Low Cost 16-Bit Stereo Audio DAC

FEATURES

- Cost effective
- Low distortion
- No zero crossing distortion
- Output voltage swing is proportional to supply voltage (V_{OPP}=V_{DD}/2)
- Space saving package SOP8
- Fast setting time permits 2*, 4*, and 8* oversampling (serial input) or double speed operation at 4* oversampling
- Compatible with most of the Japanese input formats; time multiplexed, two's complement, TTL input level

APPLICATIONS

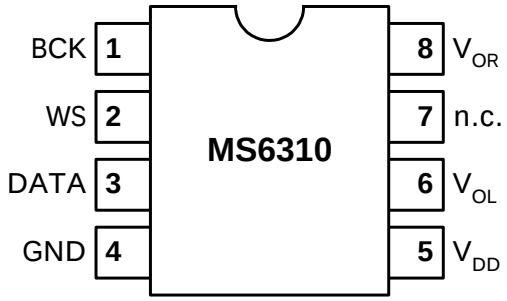
- VCD Player, DVD Player
- CD-ROM, DVD-ROM, CD-RW, DVD-RW

DESCRIPTION

The MS6310 is a voltage-output Digital-to-Analog Converter (DAC). The accuracy of the weight current sources, combined with the unique symmetrical decoding method, preclude zero-crossing distortion and ensures high quality audio reproduction. The MS6310 is pin and function compatible with MS6311, Philips TDA1311.

PIN CONFIGURATION

Symbol	Pin	Description
BCK	1	Bit clock input
WS	2	Word select input
DATA	3	Data input
GND	4	Ground
V_{DD}	5	Positive supply voltage
V_{OL}	6	Left channel output
n.c.	7	not connected
V_{OR}	8	Right channel output



