FAIRCHILD SEMICONDUCTOR®

April 2012

FSA2467
0.4Ω Low-Voltage Dual DPDT Analog Switch

Features

- Typical 0.4Ω On Resistance (R_{ON}) for +2.7V Supply
- Features Less then12µA I_{CCT} Current when Sn Input is Lower than V_{CC}
- 0.25Ω Maximum R_{ON} Flatness for +2.7V Supply
- 3 x 3mm 16-Lead MLP Package
- 1.8x2.6mm 16-Lead UMLP Package
- Broad V_{CC} Operating Range
- Low THD (0.02% Typical for 32Ω Load)

Applications

- Cell Phone
- PDA
- Portable Media Player

Description

The FSA2467 is a dual Double-Pole, Double-Throw (DPDT) analog switch. The FSA2467 operates from a single 1.65V to 4.3V supply. The FSA2467 features an ultra-low on resistance of 0.4Ω at a +2.7V supply and 25°C. This device is fabricated with sub-micron CMOS technology to achieve fast switching speeds and is designed for break-before-make operation.

FSA2467 features very low quiescent current even when the control voltage is lower than the V_{CC} supply. This feature allows mobile handset applications direct interface with baseband processor general-purpose I/Os.

Ordering Information

Part Number	Top Mark	Package Description
FSA2467MPX	FSA 2467	16-lead Molded Leadless Package (MLP), JEDEC MO-220, 3 x 3mm Square
FSA2467UMX	GC	16-lead Ultrathin Molded Leadless Package (UMLP), 1.8 x 2.6mm

Application Diagram

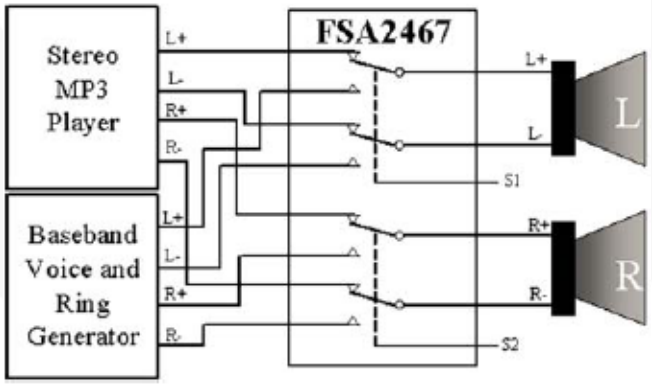


Figure 1. Application Diagram

Pin Assignments

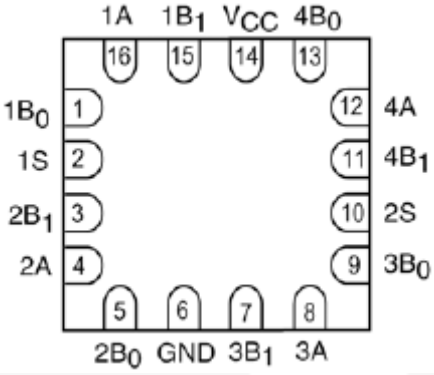


Figure 2. MLP (Top Through View)

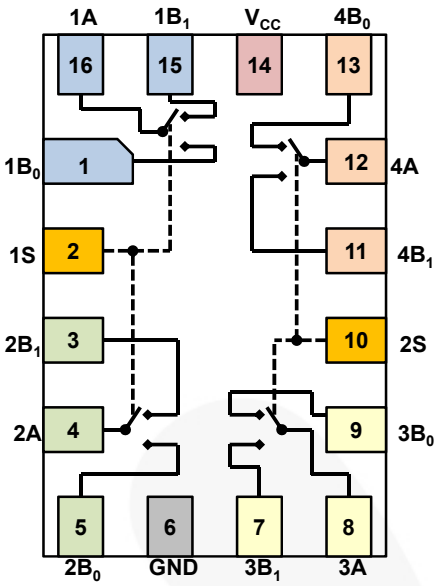


Figure 3. UMLP (Top View)

