# Real time DSP

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# AD1847

**Serial-Port 16-Bit SoundPort Stereo Codec**

- stereo pair of analog-to-digital converters (ADCs)
- stereo pair of digital-to-analog converters (DACs)
- Multiple Channels of Stereo Input
  - Line1, Line2, AUX1, AUX2
- Analog and Digital Signal Mixing
- Programmable Gain and Attenuation
- On-Chip Signal Filters
- Analog Output Low-Pass Filter
- Sample Rates from 5.5 kHz to 48 kHz

# Functional Block Diagram
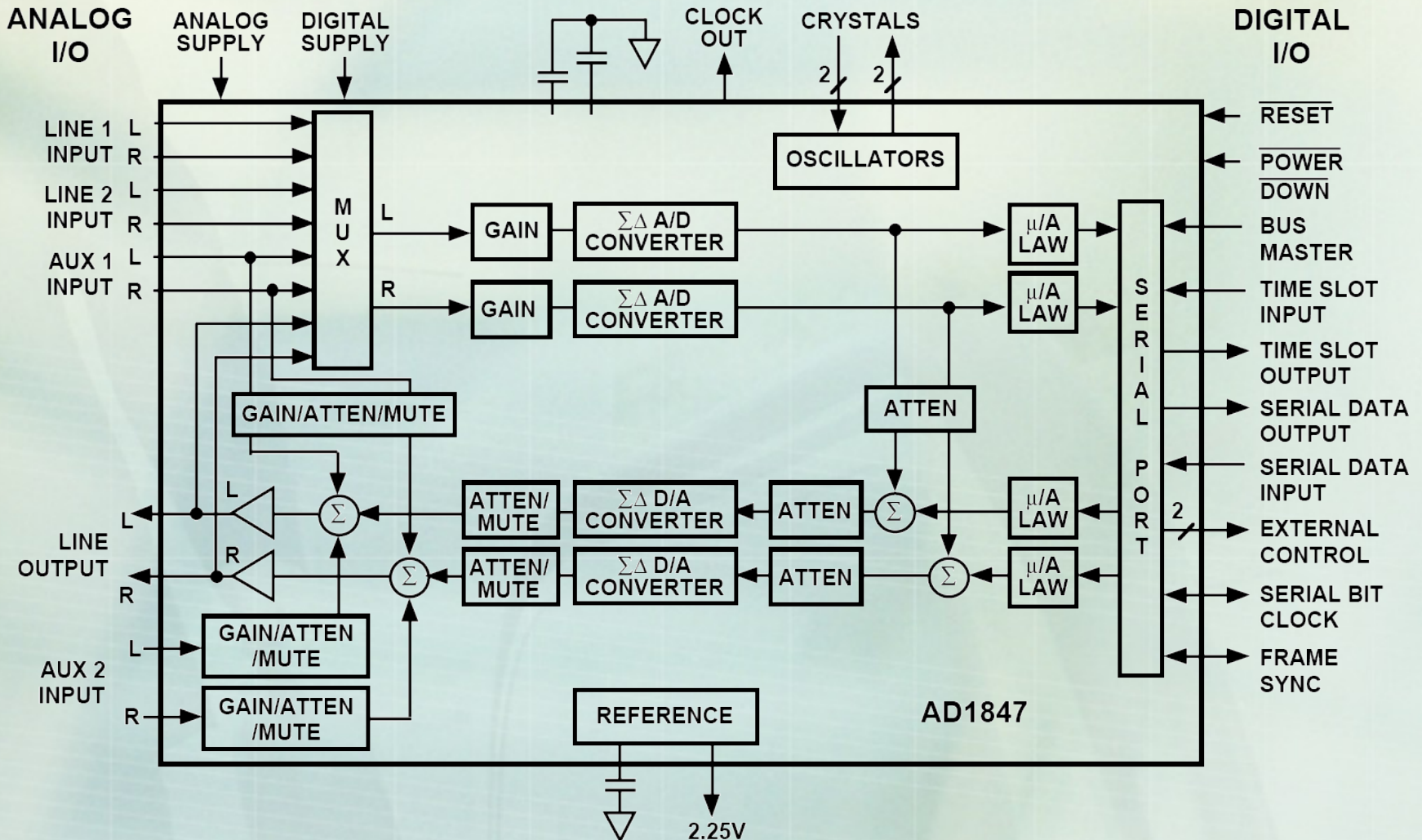
- **Analog Mixing**

AUX1 and AUX2 analog stereo signals can be mixed in the analog domain with the DAC output.

- **Digital Mixing**

Stereo digital output from the ADCs can be mixed digitally with the input to the DACs.

