

# WAS4760Q

**Dual SPST Analog Switch with Negative Swing Audio Capability and 12V Tolerance**

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

## Descriptions

The WAS4760Q is a high performance, dual Single Pole Single Throw (SPST) analog switch with negative swing audio capability that features low Ron of 1Ω (typical) at 3.6V VCC. The WAS4760Q operates over a wide VCC range of 3.3V to 4.5V and is designed for high voltage isolation. The EN input is 1.8V logic level compatible.

WAS4760Q 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.

As EN is logic high, INx connects to Ox, very flatten Ron from INx to Ox minimizes little distortion as analog signals pass through; As EN is logic low, INx disconnects to Ox and Ox is withstanding high voltage up to 12V with very limit couplings back to INx.

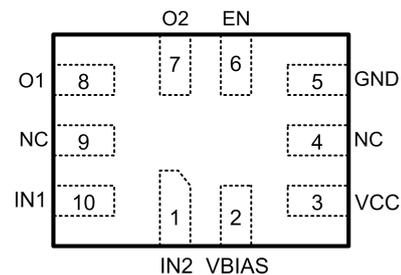
The WAS4760Q is available in QFN1418-10L package. Standard product is Pb-Free and halogen-Free.

## Features

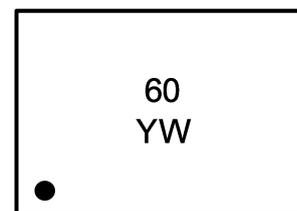
- Supply voltage : 3.3 ~ 4.5V
- O1/O2 pin voltage range : 12V DC
- Ultra high OFF isolation : -130dB @ 1KHz
- Low ON resistance : 1Ω @ 3.6V
- Crosstalk rejection : -130dB @ 1KHz
- THD for 0.707Vrms @ RL=32Ω : - 95 dB
- Signal-to-Noise Ratio : 120dBV
- -3dB Bandwidth : 50MHz
- HBM JEDEC: JESD22-A114
  - ◆ IO to GND : ±8KV
  - ◆ Power to GND : ±5KV



**QFN1418-10L**



**Pin configuration (Top view)**



- 60** = Device code
- Y** = Year Code (A~Z)
- W** = Week Code (A~Z)

