Winbond
Electronics Corp.

32-NOTE POLYPHONIC RINGTONE CHIP

GENERAL DESCRIPTION

The W56932 is designed for the ringtone application of cell phones with 32-note MIDI plus ADPCM/PCM synthesis. This single chip consists of a CPU interface, FIFO buffering, a wavetable sound set, a MIDI sequencer, a wavetable/ADPCM synthesizer, DAC, and a power amplifier that can drive an 8-ohm speaker directly. The W56932 also has a built-in, 4-wire SPI and 2-wire I^2C bus to communicate directly with other SPI- or I^2C-enabled devices.

With an on-chip, high-quality, GM-compliant sound set, the W56932 supports up to 128 instruments and 47 drums for playback of any MIDI song with up to 32 simultaneous notes. MIDI songs in various formats can be downloaded and played back by passing the song to the CPU interface in the W56932.

The ADPCM/PCM synthesizer is designed to allow for customized SFX (sound effects), in addition to ordinary MIDI songs. The sound effects can be played along with the MIDI tunes for more fantastic sound experiences.
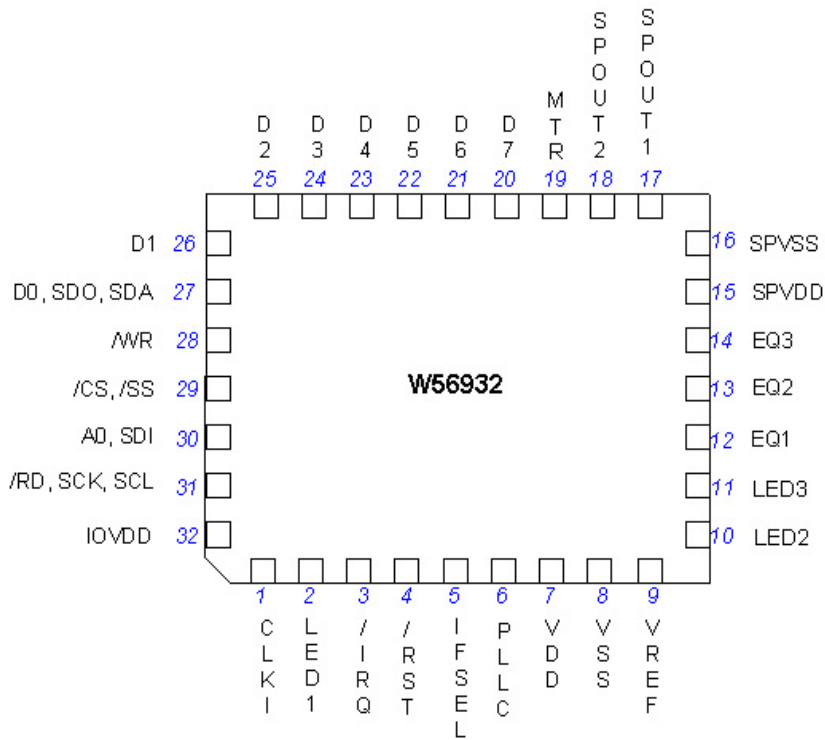
Synchronization between MIDI, SFX, LED, and MTR is done using embedded events in the MIDI file, which W56932 decodes and processes accordingly. The LED and MTR output pins, each with 256-level output, can be used for brightness and speed control, respectively.

