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.

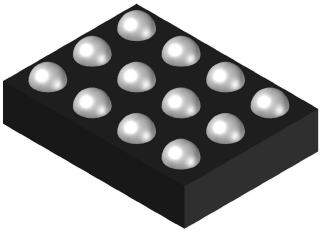
The WSP6582C is available in 12 Ball Wafer Level Chip Scale Package (WLCSP) with 1.2x1.6x0.5mm. All products is Pb-free and Halogen-free.

Features

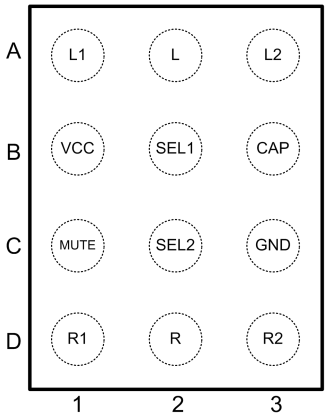
- Single supply range operating from 3.0V to 4.5V
- -118dB THD+N into 100kΩ load at 2Vrms
- -114dB THD+N into 32Ω load at 2Vrms
- Signal-to-Noise (SNR) Ratio 132dBA
- 100dB PSRR at 10kHz
- 137dB crosstalk & separation
- Adjust soft-start with external capacitor

Applications

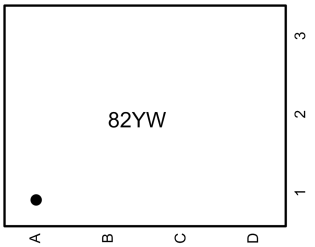
- Hi-Fi Smartphones and Portable Device
- Hi-Fi SACD/DVD players
- High Quality Home Theaters