## Marking

## Order information

Device	Package	Shipping
WAS4760Q-10/TR	QFN1418-10L	3000/Reel&Tape

## Applications

- Cell phones and PDA
- Audio and Video Signal Routing

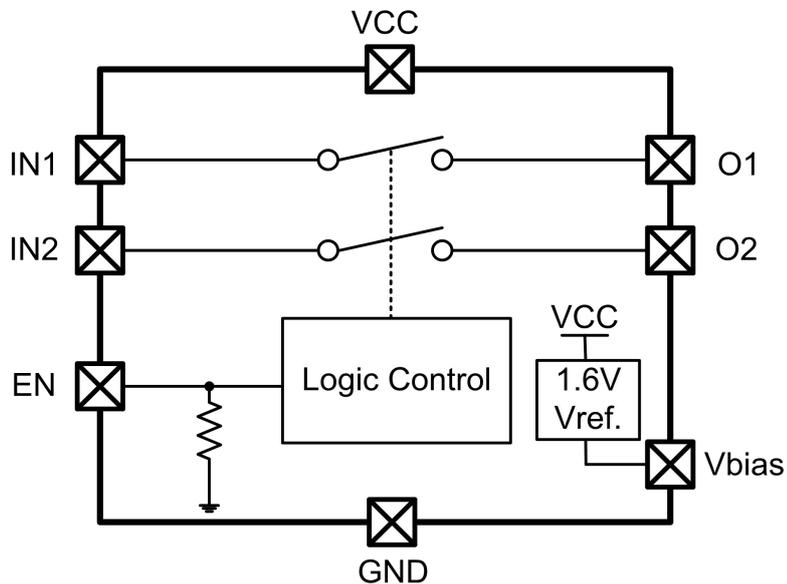
**Pin descriptions**

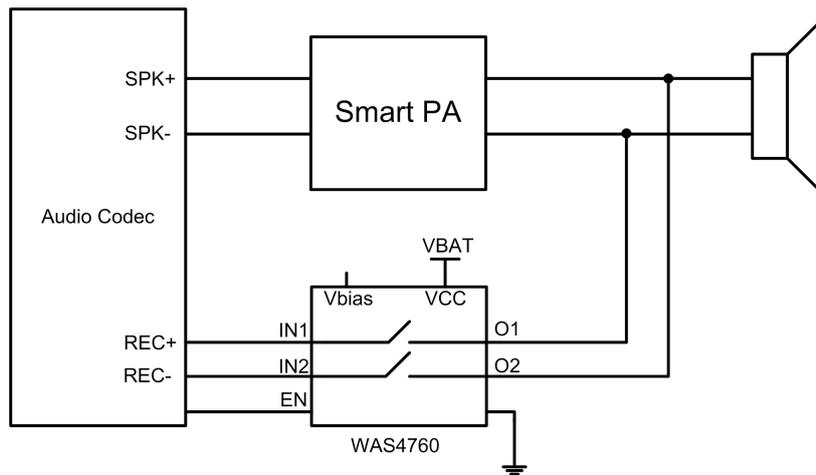
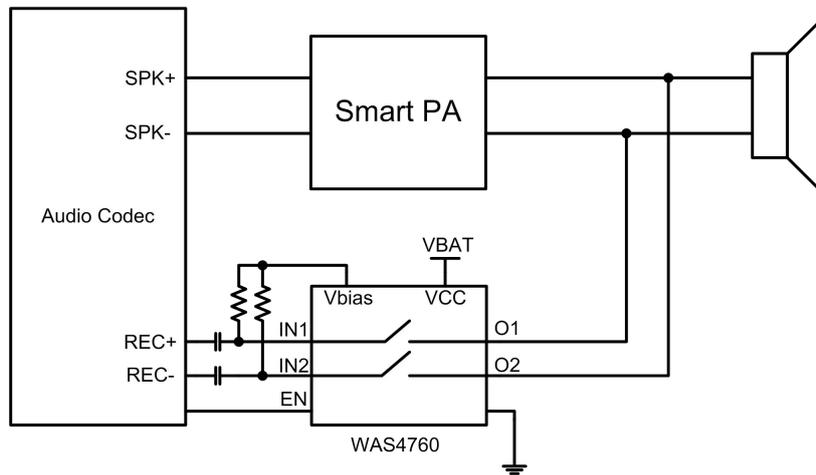
Pin No.	Symbol	Type	Descriptions
1,10	IN2,IN1	Input	Signal Input
5	GND	Ground	Ground
7,8	O2,O1	Output	Signal Output
2	VBIAS	Output	Bias Voltage Output
3	VCC	VDD	Positive Power Supply
4,9	NC	-	No connection
6	EN	Input	Logic Control

**True Table**

Logic Input (EN)	Function
1	IN <sub>x</sub> Connected to O <sub>x</sub>
0	IN <sub>x</sub> Disconnected to O <sub>x</sub>

Note: x=1 or 2

**Functional Block Diagram**


**Typical Applications**

**2 in 1 Speaker applications with smart PA and none cap-less receiver output**

**2 in 1 Speaker applications with smart PA and cap-less receiver output**

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

Parameter	Symbol	Value	Unit
Supply Voltage	$V_{CC}$	-0.3 ~ 6.5	V
Signal Output Pin Voltage	$V_{OX}$	0.7-VCC ~ 12	V
Signal Input Pin Voltage	$V_{INX}$	0.7-VCC ~ VCC	V
Logic Control Pin Voltage	$V_{EN}$	-0.3 ~ 6.5	V
Continuous Current	$I_{out}$	±200	mA
Peak Current (pulsed at 1ms 50% duty cycle)	$I_{out}$	±400	mA
Storage Temperature Range	$T_{STG}$	-55 ~ 150	°C
Junction Temperature	$T_J$	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
Operating Supply Voltage	$V_{CC}$	3.3 ~ 4.5	V
Logic Control Voltage	$V_{EN}$	0.0 ~ $V_{CC}$	V
Input Signal Voltage	$V_{INX}$	-3 ~ +3	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)**

