub>                                | Input Voltage Low                                                       |                                                                                      | 3.6 to 4.3      |                        |      |      |                               | 0.7   | V     |
|                                                |                                                                         |                                                                                      | 2.7 to 3.6      |                        |      |      |                               | 0.5   |       |
|                                                |                                                                         |                                                                                      | 2.3 to 2.7      |                        |      |      |                               | 0.4   |       |
| I <sub>IN</sub>                                | Control Input Leakage                                                   | V <sub>IN</sub> = 0V to V <sub>CC</sub>                                              | 2.3 to 4.3      |                        |      |      | -0.5                          | 0.5   | μA    |
| I <sub>NO(OFF)</sub> ,<br>I <sub>NC(OFF)</sub> | Off-Leakage Current of Port nB <sub>0</sub> and nB <sub>1</sub>         | nA = 0.3V, 4.0V, nB <sub>0</sub> or nB <sub>1</sub> = 4.0V, 0.3V or floating         | 4.3             | -10.0                  |      | 10.0 | -100                          | 100   | nA    |
|                                                |                                                                         | nA = 0.3V, 3.3V, nB <sub>0</sub> or nB <sub>1</sub> = 0.3V, 3.3V or floating         | 3.6             | -5.0                   |      | 5.0  | -50                           | 50    |       |
|                                                |                                                                         | nA = 0.3V, 2.4V, nB <sub>0</sub> or nB <sub>1</sub> = 0.3V, 2.4V or floating         | 2.7             | -5.0                   |      | 5.0  | -50                           | 50    |       |
| I <sub>A(ON)</sub>                             | On Leakage Current of Port 1A and 2A                                    | nA = 0.3V, 4.0V, nB <sub>0</sub> or nB <sub>1</sub> = 0.3V, 4.0V or floating         | 4.3             | -20.0                  |      | 20.0 | -200                          | 200   | nA    |
|                                                |                                                                         | nA = 0.3V, 3.3V, nB <sub>0</sub> or nB <sub>1</sub> = 0.3V, 3.3V or floating         | 3.6             | -5.0                   |      | 5.0  | -50                           | 50    |       |
|                                                |                                                                         | nA = 0.3V, 3.3V, nB <sub>0</sub> or nB <sub>1</sub> = 0.3V, 3.3V or floating         | 2.7             | -5.0                   |      | 5.0  | -50                           | 50    |       |
| R <sub>ON</sub>                                | Switch On Resistance <sup>(7)</sup>                                     | I <sub>OUT</sub> = 100mA, nB <sub>0</sub> or nB <sub>1</sub> = 0V, 0.7V, 3.6V, 4.3V  | 4.3             |                        | 0.35 |      |                               | 0.6   | Ω     |
|                                                |                                                                         | I <sub>OUT</sub> = 100mA, nB <sub>0</sub> or nB <sub>1</sub> = 0V, 0.7V, 2.3V, 3.0V  | 3.0             |                        | 0.35 |      |                               | 0.6   |       |
|                                                |                                                                         | I <sub>OUT</sub> = 100mA, nB <sub>0</sub> or nB <sub>1</sub> = 0V, 0.7V, 2.0V, 2.7V  | 2.7             |                        | 0.35 |      |                               | 0.6   |       |
|                                                |                                                                         | I <sub>OUT</sub> = 100mA, nB <sub>0</sub> or nB <sub>1</sub> = 0.8V                  | 1.65            |                        | 1.0  |      |                               |       |       |
| ΔR <sub>ON</sub>                               | On Resistance Matching Between Channels <sup>(8)</sup><br>See Figure 10 | I <sub>OUT</sub> = 100mA, nB <sub>0</sub> or nB <sub>1</sub> = 0.7V                  | 4.3             |                        | 0.04 |      |                               | 0.075 | Ω     |
|                                                |                                                                         |                                                                                      | 3.0             |                        | 0.04 |      |                               | 0.075 |       |
|                                                |                                                                         |                                                                                      | 2.7             |                        | 0.04 |      |                               | 0.075 |       |
|                                                |                                                                         |                                                                                      | 1.65            |                        | 0.1  |      |                               |       |       |
| R <sub>FLAT(ON)</sub>                          | On Resistance Flatness <sup>(9)</sup>                                   | I <sub>OUT</sub> = 100mA, nB <sub>0</sub> or nB <sub>1</sub> = 0V to V <sub>CC</sub> | 4.3             |                        | 0.15 |      |                               | 0.25  | Ω     |
|                                                |                                                                         |                                                                                      | 3.0             |                        | 0.15 |      |                               | 0.25  |       |
|                                                |                                                                         |                                                                                      | 2.7             |                        | 0.15 |      |                               | 0.25  |       |
|                                                |                                                                         |                                                                                      | 1.65            |                        | 0.3  |      |                               |       |       |
| I <sub>CC</sub>                                | Quiescent Supply Current                                                | V <sub>IN</sub> = 0V or V <sub>CC</sub> , I <sub>OUT</sub> = 0A                      | 4.3             | -100                   | 80   | 100  | -500                          | 500   | nA    |
| I <sub>CCT</sub>                               | Increase in I <sub>CC</sub> per Input                                   | V <sub>IN</sub> = 1.8V                                                               | 4.3             |                        | 7.0  | 10.0 |                               | 15.0  | μA    |
|                                                |                                                                         | V <sub>IN</sub> = 2.6V                                                               |                 |                        | 0.5  | 2.0  |                               | 7.0   |       |

### Notes:

- On resistance is determined by the voltage drop between A and B pins at the indicated current through the switch.
- ΔR<sub>ON</sub> = R<sub>ONmax</sub> - R<sub>ONmin</sub> measured at identical V<sub>CC</sub>, temperature, and voltage.
- Flatness is defined as the difference between the maximum and minimum value of R<sub>ON</sub> over the specified range of conditions.

