

Description

The μPD27128 is a 131,072-bit (16,384 × 8) electrically programmable read-only memory (EPROM). It operates from a single +5V supply making it ideal for microprocessor applications. It features an output enable control and offers a standby mode with reduction in power consumption.

A distinctive feature of the μPD27128 is a separate output enable control (OE) in addition to the chip enable control (CE). The OE control eliminates bus contention in multiple-bus microprocessor systems. The μPD27128 features conventional, simple one-pulse programming controlled by TTL-level signals as well as a high-speed programming mode. Total programming time for all 131,072 bits is 820 seconds for the conventional mode, and typically 120 seconds for the high-speed mode.

The μPD27128 is available in a cerdip package as an ultraviolet (UV), erasable EPROM, or in a plastic package as a one-time-programmable (OTP), non-erasable EPROM.

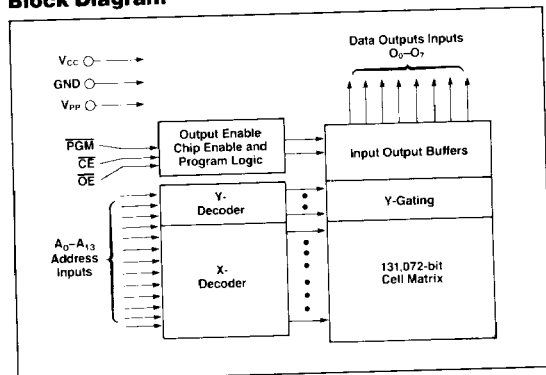
Features

- Ultraviolet erasable and electrically programmable
- Access time—200ns max
- Low power dissipation: 100mA max active current
25mA max standby current
- High-speed programming mode (typical program time 120s)
- Programmable with single pulse (total program time 820s)
- Industry standard pinout (JEDEC approved)
- 4 performance ranges

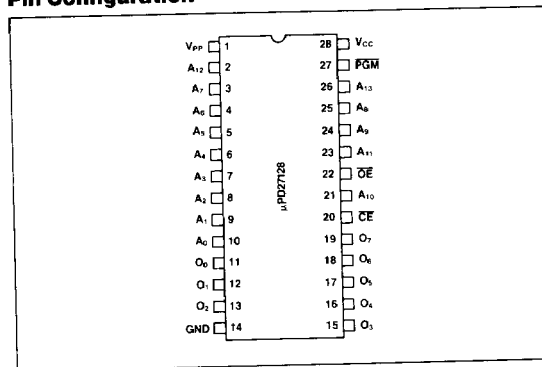
Device	Max Access Time	Max Vcc Supply Current	
		Active	Standby
μPD27128-2	200ns	100mA	25mA
μPD27128-3	250ns	100mA	25mA
μPD27128-3S	300ns	100mA	25mA
μPD27128-4	450ns	100mA	25mA

Note: 1 Available as either UV or OTP

Block Diagram



Pin Configuration



Pin Identification

Pin	Address
A0-A13	Addresses
OE	Output Enable
O0-O7	Data Outputs
CE	Chip Enable
PGM	Program

Mode Selection

Mode	Pins	CE (20)	OE (22)	PGM (27)	Vpp (1)	Vcc (28)	Outputs (11-13, 15-19)
Read		V _{IL}	V _{IL}	V _{IH}	V _{CC}	V _{CC}	DOUT
Standby		V _{IH}	X	X	V _{CC}	V _{CC}	High Z
Program		V _{IL}	V _{IH}	V _{IL}	V _{PP}	V _{CC}	DIN
Program Verify		V _{IL}	V _{IL}	V _{IH}	V _{PP}	V _{CC}	DOUT
Program Inhibit		V _{IH}	X	X	V _{PP}	V _{CC}	High Z
High Speed Programming		V _{IL}	V _{IH}	V _{IL}	V _{PP}	V _{CC}	DIN

Note: X can be either V_{IL} or V_{IH}.

Absolute Maximum Ratings*

Operating Temperature	-10°C to +80°C
Storage Temperature	-65°C to +125°C
Output Voltage	-0.6V to 7.0V
Input Voltage	-0.6V to 7.0V
Supply Voltage Vcc	-0.6V to 7.0V
Supply Voltage Vpp	-0.6V to +22V

* COMMENT: Exposing the device to stresses above those listed in Absolute Maximum Ratings could cause permanent damage. The device is not meant to be operated under conditions outside the limits described in the operational sections of this specification. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

Capacitance

T_A = 25°C; f = 1MHz

Parameter	Symbol	Limits			Unit	Test Conditions
		Min	Typ	Max		
Input Capacitance	C _{IN}		4	8	pF	V _{IN} = 0V
Output Capacitance	C _{OUT}		8	14	pF	V _{OUT} = 0V

DC Characteristics

Read Mode and Standby Mode

T_A = 0°C to +70°C; V_{CC} = +5V ± 5%; V_{PP} = V_{CC}

Parameter	Symbol	Limits			Unit	Test Conditions	
		Min	Typ	Max			
Output High Voltage	V _{OH}	2.4			V	I _{OH} = -400μA	
Output Low Voltage	V _{OL}		0.45		V	I _{OL} = 2.1mA	
Input High Voltage	V _{IH}	2.0		V _{CC} + 1	V		
Input Low Voltage	V _{IL}	-0.1		0.8	V		
Output Leakage Current	I _{LO}		10		μA	V _{OUT} = 5.25V	
Input Leakage Current	I _{LI}		10		μA	V _{IN} = 5.25V	
V _{CC} Current	Standby	I _{CC1}		25		mA	CE = V _{IH}
	Active	I _{CC2}	60	100		mA	OE = CE = V _{IL}
V _{PP} Current	I _{PP1}		15			mA	V _{PP} = 5.25V

