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

Features

	Accessory Plug-In
Detection	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
Baakaga	10-Lead UMLP
Гаскауе	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

Typical Application

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: <u>Analog.Switch@fairchildsemi.com</u>.
- FSA8029 Demonstration Board



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Pin Configuration



Figure 2. Pin Assignments (Through View)

Pin Descriptions

Name	Pin #	Туре	Description						
R_VDD	1	Output	Optional pull-up voltage, with a resistor divider, sets the reference	ptional pull-up voltage, with a resistor divider, sets the reference voltage on the REF pin					
S/E2	2	Quitout	Indicates state of normally open (N/O) send / end key press;	0	Key Press ⁽¹⁾				
3/E2	2	Output	open-drain output requires pull-up resistor	1	No Key Press ⁽¹⁾				
SEI .	2	Input	MIC ()/ID switch select nin	0	$VID = J_MIC^{(1)}$				
JEL	3	mput	IIC / VID switch select pin		$MIC = J_MIC^{(1)}$				
S/F1	4	Output	ndicates state of normally closed (N/C) send / end key press;		Key Press ⁽¹⁾				
5/E1	4	Output	open-drain output requires pull-up resistor	1	No Key Press ⁽¹⁾				
VID	6	Switch	Video switch path; connects between video source and audio jack	micro	phone 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 ke	ey, and	d video of the jack pole				
REF	10	Input	Reference voltage used to detect a send / end key press through a external voltage reference	eference voltage used to detect a send / end key press through a resistor divider off R_VDD o xternal voltage reference					
VDD	5	Power	Supply voltage	/					
GND	9	Ground	Ground for both the audio jack and PCB						

Note:

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

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

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
TJ	Maximum Junction Temperature			+150	°C
TL	Lead Temperature (Soldering, 10 Seconds)			+260	°C
		Air Gap	16		
	IEC 61000-4-2 System ESD	Contact	10		
ESD	Human Bady Madal, JEDEC, JECD22 A114	All other Pins	5		kV
	Human Body Model, JEDEC JESD22-A114	$\begin{array}{l} J_\text{DET}, \ J_\text{MIC}, \ V_{\text{DD}}, \\ V_{\text{IO}}, \ \text{GND} \end{array}$	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 $T_A = 25^{\circ}$ C unless otherwise specified.

MIC Switch

Symbol	Deremeter	Conditions		T _A =	-40 to +	85°C	Unito
Symbol	Falameter	Conditions	$\mathbf{v}_{DD}(\mathbf{v})$	Min.	Тур.	Max.	Units
		I _{OUT} = 24mA, V _{IN} = 2.2V	2.8		2.0	4.0	
Б	MIC Switch On Resistance		3.0		1.5	3.5	0
RON			3.3		1.2	3.0	
			3.8		1.0	2.5	
			2.8		0.7	1.5	
P	On Desistance Flatace	I _{OUT} = 24mA,	3.0		0.6	1.4	0
r FLAT(ON)	On Resistance Flathess	$V_{IN} = V$ to V_{DD}	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	Deremeter	Conditions		T _A =	-40 to +8	5°C	l lmit
Symbol	Falailletei	Conditions	V _{DD} (V)	Min.	Тур.	Max.	Unit
			2.8		1.0	1.5	
P	MIC Quitch On Desistance	Resistance $I_{OUT} = 24$ mA, $V_{IN} = 0.5V$	3.0		0.9	1.4	
RON	MIC Switch On Resistance		3.3		0.8	1.3	Ω
			3.8		0.7	1.2	
			2.8		0.4	0.60	
	On Desistance Flatness	I _{OUT} = 24mA,	3.0	7	0.3	0.55	
RFLAT(ON)	On Resistance Flatness	$V_{IN} = 0V$ to 1.2V	3.3		0.2	0.50	Ω
			3.8		0.15	0.45	
V _{IN}	Switch Input Voltage Range		2.5 to 4.3	0		1.5	V
Con	VID Switch On Capacitance	f = 1MHz	2.8		40		pF
COFF	VID Switch Off Capacitance	f = 1MHz	2.8		10		pF

Parallel I/O

Cumb al	Deversetor	T _A = -4	0 to +8	5°C	Unit
Symbol	Parameter	Min.	Тур.	Max.	Unit
VIH	Input High Voltage (EN, SEL)	0.44 x V _{DD}		V _{DD}	V
VIL	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...

DC Electrical Characteristics (Continued)

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

Comparator NC Switch

Symbol	Parameter		T _A = -40 to +85°C		
Symbol			Тур.	Max.	Unit
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	Beremeter		T	Unit		
Symbol	Parameter	$\mathbf{v}_{DD}(\mathbf{v})$	Min.	Тур.	Max.	Unit
V _{COMP}	Comparator Threshold for Send / End Sensing	2.5 to 4.3		$0.07 \text{ x V}_{\text{DD}}$	S	V
COM _{HYS}	Hysteresis of Comparator "+" Terminal			50		mV

Current

Symbol	Deremeter	Conditiono		T _{A =} -40 to +85°C			Unit
Symbol	Parameter	Conditions	V _{DD} (V)	Min.	Тур.	Max.	Unit
IOFF	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
І _{сс-міс}	Current During Microphone Mode	Active Current, SEL = HIGH	2.5 to 4.3		20		μA

AC Electrical Characteristics

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

MIC Switch

Symbol	Deremeter	Conditiono		T _A = -40 to +85°C			Unit
Symbol	Farameter	Conditions	VDD(V)	Min.	Тур.	Max.	Unit
THD	Total Harmonic Distortion	$R_{T} = 600\Omega, V_{SW} = 0.5V_{PP},$ f = 20Hz to 20kHz, V _{IN} = 2.2V	2.8		.003		%
O _{IRR}	Off Isolation	$\label{eq:rescaled_f} \begin{array}{l} f=20 \text{kHz}, R_{\text{S}}=32\Omega, C_{\text{L}}=0 \text{pF}, \\ R_{\text{T}}=32\Omega \end{array}$	2.8		-100		dB
X _{TALK}	Crosstalk from MIC to VID	$f = 1MHz, R_L = 100\Omega$	2.8		-67		dB

Video Switch Characteristics

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

Parallel I/O

Symbol	Doromotor	Conditiona		T _A =	-40 to +	85°C	Ilmit
Symbol	Parameter	Conditions	V _{DD} (V)	Min.	Тур.	Max.	Unit
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	1	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	Deremeter	Conditiona		T _{A=}	-40 to +	85°C	Unit
Symbol	Parameter	Conditions	V _{DD} (V)	Min.	Тур.	Max.	Unit
PSRR	Power Supply Rejection Ratio	Power Supply Noise at 300Mv _{PP} , Measured 10/90%, f = 217Hz	2.8		-100		dB

Physical Dimensions



2X

// 0.10 C ⊂ 0.55 MAX. 0.152 0.08 C 0.05 PLANE SIDE VIEW









NOTES:

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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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