

# WAS4729QB

**Low On Resistance (0.8Ω) Dual SPDT Analog Switch with Negative Swing Audio Capability**

[Http://www.sh-willsemi.com](http://www.sh-willsemi.com)

## Descriptions

The WAS4729QB is a high performance, dual Single Pole Double Throw (SPDT) analog switch with negative swing audio capability that features ultra-low Ron of 0.8Ω (typical) at 3.6V VCC. The WAS4729QB operates over a wide VCC range of 2.3V to 5.5V and is designed for break-before-make operation. The select input is TTL-level compatible.

WAS4729QB is also featured with smart circuitry to minimize VCC leakage current even when the control voltage is lower than VCC supply voltage. This feature suits mobile handset applications by allowing direct interface with baseband processor general-purpose IO with minimal battery consumption. In other word, there is no need of additional device to shift control level to be the same as that of VCC in real application.

The WAS4729QB is available in QFN1418-10L package. Standard product is Pb-Free and halogen-Free.

## Features

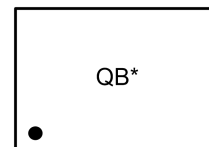
- Supply voltage : 2.3 ~ 5.5V
- ultra-low On Resistance : 0.8Ω @ 3.6V
- High Off isolation : -81dB @ 1KHz
- Crosstalk Rejection : -83dB @ 1KHz
- -3dB Bandwidth : 80MHz
- Rail-to-Rail Signal Range
- Break-Before-Make Switching
- HBM JEDEC: JESD22-A114
  - ◆ IO to GND : ±8KV
  - ◆ Power to GND : ±5KV

## Applications

- Cell phones, PDA, Digital Camera and Notebook
- LCD Monitor, TV and Set-Top Box
- Audio and Video Signal Routing



**QFN1418-10L**



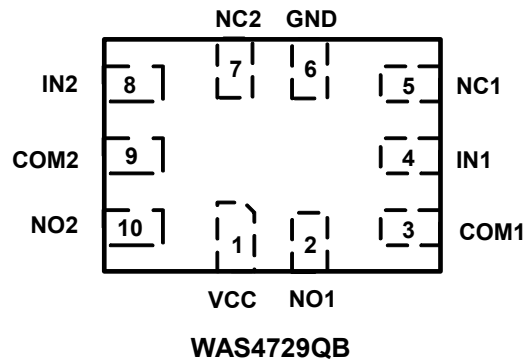
**WAS4729QB**

**QB = Device code**  
**\* = Month (A~Z)**

## Marking

## Order information

Device	Package	Shipping
WAS4729QB-10/TR	QFN1418-10L	3000/Reel&Tape

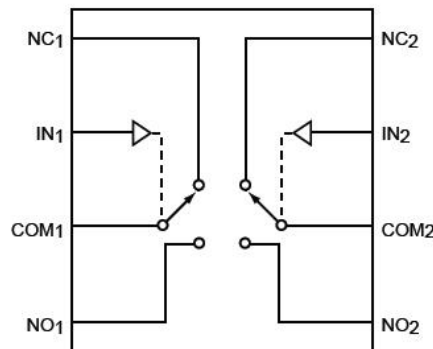
**Pin configuration (Top view)**

**Pin descriptions**

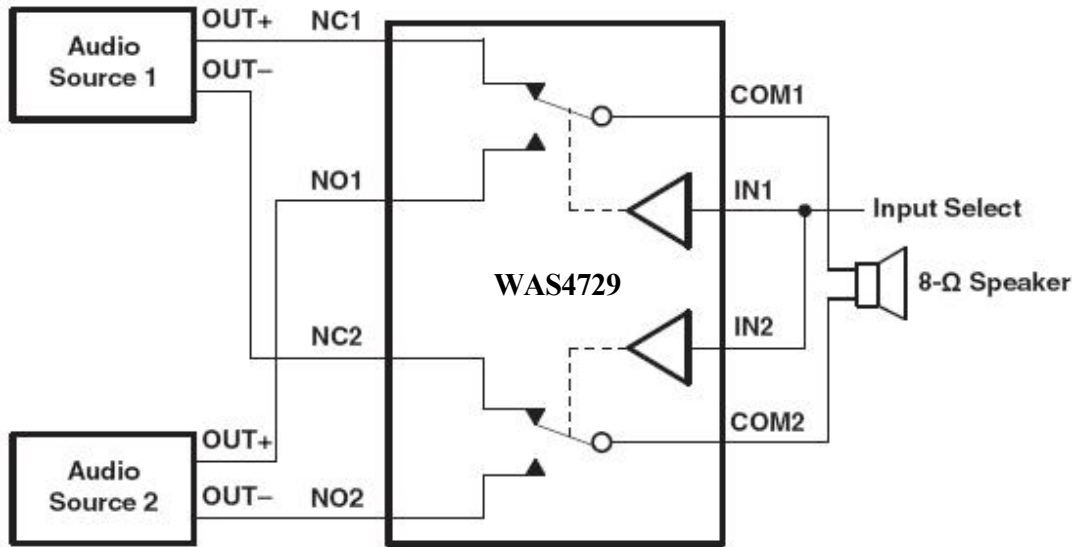
Pin Number	Symbol	Descriptions
2,10	NO <sub>x</sub>	Data Port(Normally open)
6	GND	Ground
5,7	NC <sub>x</sub>	Data Port(Normally closed)
3,9	COM <sub>x</sub>	Common Data Port
1	VCC	Positive Power Supply
4,8	IN <sub>x</sub>	Logic Control

