

# WSP6582C

**SwitchPro** Family High Fidelity Stereo SPDT Switch with Pop and Click Suppression

<http://www.willsemi.com>

## Descriptions

With **SwitchPro** technology, The WSP6582C is a Dual SPDT analog switch with ultra-low distortion, high OFF-Isolation for special stereo audio applications with negative swing audio signals capacity that features ultra-low Ron of 0.2Ω (typical) at 3.3V VCC.

The WSP6582C operates a single power supply over a wide range from 3.0V to 4.5V and 1.8V logic compatible with ultra high PSRR. With soft-start feature that eliminates pops and clicks associated at any application conditions likes switched, enable/disable and power-up.

With superior THD+N performance and other high performance, the WSP6582C is an ideal device for Hi-Fi system applications.

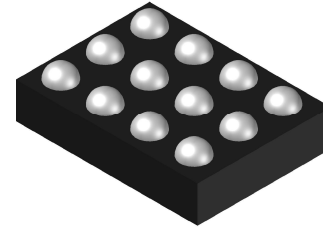
The WSP6582C is available in 12 Ball Wafer Level Chip Scale Package (WLCSP) with 1.2x1.6x0.5mm. All products is Pb-free and Halogen-free.

## Features

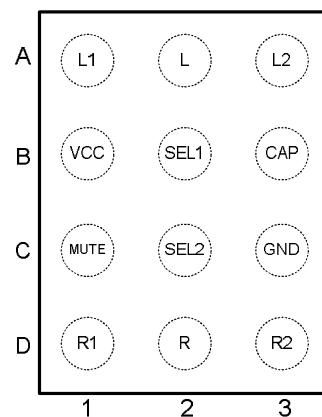
- Single supply range operating from 3.0V to 4.5V
- -118dB THD+N into 100kΩ load at 2Vrms
- -114dB THD+N into 32Ω load at 2Vrms
- Signal-to-Noise (SNR) Ratio 132dBA
- 100dB PSRR at 10kHz
- 137dB crosstalk & separation
- Adjust soft-start with external capacitor

## Applications

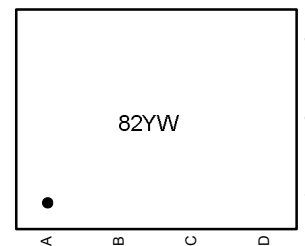
- Hi-Fi Smartphones and Portable Device
- Hi-Fi SACD/DVD players
- High Quality Home Theaters



**WLCSP-12B (Bottom view)**



**Pin configuration (Top view)**



### Marking

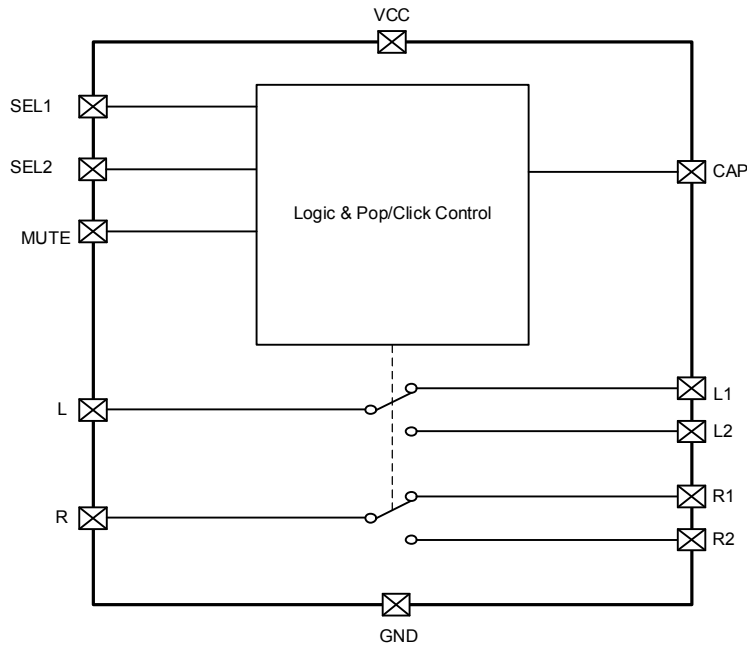
- 82** = Device code  
**Y** = Year code  
**W** = Week Code

