

Is Now Part of



ON Semiconductor®

To learn more about ON Semiconductor, please visit our website at
www.onsemi.com

Please note: As part of the Fairchild Semiconductor integration, some of the Fairchild orderable part numbers will need to change in order to meet ON Semiconductor's system requirements. Since the ON Semiconductor product management systems do not have the ability to manage part nomenclature that utilizes an underscore (_), the underscore (_) in the Fairchild part numbers will be changed to a dash (-). This document may contain device numbers with an underscore (_). Please check the ON Semiconductor website to verify the updated device numbers. The most current and up-to-date ordering information can be found at www.onsemi.com. Please email any questions regarding the system integration to Fairchild_questions@onsemi.com.

ON Semiconductor and the ON Semiconductor logo are trademarks of Semiconductor Components Industries, LLC dba ON Semiconductor or its subsidiaries in the United States and/or other countries. ON Semiconductor owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of ON Semiconductor's product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent-Marking.pdf. ON Semiconductor reserves the right to make changes without further notice to any products herein. ON Semiconductor makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does ON Semiconductor assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using ON Semiconductor products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by ON Semiconductor. "Typical" parameters which may be provided in ON Semiconductor data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. ON Semiconductor does not convey any license under its patent rights nor the rights of others. ON Semiconductor products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use ON Semiconductor products for any such unintended or unauthorized application, Buyer shall indemnify and hold ON Semiconductor and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that ON Semiconductor was negligent regarding the design or manufacture of the part. ON Semiconductor is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

FAIRCHILD SEMICONDUCTOR®

November 2012

FSA223 — USB2.0 High-Speed (480Mbps) and Audio Switches with Negative Signal Capability

Features

- HS-USB: 4 Ω Typical On Resistance
- HS-USB: 4.5 pF Typical On Capacitance
- Audio: 3 Ω Typical On Resistance
- -3 db Bandwidth: > 720 MHz
- Low Power Consumption
- Power-off Protection on Common D+/R, D-/L Ports
- Automatically Detects V_{CC} for Switch Path Selection

Applications

- Cell Phone, PDA, Digital Camera, and Notebook
- LCD Monitor, TV, and Set-Top Box

Related Resources

- Please refer to tape and reel specifications on *www.fairchildsemi.com*; *http://www.fairchildsemi.com/packaging*.

Description

The FSA223 is a Double-Pole, Double Throw (DPDT) multiplexer that combines a low-distortion audio and a USB2.0 High-Speed (HS) switch path. This configuration enables audio and USB data to share a common connector port. The architecture is designed to allow both audio and USB signals to swing below ground. This means a common USB and headphone jack can be used for personal media players and portable peripheral devices.

Since USB2.0 is an industry standard for shared data-path in portable devices, the FSA223 also incorporates a V_{CC} detection capability. The FSA223 includes a power-off feature to minimize current consumption when V_{CC} is not present. This power-off circuitry is available for the common D+/R, D-/L ports only. Typical applications involve switching in portables and consumer applications, such as cell phones, digital cameras, and notebooks with hubs or controllers.

IMPORTANT NOTE:

For additional performance information, please contact analogswitch@fairchildsemi.com.

Ordering Information

Part Number	Package Number	Top Mark	Package Description
FSA223L10X	MAC010A	GN	10-Lead MicroPak™, JEDEC MO-255, 1.6 x 2.1 mm
FSA223MUX	MUA010A	FSA223	10-Lead MSOP, JEDEC MO-187, 3.0 mm Wide
FSA223UMX	MLP010A	GP	10-Lead Quad, Ultrathin MLP, 1.4 x 1.8 mm

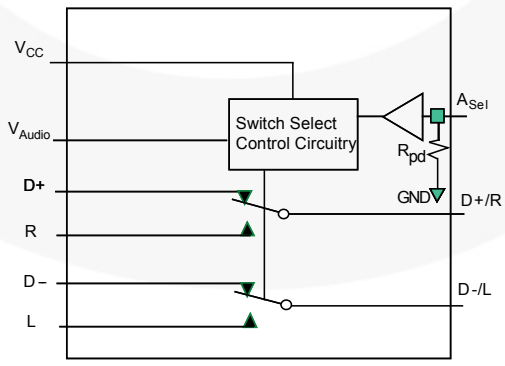


Figure 1. FSA223 Analog Symbol

© 2007 Fairchild Semiconductor Corporation

Pin Configuration

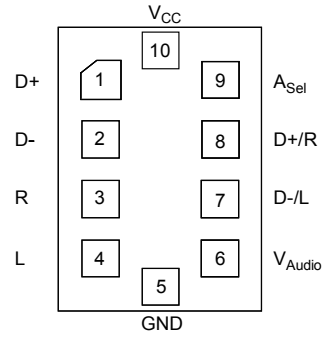


Figure 2. 10-Pin MicroPak™

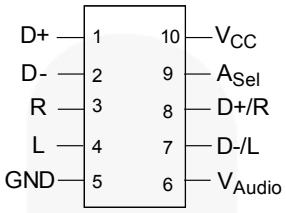


Figure 3. 10-Pin MSOP

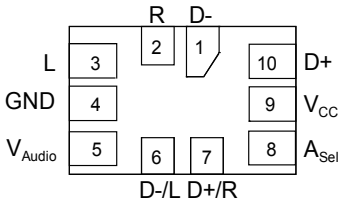


Figure 4. 10-Pin UMLP

Pin Definitions

Name	Description
V_{audio}	Power supply (audio)
V_{CC}	Power supply (USB) and auto USB switch-path select
A_{Sel}	Audio select to override auto USB detect when V_{AUDIO} supply is present
D+, D-	USB data bus input sources
R, L	Audio right and left input sources
D+/R, D-/L	USB and audio common connector ports

Truth Table

A_{Sel} (1)	V_{audio}	V_{CC}	L, R	D+, D-
—(2)	—	LOW	OFF	OFF
—	LOW	HIGH	OFF	ON
LOW	HIGH	HIGH	OFF	ON
HIGH	HIGH	HIGH	ON	OFF

Note:

1. A_{Sel} - Internal resistor to GND provides auto-V_{CC} detect if there is no external connection. Forcing A_{Sel} HIGH when V_{AUDIO} is present overrides the USB path.
2. The dash (—) indicates “Don’t Care” state.

© 2007 Fairchild Semiconductor Corporation

Functional Description

The FSA223 is a combined USB and audio switch that enables sharing the D+/D- lines of a USB connector with stereo audio CODEC outputs. The switch is optimized for high-speed USB signals and includes an automatic V_{CC}-detection circuit. The FSA223 detects the presence of V_{CC} and defaults to USB mode. Both the USB and audio switch paths also handle negative signals, which eliminates the need for large coupling capacitors.

The A_{Sel} pin is internally terminated by a resistor to GND (typical value: 3 MΩ) and results in a default USB connection. For optimal performance, V_{CC} should be connected directly to the device battery.