BLOCK DIAGRAM

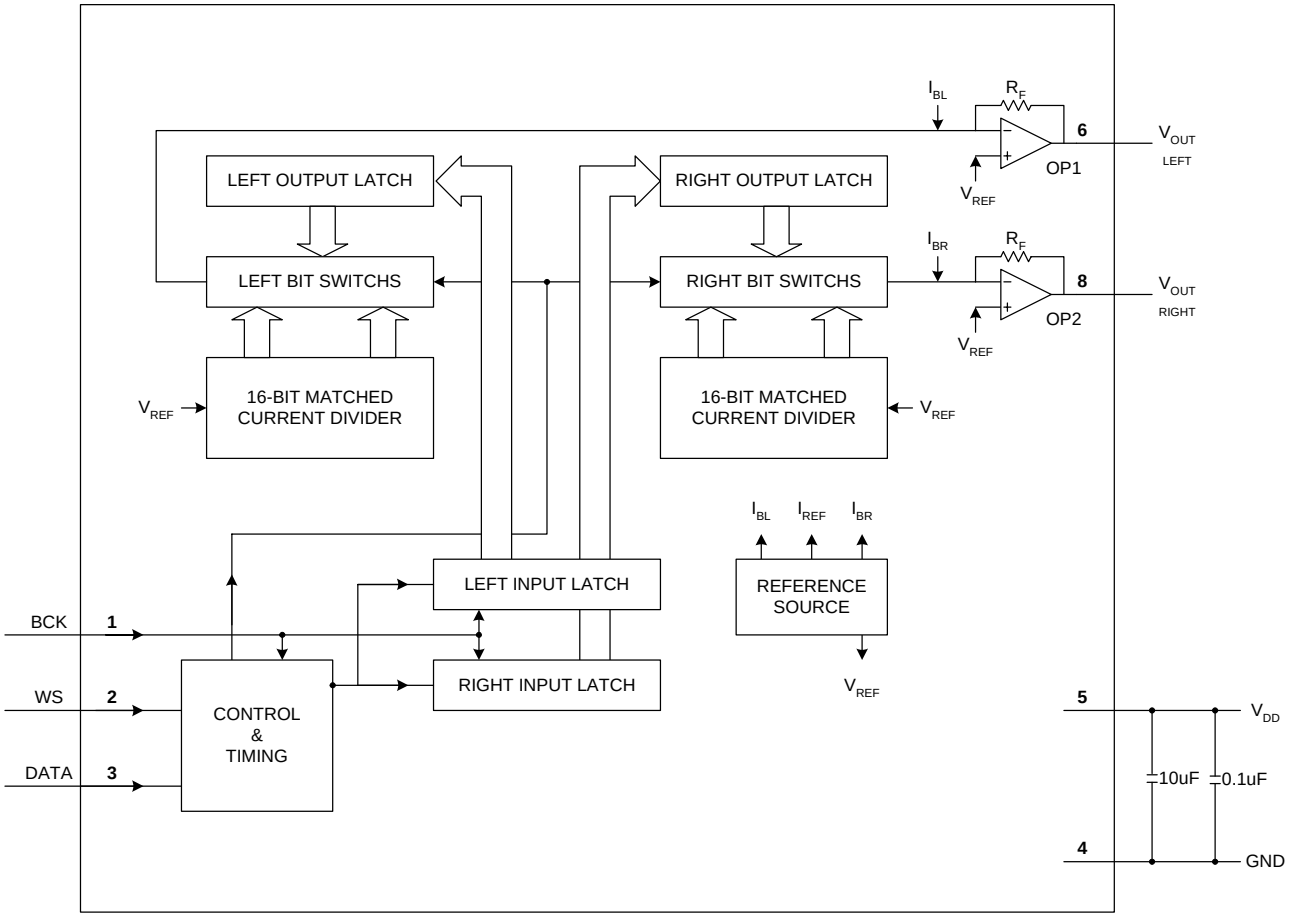


Fig.1 Block diagram.

ORDERING INFORMATION

Package	Part number	Packaging Marking	Transport Media
8-Pin SOP	MS6310CSTR	MS6310CS	2.5k Units Tape and Reel
8-Pin SOP	MS6310CSU	MS6310CS	100 Units Tube
8-Pin SOP (lead free)	MS6310CSGTR	MS6310CSG	2.5k Units Tape and Reel
8-Pin SOP (lead free)	MS6310CSGU	MS6310CSG	100 Units Tube

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Rating	Unit
V_{DD}	Positive Supply Voltage	6	V
V_{ESD}	Electrostatic Handling	-2000 to 2000	V
T_{STG}	Storage Temperature Range	-65 to 150	℃
T_A	Operating Ambient Temperature Range	-40 to 85	℃
T_J	Maximum Junction Temperature	150	℃
T_S	Soldering Temperature, 10 seconds	260	℃
R_{THJA}	Thermal Resistance from Junction to Ambient in Free Air SOP8	210	℃/W

OPERATING RATINGS

Symbol	Parameter	Min	Typ	Max	Unit
V_{DD}	Supply Voltage	2.7	-	5.5	V

5V ELECTRICAL CHARACTERISTICS

(Ta=25℃, V_{DD}=5V, f=1kHz; unless otherwise specified)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
DC Characteristics						
V_{DC}	Output DC level		2.3	2.5	2.7	V
V_{FS}	Full scale output voltage	V_{FS}=0.5V_{DD}	2.3	2.5	2.7	Vpp
I_Q	Quiescent current	At code 0000H	-	3.4	6	mA
CS	Channel separation		75	80	-	dB
AC Characteristics						
Res	Resolution		-	-	16	bits
THD+N	Total harmonic distortion plus noise		-	-57	-51	dB
			-	0.14	0.28	%
S/N	Signal-to-noise ratio	A-weighted at code 0000H	80	85	-	dB

TIMING AND DATA FORMAT

The MS6310 accepts input serial data formats of 16-bit word length. Left and right data words are time multiplexed. The MSB must always be first. The format of data input is shown in Figs. 2 and 3. With a HIGH level on the word select input (WS), data is placed in the left input register and with LOW level on the WS input, data is placed in the right register (Fig. 1). The data in the input registers are simultaneously latched in the output registers which control the bit switches. Internal bias currents I_{BL} and I_{BR} are each added to the full scale output current I_{FS} in order to achieve the maximum dynamic range at the outputs of OP1 and OP2 (Fig. 1). In this way the maximum dynamic range is achieved over the entire power supply range.

