



CYPRESS

CY27C64

8K x 8 EPROM

Features

- CMOS for optimum speed/power
- Windowed for reprogrammability
- High speed
 - 70 ns (commercial)
- Low power
 - 440 mW (commercial)
 - 530 mW (military)
- Super low standby power
 - Less than 85 mW when deselected
- EPROM technology 100% programmable
- 5V $\pm 10\%$ V_{CC}, commercial and military

TTL-compatible I/O

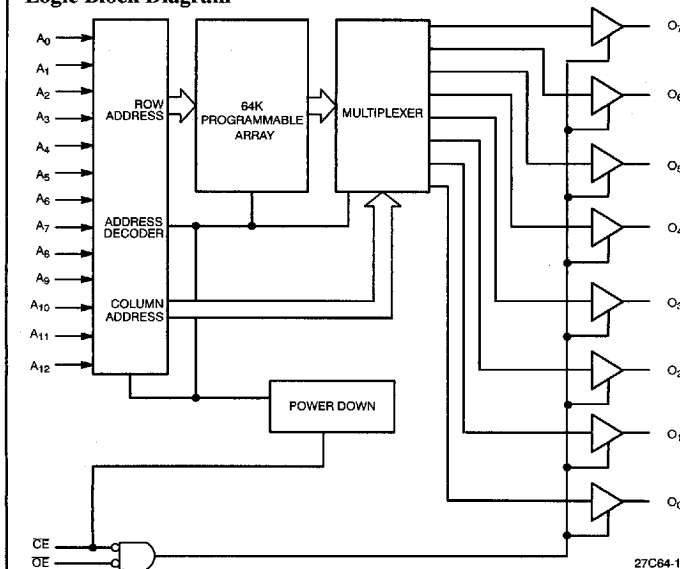
Functional Description

The CY27C64 is a high-performance 8192 word by 8 bit CMOS PROM. When deselected, the CY27C64 automatically powers down into a low-power standby mode. It is packaged in a 600-mil-wide package. The reprogrammable packages are equipped with an erasure window; when exposed to UV light, these EPROMs are erased and can then be reprogrammed. The memory cells utilize proven EPROM floating-gate technology and byte-wide intelligent programming algorithms.

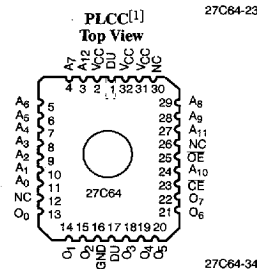
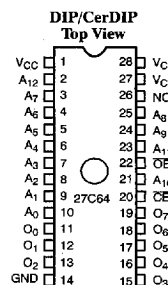
The EPROM cell requires only 12.5V for the super voltage and low-current requirements allow for gang programming. The EPROM cells allow for each memory location to be tested 100%, as each location is written into, erased, and repeatedly exercised prior to encapsulation. Each EPROM is also tested for AC performance to guarantee that after customer programming, the product will meet DC and AC specification limits.

Reading is accomplished by placing an active LOW signal on OE and CE. The contents of the memory location addressed by the address lines (A₀ through A₁₂) will become available on the output lines (O₀ through O₇).

Logic Block Diagram



Pin Configurations



Selection Guide

| | | 27C64-70 | 27C64-90 | 27C64-120 | 27C64-150 | 27C64-200 |
|--------------------------------|------------|----------|----------|-----------|-----------|-----------|
| Maximum Access Time (ns) | | 70 | 90 | 120 | 150 | 200 |
| Maximum Operating Current (mA) | Commercial | 80 | 80 | 80 | 80 | 80 |
| | Military | 100 | 100 | 100 | 100 | 100 |
| Maximum Standby Current (mA) | Commercial | 15 | 15 | 15 | 15 | 15 |
| | Military | 15 | 15 | 15 | 15 | 15 |

Note:

1. Pins 1 and 17 are common and tied to the die attach pad. They should not be used.

Maximum Ratings

(Above which the useful life may be impaired. For user guidelines, not tested.)

