

PY291A

2K x 8 REPROGRAMMABLE PROM



FEATURES

- EPROM Technology for reprogramming
- High Speed
 - 20/25/35/50 ns (Commercial)
 - 25/35/50 ns (Industrial)
 - 35/50 ns (Military)
- Low Power Operation: 660 mW
- Single 5V±10% Power Supply
- Windowed devices for reprogramming
- Fully TTL Compatible Inputs and Outputs
- Standard Pinout (JEDEC Approved)
 - 24-Pin 300 mil DIP
 - Windowed Cerdip
 - Non-Windowed Cerdip
 - Non-Windowed Plastic DIP



DESCRIPTION

The PY291A is a 2Kx8 CMOS PROM. The device is available in windowed packages which when exposed to UV light, the memory content in the PROM is erased and can be reprogrammed. EPROM technology is used in the memory cells for programming. The EPROM requires a 12.5V for programming. Devices are tested to insure that performance of the device meets the DC and AC specification limits after customer programming.

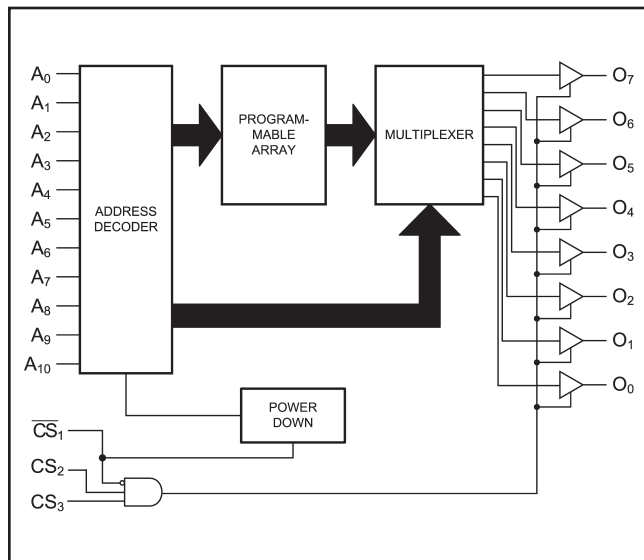
and CS_2 and CS_3 are HIGH. The memory contents in the address established by the Address pins (A_0 to A_{10}) will become available on the outputs (O_0 to O_7).

The PY291A is available in 24-pin 300 mil Ceramic DIPs (CERDIP, Windowed and Non-Windowed) and Plastic DIPs (Non-Windowed).

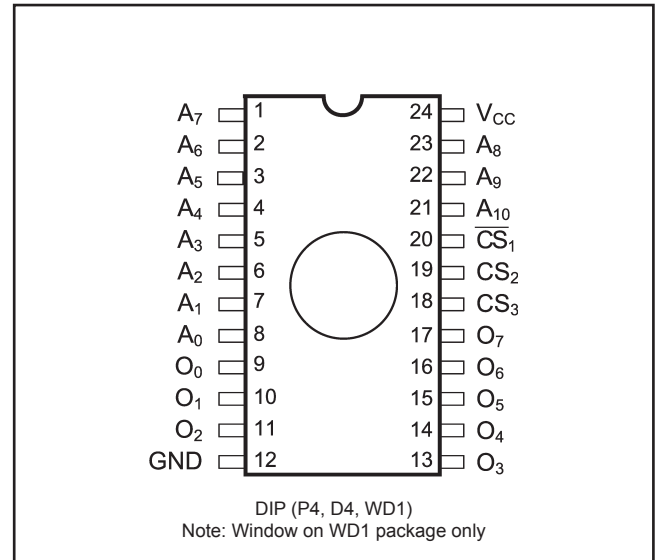
To perform a read operation from the device, \overline{CS}_1 is LOW