Application Diagram

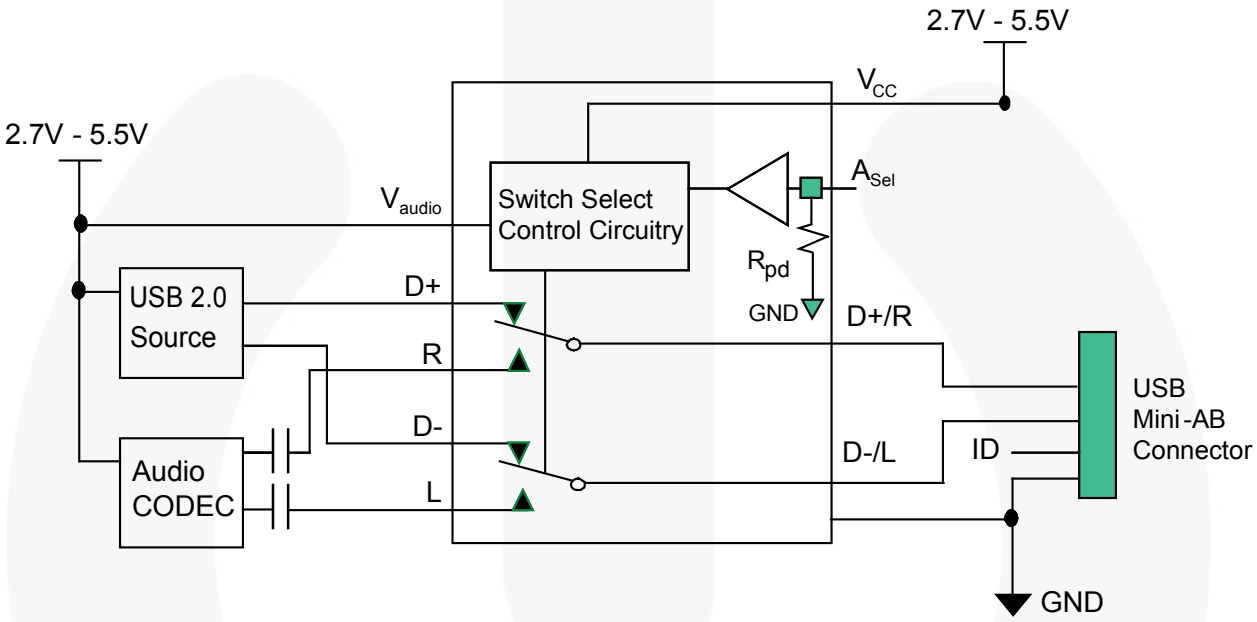


Figure 5. Typical Application

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_{Audio}	Supply Voltage		-0.5	6.0	V
V_{CC}	Supply Voltage		-0.5	6.0	V
V_{SW}	Switch I/O Voltage[3,4]	R, L Pins	V_{audio}- 7.0V	V_{audio} + 0.3V	V
		D+, D-, D+/R, D-/L Pins	V_{CC}- 7.0V	V_{CC} + 0.3V	V
A_{Sel}	Control Input Voltage[3]		-0.5	6.0	V
I_{IK}	Input Clamp Diode Current			-50	mA
I_{SW}	Switch I/O Current (Continuous)	USB		50	mA
		Audio		50	mA
I_{SWPEAK}	Peak Switch Current (Pulsed at 1ms Duration, <10% Duty Cycle)	USB		100	mA
		Audio		100	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, JESD22-A114	I/O to GND		7.5	kV
		All Other Pins		3.0	
		V_{Audio} V_{CC} to GND		12.0	
	Charged Device Model, JESD22-C101			2.0	

Notes:

3. The input and output negative ratings may be exceeded if the input and output diode current ratings are observed.
4. V_{SW} maximum values can be exceeded ONLY if I_{SW} maximum values are observed. For example, V_{SW}=V_{CC} + 0.6 V is acceptable if I_{SW} is limited externally to ≤ 50 mA.

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.	Units
V_{Audio}	Supply Voltage		2.7	5.5	V
V_{CC}	Supply Voltage		2.7	5.5	V
A_{Sel}	Control Input Voltage		0	V_{CC}	V
V_{SW}	Switch I/O Voltage		V_{Audio} – 6.5 V	V_{Audio} – 0.3 V	V
			V_{CC} – 6.5 V	V_{CC}	V
T_A	Operating Temperature		-40	+85	°C
θ_{JA}	Thermal Resistance (free air)	MicroPak™		330 (estimated)	°C/W

© 2007 Fairchild Semiconductor Corporation

DC Electrical Characteristics

V_{Audio} supply=2.7 V and typical values are at 25ºC unless otherwise specified.

Symbol	Parameter	V_{CC} (V)	Condition	T_A=- 40°C to +85°C			Unit
				Min.	Typ.	Max.	
Common Pins							
V_{IK}	Clamp Diode Voltage	3.0	I_{IK}=-18 mA			-1.2	V
V_{IH}	Control Input Voltage HIGH	3.0 to 4.3[5]		1.2			
V_{IL}	Control Input Voltage LOW	3.0 to 4.3[5]				0.5	
I_{IN}	A_{Sel} Input HIGH Current	V_{audio}=4.3 V, V_{CC}=3.0 V	V_{IN}=3.6 V	-1		10	µA
			V_{IN}=0 V	-1		1	
I_{OFF}	Power Off Leakage Current (Common Port Only D+/R, D-/L)	V_{audio}=V_{CC}=0 V	Common Port (D+/R, D-/L) V_{SW}=0V, 5.5 V			10	µA
$I_{NO(0FF)}$	Off-Leakage Current of Port D+, D-, R, L	3.6	D+/R, D-/L=0.3 V, V_{CC} – 0.3 V D+, D-, R, L=0.3 V, V_{CC} – 0.3 V or Floating	-50	1	50	nA
$I_{NC(0N)}$	On-Leakage Current of Port D+/R or D-/L	3.6	D+/R, D-/L=0.3 V, V_{CC} – 0.3 V D+, D-, R, L=Floating	-50	1	50	nA
R_{PD}	A_{Sel} Internal Pull-Down Resistor				3		MΩ
USB Switch Path							
	USB Analog Signal Range			0		3.6	V
R_{ONUSB}	HS Switch On Resistance[6]	3.0	$V_{D+/D-}$=0 V, 0.4 V, I_{ON}=-8 mA		4	6	Ω
Δ R_{ONUSB}	HS Delta R_{ON}[7,8]	3.0	$V_{D+/D-}$=0V, I_{ON}=-8 mA		0.4		Ω
Audio Switch Path							
	Audio Analog Signal Range			V_{audio} – 5.5		V_{audio}	V
$R_{ONAudio}$	Audio Switch On Resistance[6]	3.0 to 4.3[5]	$V_{L/R}$=-2V, 0V, 0.7V, 2.0V; I_{ON}=-26 mA		3	6	Ω
Δ $R_{ONAudio}$	Audio Delta R_{ON}[7]	3.0 to 4.3[5]	$V_{L/R}$=0.7V I_{ON}=-26 mA		0.4		Ω
$R_{FLAT(Audio)}$	Audio R_{ON} Flatness[9]	3.0 to 4.3[5]	$V_{L/R}$=-2 V, 0 V, 0.7 V, 2.0 V; I_{ON}=-26 mA		1.5	2.5	Ω
Power Supply							
$I_{CC(Audio)}$	Quiescent Supply Current (Audio)	V_{audio}=5.5 V	V_{ASel}=0 and V_{CC}, I_{OUT}=0		4	10	µA
$I_{CC(VCC)}$	Quiescent Supply Current (V_{CC})	V_{CC}=5.5 V	I_{OUT}=0, V_{audio}=0		12	20	µA
I_{CCT}	Increase in I_{CC} Current per Control Voltage and V_{CC}	V_{audio}=3.6 V, 4.3 V[5]	V_{ASel}=2.6 V, V_{CC}=Floating		10	15	µA
			V_{ASel}=1.8 V, V_{CC}=Floating		14	18	

