WAS4729QB

Low On Resistance (0.75Ω) Dual SPDT Analog Switch with Negative Swing Audio Capability

Http//:www.sh-willsemi.com

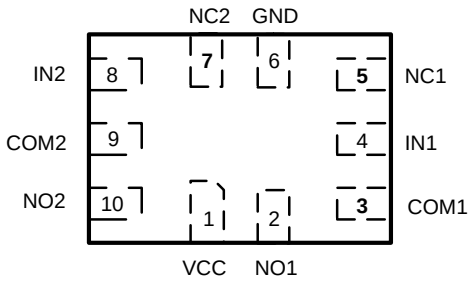
Descriptions

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 0.75Ω (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.

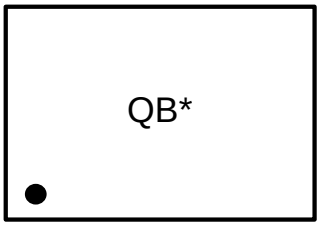
WAS4729QB is also featured with smart circuitry to minimize VCC leakage current even when the control voltage is lower than VCC supply voltage. This feature suits mobile handset applications by allowing direct interface with baseband processor general-purpose IO with minimal battery consumption. In other 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.

QFN1418-10L



Pin configuration (Top view)



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

Marking

Features

- Supply voltage : 2.3 ~ 5.5V
- ultra-low On Resistance : 0.75Ω @ 3.6V
- High Off isolation : -81dB @ 1KHz
- Crosstalk Rejection : -83dB @ 1KHz
- -3dB Bandwidth : 80MHz
- THD for 2Vp-p @R_L=32Ω : 0.05%
- Signal-to-Noise Ratio : 150dBV
- Break-Before-Make Switching
- HBM JEDEC: JESD22-A114
  - IO to GND : ±8KV
  - Power to GND : ±5KV

Applications

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

Order information

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

Pin descriptions

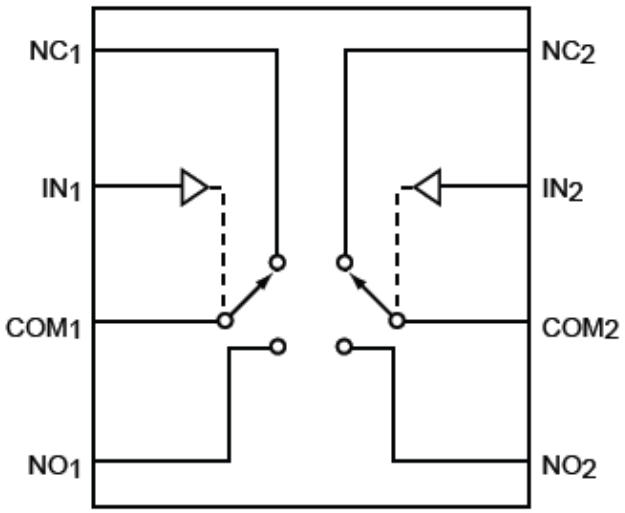
Pin Number	Symbol	Descriptions
2,10	NO_X	Data Port(Normally open)
6	GND	Ground
5,7	NC_X	Data Port(Normally closed)
3,9	COM_X	Common Data Port
1	VCC	Positive Power Supply
4,8	IN_X	Logic Control

Function descriptions

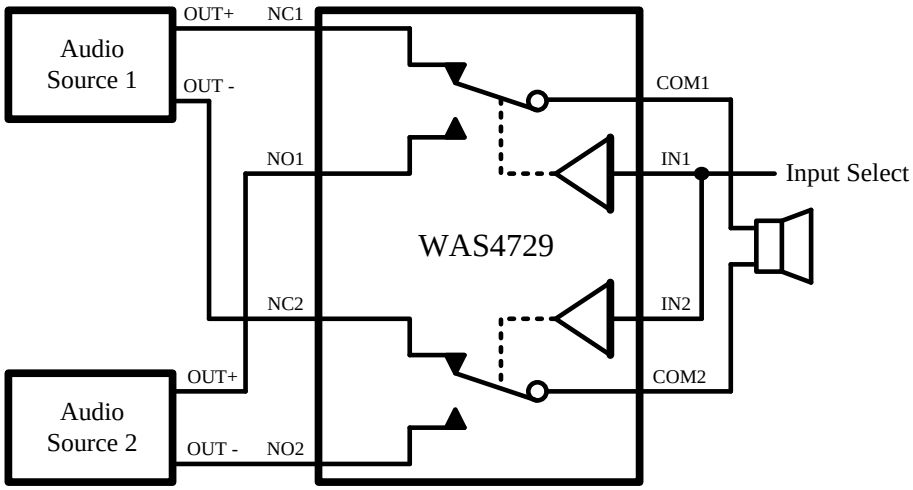
Logic Input(IN_X)	Function
0	NC_X Connected to COM_X
1	NO_X Connected to COM_X

