

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

Applications

- MP3 Portable Media Players
- Cellular Phones, Smartphones

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.

Related Resources

- For samples and questions, please contact: Analog.Switch@fairchildsemi.com.
- FSA2466 Evaluation Board

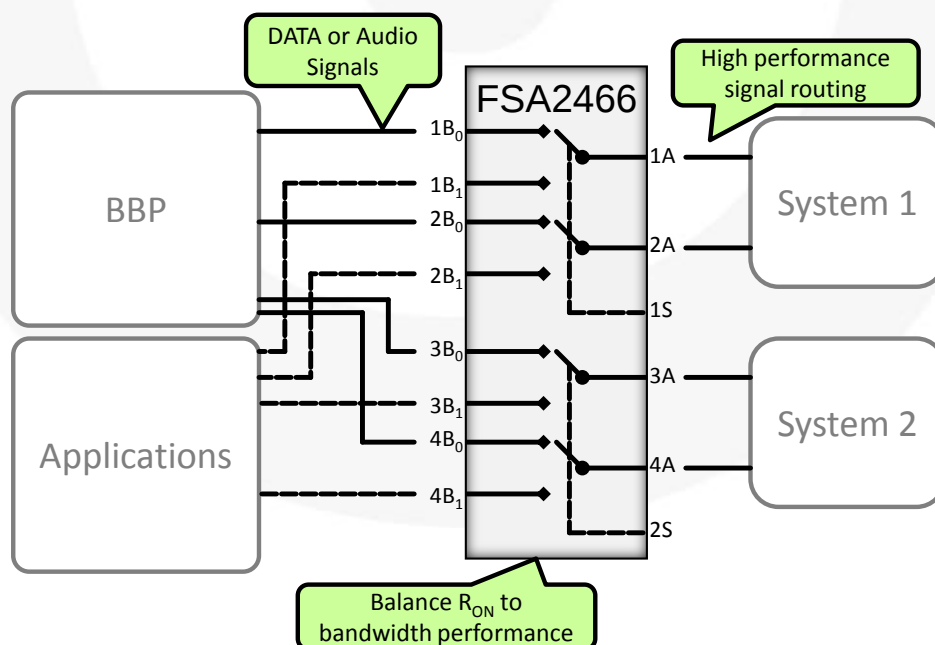


Figure 1. Typical Mobile Phone Application

Pin Configuration

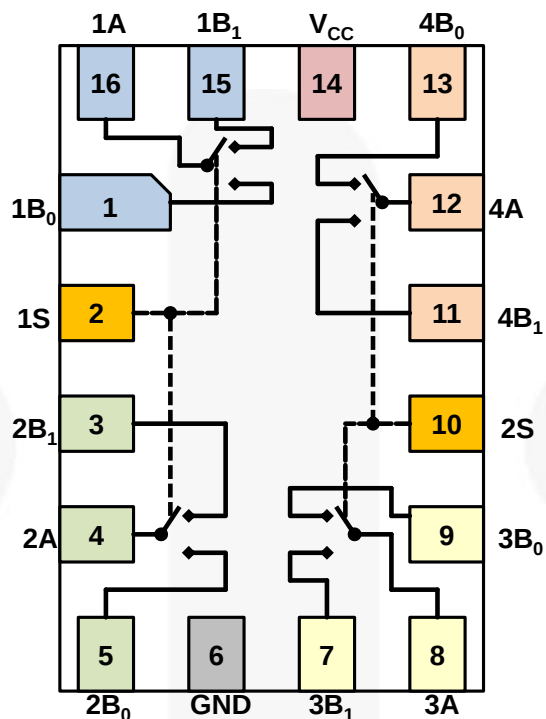


Figure 2. FSA2466UMX (Top View)

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. Fairchild 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	
			2.30		2.2			2.7	
		$I_{OUT}=100\text{ mA, }nB_0$ or $nB_1=0.7\text{ V}$	1.80		4.3			6.0	
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 KHz	3.6 to 4.3		0.21				%	Figure 9
			2.7 to 3.6		0.17					
			2.3. to 2.7		0.26					
		$R_L=600\ \Omega$, $V_{IN}=2\text{ V}_{PP}$, $f=20$ 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}	$T_A=+25^{\circ}\text{C}$ 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