## FSA2267 AC Electrical Characteristics

All typical values are at 25°C unless otherwise specified.

| Symbol           | Parameter                 | Conditions                                                                                 | V <sub>CC</sub><br>(V) | T <sub>A</sub> = +25°C |       |      | T <sub>A</sub> = -40 to +85°C |      | Units | Figure Number |
|------------------|---------------------------|--------------------------------------------------------------------------------------------|------------------------|------------------------|-------|------|-------------------------------|------|-------|---------------|
|                  |                           |                                                                                            |                        | Min.                   | Typ.  | Max. | Min.                          | Max. |       |               |
| t <sub>ON</sub>  | Turn-On Time              | nB <sub>0</sub> or nB <sub>1</sub> = 1.5V,<br>R <sub>L</sub> = 50Ω, C <sub>L</sub> = 35 pF | 2.7 to 3.6             |                        | 30.0  | 38.0 |                               | 42.0 | ns    | Figure 11     |
|                  |                           |                                                                                            | 2.3 to 2.7             |                        | 29.0  | 37.0 |                               | 40.0 |       |               |
|                  |                           |                                                                                            | 1.65 to 1.95           |                        | 27.0  | 35.0 |                               | 38.0 |       |               |
| t <sub>OFF</sub> | Turn-Off Time             | nB <sub>0</sub> or nB <sub>1</sub> = 1.5V,<br>R <sub>L</sub> = 50Ω, C <sub>L</sub> = 35 pF | 2.7 to 3.6             |                        | 13.0  | 16.0 |                               | 18.0 | ns    | Figure 11     |
|                  |                           |                                                                                            | 2.3 to 2.7             |                        | 14.0  | 18.0 |                               | 20.0 |       |               |
|                  |                           |                                                                                            | 1.65 to 1.95           |                        | 15.0  | 21.0 |                               | 25.0 |       |               |
| t <sub>BBM</sub> | Break-Before-Make Time    | nB <sub>0</sub> or nB <sub>1</sub> = 1.5V,<br>R <sub>L</sub> = 50Ω, C <sub>L</sub> = 35 pF | 2.7 to 3.6             |                        | 17.0  |      | 2.0                           |      | ns    | Figure 12     |
|                  |                           |                                                                                            | 2.3 to 2.7             |                        | 15.0  |      | 2.0                           |      |       |               |
|                  |                           |                                                                                            | 1.65 to 1.95           |                        | 12.0  |      | 2.0                           |      |       |               |
| Q                | Charge Injection          | C <sub>L</sub> = 100 pF, V <sub>GEN</sub> = 0V,<br>R <sub>GEN</sub> = 0Ω                   | 2.7 to 3.6             |                        | 9.0   |      |                               |      | pC    | Figure 14     |
|                  |                           | C <sub>L</sub> = 100 pF, V <sub>GEN</sub> = 0V,<br>R <sub>GEN</sub> = 0Ω                   | 2.3 to 2.7             |                        | 9.0   |      |                               |      |       |               |
|                  |                           | C <sub>L</sub> = 100 pF, V <sub>GEN</sub> = 0V,<br>R <sub>GEN</sub> = 0Ω                   | 1.65 to 1.95           |                        | 9.0   |      |                               |      |       |               |
| OIRR             | Off Isolation             | f = 100kHz, R <sub>L</sub> = 50Ω, C <sub>L</sub> = 5pF<br>(Stray)                          | 2.7 to 3.6             |                        | -80.0 |      |                               |      | dB    | Figure 13     |
|                  |                           |                                                                                            | 2.3 to 2.7             |                        | -80.0 |      |                               |      |       |               |
|                  |                           |                                                                                            | 1.65 to 1.95           |                        | -80.0 |      |                               |      |       |               |
| Xtalk            | Crosstalk                 | f = 100kHz, R <sub>L</sub> = 50Ω, C <sub>L</sub> = 5pF<br>(Stray)                          | 2.7 to 3.6             |                        | -80.0 |      |                               |      | dB    | Figure 13     |
|                  |                           |                                                                                            | 2.3 to 2.7             |                        | -80.0 |      |                               |      |       |               |
|                  |                           |                                                                                            | 1.65 to 1.95           |                        | -80.0 |      |                               |      |       |               |
| BW               | -3db Bandwidth            | R <sub>L</sub> = 50Ω                                                                       | 1.65 to 3.6            |                        | 45.0  |      |                               |      | MHz   | Figure 16     |
| THD              | Total Harmonic Distortion | R <sub>L</sub> = 32Ω, V <sub>IN</sub> = 2V <sub>pk-pk</sub> ,<br>f = 20Hz to 20kHz         | 2.7 to 3.6             |                        | 0.024 |      |                               |      | %     | Figure 17     |
|                  |                           | R <sub>L</sub> = 32Ω, V <sub>IN</sub> = 1.5V <sub>pk-pk</sub> ,<br>f = 20Hz to 20kHz       | 2.3 to 2.7             |                        | 0.015 |      |                               |      |       |               |
|                  |                           | R <sub>L</sub> = 32Ω, V <sub>IN</sub> = 1.2V <sub>pk-pk</sub> ,<br>f = 20Hz to 20kHz       | 1.65 to 1.95           |                        | 0.35  |      |                               |      |       |               |

