4PST Depletion Mode Isolation Switch

1 FEATURES

- **4PST(NC)**
- **Depletion Mode MOSFETs**
- **Audio Frequency Range**
- **Supply Range: +1.6V to +3.0V**
- **Low ON-State Resistance: 0.63Ω (TYP)**
- **R_{ON} Flat: 0.01 Ω Typical**
- **THD+N: 0.002% Typical**
- **Extended Industrial Temperature Range: -40°C to +85°C**
- **Available in Green WLCSP1.6X1.2-12 and QFN3X3-16 Package**

2 APPLICATIONS

- **MP3 Portable Media Players**
- **Cell Phones**

3 DESCRIPTIONS

The RS550A 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 RS550A 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.

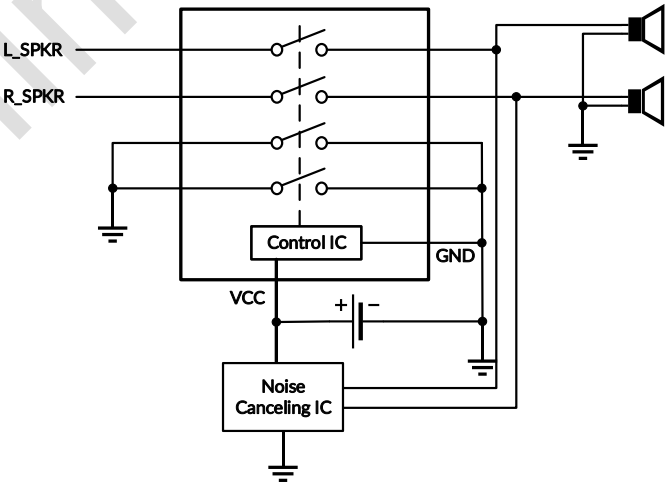
Device Information (1)

PART NUMBER	PACKAGE	BODY SIZE (NOM)
RS550A	WLCSP1.6X1.2-12	1.60mm×1.20mm
	QFN3X3-16	3.00mm×3.00mm

(1) For all available packages, see the orderable addendum at the end of the data sheet.

4 TYPICAL APPLICATION CIRCUIT

RS550A



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5 REVISION HISTORY

Note: Page numbers for previous revisions may different from page numbers in the current version.

VERSION	Change Date	Change Item
A.0	2026/01/07	Preliminary version completed

6 PACKAGE/ORDERING INFORMATION (1)

PRODUCT	ORDERING NUMBER	TEMPERATURE RANGE	PACKAGE LEAD	PACKAGE MARKING (2)	MSL (3)	PACKAGE OPTION
RS550A	RS550AYUCM12	-40°C ~+85°C	WLCSP1.6X1.2-12	RS550A	MSL3	Tape and Reel, 3000
	RS550AYTQC16	-40°C ~+85°C	QFN3X3-16	RS550A	MSL3	Tape and Reel, 5000

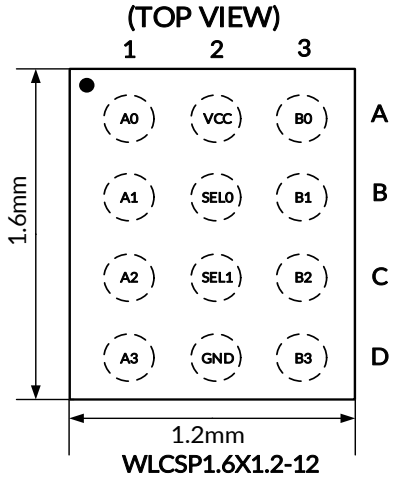
NOTE:

(1) This information is the most current data available for the designated devices. This data is subject to change without notice and revision of this document. For browser-based versions of this data sheet, refer to the right-hand navigation.

(2) There may be additional marking, which relates to the lot trace code information (data code and vendor code), the logo or the environmental category on the device.

(3) RUNIC classify the MSL level with using the common preconditioning setting in our assembly factory conforming to the JEDEC industrial standard J-STD-20F. Please align with RUNIC if your end application is quite critical to the preconditioning setting or if you have special requirement.

