WILLSEMI

WAS4766C

MIC/GND Cross-point Switch for EU/US
Headphone Compatible Application

Descriptions

The WAS4766C is a cross-point switch that is used to interchange the Ground and MIC connections on a headphone connector. The Ground switch has an ultra-low Ron of 60mΩ (typical) to minimize voltage drop across it, preventing undesired increase in headphone ground reference voltage. The switch state is controlled via the SEL input. Furthermore, a GND sense path supports quasi-differential amplifier architectures. When SEL=High, GND is connected to CON2 and MIC is connected to SNS1; When SEL=Low, GND is connected to CON1 and MIC is connected to SNS2. An internal pull-down 2MΩ resistor on SEL input sets the default state of the switch.
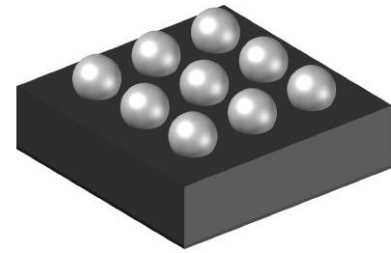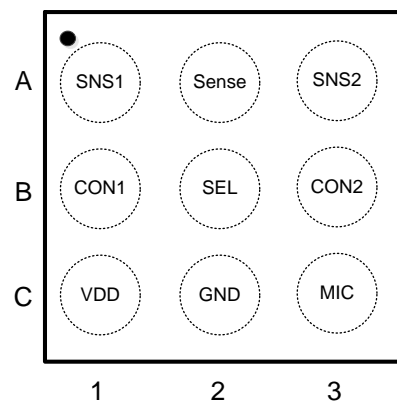
The WAS4766C is available in WLCSP-9L package. Standard product is Pb-Free and halogen-Free.

WLCSP-9L (Bottom view)

Pin configuration (Top view)

Features

- Supply voltage   : 2.5 ~ 4.5V
- ultra-low Ron for GND Switch   : 60mΩ
- low Ron for MIC Switch   : 3.5Ω
- Break-Before-Make Switching
- Low quiescent current over an Expanded Control Input Range
- ESD Rating (HBM JEDEC: JESD22-A114)
  - ◆ IO to GND   : ±8KV
  - ◆ Power to GND   : ±5KV

Applications

- Cell phone
- Tablet
- Others Music Players

4766
ACYW

A   B   C
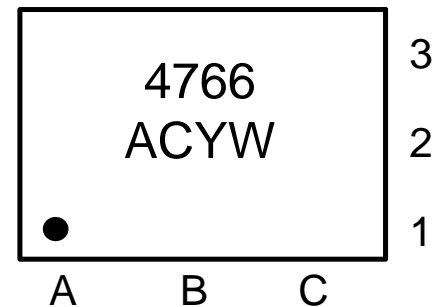
Marking

4766	**= Device code**
AC	**= Special code**
Y	**= Year code**
W	**= Week Code**

Order information

Device	Package	Shipping
WAS4766C-9/TR	WLCSP-9L	3000/Reel&Tape

Pin descriptions

Pin Number	Symbol	Descriptions
A1	SNS1	analog sense path 1 to headset jack GND
A2	Sense	analog sense path for GND sensing of Audio Codec
A3	SNS2	analog sense path 2 to headset jack GND
B1	CON1	headset jack pin 1
B2	SEL	Logic Control
B3	CON2	headset jack pin 2
C1	VDD	Power Supply
C2	GND	Ground
C3	MIC	Microphone bias connection audio codec side

Function descriptions

Logic Input (SEL)	Function
0	GND=CON1, Sense=SNS1, MIC=SNS2
1	GND=CON2, Sense=SNS2, MIC=SNS1

