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FSA8009 Audio Jack Send / End Detection with MIC / Video Switch

Features

Accessory Plug-In			
3- or 4-Pole Audio Jack			
Send / End Key Pressed			
Microphone & Video			
2.5 to 4.3 V			
0.01% Typical			
16 kV			
-40°C to 85°C			
10-Lead UMLP			
1.4x1.8x0.5 mm, 0.4 mm			
Pitch			
KP			
FSA8009UMX			

Applications

- 3.5 mm and 2.5 mm Audio Jacks
- Cellular Phones, Smartphones
- MP3 and PMP

Typical Application

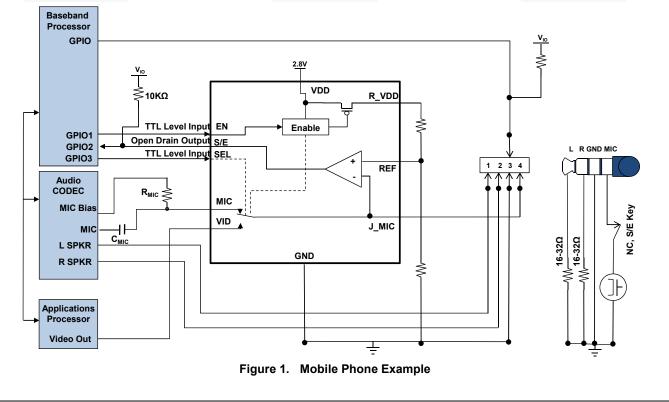
Description

The FSA8009 is an audio jack microphone / video switch for 3- or 4-pole accessories with send / end (S/E) detection. In addition to detection, the FSA8009 features an integrated microphone / video switch that allows the processor to configure the audio jack. The architecture is designed to allow common third-party headphones to be used for listening to music from mobile handsets, personal media players, and portable peripheral devices.

- Determines When Send / End Button Key is Pressed
- Integrates a MIC / Video Switch for 4-Pole Configuration
- Reduces Pop / Click Caused by Microphone Bias

Related Resources

- For samples and questions, please contact: <u>Analog.Switch@fairchildsemi.com</u>.
- FSA8009 Demonstration Board



Pin Descriptions

			1						
Name	Pin #	Туре	Description						
R_VDD	1	Output	Optional pull-up voltage, with a resistor divider, sets the reference voltage on the REF pin						
EN	2	lanut	Device enable, law newer mode	0	Device inactive ⁽¹⁾				
EIN	2	Input	Device enable, low-power mode	1	Device active ⁽¹⁾				
051	3	laput	MIC ()/ID switch colort ain	0	$VID = J_MIC^{(1)}$				
SEL	3	Input	MIC / VID switch select pin	1	$MIC = J_MIC^{(1)}$				
S/E	4	Output	Indicates state of send /end key press, open-drain output requires	0	Press ⁽¹⁾				
5/E	4	Output	pull-up resistor	1	No key press ⁽¹⁾				
VID	6	Switch	Video switch path; connects between video source and audio jack m	icroph	one pin				
VDD	5	Power	Supply voltage						
MIC	7	Switch	Microphone switch path that goes to the CODEC microphone amplifi	er inpu	ıt				
J_MIC	8	Switch	Microphone switch path that connects to the microphone, SEND/EN	D key,	and jack pole video				
REF	10	Input	Reference voltage used to detect a send / end key press, through a external voltage reference	resisto	r divider off R_VDD or				
GND	9	Ground	Ground for both the audio jack and the PCB						

Note:

1. $0 = V_{OL}$ or V_{IL} ; $1 = V_{OH}$ or V_{IH} .

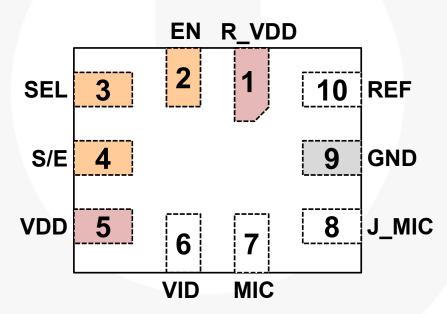


Figure 2. UMLP Pin Assignment (Through View)

Table 1.	Device Configuration in Reset and Active States
----------	---

EN	SEL	MIC	VID	R_VDD	S/E
0	Х	3-State	3-State	GND	HIGH
1	1	J_MIC	Open	VDD	Active
1	0	Open	J_MIC	GND	LOW

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.	Units
V _{DD}	Supply Voltage from Battery		-0.5	5.5	V
V _{SW}	Switch I/O Voltage		-0.5	V _{DD} +0.5	V
l _{IK}	Input Clamp Diode Current ⁽²⁾		-50		mA
I _{SW}	Switch I/O Current (Continuous) ⁽²⁾			50	mA
T _{STG}	Storage Temperature Range			+150	°C
TJ	Maximum Junction Temperature			+150	°C
TL	Lead Temperature (Soldering, 10 Seconds)			+260	°C
	IEC 61000-4-2 System	Air Gap	16		
	1EC 61000-4-2 System	Contact	10		
ESD		All other Pins	6		kV
	Human Body Model, JEDEC JESD22-A114	$\begin{array}{c} J_\text{DET}, \ J_\text{MIC}, \ V_{\text{DD}}, \\ V_{\text{IO}}, \ \text{GND} \end{array}$	8		
	Charged Device Model, JEDEC JESD22-C101	All Pins	2		