## FSA2267A AC Electrical Characteristics

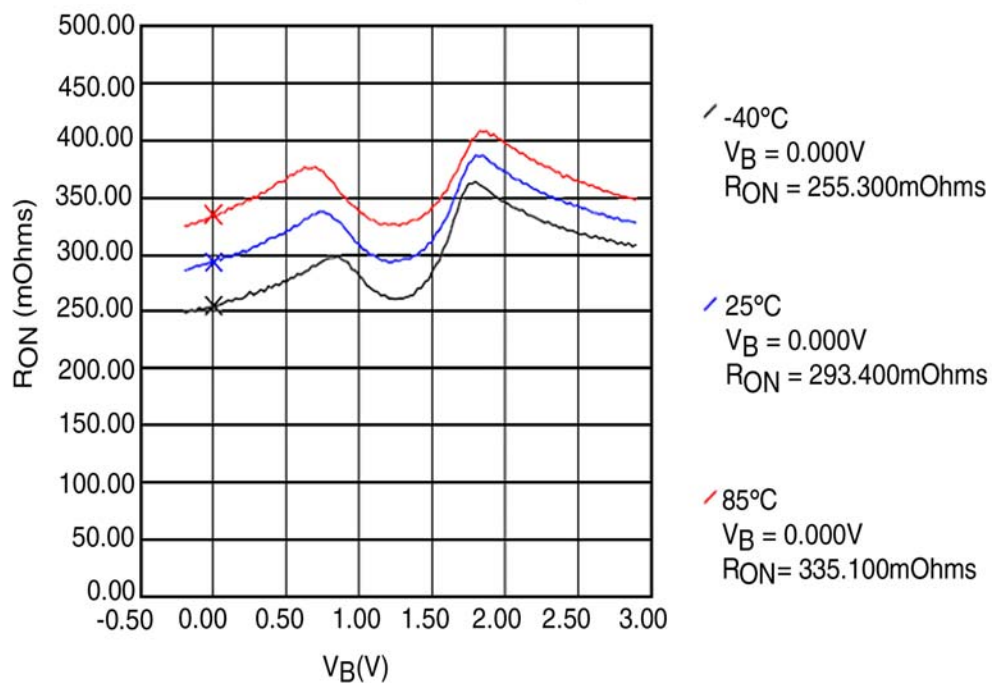
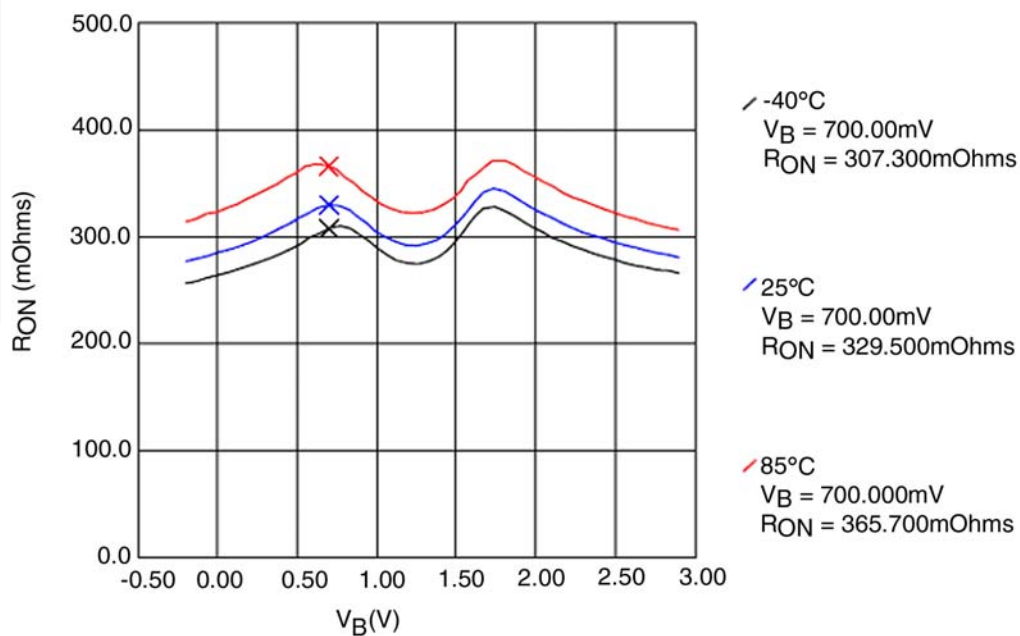
All typical value are at 25°C unless otherwise specified.