Notes:

5. 4.3 V is guaranteed by characterization, not production tested.
6. On resistance is determined by the voltage drop between the A and B pins at the indicated current through the switch.
7. Δ R_{ON}=R_{ON} max – R_{ON} min measured at identical V_{CC}, temperature, and voltage. Worst-case signal path, audio or USB channel, is characterized.
8. Guaranteed by characterization, not production tested.
9. Flatness is defined as the difference between the maximum and minimum values of on resistance over the specified range of conditions.

© 2007 Fairchild Semiconductor Corporation

AC Electrical Characteristics

V_{Audio} supply=2.7 V unless otherwise specified.

Symbol	Parameter	V_{CC} (V)	Conditions	T_A=- 40°C to +85°C			Unit
				Min.	Typ.	Max.	
$t_{ONAUDIO2}$	Turn-On Time A_{Sel} to Output	3.0 to 4.3(10)	$V_{D+/R, D-/L}$=1.0 V; R_L=50 Ω; C_L=50pF, Figure 14, Figure 15			2	µs
$t_{OFFAUDIO2}$	Turn-Off Time A_{Sel} to Output	3.0 to 4.3(10)	$V_{D+/R, D-/L}$=1.0 V; R_L=50 Ω; C_L=50pF, Figure 14, Figure 15			2	µs
t_{PDUSB}	USB Switch Propagation Delay(10)	3.6	R_L=50 Ω; C_L=0 pF Figure 17		0.25		ns
$Xtalk_A$	Non-Adjacent Channel Crosstalk - Audio	3.0 to 4.3(10)	f=20 kHz; R_T=32 Ω; C_L=0 pF Figure 22		-110		dB
BW	-3db Bandwidth - USB	3.0 to 4.3(10)	R_T=50 Ω, C_L=0 pF, Signal 0 dBm Figure 20		720		MHz
THD	Total Harmonic Distortion	3.0 to 4.3(10)	f=20 Hz to 20 kHz; R_L=32 Ω, V_{IN}=2 V_{pp}, Figure 25		0.1		%

Note:

10. Guaranteed by characterization, not production tested.

USB High-Speed-Related AC Electrical Characteristics

V_{Audio} supply=2.7 V unless otherwise specified.

Symbol	Parameter	V_{CC} (V)	Conditions	T_A=- 40°C to +85°C			Unit
				Min.	Typ.	Max.	
$t_{SK(o)}$	Channel-to-Channel Skew(11)	3.0 to 4.3(11)	t_R=t_F=750 ps (10-90%) at 240 MHz C_L=0 pF, R_L=50 Ω Figure 18, Figure 19		35		ps
$t_{SK(P)}$	Skew of Opposite Transitions of the Same Output(11)	3.0 to 4.3(11)	t_R=t_F=750 ps (10-90%) at 240 MHz C_L=0 pF, R_L=50 Ω Figure 18, Figure 19		35		
t_J	Total Jitter(11)	3.0 to 4.3(11)	R_L=50 Ω, C_L=50 pF, t_R=t_F=500 ps (10-90%) at 480 Mbps (PRBS=2^{15} – 1)		130		ps

Note:

11. Guaranteed by characterization, not production tested.

Capacitance(12)

V_{Audio} supply=3.0V unless otherwise specified.

Symbol	Parameter	V_{CC} (V)	Condition	T_A=- 40°C to +85°C			Unit
				Min.	Typ.	Max.	
$C_{IN\ (ASel)}$	Control Pin Input Capacitance (A_{Sel})	V_{CC}=3.0 V, 4.3 V	V_{Bias}=0.05 V		2.0		pF
$C_{ON(D+/R, D-/L)}$	D+/R, D-/L (Source Port) On Capacitance	V_{CC}=3.0 V, 4.3 V A_{Sel}=0V (C_{ONUSB})	V_{Bias}=0.2 V; f=240 MHz Figure 24		4.5	6.0	pF
		V_{CC}=3.0 V, 4.3 V A_{Sel}=3.0 V ($C_{ONAudio}$)	V_{Bias}=0.2 V; f=1 MHz Figure 24		9.0		
$C_{OFF(D+, D-)}$	USB Input Source Off Capacitance	V_{CC}=3.0 V, 4.3 V A_{Sel}=3.0 V	f=1 MHz Figure 23		1.5		pF
$C_{OFF(R/L)}$	Audio Input Source Off Capacitance	V_{CC}=3.0 V, 4.3 V A_{Sel}=0 V	f=1MHz Figure 23		3.0		pF

Note:

12. Guaranteed by characterization, not production tested.

© 2007 Fairchild Semiconductor Corporation

Applications Information

In applications where Vsw could exceed the absolute maximum rating of V_{CC}+0.3 V, the following recommendations help maintain low power consumption and protect the part.

The addition of the series diode in the V_{CC} supply line blocks any current that might leak back into V_{CC} for over-voltage input cases.

Because the deselected channel may no longer provide guaranteed off isolation, consider the following:

- During USB transfer, the audio amplifier should be powered down.
- During audio transfer, the USB pull-up resistor supply must be removed *(as specified on page 141 of the USB 2.0 specification)*.