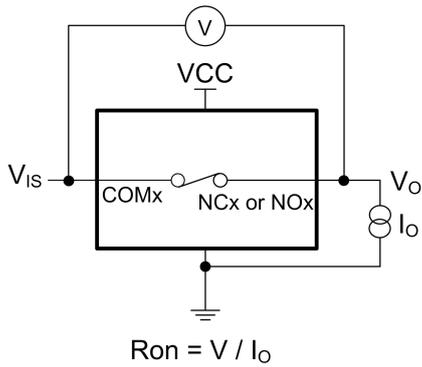
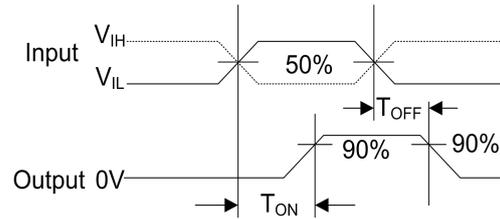
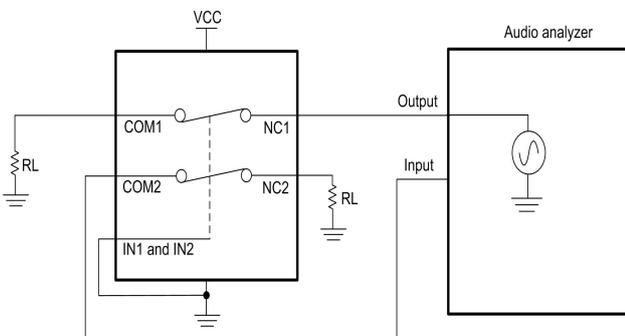
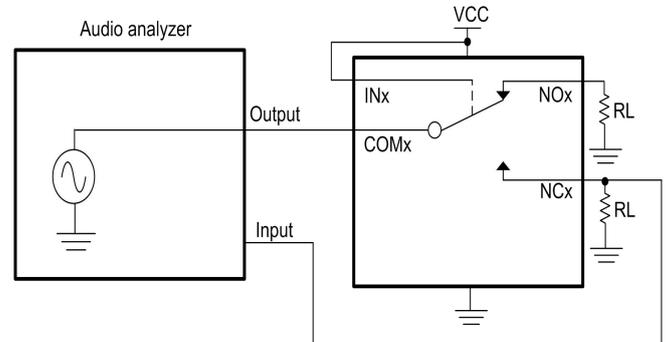
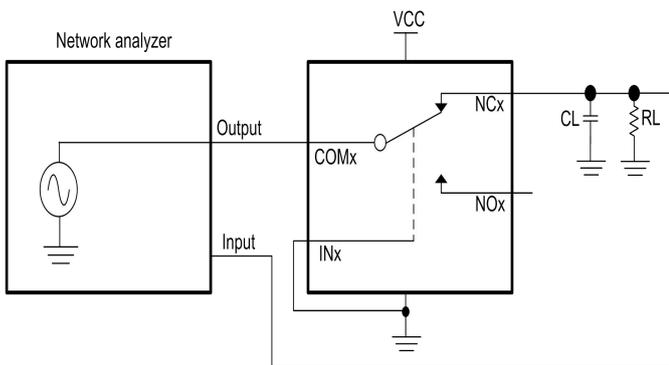
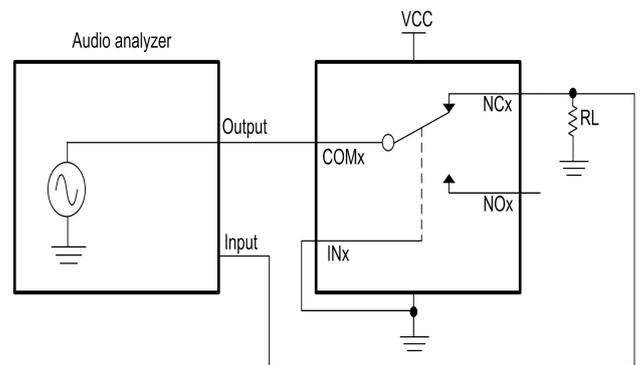
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Input logic high level	V <sub>IH</sub>	VCC: 3.3 ~ 4.5	1.6			V
Input logic low level	V <sub>IL</sub>	VCC: 3.3 ~ 4.5			0.6	V
Output voltage of bias	V <sub>bias</sub>	VCC: 3.3~4.5		1.6		V
Supply quiescent current	I <sub>CC</sub>	EN=0		15		μA
		EN=VCC		200		μA
EN pull down resistor	R <sub>PD</sub>			100		KΩ
Off state switch leakage current	I <sub>OFF</sub>	EN=0			±1.0	μA
On-Resistance	R <sub>ON</sub>	V <sub>IS</sub> = -3~+3, I <sub>OUT</sub> =100mA,		1		Ω
On-Resistance Matching Between Channels	Δ R <sub>ON</sub>	V <sub>IS</sub> = -3~+3, I <sub>OUT</sub> =100mA,		0.02		Ω
On-Resistance Flatness	R <sub>FLAT(ON)</sub>	V <sub>IS</sub> =-3~+3, I <sub>OUT</sub> =100mA,		0.01		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> =1V, R <sub>L</sub> =32Ω		200		μs
Turn-Off Time	T <sub>OFF</sub>	V <sub>IS</sub> =1V, R <sub>L</sub> =32Ω		100		ns
-3dB Bandwidth	BW	R <sub>L</sub> =50Ω, C <sub>L</sub> =0pF		50		MHz
Off isolation	OIRR	F=1K~10KHz, R <sub>L</sub> =50Ω		-130		dB
Channel-to-channel Crosstalk	Xtalk	F=1K~10KHz, R <sub>L</sub> =50Ω		-130		dB
Total Harmonic Distortion	THD	F=20Hz to 20KHz V <sub>IS</sub> =0.707V <sub>rms</sub> @R <sub>L</sub> =32Ω		-95		dB
		F=20Hz to 20KHz V <sub>IS</sub> =2V <sub>rms</sub> @R <sub>L</sub> =20kΩ		-105		dB
Signal-to-Noise Ratio	SNR	F=20Hz to 20KHz, A-weighted filter, Inputs grounded		120		dBV

