

**8-pin, 24-Bit Stereo D/A Converter for PCM Audio****GENERAL DESCRIPTION**

The ES7134S is a low cost 8-pin stereo digital to analog converter. The ES7134S can accept I²S serial audio data format up to 24-bit word length. The device uses advanced multi-bit Δ - Σ modulation technique to convert data into two channel analog outputs. The multi-bit Δ - Σ modulator makes the device with very low sensitivity to clock jitter and very low out of band noise.

FEATURES

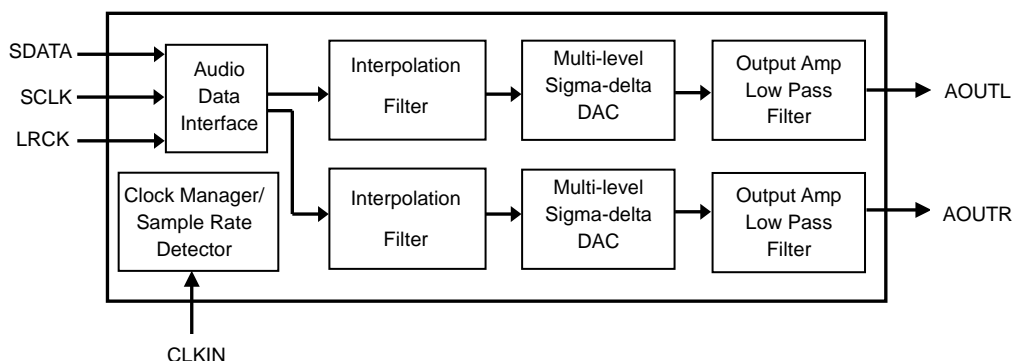
- 95 dB dynamic range
- -85 dB THD+N
- Up to 100 kHz sampling frequency
- Support USB clocks or non standard audio clocks like 25 MHz or 26 MHz
- I²S audio data format, 16-24 bits
- Single power supply 3V to 3.6V

APPLICATIONS

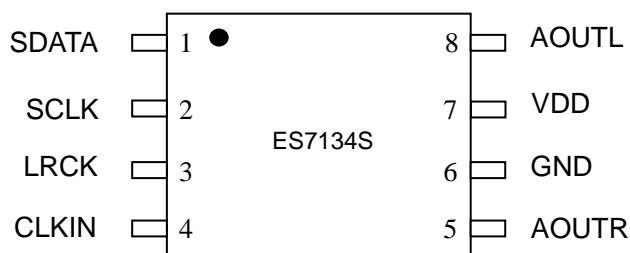
- Digital Photo Frame
- Set top box
- Digital TV
- DVD player
- Audio player

ORDERING INFORMATION

ES7134S -40°C ~ +85°C SOIC-8 (SOP8L)

BLOCK DIAGRAM

1. PIN DESCRIPTIONS



| PIN | PIN | I/O | DESCRIPTION |
|-----|-------|-----|---|
| 1 | SDATA | I | Serial audio data input |
| 2 | SCLK | I | Bit clock input |
| 3 | LRCK | I | Left and right channel clock input indicating input data sampling rate (Fs) and channel selection |
| 4 | CLKIN | I | System clock input |
| 5 | AOUTR | O | Analog output of right channel |
| 6 | GND | I | Ground |
| 7 | VDD | I | Device power supply |
| 8 | AOUTL | O | Analog output of left channel |