| Symbol           | Parameter                 | Conditions                                                                                | V <sub>CC</sub><br>(V) | T <sub>A</sub> = +25°C |       |      | T <sub>A</sub> = -40 to +85°C |      | Units | Figure Number |
|------------------|---------------------------|-------------------------------------------------------------------------------------------|------------------------|------------------------|-------|------|-------------------------------|------|-------|---------------|
|                  |                           |                                                                                           |                        | Min.                   | Typ.  | Max. | Min.                          | Max. |       |               |
| t <sub>ON</sub>  | Turn-On Time              | nB <sub>0</sub> or nB <sub>1</sub> = 1.5V,<br>R <sub>L</sub> = 50Ω, C <sub>L</sub> = 35pF | 3.6 to 4.3             |                        | 37.0  | 46.0 |                               | 48.0 | ns    | Figure 11     |
|                  |                           |                                                                                           | 2.7 to 3.6             |                        | 37.0  | 50.0 |                               | 57.0 |       |               |
|                  |                           |                                                                                           | 2.3 to 2.7             |                        | 60    |      |                               |      |       |               |
|                  |                           |                                                                                           | 1.65                   |                        | 570   |      |                               |      |       |               |
| t <sub>OFF</sub> | Turn-Off Time             | nB <sub>0</sub> or nB <sub>1</sub> = 1.5V,<br>R <sub>L</sub> = 50Ω, C <sub>L</sub> = 35pF | 3.6 to 4.3             |                        | 15.0  | 23.0 |                               | 25.0 | ns    | Figure 11     |
|                  |                           |                                                                                           | 2.7 to 3.6             |                        | 16.0  | 30.0 |                               | 30.0 |       |               |
|                  |                           |                                                                                           | 2.3 to 2.7             |                        | 50.0  |      |                               |      |       |               |
|                  |                           |                                                                                           | 1.65                   |                        | 500   |      |                               |      |       |               |
| t <sub>BBM</sub> | Break-Before-Make Time    | nB <sub>0</sub> or nB <sub>1</sub> = 1.5V,<br>R <sub>L</sub> = 50Ω, C <sub>L</sub> = 35pF | 3.6 to 4.3             |                        | 8.0   |      | 2.0                           |      | ns    | Figure 12     |
|                  |                           |                                                                                           | 2.7 to 3.6             |                        | 8.0   |      | 2.0                           |      |       |               |
|                  |                           |                                                                                           | 2.3 to 2.7             |                        | 8.0   |      | 2.0                           |      |       |               |
| Q                | Charge Injection          | C <sub>L</sub> = 100 pF, V <sub>GEN</sub> = 0V,<br>R <sub>GEN</sub> = 0Ω                  | 3.6 to 4.3             |                        | 24.0  |      |                               |      | pC    | Figure 14     |
|                  |                           | C <sub>L</sub> = 100 pF, V <sub>GEN</sub> = 0V,<br>R <sub>GEN</sub> = 0Ω                  | 2.7 to 3.6             |                        | 24.0  |      |                               |      |       |               |
|                  |                           | C <sub>L</sub> = 100 pF, V <sub>GEN</sub> = 0V,<br>R <sub>GEN</sub> = 0Ω                  | 2.3 to 2.7             |                        | 24.0  |      |                               |      |       |               |
| OIRR             | Off Isolation             | f = 100kHz, R <sub>L</sub> = 50Ω, C <sub>L</sub> = 5pF<br>(Stray)                         | 3.6 to 4.3             |                        | -75.0 |      |                               |      | dB    | Figure 13     |
|                  |                           |                                                                                           | 2.7 to 3.6             |                        | -75.0 |      |                               |      |       |               |
|                  |                           |                                                                                           | 2.3 to 2.7             |                        | -75.0 |      |                               |      |       |               |
| Xtalk            | Crosstalk                 | f = 100kHz, R <sub>L</sub> = 50Ω, C <sub>L</sub> = 5pF<br>(Stray)                         | 3.6 to 4.3             |                        | -70.0 |      |                               |      | dB    | Figure 13     |
|                  |                           |                                                                                           | 2.7 to 3.6             |                        | -70.0 |      |                               |      |       |               |
|                  |                           |                                                                                           | 2.3 to 2.7             |                        | -70.0 |      |                               |      |       |               |
| BW               | -3db Bandwidth            | R <sub>L</sub> = 50Ω                                                                      | 2.3 to 4.3             |                        | 45.0  |      |                               |      | MHz   | Figure 16     |
| THD              | Total Harmonic Distortion | R <sub>L</sub> = 32Ω, V <sub>IN</sub> = 2V <sub>pk-pk</sub> ,<br>f = 20Hz to 20kHz        | 3.6 to 4.3             |                        | 0.02  |      |                               |      | %     | Figure 17     |
|                  |                           | R <sub>L</sub> = 32Ω, V <sub>IN</sub> = 1.5V <sub>pk-pk</sub> ,<br>f = 20Hz to 20kHz      | 2.7 to 3.6             |                        | 0.02  |      |                               |      |       |               |
|                  |                           | R <sub>L</sub> = 32Ω, V <sub>IN</sub> = 1.2V <sub>pk-pk</sub> ,<br>f = 20Hz to 20kHz      | 2.3 to 2.7             |                        | 0.02  |      |                               |      |       |               |