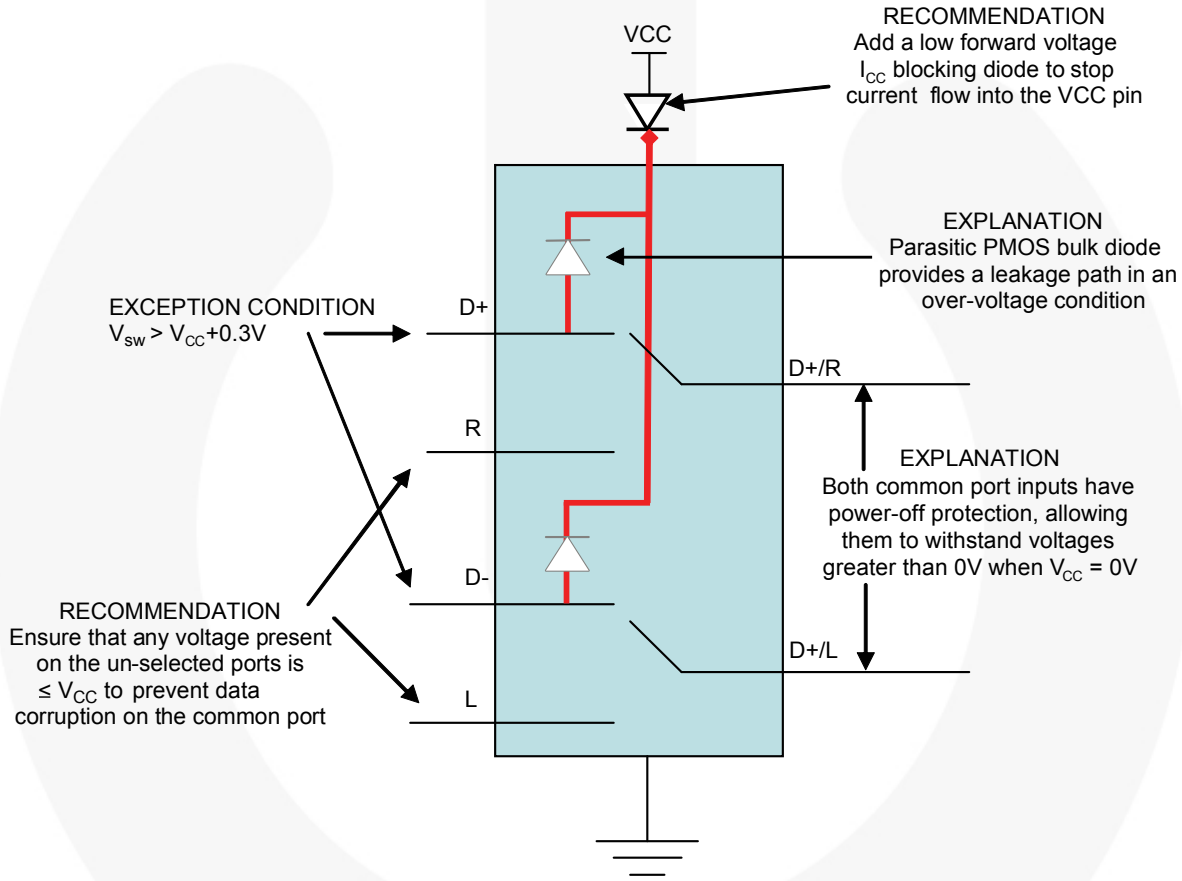


Figure 6. Application Suggestions

Typical Performance Characteristics

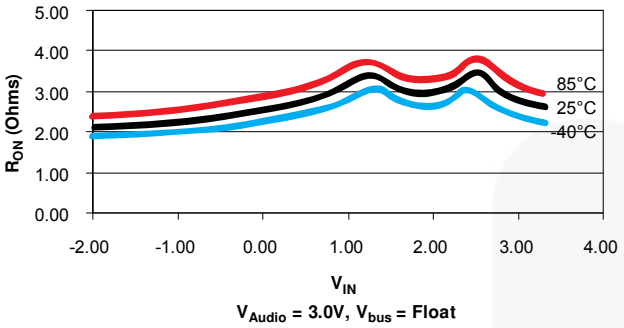


Figure 7. R_{ON} Audio, V_{Audio}=3.0 V

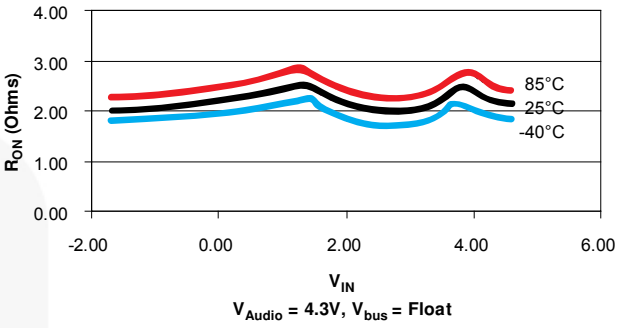


Figure 8. R_{ON} Audio, V_{Audio}=4.3 V

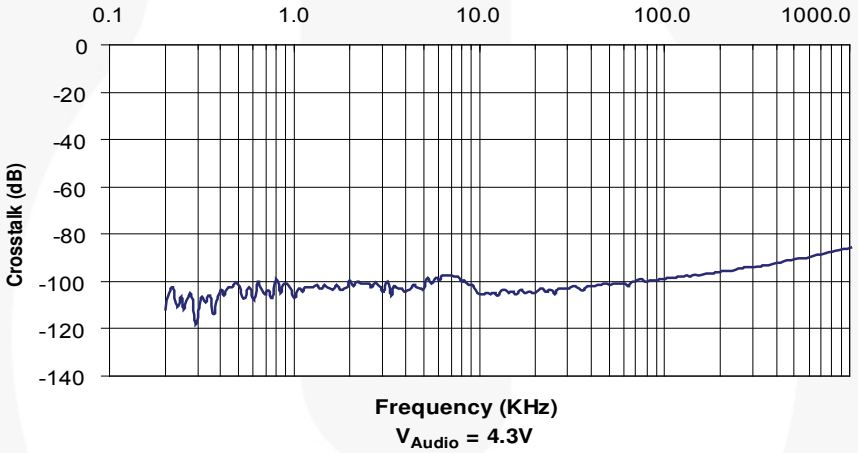


Figure 9. Crosstalk

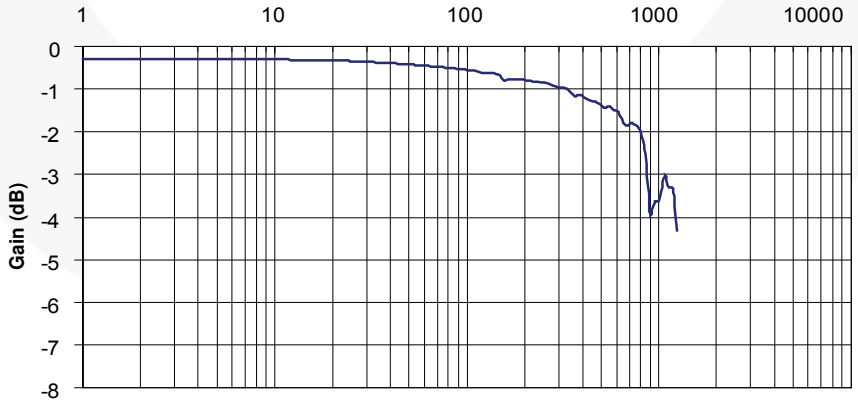


Figure 10. USB Bandwidth

Test Diagrams

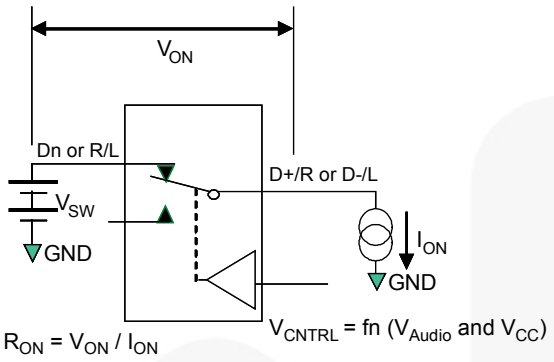


Figure 11. On Resistance

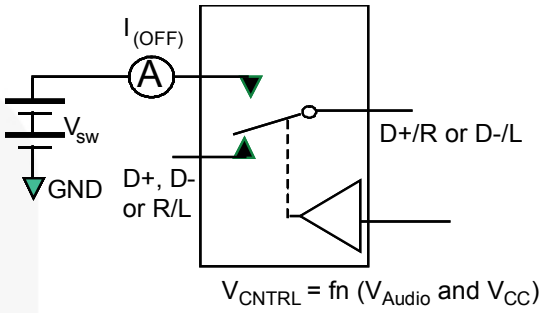


Figure 12. Off Leakage

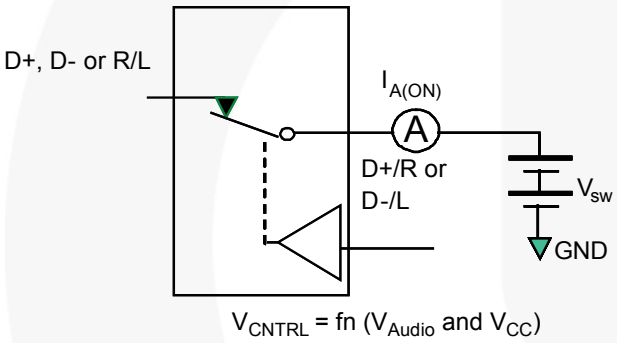
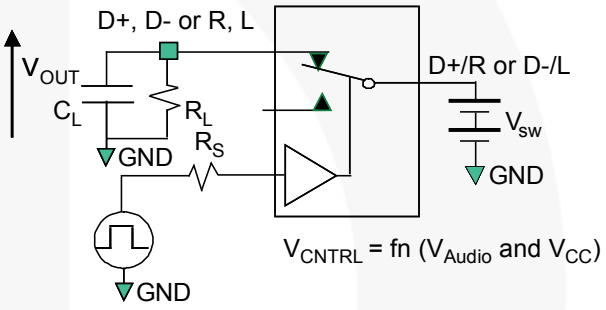


Figure 13. On Leakage



