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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

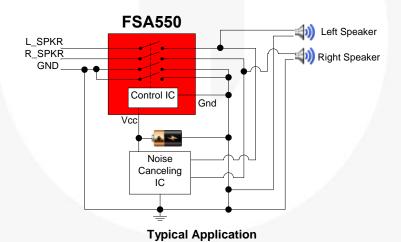
Description

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 $V_{\rm CC}$ available and to isolate the signals when $V_{\rm CC}$ 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



Ordering Information

Part Number Top Operating Mark 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

Pin Configuration

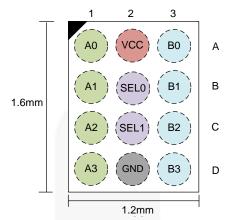


Figure 1. Pin Assignment (Top Through View)

Pin Descriptions

Pin#	Name	Туре	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	Vcc	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		
А3	В0	I/O	B - Port		
В3	B1	I/O	B - Port		
C3	B2	I/O	B - Port		
D3	В3	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

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	Vcc	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
	Human Body Model, ANSI/ESDA/JEDEC JS-001-2012	All Pins		5.0	
ESD	Charged Device Model, JEDEC: JESD22-C1	rol Voltage 0 4.6 e (Select Pins) 0 Vcc O Voltage (Switch Conducting) Vcc=0 V -4 +4 O Voltage (Switch Isolated) Vcc=Powered -0.5 3.0 ede Current Vcc=0 V (Switch Conducting) 350 Current Pulsed at 1 ms Duration, <10% Duty Cycle 5.0 evice Model, ANSI/ESDA/JEDEC All Pins 5.0 evice Model, JEDEC: JESD22-C101 1.5 e-2 System Contact Air Gap 15.0 eximum Operating Temperature -40 +85	1.5	kV	
	IFC 64000 4 2 System	Contact		8.0	
	IEC 61000-4-2 System	0 V _{CC} V _{CC} =0 V -4 +4 V _{CC} =Powered -0.5 3.0 -50 V _{CC} =0 V (Switch Conducting) 350 Pulsed at 1 ms Duration, 10% Duty Cycle 5.0 All Pins 5.0 1 1.5 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	7	Min.	Max.	Unit
V _{CC(ON)}	Supply Voltage with Switch Conducting		0	0.2	V
V _{CC (OFF)}	Supply Voltage with Switch Isolated	Supply Voltage with Switch Isolated			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 =- 4	0ºC to	+85°C	Unit
Cymbol	T di diffetei	Condition	• 66 (•)			Max.	
I _{ON}	Switch-to-GND Leakage Current (Switch Conducting)	$A_n = -1.4 \text{ V to } 1.4 \text{ V},$ $B_n = \text{Float}$	0	0	0.3	1.0	μΑ
I _{OFF}	Switch-to-GND Leakage Current (Switch Isolated)	$A_n = 0.4 \text{ V to } 1.4 \text{ V},$ $B_n = \text{Float}$	3	0	0.5	3.5	μΑ
R _{ON}	Switch On Resistance ⁽²⁾	$I_{SW} = \pm 24 \text{ mA},$ $V_{SW} = -1.4 \text{ V to } +1.4 \text{ V}$	0		0.8		Ω
R _{FLAT(ON)}	On Resistance Flatness ⁽²⁾	$I_{SW} = \pm 24 \text{ mA},$ $V_{SW} = -1.4 \text{ V to } +1.4 \text{ V}$	0		0.01		Ω
Icc	Quiescent Supply Current	SEL0 = SEL1 = V _{CC}	3	0	50	70	μΑ
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	μΑ

Notes:

- 2. Guaranteed by test and characterization.
- 3. Voltages on select control pins must be $\leq V_{CC}$.

