16-Bits Stereo Audio DAC, Current output, Low Power Consumption, Low Voltage,

FEATURES

- Operation range: 2.7V~6.5V.
- Low power consumption
- Low distortion.
- No zero crossing distortion.
- Wide dynamic range(16-bit resolution).
- Current output
- Space saving package SOP8.
- Fast setting time permits 2*, 4*, and 8* oversampling(serial input) or double speed operation at 4* oversampling .
- Output and bias current are proportional to supply voltage
- Internal timing and control circuits
- Internal bias current ensures maximum dynamic range

APPLICATIONS

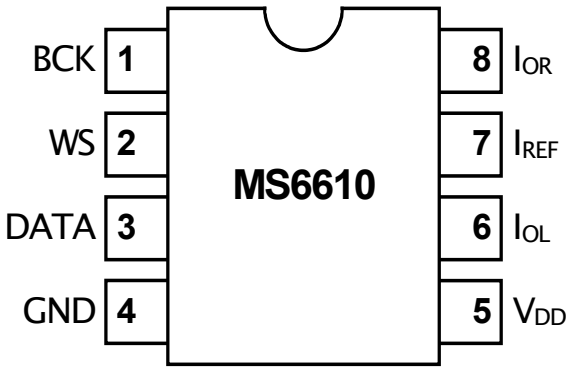
- DVD, Multimedia system.

DESCRIPTION

The MS6610 is a 16-bit current-output Digital-to-Analog Converter(DAC). The MS6610 is fabricated in a 0.8μm CMOS process and features extremely low power dissipation, small package size and ease of application. The accuracy of the matched coarse current sources, combined with the unique symmetrical decoding method, preclude zero-crossing distortion and ensures high quality audio reproduction. These unique features, combined with its exceptional performance, make the MS6610 ideally suited for use in digital audio equipment. MS6610 is pin and function compatible with the Philips, TDA1545.

PINNING

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
I_{OL}	6	left channel output
V_{REF}	7	reference voltage output
I_{OR}	8	right channel output



