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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_{CC}
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 $T_A=25^\circ\text{C}$. 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.

Applications

- MP3 Portable Media Players
- Cellular Phones, Smartphones

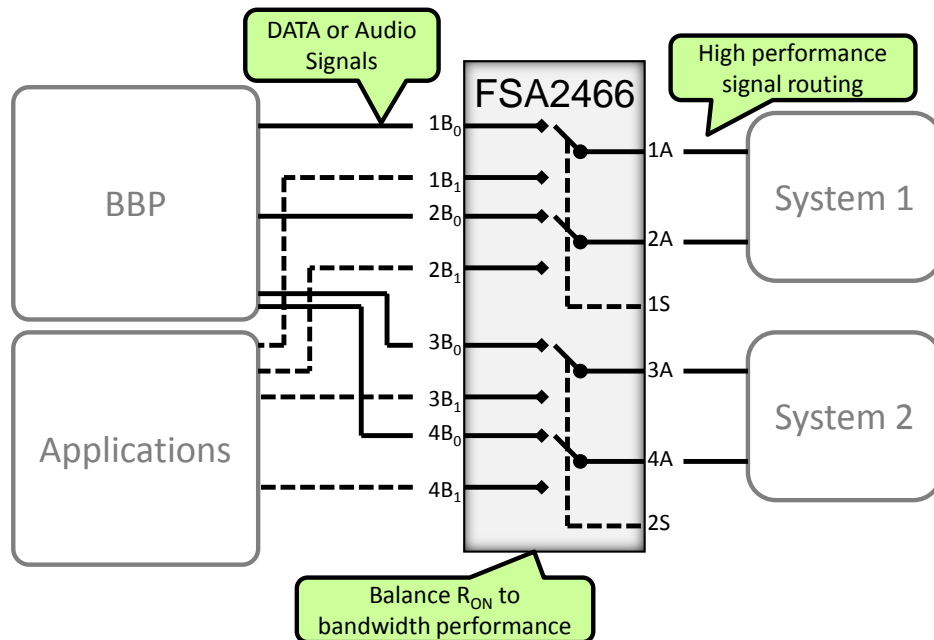


Figure 1. Typical Mobile Phone Application

Pin Configuration

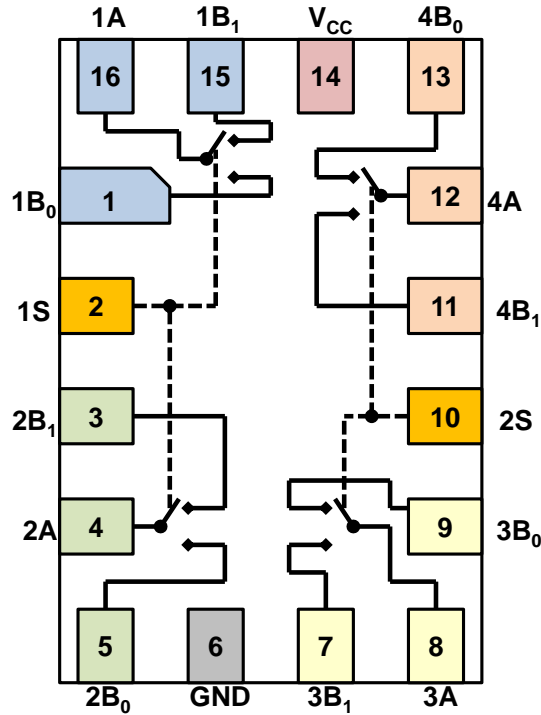


Figure 2. FSA2466UMX (Top View)

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:

- For 4.45 V operation, SEL frequency (pins 1S & 2S) should not exceed 100Hz and 100ns edge rate.
- 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)	$T_A=+25^\circ\text{C}$			$T_A=-40$ 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	μA
$I_{NO(OFF)}$ $I_{NC(OFF)}$	Off Leakage Current of Port nB_0 and nB_1	$nA=0.3\text{ V, }V_{CC}=0.3\text{ V}$ nB_0 or $nB_1=0.3\text{ V, }V_{CC}=0.3\text{ V}$ or Floating	1.95 to 4.30	-10		10	-50	50	nA
$I_{A(ON)}$	On Leakage Current of Port A	$nA=0.3\text{ V, }V_{CC}=0.3\text{ V}$ nB_0 or $nB_1=0.3\text{ V, }V_{CC}=0.3\text{ V}$ or Floating	1.95 to 4.30	-10		10	-50	50	nA
R_{ON}	Switch On Resistance ⁽³⁾	$I_{OUT}=100\text{ mA}$	4.30		1.6			2.0	Ω
		$I_{OUT}=100\text{ mA, }nB_0$ or $nB_1=0\text{ V, }0.7\text{ V, }1.2\text{ V, }V_{CC}$	2.70		2.0			2.5	
		$I_{OUT}=100\text{ mA, }nB_0$ or $nB_1=0.7\text{ V}$	2.30		2.2			2.7	
ΔR_{ON}	On Resistance Matching Between Channels ⁽⁴⁾	$I_{OUT}=100\text{ mA, }nB_0$ or $nB_1=0.8\text{ V}$	2.70		0.04			0.20	Ω
		$I_{OUT}=100\text{ mA, }nB_0$ or $nB_1=0.7\text{ V}$	2.30		0.03			0.30	
$R_{FLAT(ON)}$	On Resistance Flatness ⁽⁵⁾	$I_{OUT}=100\text{ mA, }nB_0$ or $nB_1=0\text{ V} \rightarrow V_{CC}$	2.70		0.60			0.8	Ω
			2.30		0.75			0.9	
I_{CC}	Quiescent Supply Current	$V_{IN}=0\text{ V to }V_{CC, }I_{OUT}=0\text{ V}$	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	μA
		$V_{IN}=2.6\text{ V}$	4.30		3	6		7	

Notes:

- On resistance is determined by the voltage drop between the A and B pins at the indicated current through the switch.
- $\Delta R_{ON}=R_{ON\text{ max}} - R_{ON\text{ min}}$ measured at identical V_{CC} , temperature, and voltage.
- 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}	$T_A=+25^\circ\text{C}$			$T_A=-40$ to $+85^\circ\text{C}$		Unit	Figure
				Min.	Typ.	Max.	Min.	Max.		
t_{ON}	Turn-On Time	nB_0 or $nB_1=1.5\text{ V}$ $R_L=50\ \Omega$, $C_L=35\ \text{pF}$	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 $nB_1=1.5\text{ V}$ $R_L=50\ \Omega$, $C_L=35\ \text{pF}$	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 ⁽⁶⁾	nB_0 or $nB_1=1.5\text{ V}$ $R_L=50\ \Omega$, $C_L=35\ \text{pF}$	3.6 to 4.3		15				ns	Figure 4
			2.7 to 3.6		15					
			2.3 to 2.7		15					
Q	Charge Injection	$C_L=100\ \text{pF}$, $V_{GEN}=0\ \text{V}$, $R_{GEN}=0\ \Omega$	3.6 to 4.3		8				pC	Figure 6
		$C_L=100\ \text{pF}$, $V_{GEN}=0\ \text{V}$, $R_{GEN}=0\ \Omega$	2.7 to 3.6		6					
		$C_L=100\ \text{pF}$, $V_{GEN}=0\ \text{V}$, $R_{GEN}=0\ \Omega$	2.3 to 2.7		3					
OIRR	Off Isolation	$f=100\ \text{KHz}$, $R_L=50\ \Omega$, $C_L=5\ \text{pF}$	3.6 to 4.3		-90				dB	Figure 5
			2.7 to 3.6		-90					
			2.3 to 2.7		-90					
Xtalk	Crosstalk	$f=100\ \text{KHz}$, $R_L=50\ \Omega$, $C_L=5\ \text{pF}$	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	$R_L=32\ \Omega$, $V_{IN}=2V_{PP}$, $f=20$ 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					
		$R_L=600\ \Omega$, $V_{IN}=2\ V_{PP}$, $f=20$ 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					

Note:

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

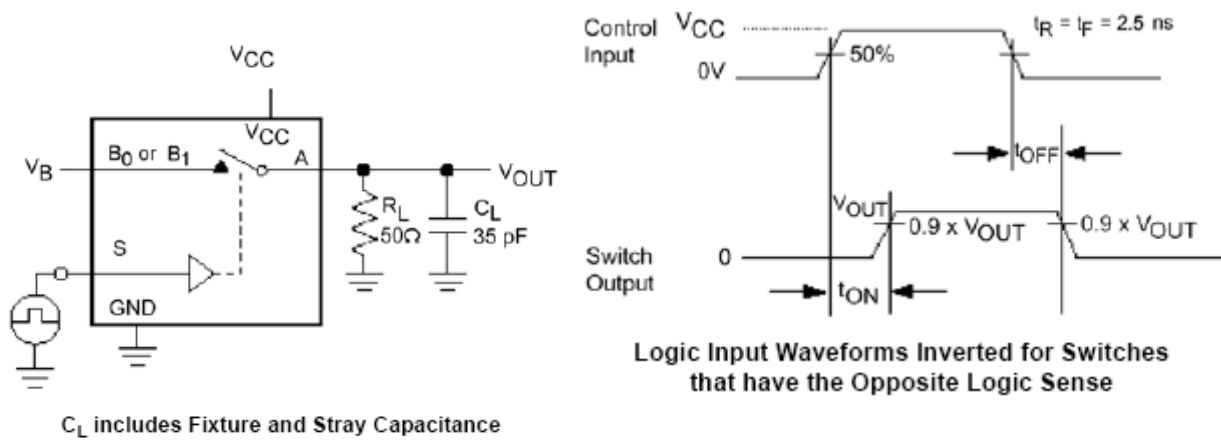


Figure 3. Turn-On / Turn-Off Timing

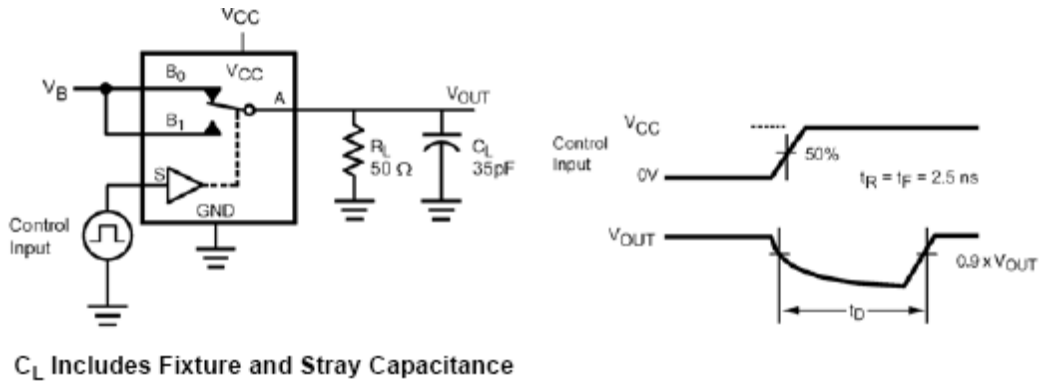


Figure 4. Break-Before-Make Timing

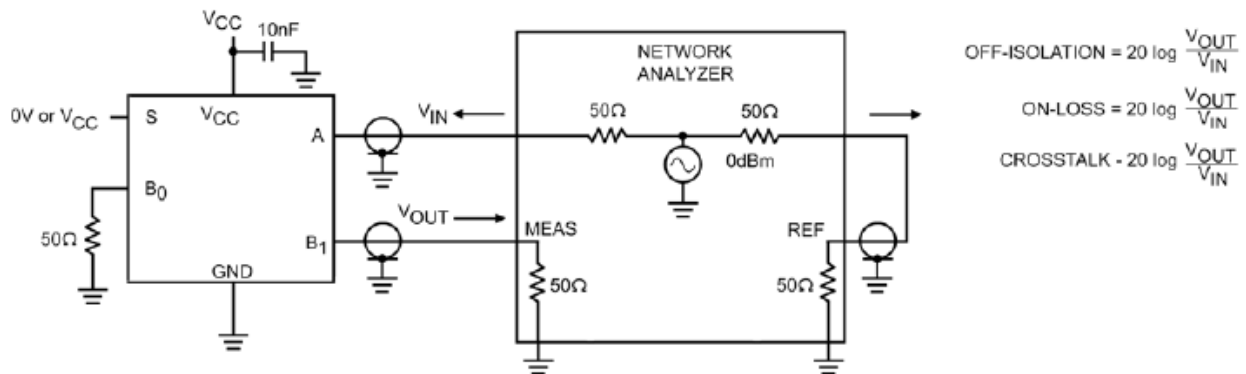


Figure 5. Off Isolation and Crosstalk

AC Loadings and Waveforms (Continued)