**Function descriptions**

Logic Input(IN <sub>x</sub> )	Function
0	NC <sub>x</sub> Connected to COM <sub>x</sub>
1	NO <sub>x</sub> Connected to COM <sub>x</sub>

**Note:**  $x=1$  or  $2$

**Functional Block Diagram**


**Application Block Diagram**


**Note:** WAS4729 switches feature negative signal capability that allows signals below ground to pass through without distortion. These analog switches operate from a signal +2.3V to 5.5V supply. The input/output signal swing of device is dependent of the supply voltage  $V_+$ : the device pass signals as high as  $V_+$  and as low as  $V_+ - 6.5$ , including signals below ground with minimal distortion. Table 1 shows the input/output signal swing the user can get with different supply voltages.

<b>SUPPLY VOLTAGE, <math>V_+</math></b>	<b>Min.</b> <b>(<math>V_{NC}, V_{NO}, V_{COM}</math>) = <math>V_+ - 6.5V</math></b>	<b>Max.</b> <b>(<math>V_{NC}, V_{NO}, V_{COM}</math>) = <math>V_+</math></b>
5.5V	-1.0 V	5.5 V
5.0V	-1.5 V	5.0 V
4.5V	-2.0 V	4.5 V
4.0V	-2.5 V	4.0 V
3.5V	-3.0 V	3.5 V
3.0V	-3.5 V	3.0 V
2.5V	-4.0 V	2.5 V

**Absolute Maximum Ratings <sup>(1)</sup>**

Parameter	Symbol	Value	Unit
Supply Voltage	$V_{CC}$	-0.3 ~ 6.5	V
Control Input Voltage	$V_{INx}$	-0.3 ~ 5.5	V
Continuous Current NO_NC_COM_		±300	mA
Peak Current NO_NC_COM_ (pulsed at 1ms 50% duty cycle)		±400	mA
Peak Current NO_NC_COM_ (pulsed at 1ms 10% duty cycle)		±500	mA
Storage Temperature Range	$T_{STG}$	-55 ~ 150	°C
Junction Temperature under Bias	$T_J$	150	°C
Lead Temperature (Soldering, 10 seconds)	$T_L$	260	°C
Power Dissipation	$P_D$	250	mW

**Recommend operating ratings <sup>(3)</sup>**

Parameter	Symbol	Value	Unit
Supply Voltage Operating	$V_{CC}$	2.3 ~ 5.5	V
Control Input Voltage	$V_{IN}$	0.0 ~ $V_{CC}$	V
Input Signal Voltage	$V_{IS}$	0.0 ~ 5.5	V
Operating Temperature	$T_A$	-40 ~ 85	°C
Input Raise and Fall Time(Control Input $V_{CC}=2.3\sim 3.6V$ )	$t_r, t_f$	0 ~ 10	ns/V
Thermal Resistance	$R_{\theta JA}$	350	°C/W

**Note:**

1. "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress only rating and operation of the device at these or any other conditions beyond those indicated in the operational sections of this specification is not implied.
2. The input and output negative voltage ratings may be exceeded if the input and output diode current ratings are observed.
3. Control input must be held high or Low, it must not float.