FUNCTIONAL BLOCK DIAGRAM



PIN CONFIGURATION



MAXIMUM RATINGS⁽¹⁾

| Symbol | Parameter | Value | Unit |
|------------|---|------------------------|------|
| V_{CC} | Power Supply Pin with Respect to GND | -0.5 to +7 | V |
| V_{TERM} | Terminal Voltage with Respect to GND (up to 7.0V) | -0.5 to $V_{CC} + 0.5$ | V |
| V_{PP} | Program Voltage | 13 | V |

| Symbol | Parameter | Value | Unit |
|------------|------------------------|-------------|------|
| T_A | Operating Temperature | -55 to +125 | °C |
| T_{BIAS} | Temperature Under Bias | -55 to +125 | °C |
| T_{STG} | Storage Temperature | -65 to +150 | °C |
| P_T | Power Dissipation | 1.0 | W |
| I_{OUT} | DC Output Current | 50 | mA |

RECOMMENDED OPERATING CONDITIONS

| Grade ⁽²⁾ | Ambient Temp | Gnd | Vcc |
|----------------------|-----------------|-----|-----------|
| Commercial | 0°C to +70°C | 0V | 5.0V ±10% |
| Industrial | -40°C to +85°C | 0V | 5.0V ±10% |
| Military | -55°C to +125°C | 0V | 5.0V ±10% |

CAPACITANCES⁽⁴⁾

($V_{CC} = 5.0V$, $T_A = 25^\circ C$, $f = 1.0MHz$)

| Symbol | Parameter | Conditions | Typ. | Unit |
|-----------|--------------------|----------------|------|------|
| C_{IN} | Input Capacitance | $V_{IN} = 0V$ | 10 | pF |
| C_{OUT} | Output Capacitance | $V_{OUT} = 0V$ | 10 | pF |

DC ELECTRICAL CHARACTERISTICS

Over recommended operating temperature and supply voltage⁽²⁾

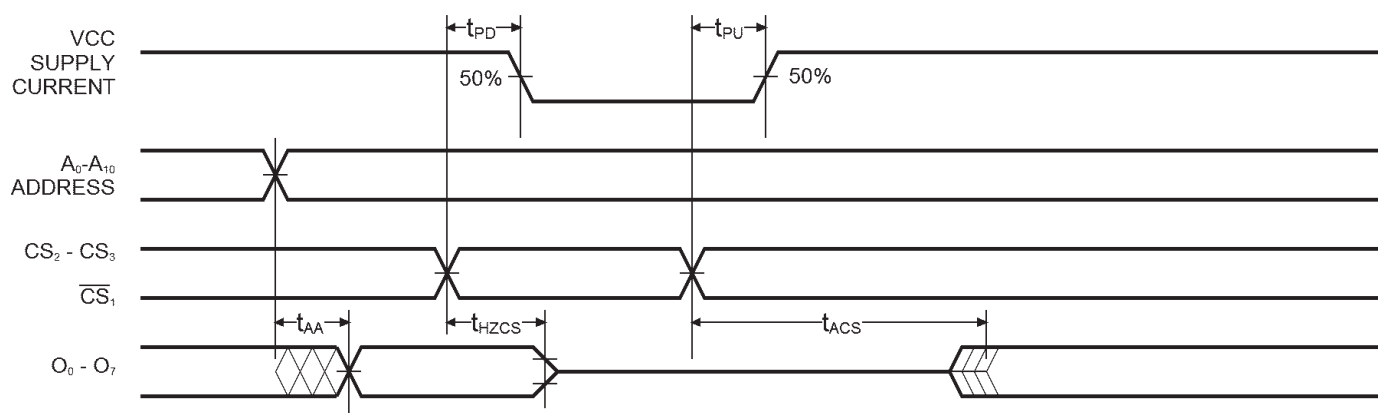
| Symbol | Parameter | Test Conditions | PY291A | | Unit |
|-----------|--------------------------------|--|---------------------|----------------|------|
| | | | Min | Max | |
| V_{IH} | Input High Voltage | | 2.0 | V_{CC} | V |
| V_{IL} | Input Low Voltage | | -0.5 ⁽³⁾ | 0.8 | V |
| V_{HC} | CMOS Input High Voltage | | $V_{CC} - 0.2$ | $V_{CC} + 0.5$ | V |
| V_{LC} | CMOS Input Low Voltage | | -0.5 ⁽³⁾ | 0.2 | V |
| V_{OL} | Output Low Voltage (TTL Load) | $I_{OL} = +16\text{ mA}$, $V_{CC} = \text{Min.}$ | | 0.4 | V |
| V_{OH} | Output High Voltage (TTL Load) | $I_{OH} = -4\text{ mA}$, $V_{CC} = \text{Min.}$ | 2.4 | | V |
| I_{LI} | Input Leakage Current | $V_{CC} = \text{Max.}$ $V_{IN} = \text{GND to } V_{CC}$ | -10 | +10 | µA |
| I_{LO} | Output Leakage Current | $V_{CC} = \text{Max.}$, $\overline{CE} = V_{IH}$, $V_{OUT} = \text{GND to } V_{CC}$ | -10 | +10 | µA |
| V_{PP} | Programming Supply Voltage | | 12 | 13 | V |
| I_{PP} | Programming Supply Current | | | 50 | mA |
| V_{IHP} | Input HIGH Programming Voltage | | 3.0 | | V |
| V_{ILP} | Input LOW Programming Voltage | | | 0.4 | V |