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.

SUPPLY VOLTAGE, V_+	**Min.** (V_{NC}, V_{NO}, V_{COM}) = V_+ - 6.5V	**Max.** (V_{NC}, V_{NO}, V_{COM}) = V_+
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 (1)

Parameter	Symbol	Value	Unit
Supply Voltage	V_{CC}	-0.3 ~ 5.5	V
Control Input Voltage	VIN_X	-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	^oC
Junction Temperature	T_J	150	^oC
Lead Temperature (Soldering, 10 seconds)	T_L	260	^oC
Power Dissipation	P_D	250	mW

Recommend operating ratings (3)

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}	(V_{CC} -6.5) ~ V_{CC}	V
Operating Temperature	T_A	-40 ~ 85	^oC
Input Raise and Fall Time(Control Input V_{CC}=2.3~3.6V)	t_r,t_f	0 ~ 10	ns/V
Thermal Resistance	$R_{\theta JA}$	350	^oC/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_{IH}	VCC: 3.0 ~ 4.5	1.6			V
		VCC: 2.3 ~ 3.0	1.4			V
Input logic low level	V_{IL}	VCC: 3.0 ~ 4.5			0.6	V
		VCC: 2.3 ~ 3.0			0.4	V
Supply quiescent current	I_{CC}	I_{OUT}=0, V_{IN} =0 or V_{IN} =VCC			1.0	uA
Increase in I_{CC} per input	I_{CCT}	I_{OUT}=0, VCC=4.5 V_{IN}>1.8 or V_{IN}<0.5			2.0	uA
Input leakage current	I_{IN}	V_{SEL}=VCC			±1.0	uA
Off state switch leakage current	I_{OFF}				±1.0	uA
On state switch leakage current	I_{ON}				±1.0	uA
On-Resistance	R_{ON}	V_{IS}=0~VCC, I_{OUT}=100mA,		0.75	1.0	Ω
On-Resistance Matching Between Channels	ΔR_{ON}	V_{IS}=0~VCC, I_{OUT}=100mA,		0.08	0.1	Ω
On-Resistance Flatness	$R_{FLAT(ON)}$	V_{IS}=-3~0V, I_{OUT}=100mA,		0.1		Ω
		V_{IS}=0~3V, I_{OUT}=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_{ON}	V_{IS}=1.5V, C_L=35pF, R_L=50Ω		180		ns
Turn-Off Time	T_{OFF}	V_{IS}=1.5V, C_L=35pF, R_L=50Ω		60		ns
Break-Before-Make time	T_{BBM}	Generate by design		160		ns
-3dB Bandwidth	BW	R_L=50Ω, C_L=0pF		80		MHz
Off isolation	OIRR	F=1KHz, R_L=50Ω		-80		dB
		F=10KHz, R_L=50Ω		-70		dB
Crosstalk	Xtalk	F=1KHz, R_L=50Ω		-81		dB
		F=10KHz, R_L=50Ω		-75		dB
Total Harmonic Distortion	THD	F=20Hz to 20KHz V_{IS}=2Vp-p @R_L=16Ω,		0.075		%
		F=20Hz to 20KHz V_{IS}=2Vp-p @R_L=32Ω,		0.05		%
		F=20Hz to 20KHz V_{IS}=2Vp-p @R_L=600Ω,		0.025		%
		F=20Hz to 20KHz V_{IS}=4Vp-p @R_L=16Ω,		0.15		%
		F=20Hz to 20KHz V_{IS}=4Vp-p @R_L=32Ω,		0.1		%
		F=20Hz to 20KHz V_{IS}=4Vp-p @R_L=600Ω,		0.04		%