R_L, R_S, and C_L are functions of the application environment (see AC tables for specific values).
C_L includes test fixture and stray capacitance.

Figure 14. AC Test Circuit Load

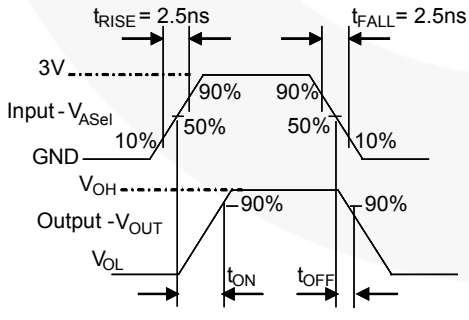


Figure 15. Turn-On / Turn-Off Waveforms (A_{Sel})

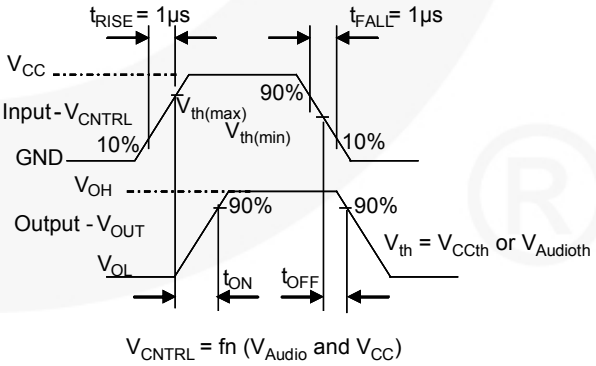


Figure 16. Turn-On / Turn-Off Waveforms (USB/Audio)

Test Diagrams (Continued)

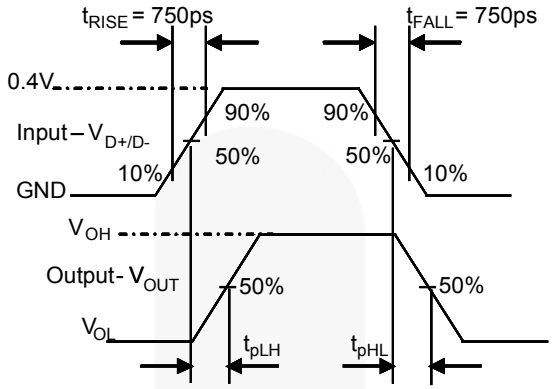


Figure 17. USB Switch Propagation Delay Waveforms

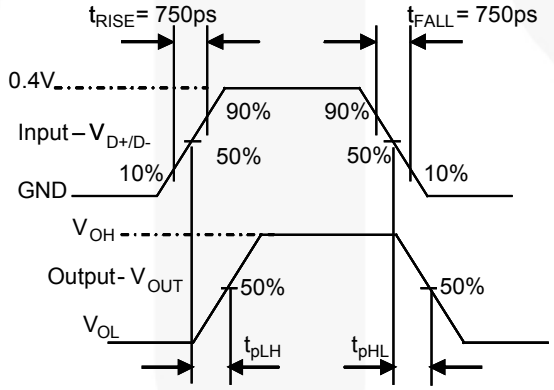


Figure 18. Pulse Skew: $t_{SK(P)}$=| t_{PHL} – t_{PLH} |

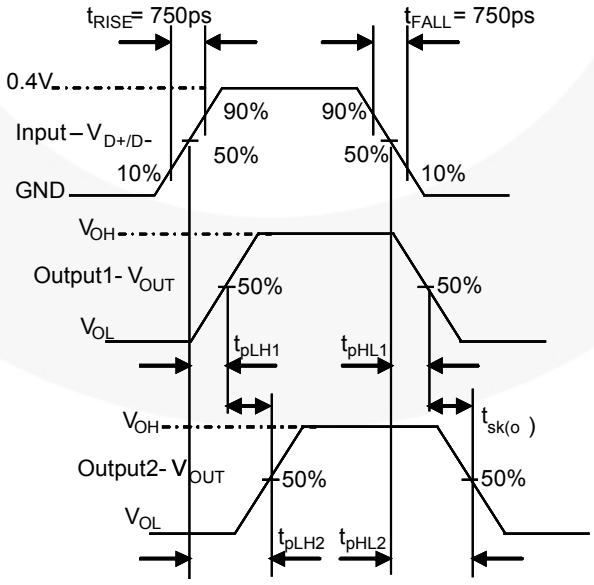
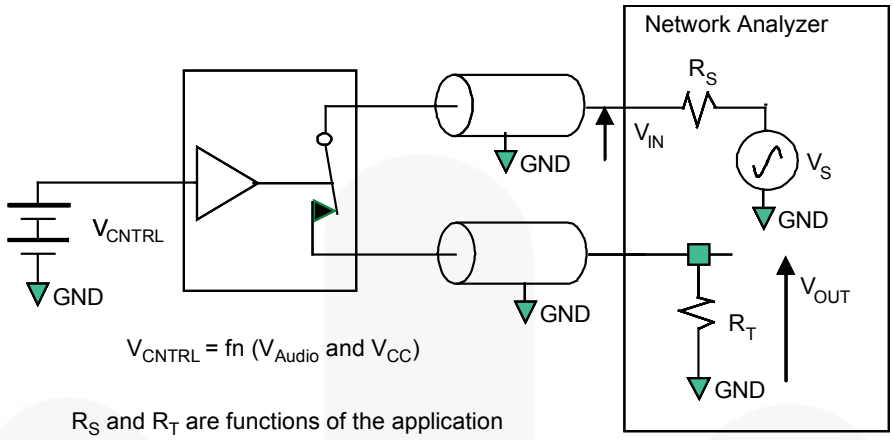