POWER DISSIPATION CHARACTERISTICS VS. SPEED

| Symbol | Parameter | Temperature Range | -20 | -25 | -35 | -50 | Unit |
|----------|----------------------------|-------------------|-----|-----|-----|-----|------|
| I_{CC} | Dynamic Operating Current* | Commercial | 120 | 90 | 90 | 90 | mA |
| | | Industrial | N/A | 90 | 90 | 90 | mA |
| | | Military | N/A | N/A | 90 | 90 | mA |

AC ELECTRICAL CHARACTERISTICS—READ CYCLE $(V_{CC} = 5V \pm 10\%$, All Temperature Ranges)⁽²⁾

| Symbol | Parameter | -20 | | -25 | | -35 | | -50 | | Unit |
|-------------|------------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|------|
| | | Min | Max | Min | Max | Min | Max | Min | Max | |
| t_{AA} | Address to Output Valid | | 20 | | 25 | | 35 | | 50 | ns |
| t_{HZCS1} | Chip Select Inactive to High Z | | 15 | | 15 | | 20 | | 20 | ns |
| t_{ACS1} | Chip Select Active to Output Valid | | 15 | | 15 | | 20 | | 20 | ns |
| t_{HZCS2} | Chip Select Inactive to High Z | | 22 | | 27 | | 35 | | 45 | ns |
| t_{ACS2} | Chip Select Active to Output Valid | | 22 | | 27 | | 35 | | 45 | ns |
| t_{PU} | Chip Select Active to Power-Up | 0 | | 0 | | 0 | | 0 | | ns |
| t_{PD} | Chip Slect Inactive to Power-Down | | 22 | | 27 | | 35 | | 45 | ns |

TIMING WAVEFORM OF READ CYCLE**Notes:**

1. Stresses greater than those listed under 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 MAXIMUM rating conditions for extended periods may affect reliability.
2. Extended temperature operation guaranteed with 400 linear feet per minute of air flow.
3. Transient inputs with V_{IL} and I_{IL} not more negative than $-3.0V$ and $-100mA$, respectively, are permissible for pulse widths up to 20ns.
4. This parameter is sampled and not 100% tested.

DEVICE ERASURE

If the device is subjected to wavelengths of light below 4000 Angstroms, device erasure will commence. It is therefore recommended to use an opaque label over the window in the event the device will be exposed to lighting for a long time. The UV dose for erasure requires a wavelength of 2,537 Angstroms for a minimum dose

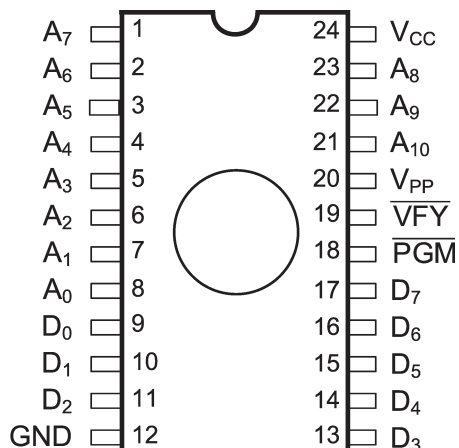
of 25 Wsec/cm². If using a UV lamp of 12 mW/cm², the exposure time is estimated to be 35 minutes. Devices should be positioned within 1 inch of the lamp during the erasure process. Permanent damage can occur to the devices if exposed to UV light for an extended period of time.