**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		50		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**

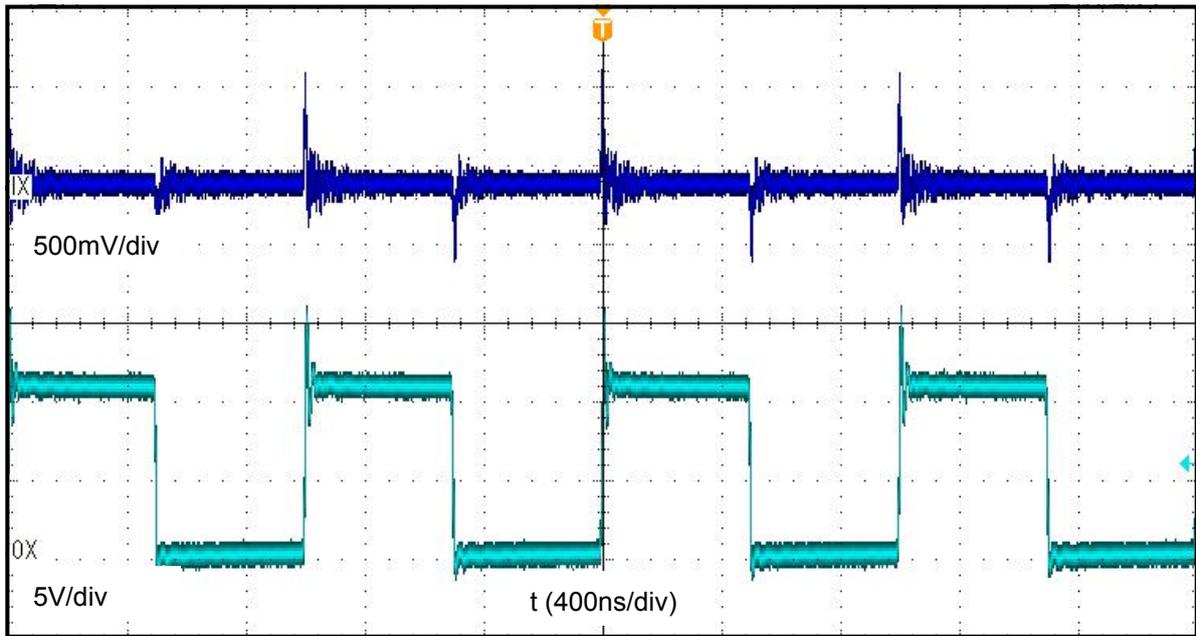


Figure 1. High Voltage Isolation

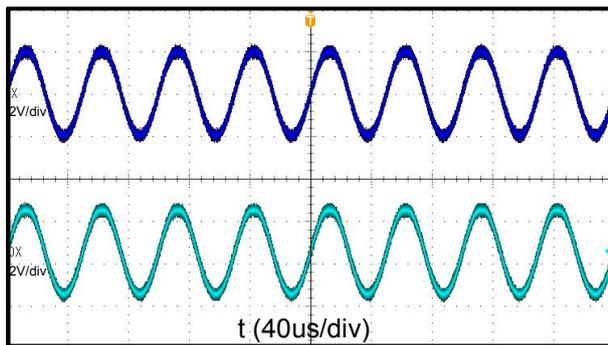


Figure 2. 2 in 1 Speaker applications with smart PA and none cap-less receiver output