Functional Block and Typical Applications
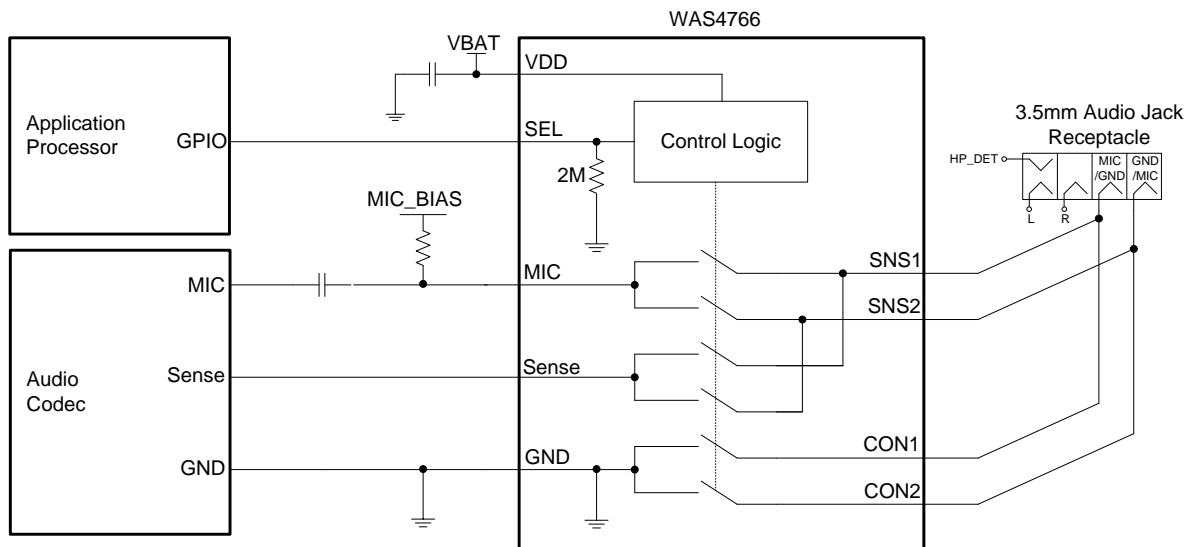
Block Diagram and Typical Applications

Absolute Maximum Ratings [1]

Parameter	Symbol	Value	Unit
Supply Voltage	V_{CC}	-0.3 ~ 6.5	V
Control Input Voltage	VIN_X	-0.3 ~ 6.5	V
DC Input Voltage [2]	V_{INPUT}	-0.3 ~ 6.5	V
Continuous Current through CONx	I_C	±100	mA
Storage Temperature Range	T_{STG}	-65 ~ 150	^{o}C
Junction Temperature under Bias	T_J	150	^{o}C
Lead Temperature (Soldering, 10 seconds)	T_L	260	^{o}C
Power Dissipation	P_D	250	mW

Recommend operating ratings [3]