MODE SELECTION

| Mode | Pin Function | | | | | |
|---------------------|------------------------|---------------------------------|------------------|------------------|-------------------|--------------------------------|
| | Read or Output Disable | A ₁₀ -A ₀ | CS ₃ | CS ₂ | \overline{CS}_1 | O ₇ -O ₀ |
| | Other | A ₁₀ -A ₀ | \overline{PGM} | \overline{VFY} | V _{PP} | D ₇ -D ₀ |
| Read | | A ₁₀ -A ₀ | V _{IH} | V _{IH} | V _{IL} | O ₇ -O ₀ |
| Output Disable | | A ₁₀ -A ₀ | X | X | V _{IH} | High Z |
| Output Disable | | A ₁₀ -A ₀ | X | V _{IL} | X | High Z |
| Output Disable | | A ₁₀ -A ₀ | V _{IL} | X | X | High Z |
| Program | | A ₁₀ -A ₀ | V _{ILP} | V _{IHP} | V _{PP} | D ₇ -D ₀ |
| Program Verify | | A ₁₀ -A ₀ | V _{IHP} | V _{ILP} | V _{PP} | O ₇ -O ₀ |
| Program Inhibit | | A ₁₀ -A ₀ | V _{IHP} | V _{IHP} | V _{PP} | High Z |
| Intelligent Program | | A ₁₀ -A ₀ | V _{ILP} | V _{IHP} | V _{PP} | D ₇ -D ₀ |
| Blank Check Zeros | | A ₁₀ -A ₀ | V _{IHP} | V _{ILP} | V _{PP} | Zeros |

X = Don't Care

PROGRAMMING PINOUTS



AC TEST CONDITIONS

| | |
|-------------------------------|---------------------|
| Input Pulse Levels | GND to 3.0V |
| Input Rise and Fall Times | 3ns |
| Input Timing Reference Level | 1.5V |
| Output Timing Reference Level | 1.5V |
| Output Load | See Figures 1 and 2 |

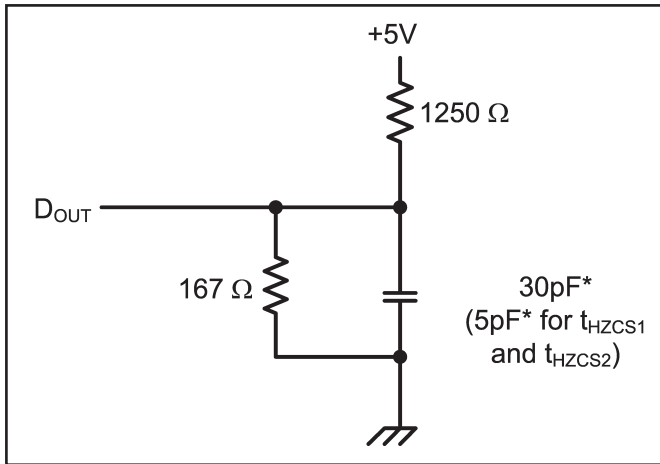


Figure 1. Output Load

* including scope and test fixture.

Note:

Because of the ultra-high speed of the PY291A, care must be taken when testing this device; an inadequate setup can cause a normal functioning part to be rejected as faulty. Long high-inductance leads that cause