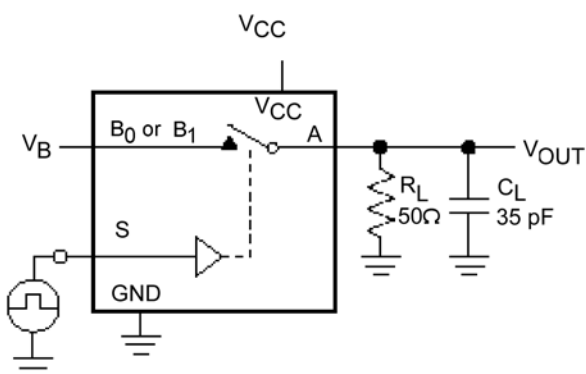
## Capacitance

| Symbol           | Parameter                     | Conditions | V <sub>CC</sub><br>(V) | T <sub>A</sub> = +25°C |      |      | T <sub>A</sub> = -40 to +85°C |      | Units | Figure Number |
|------------------|-------------------------------|------------|------------------------|------------------------|------|------|-------------------------------|------|-------|---------------|
|                  |                               |            |                        | Min.                   | Typ. | Max. | Min.                          | Max. |       |               |
| C <sub>IN</sub>  | Control Pin Input Capacitance | f = 1Mhz   | 0.0                    |                        | 1.5  |      |                               |      | pF    | Figure 15     |
| C <sub>OFF</sub> | B Port Off Capacitance        | f = 1Mhz   | 3.3                    |                        | 30.0 |      |                               |      | pF    | Figure 15     |
| C <sub>ON</sub>  | A Port On Capacitance         | f = 1Mhz   | 3.3                    |                        | 126  |      |                               |      | pF    | Figure 15     |

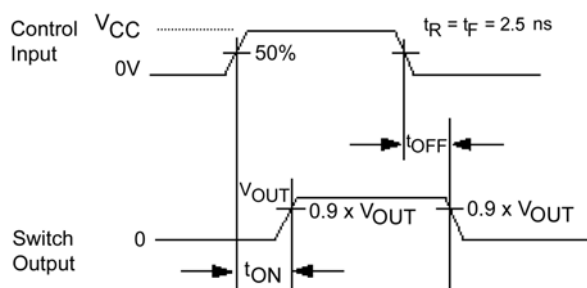
## Typical Characteristics

Figure 9.  $R_{ON}$  at 2.7V for FSA2267Figure 10.  $R_{ON}$  at 2.7V for FSA2267A

## AC Loading and Waveforms

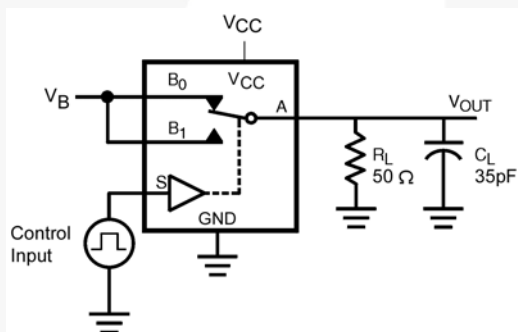


$C_L$  includes Fixture and Stray Capacitance.



Logic input waveforms are inverted for switches with opposite logic sense.

