



N E C ELECTRONICS INC

 μ PD17P401**4-BIT SINGLE-CHIP MICROCONTROLLER FOR VCR CAMERA**

μ PD17P401 is a product which has replaced an on-chip mask ROM in 4-bit single-chip microcontroller μ PD17401 for a VTR camera with an on-time PROM. μ PD17401 allows write operation only once. It is effective for small production of a set, and an earlier start-up.

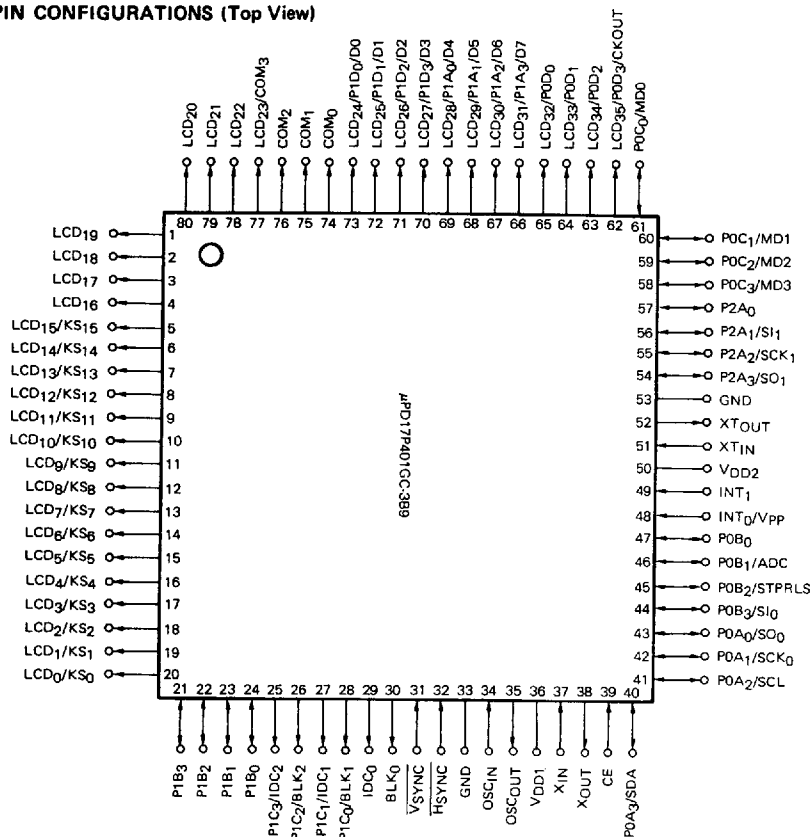
μ PD17P401 incorporates an image display controller (IDC) and an LCD controller/driver. Since it can be operated on the same power-supply voltage as for the mask product, it is the most suitable for preproduction and small production at system development.

FEATURES

- Fully compatible with μ PD17401
- Program memory (one-time PROM): 12288 x 16 bits
- Data memory (RAM): 524 x 4 bits
- Stack level: 7
- Instruction set comprising 36 easy-to-understand instructions
- Decimal operation capability
- Instruction execution time: 1.6 μ s (at 10 MHz oscillator connection)
- On-chip Image Display Controller (IDC) (user programmable)
 - Number of display characters: Up to 155 characters on one screen
 - Display position: 14 lines x 24 digits
 - Character types: 256 types
 - Character format: 10 x 15 dots (Can be fringed)
 - Character size: 4 types can be independently set for each of vertical and horizontal directions. (14, 28, 42, 56H) (2.5, 5.0, 7.5, 10 μ s)
- On-chip LCD controller/driver
 - 35-segment, 4-common or 36-segment, 3-common
- On-chip serial interface (2-system, 3-channel: 3-wire and 2-wire)
- On-chip 6-bit A/D converter: 1 input
- On-chip 32 kHz clock counter ($V_{DD} = 2.2$ to 5.5 V)
- On-chip power failure detection circuit and power-on reset circuit
- Interrupt pins: 2 pins
- Various range of I/O ports
 - Input/output ports: 20 (dual-function pin included)
 - Output ports: 16 (dual-function pin included)
- 5 V $\pm 10\%$
- CMOS low power consumption
- 80-pin plastic QFP (14 x 14 mm)
- Mask PROM product: μ PD17P401GC-xxx-3B9 is available

μ PD17P401

PIN CONFIGURATIONS (Top View)