### Order information

Device	Package	Shipping
WSP6582C-12/TR	WLCSP-12B	3000/Reel&Tape

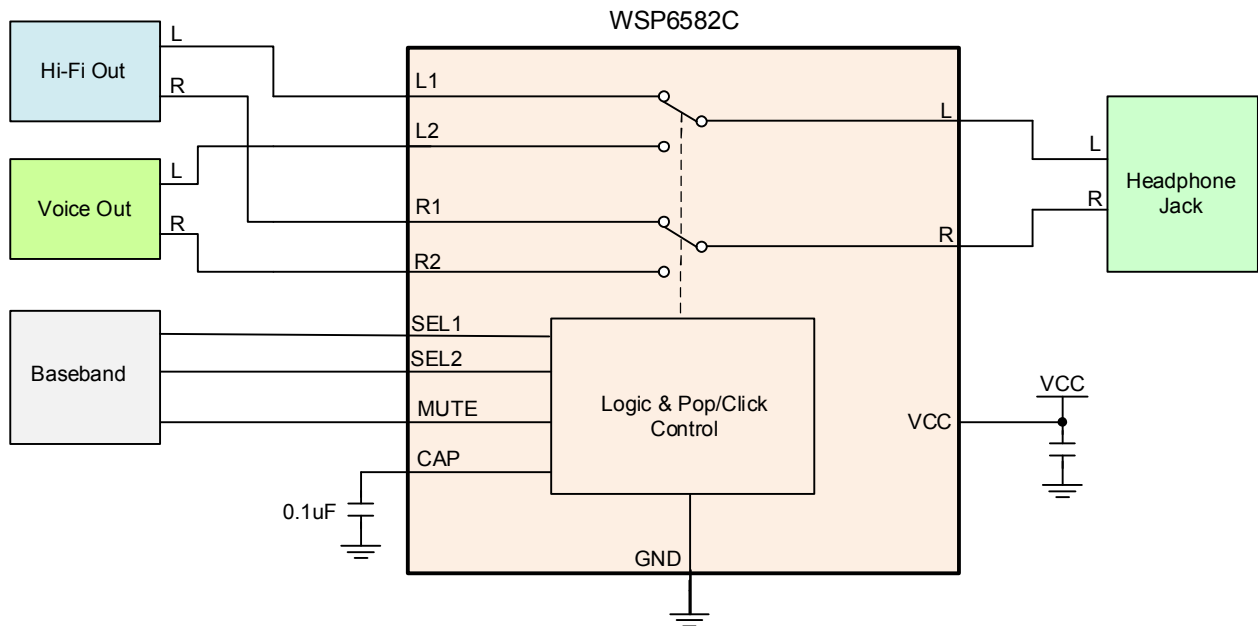
**Pin descriptions**

Pin Number	Symbol	Descriptions
A1	L1	Left normally closed pin
A2	L	Left common pin
A3	L2	Left normally open pin
B1	VCC	Power supply
B2	SEL1	Select control pin for Left
B3	CAP	Soft-start rising time control with external ceramic capacitor
C1	MUTE	Signal mute control pin
C2	SEL2	Select control pin for Right
C3	GND	Ground
D1	R1	Right normally closed pin
D2	R	Right common pin
D3	R2	Right normally open pin

**Block Diagram**

**Figure 1. WSP6582C Block Diagram**
**Function Table**

MUTE	SEL1	SEL2	L1	L2	R1	R2
0	0	0	ON	OFF	ON	OFF
0	0	1	ON	OFF	OFF	ON
0	1	0	OFF	ON	ON	OFF
0	1	1	OFF	ON	OFF	ON
1	X	X	OFF	OFF	OFF	OFF

Note: X=0 or 1, don't care

**Typical Applications**

**Figure 2. Hi-Fi Phone Application Block Diagram**

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

Parameter	Symbol	Value	Unit
Supply Voltage	$V_{CC}$	-0.3 ~ 5.5	V
Digital Control Input Voltage	$V_{IN}$	-0.3 ~ 5.5	V
Analog Input/Output Voltage (L1,L2,R1,R2,L,R)	$V_{IS}$	-4.0 ~ 4.0	V
Switch Continuous Current (L1,L2,R1,R2,L,R)	$I_{IO}$	±300	mA
Switch Peak Current (L1,L2,R1,R2,L,R) (pulsed at 1ms, 10% duty cycle, Max)	$I_{IO\_PK}$	±500	mA
Power Dissipation in Still Air	$P_D$	250	mW
Storage Temperature Range	$T_{STG}$	-55 ~ 150	°C
Junction Temperature	$T_J$	150	°C
Lead Temperature (Soldering, 10 seconds)	$T_L$	260	°C
Thermal Resistance	$R_{\theta JA}$	80	°C/W
ESD protection (HBM)	I/O to VCC, I/O to GND	±6000	V
	I/O to I/O	±4000	V

**Recommend operating ratings <sup>(2)</sup>**

Parameter	Symbol	Value	Unit
Supply Voltage	$V_{CC}$	3.3 ~ 4.5	V
Digital Control Input Voltage	$V_{IN}$	0.0 ~ $V_{CC}$	V
Analog Input/Output Voltage (L1,L2,R1,R2,L,R)	$V_{IS}$	-3.3 ~ $V_{CC}$	V
Operating Temperature	$T_A$	-40 ~ 85	°C