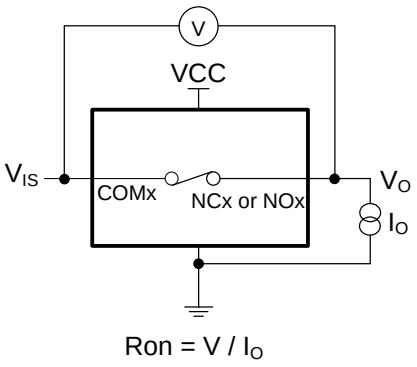
AC Electronics Characteristics (continued) (Ta=25°C, VCC=3.6V, unless otherwise noted)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Total Harmonic Distortion	THD	F=20Hz to 20KHz V_{IS}=6Vp-p @R_L=16Ω,		0.25		%
		F=20Hz to 20KHz V_{IS}=6Vp-p @R_L=32Ω,		0.175		%
		F=20Hz to 20KHz V_{IS}=6Vp-p @R_L=600Ω,		0.015		%
Signal-to-Noise Ratio	SNR	F=20Hz to 20KHz, A-weighted filter, Inputs grounded R_L=32Ω or 20K		150		dBV
Stereo Channel Imbalance NC1 and NO1, NC2 and NO2	IMB	F=20Hz to 20KHz, RL=32Ω		±0.003		dB

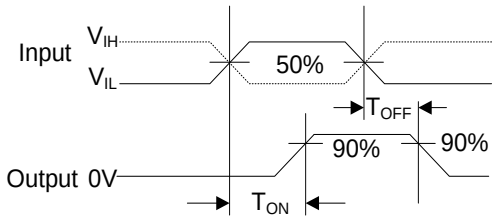
Capacitance (Ta=25°C unless otherwise noted)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Off capacitance	C_{OFF}	F=100KHz, VCC=3.3		50		pF
On capacitance	C_{ON}	F=100KHz, VCC=3.3		80		pF

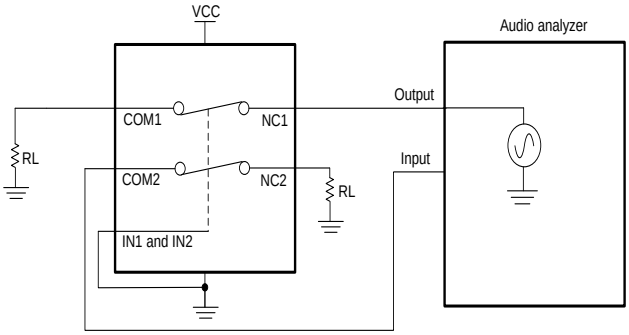
Test Circuits



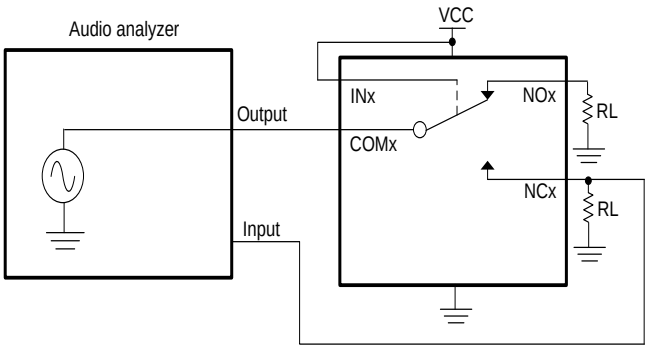
ON-Resistance (R_{ON})



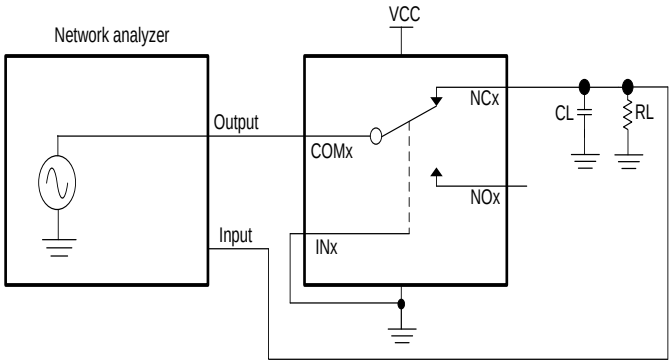
ON/OFF Time Waveforms (T_{ON} / T_{OFF})