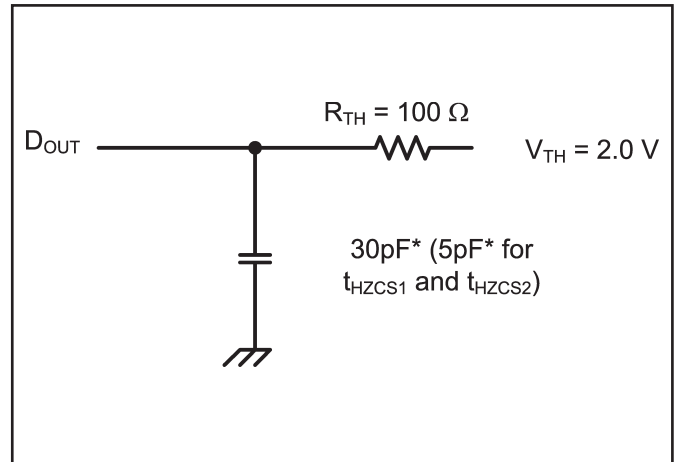
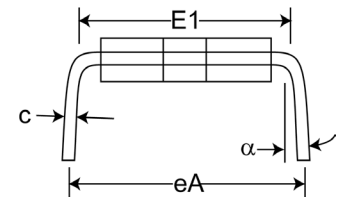
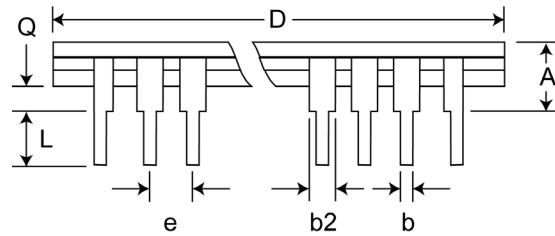
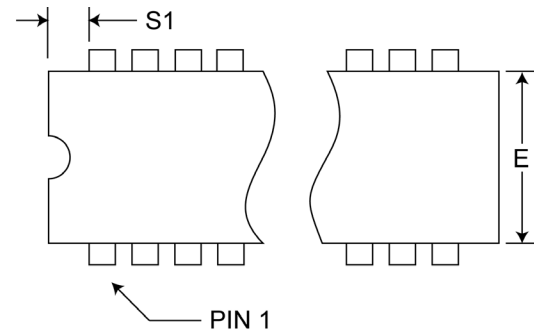


Figure 2. Thevenin Equivalent

supply bounce must be avoided by bringing the V_{CC} and ground planes directly up to the contactor fingers. A 0.01 μ F high frequency capacitor is also required between V_{CC} and ground.

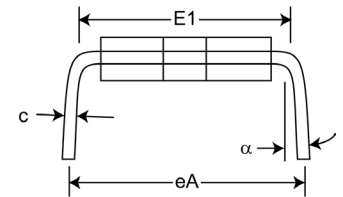
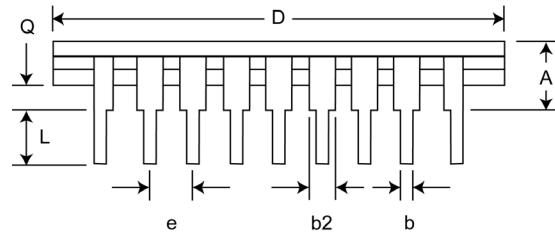
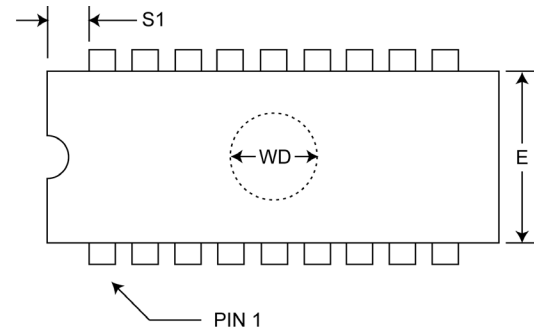
| Pkg # | D4 | |
|----------|--------------|-------|
| # Pins | 24 (300 mil) | |
| Symbol | Min | Max |
| A | - | 0.200 |
| b | 0.014 | 0.026 |
| b2 | 0.045 | 0.065 |
| C | 0.008 | 0.018 |
| D | - | 1.280 |
| E | 0.220 | 0.310 |
| eA | 0.300 BSC | |
| e | 0.100 BSC | |
| L | 0.125 | 0.200 |
| Q | 0.015 | 0.060 |
| S1 | 0.005 | - |
| α | 0° | 15° |

CERAMIC DUAL IN-LINE PACKAGE (NON-WINDOWED)