**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.

**DC Electronics Characteristics**

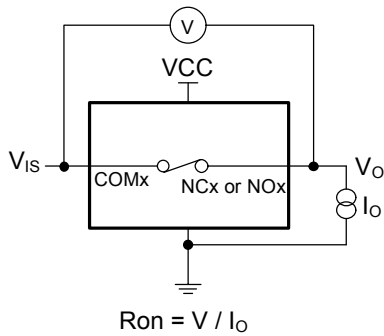
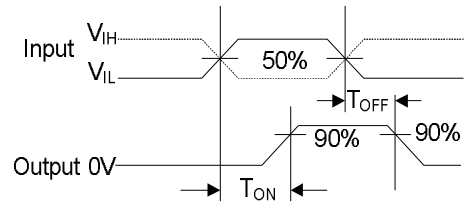
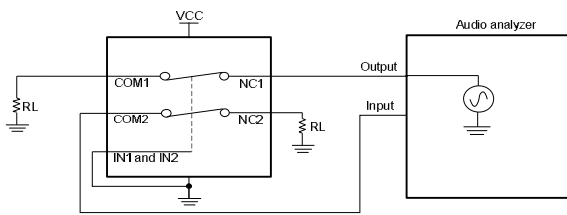
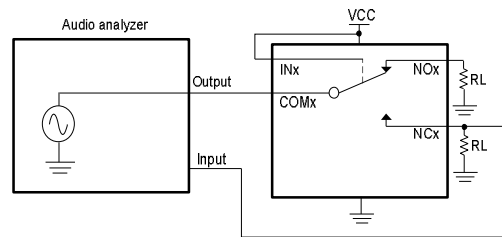
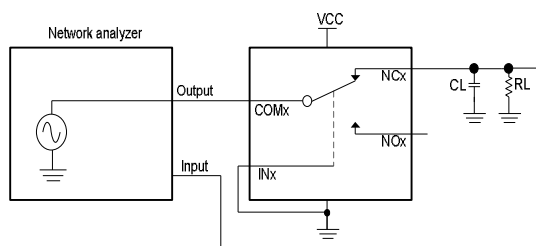
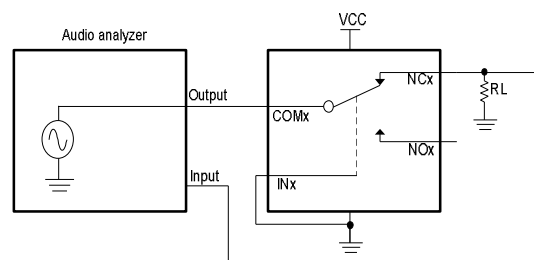
 (Ta=25°C, VCC=3.6V, V<sub>IS</sub>=2V<sub>rms</sub>, R<sub>L</sub>=32Ω, f=1kHz, CAP=0.1uF, unless otherwise noted)