7 PIN CONFIGURATIONS



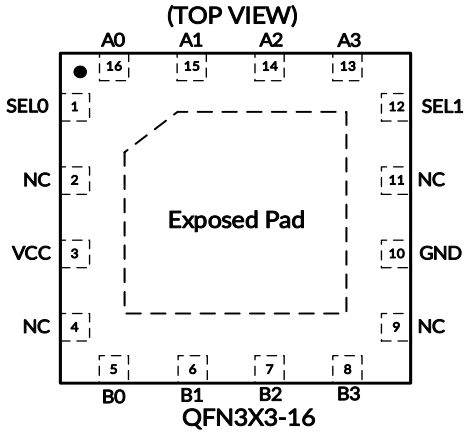
WLCSP1.6X1.2-12

PIN DESCRIPTION

PIN#	NAME	TYPE (1)	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	P	Supply Voltage (see Table 1)
B2	SEL0	I	Oscillator Frequency Control (see Table 2). Used to shift the electromagnetic interference (EMI) signature to meet the customer specifications.
C2	SEL1	I	
D2	GND	G	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

(1) I = Input, O = Output, P=Power, G=Ground.

PIN CONFIGURATIONS



QFN3X3-16

PIN DESCRIPTION

PIN#	NAME	TYPE (1)	DESCRIPTION
1	SEL0	I	Oscillator Frequency Control (see Table 2). Used to shift the electromagnetic interference (EMI) signature to meet the customer specifications.
12	SEL1	I	
2	NC	-	No Connect.
3	VCC	P	Supply Voltage (see Table 1)
4	NC	-	No Connect.
5	B0	I/O	B-Port
6	B1	I/O	B-Port
7	B2	I/O	B-Port
8	B3	I/O	B-Port
9	NC	-	No Connect.
10	GND	G	Ground
11	NC	-	No Connect.
13	A3	I/O	A-Port
14	A2	I/O	A-Port
15	A1	I/O	A-Port
16	A0	I/O	A-Port
--	Exposed Pad	G	Ground or float

(1) I = Input, O = Output, P=Power, G=Ground.

Table 1. Truth Table

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

Table 2. Oscillator Frequency Step Logic

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

8 SPECIFICATIONS

8.1 Absolute Maximum Ratings

Over operating free-air temperature range (unless otherwise noted) (1)

SYMBOL	PARAMETER		MIN	MAX	UNIT
V_{CC}	Supply/Control Voltage,		0	5.5	V
V_{IN}	Input Voltage (Select Pins SEL0, SEL1)		0	V_{CC}	V
$V_{SW(ON)}$	DC Switch I/O Voltage (Switch Conducting)	V_{CC}=0V	-5.0	5.0	V
$V_{SW(OFF)}$ (2)	DC Switch I/O Voltage (Switch Isolated)	V_{CC}=Powered	-1.8	3.0	V
I_{IK}	DC Input Diode Current		-50		mA
I_{SW}	Switch I/O Current	V_{CC}=0V		350	mA
I_{SWPEAK}	Peak Switch Current	Pulsed at 1ms Duration, <10% Duty Cycle		500	mA
θ_{JA}	Package thermal impedance (3)	QFN3X3-16		70	°C/W
T_A	Absolute Maximum Operating Temperature		-40	85	°C
T_{stg}	Storage		-65	150	°C

(1) Stresses above these ratings may cause permanent damage. Exposure to absolute maximum conditions for extended periods may degrade device reliability. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those specified is not implied.
(2) When a switch is isolated (OFF), V_{SW} value must be < V_{CC}.
(3) The package thermal impedance is calculated in accordance with JESD-51.

8.2 ESD Ratings

The following ESD information is provided for handling of ESD-sensitive devices in an ESD protected area only.

			VALUE	UNIT
$V_{(ESD)}$	Electrostatic discharge	Human-Body Model (HBM)	TBD	V
		Charged-Device Model (CDM)	TBD	V

ESD SENSITIVITY CAUTION

ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications.

8.3 Recommended Operating Conditions

Over operating free-air temperature range (unless otherwise noted) (1)

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}=0V	-2.0	2.0	V
$V_{SW(OFF)}$	DC Switch I/O Voltage (Switch Isolated)	V_{CC}=1.6V to 3.0V	-1.6	1.6	V

(1) The Recommended Operating Condition table defines the conditions for actual device operation. Recommended operating condition are specified to ensure optimal performance to the datasheet specifications.