Figure 11. Turn-On/Turn-Off Timing



$C_L$  Includes Fixture and Stray Capacitance

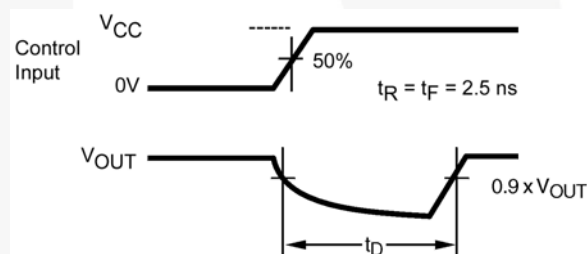


Figure 12. Break-Before-Make Timing

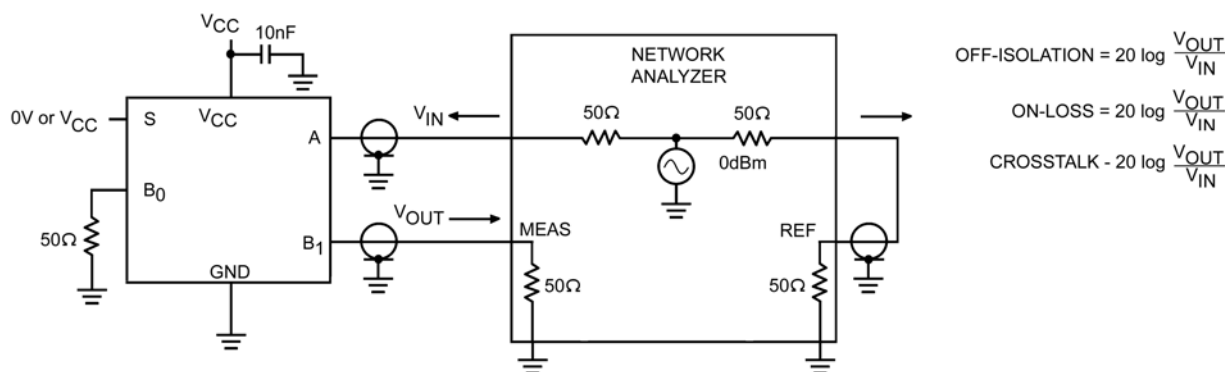


Figure 13. Off Isolation and Crosstalk

# AC Loading and Waveforms (Continued)

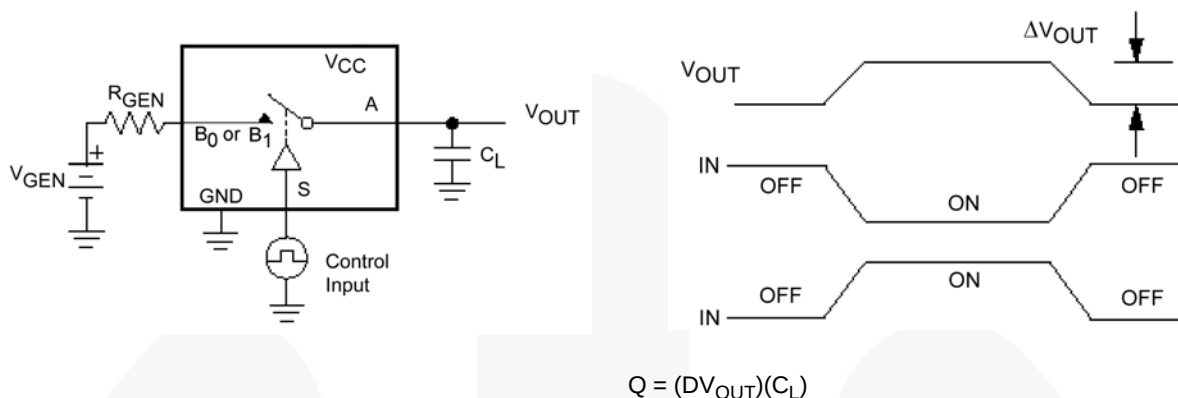


Figure 14. Charge Injection

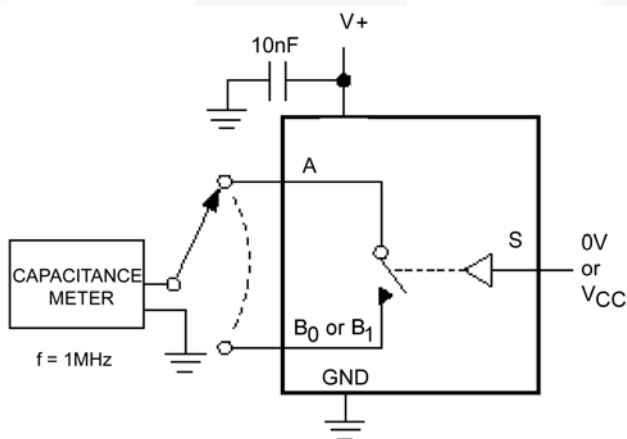


Figure 15. On/Off Capacitance Measurement Setup

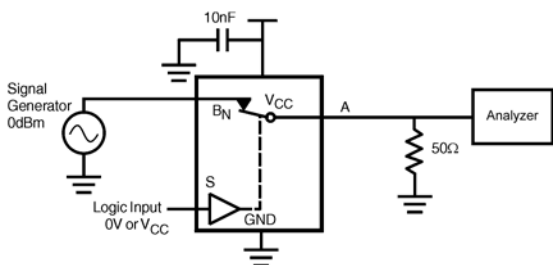


Figure 16. Bandwidth

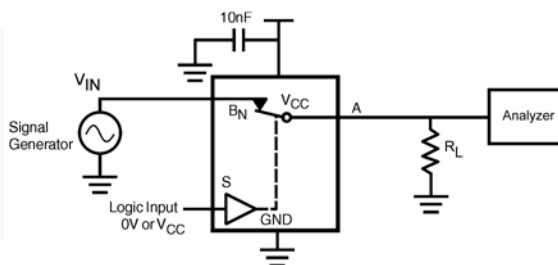
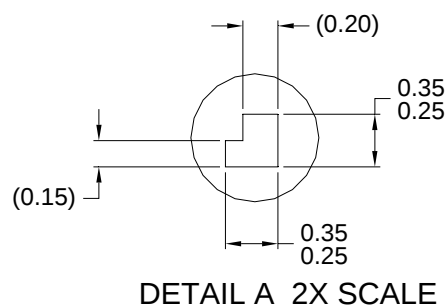
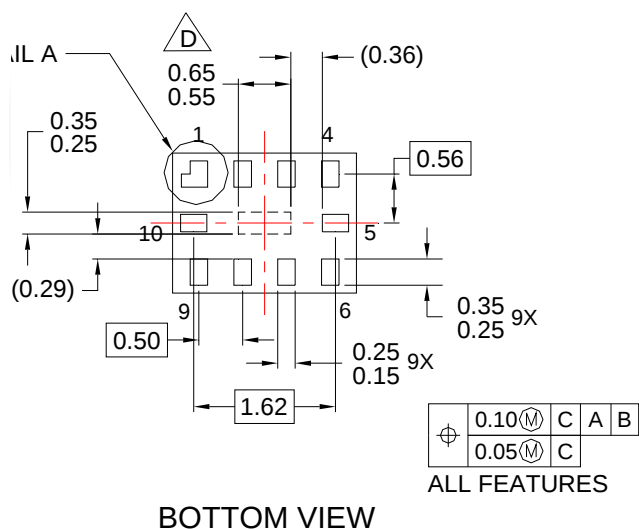
