

## NMOS 4-Bit Single-Chip Microcomputers

# LM6413/6416/6417

### Overview

The LM6413/6416/6417 NMOS 4-bit single-chip microcomputers are optimized for consumer equipment. They are compact and powerful, yet have an excellent cost/performance ratio.

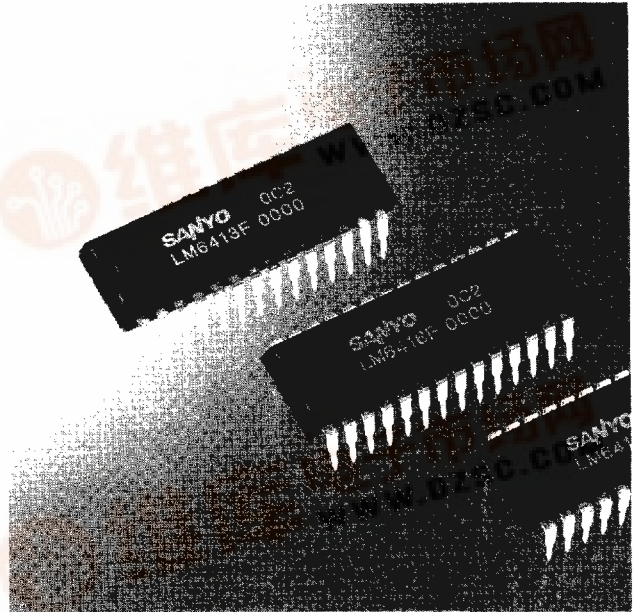
These microcomputers contain a high-speed 4-bit parallel-processing CPU core, 1K to 2K bytes of ROM, 64 to 128 words (by 4 bits) of RAM, a programmable timer, clock generator, and 17 to 21 I/O pins that can withstand up to 15 V and can interface directly with 12 V equipment.

The LM6413/6416/6417 microcomputers have 65 instructions. Their capabilities include subroutine nesting, a wide range of timer settings, automatic stepping of page settings, and pseudo-interrupt functions.

The LM6413/6416/6417 microcomputers are ideal for logic replacement in consumer equipment and for sub-CPU's in multi-CPU systems.

### Features

- Single 5 V power supply with wide voltage operating range (4.5 to 6.5 V)
- N-channel E/D MOS
- CMOS/TTL compatible
- 1K to 2K bytes of ROM, 64 to 128 words (by 4 bits) of RAM
- Wide range of settings for programmable timer
- 17 to 21 I/O pins that can interface directly with 12 V equipment. All ports can withstand 15 V. Normal current output ports provide 20 mA.
- On-chip clock generator (ceramic resonator external)  
LM6413E/16E/17F : RC oscillator  
LM6413F/16F : Ceramic resonator
- Interrupts  
pseudo-interrupts, 1 internal, 1 external
- Schmitt trigger gates on-chip for reset and external interrupt pins



- Subroutine nesting  
2 levels
- Automatic stepping of page settings
- 1 Kbyte and 2 Kbyte versions/instruction and pin-compatible
- High-speed operation  
LM6413E/16E minimum cycle time : 4.0 μs at 4.5 V  
LM6413F/16F/17F minimum cycle time : 2.94 μs at 4.5 V
- Instruction set  
65 instructions

### Applications

- Consumer equipment (logic replacement, sub-CPU of multi-CPU system)
- Other small to mid-scale equipment where low cost is needed (control)

### LM6413/6416/6417

| Type No. | ROM (bits) | RAM (bits) | Cycle time | Ports             |         |             | SI/O | Timers | Package | Evaluation chip | Notes             |
|----------|------------|------------|------------|-------------------|---------|-------------|------|--------|---------|-----------------|-------------------|
|          |            |            |            | Withstand voltage | Current | No. of pins |      |        |         |                 |                   |
| LM6413E  | 2K × 8     | 128 × 4    | 4.0 μs     | 15 V              | 20 mA   | 21          | —    | 1      | DIP-28S | LM64PG98        | RC oscillator     |
| LM6413F  |            |            | 2.94 μs    |                   |         |             |      |        |         |                 | Ceramic resonator |
| LM6416E  | 1K × 8     | 64 × 4     | 4.0 μs     | 15 V              | 20 mA   | 21          | —    | 1      | DIP-28S | LM64PG97        | RC oscillator     |
| LM6416F  |            |            | 2.94 μs    |                   |         |             |      |        |         |                 | Ceramic resonator |
| LM6417F  | 1K × 8     | 64 × 4     | 2.94 μs    | 15 V              | 20 mA   | 17          | —    | 1      | DIP-22  | LM64PG97        | RC oscillator     |

**LM6413/6416 Block Diagram**