Figure 19. Output Skew: $t_{SK(O)}$=| t_{PLH1} – t_{PLH2} | or | t_{PHL1} – t_{PHL2} |

© 2007 Fairchild Semiconductor Corporation

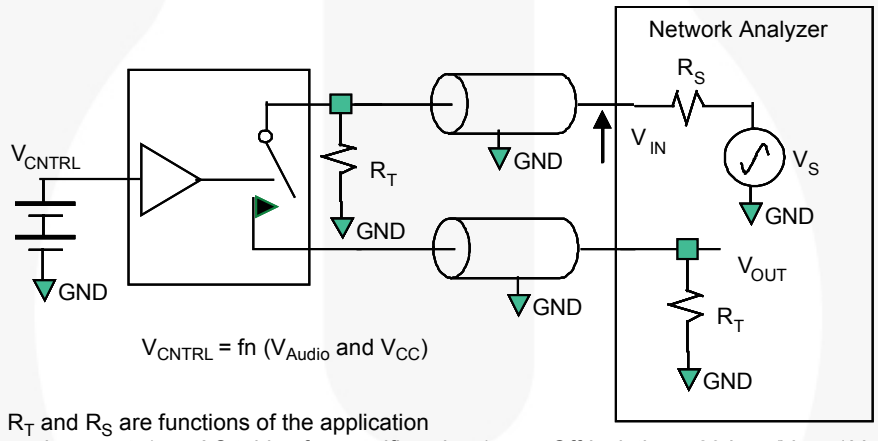
Test Diagrams (Continued)



V_{CNTRL} = fn (V_{Audio} and V_{CC})

R_S and R_T are functions of the application environment (see tables for specific values).

Figure 20. USB Bandwidth

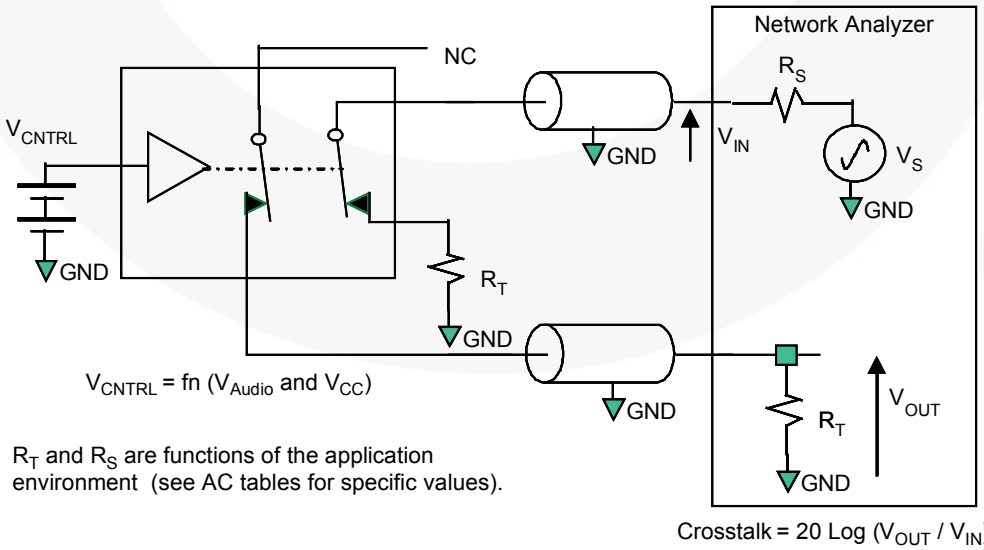


V_{CNTRL} = fn (V_{Audio} and V_{CC})

R_T and R_S are functions of the application environment (see AC tables for specific values).

Off Isolation = 20 Log (V_{OUT} / V_{IN})

Figure 21. Channel Off Isolation



V_{CNTRL} = fn (V_{Audio} and V_{CC})

R_T and R_S are functions of the application environment (see AC tables for specific values).

Crosstalk = 20 Log (V_{OUT} / V_{IN})

Figure 22. Non-Adjacent Channel-to-Channel Crosstalk

© 2007 Fairchild Semiconductor Corporation

Test Diagrams (Continued)

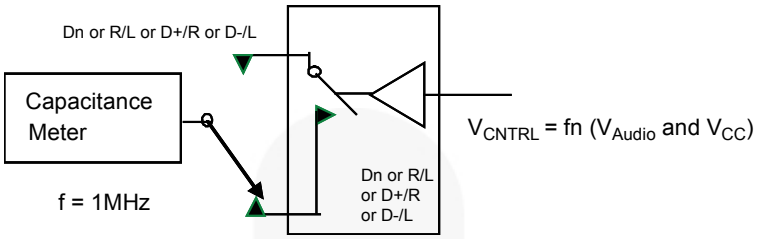


Figure 23. Channel Off Capacitance

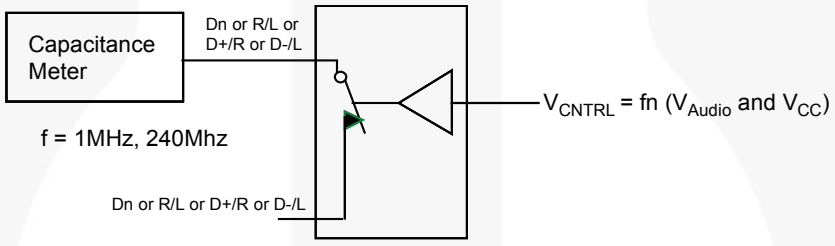
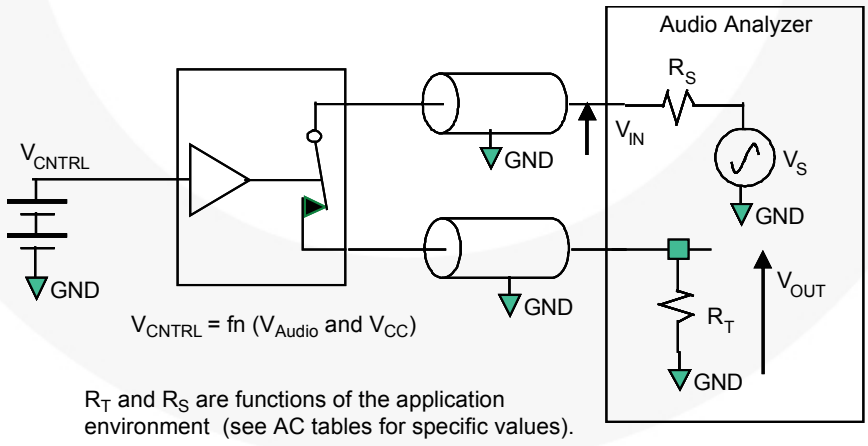


Figure 24. Channel On Capacitance



R_T and R_S are functions of the application environment (see AC tables for specific values).