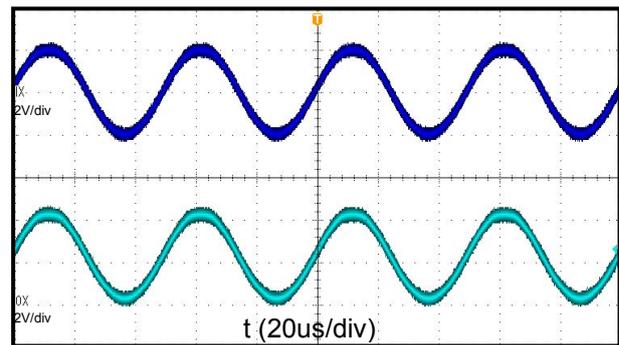
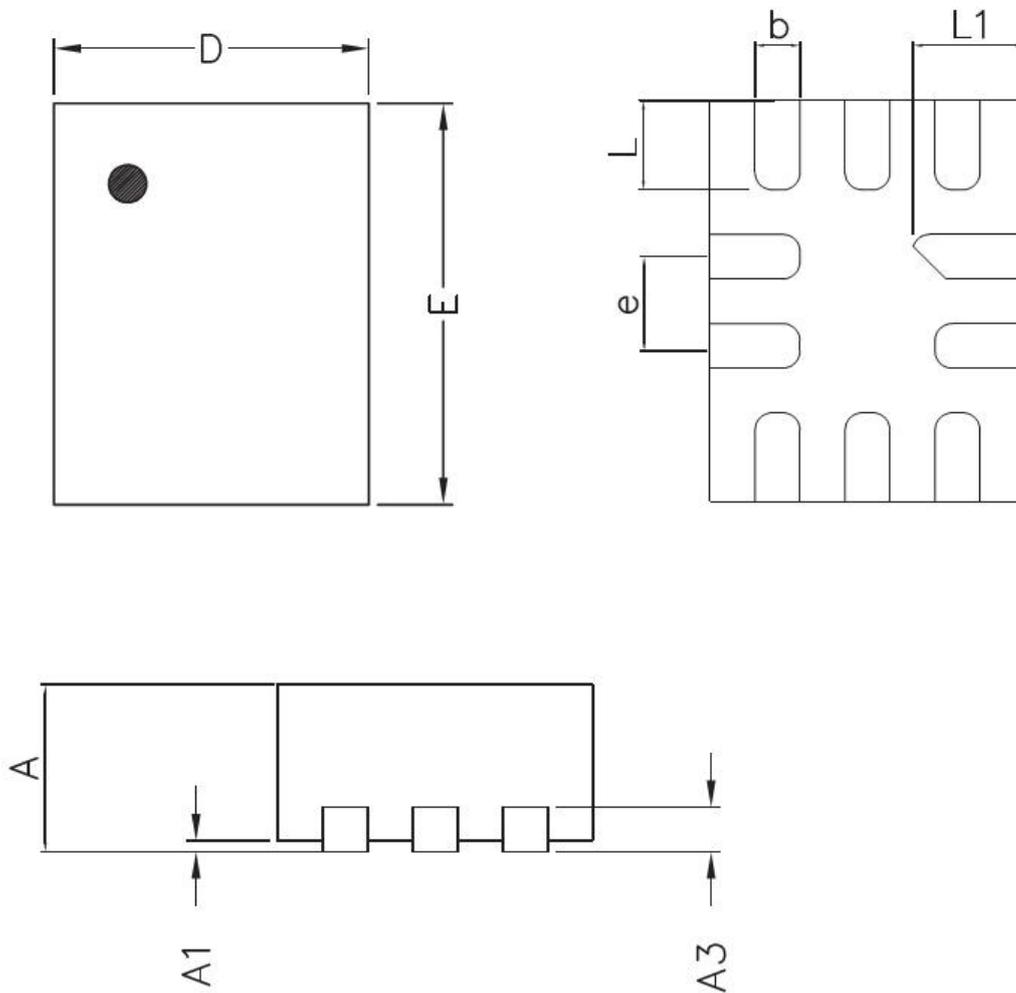


Figure 3. 2 in 1 Speaker applications with smart PA and cap-less receiver output

**Package outline dimensions**
**QFN1418-10L**


Symbol	Dimension in Millimeters	
	Min.	Max.
A	0.50	0.60
A1	0.000	0.050
A3	0.15 Ref.	
D	1.350	1.450
E	1.750	1.850
b	0.150	0.250
e	0.400 Typ.	
L	0.30	0.50
L1	0.40	0.60