Program, Program Verify, and Program Inhibit Modes

T_A = 25°C ± 5°C; V_{CC} ⊕ = +5V ± 5%; V_{PP} = +21V ± 0.5V

Parameter	Symbol	Limits			Unit	Test Conditions	
		Min	Typ	Max			
Input High Voltage	V _{IH}	2.0		V _{CC} + 1	V		
Input Low Voltage	V _{IL}	-0.1		0.8	V		
Input Leakage Current	I _{LI}		10		μA	V _{IN} = V _{IL} or V _{IH}	
Output High Voltage	V _{OH}	2.4			V	I _{OH} = -400μA	
Output Low Voltage	V _{OL}		0.45		V	I _{OL} = 2.1mA	
V _{CC} Current	Program Inhibit	I _{CC1}		25mA			CE = V _{IH}
	Program Verify	I _{CC2}		100mA			
V _{PP} Current	Program	I _{PP2}		30mA			CE = PGM = V _{IL}
	Program Verify	I _{PP3}		15mA			CE = V _{IL} PGM = V _{IH}
V _{PP} Current	Program Inhibit	I _{PP4}		15mA			CE = V _{IH}

Note: ⊕ V_{CC} = 6V ± 0.25V for high-speed programming.

AC Characteristics

Read Mode and Standby Mode

T_A = 0°C to +70°C; V_{CC} = +5V ± 5%; V_{PP} = V_{CC}

Parameter	Symbol	Limits								Test Conditions	
		27128-2		27128-3 ⊕		27128-3 ⊕		27128-4 ⊕			
Min	Max	Min	Max	Min	Max	Min	Max	Unit			
Address to Output Delay	t _{ACC}	200	250			300	450	ns	CE = OE = V _{IL}		
CE to Output Delay	t _{CE}	200	250			300	450	ns	OE = V _{IL}		
Output Enable to Output Delay	t _{OE}	75	100			120	150	ns	CE = V _{IL}		
Output Enable High to Output Delay	t _{OE}	0	60	0	85	0	105	0	130	ns	CE = V _{IL}
Address to Output Hold Time	t _{OH}	0	0	0	0	0	0	ns	CE = OE = V _{IL}		

Note: ⊕ Available as either UV or OTP.

Test Conditions—

Output Load: See Fig. 1.

Input Rise and Fall Times: 20ns

Input Pulse Levels: 0.45V to 2.4V

Timing Measurement Reference Levels:

Inputs: 0.8V and 2.0V

Outputs: 0.8V and 2.0V

AC Characteristics (Cont.)

Program, Program Verify, and Program Inhibit Modes

T_A = 25°C ± 5°C; V_{CC} = +5V ± 5%; V_{PP} = +21V ± 0.5V

Parameter	Symbol	Limits			Unit	Test Conditions
		Min	Typ	Max		
Address Setup Time	t _{AS}	2			μs	Input Pulse Levels = 0.45V to 2.4V
OE Setup Time	t _{OES}	2			μs	Input Timing Reference Level = 0.8V and 2.0V
Data Setup Time	t _{DS}	2			μs	Reference Level = 0.8V and 2V
Address Hold Time	t _{AH}	0			μs	Output Timing Reference Level = 0.8V and 2V
CE Setup Time	t _{CES}	2			μs	Input Rise and Fall Times: 20ns
Data Hold Time	t _{DH}	2			μs	
Chip Enable to Output Float Delay	t _{DF}	0		130	ns	
Data Valid from OE	t _{OE}			150	ns	
Program Pulse Width ⊕	t _{PW}	45	50	55	ms	
V _{PP} Setup Time	t _{VS}	2			μs	

Note: ⊕ V_{CC} = 6V ± 0.25V and t_{PW} = 1 ms ± 5% for high-speed programming

Test Conditions—

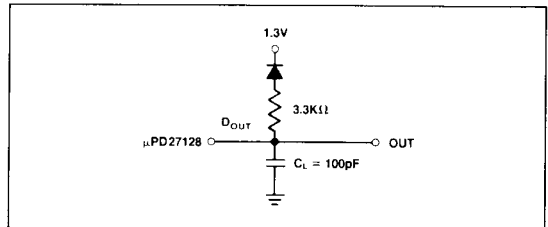
Input Pulse Levels = 0.45V to 2.4V

Input Timing Reference Level = 0.8V and 2.0V

Output Timing Reference Level = 0.8V and 2V

Input Rise and Fall Times: 20ns

Figure 1. Loading Conditions Test Circuit



Function

The μPD27128 operates from a single +5V power supply making it ideal for microprocessor applications.

The μPD27128 features a standby mode which reduces the power dissipation.

Operation

The six operation modes of the μPD27128 are listed in Table 1. In the read mode the only power supply required is a +5V supply. During programming all inputs are TTL levels except for V_{PP} which rises from V_{CC} level to 21V.

Read Mode

When CE and OE are at a low (0) level, Read is set and data is available at the outputs after t_{OE} from the falling edge of OE and t_{ACC} after setting the address.

Standby Mode

The μPD27128 is placed in a standby mode with the application of a high (1) level TTL signal to the CE input. In this mode the outputs are in a high impedance state, independent of the OE input. The active power dissipation is also reduced.

Programming Modes

The μPD27128 can be programmed in two ways: (1) conventional programming mode, and (2) high-speed programming mode. In the conventional mode, basically a 50ms PGM pulse is applied to each bit location. The high-speed