In addition, API (Application Program Interface) source code is provided for the CPU to control the W56932 easily via the memory parallel interface, or I^2C and SPI serial interface.
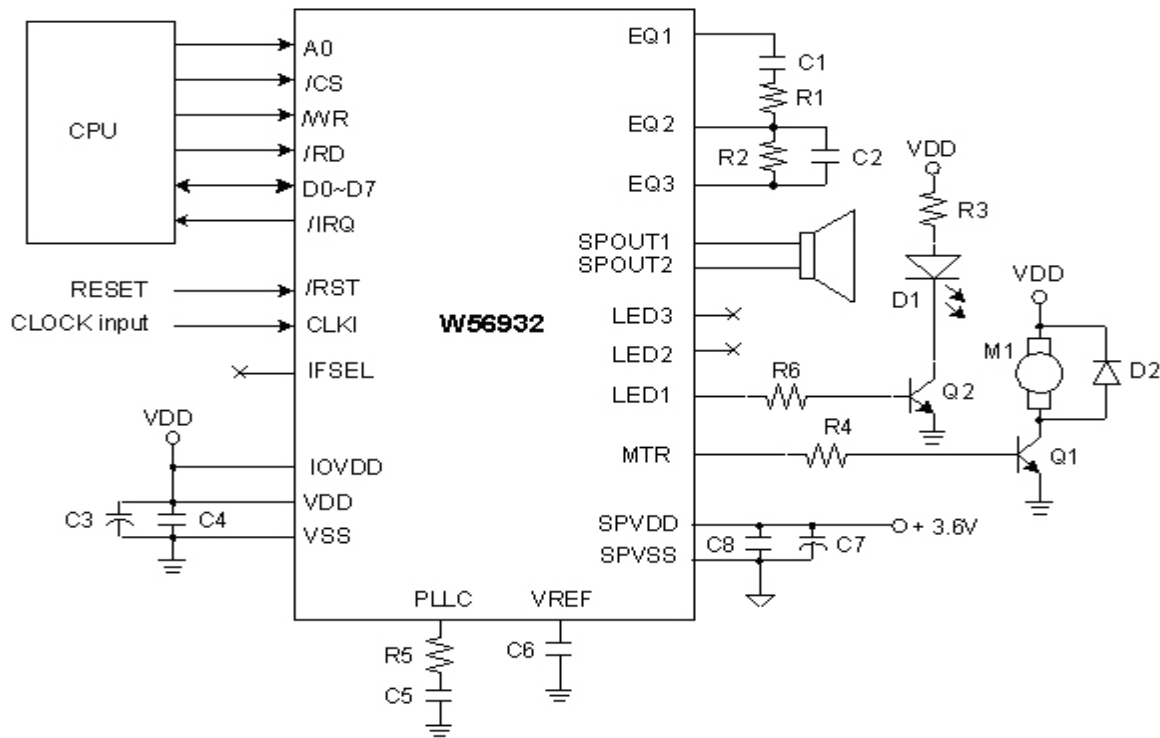
1. FEATURES

- 4-wire SPI or 2-wire I^2C bus (standard-mode and fast-mode)
- General MIDI compliant sound set: 128 instruments + 47 drums
- 32-note, 100%-wavetable MIDI synthesizer with ADPCM/PCM synthesis
- High quality sound
- Simultaneous playback of
  - o   MIDI, or
  - o   MIDI + ADPCM, or
  - o   Two ADPCM files,
- Karaoke feature supported
- MIP support for SP-MIDI format
- Middleware API source code provided for function control and CPU interface which include 8-bit parallel memory bus, SPI and I^2C serial interface.
- Multiple Format Parser that supports
  - o   MIDI: SMF, SP-MIDI, i-Melody, RTTTL, etc.
  - o   Audio: WAV @ 48 KHz
- Mono DAC with 12-bit resolution