BLOCK DIAGRAM

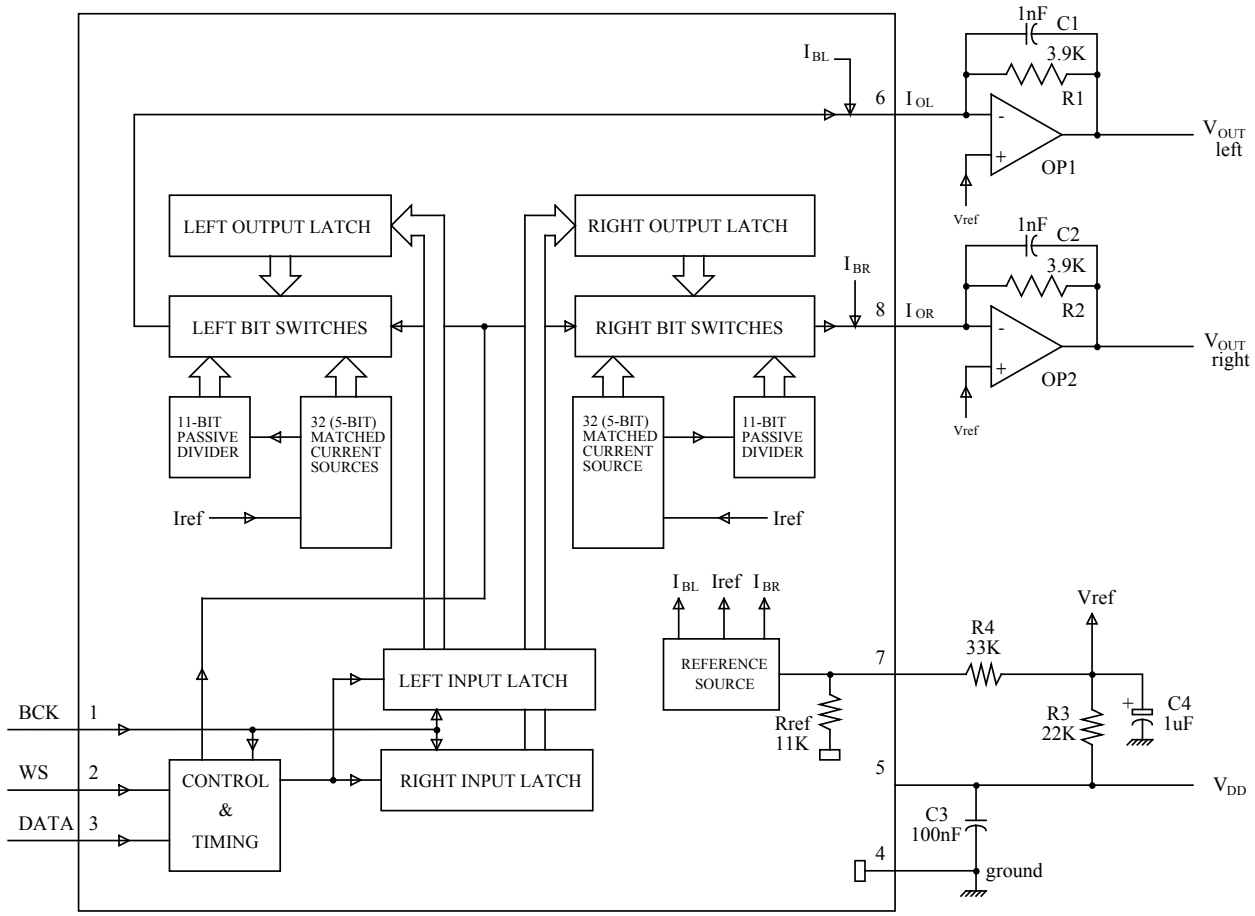


Fig.1 Block diagram.

ORDERING INFORMATION

Package	Part number	Packaging Marking	Transport Media
8-Pin SOP (lead free)	MS6610BSGTR	MS6610BSG	2.5k Units Tape and Reel
8-Pin SOP (lead free)	MS6610BSGU	MS6610BSG	100 Units Tube

RoHS Compliance

LIMITING VALUES

Symbol	Parameter	Min	Max	Unit
VDD	Positive Supply Voltage	-	6.5	V
Tsig	Storage Temperature Range	-55	+150	℃
TXTAL	Maximum Crystal Temperature	-	+150	℃
TAMB	Operating Ambient Temperature Range	-40	+85	℃
Ves	Electrostatic Handling	-2000	2000	V