**Digital Data Types**

- 16-bit twos complement linear PCM

- 8-bit unsigned linear PCM

- 8-bit companded m-law

- 8-bit companded A-law

# Control Register Mapping

- six 16-bit registers

- thirteen 8-bit registers
  - accessed via indirect addressing

# Control Register

- TSSEL = 0
  - SDI and SDO pins are tied together
  - "1-wire" system

| Slot | Register Name (16-Bit) |
|------|------------------------|
| 0 | Control Word Input |
| 1 | Left Playback Data Input |
| 2 | Right Playback Data Input |
| 3 | Status Word/Index Readback Output |
| 4 | Left Capture Data Output |
| 5 | Right Capture Data Output |

- TSSEL = 1
  - SDI and SDO pins are independent
  - "2-wire" system

| Slot | Register Name (16-Bit) |
|------|------------------------|
| 0 | Control Word Input |
| 1 | Left Playback Data Input |
| 2 | Right Playback Data Input |
| 0 | Status Word/Index Readback Output |
| 1 | Left Capture Data Output |
| 2 | Right Capture Data Output |

# Serial Data Interface (I)

- Time Division Multiplex (TDM) scheme

- Two audio samples x 32 time slots

- The format of the first 16 time slots (sample N) is the same as the format of the second 16 time slots (sample N+1)

