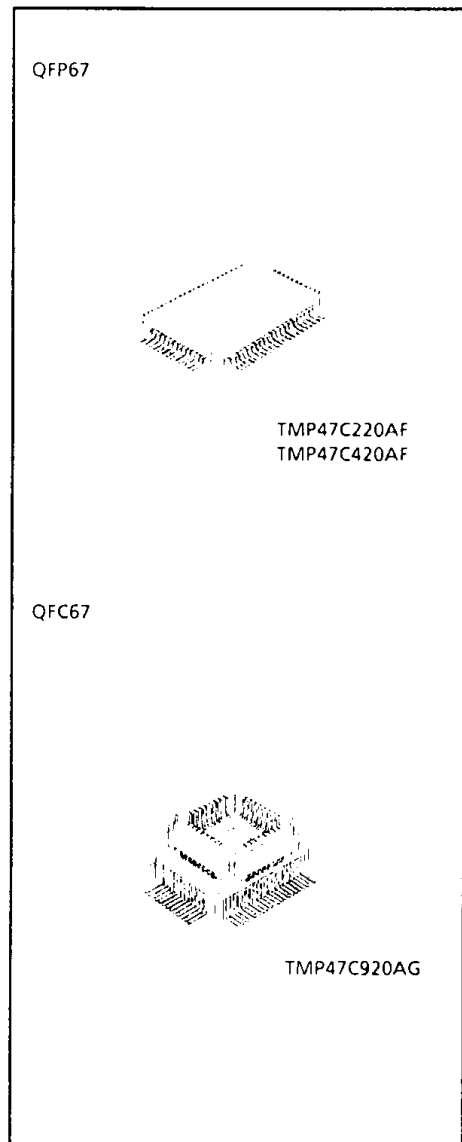## CMOS 4-BIT MICROCONTROLLER

TMP47C220AF, TMP47C420AF

The 47C220A/420A are high speed and high performance 4-bit single chip microcomputers based on the TLCS-47 CMOS series with LCD driver.
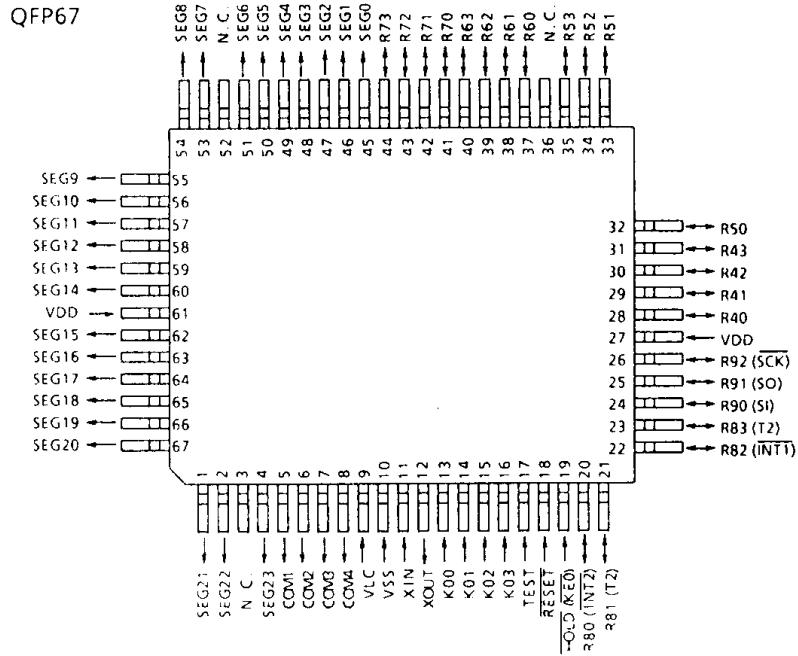
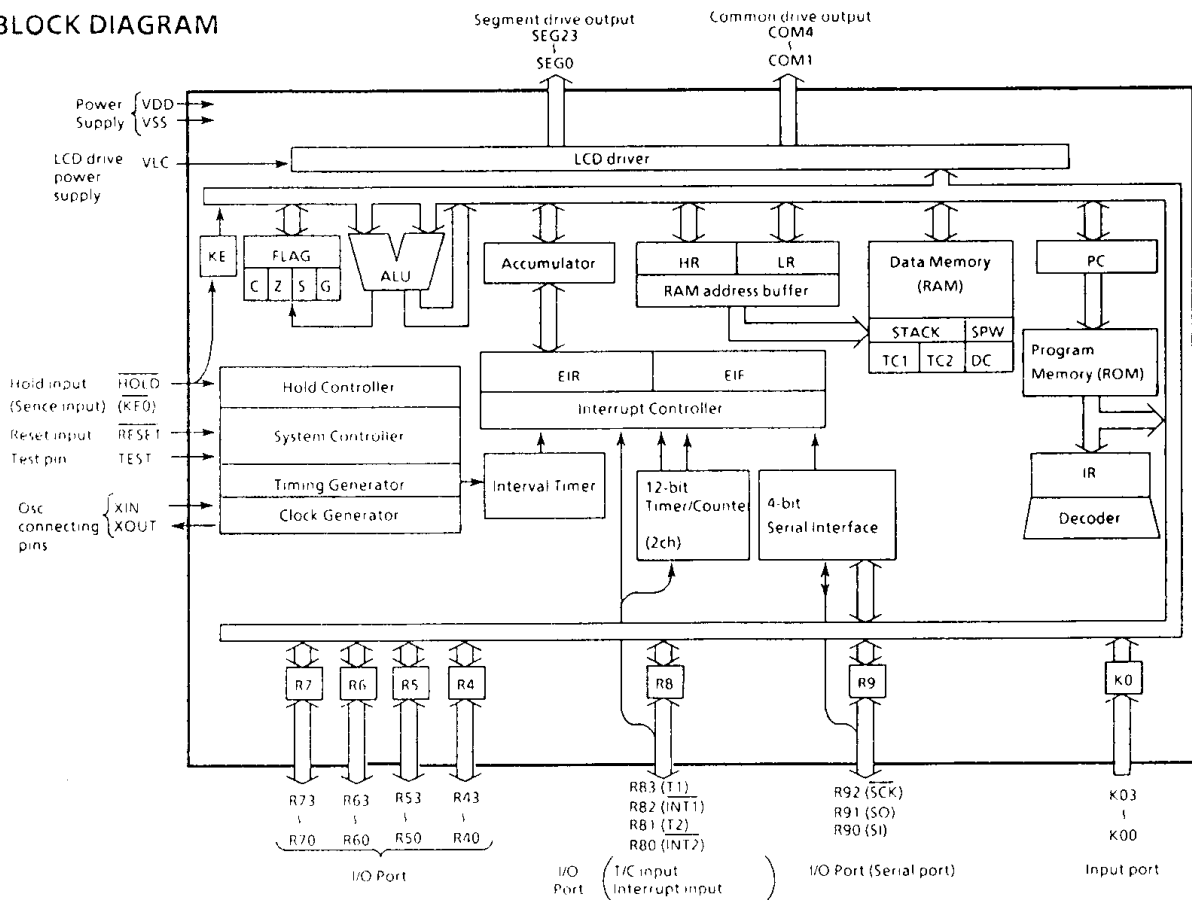| PART No.	ROM	RAM	PACKAGE	PIGGYBACK
TMP47C220AF	2048 x 8-bit	192 x 4-bit	QFP67	TMP47C920AG
TMP47C420AF	4096 x 8-bit	256 x 4-bit		