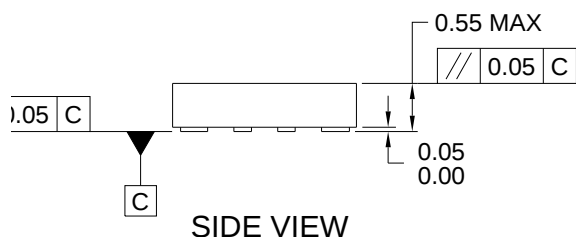
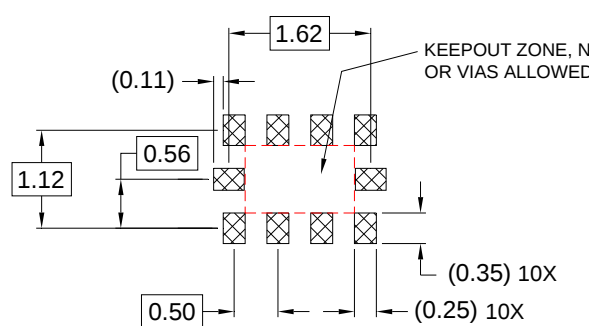
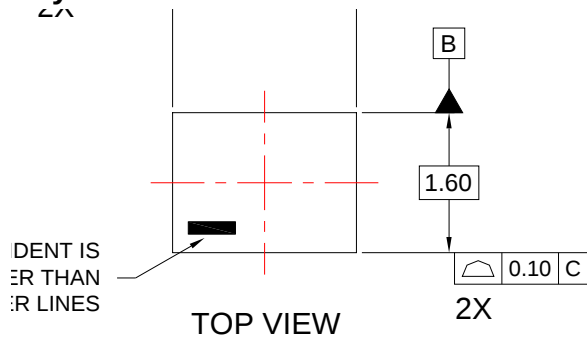


Figure 17. Harmonic Distortion

## Physical Dimensions



## NOTES:

- A. PACKAGE CONFORMS TO JEDEC REGISTRATION MO-255, VARIATION UABI
- B. DIMENSIONS ARE IN MILLIMETERS.
- C. DIMENSIONS AND TOLERANCES PER ASME Y14.5M, 1994.
- D. PRESENCE OF CENTER PAD IS PACKAGE SUPPLIER DEPENDENT. IF PRESENT IS NOT INTENDED TO BE SOLDERED AND HAS A BLACK OXIDE FINISH.
- E. DRAWING FILENAME: MKT-MAC10Arev5.

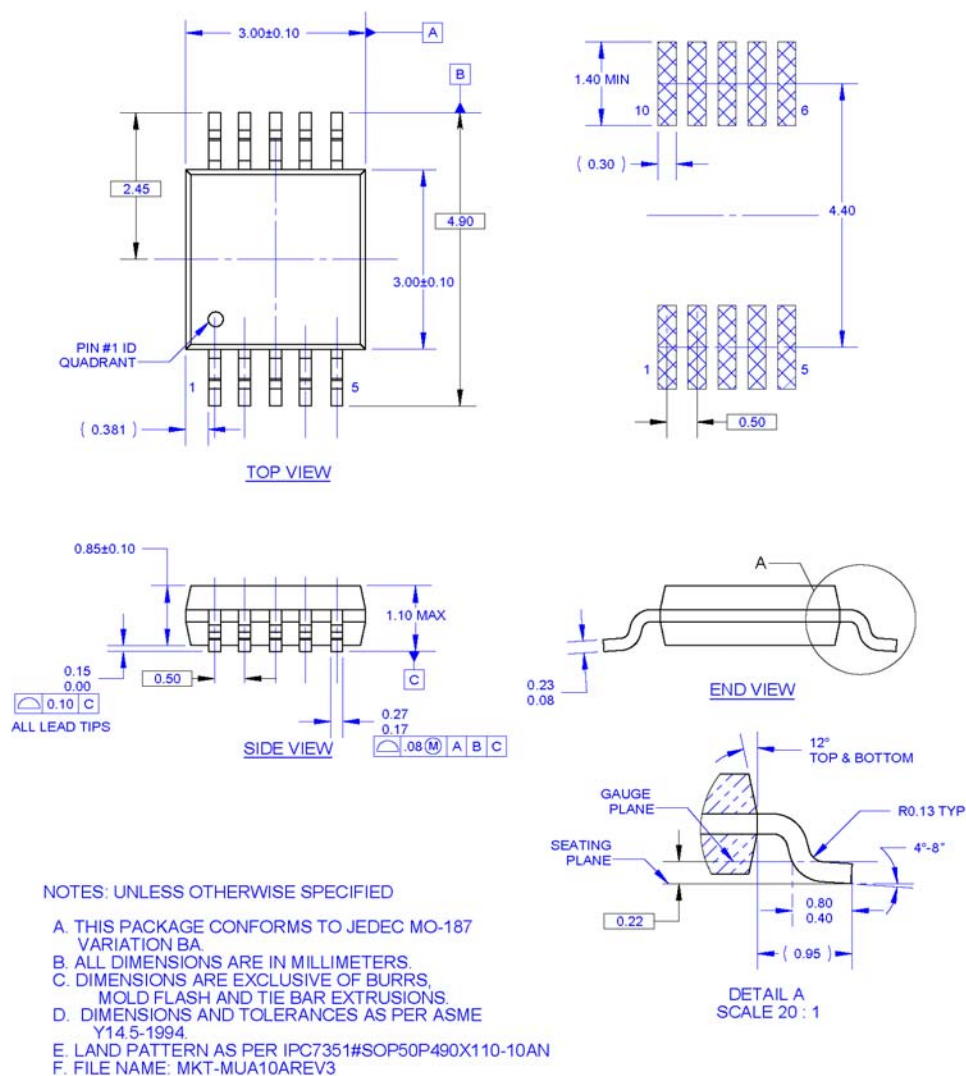
Figure 18. 10-Lead, MicroPak™, 1.6 x 2.1mm