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

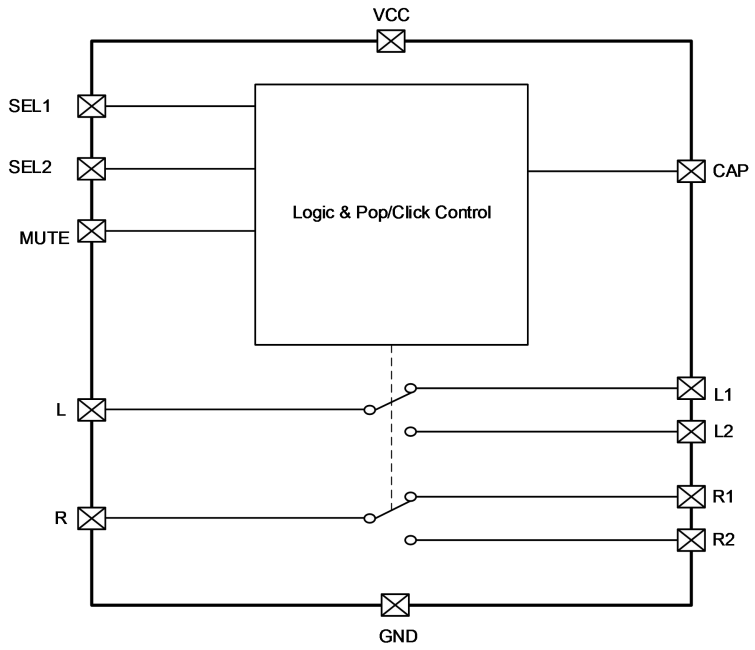


Figure 1. WSP6582C Block Diagram

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

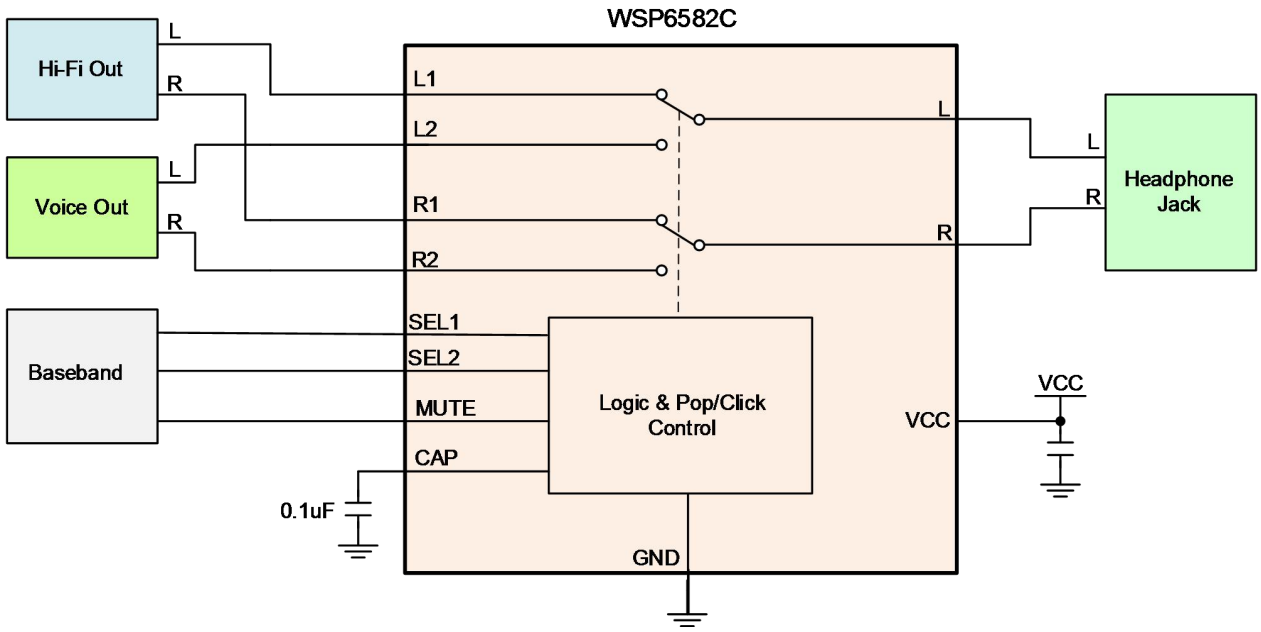


Figure 2. Hi-Fi Phone Application Block Diagram

Absolute Maximum Ratings (1)

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 (2)

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_{IS}=2Vrms, R_L=32Ω, f=1kHz, CAP=0.1uF, unless otherwise noted)

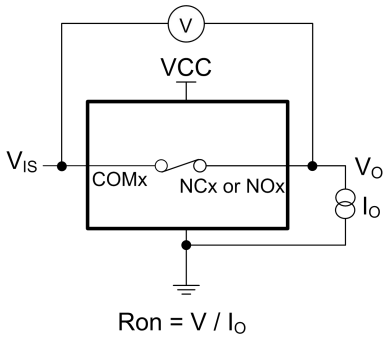
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Analog Switch Characteristics						
Analog Signal Range	V_{IS}	VCC: 3.3 ~ 4.2		2.5		Vrms
On-Resistance	R_{ON}	V_{IS}= -3.3V~+3.3V I_{OUT}=100mA		0.2		Ω
R_{ON} Matching Between Channels	ΔR_{ON}	V_{IS}= -3.3V~+3.3V I_{OUT}=100mA		0.0015		Ω
R_{ON} Flatness	$R_{FLAT(ON)}$	V_{IS}= -3.3V~+3.3V I_{OUT}=100mA		0.0015		Ω
Dynamic Characteristics						
Total Harmonic Distortion	THD+N	f=10Hz to 22KHz V_{IS}=2Vrms @R_L=100kΩ		-118		dB
Total Harmonic Distortion	THD+N	f=10Hz to 22KHz V_{IS}=2Vrms @R_L=32Ω		-114		dB
Total Harmonic Distortion	THD+N	f=10Hz to 500kHz V_{IS}=1.55Vrms @RL=100kΩ		-104		dB
Intermodulation Distortion	IMD	Mode=CCIF 19k+20k Ratio=1 V_{IS}=500mVrms @R_L=100kΩ		-122		dB
Dynamic/Transient Intermodulation Distortion	IMD	Mode=DIM100 VIS=1Vrms @ RL=100kΩ		-103		dB
Signal-to-Noise Ratio	SNR	f=10Hz to 22KHz, Inputs grounded R_L=32Ω or 100kΩ		132		dBA
Stereo Channel Imbalance L1 and R1, L2 and R2	IMB	f=10Hz to 22KHz, R_L=100kΩ		±0.003		dB
Off isolation (Muting)	OIRR	f=10Hz to 22KHz, V_L= V_R = 2Vrms @R_L=32Ω MUTE=VCC SEL="X"		127		dB
Crosstalk (Channel-to-Channel)	Xtalk	f=10Hz to 22KHz, V_{IS} = 2Vrms, Source Impedance=0Ω R_L = 100kΩ		137		dB
Power Supply Ripple Rejection	PSRR	f=10kHz, V_{IS} = 0.1Vrms, Inputs grounded		100		dB
-3dB Bandwidth	BW	R_L=50Ω		50		MHz
On-to-Mute Time	T_{TRS-OM}	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=20KΩ MUTE=0		60		ns
Turn-On Time	T_{ON}	V_{IS}=1.5V, R_L=20KΩ MUTE=0		60		us
Break-Before-Make time	T_{BBM}	V_{IS}=1.5V, R_L=20KΩ MUTE=0		50		us
Lx, Rx Off capacitance	C_{OFF}	f=100kHz, V_{Lx} or V_{Rx} = V_L or V_R =0V		110		pF
L, R On capacitance	C_{ON}	f=100kHz, V_{Lx} or V_{Rx} = V_L or V_R =0V		130		pF
Power Supply Characteristics						
Supply quiescent current	I_{CC}	MUTE=0V		190		uA
		MUTE=VCC		55		uA
Digital Input Characteristics						
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

