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March 2012

FSA8029
Audio Jack Send / End Detection with MIC / Video Switch

Features

Detection	Accessory Plug-In 3- or 4-Pole Audio Jack Send / End Key Pressed
Switch Type	Microphone & Video
V_{DD}	2.5 to 4.3V
THD (MIC)	0.01% Typical
ESD (Air Gap)	16kV
Operating Temperature	-40°C to 85°C
Package	10-Lead UMLP 1.4x1.8x0.5mm, 0.4mm Pitch
Top Mark	KS
Ordering Information	FSA8029UMX

Applications

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

Description

The FSA8029 is an audio jack microphone / video switch for 3- or 4-pole accessories with send / end (S/E) detection. In addition to detection, the FSA8029 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: Analog.Switch@fairchildsemi.com.*
- *FSA8029 Demonstration Board*

Typical Application

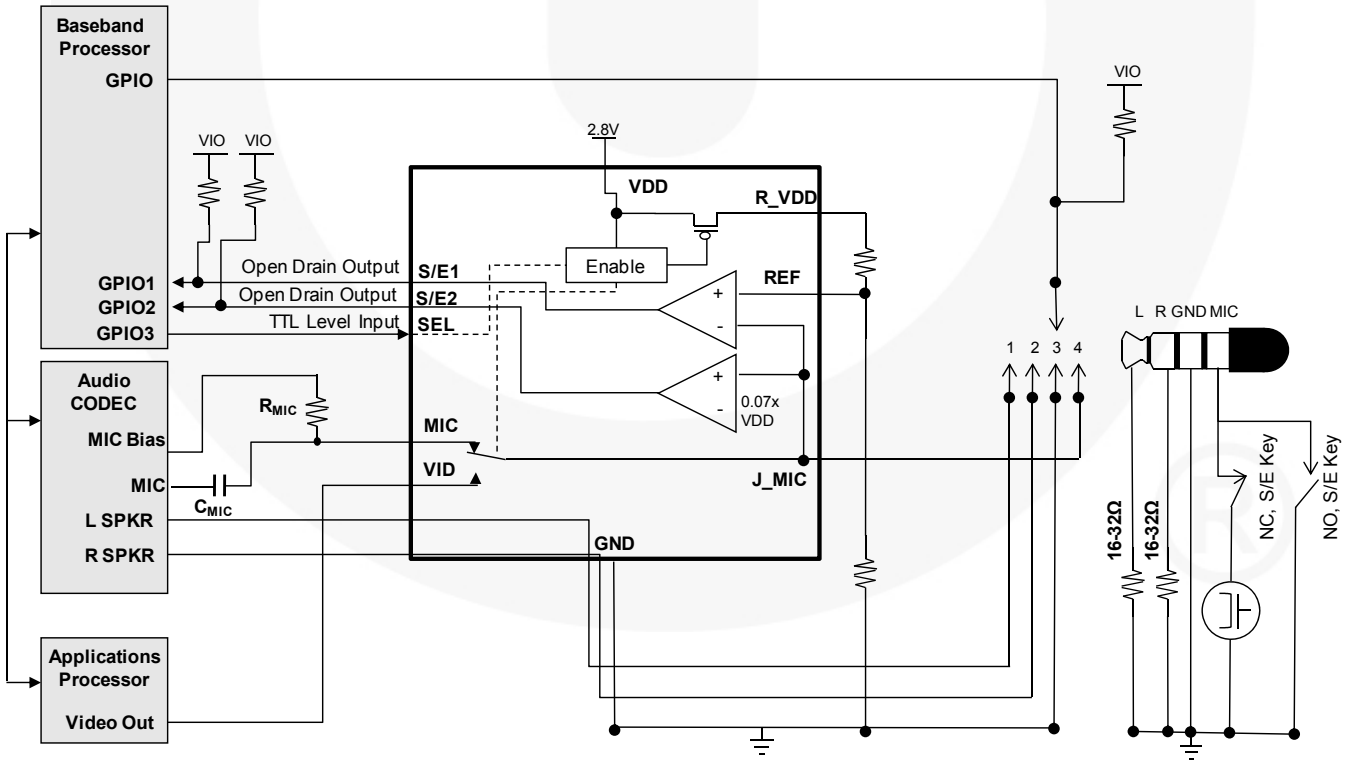

Figure 1. Mobile Phone Example

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Pin Configuration

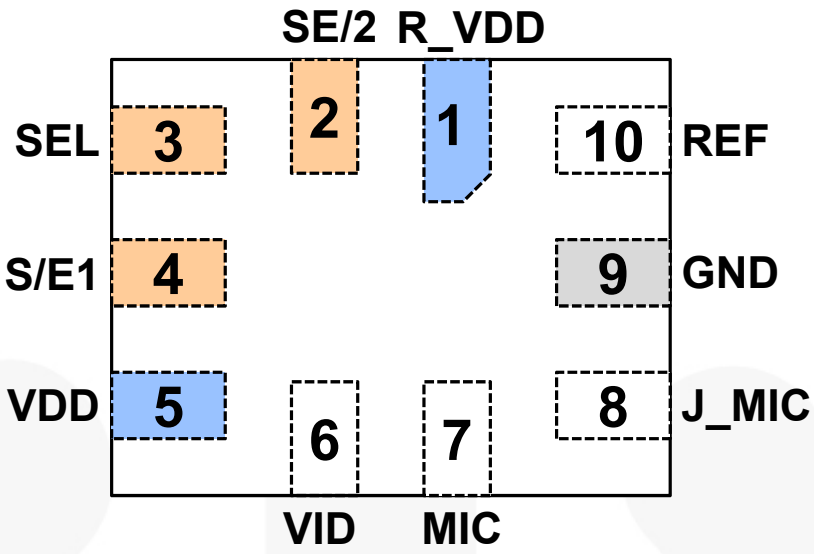

Figure 2. Pin Assignments (Through View)

Pin Descriptions

Name	Pin #	Type	Description		
R_VDD	1	Output	Optional pull-up voltage, with a resistor divider, sets the reference voltage on the REF pin		
S/E2	2	Output	Indicates state of normally open (N/O) send / end key press; open-drain output requires pull-up resistor	0	Key Press(1)
				1	No Key Press(1)
SEL	3	Input	MIC / VID switch select pin	0	VID = J_MIC(1)
				1	MIC = J_MIC(1)
S/E1	4	Output	Indicates state of normally closed (N/C) send / end key press; open-drain output requires pull-up resistor	0	Key Press(1)
				1	No Key Press(1)
VID	6	Switch	Video switch path; connects between video source and audio jack microphone pin		