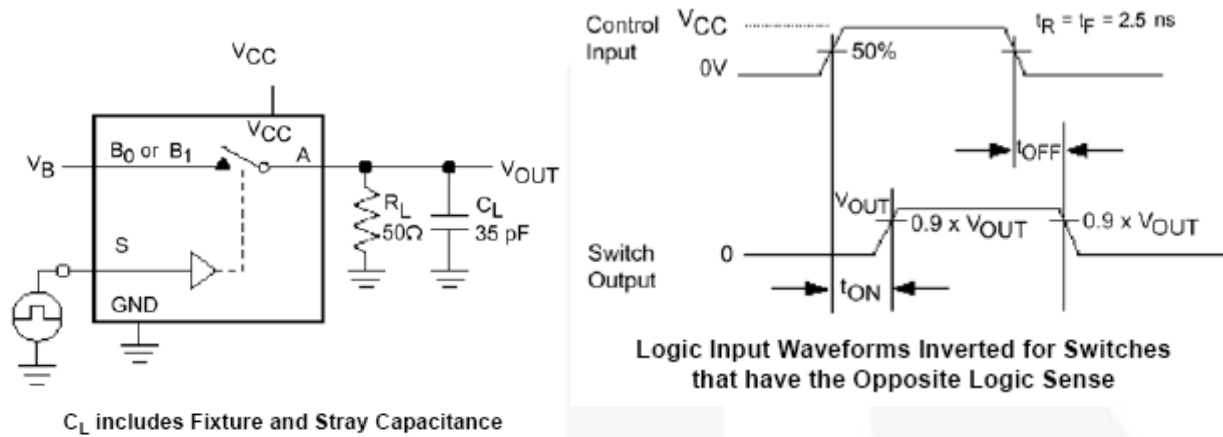


Figure 3. Turn-On / Turn-Off Timing

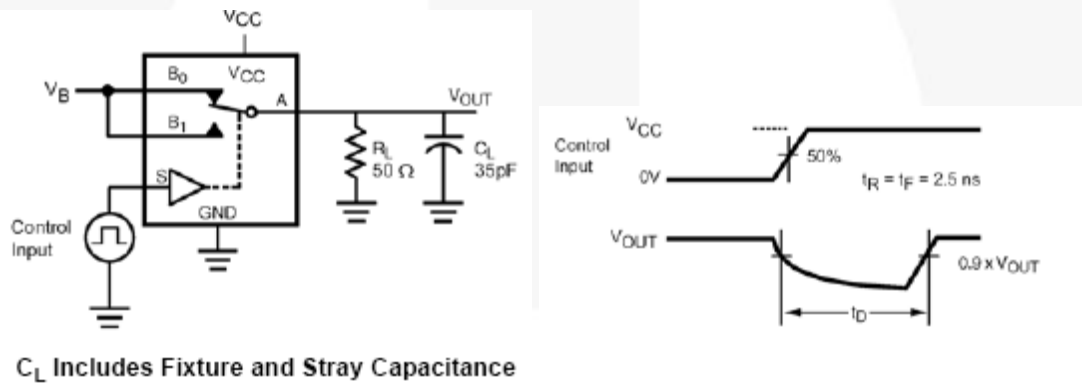


Figure 4. Break-Before-Make Timing

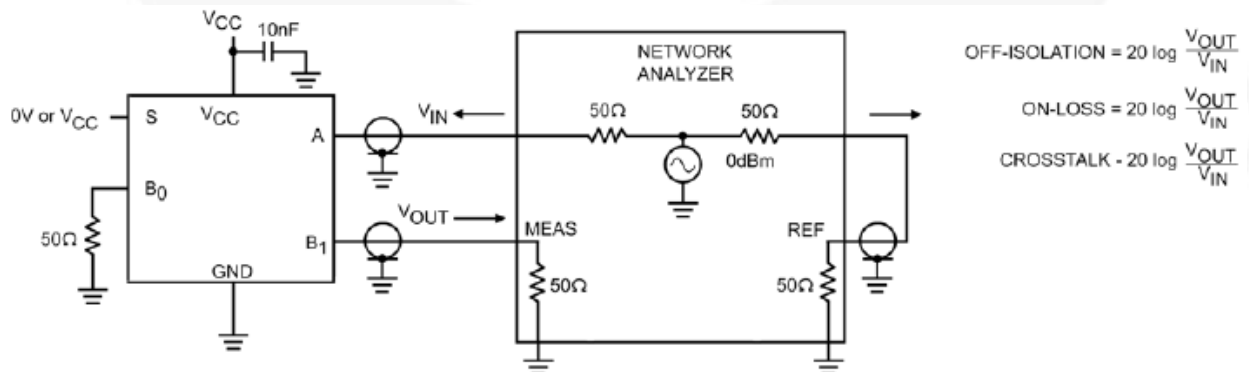


Figure 5. Off Isolation and Crosstalk

AC Loadings and Waveforms (Continued)