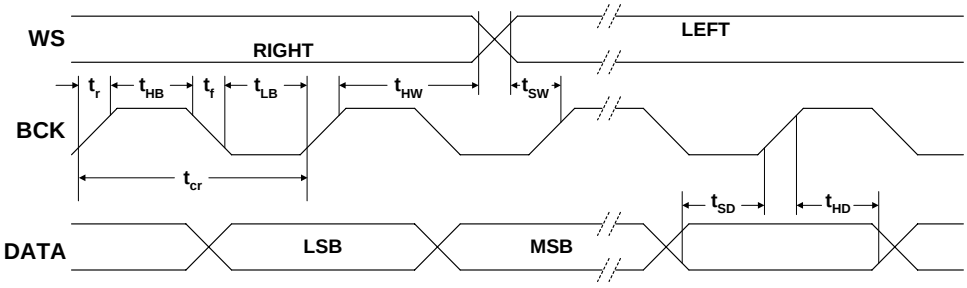


Fig.2 Timing and input signals.

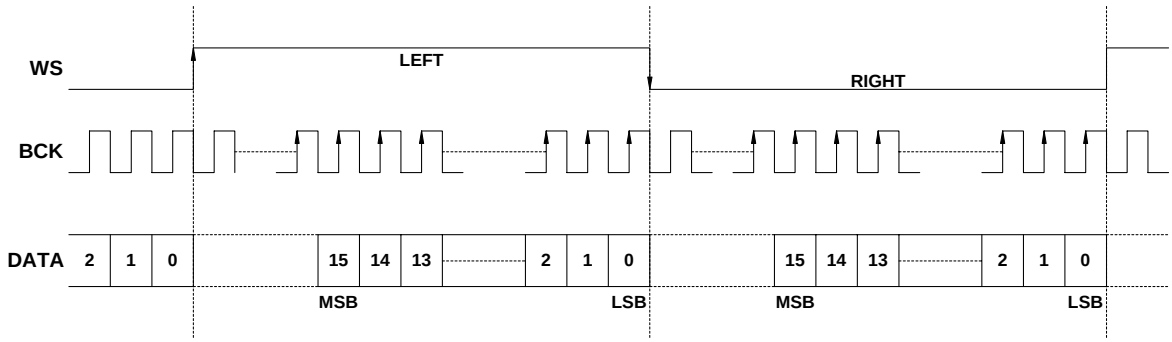


Fig.3 Format of input signals.

Data format (BCK, WS, DATA)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{IL}	Input LOW level		-	-	0.3V_{DD}	V
V_{IH}	Input HIGH level		0.7V_{DD}	-	-	V
$\lvert I_{IL} \rvert$	Input Leakage Current LOW		-	-	10	μA
$\lvert I_{IH} \rvert$	Input Leakage Current HIGH		-	-	10	μA
f_{BCK}	Input Clock Frequency		-	-	18.4	MHz
BR	Bit Rate Data Input		-	-	18.4	Mbits/s
f_{WS}	Word Select Input		-	-	384	kHz
t_r	Rise Time		-	-	12	ns
t_f	Fall Time		-	-	12	ns
t_{Cr}	Bit Clock Cycle Time		54	-	-	ns
t_{HB}	Bit Clock High Time		15	-	-	ns
t_{LB}	Bit Clock Low Time		15	-	-	ns
t_{SD}	Data Set-up Time		12	-	-	ns
t_{HD}	Data Hold Time to Bit Clock		2	-	-	ns
t_{HW}	Word Select Hold Time		2	-	-	ns
t_{SW}	Word Select Set-up Time		12	-	-	ns

APPLICATION INFORMATION

Basic application example

A typical example of a CD-application with the MS6310 is shown in Fig.4. It features typical decoupling components and a second-order analog post-filter (smoothing filter) stage providing a line output.

