

# ISD2360

## Voice/Audio Digital ChipCorder<sup>®</sup> featuring Multi Channel Mixing delivers highly integrated single chip solution ideal for wide range of voice/audio applications in industrial and consumer markets

The ISD2360 is a **3-channel digital** ChipCorder providing single-chip storage and playback of high quality audio. The device features digital de-compression, comprehensive memory management, flash storage, integrated audio signal path with up to 3 channel concurrent playback and Class D speaker driver capable of delivering power of 0.95W. This family utilizes flash memory to provide non-volatile audio playback with duration up to 64 seconds (based on 8 kHz/4bit ADPCM compression) for a single-chip audio playback solution.

The ISD2360 can be controlled and programmed through an SPI serial interface or operated stand-alone by triggers applied to the device's six GPIO pins.

The ISD2360 requires no external clock sources or components except a speaker to deliver quality audio prompts or sound effects to enhance user interfaces.

In addition the part can provide non-volatile flash storage in 1Kbyte sectors eliminating the need for additional serial EEPROM/Flash devices.

Compared to previous ChipCorder series, this device provides higher sampling frequencies, improved SNR, lower power, fast programming time and integrated program verification.

### FEATURES

- **New features**
- Multi-channel: 3-channel mixing playback
- GPIO parallel processing: Support dynamic change on GPIO output while the chip is in playback
- EMI, EFT, ESD improvement
- 0.95W power at 5V
- Duration
  - **ISD2360** – 64 seconds based on 8kHz/4bit ADPCM in 2Mbit of flash storage (256KB)
- **Audio Management**
- Store pre-recorded audio (**Voice Prompts**) using high quality digital compression
- Use simple index based command for playback – no address needed.
- Execute pre-programmed macro scripts (**Voice Macros**) designed to control the configuration of the device and playback Voice Prompts sequences.
- **Path and playback Control**
- Up to 3 channel audio streaming can be mixed and played back concurrently
- Each channel has independent counter which enables user micro-management on VM execution
- Mask Jump allows branch execution depending on internal register or external GPIO pin status
- **Control**
- Serial SPI interface for microprocessor control and programming.
- Stand-alone control where customized Voice Macro scripts are assigned to GPIO trigger pins.
- Sample Rate
  - 7 sampling frequencies 4, 5.3, 6.4, 8, 12.8, 16 and 32 kHz are available.
  - Each Voice Prompt can have optimal sample rate.
- Compression Algorithms
  - $\mu$ -Law: 6, 7 or 8 bits per sample
  - Differential  $\mu$ -Law: 6, 7 or 8 bits per sample
  - PCM: 8, 10 or 12 bits per sample
  - Enhanced ADPCM: 2, 3, 4 or 5 bits per sample
- Variable-bit-rate optimized compression. This allows best possible compression given a metric of SNR and background noise levels.

- Oscillator
- Internal oscillator with internal reference: factory trimmed to  $\pm 1\%$  deviation at room temperature.
- Output
- PWM: Class D speaker driver to direct drive an  $8\Omega$  speaker or buzzer.
- Delivers 950mW at 5V supply
- Delivers 400mW at 3V supply.
- I/Os
- SPI interface: MISO, MOSI, SCLK, SS for commands and digital audio data
- 6 general purpose I/O pins multiplexed with SPI interface.
- Flash Storage
- 2Mbit of storage for combined audio/data.
- Fast programming time (20 $\mu$ s/byte)
- Erase sector size 1Kbyte, sector erase time 2ms.
- Integrated memory checksum calculation for fast verification.
- Endurance >100K cycles. Retention > 10 years
- Operating Voltage: 2.4-5.5V
- Package:
- green, QFN32 and SOP-16
- Temperature Options:
- Industrial: -40°C to 85°C

## APPLICATIONS

- ❖ Industrial/Medical
  - Portable personal medical meters
  - Security keypad panels
  - White Goods
  - Instrumentations
- ❖ Automotive
  - Metro bus announcement
- ❖ Consumer
  - Downloadable audio photo frames and albums
  - Toys
  - Greeting Cards