Note:

2. The input and output negative ratings may be exceeded if the input and output diode current ratings are observed.

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 _{DD}	Battery Supply Voltage	2.5	4.3	V
T _A	Operating Temperature	-40	+85	°C

DC Electrical Characteristics

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

MIC Switch

Symbol	Parameter		Conditions	T _A =	-40 to +	85°C	Units
Symbol	Farameter	V _{DD} (V)	Conditions	Min.	Тур.	Max.	Units
		2.8			2.0	4.0	
Bau	MIC Switch On Resistance	3.0	$1_{m} = 24 \text{ m} (1_{m} = 2.2)/(1_{m} = 2.$		1.5	3.5	Ω
Ron	MIC Switch On Resistance	3.3	Ι _{ουτ} = 24 mA, V _{IN} = 2.2 V		1.2	3.0	Ω
		3.8			1.0	2.5	
	On Resistance Flatness	2.8			0.7	1.5	
		3.0	I _{OUT} = 24 mA, V _{IN} = 1 V to V _{DD}		0.6	1.4	Ω
R _{FLAT(ON)}		3.3			0.5	1.3	
		3.8			0.5	1.2	
V _{IN}	Switch Input Voltage Range	2.5 to 4.3		0		V _{DD}	V
C _{ON}	MIC and J_MIC Switch ON Capacitance	2.8	f = 1 MHz		15		pF
C _{OFF}	MIC and J_MIC Switch OFF Capacitance	2.8	f = 1 MHz		8		pF

Video Switch Characteristics

Cumph of	Deremeter	V 00	Conditions	T _A = -40 to +85°C			Unit
Symbol	Parameter	$V_{DD}(V)$	Conditions	Min.	Тур.	Max.	Unit
		2.8			1.0	1.5	
В	MIC Switch On Registerion	3.0	I _{OUT} = 24 mA, V _{IN} = 0.5 V		0.9	1.4	0
RON	R _{ON} MIC Switch On Resistance	3.3	$1_{OUT} - 24 \text{ mA}, V_{IN} - 0.3 \text{ V}$		0.8	1.3	Ω
		3.8			0.7	1.2	
		2.8	I _{OUT} = 24 mA, V _{IN} = 0 V to 1.2 V		0.4	0.60	
Б		3.0			0.3	0.55	Ω
R _{FLAT(ON)}	On Resistance Flatness	3.3			0.2	0.50	
		3.8			0.15	0.45	
VIN	Switch Input Voltage Range	2.5 to 4.3		0		1.5	V
C _{ON}	VID Switch ON Capacitance	2.8	f = 1 MHz		40		pF
COFF	VID Switch OFF Capacitance	2.8	f = 1 MHz		10		pF

Parallel I/O

Symbol	Poromotor	T _A =	Unit		
	Parameter	Min.	Тур.	Max.	Unit
VIH	Input High Voltage (EN, SEL)	$0.44 \text{ x V}_{\text{DD}}$		V _{DD}	V
VIL	Input Low Voltage (EN, SEL)	GND		$0.15 \text{ x } V_{\text{DD}}$	V
PUR _{S/E}	Pull-Up Resistor on S/E	2		110	KΩ
V _{OL}	Output Low Voltage (S/E) (V _{PUR} = Voltage of Pull-Up Resistor)			0.2 x V _{PUR}	V

DC Electrical Characteristics (Continued)

All typical values are at $T_A=25^{\circ}C$ unless otherwise specified.

Comparator NC Switch

Symbol	Parameter		Conditions	T _A =	Unit		
		$V_{DD}(V)$		Min.	Тур.	Max.	Unit
V _{REF}	Input Voltage on REF Pin			1		V _{DD} - 0.075	V
COM _{HYS}	Hysteresis of Comparator "-" Termina	1			50		mV

Current

Currence of	Symbol Parameter V _{DD} (V)		Conditions	T _A =	Unit		
Symbol		Conditions	Min.	Тур.	Max.	Unit	
I _{OFF}	Off-State Leakage Current	4.3	J_MIC = 1 V, 4.3 V MIC or VID = 4.3 V, 1 V	-15		15	nA
I _{IN}	Input Leakage Current	0 to 4.3	Inputs 0 to 4.3 V			1	μA
I _{CC-EN}	Low-Power Mode	2.5 to 4.3	EN = LOW		10		nA
I _{CC-VID}	Current during Video Mode	2.5 to 4.3	Active Current (EN = HIGH, SEL = LOW)		10		nA
I _{CC-MIC}	Current during Microphone Mode	2.5 to 4.3	Active Current (EN = HIGH, SEL = HIGH)		20		μA

AC Electrical Characteristics

All typical values are for V_{CC}=3.3 V at T_A=25°C unless otherwise specified.