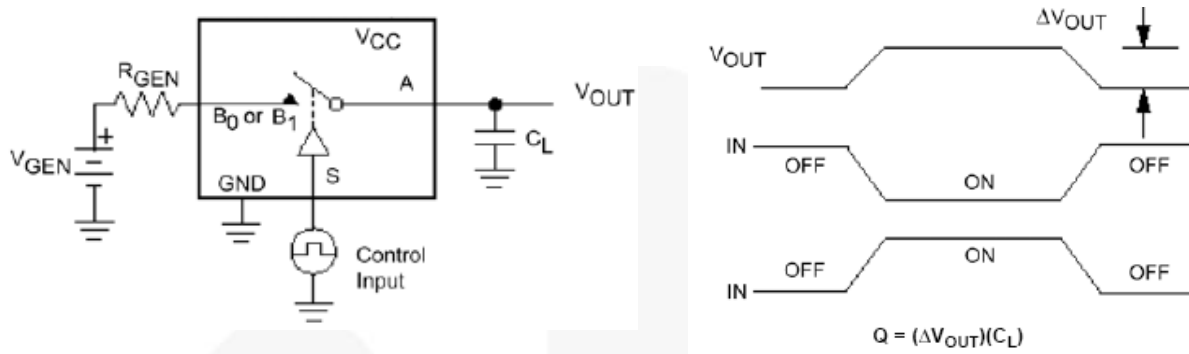


Figure 6. Charge Injection

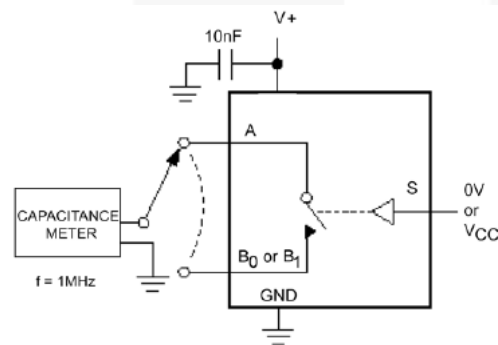


Figure 7. On / Off Capacitance Measurement Setup

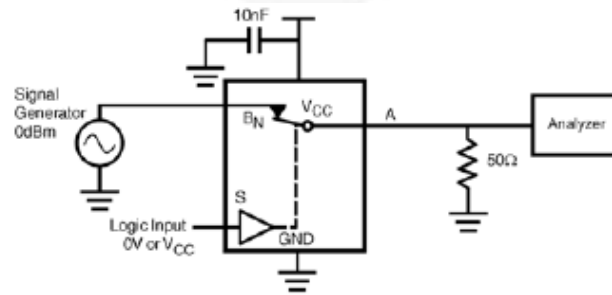


Figure 8. Bandwidth

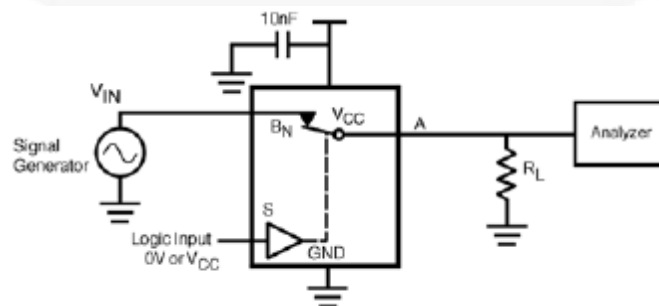


Figure 9. Harmonic Distortion

Physical Dimensions

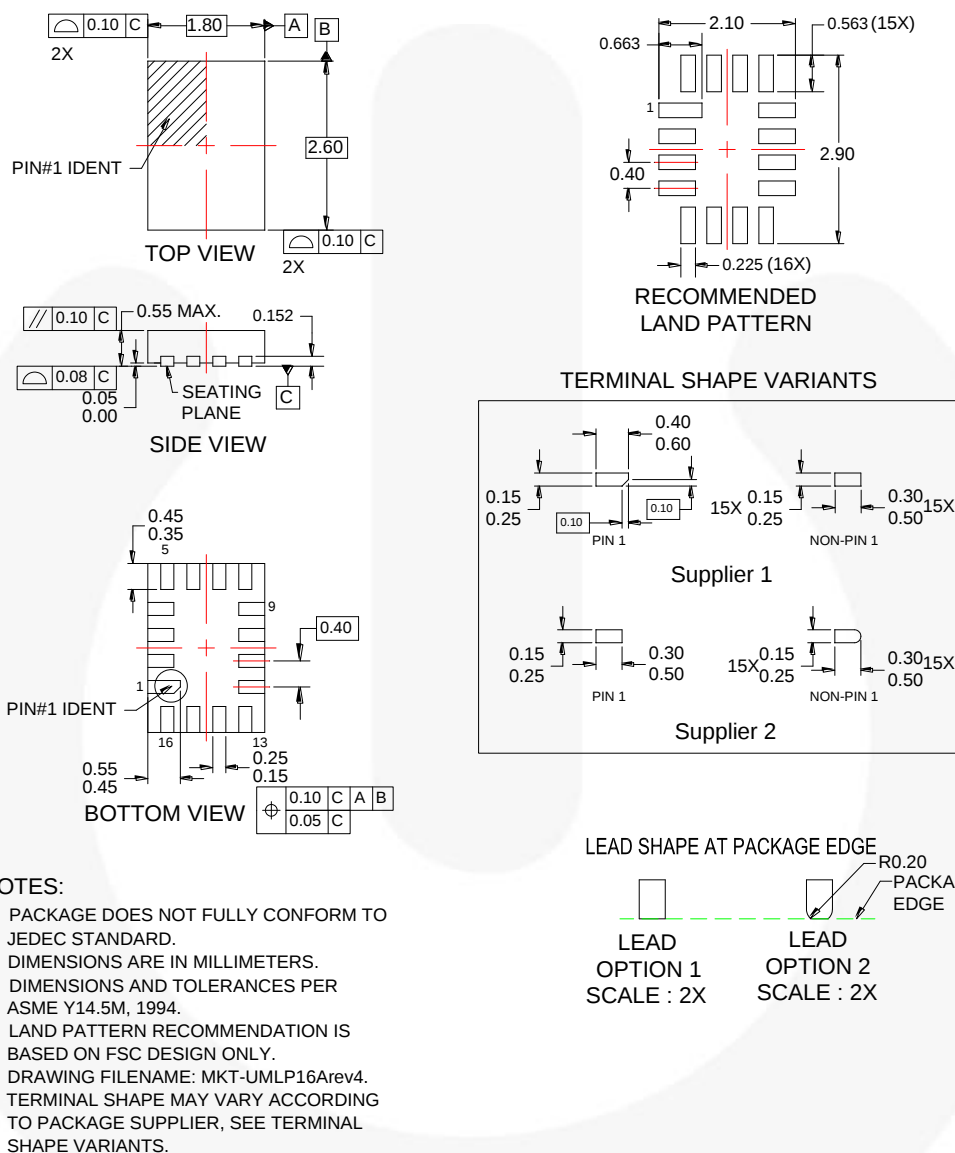


Figure 10. 16-Pin Ultrathin Molded Leadless Package (UMLP)

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

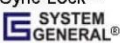
Package drawings are provided as a service to customers considering Fairchild components. Drawings may change in any manner without notice. Please note the revision and/or date on the drawing and contact a Fairchild Semiconductor representative to verify or obtain the most recent revision. Package specifications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

Always visit Fairchild Semiconductor's online packaging area for the most recent package drawings: <http://www.fairchildsemi.com/packaging/>.



TRADEMARKS

The following includes registered and unregistered trademarks and service marks, owned by Fairchild Semiconductor and/or its global subsidiaries, and is not intended to be an exhaustive list of all such trademarks.