Parameter	Symbol	Value	Unit
Supply Voltage Operating	V_{CC}	2.5 ~ 4.5	V
Control Input Voltage	V_{IN}	0.0 ~ V_{CC}	V
Input Signal Voltage	V_{IS}	0.0 ~ V_{CC}	V
Operating Temperature	T_A	-40 ~ 85	^{o}C
Input Raise and Fall Time(Control Input V_{CC}=2.3~3.6V)	t_r,t_f	0 ~ 10	ns/V
Thermal Resistance	$R_{\theta JA}$	115	^{o}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=3.3V, 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		3		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		uA
SEL Input leakage current	I_{IN}	V_{SEL}=VCC		2		uA
SEL Pull-down Resistor	R_{SEL}			2		MΩ
Off state switch leakage current	I_{OFF}				±1.0	uA
On state switch leakage current	I_{ON}				±1.0	uA
GND path On-Resistance	R_{ON1}	V_{IS}= 0 ~ 0.1V I_O =32mA Fig.1		60		mΩ
GND path On-Resistance match	$\triangle R_{ON1}$	V_{IS}= 0 ~ 0.1V I_O =32mA		6		mΩ
GND path On-Resistance flatness	$R_{FLAT1(ON)}$	V_{IS}= 0 ~ 0.1V I_O =32mA		6		mΩ
Sense path On-Resistance	R_{ON2}	V_{IS}= 0 ~ 0.1V I_O =32mA Fig.1		50		mΩ
Sense path On-Resistance match	$\triangle R_{ON2}$	V_{IS}= 0 ~ 0.1V I_O =32mA		5		mΩ
Sense path On-Resistance flatness	$R_{FLAT2(ON)}$	V_{IS}= 0 ~ 0.1V I_O =32mA		5		mΩ
MIC path On-Resistance	R_{ON3}	V_{IS}= 0 ~1.8V I_{OUT} =32mA Fig.1		3.5		Ω
MIC path On-Resistance match	$\triangle R_{ON3}$	V_{IS}= 0 ~VCC I_{OUT} =32mA		0.2		Ω
MIC path On-Resistance flatness	$R_{FLAT3(ON)}$	V_{IS}= 0 ~1.8V I_{OUT} =32mA		0.5		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		150		ns
Turn-Off Time	T_{OFF}	V_{IS}=1.5V, C_L=35pF, R_L=50Ω		150		ns
Break-Before-Make time [1]	T_{BBM}	V_{IS}=1.5V, C_L=35pF, R_L=50Ω		800		ns
-3dB Bandwidth (MIC)	BW_{MIC}	R_L=50Ω, C_L=0pF Fig.5		100		MHz
Off isolation	OIRR	F=1KHz, R_L=32Ω Fig.6		-55		dB
Crosstalk	Xtalk	F=1KHz, R_L=32Ω without sense Fig.3		-52		dB
		F=1KHz, R_L=32Ω with sense Fig.4		-100		dB
Total Harmonic Distortion (MIC)	THD	F=20Hz to 20KHz R_L=1KΩ,V_{IS}=30mVpp Fig.2		-80		dB

(1) Guarantee by design

Capacitance (Ta=25°C unless otherwise noted)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Off capacitance	C_{OFF}	F=100KHz, VCC=3.3		70		pF
On capacitance	C_{ON}	F=100KHz, VCC=3.3		100		pF