Truth Table

Control Inputs	Function
LOW	nB_0 Connected to nA
HIGH	nB_1 Connected to nA

Pin Descriptions

Name	Function
nA，nB_0，nB_1	Data Ports
nS	Control Input

Analog Symbol

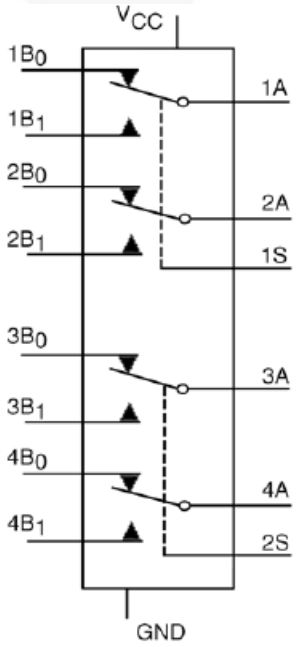


Figure 4. Analog Symbol

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	5.0	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	ºC
T_J	Junction Temperature			+150	ºC
T_L	Lead Temperature, Soldering 10 Seconds			+260	ºC
ESD	Electrostatic Discharge Capability	Human Body Model, JESD22-A114		5.5	kV

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	1.65	4.30	V
V_{IN}	Control Input Voltage(1)	0	V_{CC}	V
V_s	Switch Input Voltage	0	V_{CC}	V
T_A	Operating Temperature	-40	+85	ºC

Note:

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

DC Electrical Characteristics

Typical values are at 25ºC unless otherwise specified.

Symbol	Parameter	Condition	V_{CC} (V)	T_A = +25ºC			T_A = -40 to +85ºC		Unit
				Min.	Typ.	Max.	Min	Max.	
V_{IH}	Input Voltage High		4.3				1.4		V
			2.7 to 3.6				1.3		
			2.3 to 2.7				1.1		
			1.65 to 1.95				0.9		
V_{IL}	Input Voltage Low		4.3					0.7	V
			2.7 to 3.6					0.5	
			2.3 to 2.7					0.4	
			1.65 to 1.95					0.4	
I_{IN}	Control Input Leakage	V_{IN}=0V 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=0.3V, V_{CC}-0.3V	1.95 to 4.30	-10		10	-50	50	nA
		nB_0 or nB_1=0.3V, V_{CC}-0.3V or floating							
$I_{A(ON)}$	On Leakage Current of Port A	nA=0.3V,V_{CC}-0.3V	1.95 to 4.30	-10		10	-50	50	nA
		nB_0 or nB_1=0.3V, V_{CC}-0.3V or Floating							
R_{ON}	Switch On Resistance[2]	I_{OUT}=100mA	4.3		0.4			0.6	Ω
		nB_0 or nB_1=0V,0.8V, 1.8V,2.7V	2.7		0.4			0.6	
		I_{OUT}=100mA, nB_0 or nB_1=0V,0.7V, 1.2V, 2.3V	2.3	0.55				0.95	
		I_{OUT}=100mA, nB_0 or nB_1=1.0V	1.8	0.8				2.0	
ΔR_{ON}	On Resistance Matching Between Channels[3]	I_{OUT}=100mA, nB_0 or nB_1=0.8V	2.7	0.04				0.10	Ω
		I_{OUT}=100mA, nB_0 or nB_1=0.7V	2.3	0.03				0.10	
$R_{FLAT(ON)}$	On Resistance Flatness[4]	I_{OUT}=100mA, B_0 or nB_1=0V to V_{CC}	2.7					0.25	Ω
			2.3					0.3	
I_{CC}	Quiescent Supply Current	V_{IN}=0V to V_{CC} I_{OUT}=0V	4.3	-100		100	-500	500	nA
I_{CCT}	Increase in I_{CC} Current per Control Voltage	V_{IN}=1.8V	4.3		7	12		15	µA
		V_{IN}=2.6V	4.3		3	6		7	

