MAS 35x5G
MIDI Synthesizer / Compressed-Audio and Speech Decoder

The MAS 35x5G is a single-chip MIDI synthesizer with compressed audio and speech decoder features, designed for implementation within portable applications. The MAS 35x5G includes a DSP engine with embedded RAM and ROM. It provides flexible digital interfaces for serial and parallel data input and serial data output. A program download option allows the support of additional functionalities. Furthermore, the MAS 35x5G has integrated power management and power-down functions.

General Features

- ◆ High-performance RISC DSP core
- ◆ On-chip PLL. All clocks generated on-chip
- ◆ Power management functions, low power consumption
- ◆ Supply voltage 2.7 − 3.5 V
- ◆ I/O voltage range down to 1.8 V ±5%
- ◆ Additional functionality via download software
- ◆ LFBGA40 package
  (6.0 × 8.0 × 1.24 mm):
  MAS 3505G, MAS 3515G

MIDI Synthesizer

- ◆ General MIDI Level 1 (GM1) compatible
- ◆ General MIDI Lite (GML) compatible
- ◆ Scalable Polyphony MIDI (SP-MIDI) compatible
- ◆ MIDI parser
- ◆ MIDI wavetable mono/stereo synthesizer
- ◆ 128 GM melodic instruments and 47 percussion sounds
- ◆ 16 MIDI channel playback
- ◆ 16/24 voice polyphony
- ◆ 22 kHz sampling rate
- ◆ Per voice or per channel LFO for vibrato, tremolo, or filter modulation
- ◆ Per voice ADSR amplitude envelope
- ◆ Per voice ADSR modulation envelope for pitch or filter
- ◆ Pitch tuning and modulation
- ◆ Amplitude gain adjustments and modulation

Audio Decoder

- ◆ MP3 decoder
- ◆ Extension to MPEG 2 Layer 3 for low sampling rates ('MPEG 2.5')
- ◆ ADPCM decoder
- ◆ Adaptive bit rates
- ◆ Intelligent power management
- ◆ Input of compressed digital data as serial bit stream, or in parallel format
- ◆ Serial PCM audio output

Interfaces

- ◆ I²C control interface
- ◆ Serial data input modes: I²S, SSI, SPI
- ◆ Alternative data input via I²C
- ◆ Flexible input buffer handling
- ◆ Parallel handshake bit stream input
- ◆ Serial bypass for PCM (low power)

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Product Range

Table 1: MAS 35x5G Family

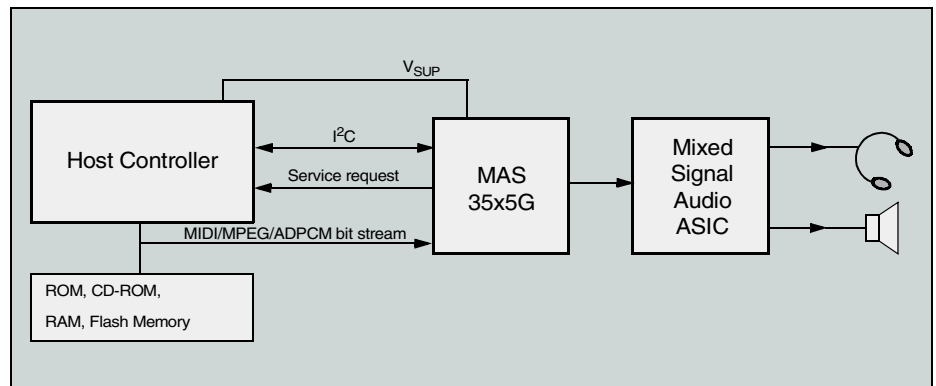| Feature	3505	3515
MIDI	●	●
ADPCM	●	●
MP3		●

Fig. 1: Application: Audio enhancement in a mobile phone

System Architecture

The main functional blocks of the MAS 35x5G are the MIDI synthesizer and the compressed audio and speech decoder. The MAS 35x5G also contains the clock generation and a power management circuitry. The flexible serial input interface of the MAS 35x5G can be driven in I^2S, SSI, and SPI mode. The data can either be sent in blocks with sizes in the range between 32 to 512 bytes (block mode), or as long as the data request pin is set (continuous mode).

The MAS 35x5G architecture provides a flexible combination of firmware stored in ROM and RAM. The MIDI and audio decoder firmware, being placed in the ROM, provides fast and easy access to the synthesizer and audio/speech decompression functions. Additional software modules can be downloaded for increased or alternative functionality.
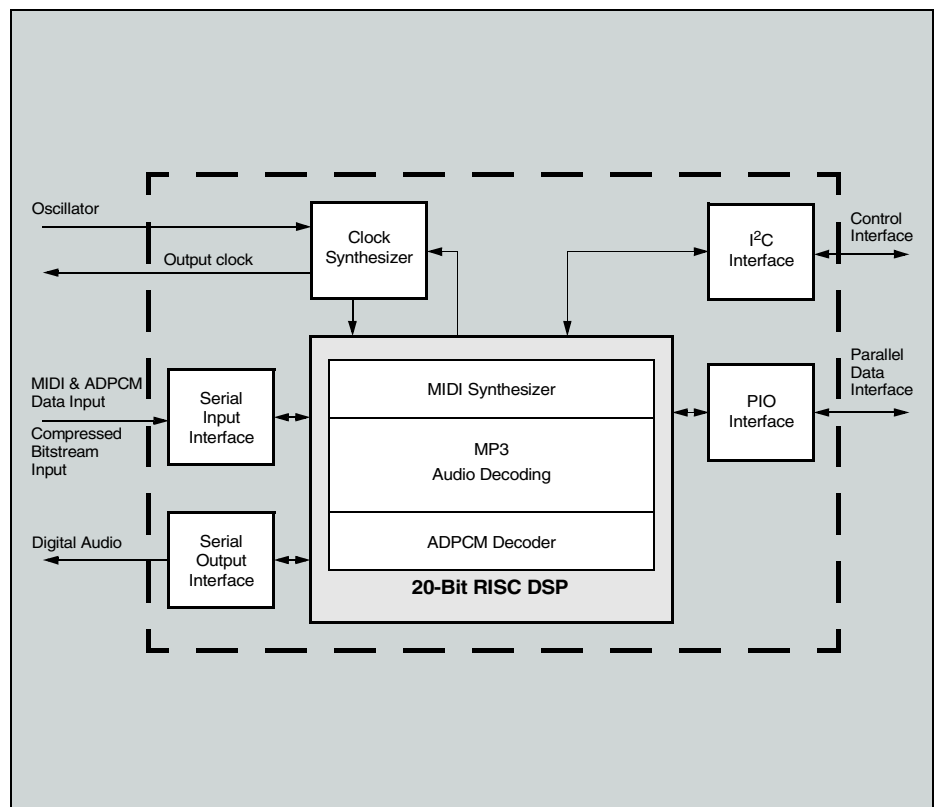
Fig. 2: Block diagram of the MAS 35x5G