8.4 Electrical Characteristics

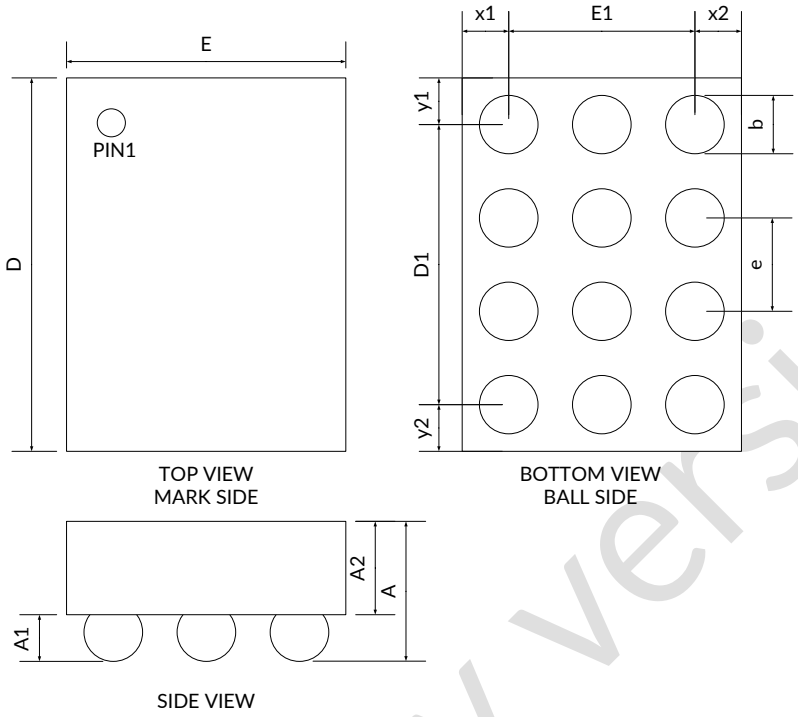
Typical values at T_A = 25°C unless otherwise specified.

PARAMETER	SYMBOL	CONDITIONS	V_{CC}(V)	T_A	MIN(1)	TYP(2)	MAX(1)	UNITS
DC Electrical Characteristics								
Switch-to-GND Leakage Current (Switch Conducting)	I_{ON}	An = -1.4 V to 1.4 V, Bn = Float	0	+25°C	0	0.3	2.0	µA
Switch-to-GND Leakage Current (Switch Isolated)	I_{OFF}	An = 0.4 V to 1.4 V, Bn = Float	3	+25°C	0	0.5	1.0	µA
Switch On Resistance (3)	R_{ON}	I_{SW} = ±24 mA, V_{SW}= -1.4V to +1.4V	0	+25°C		0.63		Ω
On Resistance Flatness (3)	$R_{FLAT(ON)}$	I_{SW} = ±24 mA, V_{SW} = -1.4V to +1.4V	0	+25°C		0.01		Ω
Quiescent Supply Current	I_{CC}	SEL0 = SEL1 = V_{CC}	3	+25°C	0	65	100	µA
Input Voltage High (Select Pins) (4)	V_{IH}		3	+25°C	0.8*V_{CC}			V
Input Voltage Low (Select Pins) (4)	V_{IL}		3	+25°C			0.2*V_{CC}	V
Input Leakage Current (Select Pins)	I_{IN}		3	+25°C	0		±1	µA
AC Electrical Characteristics								
Turn-On Time V_{CC} to Output (5,6)	t_{ON}	R_L = 32 Ω, C_L = 10pF, V_{SW} = 1.4V	1.6	+25°C		310		ns
Turn-Off Time V_{CC} to Output (5,6)	t_{OFF}	R_L = 32 Ω, C_L = 10pF, V_{SW} = 1.4V	1.6	+25°C		75		µs
Off Isolation (5,6)	O_{IRR}	R_L = 32 Ω, f = 20 kHz, V_{SW} = 0.35 V_{RMS}	1.6	+25°C		-85		dB
Crosstalk (5,6)	X_{TALK}	R_L = 32 Ω, f = 20 kHz, V_{SW} = 1 V_{RMS}	0	+25°C		-90		dB
-3dB Bandwidth (5)	BW	R_L = 32 Ω, C_L = 0 pF	0	+25°C		250		MHZ
Total Harmonic Distortion + Noise (5,6)	THD+N	R_L = 32 Ω, f = 20 Hz to 20 kHz, V_{SW} = 1 V_{RMS}	0	+25°C		0.002		%