MIC	7	Switch	Microphone switch path to the CODEC microphone amplifier input		
J_MIC	8	Switch	Microphone switch path connects to the microphone, send / end key, and video of the jack pole		
REF	10	Input	Reference voltage used to detect a send / end key press through a resistor divider off R_VDD or external voltage reference		
VDD	5	Power	Supply voltage		
GND	9	Ground	Ground for both the audio jack and PCB		

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

Table 1. Device Configuration in Reset and Active States

SEL	MIC	VID	R_VDD	S/E1 + S/E2
1	J_MIC	Open	VDD	Active
0	Open	J_MIC	GND	HIGH

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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
I_{IK}	Input Clamp Diode Current(2)		-50		mA
I_{SW}	Switch I/O Current (Continuous)(2)			50	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	IEC 61000-4-2 System ESD	Air Gap	16		kV
		Contact	10		
	Human Body Model, JEDEC JESD22-A114	All other Pins	5		
		J_DET, J_MIC, V_{DD}, V_{IO}, GND	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	ºC

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DC Electrical Characteristics

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

MIC Switch

Symbol	Parameter	Conditions	V_{DD} (V)	T_A = -40 to +85°C			Units
				Min.	Typ.	Max.	
R_{ON}	MIC Switch On Resistance	I_{OUT} = 24mA, V_{IN} = 2.2V	2.8		2.0	4.0	Ω
			3.0		1.5	3.5	
			3.3		1.2	3.0	
			3.8		1.0	2.5	
$R_{FLAT(ON)}$	On Resistance Flatness	I_{OUT} = 24mA, V_{IN} = V to V_{DD}	2.8		0.7	1.5	Ω
			3.0		0.6	1.4	
			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	f = 1MHz	2.8		15		pF
C_{OFF}	MIC and J_MIC Switch OFF Capacitance	f = 1MHz	2.8		8		pF