**DC Electronics Characteristics (Ta=25°C, VCC=3.6V, unless otherwise noted)**

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Input logic high level	V <sub>IH</sub>	VCC: 3.0 ~ 4.5	1.6			V
		VCC: 2.3 ~ 3.0	1.4			V
Input logic low level	V <sub>IL</sub>	VCC: 3.0 ~ 4.5			0.6	V
		VCC: 2.3 ~ 3.0			0.4	V
Supply quiescent current	I <sub>CC</sub>	I <sub>OUT</sub> =0, V <sub>IN</sub> =0 or V <sub>IN</sub> =VCC			1.0	μA
Increase in I <sub>CC</sub> per input	I <sub>CCCT</sub>	I <sub>OUT</sub> =0, VCC=4.5 V <sub>IN</sub> >1.8 or V <sub>IN</sub> <0.5			2.0	μA
Input leakage current	I <sub>IN</sub>	V <sub>SEL</sub> =VCC			±1.0	μA
Off state switch leakage current	I <sub>OFF</sub>				±1.0	μA
On state switch leakage current	I <sub>ON</sub>				±1.0	μA
On-Resistance	R <sub>ON</sub>	V <sub>IS</sub> =0~VCC, I <sub>OUT</sub> =100mA,		<b>0.8</b>	1.0	Ω
On-Resistance Matching Between Channels	Δ R <sub>ON</sub>	V <sub>IS</sub> =0~VCC, I <sub>OUT</sub> =100mA,		0.08	0.1	Ω
On-Resistance Flatness	R <sub>FLAT(ON)</sub>	V <sub>IS</sub> =-3~0V, I <sub>OUT</sub> =100mA,		0.1		Ω
		V <sub>IS</sub> =0~3V, I <sub>OUT</sub> =100mA,		0.12		Ω

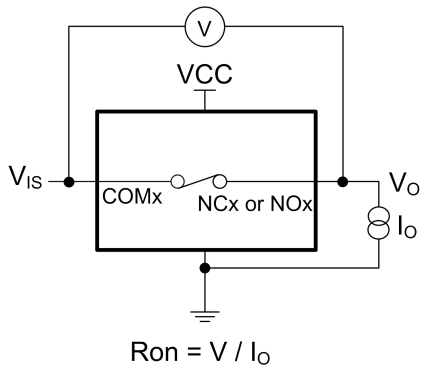
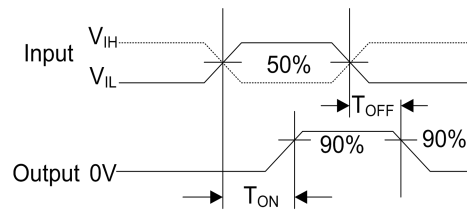
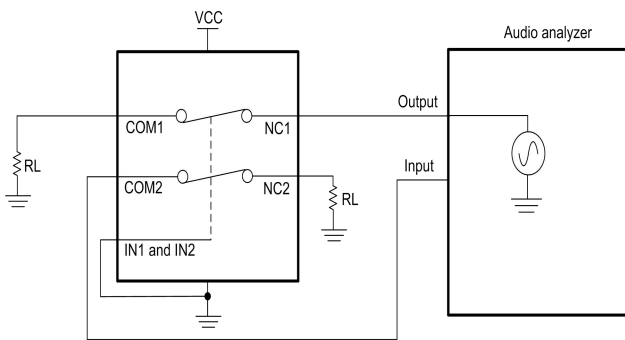
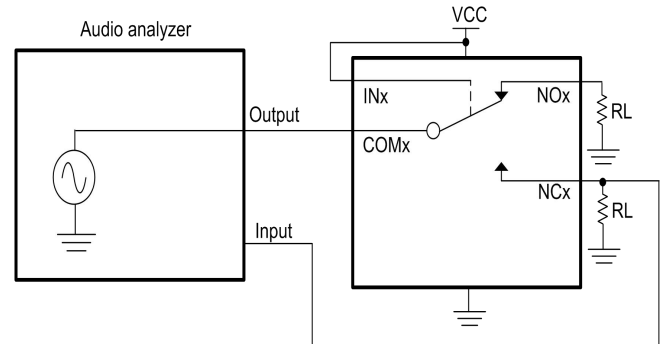
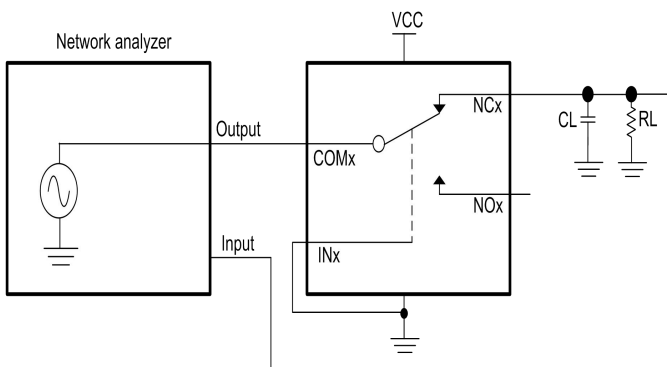
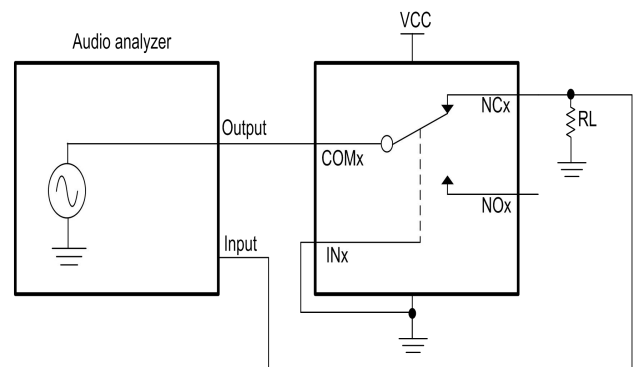
**AC Electronics Characteristics (Ta=25°C, VCC=3.6V, unless otherwise noted)**