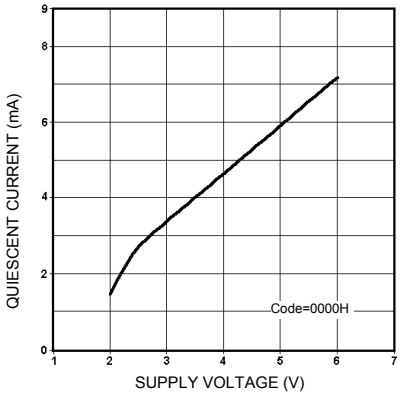
5V ELECTRICAL CHARACTERISTICS

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

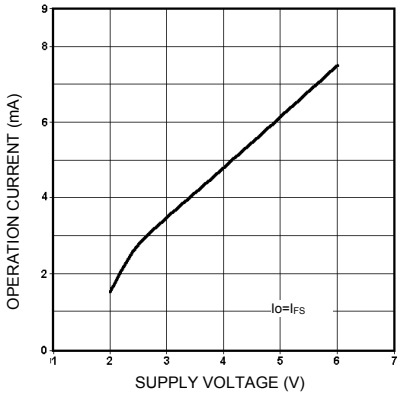
SYM	PARAMETER	CONDITIONS	MIN	TYP	MAX	UNIT
DC Characteristics						
V_{DD}	Positive Supply Voltage		2.7	5	6.5	V
I_Q	Quiescent current	at code 0000H	-	5.8		mA
I_{DD}	Operating Current	$I_O=I_{FS}$	-	6.1		mA
Rref	Reference Resistor (Fig.1)		7.4	11.0	14.6	KΩ
PSSR	Power Ripple Rejection Ratio	Cap=1uF, f=100Hz Vripple=-20dBV	-	36		dB
CS	Channel Separation	f=1kHz		86		dB
AC Characteristics						
Res	Resolution				16	bits
I_{FS}	Full Scale Output Current	$I_{FS} = 0.2V_{DD}$	0.9	1.0	1.1	mA
Ptot	Total Power Dissipation	at code 0000H		29		mW
Ibias	Bias Current (adjustable)		643	714	785	μA
THD+N	Total harmonic distortion plus noise	f=1kHz		-67	-62	dB
				0.0447	0.0794	%
S/N	Signal-to-Noise Ratio	A-weighted		90		dB

TYPICAL PERFORMANCE CHARACTERISTICS

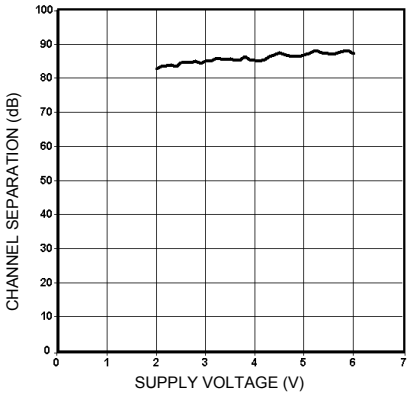
(Ta=25℃, f=1kHz, sampling rate=4fs; unless otherwise specified)



