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November 2014

FSA550
4PST Depletion Mode Isolation Switch

Features

- 4PST (NC)
- Depletion Mode MOSFETs
- Audio Frequency Range
- $V_{CC(OFF)}$: 1.6 V to 3.0 V
- R_{ON}: 0.8 Ω Typical
- R_{ON} Flat: 0.01 Ω Typical
- THD+N: 0.002% Typical
- Eco Status: Fairchild Green, RoHS Compliant, Halogen Free

Applications

- MP3 Portable Media Players
- Cellular Phones, Smart Phones

Description

The FSA550 is a high-performance four-pole single-throw (4PST) normally closed Depletion-Mode isolation switch. The Depletion Mode technology allows the device to conduct signals when there is no V_{CC} available and to isolate the signals when V_{CC} is present.

The FSA550 operates on a wide V_{CC} range for design flexibility. Additionally, select pins allow the internal oscillator frequency to be adjusted between 500 kHz and 750 kHz in 75 kHz steps when V_{CC} is present. This feature is used to shift the electromagnetic interference (EMI) signature to meet customer specifications.

Related Resources

- FSA550 Evaluation Board
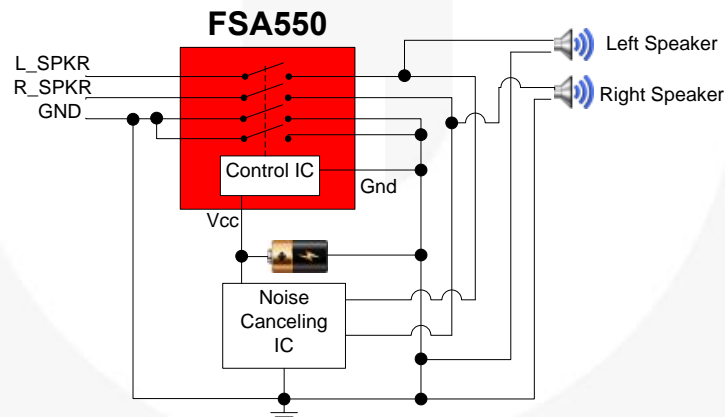
Typical Application

Ordering Information

Part Number	Top Mark	Operating Temperature Range	Package	Packing Method
FSA550UCX	M4	-40 to +85°C	12-Ball WLCSP, 3 x 4 Array, 0.4 mm Pitch, 250 μm Ball	3000 Units on Tape and Reel
FSA550BUCX	M4	-40 to +85°C	12-Ball WLCSP(with Backside Laminate), 3 x 4 Array, 0.4 mm Pitch, 250 μm Ball	3000 Units on Tape and Reel

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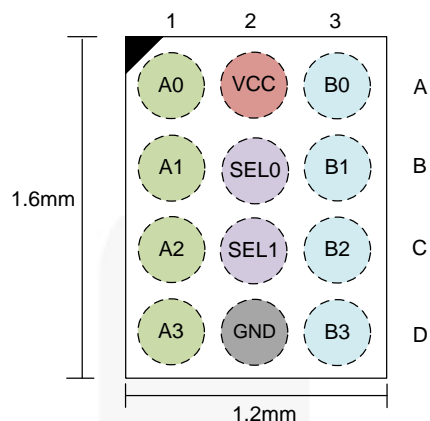
Pin Configuration

Figure 1.   Pin Assignment (Top Through View)

Pin Descriptions

Pin #	Name	Type	Description
A1	A0	I/O	A - Port
B1	A1	I/O	A - Port
C1	A2	I/O	A - Port
D1	A3	I/O	A - Port
A2	V_{CC}	Supply / Control	Isolation Circuit Supply Voltage *(see Table 1)*
B2	SEL0	Input	Oscillator Frequency Control *(see Table 2)*. Used to shift the electromagnetic
C2	SEL1	Input	interference (EMI) signature to meet the customer specifications.
D2	GND	Ground	System Ground
A3	B0	I/O	B - Port
B3	B1	I/O	B - Port
C3	B2	I/O	B - Port
D3	B3	I/O	B - Port

Table 1.   Truth Table

V_{CC}	Function
0 V – 0.2 V	B0-B3 = A0-A3
1.6 V - 3.0 V	Disconnect; B0-B3 ≠ A0-A3

Table 2.   Oscillator Frequency Step Logic

SEL1	SEL0	Frequency (Typ.)
LOW	LOW	500 kHz
LOW	HIGH	575 kHz
HIGH	LOW	650 kHz
HIGH	HIGH	725 kHz