Notes:

2. On resistance is determined by the voltage drop between A and B pins at the indicated current through the switch.
3. $\Delta R_{ON}=R_{ON\ max} - R_{ON\ min}$ measured at identical V_{CC}, temperature and voltage.
4. 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 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	nB0 or nB1=1.5V	3.6 to 4.3			50		60	ns	Figure 8
		R_L=50Ω, C_L=35pF	2.7 to 3.6			65		75		
			2.3 to 2.7			80		90		
t_{OFF}	Turn-Off Time	nB0 or nB1=1.5V	3.6 to 4.3			32		40	ns	Figure 8
		R_L=50Ω, C_L=35pF	2.7 to 3.6			42		50		
			2.3 to 2.7			52		60		
t_{BBM}	Break-Before-Make Time	nB0 or nB1=1.5V	3.6 to 4.3		12				ns	Figure 9
		R_L=50Ω, C_L=35pF	2.7 to 3.6		15					
			2.3 to 2.7		20					
Q	Charge Injection	C_L=100pF, V_{GEN}=0V, R_{GEN}=0Ω	3.6 to 4.3		15				pC	Figure 11
		C_L=100pF, V_{GEN}=0V, R_{GEN}=0Ω	2.7 to 3.6		10					
		C_L=100pF, V_{GEN}=0V, R_{GEN}=0Ω	2.3 to 2.7		8					
OIRR	Off Isolation	f=100KHz, R_L=50Ω,C_L=5pF	3.6 to 4.3		-75				dB	Figure 10
			2.7 to 3.6		-75					
			2.3 to 2.7		-75					
Xtalk	Crosstalk	f=100KHz, R_L=50Ω, C_L=5pF	3.6 to 4.3		-75				dB	Figure 10
			2.7 to 3.6		-75					
			2.3 to 2.7		-75					
BW	-3dB Bandwidth	R_L=50Ω	2.3 to 4.3		85				MHZ	Figure 13
THD	Total Harmonic Distortion	R_L=32Ω, V_{IN}=2V_{PP}, f=20 to 20kHZ	3.6 to 4.3		0.02				%	Figure 14
		R_L=32Ω, V_{IN}=2V_{PP}, f=20 to 20kHZ	2.7 to 3.6		0.02					
		R_L=32Ω, V_{IN}=2V_{PP}, f=20 to 20kHZ	2.3. to 2.7		0.02					

Capacitance

Symbol	Parameter	Condition	V_{CC}	T_A = +25ºC Typical	Unit	Figure
C_{IN}	Control Pin Input Capacitance	f=1MHZ	0	1.5	pF	Figure 8
C_{OFF}	B Port Off Capacitance	f=1MHZ	3.3	32	pF	Figure 8
C_{ON}	A Port On Capacitance	f=1MHZ	3.3	118	pF	Figure 8