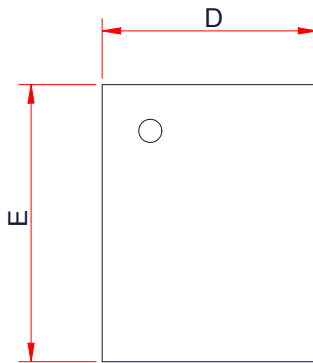
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Turn-On Time	T <sub>ON</sub>	V <sub>IS</sub> =1.5V, C <sub>L</sub> =35pF, R <sub>L</sub> =50Ω		200		ns
Turn-Off Time	T <sub>OFF</sub>	V <sub>IS</sub> =1.5V, C <sub>L</sub> =35pF, R <sub>L</sub> =50Ω		200		ns
Break-Before-Make time	T <sub>BBM</sub>	Generate by design		100		ns
-3dB Bandwidth	BW	R <sub>L</sub> =50Ω, C <sub>L</sub> =0pF		80		MHz
Off isolation	OIRR	F=1KHz, R <sub>L</sub> =50Ω		-81		dB
		F=10KHz, R <sub>L</sub> =50Ω		-80		dB
Crosstalk	Xtalk	F=1KHz, R <sub>L</sub> =50Ω		-83		dB
		F=10KHz, R <sub>L</sub> =50Ω		-82		dB
Total Harmonic Distortion	THD	F=20Hz to 20KHz V <sub>IS</sub> =2Vp-p @R <sub>L</sub> =16Ω,		0.2		%
		F=20Hz to 20KHz V <sub>IS</sub> =2Vp-p @R <sub>L</sub> =32Ω,		<b>0.1</b>		%
		F=20Hz to 20KHz V <sub>IS</sub> =2Vp-p @R <sub>L</sub> =600Ω,		0.0054		%
		F=20Hz to 20KHz V <sub>IS</sub> =4Vp-p @R <sub>L</sub> =16Ω,		0.56		%
		F=20Hz to 20KHz V <sub>IS</sub> =4Vp-p @R <sub>L</sub> =32Ω,		0.28		%
		F=20Hz to 20KHz V <sub>IS</sub> =4Vp-p @R <sub>L</sub> =600Ω,		0.015		%

		F=20Hz to 20KHz V <sub>IS</sub> =6Vp-p @R <sub>L</sub> =16Ω,		0.44		%
		F=20Hz to 20KHz V <sub>IS</sub> =6Vp-p @R <sub>L</sub> =32Ω,		0.29		%
		F=20Hz to 20KHz V <sub>IS</sub> =6Vp-p @R <sub>L</sub> =600Ω,		0.012		%
Signal-to-Noise Ratio	SNR	F=20Hz to 20KHz, A-weighted filter, Inputs grounded R <sub>L</sub> =32Ω or 20K		150		dBV
Stereo Channel Imbalance NC1 and NO1, NC2 and NO2	IMB	F=20Hz to 20KHz, R <sub>L</sub> =32Ω		±0.003		dB

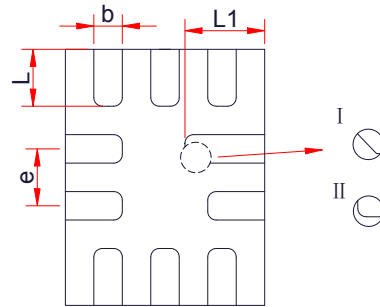
**Capacitance (Ta=25°C unless otherwise noted)**

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Off capacitance	C <sub>OFF</sub>	F=100KHz, VCC=3.3		50		pF
On capacitance	C <sub>ON</sub>	F=100KHz, VCC=3.3		80		pF