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[For current tape and reel specifications, visit Fairchild Semiconductor's online packaging area:](http://www.fairchildsemi.com/products/logic/pdf/micropak_tr.pdf)  
[http://www.fairchildsemi.com/products/logic/pdf/micropak\\_tr.pdf](http://www.fairchildsemi.com/products/logic/pdf/micropak_tr.pdf)

## Physical Dimensions



**Figure 19. Pb-Free, 10-Lead, Molded Small Outline Package (MSOP), JEDEC MO-187, 3.0mm Wide**

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[http://www.fairchildsemi.com/products/analog/pdf/msop10\\_tr.pdf](http://www.fairchildsemi.com/products/analog/pdf/msop10_tr.pdf)



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|-----------------------------------------------------------------------------------|------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| 2Cool™                                                                            | F-PFS™                                         | PowerTrench®                                                                      | The Power Franchise®                                                                |
| AccuPower™                                                                        | FRFET®                                         | PowerXS™                                                                          | the power franchise                                                                 |
| AX-CAP™*                                                                          | Global Power Resource™                         | Programmable Active Droop™                                                        | TinyBoost™                                                                          |
| BitSiC™                                                                           | GreenBridge™                                   | QFET®                                                                             | TinyBuck™                                                                           |
| Build it Now™                                                                     | Green FPS™                                     | QS™                                                                               | TinyCalc™                                                                           |
| CorePLUS™                                                                         | Green FPS™ e-Series™                           | Quiet Series™                                                                     | TinyLogic®                                                                          |
| CorePOWER™                                                                        | Gmax™                                          | RapidConfigure™                                                                   | TINYOPTO™                                                                           |
| CROSSVOLT™                                                                        | GTO™                                           |  | TinyPower™                                                                          |
| CTL™                                                                              | IntelliMAX™                                    | Saving our world, 1mW/WkW at a time™                                              | TinyPWM™                                                                            |
| Current Transfer Logic™                                                           | ISOPLANAR™                                     | SignalWise™                                                                       | TinyWire™                                                                           |
| DEUXPEED®                                                                         | Making Small Speakers Sound Louder and Better™ | SmartMax™                                                                         | TranSiC™                                                                            |
| Dual Cool™                                                                        | MegaBuck™                                      | SMART START™                                                                      | TriFault Detect™                                                                    |
| EcoSPARK®                                                                         | MICROCOUPLER™                                  | Solutions for Your Success™                                                       | TRUECURRENT®*                                                                       |
| EfficientMax™                                                                     | MicroFET™                                      | SPM®                                                                              | µSerDes™                                                                            |
| ESBC™                                                                             | MicroPak™                                      | STEALTH™                                                                          |  |
|  | MicroPak2™                                     | SuperFET®                                                                         | SerDes™                                                                             |
| Fairchild®                                                                        | MillerDrive™                                   | SuperSOT™-3                                                                       | UHC®                                                                                |
| Fairchild Semiconductor®                                                          | MotionMax™                                     | SuperSOT™-6                                                                       | Ultra FRFET™                                                                        |
| FACT Quiet Series™                                                                | Motion-SPM™                                    | SuperSOT™-8                                                                       | UniFET™                                                                             |
| FACT®                                                                             | mWSaver™                                       | SupreMOS®                                                                         | VCX™                                                                                |
| FAST®                                                                             | OptoHiT™                                       | SyncFET™                                                                          | VisualMax™                                                                          |
| FastvCore™                                                                        | OPTOLOGIC®                                     | Sync-Lock™                                                                        | VoltagePlus™                                                                        |
| FETBench™                                                                         | OPTOPLANAR®                                    |  | XS™                                                                                 |
| FlashWriter®*                                                                     |                                                |                                                                                   |                                                                                     |
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