Storage Temperature -65°C to +150°C

Ambient Temperature with
Power Applied -55°C to +125°C

Supply Voltage to Ground Potential
(DIP Pin 28 to Pin 14) -0.5V to +7.0V

DC Voltage Applied to Outputs
in High Z State -0.5V to +7.0V

DC Input Voltage -3.0V to +7.0V

DC Program Voltage 13.0V

Static Discharge Voltage > 2001V
(per MIL-STD-883, Method 3015)

Latch-Up Current > 200 mA

UV Exposure 7258 Wsec/cm²

Operating Range

| Range | Ambient Temperature | V _{CC} |
|---------------------------|---------------------|-----------------|
| Commercial | 0°C to +70°C | 5V ± 10% |
| Industrial ^[2] | -40°C to +85°C | 5V ± 10% |
| Military ^[3] | -55°C to +125°C | 5V ± 10% |

Electrical Characteristics Over the Operating Range^[4,5]

| Parameter | Description | Test Conditions | Min. | Max. | Unit |
|-----------------|---|--|--------|------|------|
| V _{OH} | Output HIGH Voltage | V _{CC} = Min., I _{OH} = -4.0 mA | 2.4 | | V |
| V _{OL} | Output LOW Voltage | V _{CC} = Min., I _{OL} = 16.0 mA | | 0.4 | V |
| V _{IH} | Input HIGH Voltage | | 2.0 | | V |
| V _{IL} | Input LOW Voltage | | | 0.8 | V |
| I _{IX} | Input Current | GND ≤ V _{IN} ≤ V _{CC} | -10 | +10 | μA |
| V _{CD} | Input Diode Clamp Voltage | | Note 5 | | |
| I _{OZ} | Output Leakage Current | GND ≤ V _{OUT} ≤ V _{CC} , Output Disabled | -10 | +10 | μA |
| I _{OS} | Output Short Circuit Current ^[6] | V _{CC} = Max., V _{OUT} = GND | -20 | -90 | mA |
| I _{CC} | Power Supply Current | V _{CC} = Max., V _{IN} = 2.0V, I _{OUT} = 0 mA f = 10 MHz | Com'l | 80 | mA |
| | | | Mil | 100 | |
| I _{SB} | Standby Supply Current | Chip Enable Inactive, CE = V _{IH} , I _{OUT} = 0 mA | Com'l | 15 | mA |
| | | | Mil | 15 | |

Capacitance^[5]

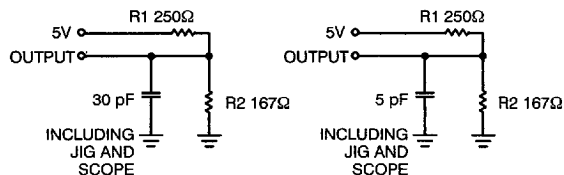
| Parameter | Description | Test Conditions | Max. | Unit |
|------------------|--------------------|---|------|------|
| C _{IN} | Input Capacitance | T _A = 25°C, f = 1 MHz, V _{CC} = 5.0V | 10 | pF |
| C _{OUT} | Output Capacitance | | 10 | pF |

Notes:

- Contact a Cypress representative regarding industrial temperature range specification.
- T_A is the "instant on" case temperature.
- See the last page of this specification for Group A subgroup testing information.
- See the "Introduction to CMOS NVMs" section of the Cypress Data Book for general information on testing.
- For test purposes, not more than one output at a time should be shorted. Short circuit test duration should not exceed 30 seconds.

AC Test Loads and Waveforms

Test Load



(a) Normal Load

(b) High-Z Load

27C84-45

Equivalent to: THÉVENIN EQUIVALENT



Switching Characteristics Over the Operating Range^[2, 3, 5]

| Parameter | Description | 27C64-70 | | 27C64-90 | | 27C64-120 | | 27C64-150 | | 27C64-200 | | Unit |
|------------|--------------------------------------|----------|-----|----------|-----|-----------|-----|-----------|-----|-----------|-----|------|
| | | Min. | Max | Min. | Max | Min. | Max | Min. | Max | Min. | Max | |
| t_{AA} | Address to Output Valid | | 70 | | 90 | | 120 | | 150 | | 200 | ns |
| t_{HZCE} | Chip Enable Inactive to High Z | | 45 | | 45 | | 45 | | 45 | | 45 | ns |
| t_{HZOE} | Output Enable Inactive to High Z | | 25 | | 25 | | 30 | | 30 | | 30 | ns |
| t_{OE} | Output Enable Active to Output Valid | | 40 | | 40 | | 50 | | 50 | | 50 | ns |
| t_{CE} | Chip Enable Active to Output Valid | | 70 | | 90 | | 120 | | 150 | | 200 | ns |
| t_{OH} | Data Hold from Address Change | 3 | | 3 | | 3 | | 3 | | 3 | | ns |
| t_{PU} | Chip Enable Active to Power-Up | | 70 | | 90 | | 120 | | 150 | | 200 | ns |
| t_{PD} | Chip Enable Inactive to Power-Down | | 70 | | 90 | | 120 | | 150 | | 200 | ns |

Erase Characteristics

Wavelengths of light less than 4000 angstroms begin to erase the devices in the windowed package. For this reason, an opaque label should be placed over the window if the EPROM is exposed to sunlight or fluorescent lighting for extended periods of time.

