

HN27C64FP Series

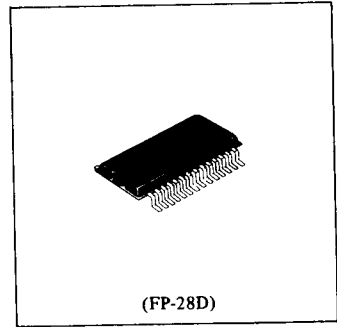
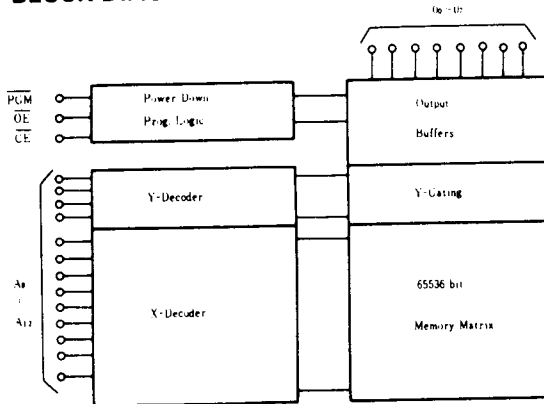
8192-word x 8-bit One Time Electrically Programmable CMOS ROM

The HN27C64FP is a 8192-word by 8-bit one time electrically programmable ROM. Initially, all bits of the HN27C64FP are in the "1" state (Output High). Data is introduced by selectively programming "0" into the desired bit locations. This device is packaged in a 28 pin, plastic flat package (SOP). Therefore, this device can not be re-written.

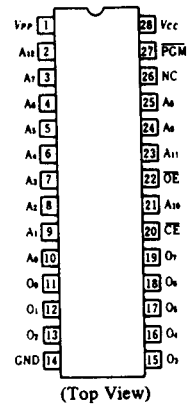
■ FEATURES

- Low Power Dissipation 20mW/MHz typ. (Active Mode)
5μW typ. (Stand by Mode)
- Access Time 200ns max. (HN27C64FP-20)
250ns max. (HN27C64FP-25)
- Single Power Supply +5V± 5 %
- Simple Programming Program Voltage; +21V D.C.
- Support High Performance Programming
- Static No Clocks Required
- Inputs and Outputs TTL Compatible During Both Read and Program Modes
- Fully Decoded On-chip Address Decode

■ BLOCK DIAGRAM



■ PIN ARRANGEMENT



MODE SELECTION

| Mode | Pins CE (20) | OE (22) | PGM (27) | V _{PP} (1) | V _{CC} (28) | Outputs (11~13, 15~19) |
|-----------------|--------------------|-----------------|-----------------|------------------------|-------------------------|---------------------------|
| Read | V _{IL} | V _{IL} | V _{IH} | V _{CC} | V _{CC} | Dout |
| Stand-by | V _{IH} | x | x | V _{CC} | V _{CC} | High Z |
| Program | V _{IL} | x | 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 |

x : don't care

ABSOLUTE MAXIMUM RATINGS

| Item | Symbol | Value | Unit |
|-------------------------------|------------------|---------------|------|
| All Input and Output Voltage* | V _T | -1.0** ~ +7.0 | V |
| V _{CC} Voltage* | V _{CC} | -0.6 ~ +7.0 | V |
| V _{PP} Voltage* | V _{PP} | -0.6 ~ +25 | V |
| Operating Temperature Range | T _{OPR} | 0 ~ +70 | °C |
| Storage Temperature Range | T _{STG} | -55 ~ +125 | °C |

* With respect to GND

** Pulse Width: 50ns, DC: -0.6V

READ OPERATION

DC AND OPERATING CHARACTERISTICS (T_a = 0 ~ +70°C, V_{CC} = 5V ± 5%, V_{PP} = V_{CC} ± 0.6V)

| Parameter | Symbol | Test Conditions | Value | | | Unit |
|------------------------------------|------------------|--|-------|-----|-------------------------|------|
| | | | min | typ | max | |
| Input Leakage Current | I _{LI} | V _{CC} = 5.25V, V _{IH} = GND to V _{CC} | - | - | 2 | μA |
| Output Leakage Current | I _{LO} | V _{CC} = 5.25V, V _{out} = GND to V _{CC} | - | - | 2 | μA |
| V _{PP} Current | I _{PP1} | V _{PP} = V _{CC} + 0.6V | - | 1 | 100 | μA |
| V _{CC} Current (Stand-by) | I _{SB1} | CE = V _{IH} | - | - | 1 | mA |
| | I _{SB2} | CE = V _{CC} ± 0.3V | - | 1 | 100 | μA |
| V _{CC} Current (Active) | I _{CC1} | CE = V _{IL} , I _{out} = 0 mA | - | - | 30 | mA |
| | I _{CC2} | f = 5MHz, I _{out} = 0 mA | - | - | 30 | mA |
| Input Voltage | V _{IL} | | -1.0* | - | 0.8 | V |
| | V _{IH} | | 2.2 | - | V _{CC} + 1.5** | V |
| Output Voltage | V _{OL} | I _{OL} = 2.1 mA | - | - | 0.45 | V |
| | V _{OH} | I _{OH} = -400μA | 2.4 | - | - | V |