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/W/kW at a time™	TinyPWM™
Current Transfer Logic™	ISOPLANAR™	SignalWise™	TinyWire™
DEUXPEED®	Making Small Speakers Sound Louder and Better™	SmartMax™	Tran SiC™
Dual Cool™	MegaBuck™	SMART START™	TriFault Detect™
EcoSPARK®	MICROCOUPLER™	Solutions for Your Success™	TRUECURRENT®*
EfficientMax™	MicroFET™	SPM®	μSerDes™
ESBC™	MicroPak™	STEALTH™	 ™
 Fairchild®	MicroPak2™	SuperFET®	UHC®
Fairchild Semiconductor®	MillerDrive™	SuperSOT™-3	Ultra FRFET™
FACT Quiet Series™	MotionMax™	SuperSOT™-6	UniFET™
FACT®	mWSaver™	SuperSOT™-8	VCX™
FAST®	OptoHiT™	SupreMOS®	VisualMax™
FastvCore™	OPTOLOGIC®	SyncFET™	VoltagePlus™
FETBench™	OPTOPLANAR®	Sync-Lock™	XS™
FlashWriter®*		 SYSTEM GENERAL®*	
FPS™			

* Trademarks of System General Corporation, used under license by Fairchild Semiconductor.

DISCLAIMER

FAIRCHILD SEMICONDUCTOR RESERVES THE RIGHT TO MAKE CHANGES WITHOUT FURTHER NOTICE TO ANY PRODUCTS HEREIN TO IMPROVE RELIABILITY, FUNCTION, OR DESIGN. FAIRCHILD DOES NOT ASSUME ANY LIABILITY ARISING OUT OF THE APPLICATION OR USE OF ANY PRODUCT OR CIRCUIT DESCRIBED HEREIN; NEITHER DOES IT CONVEY ANY LICENSE UNDER ITS PATENT RIGHTS, NOR THE RIGHTS OF OTHERS. THESE SPECIFICATIONS DO NOT EXPAND THE TERMS OF FAIRCHILD'S WORLDWIDE TERMS AND CONDITIONS, SPECIFICALLY THE WARRANTY THEREIN, WHICH COVERS THESE PRODUCTS.

LIFE SUPPORT POLICY

FAIRCHILD'S PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE EXPRESS WRITTEN APPROVAL OF FAIRCHILD SEMICONDUCTOR CORPORATION.

As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body or (b) support or sustain life, and (c) whose failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury of the user.
2. A critical component in any component of a life support, device, or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

ANTI-COUNTERFEITING POLICY

Fairchild Semiconductor Corporation's Anti-Counterfeiting Policy. Fairchild's Anti-Counterfeiting Policy is also stated on our external website, www.fairchildsemi.com, under Sales Support.

Counterfeiting of semiconductor parts is a growing problem in the industry. All manufacturers of semiconductor products are experiencing counterfeiting of their parts. Customers who inadvertently purchase counterfeit parts experience many problems such as loss of brand reputation, substandard performance, failed applications, and increased cost of production and manufacturing delays. Fairchild is taking strong measures to protect ourselves and our customers from the proliferation of counterfeit parts. Fairchild strongly encourages customers to purchase Fairchild parts either directly from Fairchild or from Authorized Fairchild Distributors who are listed by country on our web page cited above. Products customers buy either from Fairchild directly or from Authorized Fairchild Distributors are genuine parts, have full traceability, meet Fairchild's quality standards for handling and storage and provide access to Fairchild's full range of up-to-date technical and product information. Fairchild and our Authorized Distributors will stand behind all warranties and will appropriately address any warranty issues that may arise. Fairchild will not provide any warranty coverage or other assistance for parts bought from Unauthorized Sources. Fairchild is committed to combat this global problem and encourage our customers to do their part in stopping this practice by buying direct or from authorized distributors.

PRODUCT STATUS DEFINITIONS

Definition of Terms

Datasheet Identification	Product Status	Definition
Advance Information	Formative / In Design	Datasheet contains the design specifications for product development. Specifications may change in any manner without notice.
Preliminary	First Production	Datasheet contains preliminary data; supplementary data will be published at a later date. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve design.
No Identification Needed	Full Production	Datasheet contains final specifications. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve the design.
Obsolete	Not In Production	Datasheet contains specifications on a product that is discontinued by Fairchild Semiconductor. The datasheet is for reference information only.

Rev. I62