(1) Limits are 100% production tested at 25°C. Limits over the operating temperature range are ensured through correlations using statistical quality control (SQC) method.
(2) Typical values represent the most likely parametric norm as determined at the time of characterization. Actual typical values may vary over time and will also depend on the application and configuration.
(3) Guaranteed by test and characterization.
(4) Voltages on select control pins must be <V_{CC}.
(5) SEL0=SEL1=LOW.
(6) Guaranteed by characterization.

9 PACKAGE OUTLINE DIMENSIONS

WLCSP1.6X1.2-12 (4)



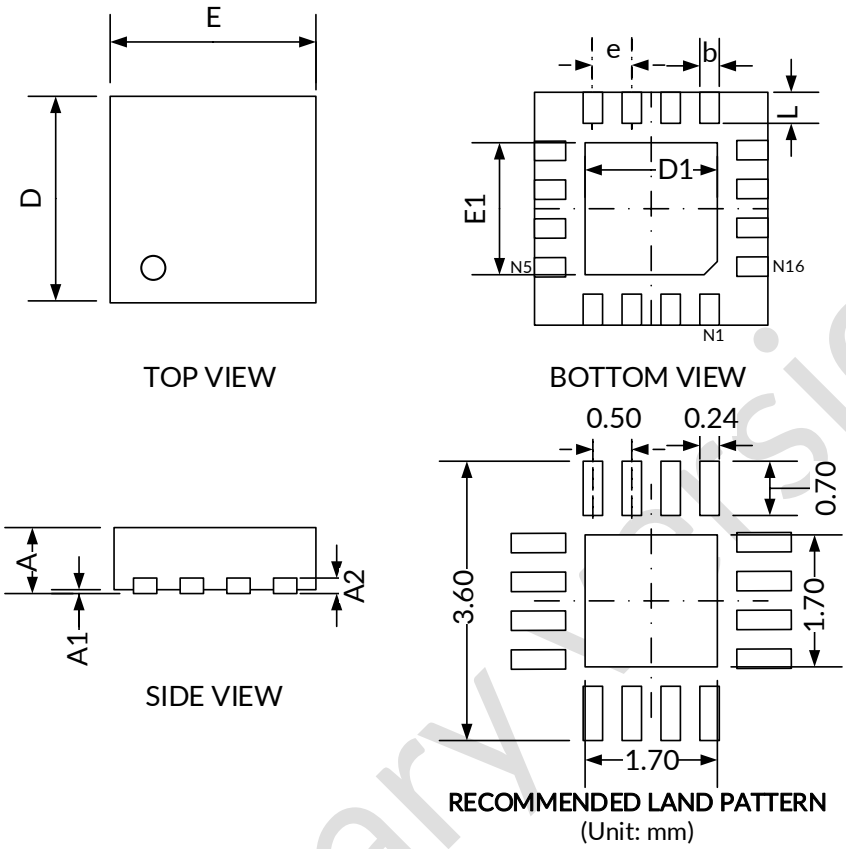
NOTES: ALL WAFER ORIENTATION NOTCH DOWN

SYMBOL	Dimensions In Millimeters			Dimensions In Inches		
	Min	Nom	Max	Min	Nom	Max
A (1)	0.542	0.582	0.622	0.021	0.023	0.024
A1	0.177	0.202	0.227	0.007	0.008	0.009
A2	0.355	0.380	0.405	0.014	0.015	0.016
D (1)	1.570	1.600	1.630	0.062	0.063	0.064
D1	1.200 BSC (2)			0.047 BSC (2)		
E (1)	1.170	1.200	1.230	0.046	0.047	0.048
E1	0.800 BSC (2)			0.031 BSC (2)		
b	0.243	0.268	0.293	0.010	0.011	0.012
e	0.400 BSC (2)			0.016 BSC (2)		
x1	0.185 REF (3)			0.007 REF (3)		
x2	0.185 REF (3)			0.007 REF (3)		
y1	0.185 REF (3)			0.007 REF (3)		
y2	0.185 REF (3)			0.007 REF (3)		

NOTE:

1. Plastic or metal protrusions of 0.075mm maximum per side are not included.
2. BSC (Basic Spacing between Centers), "Basic" spacing is nominal.
3. REF is the abbreviation for Reference.
4. This drawing is subject to change without notice.