2. RECOMMENDED APPLICATION CIRCUIT

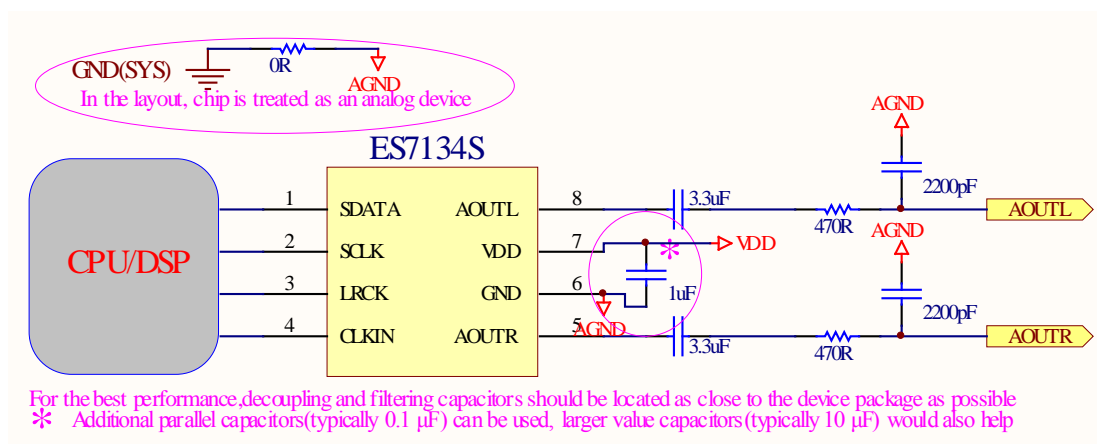


Figure 1 Recommended Application Circuit

3. APPLICATION DESCRIPTIONS

Sampling Rate and Input Clocks

According to the sampling rate, the device can work in two speed modes, single speed and double speed. Table 1 lists the typical clock modes supported by the device. The device supports USB clocks or non standard audio clocks like 25 MHz or 26 MHz.

Table 1 Speed Mode and CLKIN/LRCK Ratio

| MODE | Sampling Rate | CLKIN/LRCK Ratio |
|--------------|----------------|--|
| Single Speed | 8kHz – 50kHz | 32, 64, 128, 192, 256, 384, 512, 768, 1024 |
| Double Speed | 84kHz – 100kHz | 128, 192, 256, 384, 512, 768, 1024 |

Audio Data Input

The ES7134S can accept I²S serial audio input data from 16-bit to 24-bit. The device can detect the data word length automatically. The relationship of SDATA, SCLK and LRCK for the format is illustrated through Figures 2.

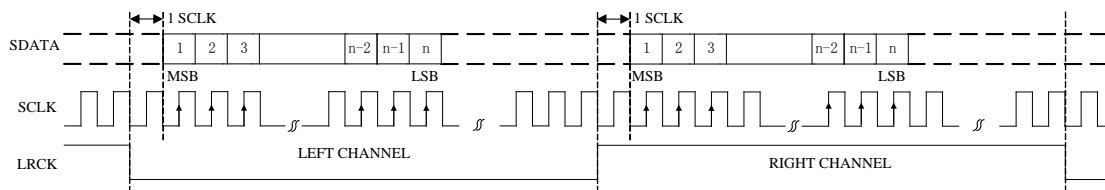


Figure 2 I²S serial audio data format up to 24-bit

Power Up and Power Down

Upon applying VDD, the device will reset itself and enter power down state. During this state, the device clamps outputs to ground and power down the device operation except for clock management unit. Once proper CLKIN and LRCK clocks are applied, the device will leave power down state, and the device outputs ramp from ground to common mode voltage softly. Then the device enters the normal operation.

4. ELECTRICAL CHARACTERISTICS

Absolute Maximum Ratings

At or beyond this condition, operating continuously may cause permanent damage to the device. The performance and functions of the device are not guaranteed at these extremes.

| PARAMETER | MIN | MAX |
|-----------------------------|----------|----------|
| Supply Voltage Level | -0.3V | +5.0V |
| Input Voltage Range | GND-0.3V | VDD+0.3V |
| Operating Temperature Range | -40°C | +85°C |
| Storage Temperature | -65°C | +150°C |

Recommended Operating Conditions

| PARAMETER | MIN | TYP | MAX | UNIT |
|----------------------|-----|-----|-----|------|
| Supply Voltage Level | 3 | 3.3 | 3.6 | V |