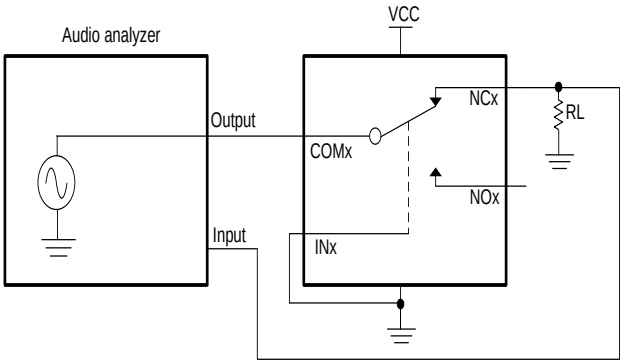
Crosstalk (Xtalk)



Off isolation (OIRR)



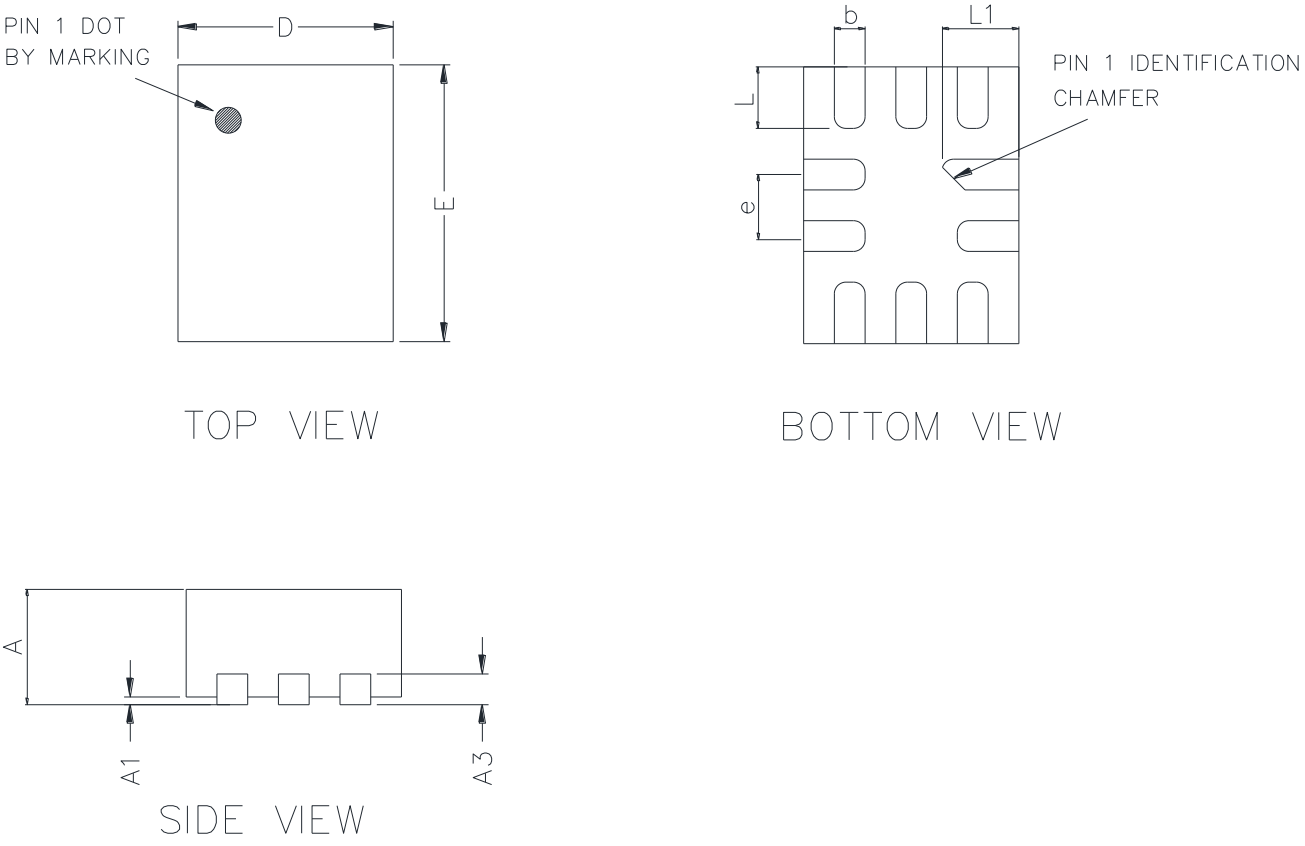
Bandwidth (BW)