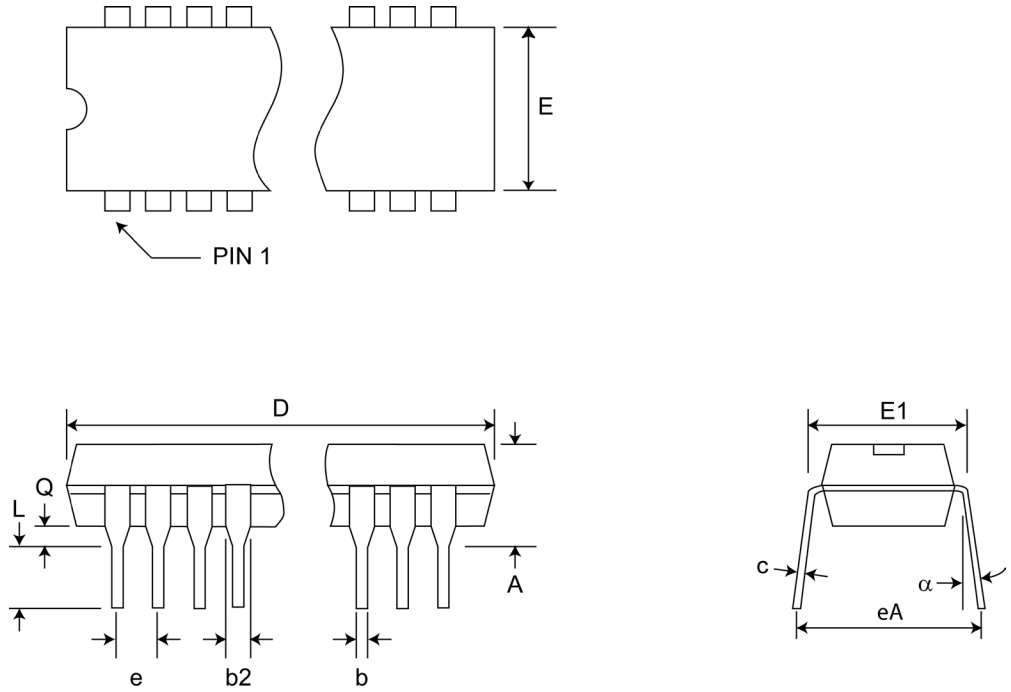
| Pkg # | WD1 | |
|----------|--------------|-------|
| # Pins | 24 (300 mil) | |
| Symbol | Min | Max |
| A | - | 0.200 |
| b | 0.014 | 0.026 |
| b2 | 0.045 | 0.065 |
| C | 0.008 | 0.018 |
| D | - | 1.280 |
| E | 0.220 | 0.310 |
| eA | 0.300 BSC | |
| e | 0.100 BSC | |
| L | 0.125 | 0.200 |
| Q | 0.015 | 0.060 |
| S1 | 0.005 | - |
| α | 0° | 15° |
| WD | 0.175 | |

CERAMIC DUAL IN-LINE PACKAGE (WINDOWED)



| Pkg # | P4 | |
|----------|--------------|-------|
| # Pins | 24 (300 Mil) | |
| Symbol | Min | Max |
| A | - | 0.210 |
| A1 | 0.015 | - |
| b | 0.014 | 0.022 |
| b2 | 0.045 | 0.070 |
| C | 0.008 | 0.014 |
| D | 1.230 | 1.280 |
| E1 | 0.240 | 0.280 |
| E | 0.280 | 0.325 |
| e | 0.100 BSC | |
| eB | - | 0.430 |
| L | 0.115 | 0.160 |
| α | 0° | 15° |

PLASTIC DUAL IN-LINE PACKAGE



REVISIONS

| | |
|------------------------|-----------------------------------|
| DOCUMENT NUMBER | EPROM101 |
| DOCUMENT TITLE | PY291A 2K x 8 REPROGRAMMABLE PROM |

| REV | ISSUE DATE | ORIGINATOR | DESCRIPTION OF CHANGE |
|------------|-------------------|-------------------|------------------------------------|
| OR | Jun-2007 | JDB | New Data Sheet |
| 01 | Mar-2010 | JDB | Added Industrial Temperature Range |