Analog Characteristics

Test conditions: VDD=3.3V, GND=0V, ambient temperature=25°C, Fs=48KHz, CLKIN/LRCK=256, input 0dB 1KHz sinewave

| PARAMETER | MIN | TYP | MAX | UNIT |
|--|-------|--------|-------|------|
| DAC Performance | | | | |
| Dynamic Range (Note 1) | 90 | 95 | | dB |
| THD+N | | -85 | -80 | dB |
| Channel Separation (1KHz) | | 100 | | dB |
| Signal to Noise Ratio | | 95 | | dB |
| Interchannel Gain Mismatch | | 0 | | dB |
| Frequency Response (20Hz-20KHz) | -0.02 | | +0.08 | dB |
| Filter Frequency Response characteristics | | | | |
| Single Speed | | | | |
| Passband | 0 | | 0.454 | Fs |
| Stopband | 0.547 | | | Fs |
| Passband Ripple | | ±0.05 | | dB |
| Stopband Attenuation | -53 | | | dB |
| Double Speed | | | | |
| Passband | 0 | | 0.417 | Fs |
| Stopband | 0.583 | | | Fs |
| Passband Ripple | | ±0.005 | | dB |

| | | | | |
|--------------------------------------|-------|-------------|--------|------------|
| Stopband Attenuation | -56 | | | dB |
| Quad Speed | | | | |
| Passband | 0 | | 0.2083 | Fs |
| Stopband | 0.792 | | | Fs |
| Passband Ripple | | ± 0.006 | | dB |
| Stopband Attenuation | -50 | | | dB |
| Analog Output Characteristics | | | | |
| Full Scale Output Level | 2 | 2.3 | 2.5 | Vpp |
| Output Impedance | | 120 | | Ω |
| Minimum Load Resistance | | 2 | | K Ω |
| Maximum Capacitance | | 100 | | pF |

Note 1. A-weighted filter is used in measurement.

Serial Audio Port Switching Characteristics

| PARAMETER | SYMBOL | MIN | MAX | UNIT |
|---------------------------------------|------------|-----|------|------|
| CLKIN Frequency | | | 51.2 | MHz |
| CLKIN Duty Cycle | | 40 | 60 | % |
| LRCK Frequency | | | 200 | KHz |
| LRCK Duty Cycle | | 40 | 60 | % |
| SCLK Frequency | | | 26 | MHz |
| SCLK Pulse Width Low | T_{SCKL} | 15 | | ns |
| SCLK Pulse Width High | T_{SCKH} | 15 | | ns |
| SCLK Rising to LRCK Edge Delay | T_{LRH} | 10 | | ns |
| SCLK Rising to LRCK Edge Setup Time | T_{RSU} | 10 | | ns |
| SDATA Valid to SCLK Rising Setup Time | T_{SDS} | 10 | | ns |
| SCLK Rising to SDATA Hold Time | T_{SDH} | 10 | | ns |

