
PRODUCT INFORMATION

Vol.102

Digital Servo DSP with On-Chip RF Amplifier Developed

CD player servo processing and decoding integrated on a single chip

LC78645E

Overview

The popularity of music has resulted in the widespread use of a wide range of audio media, such as cassette tape, CD, and MD. Recently, the consumer's options have expanded to include products that use semiconductor memory as the storage medium.

Still, the CD, with an annual worldwide market of 120 million units, remains the most popular format and is expected to retain its lead for the near future.

Since the CD player represents a mature market, particular aspects are desired in the components used in these products. The main desired properties are (1) the ability to provide stable performance for easy development of end products (In particular, this means reducing both the time and the number of employees required for end product development.) and (2) a small total parts count to improve reliability, to reduce manufacturing and parts costs and to increase production efficiency.

To respond to these needs, Sanyo has now developed the LC78645E super system-on-chip servo CD DSP that integrates an RF amplifier on the same chip.

Until now, even though a digital servo CD DSP has been used, CD players have required a separate bipolar IC to provide the required RF amplifier. Thus the main signal processing for CD playback has, until now, required a two-chip structure consisting of this bipolar IC and the CD DSP that handles the servo and digital later signal processing. The LC78645E is a super system-on-chip CD DSP that incorporates bipolar IC technology onto the MOS IC itself.

Use of the LC78645E allows both the parts count and the number of manufacturing steps to be reduced, and to increase end product reliability as a result. Furthermore, servo development support software can now be used to verify servo characteristics on a personal computer, an operation that had been extremely time consuming up to now.

Features

- Playback functions
 - Audio CD playback (standard, 2×, and 4× speeds)

PRODUCT INFORMATION

- Jitter-free playback (VCEC)
- CAV playback
- RF processing block
 - RF system: AGC, support for CD-R and CD-RW playback, peak hold, bottom hold
 - Error system: Tracking error signal generation (with balance adjustment), focus error signal generation, CD-RW playback support
 - Track jump counter clock generation, jitter detection, defect (black, mirror) detection
 - APC
- Servo control block
 - All servo systems (tracking, focus, sled, and spindle) are implemented with digital processing.
 - Automatic adjustment functions: focus gain, focus balance, focus offset, tracking gain, tracking offset, tracking balance
 - Shock detection
 - Interruption detection
- EFM processing block
 - EFM signal synchronization detection, protection, and interpolation
 - EFM signal demodulation
 - Subcode P to W output
 - Subcode Q output
 - Jitter margin: ± 13 frames
 - Unscrambling and deinterleaving
 - Error detection and correction (dual errors in both C1 and C2)
 - Interpolation (quadruple interpolation)
 - DOUT output
- Audio processing
 - Digital attenuator
 - Fadeout function
 - Bilingual function
 - 8 \times oversampling digital filters
 - Digital deemphasis filter
 - 1-bit D/A converter (third-order $\Delta\Sigma$ noise shaping)
 - Second-order low-pass filter for audio output
 - Supports external supply of DF and D/A converter clocks.

PRODUCT INFORMATION

Specifications

- Operating supply voltage: 3.3 V (The microcontroller interface also supports 5 V signal levels.)
- Package: QFP80 (14 × 14)

Sample Availability

The LC78645E will be available in sample quantities in mid-December 2000, and in production quantities in August 2001.

AUGUST 7, 2000

PRODUCT INFORMATION

- Any and all SANYO products described or contained herein do not have specifications that can handle applications that require extremely high levels of reliability, such as life-support systems, aircraft's control systems, or other applications whose failure can be reasonably expected to result in serious physical and/or material damage. Consult with your SANYO representative nearest you before using any SANYO products described or contained herein in such applications.
- SANYO assumes no responsibility for equipment failures that result from using products at values that exceed, even momentarily, rated values (such as maximum ratings, operating condition ranges, or other parameters) listed in products specifications of any and all SANYO products described or contained herein.
- Specifications of any and all SANYO products described or contained herein stipulate the performance, characteristics, and functions of the described products in the independent state, and are not guarantees of the performance, characteristics, and functions of the described products as mounted in the customer's products or equipment. To verify symptoms and states that cannot be evaluated in an independent device, the customer should always evaluate and test devices mounted in the customer's products or equipment.
- SANYO Electric Co., Ltd. strives to supply high-quality high-reliability products. However, any and all semiconductor products fail with some probability. It is possible that these probabilistic failures could give rise to accidents or events that could endanger human lives, that could give rise to smoke or fire, or that could cause damage to other property. When designing equipment, adopt safety measures so that these kinds of accidents or events cannot occur. Such measures include but are not limited to protective circuits and error prevention circuits for safe design, redundant design, and structural design.
- In the event that any or all SANYO products (including technical data, services) described or contained herein are controlled under any of applicable local export control laws and regulations, such products must not be exported without obtaining the export license from the authorities concerned in accordance with the above law.
- No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying and recording, or any information storage or retrieval system, or otherwise, without the prior written permission of SANYO Electric Co., Ltd.
- Any and all information described or contained herein are subject to change without notice due to product/technology improvement, etc. When designing equipment, refer to the "Delivery Specification" for the SANYO product that you intend to use.
- Information (including circuit diagrams and circuit parameters) herein is for example only; it is not guaranteed for volume production. SANYO believes information herein is accurate and reliable, but no guarantees are made or implied regarding its use or any infringements of intellectual property rights or other rights of third parties.