PRODUCT INFORMATION

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Telephone Answering Machine IC with On-Chip Audio Codec Developed

Implements speaker-independent voice recognition for the first time in the industry.

LC85050

Overview

Recent telephone and telephone answering machine products incorporate an ever expanding range of advanced functions, including audio recording and playback, voice synthesis, voice recognition, and other audio signal-processing application functions. Recently developed telephone products have also included data communication functions, such as call originator identification display and message exchanging.

Sanyo has now developed the industry's first single-chip general-purpose telephone answering machine IC, the LC85050, that also includes a speaker-independent voice recognition function for the first time in the industry. The LC85050 integrates an analog signal-processing block, a digital signal processor, and a flash memory interface on a single chip, and thus is a telephone answering machine IC that provides improved answering machine functions and improved support for a wide range of audio applications.

The LC85050 includes an implementation of the newly-developed PULCOD™ (pulse and code excited linear prediction) high compression ratio audio encoding algorithm for use by telephone answering machine functions. This algorithm allows about 19 minutes of audio recording when a 4M flash memory is used. It also provides a line and environmental echo canceler function and can provide stable communication even when used with a full-duplex speakerphone for bidirectional communication.

This IC supports many audio applications using the text-to-speech conversion, speaker-dependent voice recognition, and speaker-independent voice recognition functions provided by this IC.

• Text-to-speech conversion function. This function announces the name of the caller by looking up the name of the caller in an index using the caller ID function, which normally only shows the caller as a numeric display, to acquire the text of the callers name for conversion to a voice signal.

• Speaker-dependent voice recognition. This function implements a voice-directed dialing function. Here, the user registers, in advance, the names of the people who will be called, and then simply speaks the name of the person to be called. The speaker-dependent voice recognition function is then

determines the number to dial.

• Speaker-independent voice recognition. Speaker-independent voice recognition, which does not require advance training to an individual speaker's voice, is used to operate the telephone, allowing, for example, "voice dialing" in which the user simply reads out the number to be called, voice operated replay of messages recorded on the answering machine, and other operations. The LC85050 also includes send/receive functions that conform to the ITU-T V.23 and the Bell 202 standards, and thus can support caller ID and commercial communications provider services.

With the development of this IC, Sanyo aims to enter the telephone answering machine device market, a market in which products are providing increasingly diverse functionality, and to contribute to opening new areas in this market with even more advanced telephone answering machine products.

Features

- Built-in 3-channel A/D and D/A converters. Supports the implementation of speaker phone functionality for both outside lines and local lines between the base set and a wireless hand set.
- The industry's first built-in speaker-independent voice recognition function. Allows the user to operate the telephone from voice commands, including "voice dialing" in which the user simply speaks the number to be dialed to the telephone.
- Voice dialing in which the user simply speaks the name of the party to call using speaker-dependent voice recognition.
- Text-to-voice conversion that reads the name of the calling party from the caller ID display.
- The PULCOD^{TM} high compression ratio audio encoding and decoding algorithm

Specifications

Audio Recording and Playback Functions

- High compression ratio audio encoding and decoding using the PULCOD^{TM} algorithm (3.6 kbps)
- Automatic input gain adjustment function (–18 to +24 dB)
- Audio trigger function
- Tail cut function
- Variable speed playback function (0.5× to 2×)
- Soundless compression function

Text-to-Speech Conversion Function

- Announces the name of the caller from the caller ID display using a Sanyo-developed technique.
- Accent adjustment

- Supports katakana and alphanumeric input

Voice Recognition Functions

- Speaker-independent voice recognition function (15 words)
- Speaker-dependent voice recognition function (50 words)

Flash Memory Management Function

- Supports up to two 4M flash memory chips.

Line and Environmental Echo Canceler Function

- Supports stable conversation even when used as a full-duplex speakerphone.

Modem Functions

- Caller ID detection
  Bell 202 (1200 bps) conforming
  ITU-T V.23 (1200 bps) conforming
- Synchronous and asynchronous communication functions
- Programmable reception sensitivity adjustment (–10 to –40 dBm)
- Programmable tone send and receive
- DTMF send and receive
- Call progress tone detection
- Programmable send level adjustment (0 to –15 dBm)
- Reception dynamic range (0 to –47 dBm)

Other Features

- Melody function (with two-part harmony)
- Twelve general-purpose output ports
- Supply voltage: Supports both single 3.3 V operation and dual 3.3 and 5 V (for I/O) operation
- Package: QFP80 (dimensions: $23.2 \times 17.2 \times 2.15$ mm, lead pitch: 0.8 mm)

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Sample Availability

The LC85050 will be available in sample quantities in October 1999 and in production quantities in December 1999.

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