# NEC

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**μPD17134A, μPD17136A**

The μPD17134A and μPD17136A are 4-bit single-chip microcontrollers containing four channels of 8-bit A/D converters, two channels of 8-bit timers, an AC zerocross detector, a power-on reset circuit, and a serial interface in one chip.

For the CPU, the 17K architecture is used. This enables accumulator direct data memory manipulation, facilitating effective programming. Every instruction is one word long, consisting of 16 bits.
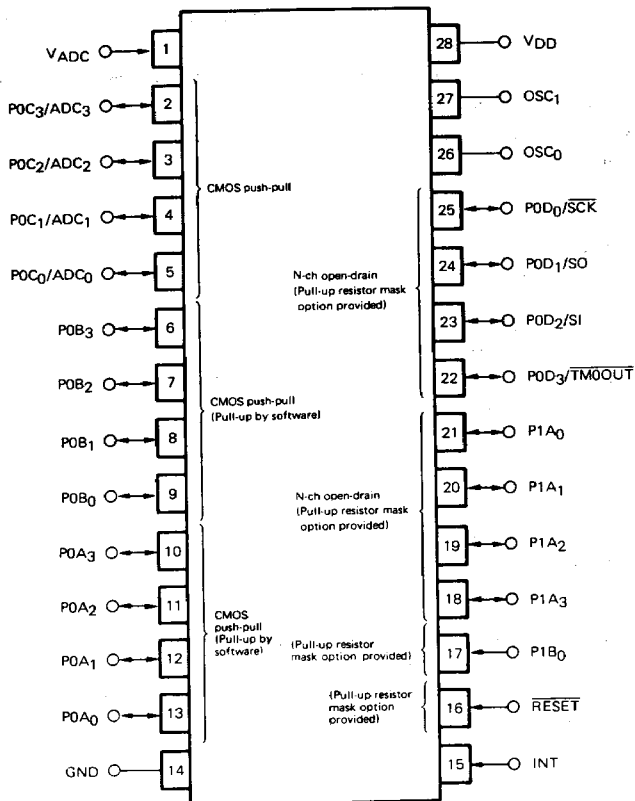
Since the μPD17134A and μPD17136A have the on-chip A/D converters and AC zerocross detector, they can provide economical electronic control in appliances.

For the evaluation of the μPD 17134A and μPD17136A or small production, the μPD17P136A, in which a program can be written once, is provided.

## FEATURES
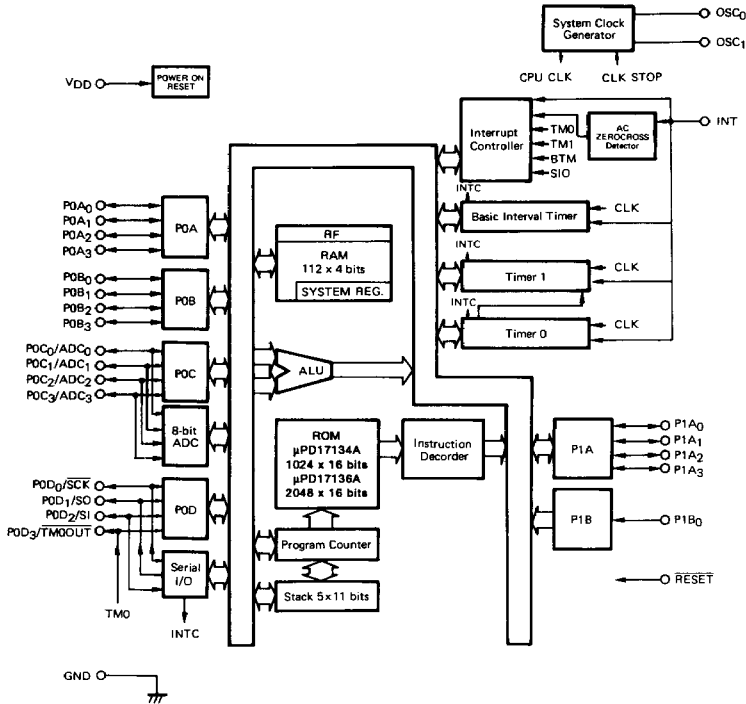
- Program memory (ROM)
  μPD17134A:  2 K bytes (1024 x 16 bits)
  μPD17136A:  4 K bytes (2048 x 16 bits)
- Data memory (RAM):  112 words (112 x 4 bits)
- 35 easy-to-understand instructions
- Instruction execution time:  8 $\mu$s (at 2 MHz) with Resistance, when $V_{DD}$ = 5 V
- Stack level:  5 levels (interrupt: 3 levels)
- Vectored interrupt function:
  5 interrupt sources (INT pin, timer 1, timer 0, basic interval timer, and serial interface)
- 8-bit A/D converter:  4 channels
  Absolute accuracy
  ±1.5 LSB or higher (on 5 V ±10 %)
- AC zerocross detector:  1 input (also used as INT pin)
- 8-bit timer:  2 channels
  Timer 0 count clock ($f_{OSC}$/16, $f_{OSC}$/64, $f_{OSC}$/256, INT pin input)
  Timer 1 count clock ($f_{OSC}$/256, $f_{OSC}$/512, $f_{OSC}$/2048, incrementing timer 0)
- 8-bit basic interval timer:  1 channel. Can be used as watchdog timer
  Basic interval timer count clock (INT pin input, incrementing timer 0, $f_{OSC}$/4096, $f_{OSC}$/8192)
- 3-wire serial interface:  1 channel
- On-chip power-on reset circuit
- I/O pin:  21 pins
- Standby function (HALT/STOP) provided
- Operating temperature:  −40 to +85°C
- Operating voltage:  2.7 to 6.0 V
- CMOS low power consumption