* Pulse Width: 50ns, DC: V_{IL} min = -0.3V** Pulse Width ≤ 20ns, DC V_{IH} max = V_{CC} + 1.0V

AC CHARACTERISTICS (T_a = 0 ~ +70°C, V_{CC} = 5V ± 5%, V_{PP} = V_{CC} ± 0.6V)

| Parameter | Symbol | Test Condition | HN27C64FP-20 | | HN27C64FP-25 | | Unit |
|-------------------------|------------------|---|--------------|-----|--------------|-----|------|
| | | | min | max | min | max | |
| Address to Output Delay | t _{ACC} | CE = OE = V _{IL} , PGM = V _{IH} | - | 200 | - | 250 | ns |
| CE to Output Delay | t _{CE} | OE = V _{IL} , PGM = V _{IH} | - | 200 | - | 250 | ns |
| OE to Output Delay | t _{OE} | CE = V _{IL} , PGM = V _{IH} | 10 | 70 | 10 | 100 | ns |
| OE High to Output Float | t _{DF} | CE = V _{IL} , PGM = V _{IH} | 0 | 60 | 0 | 90 | ns |
| Address to Output Hold | t _{OH} | CE = OE = V _{IL} , PGM = V _{IH} | 0 | - | 0 | - | ns |

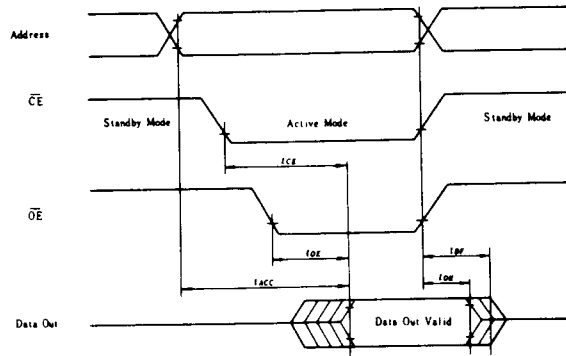
CAPACITANCE (T_a = 25°C, f = 1MHz)

| Parameter | Symbol | Test Condition | min | typ | max | Unit |
|--------------------|----------------|---------------------|-----|-----|-----|------|
| Input Capacitance | C _i | V _i = 0V | - | 4 | 6 | pF |
| Output Capacitance | C _o | V _o = 0V | - | 8 | 12 | pF |

● SWITCHING CHARACTERISTICS

Test Condition

| | |
|---------------------------------------|---------------|
| Input Pulse Levels: | 0.45V to 2.4V |
| Input Rise and Fall Time: | ≤20ns |
| Output Load: | 1TTL + 100pF |
| Reference Level for Measuring Timing: | 0.8V and 2V |



■ PROGRAMMING OPERATION

● DC PROGRAMMING CHARACTERISTICS ($T_a = 25^\circ\text{C} \pm 5^\circ\text{C}$, $V_{CC} = 5\text{V} \pm 5\%$, $V_{PP} = 21\text{V} \pm 0.5\text{V}$)

| Parameter | Symbol | Test Condition | min | typ | max | Unit |
|-----------------------------------|----------|--|------|-----|----------|---------------|
| Input Leakage Current | I_{LI} | $V_{IN} = 6.25\text{V}/0.45\text{V}$ | - | - | 2 | μA |
| Output Low Voltage During Verify | V_{OL} | $I_{OL} = 2.1\text{mA}$ | - | - | 0.45 | V |
| Output High Voltage During Verify | V_{OH} | $I_{OH} = -400\mu\text{A}$ | 2.4 | - | - | V |
| V_{CC} Current (Active) | I_{CC} | | - | - | 30 | mA |
| Input Low Level | V_{IL} | | -0.1 | - | 0.8 | V |
| Input High Level | V_{IH} | | 2.2 | - | V_{CC} | V |
| V_{PP} Supply Current | I_{PP} | $\overline{\text{CE}} = \text{PGM} = V_{IL}$ | - | - | 30 | mA |

Notes) 1. V_{CC} must be applied before V_{PP} and removed after V_{PP} .