Video Switch Characteristics

Symbol	Parameter	Conditions	V_{DD} (V)	T_A = -40 to +85°C			Unit
				Min.	Typ.	Max.	
R_{ON}	MIC Switch On Resistance	I_{OUT} = 24mA, V_{IN} = 0.5V	2.8		1.0	1.5	Ω
			3.0		0.9	1.4	
			3.3		0.8	1.3	
			3.8		0.7	1.2	
$R_{FLAT(ON)}$	On Resistance Flatness	I_{OUT} = 24mA, V_{IN} = 0V to 1.2V	2.8		0.4	0.60	Ω
			3.0		0.3	0.55	
			3.3		0.2	0.50	
			3.8		0.15	0.45	
V_{IN}	Switch Input Voltage Range		2.5 to 4.3	0		1.5	V
C_{ON}	VID Switch On Capacitance	f = 1MHz	2.8		40		pF
C_{OFF}	VID Switch Off Capacitance	f = 1MHz	2.8		10		pF

Parallel I/O

Symbol	Parameter	T_A = -40 to +85°C			Unit
		Min.	Typ.	Max.	
V_{IH}	Input High Voltage (EN, SEL)	0.44 x V_{DD}		V_{DD}	V
V_{IL}	Input Low Voltage (EN, SEL)	GND		0.15 x V_{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

Continued on the following page…

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DC Electrical Characteristics (Continued)

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

Comparator NC Switch

Symbol	Parameter	T_A = -40 to +85°C			Unit
		Min.	Typ.	Max.	
V_{REF}	Input Voltage on REF Pin	1		V_{DD} – 0.075	V
COM_{HYS}	Hysteresis of Comparator "-" Terminal		50		mV

Comparator NO Switch

Symbol	Parameter	V_{DD} (V)	T_A = -40 to +85°C			Unit
			Min.	Typ.	Max.	
V_{COMP}	Comparator Threshold for Send / End Sensing	2.5 to 4.3		0.07 x V_{DD}		V
COM_{HYS}	Hysteresis of Comparator "+" Terminal			50		mV

Current

Symbol	Parameter	Conditions	V_{DD} (V)	T_A = -40 to +85°C			Unit
				Min.	Typ.	Max.	
I_{OFF}	Off-State Leakage Current	J_MIC = 1V, 4.3V, MIC or VID = 4.3V, 1V	4.3	-15		15	nA
I_{IN}	Input Leakage Current	Inputs 0 to 4.3V	0 to 4.3			1	µA
I_{CC-EN}	Low-Power Mode	EN = LOW	2.5 to 4.3		10		nA
I_{CC-VID}	Current During Video Mode	Active Current, SEL = LOW	2.5 to 4.3		10		nA
I_{CC-MIC}	Current During Microphone Mode	Active Current, SEL = HIGH	2.5 to 4.3		20		µA

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AC Electrical Characteristics

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

MIC Switch

Symbol	Parameter	Conditions	V_{DD} (V)	T_A = -40 to +85°C			Unit
				Min.	Typ.	Max.	
THD	Total Harmonic Distortion	R_T = 600Ω, V_{SW} = 0.5V_{PP}, f = 20Hz to 20kHz, V_{IN} = 2.2V	2.8		.003		%
O_{IRR}	Off Isolation	f = 20kHz, R_S = 32Ω, C_L = 0pF, R_T = 32Ω	2.8		-100		dB
X_{TALK}	Crosstalk from MIC to VID	f = 1MHz, R_L = 100Ω	2.8		-67		dB

Video Switch Characteristics

Symbol	Parameter	Conditions	V_{DD} (V)	T_A = -40 to +85°C			Unit
				Min.	Typ.	Max.	
D_G	Differential Gain	R_L = 150Ω, f = 3.58MHz	2.8		.09		%
D_P	Differential Phase	R_L = 150Ω, f = 3.58MHz	2.8		.13		◦
O_{IRR}	Off Isolation	f = 10MHz, R_L = 150Ω,	2.8		-45		dB
X_{TALK}	Crosstalk from VID to MIC	f = 10MHz, R_{IN} = 10Ω, C_L = 0pF, R_L = 150Ω	2.8		-65		dB

Parallel I/O

Symbol	Parameter	Conditions	V_{DD} (V)	T_A = -40 to +85°C			Unit
				Min.	Typ.	Max.	
t_{BBM}	Break-Before-Make Time		2.5 to 4.3		120		ns
$t_{SEL-COM-ON}$	Select to Comparator On	SEL LOW→ HIGH to Comparator On	2.5 to 4.3		10		µs
$t_{SEL-COM-OFF}$	Select to Comparator Off	SEL HIGH→LOW to Comparator Off	2.5 to 4.3		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	J_MIC > REF from LOW→HIGH J_MIC < REF from HIGH→LOW	2.5 to 4.3		10		µs