Typical Applications

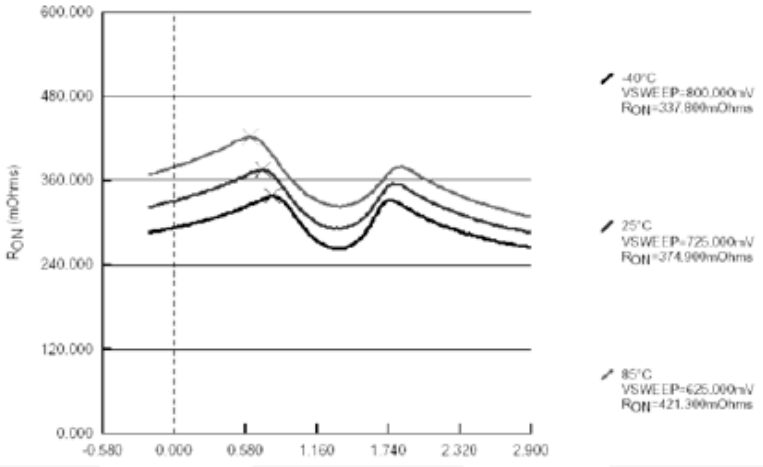


Figure 5. R_{ON} at 2.7V V_{CC}

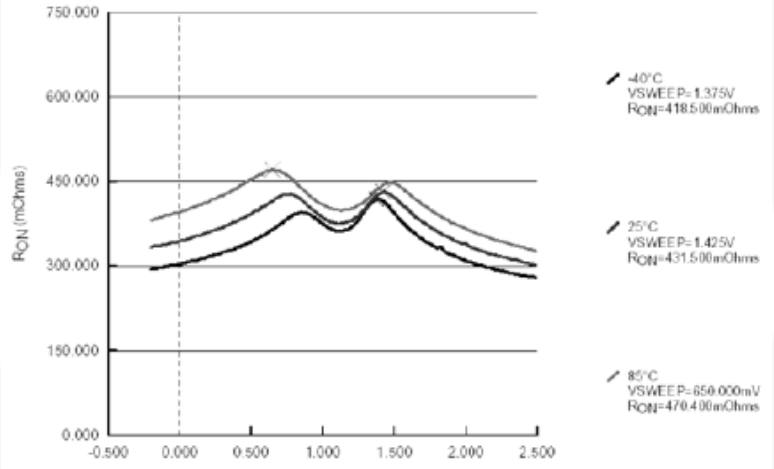


Figure 6. R_{ON} at 2.3V V_{CC}

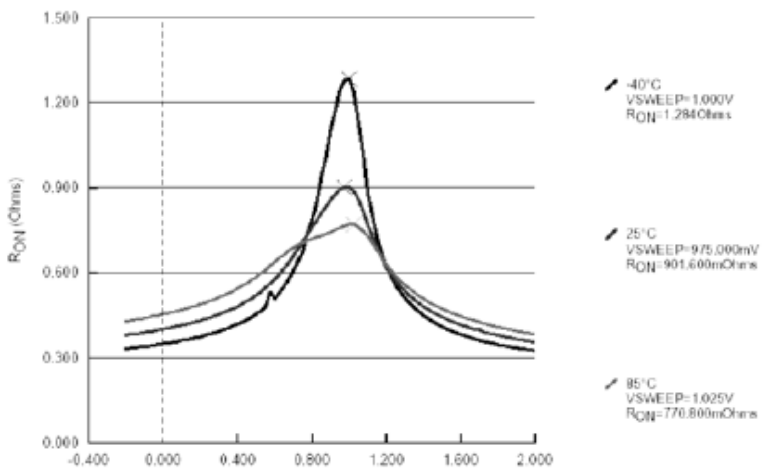
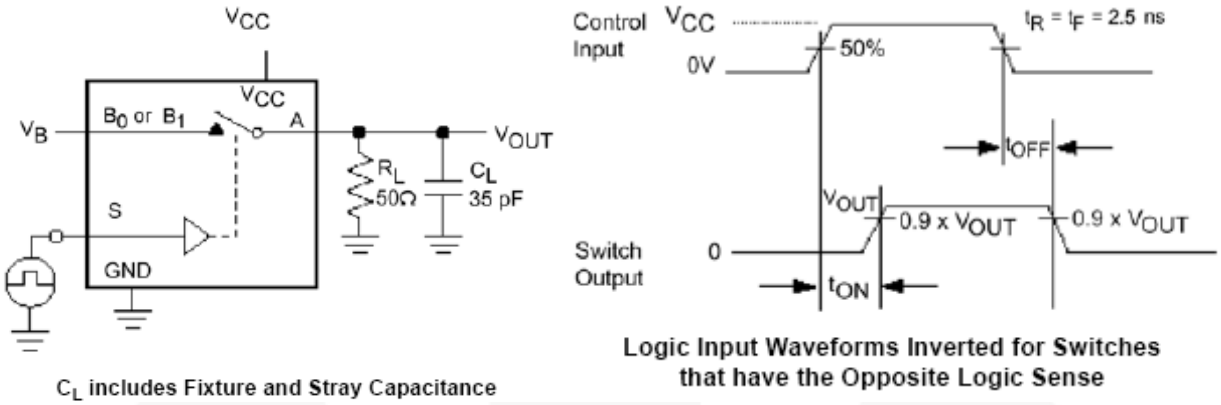