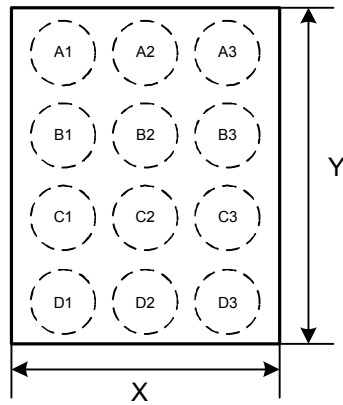
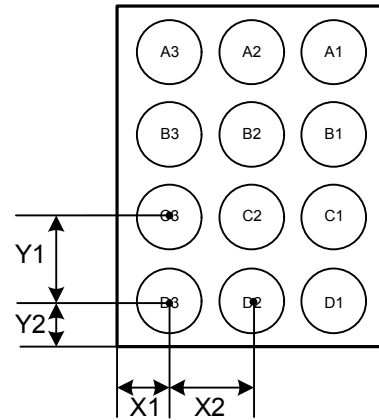
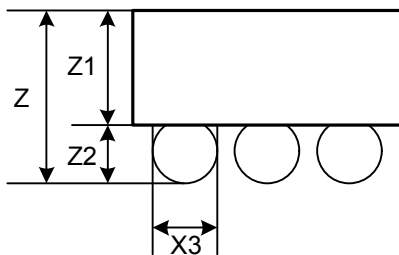
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
<b>Analog Switch Characteristics</b>						
Analog Signal Range	V <sub>IS</sub>	VCC: 3.3 ~ 4.2		2.5		V <sub>rms</sub>
On-Resistance	R <sub>ON</sub>	V <sub>IS</sub> = -3.3V~+3.3V I <sub>OUT</sub> =100mA		0.2		Ω
R <sub>ON</sub> Matching Between Channels	Δ R <sub>ON</sub>	V <sub>IS</sub> = -3.3V~+3.3V I <sub>OUT</sub> =100mA		0.0015		Ω
R <sub>ON</sub> Flatness	R <sub>FLAT(ON)</sub>	V <sub>IS</sub> = -3.3V~+3.3V I <sub>OUT</sub> =100mA		0.0015		Ω
<b>Dynamic Characteristics</b>						
Total Harmonic Distortion	THD+N	f=10Hz to 22KHz V <sub>IS</sub> =2V <sub>rms</sub> @R <sub>L</sub> =100kΩ		-118		dB
Total Harmonic Distortion	THD+N	f=10Hz to 22KHz V <sub>IS</sub> =2V <sub>rms</sub> @R <sub>L</sub> =32Ω		-114		dB
Total Harmonic Distortion	THD+N	f=10Hz to 500kHz V <sub>IS</sub> =1.55V <sub>rms</sub> @R <sub>L</sub> =100kΩ		-104		dB
Intermodulation Distortion	IMD	Mode=CCIF 19k+20k Ratio=1 V <sub>IS</sub> =500mV <sub>rms</sub> @R <sub>L</sub> =100kΩ		-122		dB
Dynamic/Transient Intermodulation Distortion	IMD	Mode=DIM100 V <sub>IS</sub> =1V <sub>rms</sub> @ R <sub>L</sub> =100kΩ		-103		dB
Signal-to-Noise Ratio	SNR	f=10Hz to 22KHz, Inputs grounded R <sub>L</sub> =32Ω or 100kΩ		132		dBA
Stereo Channel Imbalance L1 and R1, L2 and R2	IMB	f=10Hz to 22KHz, R <sub>L</sub> =100kΩ		±0.003		dB
Off isolation (Muting)	OIRR	f=10Hz to 22KHz, V <sub>L</sub> = V <sub>R</sub> = 2V <sub>rms</sub> @R <sub>L</sub> =32Ω MUTE=VCC SEL="X"		127		dB
Crosstalk (Channel-to-Channel)	Xtalk	f=10Hz to 22KHz, V <sub>IS</sub> = 2V <sub>rms</sub> , Source Impedance=0Ω R <sub>L</sub> = 100kΩ		137		dB
Power Supply Ripple Rejection	PSRR	f=10kHz, V <sub>IS</sub> = 0.1V <sub>rms</sub> , Inputs grounded		100		dB
-3dB Bandwidth	BW	R <sub>L</sub> =50Ω		50		MHz
On-to-Mute Time	T <sub>TRS-OM</sub>	CAP=0.1uF		50		ns

Mute-to-On Time	$T_{TRS-MO}$	CAP=0.1uF		160		ms
Turn-Off Time	$T_{OFF}$	$V_{IS}=1.5V, R_L=20K\Omega$ MUTE=0		60		ns
Turn-On Time	$T_{ON}$	$V_{IS}=1.5V, R_L=20K\Omega$ MUTE=0		60		us
Break-Before-Make time	$T_{BBM}$	$V_{IS}=1.5V, R_L=20K\Omega$ MUTE=0		50		us
Lx, Rx Off capacitance	$C_{OFF}$	f=100kHz, $V_{Lx}$ or $V_{Rx} = V_L$ or $V_R = 0V$		15		pF
L, R On capacitance	$C_{ON}$	f=100kHz, $V_{Lx}$ or $V_{Rx} = V_L$ or $V_R = 0V$		30		pF
<b>Power Supply Characteristics</b>						
Supply quiescent current	$I_{CC}$	MUTE=0V		190		uA
		MUTE=VCC		55		uA
<b>Digital Input Characteristics</b>						
Digital input logic high level	$V_{IH}$	VCC=3.6~4.5	1.6			V
		VCC=3.0~3.6	1.5			V
Digital input logic low level	$V_{IL}$	VCC=3.6~4.5			0.5	V
		VCC=3.0~3.6			0.4	V
Digital Input leakage current	$I_{IN}$				±2.0	uA
SEL pull-down resistor	$R_{PD}$			4		MΩ
MUTE pull-up resistor	$R_{PU}$			4		MΩ

**Note:**

- Flatness is defined as the difference between maximum and minimum value of ON-resistance at the specified analog signal voltage points.
- $R_{ON}$  matching between channels is calculated by subtracting the channel with the highest max Ron value from the channel with lowest max ron value.
- Crosstalk is inversely proportional to source impedance.

**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**
**WLCSP-12B**

**Top View**

**Bottom View**

**Side View**

Symbol	Dimensions in millimeter		
	Min.	Typ.	Max.
X	1.180	1.205	1.230
Y	1.610	1.635	1.660
X1		0.077	
X2		0.400	
X3	0.230	0.250	0.270
Y1		0.400	
Y2		0.077	
Z	0.480	0.535	0.590
Z1	0.305	0.330	0.355
Z2	0.145	0.165	0.185