Test Circuits
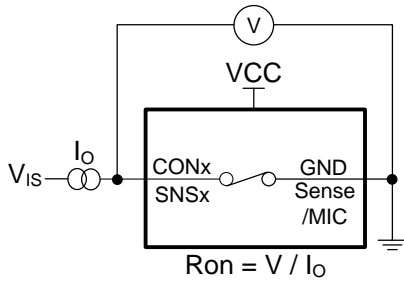
Fig.1 ON-Resistance (R$_{ON}$)
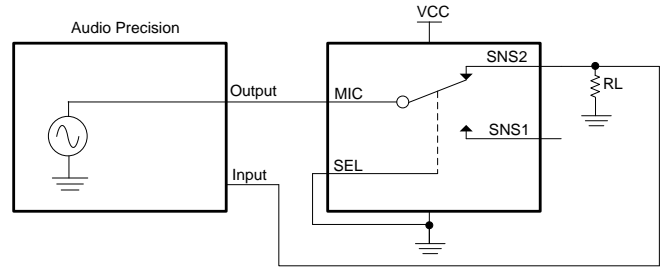
Fig.2 THD+N
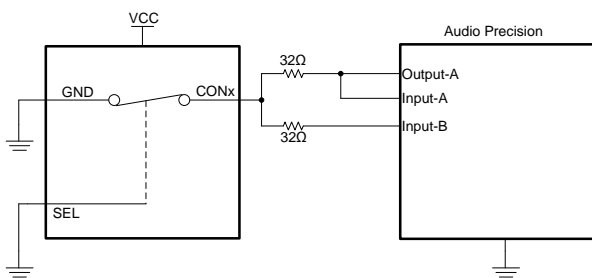
Fig.3 Crosstalk without Sense (Xtalk)
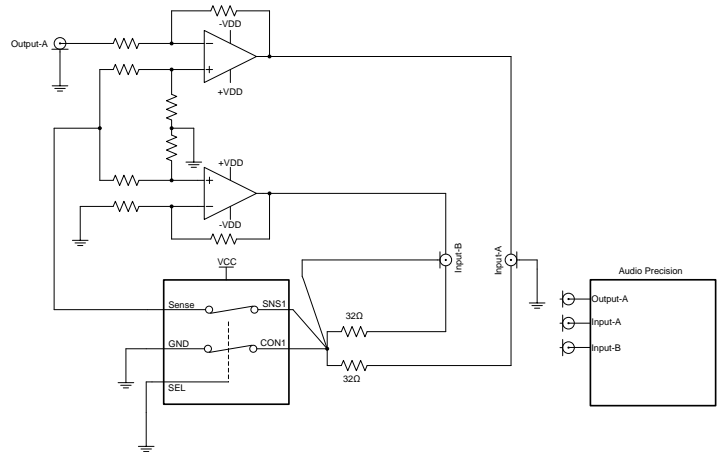
Fig.4 Crosstalk with Sense (Xtalk)
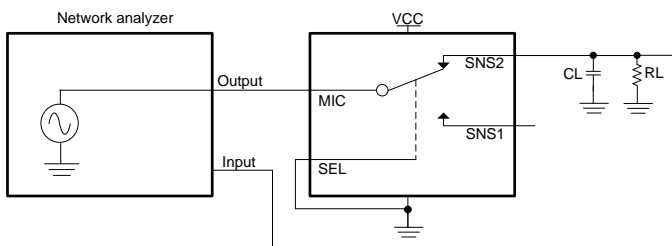
Fig.5 Bandwidth (BW)
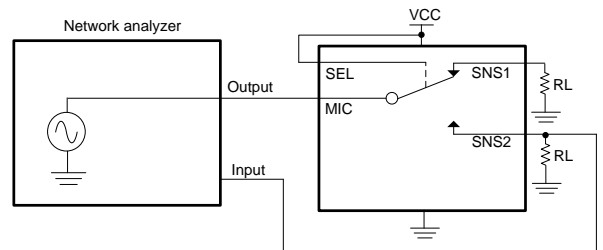
Fig.6 Off Isolation (OIRR)

PACKAGE OUTLINE DIMENSIONS

CSP-9L
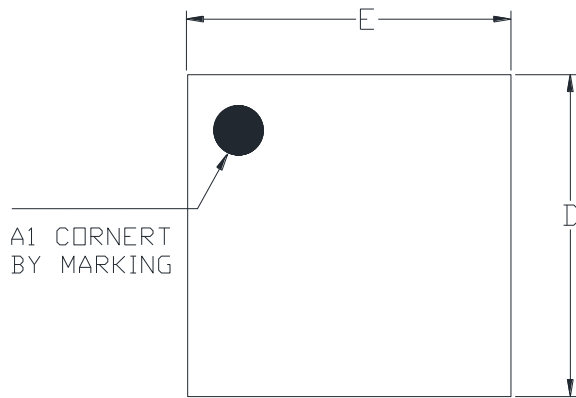
TOP VIEW
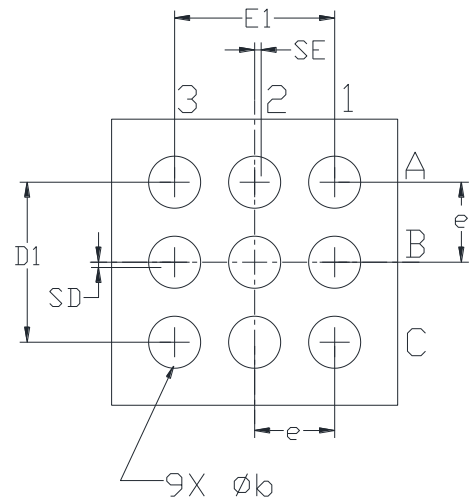
BOTTOM VIEW
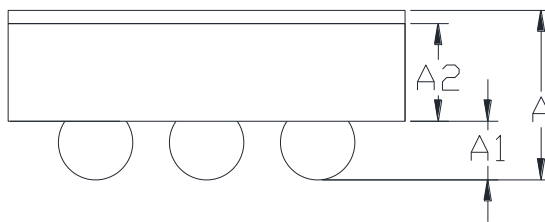
SIDE VIEW