FEATURES

- ◆ 4-bit single chip microcomputer
- ◆ Instruction execution time : 1.9μs (at 4.2MHz)
- ◆ 89 basic instructions
- ◆ Table look-up instructions
- ◆ Subroutine nesting : 15 levels max.
- ◆ 6 interrupt sources (External : 2, Internal : 4)
  All sources have independent latches each, and multiple interrupt control is available.
- ◆ I/O port (28 pins)
  - Input   2 ports   5 pins
  - I/O   6 ports   23 pins
- ◆ Interval Timer
- ◆ Two 12-bit Timer/Counters
  Timer, event counter, and pulse width measurement mode
- ◆ Serial Interface with 4-bit buffer
  External/internal clock, and leading/trailing edge shift mode
- ◆ LCD driver
  - LCD direct drive is available (Max. 12-digit display at 1/4 duty LCD)
  - 1/4, 1/3, 1/2, duties or static drive are programmably selectable.
- ◆ Hold function
  Battery/Capacitor back-up
- ◆ Real Time Emulator : BM4721A + BM4723A

QFP67

TMP47C220AF
TMP47C420AF

QFC67

TMP47C920AG

PIN ASSIGNMENT (TOP VIEW)

QFP67

BLOCK DIAGRAM

PIN FUNCTION

PIN NAME	Input/Output	FUNCTIONS	
K03 - K00	Input	4-bit input port	
R43 - R40	I/O	4-bit output port with latch. When used as input port, the latch must be set to "1". Every bit data is possible to be set, cleared and tested by the bit manipulation of the L-register indirect addressing.	
R53 - R50			
R63 - R60			
R73 - R70			
R83 (T1)	I/O (Input)	4-bit I/O port with latch. When used as input port, external interrupt input pin or timer/counter external input pin, the latch must be set to "1".	Timer/Counter 1 external input
R82 (INT1)			External interrupt 1 input
R81 (T2)			Timer/Counter 2 external input
R80 (INT2)			External interrupt 2 input
R92 (SCK)	I/O (I/O)	3-bit I/O port with latch. When used as input port or serial port, the latch must be set to "1".	Serial clock I/O
R91 (SO)	I/O (Output)		Serial data output
R90 (SI)	I/O (Input)		Serial data input
SEG23 - SEG0	Output	LCD Segment drive output	
COM4 - COM1		LCD Common drive output	
XIN	Input	Resonator connecting pins. For inputting external clock. XIN is used and XOUT is opened.	
XOUT	Output		
RESET	Input	Reset signal input	
HOLD (KE0)	Input (Input)	Hold request/release signal input	Sense input
TEST	Input	Test pin for out-going test Be opened or fixed to low level.	
VDD	Power Supply	+ 5V	
VSS		0V (GND)	
VLC		LCD drive power supply	

OPERATIONAL DESCRIPTION

The 47C220A/420A are packaged in a 67-pin flat package instead of the 47C221A/421A's 64-pin flat package. As the function and instruction are equivalent to the 47C221A/421A, the technical data sheets for the 47C221A/421A and 47C200A/400A shall also be referred to.