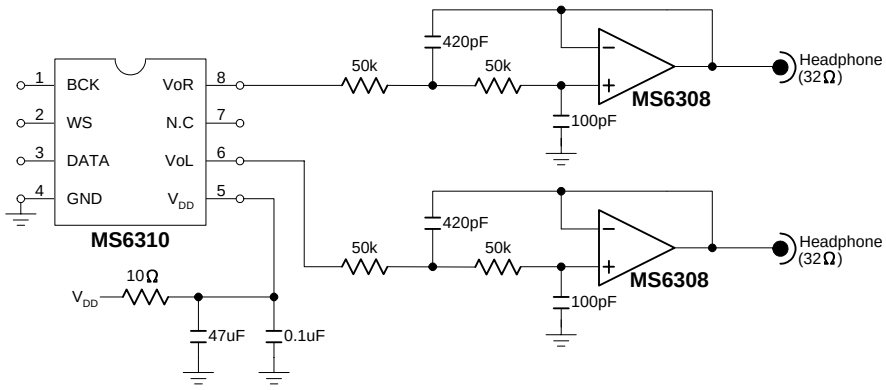


Fig.4 Example of a 2nd order filter application.

VCD player

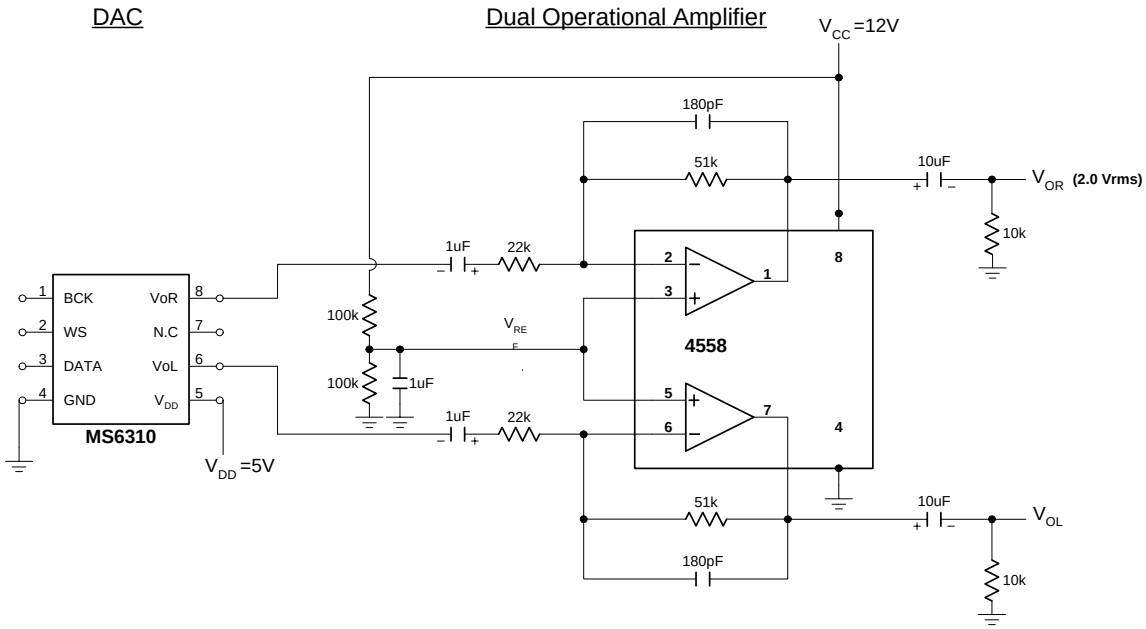
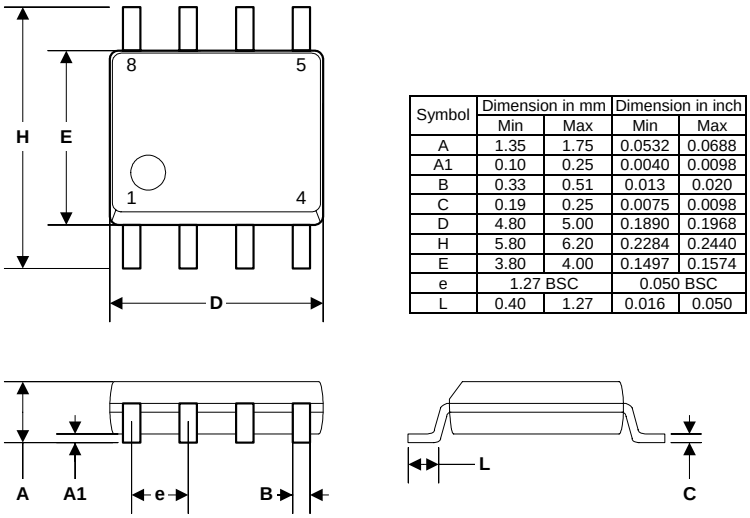


