CMOS 4-BIT SINGLE-CHIP MICROCOMPUTERS

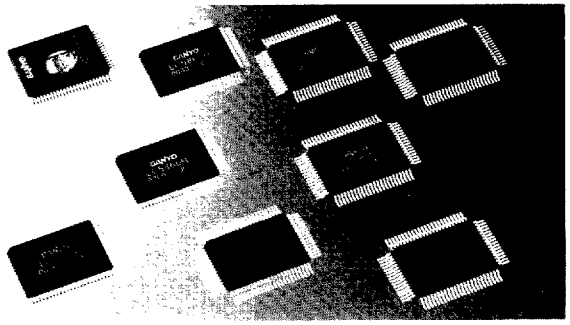
LC5860/5870 SERIES

Overview

The LC5860/5870 Series CMOS 4-bit single-chip microcomputers are ideal for controlling LCD displays. Sanyo's proprietary LCD display circuit technology (controller/drivers) can drive any LCD panel arrangement without program support. Other powerful peripheral functions include a 2K to 8K word ROM (by 16 bits), 256-/512-word (by 4 bits) RAM, two 8-bit timers, a 15-bit free-running timer (for a real-time clock function), a watchdog timer, event counter functions, three types of clock generators, 8-bit serial I/O, and 29 I/O port pins.

Furthermore, software is easier to write thanks to a large instruction set of 123 instructions, with single-step execution of all instructions that speeds up program development. Low-voltage, low-power operation is made possible with a standby mode (HALT/HOLD) and a fast mode/slow mode operation switch. The user can also switch between three types of timer input, and can switch between three types of internal clocks as well as an external clock (serial clock). Other features that make the LC5860/5870 microcomputers easier to use include an 8-bit read/write timer, I/O ports that can perform on/off control for internal resistors, two internal interrupts, and three external interrupts.

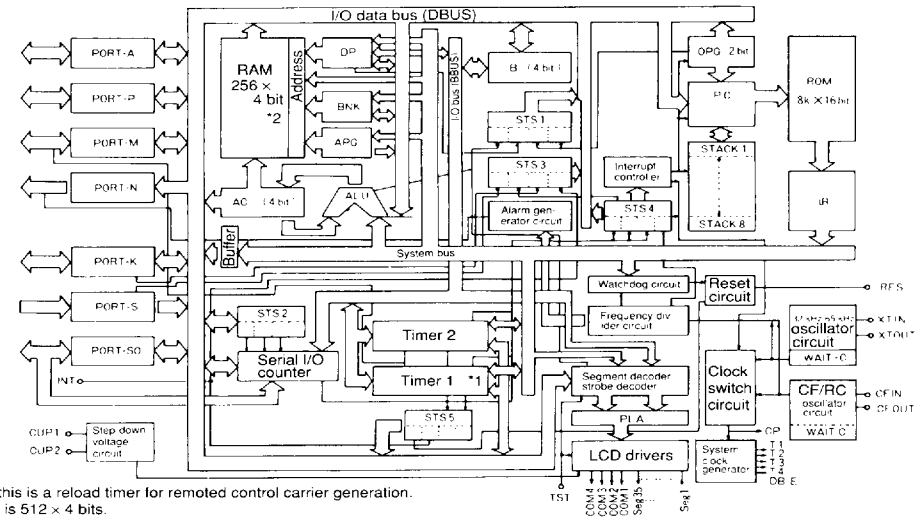
The LC5860/5870 Series are sophisticated microcomputers perfectly suited for controlling battery-operated devices with LCD display functions.