Figure 25. Total Harmonic Distortion

Physical Dimensions

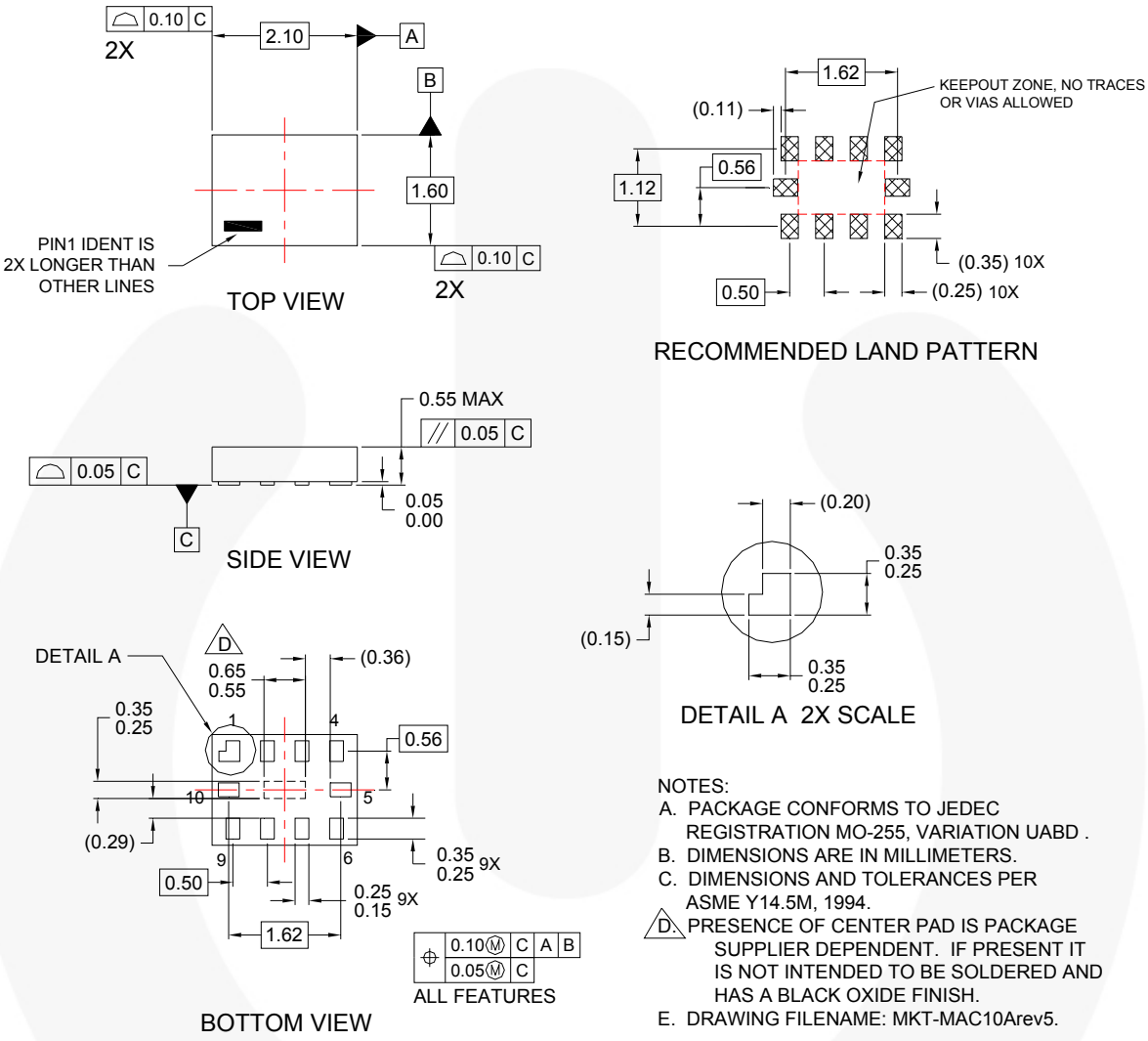


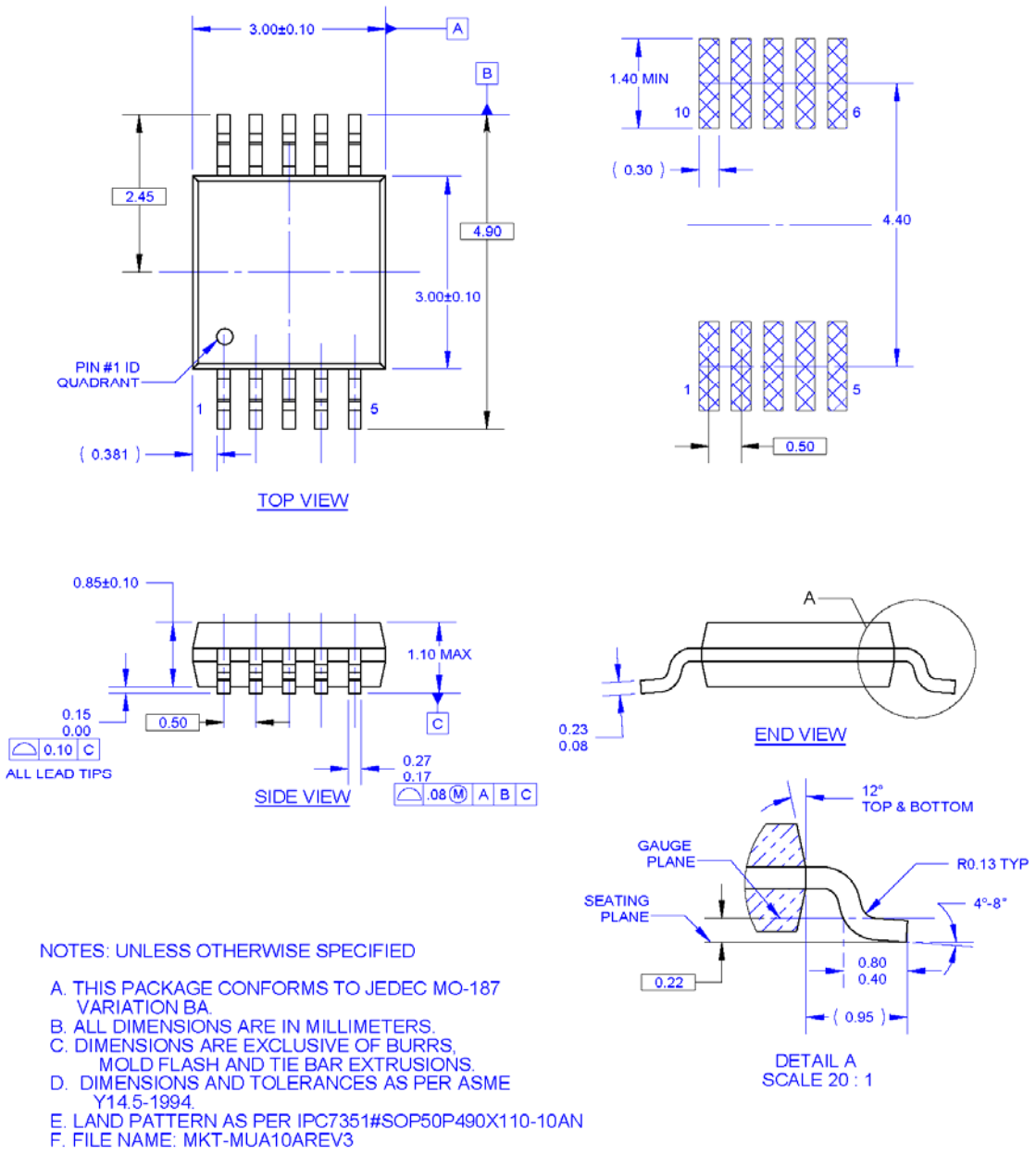
Figure 26. 10-Lead MicroPak™

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 tape & reel specifications, please visit, http://www.fairchildsemi.com/products/logic/pdf/micropak_tr.pdf.

Physical Dimensions (Continued)



NOTES: UNLESS OTHERWISE SPECIFIED

A. THIS PACKAGE CONFORMS TO JEDEC MO-187 VARIATION BA.
B. ALL DIMENSIONS ARE IN MILLIMETERS.
C. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH AND TIE BAR EXTRUSIONS.
D. DIMENSIONS AND TOLERANCES AS PER ASME Y14.5-1994.
E. LAND PATTERN AS PER IPC7351#SOP50P490X110-10AN
F. FILE NAME: MKT-MUA10AREV3

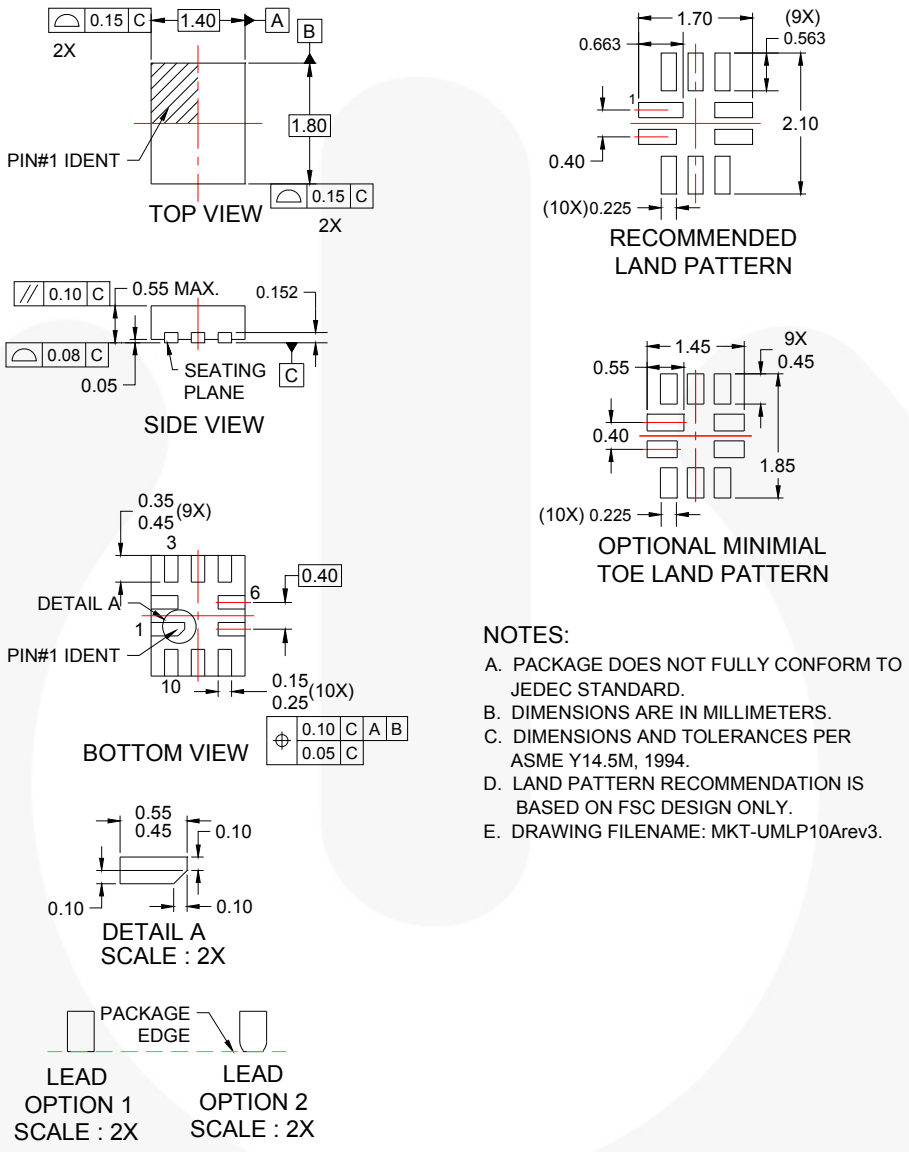
Figure 27. 10-Lead Molded Small Outline Package (MSOP)

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 tape & reel specifications, please visit http://www.fairchildsemi.com/products/analog/pdf/msop10_tr.pdf.

Physical Dimensions (Continued)



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-UMLP10Arev3.

Figure 28. 10-Lead Quad Ultrathin MLP

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 tape & reel specifications, please visit, http://www.fairchildsemi.com/products/analog/pdf/umlp10_tr.pdf.

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™
F®
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™
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. I62

© 2007 Fairchild Semiconductor Corporation

ON Semiconductor and ON are trademarks of Semiconductor Components Industries, LLC dba ON Semiconductor or its subsidiaries in the United States and/or other countries. ON Semiconductor owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of ON Semiconductor's product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent−Marking.pdf. ON Semiconductor reserves the right to make changes without further notice to any products herein. ON Semiconductor makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does ON Semiconductor assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using ON Semiconductor products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by ON Semiconductor. "Typical" parameters which may be provided in ON Semiconductor data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. ON Semiconductor does not convey any license under its patent rights nor the rights of others. ON Semiconductor products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use ON Semiconductor products for any such unintended or unauthorized application, Buyer shall indemnify and hold ON Semiconductor and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that ON Semiconductor was negligent regarding the design or manufacture of the part. ON Semiconductor is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

PUBLICATION ORDERING INFORMATION

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

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

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

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

For additional information, please contact your local Sales Representative