Fig.5 A 1st order filter for VCD player.

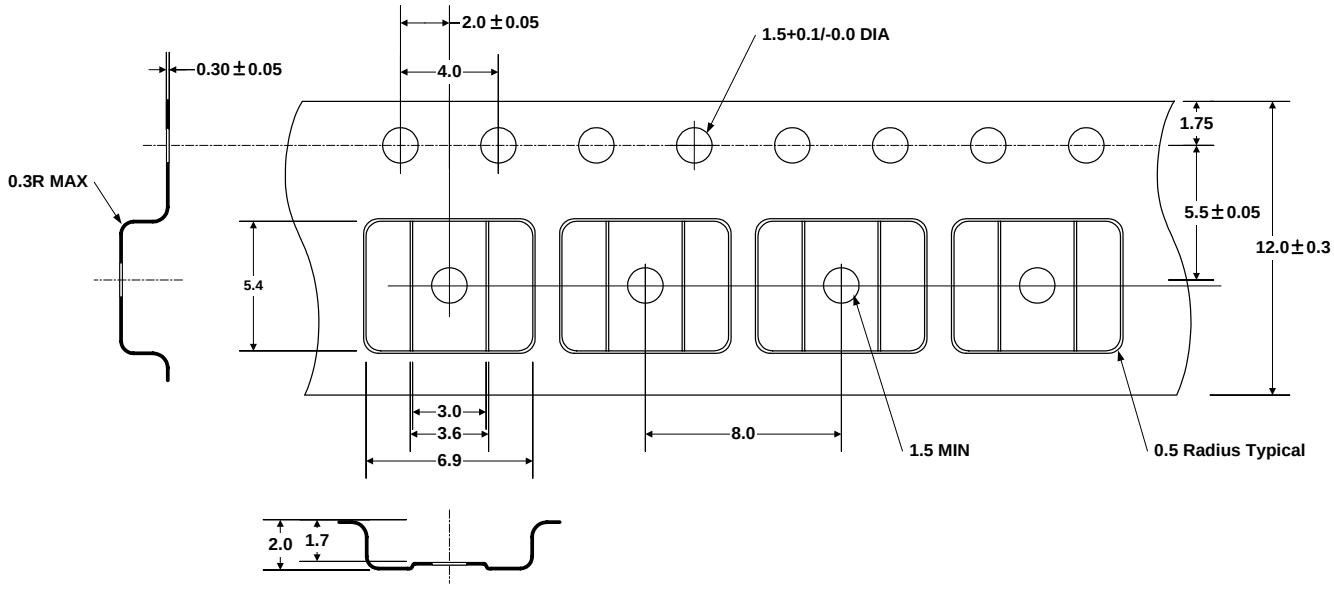
EXTERNAL DIMENSIONS



Symbol	Dimension in mm		Dimension in inch	
	Min	Max	Min	Max
A	1.35	1.75	0.0532	0.0688
A1	0.10	0.25	0.0040	0.0098
B	0.33	0.51	0.013	0.020
C	0.19	0.25	0.0075	0.0098
D	4.80	5.00	0.1890	0.1968
H	5.80	6.20	0.2284	0.2440
E	3.80	4.00	0.1497	0.1574
e	1.27 BSC		0.050 BSC	
L	0.40	1.27	0.016	0.050

SOP8

TAPE AND REEL (Unit : mm)



SOP8