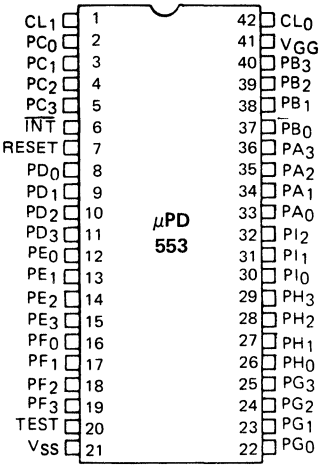
# 4-BIT SINGLE CHIP MICROCOMPUTER

## DESCRIPTION

The μPD553 is a μCOM-43 4-bit single chip microcomputer with high voltage outputs that can be pulled to −35V for direct interfacing to vacuum fluorescent displays. The μPD553 is manufactured with a standard PMOS process, allowing use of a single −10V power supply. The μPD553 provides all of the hardware features of the μCOM-43 family, and executes all 80 instructions of the μCOM-43 instruction set.

## PIN CONFIGURATION




**PIN NAMES**

| | |
|---|---|
| $PA_0$-$PA_3$ | Input Port A |
| $PB_0$-$PB_3$ | Input Port B |
| $PC_0$-$PC_3$ | Input/Output Port C |
| $PD_0$-$PD_3$ | Input/Output Port D |
| $PE_0$-$PE_3$ | Output Port E |
| $PF_0$-$PF_3$ | Output Port F |
| $PG_0$-$PG_3$ | Output Port G |
| $PH_0$-$PH_3$ | Output Port H |
| $PI_0$-$PI_2$ | Output Port I |
| $CL_0$-$CL_1$ | External Clock Signals |
| INT | Interrupt Input |
| RESET | Reset |
| $V_{GG}$ | Power Supply Negative |
| $V_{SS}$ | Power Supply Positive |
| TEST | Factory Test Pin (Connect to $V_{SS}$) |

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## ABSOLUTE MAXIMUM RATINGS*

| | |
|---|---|
| Operating Temperature | −10°C to +70°C |
| Storage Temperature | −40°C to +125°C |
| Supply Voltage | −15 to +0.3 Volts |
| Input Voltages (Port A, B, INT, RESET) | −15 to +0.3 Volts |
| (Ports C, D) | −40 to +0.3 Volts |
| Output Voltages | −40 to +0.3 Volts |
| Output Current (Ports C through I, each bit) | −12 mA |
| (Total, all ports) | −60 mA |

COMMENT: Stress above those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

*$T_a = 25°C$

## DC CHARACTERISTICS

$T_a$ = −10°C to +70°C; $V_{GG}$ = −10V ± 10%

| PARAMETER | SYMBOL | LIMITS MIN | LIMITS TYP | LIMITS MAX | UNIT | TEST CONDITIONS |
|---|---|---|---|---|---|---|
| Input Voltage High | $V_{IH}$ | 0 | | −3.5 | V | Ports A through D, $\overline{INT}$, RESET |
| Input Voltage Low | $V_{IL_1}$ | −7.5 | | $V_{GG}$ | V | Ports A, B, $\overline{INT}$, RESET |
| | $V_{IL_2}$ | −7.5 | | −35 | V | Ports C, D |
| Clock Voltage High | $V_{\phi H}$ | 0 | | −0.8 | V | $CL_0$ Input, External Clock |
| Clock Voltage Low | $V_{\phi L}$ | −6.0 | | $V_{GG}$ | V | $CL_0$ Input, External Clock |
| Input Leakage Current High | $I_{LIH}$ | | | +10 | μA | Ports A through D, $\overline{INT}$, RESET, $V_I$ = −1V |
| Input Leakage Current Low | $I_{LIL_1}$ | | | −10 | μA | Ports A through D, $\overline{INT}$, RESET, $V_I$ = −11V |
| | $I_{LIL_2}$ | | | −30 | μA | Ports C, D, $V_I$ = −35V |
| Clock Input Leakage Current High | $I_{L\phi H}$ | | | +200 | μA | $CL_0$ Input, $V_{\phi H}$ = 0V |
| Clock Input Leakage Current Low | $I_{L\phi L}$ | | | −200 | μA | $CL_0$ Input, $V_{\phi L}$ = −11V |
| Output Voltage High | $V_{OH}$ | | | −2.0 | V | Ports C through I, $I_{OH}$ = −8 mA |
| Output Leakage Current Low | $I_{LOL_1}$ | | | −10 | μA | Ports C through I, $V_O$ = −11V |
| | $I_{LOL_2}$ | | | −30 | μA | Ports C through I, $V_O$ = −35V |
| Supply Current | $I_{GG}$ | | −30 | −50 | mA | |

## CAPACITANCE

$T_a$ = 25°C

| PARAMETER | SYMBOL | LIMITS MIN | LIMITS TYP | LIMITS MAX | UNIT | TEST CONDITIONS |
|---|---|---|---|---|---|---|
| Input Capacitance | $C_I$ | | | 15 | pF | f = 1 MHz |
| Output Capacitance | $C_O$ | | | 15 | pF | |
| Input/Output Capacitance | $C_{IO}$ | | | 15 | pF | |

## AC CHARACTERISTICS

$T_a$ = −10°C to +70°C; $V_{GG}$ = −10V ± 10%

| PARAMETER | SYMBOL | LIMITS MIN | LIMITS TYP | LIMITS MAX | UNIT | TEST CONDITIONS |
|---|---|---|---|---|---|---|
| Oscillator Frequency | f | 150 | | 440 | KHz | |
| Rise and Fall Times | $t_r$, $t_f$ | 0 | | 0.3 | μs | EXTERNAL CLOCK |
| Clock Pulse Width High | $t_{\phi W_H}$ | 0.5 | | 5.6 | μs | |
| Clock Pulse Width Low | $t_{\phi W_L}$ | 0.5 | | 5.6 | μs | |

## CLOCK WAVEFORM