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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.	Unit
V_{CC}	Supply/Control Voltage		0	4.6	V
V_{IN}	Input Voltage (Select Pins)		0	V_{CC}	V
$V_{SW(ON)}$	DC Switch I/O Voltage (Switch Conducting)	V_{CC}=0 V	-4	+4	V
$V_{SW(OFF)}$[1]	DC Switch I/O Voltage (Switch Isolated)	V_{CC}=Powered	-0.5	3.0	V
I_{IK}	DC Input Diode Current		-50		mA
I_{SW}	Switch I/O Current	V_{CC}=0 V (Switch Conducting)		350	mA
I_{SWPEAK}	Peak Switch Current	Pulsed at 1 ms Duration, <10% Duty Cycle		500	mA
ESD	Human Body Model, ANSI/ESDA/JEDEC JS-001-2012	All Pins		5.0	kV
	Charged Device Model, JEDEC: JESD22-C101			1.5	
	IEC 61000-4-2 System	Contact		8.0	
		Air Gap		15.0	
T_A	Absolute Maximum Operating Temperature		-40	+85	°C
T_{STG}	Storage Temperature		-65	+150	°C

Note:
1. When a switch is isolated (OFF), V_{SW} value must be < V_{CC}.

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
$V_{CC(ON)}$	Supply Voltage with Switch Conducting		0	0.2	V
$V_{CC(OFF)}$	Supply Voltage with Switch Isolated		1.6	3.0	V
$V_{SW(ON)}$	DC Switch I/O Voltage (Switch Conducting)	V_{CC} = 0 V	-2	2	V
$V_{SW(OFF)}$	DC Switch I/O Voltage (Switch Isolated)	V_{CC} = 1.6 V to 3.0 V	0	1.4	V

DC Electrical Characteristics

Typical values at T_A = 25°C unless otherwise specified.

Symbol	Parameter	Condition	V_{CC} (V)	T_A=- 40ºC to +85ºC			Unit
				Min.	Typ.	Max.	
I_{ON}	Switch-to-GND Leakage Current (Switch Conducting)	A_n = -1.4 V to 1.4 V, B_n = Float	0	0	0.3	1.0	µA
I_{OFF}	Switch-to-GND Leakage Current (Switch Isolated)	A_n = 0.4 V to 1.4 V, B_n = Float	3	0	0.5	3.5	µA
R_{ON}	Switch On Resistance[2]	I_{SW} = ±24 mA, V_{SW} = -1.4 V to +1.4 V	0		0.8		Ω
$R_{FLAT(ON)}$	On Resistance Flatness[2]	I_{SW} = ±24 mA, V_{SW} = -1.4 V to +1.4 V	0		0.01		Ω
I_{CC}	Quiescent Supply Current	SEL0 = SEL1 = V_{CC}	3	0	50	70	µA
V_{IH}	Input Voltage High (Select Pins)[3]		3	0.8•V_{CC}			V
V_{IL}	Input Voltage Low (Select Pins)[3]		3			0.2•V_{CC}	V
I_{IN}	Input Leakage Current (Select Pins)		3	0		±1	µA

Notes:
2. Guaranteed by test and characterization.
3. Voltages on select control pins must be ≤ V_{CC}.

AC Electrical Characteristics

Typical values at T_A = 25°C unless otherwise specified.

Symbol	Parameter	Condition	V_{CC} (V)	Typ.	Unit
t_{ON}	Turn-On Time V_{CC} to Output[4,5]	R_L = 32 Ω, C_L = 10 pF, V_{SW} = 1.4 V	1.6	120	ns
t_{OFF}	Turn-Off Time V_{CC} to Output[4,5]	R_L = 32 Ω, C_L = 10 pF, V_{SW} = 1.4 V	1.6	160	µs
O_{IRR}	Off Isolation[4,5]	R_L = 32 Ω, f = 20 kHz, V_{SW} = 0.35 V_{RMS}	1.6	-90	dB
X_{TALK}	Crosstalk[4,5]	R_L = 32 Ω, f = 20 kHz, V_{SW} = 1 V_{RMS}	0	-90	dB
BW	-3dB Bandwidth[5]	R_L = 50 Ω, C_L = 0 pF	0	<50	MHz
THD+N	Total Harmonic Distortion + Noise[4,5]	R_L = 32 Ω, f = 20 Hz to 20 kHz, V_{SW} = 1 V_{RMS}	0	0.002	%