Power

Symbol	Parameter	Conditions	V_{DD} (V)	T_A = -40 to +85°C			Unit
				Min.	Typ.	Max.	
PSRR	Power Supply Rejection Ratio	Power Supply Noise at 300MV_{PP}, Measured 10/90%, f = 217Hz	2.8		-100		dB

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Physical Dimensions

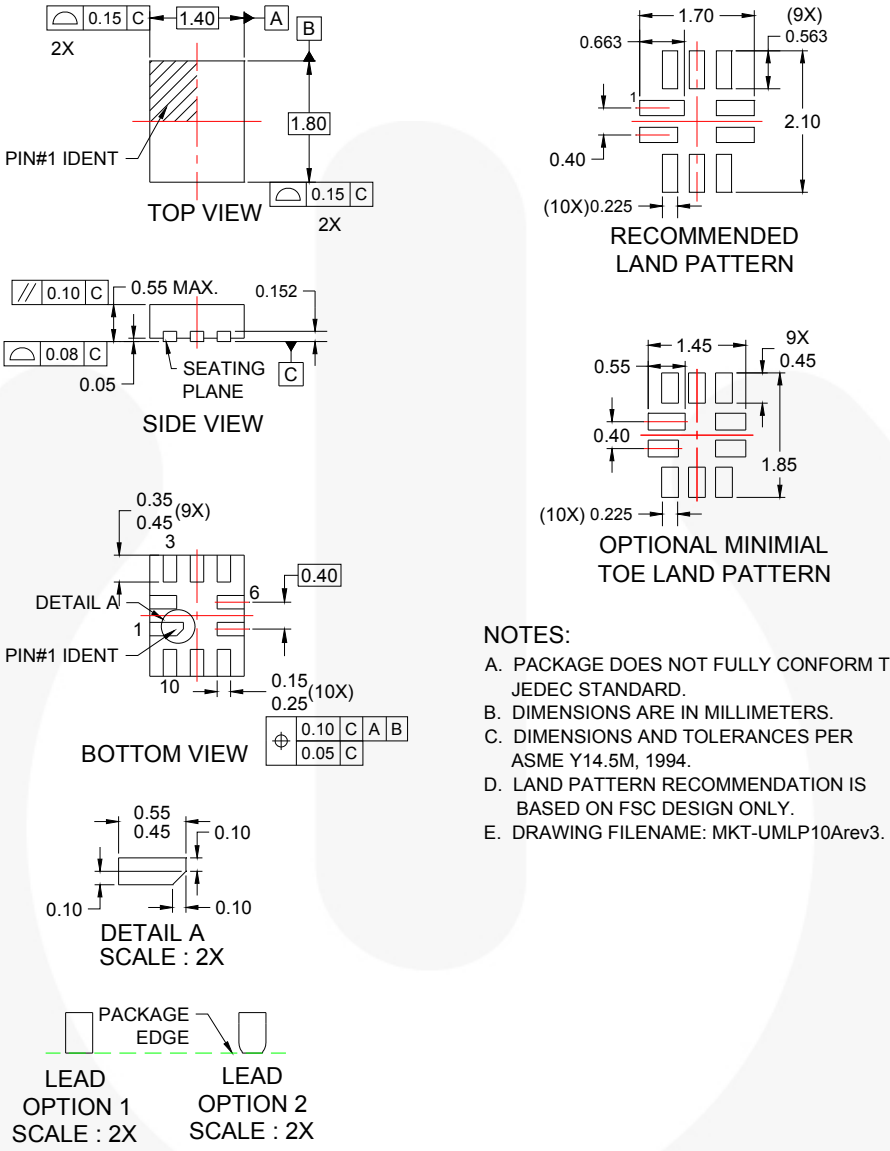

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Figure 3. 10-Lead, UMLP Package

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Ordering Information

Part Number	Operating Temperature Range	Top Mark	Package
FSA8029UMX	-40 to +85°C	KS	10-Lead 1.4 x 1.8 x 0.55mm, 0.4mm Pitch, Ultrathin Molded Leadless Package (UMLP)

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