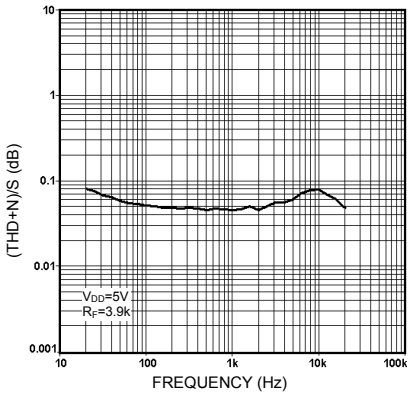
Quiescent current vs. supply voltage



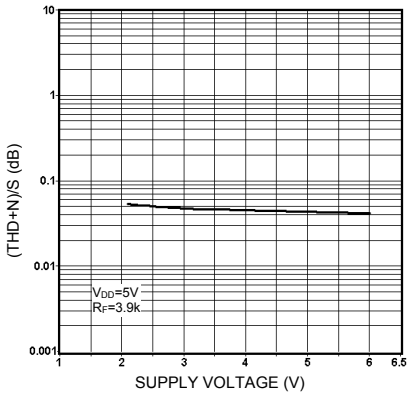
Operation current vs. supply voltage



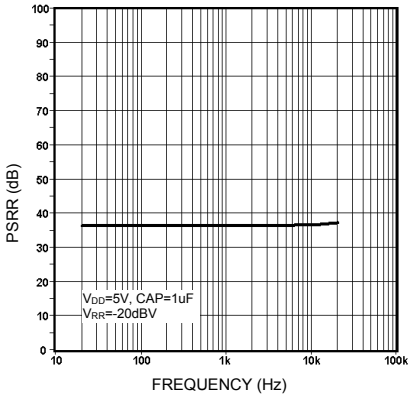
Channel separation vs. supply voltage



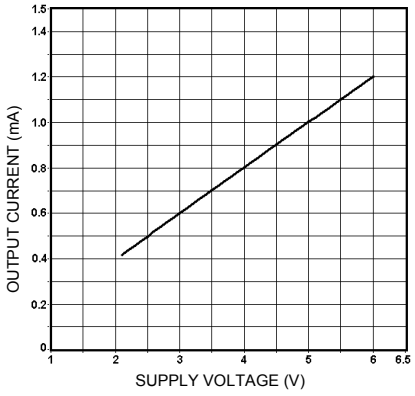
(THD+N)/S vs. frequency



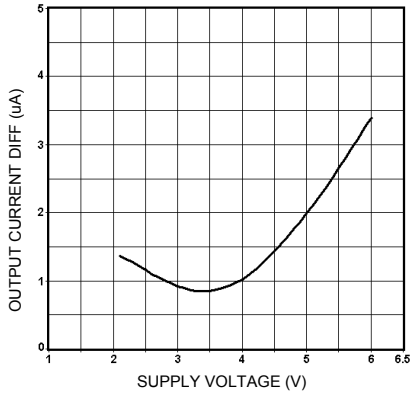
(THD+N)/S vs. supply voltage



PSRR vs. frequency



Output current vs. supply voltage



Output current diff vs. supply voltage

TIMING AND DATA FORMAT

The MS6610 accepts input serial data formats of 16-bit word length. Left and right data words are time multiplexed. The MSB(bit 1) must always be First. The format of data input is shown in Figs. 2 and 3. With a LOW level on the word select input(WS) input data is placed in the right input register and with HIGH level on the WS input data is placed in the left register. The data in the input registers are simultaneously latched in the output registers which control the bit switches. Internal bias currents IBL and IBR are each added to the full scale output current IFS in order to achieve the maximum dynamic range at the outputs of OP1 and OP2(Fig. 1). The reference output voltage Vref(Fig. 1) is 2/3 VDD. In this way the maximum dynamic range is achieved over the entire power supply range.

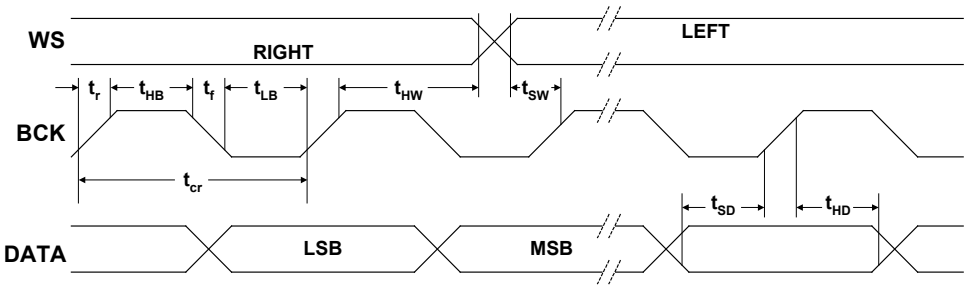


Fig.2 Timing and input signals.

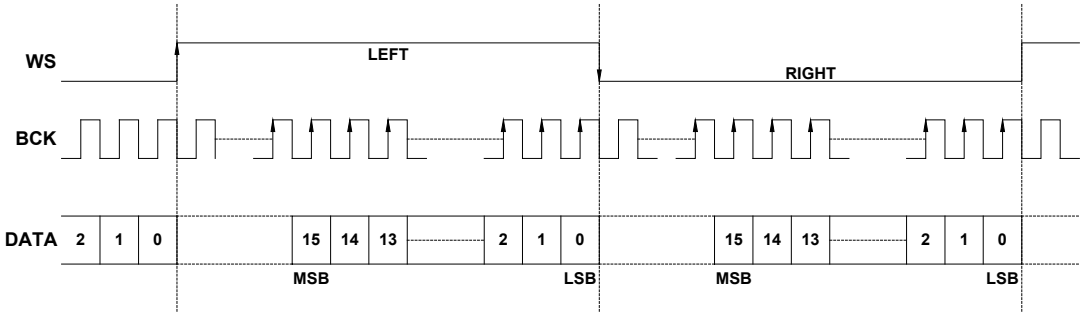


Fig.3 Right justified format

DIGITAL INPUTS (WS, BCK, DATA)