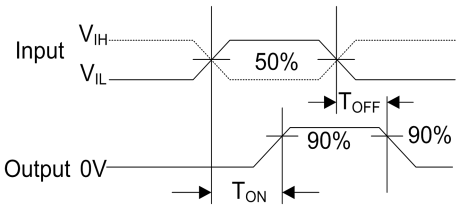
Note:

3. Flatness is defined as the difference between maximum and minimum value of ON-resistance at the specified analog signal voltage points.
4. 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.
5. Crosstalk is inversely proportional to source impedance.

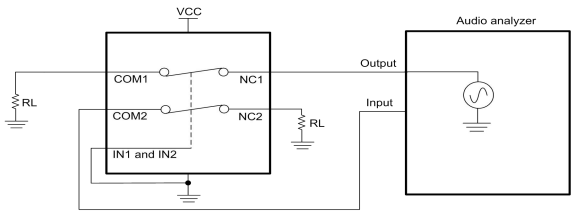
Test Circuits



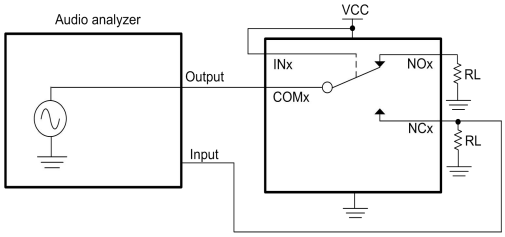
ON-Resistance (R_{ON})



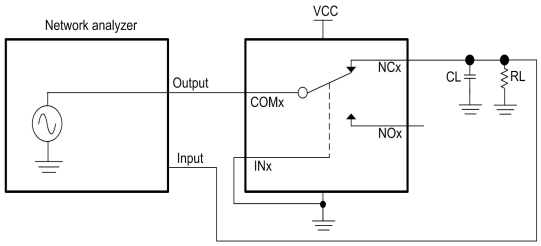
ON/OFF Time Waveforms (T_{ON} / T_{OFF})



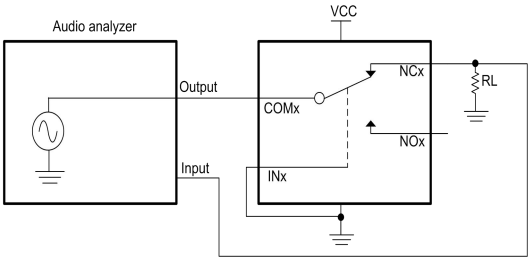
Crosstalk (Xtalk)



Off isolation (OIRR)



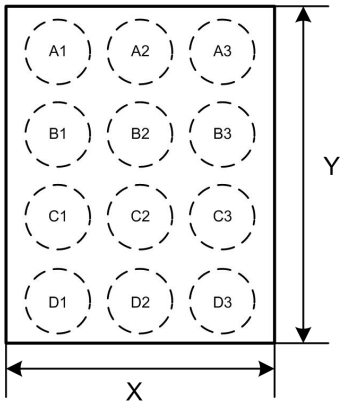
Bandwidth (BW)



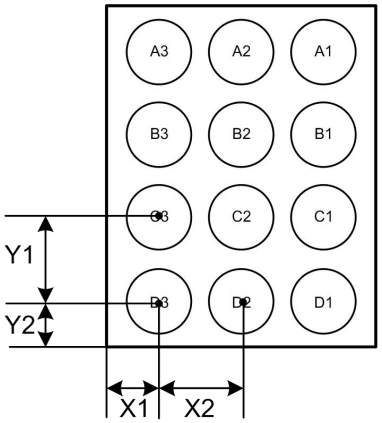
THD+N

Package outline dimensions

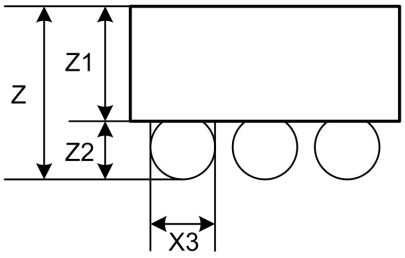
WLCSP-12B



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