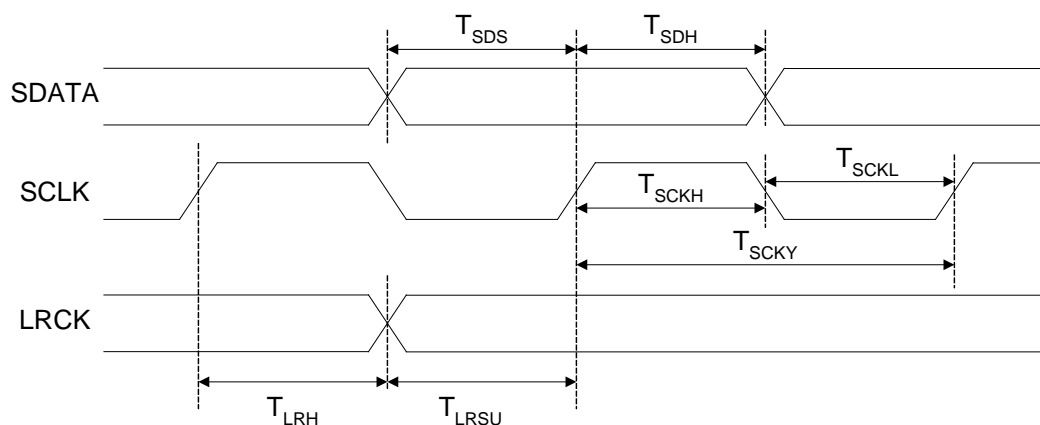


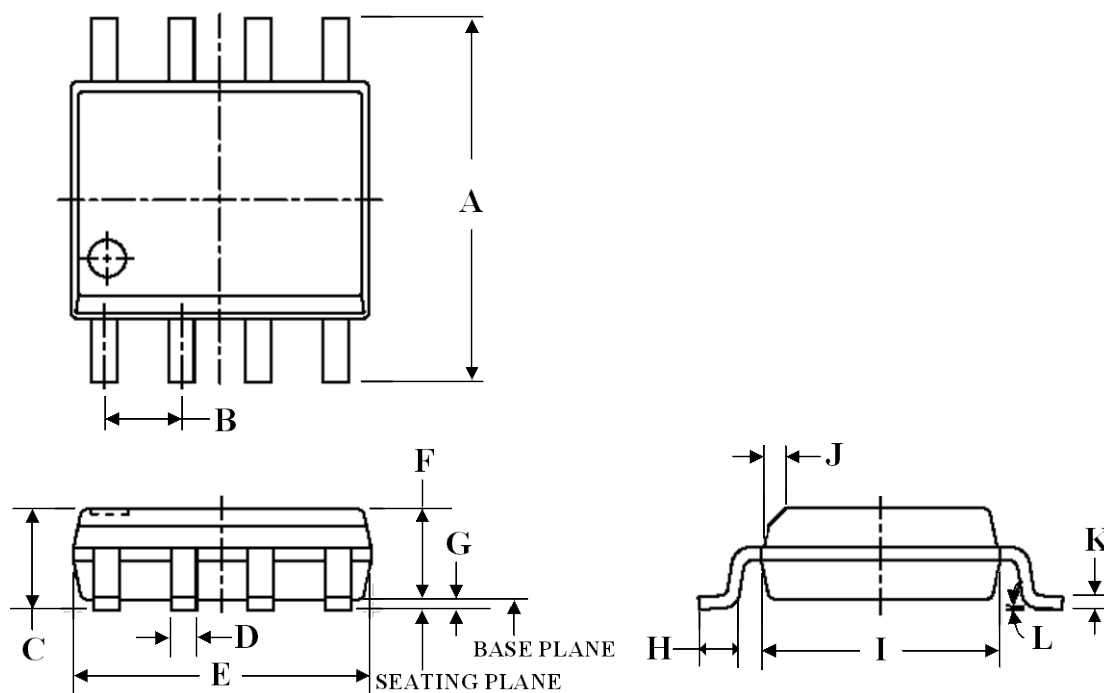
Figure 3 Serial Audio Port Timing

DC Characteristics

| PARAMETER | MIN | TYP | MAX | UNIT |
|------------------------------|------|-----|-----|------|
| Normal Operation Mode | | | | |
| VDD Current VDD=3.3V | | 20 | | mA |
| Power Down Mode | | | | |
| VDD Current VDD=3.3V | | 5 | | mA |
| Digital Voltage Level | | | | |
| Input High-level Voltage | 1.65 | | | V |
| Input Low-level Voltage | | | 0.8 | V |
| Output High-level Voltage | | VDD | | V |
| Output Low-level Voltage | | 0 | | V |

5. PACKAGE INFORMATION

8-pin SOIC/SOP8L (150mil) Outline Dimensions



| Symbols | Dimensions (inch) | | | Dimensions (mm) | | |
|---------|-------------------|-------|-------------|-----------------|-------|------------|
| | Min | TYP | Max | Min | TYP | Max |
| A | 0.2300 | --- | 0.2440 | 5.842 | --- | 6.198 |
| B | --- | 0.050 | --- | --- | 1.270 | --- |
| C | 0.0600 | --- | 0.0680 | 1.524 | --- | 1.727 |
| D | 0.0138 | --- | 0.0200 | 0.351 | --- | 0.508 |
| E | 0.1890 | --- | 0.1950 | 4.801 | --- | 4.953 |
| F | 0.055 | --- | 0.061 | 1.397 | --- | 1.549 |
| G | 0.0040 | --- | 0.0098 | 0.102 | --- | 0.249 |
| H | 0.0160 | --- | 0.0350 | 0.406 | --- | 0.889 |
| I | 0.1520 | --- | 0.1574 | 3.861 | --- | 3.998 |
| J | 0.0100x45° | --- | 0.0160 x45° | 0.254 x45° | --- | 0.406 x45° |
| K | 0.0075 | --- | 0.0098 | 0.190 | --- | 0.250 |
| L | 0° | --- | 8° | 0° | --- | 8° |

Note:

1. Reference JEDEC MS-012 (C), VAR. AA

6. Contact Information:

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