SYM	PARAMETER	CONDITIONS	MIN	TYP	MAX	UNIT
V_{IL}	Input LOW TTL level	MS6323T	-	-	0.8	V
V_{IH}	Input HIGH TTL level	MS6323T	2	-	-	V
f_{BCK}	Input Clock Frequency				18.4	MHz
BR	Bit Rate Data Input (Pin 3)				18.4	Mbits/s
F_{WS}	Word Select Input (Pin 2)				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

APPLICATION INFORMATION

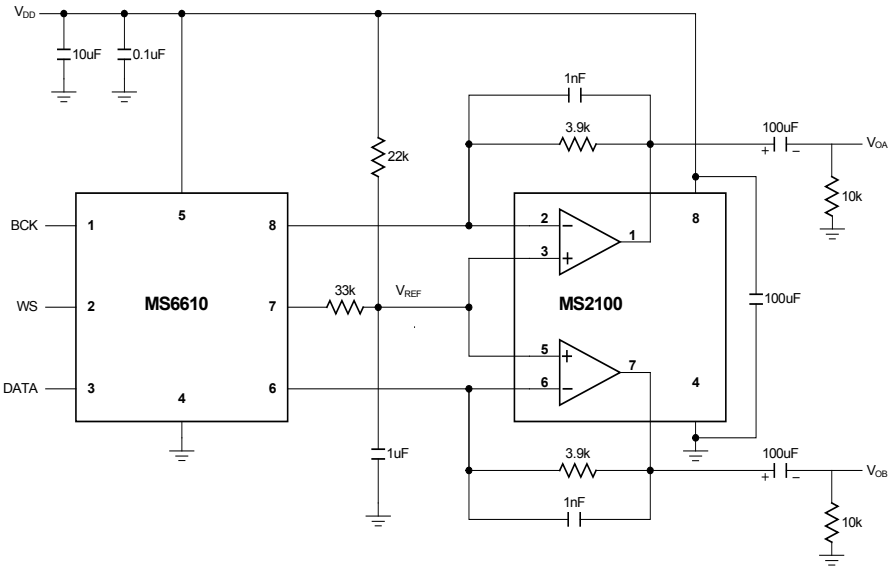
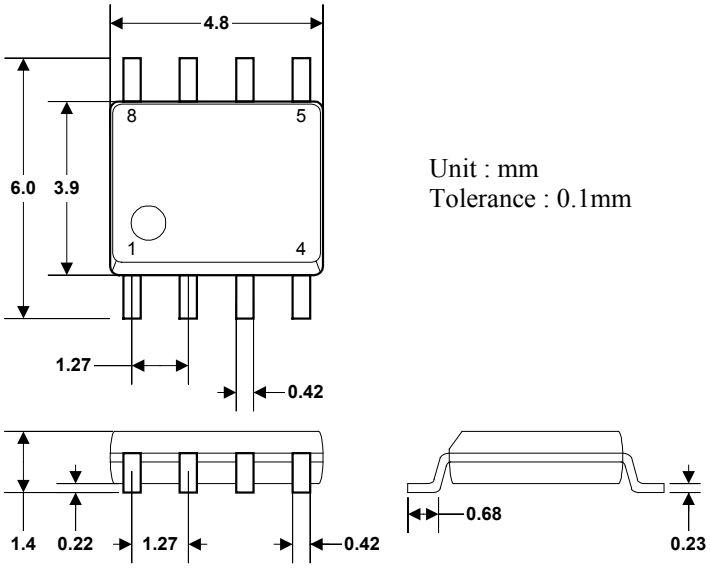


Fig.3 Example of application with MS6610 (audio DAC)

EXTERNAL DIMENSIONS



Unit : mm
Tolerance : 0.1mm

TAPE AND REEL (Unit : mm)