QFN3X3-16 (2)



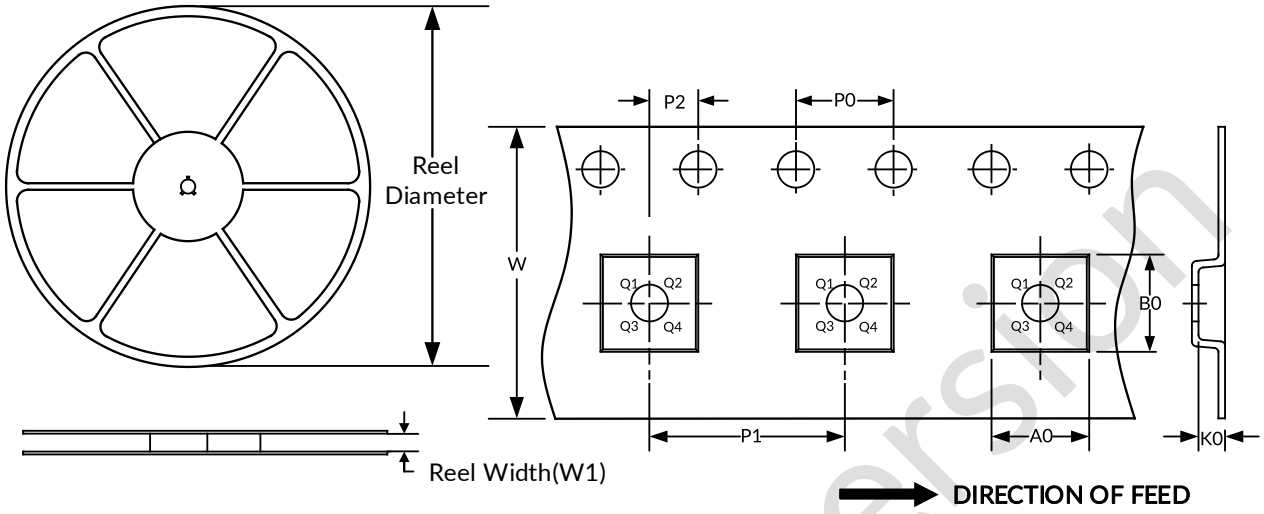
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A (1)	0.700	0.800	0.028	0.031
A1	0.000	0.050	0.000	0.002
A2	0.203		0.008	
b	0.180	0.300	0.007	0.012
D (1)	2.900	3.100	0.114	0.122
D1	1.600	1.800	0.063	0.071
E (1)	2.900	3.100	0.114	0.122
E1	1.600	1.800	0.063	0.071
e	0.500 TYP		0.020 TYP	
L	0.300	0.500	0.012	0.020

NOTE:
1. Plastic or metal protrusions of 0.075mm maximum per side are not included.
2. This drawing is subject to change without notice.

10 TAPE AND REEL INFORMATION

REEL DIMENSIONS

TAPE DIMENSION



NOTE: The picture is only for reference. Please make the object as the standard.

KEY PARAMETER LIST OF TAPE AND REEL

Package Type	Reel Diameter	Reel Width (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P0 (mm)	P1 (mm)	P2 (mm)	W (mm)	Pin1 Quadrant
QFN3X3-16	13”	12.4	3.35	3.35	1.13	4.0	8.0	2.0	12.0	Q1
WLCSP1.6X1.2-12	7”	8.3	1.35	1.75	0.70	4.0	4.0	2.0	8.0	Q1

NOTE:
1. All dimensions are nominal.
2. Plastic or metal protrusions of 0.15mm maximum per side are not included.

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