# Serial Data Interface (II)
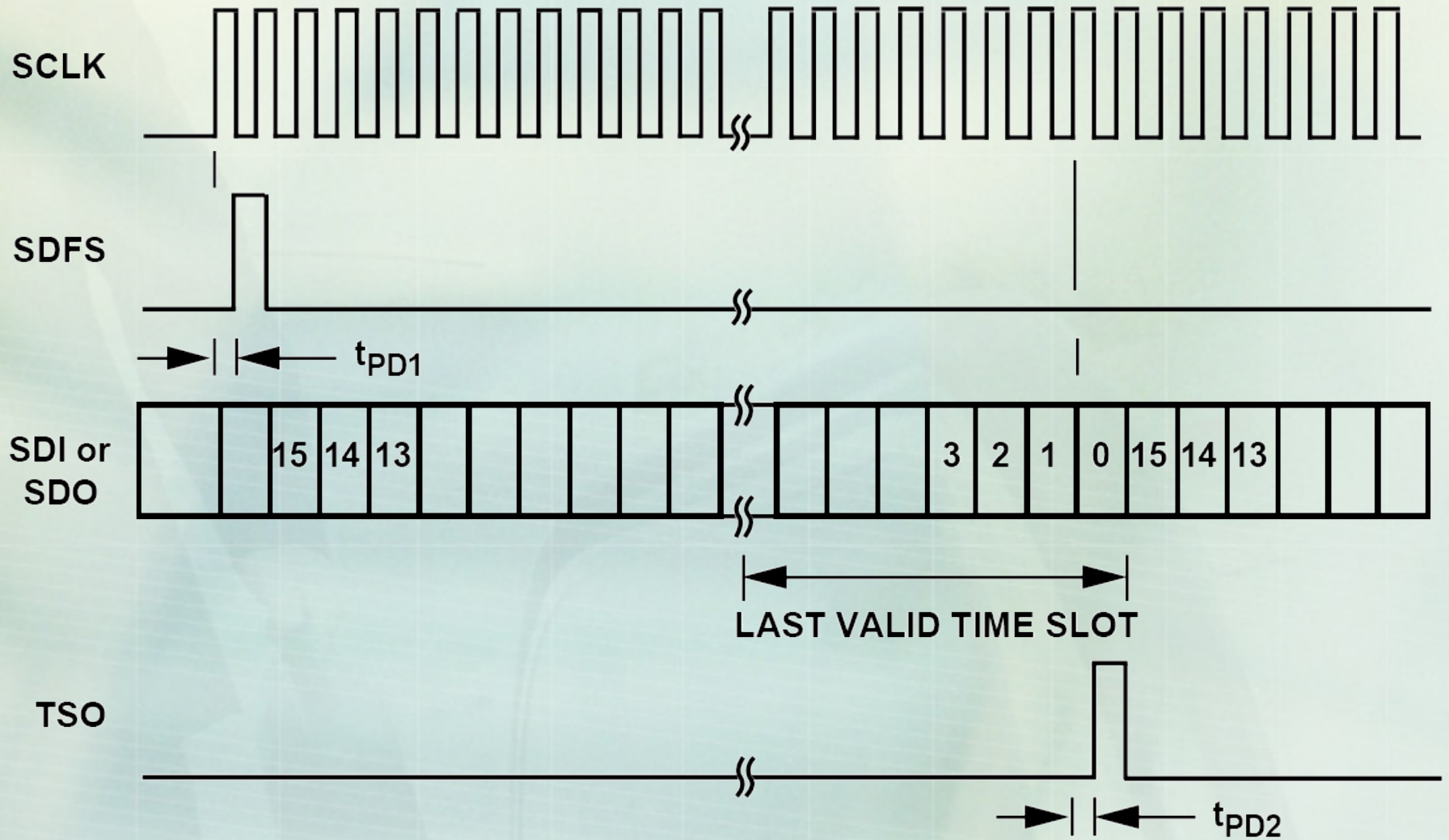
# Serial Data Interface (III)
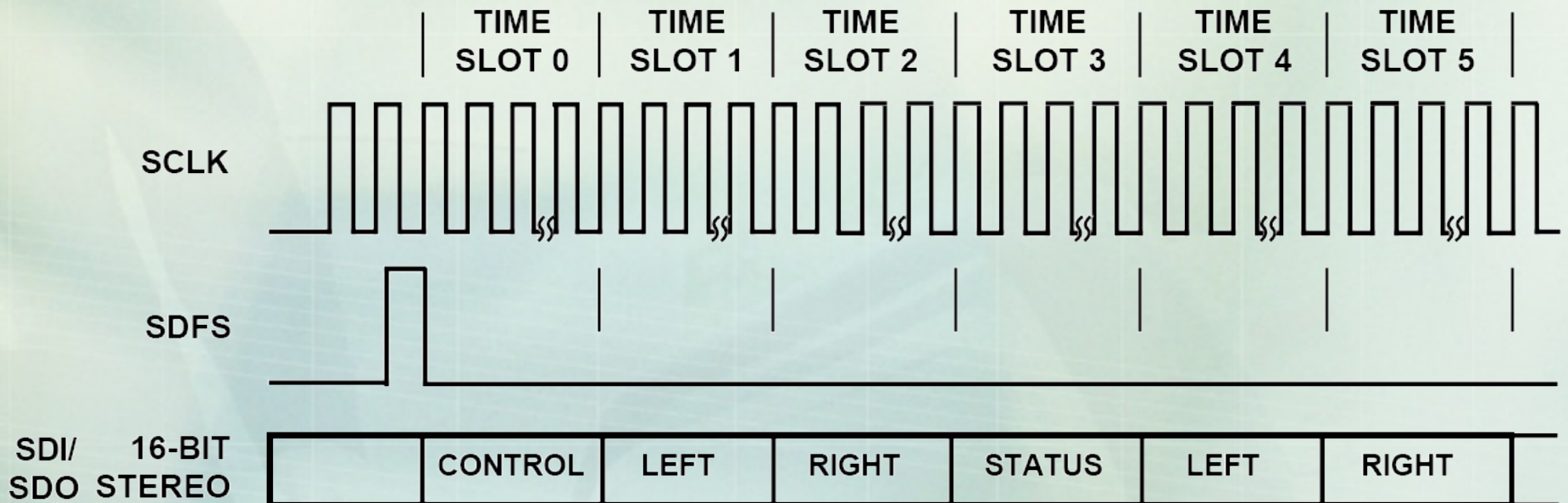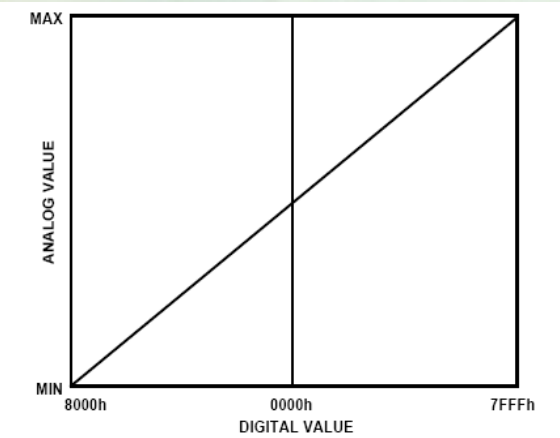
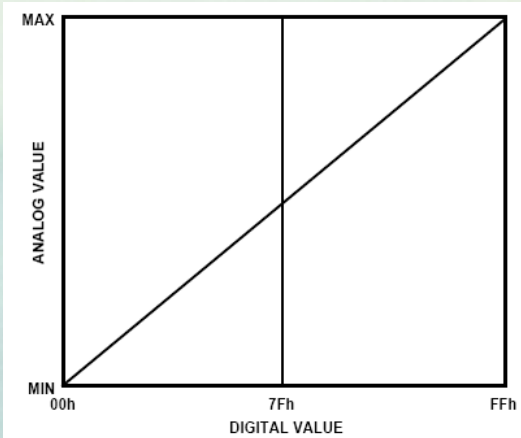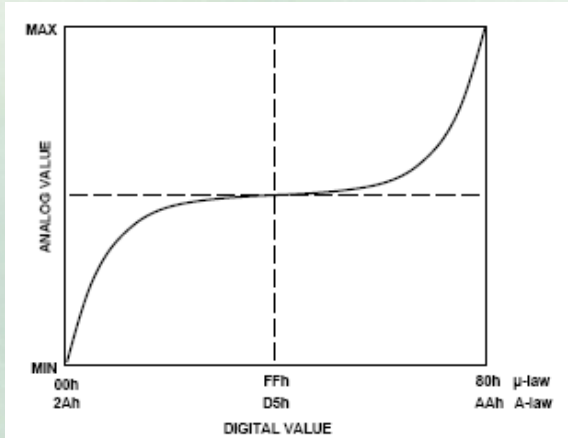# Data Formats



Figure 11. 16-Bit Signed Format



Figure 12. 8-Bit Unsigned Format



Figure 13. 8-Bit Companded Format