



# PRODUCT INFORMATION

Vol. 67

## On-Chip Flash Memory 8-Bit Microcontrollers Developed

**The industry's first flash memory microcontrollers for built-in OSD TV sets.**

**LC86F3248A, LC86F3348A**

### Overview

When issues such as reducing the development period, quickly bringing production to full volume, and ease of maintenance are important, on-chip flash memory microcontrollers (flash microcontrollers) are superior to the earlier mask ROM microcontrollers. First, flash microcontrollers can reduce the development period by allowing software debugging to continue through the day before mass production starts; in other words, they can provide major reductions in the turnaround time required with the earlier mask ROM microcontrollers. Second, flash microcontrollers contribute to quickly bringing production to full volume by providing functions for both EPROM writer programming and on-board programming. In particular, these functions support products whose specifications change frequently and products whose specifications differ depending on the customer. Finally, the flash microcontroller on-board programming function contributes to improved end product maintenance by allowing version upgrades to the end-product software to correct problems due to bugs discovered after the product shipped or to provide improved functionality.

Sanyo has developed flash microcontrollers for multimedia equipment applications, an area where the features of flash microcontrollers can be proved particularly advantageous, for IC cards, for system control in a wide range of data storage equipment, and for use as controllers that can directly drive fluorescent display tubes for consumer products. Furthermore, Sanyo is committed to providing extensive flash microcontroller product lines for these areas.

As part of this commitment, Sanyo has now developed a TV control flash microcontroller that provides built-in on-screen display (OSD) functions. Since the OSD functions require a character generator ROM (CGROM) to store the display fonts, these microcontrollers require separate flash memory systems for program ROM and the CGROM. However, Sanyo has developed circuit technology that allows these two ROMs to be allocated to a single flash memory system, and thus allows such systems to be implemented efficiently. Furthermore, since these microcontrollers include pseudo-graphics functions for OSD, they can take advantage of these features to provide even high quality screen display.

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Two versions of this new microcontroller have been developed: the LC86F3248A, which includes closed caption functions for the North American market, and the LC86F3348A, which is designed for NTSC and PAL systems that do not require closed caption functions. These two microcontrollers are pin compatible, and thus can easily support unified chassis products. Initially, these products will be sold as replacements for earlier Sanyo one-time programmable products (microcontrollers with on-chip EPROM), but a significant increase in demand is expected when improvements in mass production technology and larger supplies allow these products to replace earlier mask ROM versions.

## **Features**

- Flash microcontroller for use in TV sets that support OSD.
- 64KB flash memory
- Operation guaranteed from a 5V single-voltage power supply
- Block erase in 128-byte units

## **Specifications**

- Original Sanyo 8-bit microcontroller
- 48KB program ROM
- 16KB CGROM
- 640 bytes of general-purpose RAM,  $352 \times 9$  bits of display RAM
- Pseudo-graphic OSD functions
  - Display capabilities: 8 lines of 36 characters each (hardware)
  - Display colors: 16 colors
  - Character font: 252 characters of  $16 \times 32$  dots
  - Character sizes: 10 sizes
  - Display position, pitch, shutter, and other aspects can be controlled for each line displayed
- Multimaster I<sup>2</sup>C interface and synchronous serial interface.
- Two 16-bit timers, clock time base timer
- Four-input 8-bit A/D converter
- Packages: DIP42S, QFP48E (QIP48E)

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## Sample Availability

Samples of the LC86F3248 and LC86F3348 are available in August 1998; production quantities will be anticipated in the end of 1998.

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