Figure 7. R_{ON} at 1.8V V_{CC}

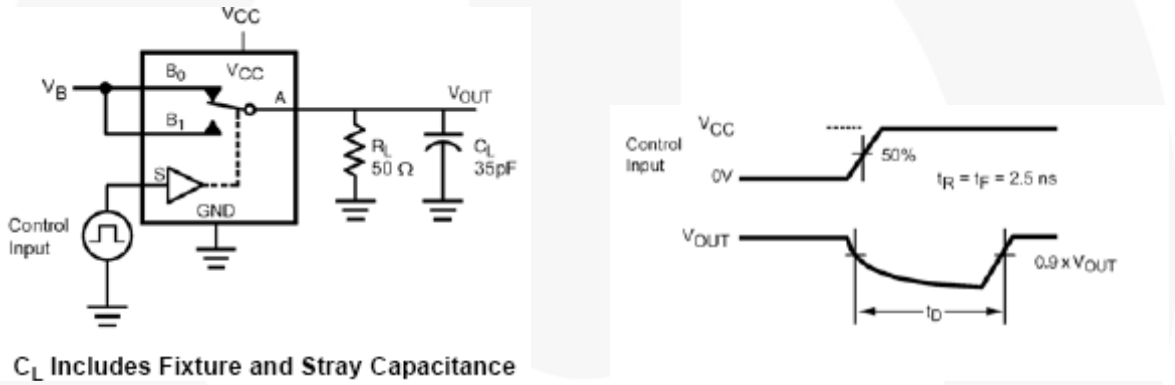
AC Loadings and Waveforms



C_L includes Fixture and Stray Capacitance

Logic Input Waveforms Inverted for Switches that have the Opposite Logic Sense

Figure 8. Turn-On / Turn-Off Timing



C_L Includes Fixture and Stray Capacitance

Figure 9. Break-Before-Make Timing

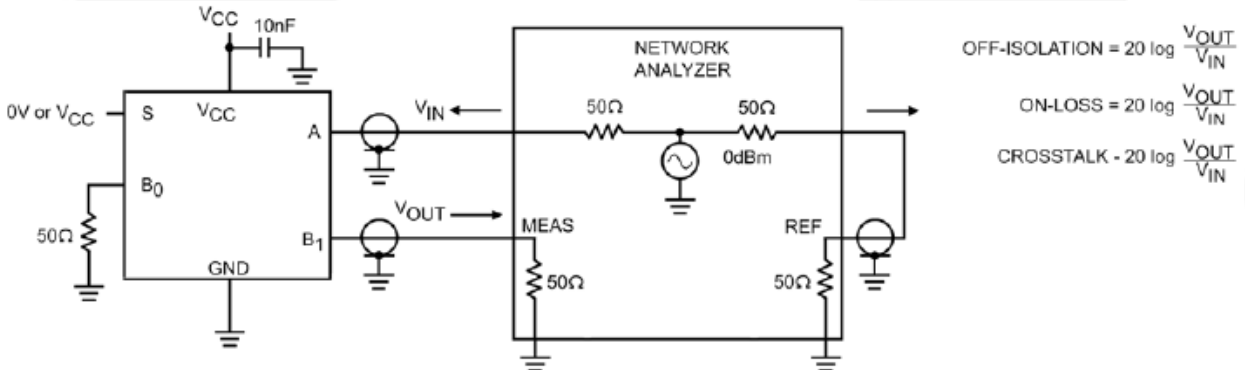


Figure 10. Off Isolation and Crosstalk

AC Loadings and Waveforms (Continued)

