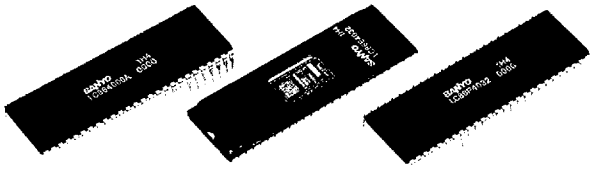
LC864000 Series

Overview

The LC864000 Series are high-speed, advanced-function CMOS 8-bit single-chip microcontrollers with an on-chip caption display function. When combined with a data slice front-end IC (LA7945), the previous products — the LC8640XX — could be used for TV sets with built-in closed-caption functions. In contrast to this, the newly developed LC8641XX has an on-chip data slice function that extracts caption data, making it possible to build TV sets with built-in closed captioning with just this single chip. What is more, OSD with an advanced-function version of the display RAM for full-screen support so well received in the LC8640XX is also on-chip, enabling support for EDS (Extended Data Service) as well. EPROM with window versions and one-time PROM versions have been incorporated into the series, allowing development time for the application system to be greatly reduced.

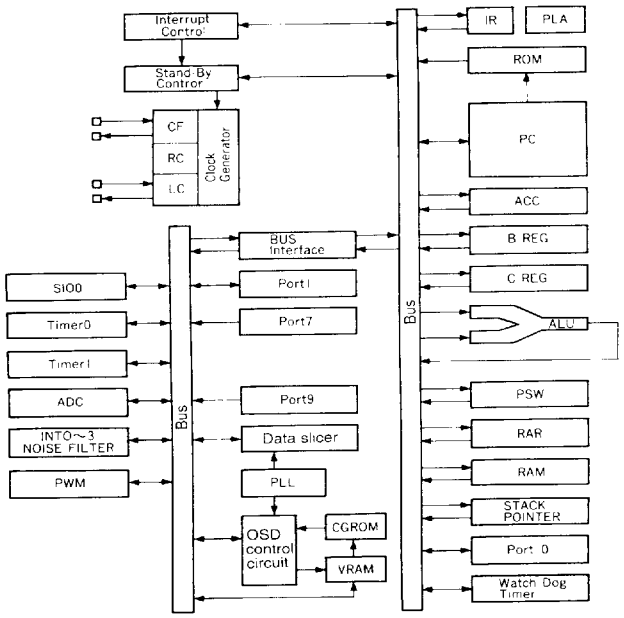
The LC8641XX integrates many powerful functions on a single chip. Centered around a CPU core that performs 8-bit processing in 1 µs, the microcontroller includes 12K to 64K bytes of ROM, 256 or 384 bytes of RAM, and an OSD function for captions with 640 x 9bits of full-screen display RAM and character-generator ROM which generates 256 types of characters. Also included are a 16-bit timer/counter, a multiple-use PWM 16-bit timer, a 10-channel x 7-bit PWM, a 4-channel x 4-bit A/D converter, 8-bit synchronized serial I/O channels, a watchdog timer, a remote control signal receive circuit, I/O ports, numerous interrupts (12 sources and 10 vectors), and a standby function.



Features (LC8641XX is under development)

- **Features of the LC8641XX**
- 12K to 64K bytes ROM
- 256 or 384 bytes RAM
- 640 x 9-bit full-screen display RAM
- 16-bit timer/counter
  - With 8-bit programmable prescaler
  - Can be split as two 8-bit timer/counters
- Multiple-use PWM 16-bit timer (with the following four modes)
  1. One 16-bit timer
  2. Two 8-bit timers
  3. 8-bit timer + 8-bit PWM
  4. 16-bit PWM
- Watchdog timer (with external RC)
- 8-bit serial I/O channels
  - Bus compatible
  - With baud rate generator
- Remote control signal receive circuit
- 10-channel x 7-bit PWM outputs
  - Withstands up to 15V
- 4-channel 4-bit A/D converter
- 16 I/O ports, 8 input-only ports, 11 onput-only ports

LC864164 Block Diagram



- Numerous interrupt functions
  - 12 sources (6 external, 6 internal) and 10 vectors
  - Control function for 3 levels of overlapping interrupts
- Standby function (HALT/HOLD mode)
- High-speed operation
  - Minimum cycle time: 1 µs (bus cycle: 0.5 µs)
  - High-speed execution of register/RAM bit manipulation instructions: 1 µs
- Symmetrical instruction set common with LC860000 Series
  - 68 instructions

❄ OSD function

- 34 characters x 16 lines (display depends on hardware)
- Number of characters — 256 types
  9 x 9 dots — 128 types
  12 x 18 dots — 128 types
- Various settings of the line-by-line control
  1) Vertical and horizontal display position
  2) 8 types of character sizes (1.5X horizontal size available)
  3) Character pitch
  4) Display start and end lines (shutter function)
- 16 colors each for characters color, background color, and border color can be specifications for each character

■ LC864000 Series

Type No.	ROM (bits)	RAM (bits)	Cycle time	OSD outputs	Ports	SI/O	Timer	A/D converter	Package	Evalution chip	Notes
LC864032A	32K×8	256×8 (data) 528×8 (display)	1µs (bus cycle: 0.5µs)	16 lines x 32 digits; 128 characters (6 x 9 dots); Allows color characters, color backgrounds, and color borders	20 I/O 8 input 6 output	8 bits ×2	16 bits ×1 (can be split into 8-bit timers) + 14-bit base timer	4 bits ×4 ch	DIP-52S	LC86E4032	• Serial interface for I²C bus • 7-bit 10-channel PWM • Remote control signal reseive circuit
LC864028A	28K×8										
LC864024A	24K×8										
LC864020A	20K×8										
LC864016B	16K×8										
LC864012B	12K×8										
LC864008B	8K×8										
LC86P4032	32K×8								DIP-52S	—	One-time PROM version of LC8640XX Series
LC86E4032	32K×8								DIC-52S	—	EPROM with window version of LC8640XX Series
*LC864164A	64K×8	384×8 (data) 640×9 (display)	1µs (bus cycle: 0.5µs)	16 lines x 34 digits; 128 characters (9 x 9 dots); 128 characters (12 x 18 dots); 16 character colors, 16 background colors, and 16 border colors; Line-by-line control possible - display position - character size (8 types) -scroll function - shutter function	16 I/O 8 input 11 output	8 bits ×1 (can be used for bus)	16 bits ×2 (can be split into 8-bit timers)	4 bits ×4 ch	DIP-52S	LC86E4164	• On-chip data slicer • 7 bit x 10 channel PWM • Remote control signal receive circuit
*LC864156A	56K×8										
*LC864148A	48K×8										
*LC864140A	40K×8										
*LC864132A	32K×8										
*LC864124A	24K×8										
*LC864120A	20K×8	256×8 (data) 640×9 (display)									
*LC864116A	16K×8										
*LC864112A	12K×8										
*LC86P4164	64K×8	384×8 (data) 640×9 (display)							DIP-52S	—	One-time PROM version of LC8641XX Series
*LC86E4164									DIC-52S	—	EPROM with window version of LC8641XX Series

* : Under development