Notes:
4. SEL0=SEL1=LOW.
5. Guaranteed by characterization.
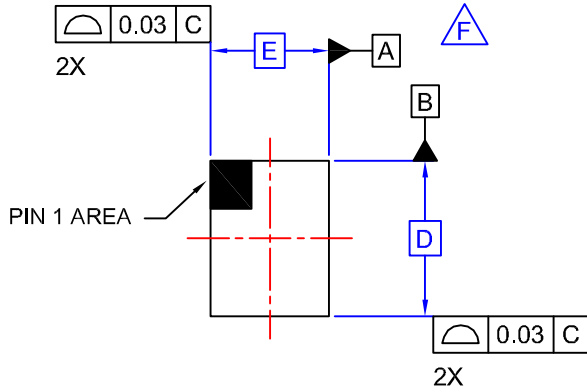
Capacitance

T_A = 25°C unless otherwise noted.

Symbol	Parameter	Condition	Typ.	Unit
C_{ON}	On Capacitance (Switch Conducting)	V_{CC} = 0 V, f = 1 MHz, 400 mV_{PP}	10	pF
C_{OFF}	Off Capacitance (Switch Isolated)	V_{CC} = 1.6 V, f = 1 MHz, 400 mV_{PP}	10	

Product-Specific Dimensions

E	D	X	Y
1.16 mm	1.56 mm	0.18 mm	0.18 mm

TOP VIEW

⌒ 0.03 C
2X

E ▶ A

B

▲

D

PIN 1 AREA

⌒ 0.03 C
2X
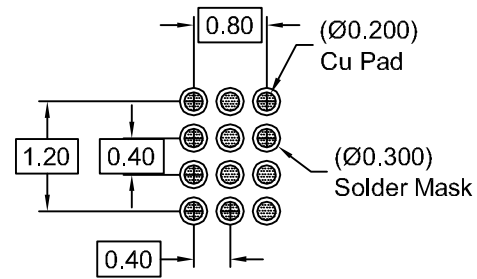
RECOMMENDED LAND PATTERN (NSMD PAD TYPE)

0.80

(Ø0.200) Cu Pad

1.20   0.40

(Ø0.300) Solder Mask

0.40

SIDE VIEWS

⌒ 0.05 C

0.625
0.547

C

▲ D

SEATING PLANE

0.378±0.018

0.208±0.021

BOTTOM VIEW

⊕ 0.005 Ⓜ C A B

0.80

0.40

Ø0.260±0.02
12X

1.20   0.40

D
C
B
A

1 2 3

(Y)±0.018

F

(X)±0.018
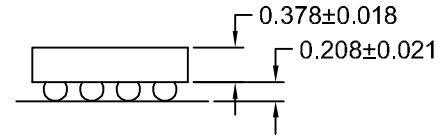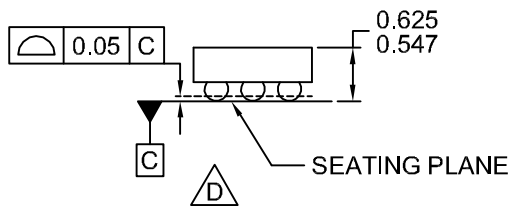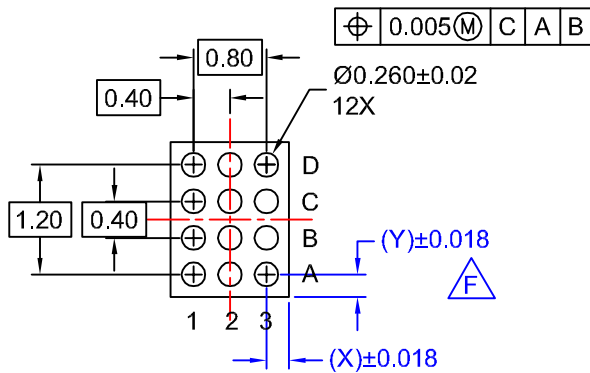
NOTES:

A. NO JEDEC REGISTRATION APPLIES.

B. DIMENSIONS ARE IN MILLIMETERS.

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

D. DATUM C IS DEFINED BY THE SPHERICAL CROWNS OF THE BALLS.

E. PACKAGE NOMINAL HEIGHT IS 586 MICRONS ±39 MICRONS (547-625 MICRONS).

F. FOR DIMENSIONS D, E, X, AND Y SEE PRODUCT DATASHEET.

G. DRAWING FILENAME: MKT-UC012ACrev1.

PUBLICATION ORDERING INFORMATION

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