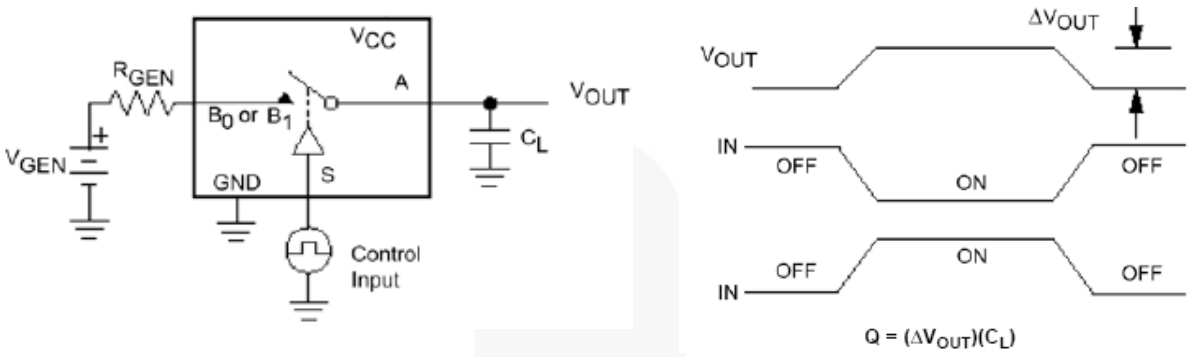


Figure 11. Charge Injection

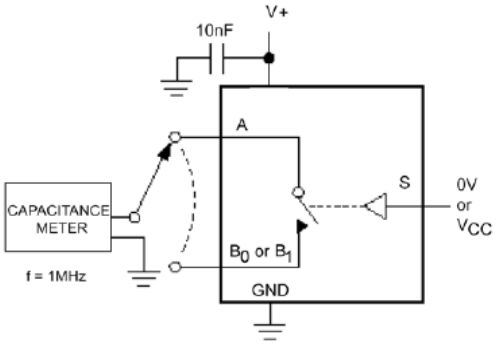


Figure 12. On / Off Capacitance Measurement Setup

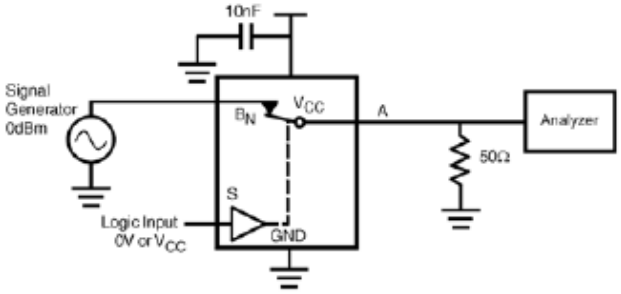