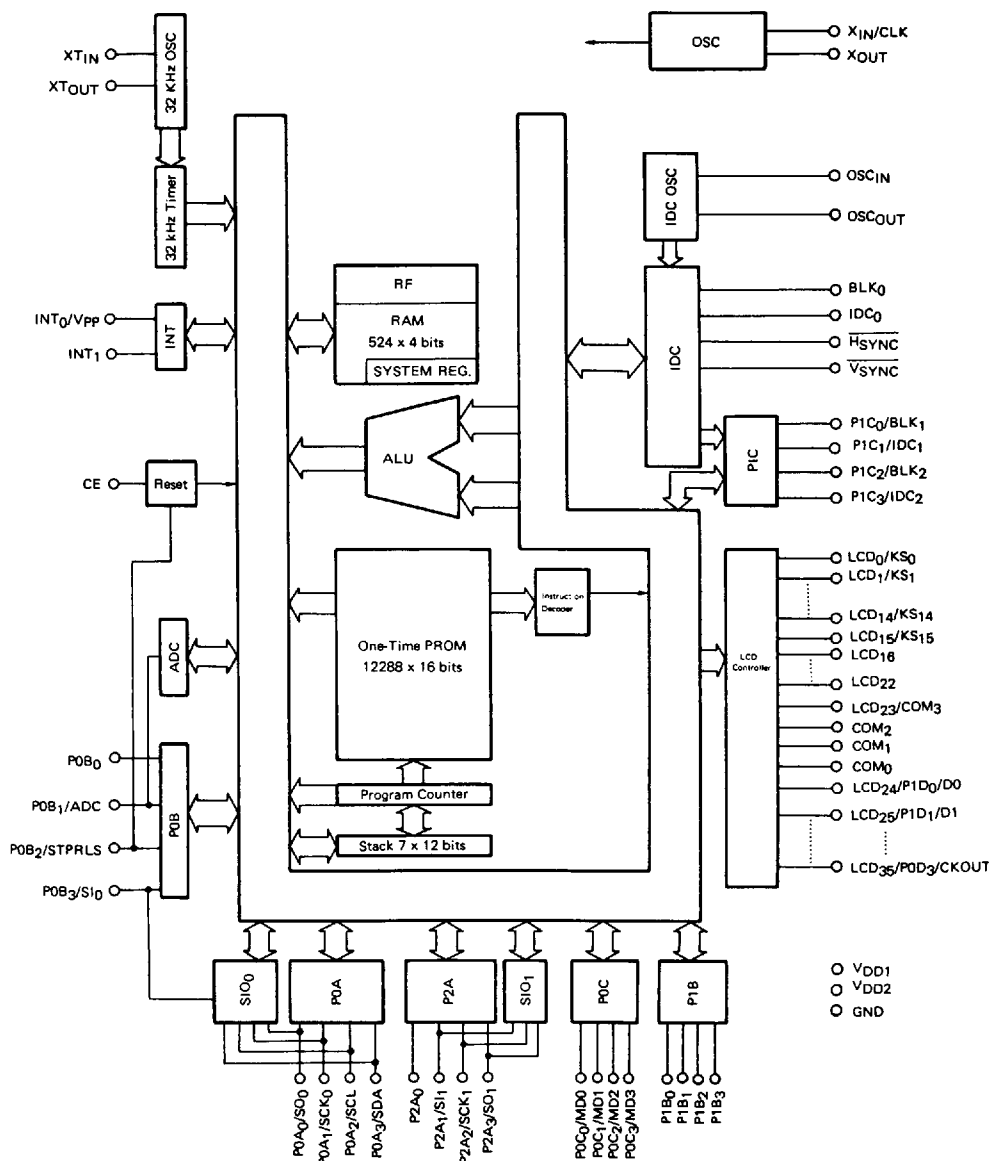


P0A₀ to P0A₃ : Input/output port
 P0B₀to P0B₃ : Input/output port
 P0C₀to P0C₃ : Input/output port
 P0D₀to P0D₃ : Output port
 P1A₀to P1A₃ : Output port
 P1B₀to P1B₃ : Input/output port
 P1C₀to P1C₃ : Output port
 P1D₀to P1D₃ : Output port
 P2A₀to P2A₃ : Input/output port
 KS₀to KS₁₅ : Key source signal output
 LCD₀to LCD₃₅ : LCD segment signal output
 COM₀to COM₃ : LCD common signal output
 CKOUT : Subclock output
 STPRLS : Stop mode release input
 CE : Chip enable input
 INT₀, INT₁ : External interrupt input
 ADC : A/D converter input
 SDA : Serial data input/output

SCL : Serial clock input/output
 SI₀, SI₁ : Serial data input
 SO₀, SO₁ : Serial data output
 SCK₀, SCK₁ : Serial clock input/output
 XIN, XOUT : Oscillation circuit for main clock
 XTIN, XTOUT : Oscillation circuit for subclock
 OSCIN, OSCOUT : Oscillation circuit for IDC
 IDC₀to IDC₂ : IDC Display signal output
 BLK₀to BLK₂ : Blanking signal output
 HSYNC : Horizontal synchronous signal input
 VSYNC : Vertical synchronous signal input
 CLK : Clock input for PROM
 MD0to MD3 : Mode selection input for PROM
 D0to D7 : Data input/output for PROM
 Vpp : Power supply for PROM
 VDD1, VDD2 : Power supply
 GND : Ground

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μPD17P401**BLOCK DIAGRAM**

μPD17P401

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NEC**FUNCTION LIST**

Product Name	μPD17401	μPD17P401
ROM	12288 x 16 bits (mask ROM)	12288 x 16 bits (One-time PROM)
RAM	524 x 4 bits	
System register	12 x 4 bits	
Register file	45 x 4 bits (control register)	
Port register	6 x 4 bits	
Instruction execution time	1.6 μs (at 10 MHz oscillation)	
Stack level	7 levels	
Serial interface	• 2-system, 3 channel 3-wire and 2-wire	
Interrupt	• 2 channels	
Timer	• 2-system 8-bit timer (10 μs, 100 μs, 500 μs, 1 ms (at 10 MHz oscillation)) clock timer (100 ms (at 10 MHz oscillation))	
Standby function	• STOP, HALT	
Power supply voltage	V _{DD} = 4.5 to 5.5 V (32 kHz counter for clock is operated at 2.2 to 5.5 V.	
Package	80-pin plastic QFP (14 x 14 mm)	