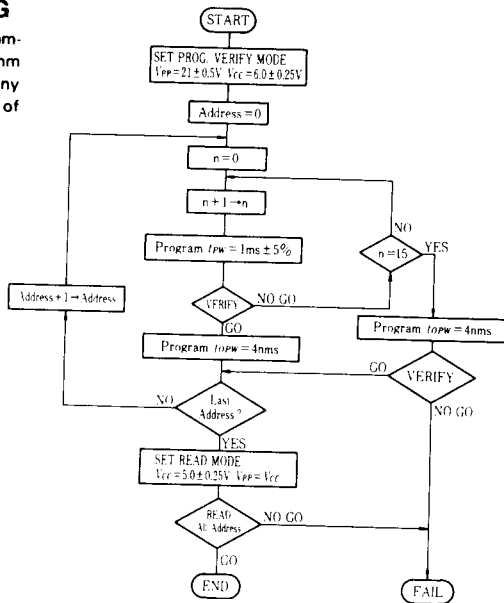
2. V_{PP} must not exceed 25V including overshoot.

3. An influence may be had upon device reliability if the device is installed or removed while $V_{PP} = 21\text{V}$.

4. Do not alter V_{PP} either V_{IL} to 21V or 21V to V_{IL} when $\overline{\text{CE}} = \text{PGM} = \text{Low}$.

■ HIGH PERFORMANCE PROGRAMMING

This device can be applied the High Performance Programming algorithm shown in following flowchart. This algorithm allows to obtain faster programming time without any voltage stress to the device nor deterioration in reliability of programmed data.



High Performance Programming Flowchart

● AC PROGRAMMING CHARACTERISTICS ($T_a=25^{\circ}\text{C}\pm 5^{\circ}\text{C}$, $V_{CC}=6\text{V}\pm 0.25\text{V}$, $V_{PP}=21\text{V}\pm 0.5\text{V}$)

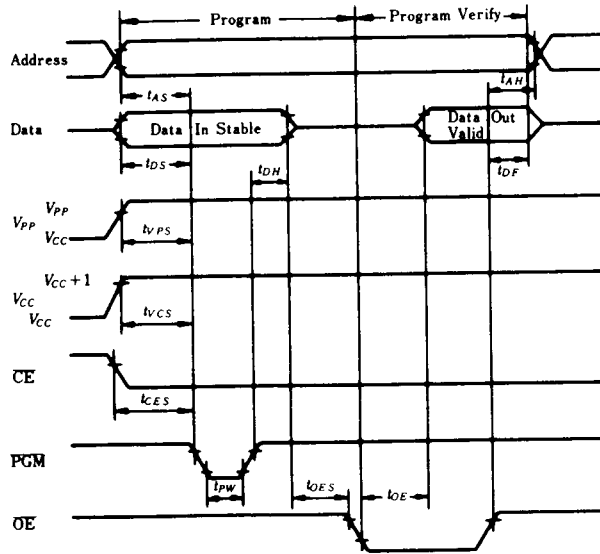
| Parameter | Symbol | Test Condition | min | typ | max | Unit |
|--|-----------|----------------|------|-----|------|---------------|
| Address Setup Time | t_{AS} | | 2 | — | — | μs |
| OE Setup Time | t_{OES} | | 2 | — | — | μs |
| Data Setup Time | t_{DS} | | 2 | — | — | μs |
| Address Hold Time | t_{AH} | | 0 | — | — | μs |
| Data Hold Time | t_{DH} | | 0 | — | — | μs |
| OE to Output Float Delay* | t_{DF} | | 0 | — | 130 | ns |
| V_{PP} Setup Time | t_{VPS} | | 2 | — | — | μs |
| V_{CC} Setup Time | t_{VCS} | | 2 | — | — | μs |
| PGM Pulse Width during Initial Program | t_{PW} | | 0.95 | 1.0 | 1.05 | ms |
| PGM Pulse Width during Over Program** | t_{OPW} | | 3.8 | — | 63 | ms |
| CE Setup Time | t_{CES} | | 2 | — | — | μs |
| Data Valid from OE | t_{OV} | | — | — | 150 | ns |

Notes) * t_{DF} defines the time at which the output achieves the open circuit condition and is not referenced to output voltage levels.
 ** t_{OPW} is defined as mentioned in flow chart.

● SWITCHING CHARACTERISTICS

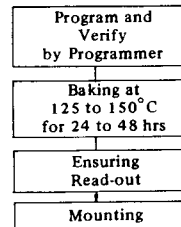
Test Condition

Input Pulse Level: 0.45V to 2.4V
 Input Rise and Fall Time: ≤20ns
 Reference Level for Measuring Timing: 0.8V and 2V



■ RECOMMENDED SCREENING CONDITIONS

Before mounting, please make the screening (baking without bias) shown in the right.



Recommended Screening conditions

