

Key Product features

1. Dedicated hardware block for independently executing functions. The HW Processor executes the following functions without using CPU resources:

Sound play processing

- 2-channel mixing sound (for playing background music + voice)
- Voice speed conversion (playback speed adjustable in 5% increments between 75% and 125%)
- The sampling rate of 15.625 kHz is high enough for background music as well as voice.
- High-compression voice decoding algorithm with high sound quality (16/24/32/40 kbps)

Self-memory check function

- Built-in RAM (R/W check, MARCH-C START)
- Built-in Flash checksum, CRC
- External QSPI-Flash checksum, CRC

Simple HW Processor interface

- Just set functions and commands in the special register and then start

2. Easily add voice later

- Sound data is easily added simply by writing the sound data and sentence information (sound data number and joining information)

3. Development environment

Epson sound creation PC tool

- Studio recording is not needed. Simply use the PC tool to create all the sound data you need (languages supported: Japanese, English, Mandarin Chinese, Korean)
- Sound data, which is assigned a number in the PC tool, can be played back by specifying the assigned number in the HW processor register, so there is no need to create and evaluate codes for linking sound data, etc.
- Your WAV format sound data is easily imported into the PC tool

Product Specifications

Product number	S1C31D50
CPU core	ARM® Cortex®-M0+ 32-bit RISC processor
Flash memory	192 kB (for both program and sound data)
RAM	8 kB (22 kB when not playing audio)
HW Processor	Sound decoding (original Epson format, 15.625 kHz sampling rate, 2-channel mixing, voice speed conversion)
	Self-memory check function (built-in Flash & RAM, external QSPI-Flash)
Sound DAC	Sampling rate: 15.625 kHz, mono
Serial interfaces	UART, SPI, and I ² C: 3 channels each. QSPI: 1 channel
Analog-digital	8 inputs, max. (12-bit successive-approximation ADC)

converter	
Supply voltage detector	32 level (1.7 V – 4.3 V)
DMA	4 channels (memory ⇔ memory, memory ⇔ peripheral)
Radio-frequency converter (RFC)	1-channel, low-resistance sensor A-D conversion, CR oscillation with 24-bit counters
Infrared remote controller	1 channel (can be used to generate EL lamp driving waveforms)
Timers	16-bit timer (8 channels), 16-bit PWM (2 channels), watchdog timer (WDT), real-time clock (RTC)
Power supply voltage	1.8 V - 5.5 V
SPI-Flash interface voltage	3.3 V (3.0 V – 3.6 V)
Operating frequency	16 MHz (V_{D1} voltage mode: mode 0) 2 MHz (V_{D1} voltage mode: mode 1)
Power consumption*	RUN: 250 μ A/MHz (V_{D1} voltage mode: mode 0) RUN: 155 μ A @ 1 MHz (V_{D1} voltage mode: mode 1) SLEEP: 0.43 μ A, RTC mode: 0.9 μ A
I/O ports	Max. 91 Of which up to 32 may be Universal Port Multiplexers (UPMUX)
Packages	TQFP12-48 (size: 7 mm x 7 mm. Pin pitch: 0.5 mm) TQFP13-64 (size: 10 mm x 10 mm. Pin pitch: 0.5 mm) TQFP14-80 (size: 12 mm x 12 mm. Pin pitch: 0.5 mm) QFP15-100 (size: 14 mm x 14 mm. Pin pitch: 0.5 mm)

*At typical environmental values, SLEEP mode, RTCA = On, 25 degrees Celsius