

FEATURES

- Current output
- Space saving package(SOP8)
- Low power consumption
- Low total harmonic distortion
- Wide dynamic range(16-bit resolution)
- Fast setting time permits 2*, 4*, and 8* oversampling(serial input) or double speed operation at 4* oversampling
- Internal bias current ensures maximum dynamic range
- Wide operating temperature range of -40°C to 85°C
- Internal timing and control circuits
- Compatible with most of the Japanese input formats; time multiplexed, two's complement, TTL
- No zero crossing distortion
- Easy application :
single 3 to 5.5 rail power supply
output and bias current are proportional to supply voltage

APPLICATIONS

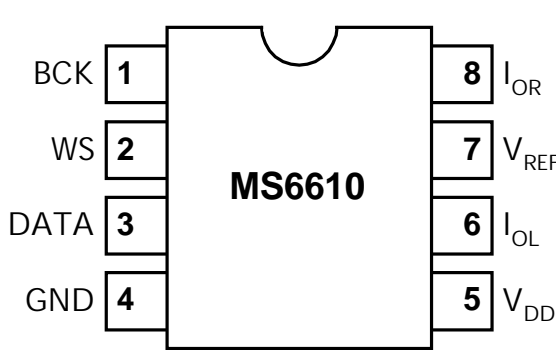
VCD Player, DVD Player.

DESCRIPTION

The MS6610 is a 16-bit current-output Digital-to-Analog Converter(DAC). The MS6610 is fabricated in a 0.8 μ m 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 |



Pin configuration

ELECTRICAL CHARACTERISTICS

(Ta=25°C, V_{DD}=5V)

| SYM | PARAMETER | CONDITIONS | MIN | TYP | MAX | UNIT |
|-----------------|------------------------------|---------------|-----|-----|-----|------|
| VDD | Positive Supply Voltage | | 3 | 5 | 5.5 | V |
| I _{DD} | Operating Current | at code 0000H | - | 3 | 5 | mA |
| PSSR | Power Ripple Rejection Ratio | | - | 30 | | dB |

DIGITAL INPUTS (WS, BCK, DATA)

| SYM | PARAMETER | CONDITIONS | MIN | TYP | MAX | UNIT |
|------------------|-----------------------------|------------|-----|-----|------|---------|
| f _{BCK} | Input Clock Frequency | | | | 18.4 | MHz |
| BR | Bit Rate Data Input (Pin 3) | | | | 18.4 | Mbits/s |
| FWS | 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 |
| t _{SW} | Word Select Set-up Time | | 12 | | | ns |

ANALOG INPUT (I_{ref})

| SYM | PARAMETER | CONDITIONS | MIN | TYP | MAX | UNIT |
|------------------|----------------------------|------------|-----|------|------|------|
| R _{ref} | Reference Resistor (Fig.1) | | 7.4 | 11.0 | 14.6 | K |

ANALOG OUTPUT (I_{OL}, I_{OR})

| SYM | PARAMETER | CONDITIONS | MIN | TYP | MAX | UNIT |
|-------------------|--|---------------------------|-----|-------|--------------------|-------------------|
| Res | Resolution | | | | 16 | bits |
| V _{DCC} | DC output Voltage Compliance | | 2.0 | | V _{DD} -1 | V |
| I _{FS} | Full Scale Output Current | | 0.9 | 1.0 | 1.1 | mA |
| T _{CFS} | Full Scale Temperature Coefficient at Analog Outputs ; I _{OL} , I _{OR} | | | ±400 | | 10 ⁻¹⁶ |
| P _{tot} | Total Power Dissipation | at code 0000H | | 15 | | mW |
| I _{bias} | Bias Current (adjustable) | | 643 | 714 | 785 | μA |
| THD | Total Harmonic Distortion | including noise at 0 dB | | -85 | -78 | dB |
| | | | | 0.005 | 0.01 | % |
| THD | Total Harmonic Distortion | including noise at -60 dB | | -30 | -24 | dB |
| | | | | 3 | 6 | % |
| S/N | Signal-to-Noise Ratio | a-weighted at code 0000H | | 92 | | dB |
| CS | Channel Separation | | | 95 | | dB |

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 $2/3 V_{DD}$. In this way the maximum dynamic range is achieved over the entire power supply range.