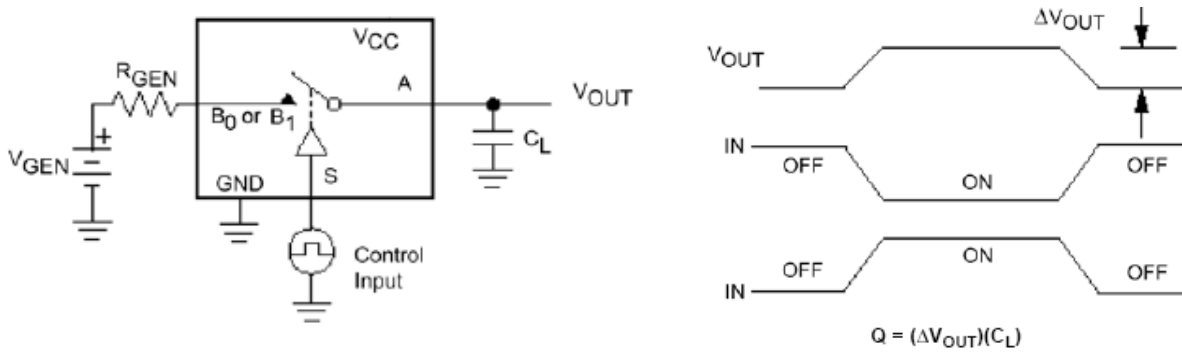


Figure 6. Charge Injection

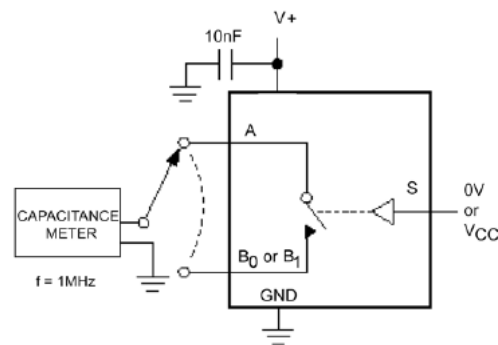


Figure 7. On / Off Capacitance Measurement Setup

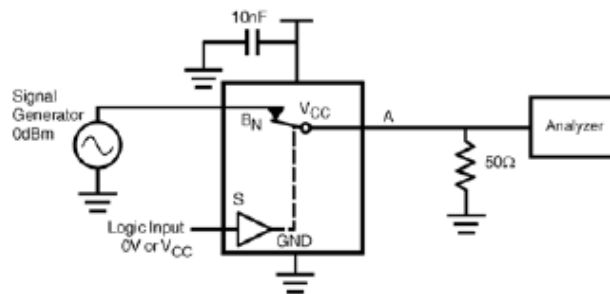


Figure 8. Bandwidth

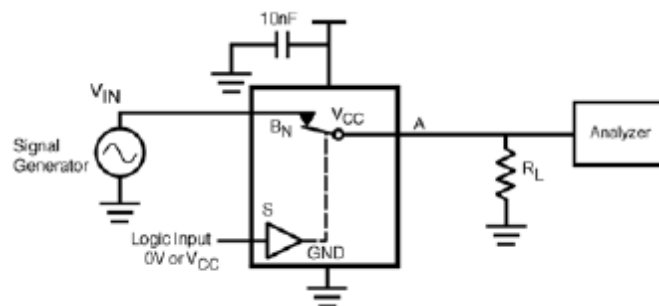