AC Electrical Characteristics

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

Symbol	Parameter	Condition	V _{cc} (V)	Тур.	Unit
t _{ON}	Turn-On Time V _{CC} to Output ^(4,5)	$R_L = 32 \Omega$, $C_L = 10 pF$, $V_{SW} = 1.4 V$	1.6	120	ns
t _{OFF}	Turn-Off Time V _{CC} to Output ^(4,5)	$R_L = 32 \Omega$, $C_L = 10 pF$, $V_{SW} = 1.4 V$	1.6	160	μs
O _{IRR}	Off Isolation ^(4,5)	$R_L = 32 \Omega$, $f = 20 \text{ kHz}$, $V_{SW} = 0.35 V_{RMS}$	1.6	-90	dB
X _{TALK}	Crosstalk ^(4,5)	$R_L = 32 \Omega$, $f = 20 \text{ kHz}$, $V_{SW} = 1 V_{RMS}$	0	-90	dB
BW	-3dB Bandwidth ⁽⁵⁾	$R_L = 50 \Omega$, $C_L = 0 pF$	0	<50	MHz
THD+N	Total Harmonic Distortion + Noise ^(4,5)	$R_L = 32 \Omega$, $f = 20 Hz$ to 20 kHz, $V_{SW} = 1 V_{RMS}$	0	0.002	%

Notes:

- 4. SEL0=SEL1=LOW.
- 5. Guaranteed by characterization.

Capacitance

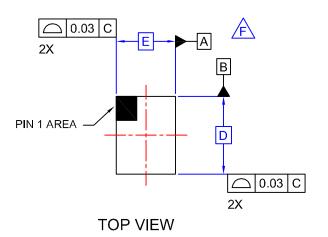
 $T_A = 25$ °C unless otherwise noted.

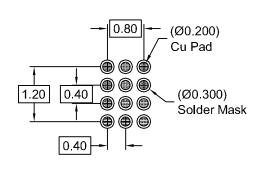
Symbol	Parameter	Condition	Тур.	Unit
Con	On Capacitance (Switch Conducting)	$V_{CC} = 0 \text{ V, f} = 1 \text{ MHz, } 400 \text{ mV}_{PP}$	10	pF
C _{OFF}	Off Capacitance (Switch Isolated)	$V_{CC} = 1.6 \text{ V}, f = 1 \text{ MHz}, 400 \text{ mV}_{PP}$	10	рΓ

Product-Specific Dimensions

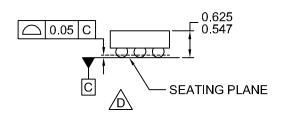
E D		X	Υ
1.16 mm	1.56 mm	0.18 mm	0.18 mm

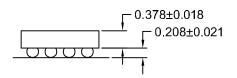
		REVISIONS		
F	REV	DESCRIPTION	DATE	APP'D / SITE
	1	Initial drawing release.	8-19-09	L. England / FSME



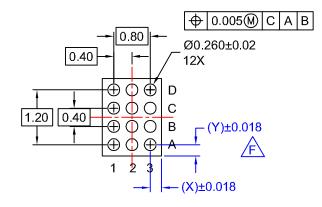


RECOMMENDED LAND PATTERN (NSMD PAD TYPE)





SIDE VIEWS



BOTTOM VIEW

NOTES:

- A. NO JEDEC REGISTRATION APPLIES.
- B. DIMENSIONS ARE IN MILLIMETERS.
- C. DIMENSIONS AND TOLERANCES PER ASME Y14.5M, 1994.
- 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.

APPROVALS	DATE	FAIR				
L. England	8-19-09	SEMICO				
DFTG. CHK. S. Martin	8-19-09	4.0	D A L L	\\		
ENGR. CHK.		12BALL WLCSP, 3X4 ARRAY 0.4MM PITCH, 250UM BALL				
		0.4MM PITCH, 2500M BALL				
PROJECTIO	٧	SCALE	SIZE	DRAWING NUMBER		REV
		N/A	N/A	MKT-U	JC012AC	1
INCH [MM]	DO NO	SCALE	DRAWING	SHEET 1 of	1	

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