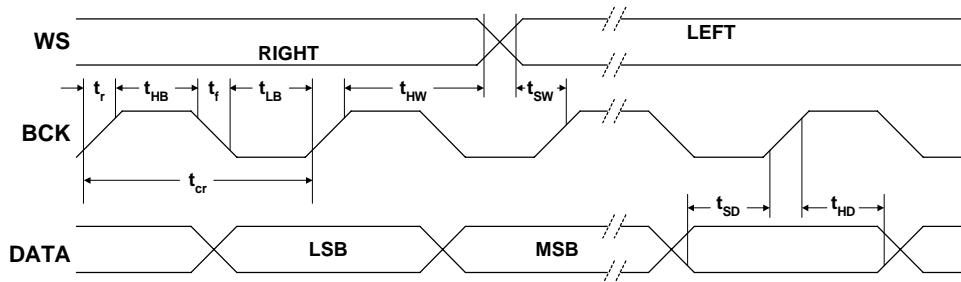
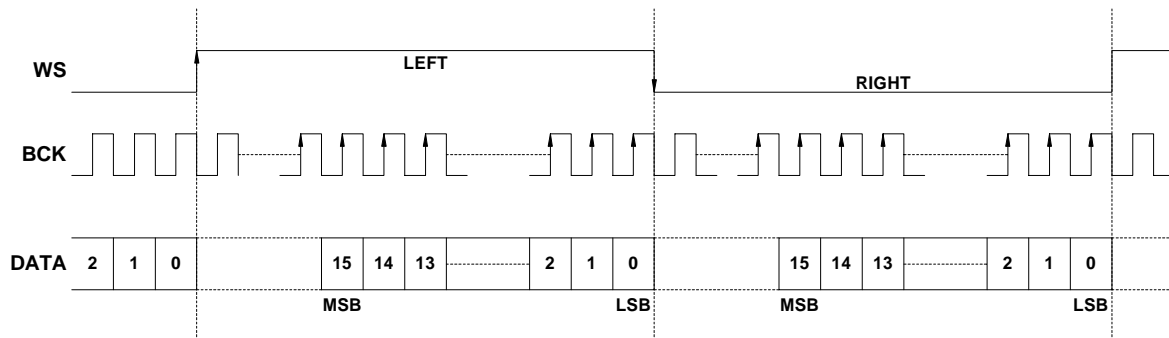
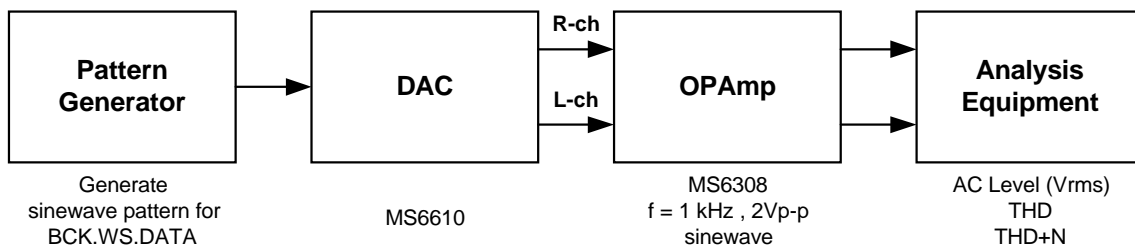


Fig.2 Timing and input signals.



MEASUREMENT BLOCK DIAGRAM



NOTE : THD and THD+N is measured by HP AUDIO ANALYZER and FFT Analysis.

APPLICATION INFORMATION

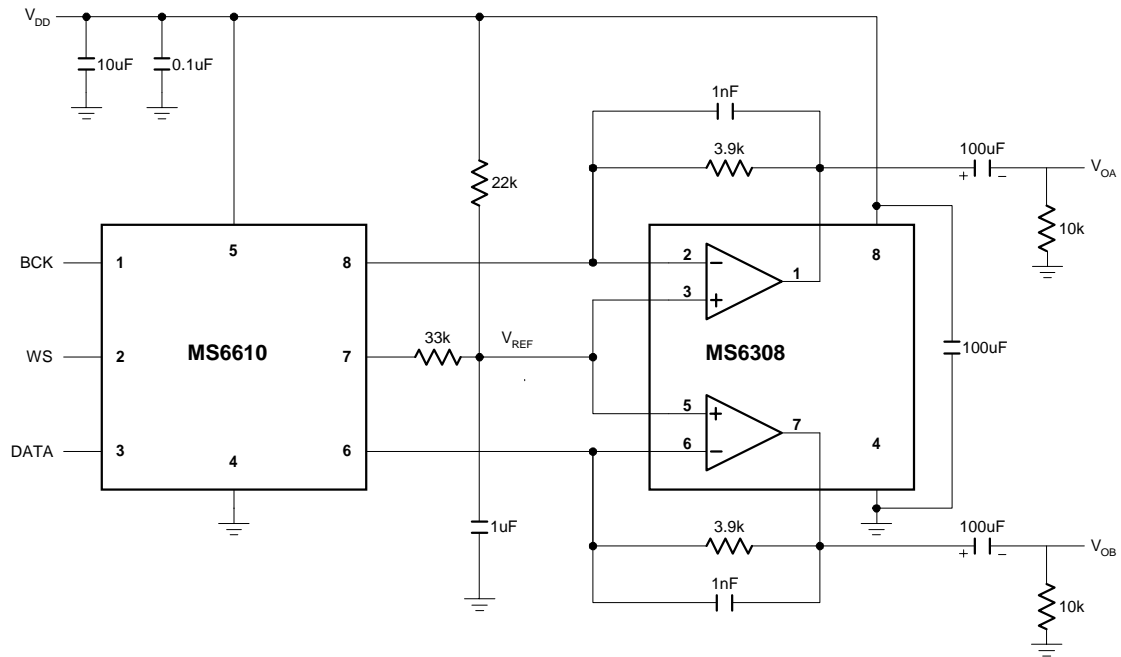


Fig.3 Example of application with MS6610 (audio DAC)

EXTERNAL DIMENSIONS