Figure 9. Harmonic Distortion

Physical Dimensions

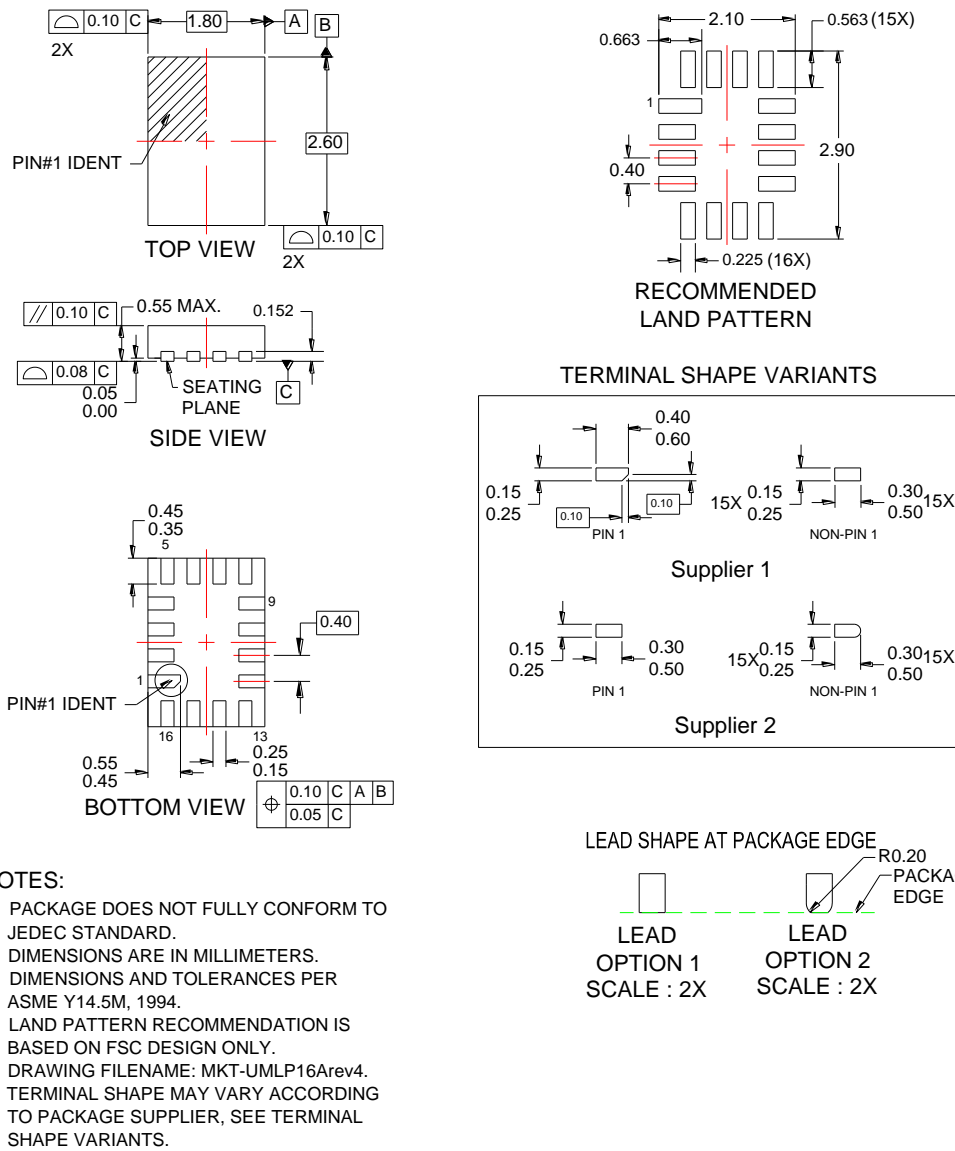


Figure 10. 16-Pin Ultrathin Molded Leadless Package (UMLP)

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

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