- On-chip power amplifier that can drive 8Ω speaker directly
- Equalizer embedded to meet speaker response
- Line-In to receive external analog signals
- LED output with 256 levels of brightness
- MTR output with 256 levels of speed
- Harmonized synchronization between MIDI, SFX, LED, and MTR
- Embedded PLL 1.7 to 36 MHz clock input
- Power supply
  - o   VDD: 2.7 ~ 3.3 volts
  - o   SPVDD: 2.7 ~ 4.5 volts
  - o   IOVDD: 1.65 ~ VDD
- Operating current: 20 mA (25°C at no load)
- Standby current: 1 uA @ 25°C
- Operating temperature: -20°C ~ 85°C
- Package
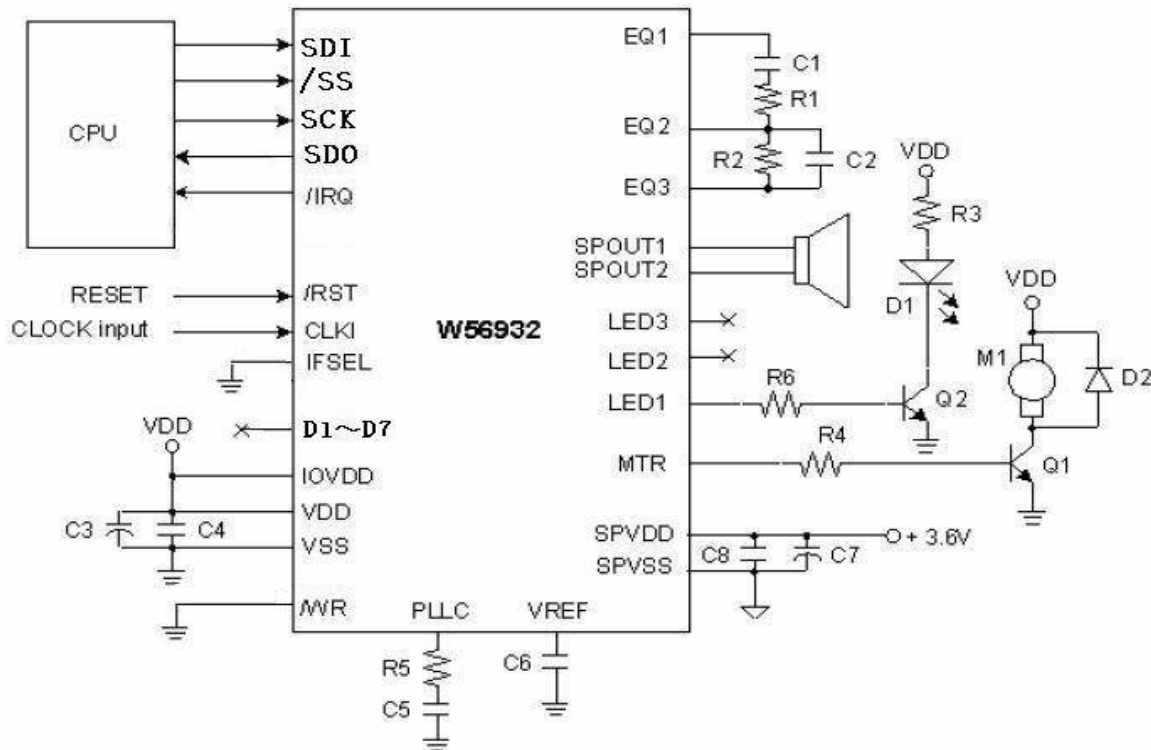 - o   32-pin plastic QFN (5.2mmx6.2mmx1mm)

PIN CONFIGURATION

W56932

Top pins (left to right): D2 25, D3 24, D4 23, D5 22, D6 21, D7 20, MTR 19, SPOUT2 18, SPOUT1 17

Left pins (top to bottom): D1 26, D0, SDO, SDA 27, /WR 28, /CS, /SS 29, A0, SDI 30, /RD, SCK, SCL 31, IOVDD 32

Right pins (top to bottom): 16 SPVSS, 15 SPVDD, 14 EQ3, 13 EQ2, 12 EQ1, 11 LED3, 10 LED2

Bottom pins (left to right): 1 CLKI, 2 LED1, 3 /IRQ, 4 /RST, 5 IFSEL, 6 PLLC, 7 VDD, 8 VSS, 9 VREF

TYPICAL APPLICATION CIRCUIT

● **Parall interface**

CPU — A0, /CS, /WR, /RD, D0~D7, /IRQ

RESET → /RST
CLOCK input → CLKI
IFSEL
VDD → IOVDD
C3, C4 → VDD, VSS

W56932

EQ1 — C1, R1
EQ2 — R2, C2
EQ3
SPOUT1
SPOUT2
LED3
LED2
LED1 — R6, Q2
MTR — R4, Q1
SPVDD — C8, C7, +3.6V
SPVSS

VDD, R3, D1
VDD, M1, D2

PLLC — R5, C5
VREF — C6

● **SPI**

● **I2C**