## PIN CONNECTION FOR THE μPD17134A AND μPD17136A (Top View)

```
   V_ADC  ○──▶│ 1 │                    │ 28 │──○ V_DD

POC_3/ADC_3 ○──▶│ 2 │                  │ 27 │──○ OSC_1

POC_2/ADC_2 ○──▶│ 3 │                  │ 26 │──○ OSC_0

                 │        CMOS push-pull        │ 25 │◀──○ POD_0/SCK
POC_1/ADC_1 ○──▶│ 4 │

POC_0/ADC_0 ○──▶│ 5 │      N-ch open-drain      │ 24 │◀──○ POD_1/SO
                          (Pull-up resistor mask
                           option provided)
     POB_3  ○──▶│ 6 │                   │ 23 │◀──○ POD_2/SI

     POB_2  ○──▶│ 7 │  CMOS push-pull   │ 22 │◀──○ POD_3/TM0OUT
                      (Pull-up by software)
     POB_1  ○──▶│ 8 │                   │ 21 │◀──○ P1A_0

     POB_0  ○──▶│ 9 │      N-ch open-drain      │ 20 │◀──○ P1A_1
                          (Pull-up resistor mask
                           option provided)
     POA_3  ○──▶│ 10 │                  │ 19 │◀──○ P1A_2

     POA_2  ○──▶│ 11 │  CMOS            │ 18 │◀──○ P1A_3
                      push-pull
     POA_1  ○──▶│ 12 │ (Pull-up by   (Pull-up resistor   │ 17 │◀──○ P1B_0
                       software)  mask option provided)
     POA_0  ○──▶│ 13 │           (Pull-up resistor   │ 16 │──○ RESET
                                  mask option
                                  provided)
      GND   ○──│ 14 │                  │ 15 │──○ INT
```

28-pin shrink DIP
28-pin SOP

## BLOCK DIAGRAM OF THE µPD17134A AND µPD17136A



## MICROCONTROLLER FAMILY FOR SMALL WHITE GOODS APPLIANCES

| Item | µPD17134A | µPD17136A | µPD17135A | µPD17137A | Remarks |
|---|---|---|---|---|---|
| ROM size | 1024 x 16 bits | 2048 x 16 bits | 1024 x 16 bits | 2048 x 16 bits | |
| RAM size | 112 x 4 bits | 112 x 4 bits | 112 x 4 bits | 112 x 4 bits | |
| Number of I/O port lines | 21 lines | | | | Including 8 N-ch open-drain lines |
| Analog input | 4 channels | | | | Also used as port pins |
| Timer | 3 timers | | | | |
| Serial interface | 1 channel | | | | Also used as port pin |
| Stack | 5 levels | | | | |
| Power-on reset | Provided | | | | |
| System clock | RC source | | Ceramic/crystal source | | |
| Standby function | Provided | | | | STOP/HALT |
| Power supply | 2.7 to 6.0 V | | | | 5 V ±10 % for A/D |
| Package | 28-pin shrink DIP 28-pin SOP | | | | |
| PROM version | µPD17P136A | | µPD17P137A | | |