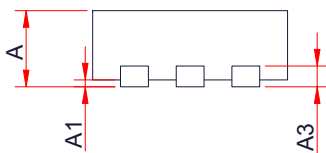
**Test Circuits**

**ON-Resistance ( $R_{ON}$ )**

**ON/OFF Time Waveforms ( $T_{ON} / T_{OFF}$ )**

**Crosstalk ( $X_{talk}$ )**

**Off isolation ( $OIRR$ )**

**Bandwidth ( $BW$ )**

**THD+N**

**PACKAGE OUTLINE DIMENSIONS**
**QFN1418-10L**


TOP VIEW



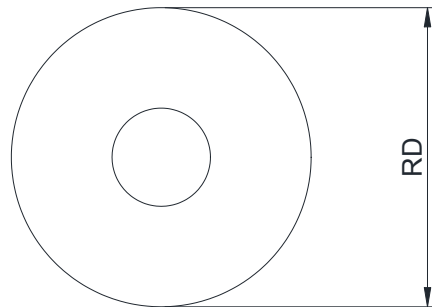
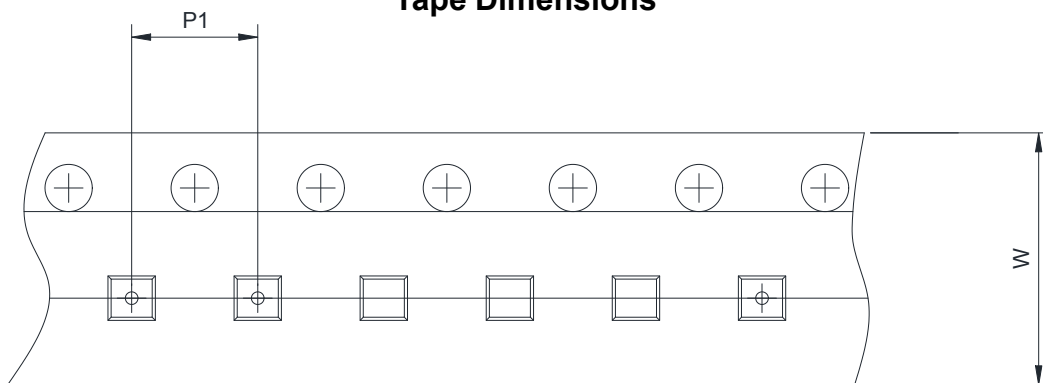
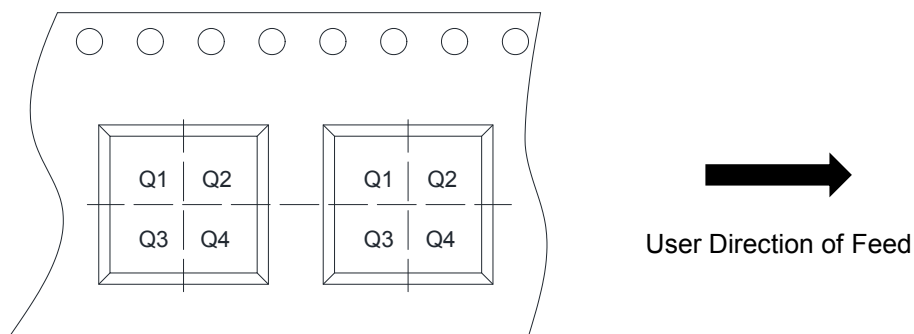
BOTTOM VIEW



SIDE VIEW

Symbol	Dimensions in Millimeters		
	Min.	Typ.	Max.
A	0.50	0.55	0.60
A1	0.00	-	0.05
A3	0.15 Ref.		
D	1.35	1.40	1.45
E	1.75	1.80	1.85
b	0.15	0.20	0.25
L	0.30	0.40	0.50
L1	0.40	0.50	0.60
e	0.40 BSC		



**TAPE AND REEL INFORMATION**
**Reel Dimensions**

**Tape Dimensions**

**Quadrant Assignments For PIN1 Orientation In Tape**


RD	Reel Dimension	<input checked="" type="checkbox"/> 7inch	<input type="checkbox"/> 13inch		
W	Overall width of the carrier tape	<input checked="" type="checkbox"/> 8mm	<input type="checkbox"/> 12mm		
P1	Pitch between successive cavity centers	<input type="checkbox"/> 2mm	<input checked="" type="checkbox"/> 4mm	<input type="checkbox"/> 8mm	
Pin1	Pin1 Quadrant	<input checked="" type="checkbox"/> Q1	<input type="checkbox"/> Q2	<input type="checkbox"/> Q3	<input type="checkbox"/> Q4