SANYO

PRODUCT INFORMATION

OCTOBER 7, 1997

Development of a Voice Speed Control System LSI

A Single Chip with a Full Set of Functions, and Internal Memory for Voice Speed Control

LC85405NE Series

Overview

In March of 1996 SANYO Electric released to market the LC85401E, a chip it developed for voice speed control systems. This chip uses the TASCOTY method (the Time-lag Adaptive Voice Speed Control Technology) to convert rapid speed to a slower, more easily understood voice tempo or to convert into a nearly-natural voice the audio track from a double-speed playback without changing the voice tone. This chip has received accolades from the market, where it is used in VCRs and tape recorders.

Research is currently underway into other applications for this chip, such as use in hearing aids for the hearing impaired to slow down rapid voice heard on television or on telephones, and applications such as in the study of foreign languages. These products require a full set of functions at a reduced cost.

Based on the LC85401E, we have developed a full-function voice speed conversion system LSI chip, the LC85405NE.

The LC85405NE is equipped with seven different operating modes, including 5/3×, 3/2×, 4/3×, 3/4×, 2/3× 1/2× and 1/3× operating modes.

- Even when the playback speed is 2×, 5/3×, 3/2× or 4/3× is used in VCRs, tape recorders, etc., this chip is able to provide a natural, easily understood voice at nearly the standard speed without any change in voice tone. In VCRs, in particular, this makes it possible to enjoy playback without a time lag between the sound and the picture.

- For 3× playback, through the addition of a function that removes any silent sections where there is no sound makes it possible to perform voice conversion to make the voice easier to understand with only minimal voice loss.

- Even when playing at normal speed, it is possible to perform a conversion in real time to slow voice when the speaker is speaking so quickly that he or she is difficult to understand, converting this voice to a speed that is optimally suited for the understanding of the listener.

The structure of this voice speed control system requires A/D and D/A converters, a DSP, I/O ampli-

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fiers, and memory for an external voice buffer. Although the required memory cannot be included in the chip because of the large memory capacity requirement, through the use of proprietary voice compression technology, it is possible to create on-board enough memory capacity for a buffer. Furthermore, because interface circuits for the microcontroller are included on board, it will be possible to structure a voice speed control system with the addition of only a few peripheral analog parts, reducing the cost of the system.

Features (Those features marked with an asterisk are new features)

A full set of voice speed control functions.

- Replay mode: Compatible with the following replay modes: 5/3×*, 3/2×*, 4/3×*, 2×, 3×* (in the simple model).
- Compatible with the following slow replay modes: 3/4×*, 2/3×*, 1/2×*, 1/3×*.
- Normal playback: Converts rapid, difficult-to-understand voice into slow, easy-to-understand voice.
- Low noise factors

On-board memory for voice buffer.*

On-board A/D and D/A converters, DSP, and I/O amps.

Improved antinoise functions using voice/pause determination technology.

Can also function as a stand-alone unit.

Repeat function (for a maximum of 5 seconds)

Specifications

Voice conversion method: Time-lag Adaptive Voice Speed Control

Sampling frequency: 12.8 KHz/6.4KHz

A/D converter: 10 bits

D/A converter: 10 bits

Voice Speed Control Functions

Time-lag Adaptive Type	
2× speed input	Output voice speed range selectable to 8 modes within the 1× to 2× range
5/3× speed input	Output voice speed range selectable to 6 modes within the 1× to 5/3× range
3/2× speed input	Output voice speed range selectable to 6 modes within the 1× to 3/2× range
4/3× speed input	Output voice speed range selectable to 4 modes within the 1× to 4/3× range
Normal speed input	Output voice speed range selectable to 4 modes within the 0.7× to 1× range
Simple Type	Replay: 3× speed (using the function that removes any silent sections)/5× /7× /9× Reverse playback: 1× /2× /3× /5× /7× /9×

Other functions: Internal analog switching circuit

Power supply voltage: 5 V ±10%

Process: CMOS

Package: QFP-64

Note: The TASCOTY (Time-lag Adaptive Voice Speed Control Technology)
This is an algorithm for the optimal control of playback speed of voice information depending on the time lag between image and voice, and depending on the length of continuous intervals of silence.

Sample Availability

Samples of the LC85405NE Series will be available in October 1997; production quantities are anticipated in January 1998.