Symbol	Dimensions in Millimeters		
	Min.	Typ.	Max.
A	0.555	0.585	0.615
A1	0.120	0.140	0.160
A2	0.407	0.420	0.433
D	1.140	1.170	1.200
E	1.140	1.170	1.200
D1	0.800 Ref.		
E1	0.800 Ref.		
b	0.160	0.180	0.200
e	0.400 BSC		
SD	0.000 BSC		
SE	0.000 BSC		

TAPE AND REEL INFORMATION

Reel Dimensions
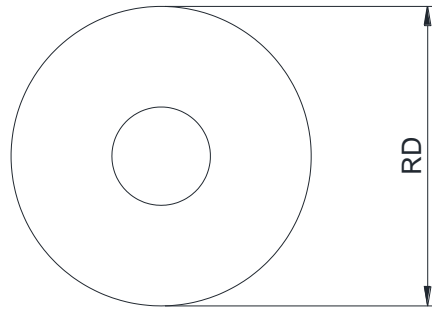
Tape Dimensions
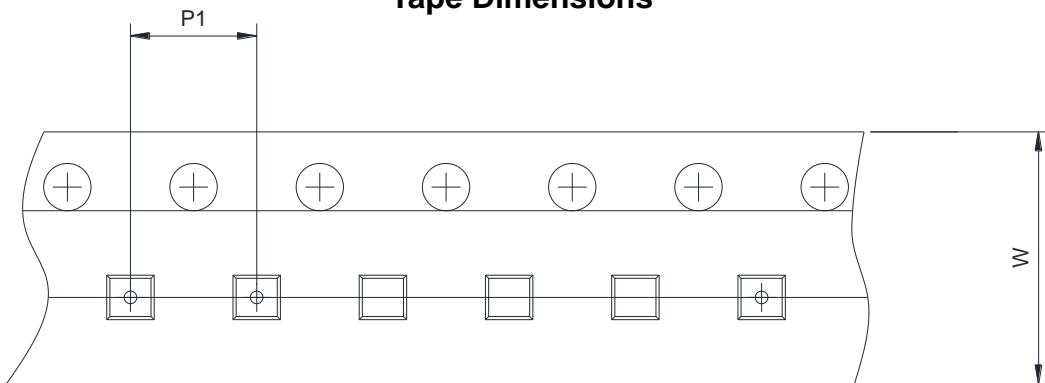
Quadrant Assignments For PIN1 Orientation In Tape

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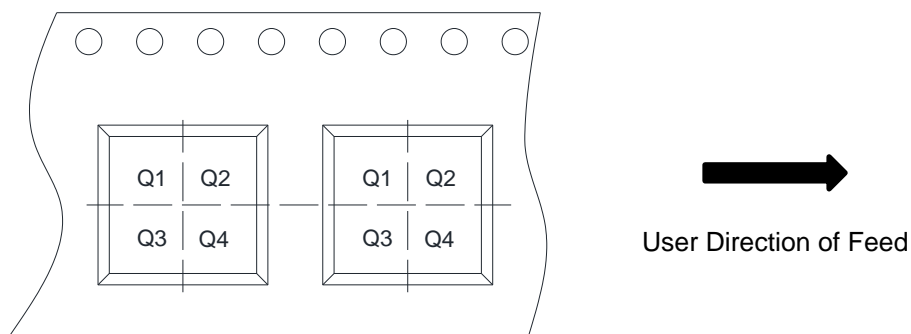
RD	Reel Dimension	☑ 7inch	☐ 13inch		
W	Overall width of the carrier tape	☑ 8mm	☐ 12mm		
P1	Pitch between successive cavity centers	☐ 2mm	☑ 4mm	☐ 8mm	
Pin1	Pin1 Quadrant	☑ Q1	☐ Q2	☐ Q3	☐ Q4