The recommended dose of ultraviolet light for erasure is a wavelength of 2537 angstroms for a minimum dose (UV intensity multiplied by exposure time) of 25 Wsec/cm². For an ultraviolet lamp with a 12 mW/cm² power rating, the exposure time would be approximately 35 minutes. The CY27C64 needs to be within 1 inch of the lamp during erasure. Permanent damage may result if the

EPROM is exposed to high-intensity UV light for an extended period of time.

7258 Wsec/cm² is the recommended maximum dosage.

Programming Modes

Programming support is available from Cypress as well as from a number of third party software vendors. For detailed programming information, including a listing of software packages, please see the PROM Programming Information located at the end of this section. Programming algorithms can be obtained from any Cypress representative. When programming, select the Cypress CY7C266 algorithm.

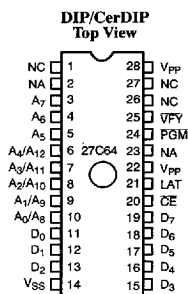
Table 1. Mode Selection

| Mode | | Pin Function ^[7,8] | | | | | | | |
|-----------------|---------|-------------------------------|------------------|------------------|------------------|------------------|------------------|-----------------|---------------------------------|
| | | Normal Operation | A ₈ | A ₉ | A ₁₀ | A ₁₁ | A ₁₂ | CE | OE |
| | Program | V _{VFY} | PGM | LAT | NA | NA | CE | V _{PP} | D ₇ - D ₀ |
| Read | | A ₈ | A ₉ | A ₁₀ | A ₁₁ | A ₁₂ | V _{IL} | V _{IL} | O ₇ - O ₀ |
| Standby | | X | X | X | X | X | V _{IH} | X | Three-States |
| Output Disable | | A ₈ | A ₉ | A ₁₀ | A ₁₁ | A ₁₂ | V _{IL} | V _{IH} | Three-States |
| Program | | V _{IHP} | V _{ILP} | V _{ILP} | V _{ILP} | V _{ILP} | V _{ILP} | V _{PP} | D ₇ - D ₀ |
| Program Verify | | V _{ILP} | V _{IHP} | V _{ILP} | V _{ILP} | V _{ILP} | V _{ILP} | V _{PP} | O ₇ - O ₀ |
| Program Inhibit | | V _{IHP} | V _{IHP} | V _{ILP} | V _{ILP} | V _{ILP} | V _{ILP} | V _{PP} | Three-States |
| Blank Check | | V _{ILP} | V _{IHP} | V _{ILP} | V _{ILP} | V _{ILP} | V _{ILP} | V _{PP} | O ₇ - O ₀ |

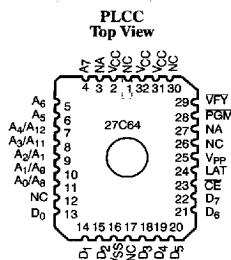
Notes:

7. X = "don't care" but must not exceed V_{CC} + 5%.

8. Address A₈ - A₁₂ must be latched through lines A₀ - A₄ in Programming modes.

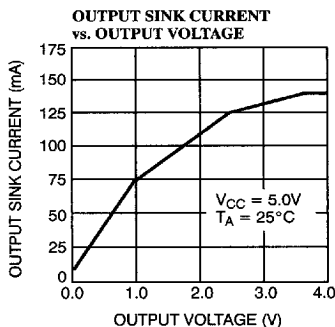
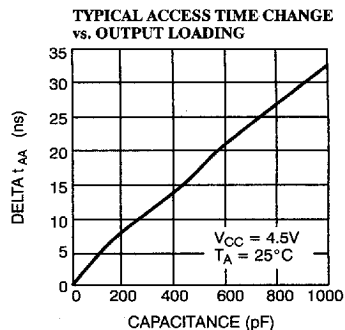
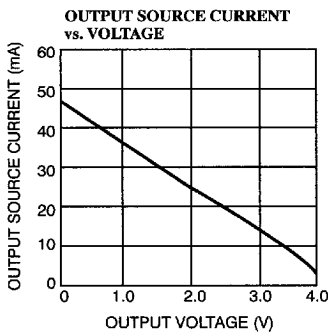
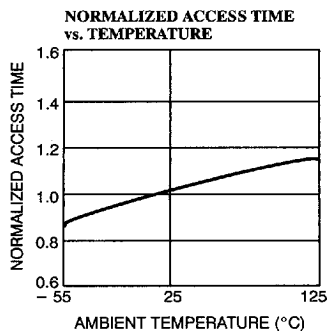
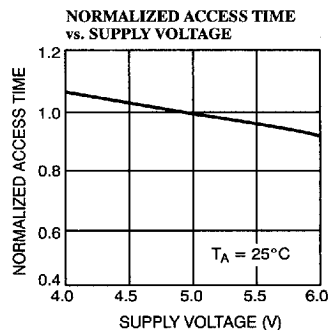
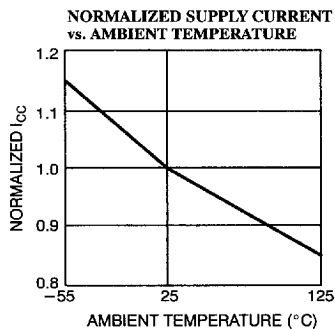
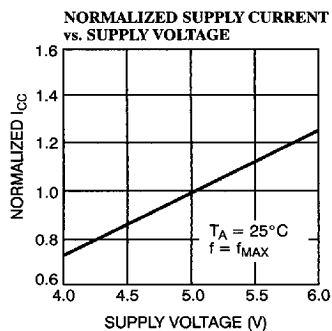


27C64-56



27C64-67

Figure 1. Programming Pinout

Typical DC and AC Characteristics


Ordering Information^[9]

| Speed (ns) | Ordering Code | Package Name | Package Type | Operating Range |
|------------|---------------|--------------|-------------------------------------|-----------------|
| 70 | CY27C64-70JC | J65 | 32-Lead Plastic Leaded Chip Carrier | Commercial |
| | CY27C64-70PC | P15 | 28-Lead (600-Mil) Molded DIP | |
| | CY27C64-70WC | W16 | 28-Lead (600-Mil) Windowed CerDIP | |
| 90 | CY27C64-90JC | J65 | 32-Lead Plastic Leaded Chip Carrier | Commercial |
| | CY27C64-90PC | P15 | 28-Lead (600-Mil) Molded DIP | |
| | CY27C64-90WC | W16 | 28-Lead (600-Mil) Windowed CerDIP | |
| 120 | CY27C64-120JC | J65 | 32-Lead Plastic Leaded Chip Carrier | Commercial |
| | CY27C64-120PC | P15 | 28-Lead (600-Mil) Molded DIP | |
| | CY27C64-120WC | W16 | 28-Lead (600-Mil) Windowed CerDIP | |
| 150 | CY27C64-150JC | J65 | 32-Lead Plastic Leaded Chip Carrier | Commercial |
| | CY27C64-150PC | P15 | 28-Lead (600-Mil) Molded DIP | |
| | CY27C64-150WC | W16 | 28-Lead (600-Mil) Windowed CerDIP | |
| 200 | CY27C64-200JC | J65 | 32-Lead Plastic Leaded Chip Carrier | Commercial |
| | CY27C64-200PC | P15 | 28-Lead (600-Mil) Molded DIP | |
| | CY27C64-200WC | W16 | 28-Lead (600-Mil) Windowed CerDIP | |

Note:

9. Most of these products are available in industrial temperature range. Contact a Cypress representative for specifications and product availability.

MILITARY SPECIFICATIONS
Group A Subgroup Testing
DC Characteristics

| Parameter | Subgroups |
|-----------------|-----------|
| V _{OH} | 1, 2, 3 |
| V _{OL} | 1, 2, 3 |
| V _{IH} | 1, 2, 3 |
| V _{IL} | 1, 2, 3 |
| I _{IX} | 1, 2, 3 |
| I _{OZ} | 1, 2, 3 |
| I _{CC} | 1, 2, 3 |
| I _{SB} | 1, 2, 3 |

Switching Characteristics

| Parameter | Subgroups |
|-----------------|-----------------|
| t _{AA} | 7, 8, 9, 10, 11 |
| t _{OE} | 7, 8, 9, 10, 11 |
| t _{CE} | 7, 8, 9, 10, 11 |

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