Figure 13. Bandwidth

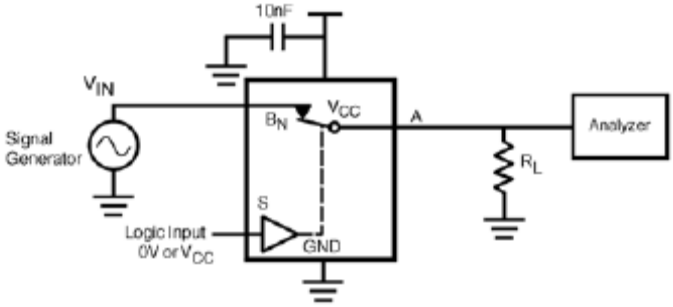
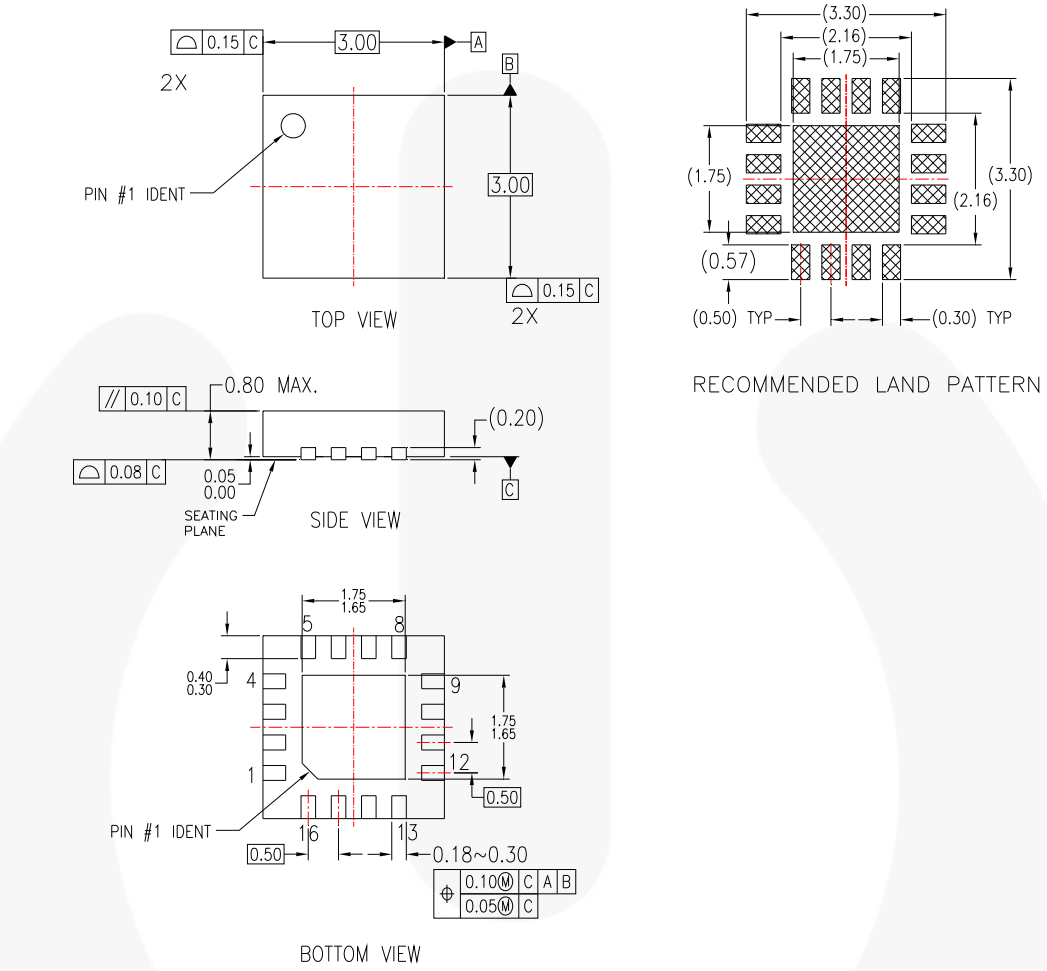


Figure 14. Harmonic Distortion

Package Dimensions



NOTES:

A. CONFORMS TO JEDEC REGISTRATION MO-220, VARIATION WEED-Pending, DATED pending

B. DIMENSIONS ARE IN MILLIMETERS.

C. DIMENSIONS AND TOLERANCES PER ASME Y14.5M, 1994

D. DIMENSIONS ARE EXCLUSIVE OF BURS, MOLD FLASH, AND TIE BAR EXTRUSIONS.

MLP16BrevB

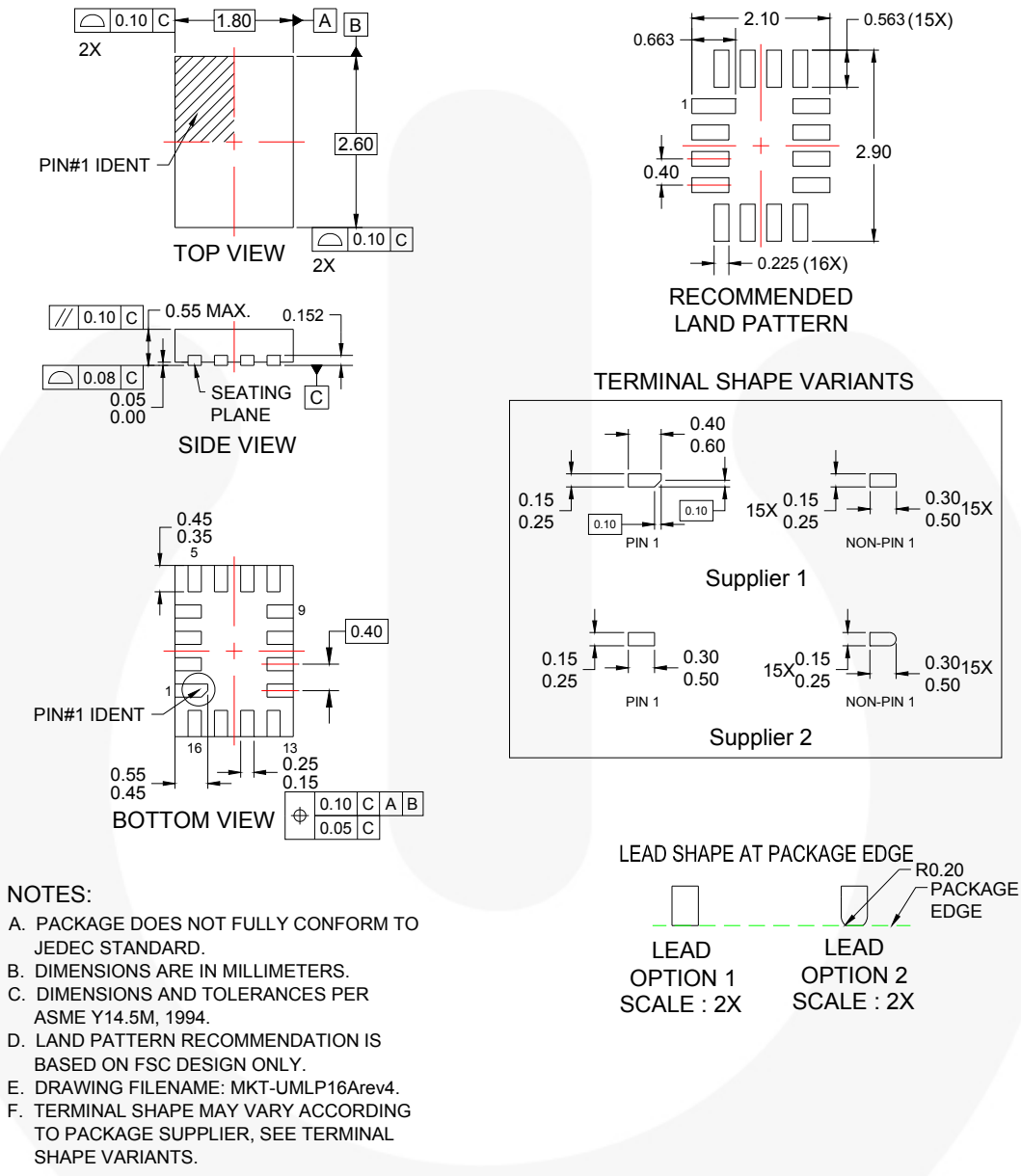
Figure 15. 16-Lead, Molded Leadless Package (MLP), JEDEC MO-220 3x3mm Square

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/.

For current tape and reel specifications, visit Fairchild Semiconductor's online packaging area:
http://www.fairchildsemi.com/packaging/3x3MLP16_Pack_TNR.pdf.

Package 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 16. 16-Lead, Ultrathin Molded Leadless Package (UMLP)

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/.

FAIRCHILD SEMICONDUCTOR®

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

* 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. I61