MIC Switch

Symbol	Parameter	$T_A = -40 t$		-40 to +	-85°C	11	
		V _{DD} (V)	Conditions	Min.	Тур.	Max.	Unit
THD	Total Harmonic Distortion	2.8	R_{T} = 600 Ω, V _{SW} = 0.5 V _{PP} , f = 20 Hz to 20 kHz, V _{IN} = 2.2 V		.003		%
O _{IRR}	Off Isolation	2.8	f = 20 kHz, R _S =32 Ω, C _L =0 pF, R _T =32 Ω		-100		dB
X _{TALK}	Crosstalk from MIC to VID	2.8	f = 100 MHz, R _L =100 Ω		-67		dB

Video Switch Characteristics

Symbol	Parameter		Conditions	T _A = -40 to +85°C		Unit	
Symbol	Parameter	V _{DD} (V)	Conditions	Min.	Тур.	Max.	Unit
D _G	Differential Gain	2.8	R _L = 150 Ω, f = 3.58 MHz		.09		%
D _P	Differential Phase	2.8	R _L = 150 Ω, f = 3.58 MHz		.13		0
O _{IRR}	Off Isolation	2.8	f=10 MHz, R _L =150 Ω,		-45		dB
X _{TALK}	Crosstalk from VID to MIC	2.8	f=10 MHz, R _{IN} = 10 Ω, C _L =0 pF, R _L =150 Ω		-65		dB

Parallel I/O

Symbol	Parameter		Conditions	T _A = -40 to +85°C			Unit
Symbol	Parameter	V _{DD} (V)	Conditions	Min.	Тур.	Max.	Unit
t _{BBM}	Break-Before-Make Time	2.5 to 4.3			120		ns
t _{EN}	Enable or Disable Time	2.5 to 4.3	EN LOW→ HIGH or EN HIGH→LOW		15		μs
tsel-com-on	Select to Comparator On	2.5 to 4.3	SEL LOW→ HIGH to Comparator ON		10		μs
t _{SEL-COM-OFF}	Select to Comparator Off	2.5 to 4.3	SEL HIGH→LOW to Comparator OFF		20		ns
t _{ON}	Switch Turn-On Time	2.5 to 4.3			40	/	ns
t _{OFF}	Switch Turn-Off Time	2.5 to 4.3			15		ns
t _{J_MIC-S/E}	Propagation Delay from Comparator Trigger to S/E Output	2.5 to 4.3	J_MIC > REF from LOW→HIGH J_MIC < REF from HIGH→LOW		10		μs

Power

Symbol	Parameter		Conditions	T _A = -40 to +85°C			Unit
Symbol	Farameter	$V_{DD}(V)$	Conditions	Min.	Тур.	Max.	Unit
PSRR	Power Supply Rejection Ratio	2.8	Power Supply Noise 300 mV _{PP} , Measured 10/90%, f=217 Hz		-100		dB

(9X)

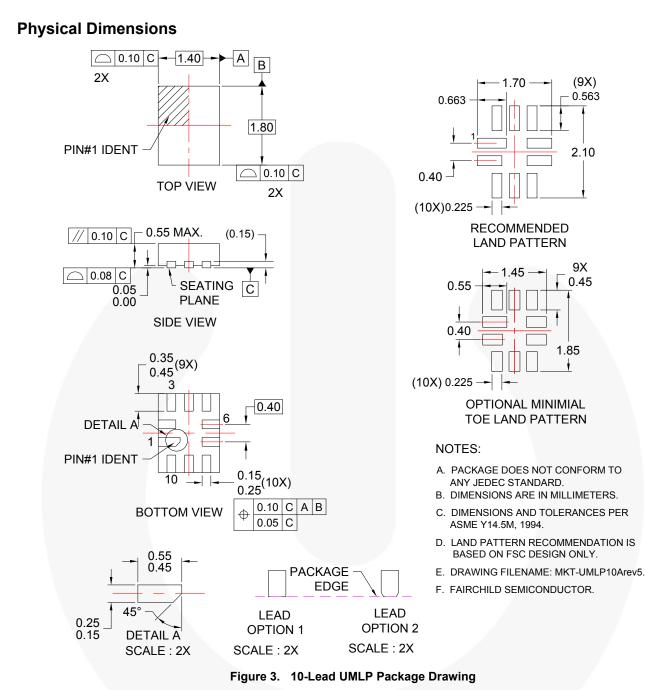
0.563

2.10

9X

0.45

1.85



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Ordering Information

Part Number	Operating Temperature Range	Top Mark	Package
FSA8009UMX	-40 to +85°C	KP	10-Lead 1.4 x 1.8 x 0.55 mm, 0.4 mm Pitch, Ultrathin Molded Leadless Package (UMLP)

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