THD+N

PACKAGE OUTLINE DIMENSIONS

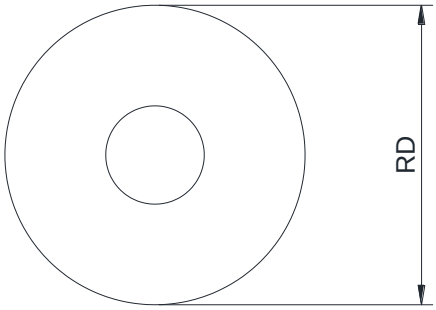
QFN1418-10L



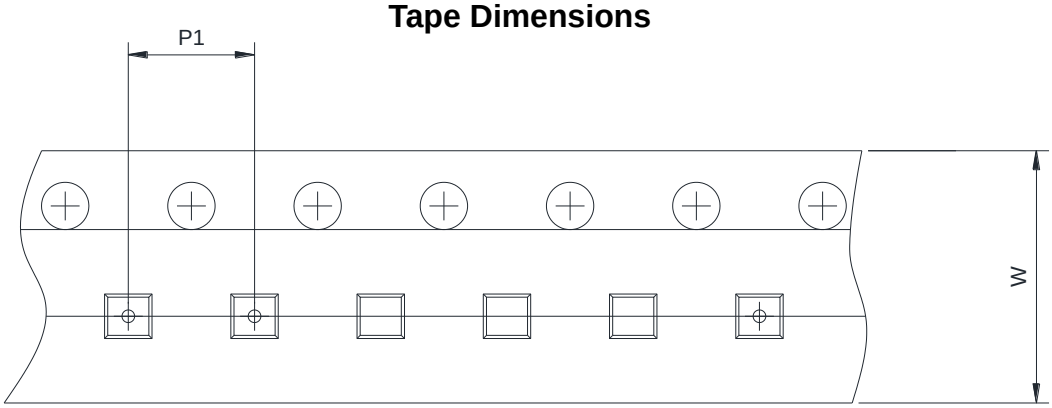
Symbol	Dimensions in Millimeters		
	Min.	Typ.	Max.
A	0.50	0.55	0.60
A1	0.00	-	0.05
A3	0.15 Ref.		
D	1.35	1.40	1.45
E	1.75	1.80	1.85
b	0.15	0.20	0.25
L	0.30	0.40	0.50
L1	0.40	0.50	0.60
e	0.40 BSC		

TAPE AND REEL INFORMATION

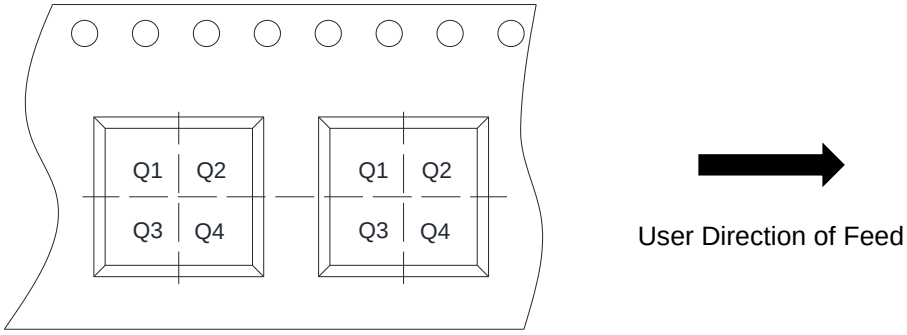
Reel Dimensions



Tape Dimensions



Quadrant Assignments For PIN1 Orientation In Tape



RD	Reel Dimension	☑ 7inch ☐ 13inch
W	Overall width of the carrier tape	☑ 8mm ☐ 12mm
P1	Pitch between successive cavity centers	☐ 2mm ☑ 4mm ☐ 8mm
Pin1	Pin1 Quadrant	☑ Q1 ☐ Q2 ☐ Q3 ☐ Q4