Features

- Can drive LCD panels of up to 140 segments with 35 segment pins and 4 common pins (the 35 segment pins can also be used as general-purpose outputs)
- Segment PLA/segment decoder can drive any LCD panel arrangement without software (reduces program development time)
- Six types of step-down voltage circuits for use as LCD driver circuits/LCD power supply
- 256/512 × 4 bits of RAM (can be used as entire RAM working area)
- Two 8-bit programmable timers/event counters (on the LC5870 Series, one of these is used as a reload timer for remote control carrier generation), one 15-bit free-running timer for use as a real-time clock, and one watchdog timer to detect runaway programs
- Three types of clock generators: crystal oscillator (32 kHz to 65 kHz), ceramic resonator (400 kHz to 4 MHz), and RC oscillator
- 8-bit serial I/O
- 29 I/O pins (plus 35 segment pins that can be used as general-purpose outputs). 4 pins provide internal 13.5 V high voltage; 8 pins tied to on-chip anti-chattering circuitry.
- On-chip pull-up/pull-down resistors (mask option)
- Floating output prevention circuitry
- Alarm sound generating circuit
- Standby mode (HALT/HOLD instruction)
- 12 pins to restore chip from complete standby mode to operating mode
- 3 internal and 7 external interrupts

LC5868H Block Diagram



*1: In the LC5870 Series, this is a reload timer for remoted control carrier generation.
*2: On the LC58700X, this is 512 × 4 bits.

- 8 HALT and 7 HOLD release functions
- Fast mode/slow mode operation switch
  Fast mode : 2 µs at 4.5 V
  Slow mode : 20 µs at 2.2 V
  122 µs/2.0 V (key input acceptable)
- Switchable between 3 types of timer inputs
- Switchable between 3 types of internal clocks and 1 external clock (serial clock)
- On/off control of I/O port internal resistors
- 8-bit reads/writes (timers 1 and 2, serial I/O)
- Single-step operation for all instructions
- Large, easy-to-use instruction set with 123 instructions

Applications

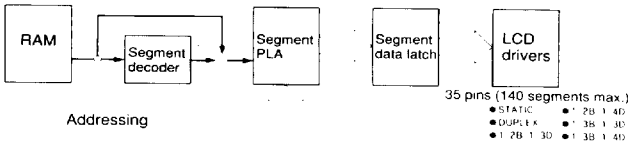
- VCR (control/LCD display/remote control unit)
- CD (control/LCD display/remote control unit)
- Tuner (control/LCD display/remote control unit)
- Camera (control/LCD display)
- Consumer electronics (control/LCD display for rice cookers, fan heaters, etc.)
- Small-size instrumentation/medical equipment (control/LCD display)
- Other hand-held battery-operated products requiring LCD display and timer functions

LC5860/5870 Series (* Under development)

Type No.	ROM (bits)	RAM (bits)	Cycle time	Ports: Segment output	Ports: Common output	Ports: No. of pins	SI/O	Timers	Package	Evaluation chip	Notes
LC5862H	2K × 16	256 × 4	2µs (3.0 V) 122µs (2.0 V)	35	4	29	8 bits	2	FLP-80 Chip	LC58E68	On-chip LCD display controller/drivers
LC5863H	3K × 16										
LC5864H	4K × 16										
LC5866H	6K × 16										
LC5868H	8K × 16										
LC5872	2K × 16										
LC5873	3K × 16									LC58E76	On-chip LCD display controller/drivers On-chip remote control carrier synthe sizing circuit
LC5874	4K × 16										
LC5876	6K × 16										
*LC587004	4K × 16	512 × 4								LC58E7008	
*LC587006	6K × 16										
*LC587008	8K × 16										
LC58E68	8K × 16	256 × 4	2µs (4.5 V) 122µs (2.8 V)						Windowed FLC-80	—	On-chip window EPROM version for LC5860 series evaluation
*LC58E76	6K × 16		Under evaluation								On-chip window EPROM version for LC587X evaluation

LC5860/5870 Series Segment PLA

- Can design LCD panel in parallel with program development
  *: LCD segment output ports set with the segment PLA
- Reduces program development time
  *: Eliminates need for LCD display program development
- Can check segment PLA with EPROM



LC5860/5870 Series Standby Mode

- Slow operation mode:
  Low voltage operation
  Reduced operating current
- HALT mode (clock oscillator)
  Real-time clock operation with low current consumption
  Low current consumption of standby mode
- HOLD mode
  RAM backup at lowest possible current consumption