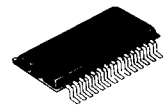
HN27C64FP Series

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.

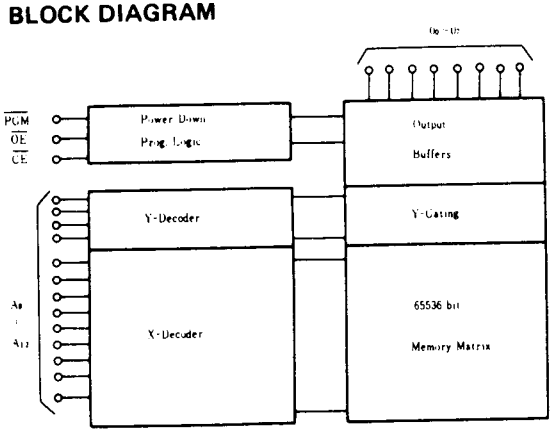


(FP-28D)

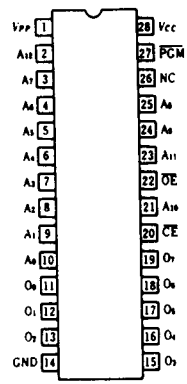
■ FEATURES

- 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



(Top View)

■ MODE SELECTION

Mode \ Pins	$\overline{CE}$ (20)	$\overline{OE}$ (22)	$\overline{PGM}$ (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}	×	×	V_{CC}	V_{CC}	High Z
Program	V_{IL}	×	V_{IL}	V_{PP}	V_{CC}	Din
Program Verify	V_{IL}	V_{IL}	V_{IH}	V_{PP}	V_{CC}	Dout
Program Inhibit	V_{IH}	×	×	V_{PP}	V_{CC}	High Z

× : 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 ($Ta = 0 \sim +70°C$, $V_{CC} = 5V \pm 5\%$, $V_{PP} = V_{CC} \pm 0.6V$)

Parameter	Symbol	Test Conditions	min	typ	max	Unit
Input Leakage Current	I_{LI}	V_{CC}=5.25V, V_{in}=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}	$\overline{CE}=V_{IH}$	–	–	1	mA
	I_{SB2}	$\overline{CE}=V_{CC}\pm0.3V$	–	1	100	μA
V_{CC} Current (Active)	I_{CC1}	$\overline{CE}=V_{IL}$, 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}	$I_{OH}=-400\mu A$	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 ($Ta = 0 \sim +70°C$, $V_{CC} = 5V \pm 5\%$, $V_{PP} = V_{CC} \pm 0.6V$)

Parameter	Symbol	Test Condition	HN27C64FP-20		HN27C64FP-25		Unit
			min	max	min	max	
Address to Output Delay	t_{ACC}	$\overline{CE}=\overline{OE}=V_{IL}$, $\overline{PGM}=V_{IH}$	–	200	–	250	ns
$\overline{CE}$ to Output Delay	t_{CE}	$\overline{OE}=V_{IL}$, $\overline{PGM}=V_{IH}$	–	200	–	250	ns
$\overline{OE}$ to Output Delay	t_{OE}	$\overline{CE}=V_{IL}$, $\overline{PGM}=V_{IH}$	10	70	10	100	ns
$\overline{OE}$ High to Output Float	t_{DF}	$\overline{CE}=V_{IL}$, $\overline{PGM}=V_{IH}$	0	60	0	90	ns
Address to Output Hold	t_{OH}	$\overline{CE}=\overline{OE}=V_{IL}$, $\overline{PGM}=V_{IH}$	0	–	0	–	ns

● CAPACITANCE (Ta=25°C, f=1MHz)

Parameter	Symbol	Test Condition	min	typ	max	Unit
Input Capacitance	C_{in}	V_{in}=0V	–	4	6	pF
Output Capacitance	C_{out}	V_{out}=0V	–	8	12	pF

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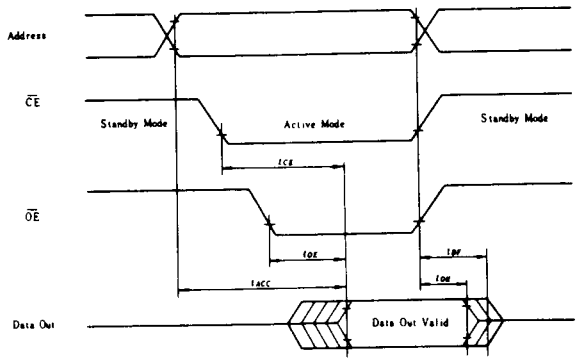
• SWITCHING CHARACTERISTICS

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

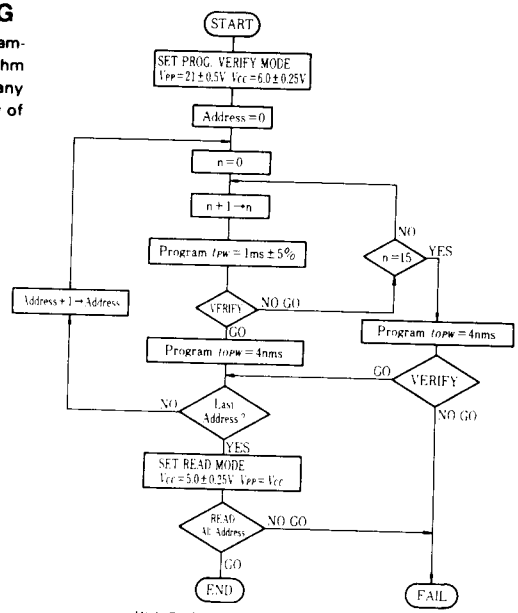
• DC PROGRAMMING CHARACTERISTICS (Ta=25°C±5°C, V_{CC}=5V±5%, V_{PP}=21V±0.5V)

Parameter	Symbol	Test Condition	min	typ	max	Unit
Input Leakage Current	I_{LI}	V_{IN}= 6.25 V/0.45 V	–	–	2	μA
Output Low Voltage During Verify	V_{OL}	I_{OL}=2.1 mA	–	–	0.45	V
Output High Voltage During Verify	V_{OH}	I_{OH}=–400 μA	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}	$\overline{CE}$=$\overline{PGM}$=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}= 21V.
4. Do not alter V_{PP} either V_{IL} to 21V or 21V to V_{IL} when $\overline{CE}$=$\overline{PGM}$=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 (Ta=25°C±5°C, V_{CC}=6V±0.25V, V_{PP}=21V±0.5V)

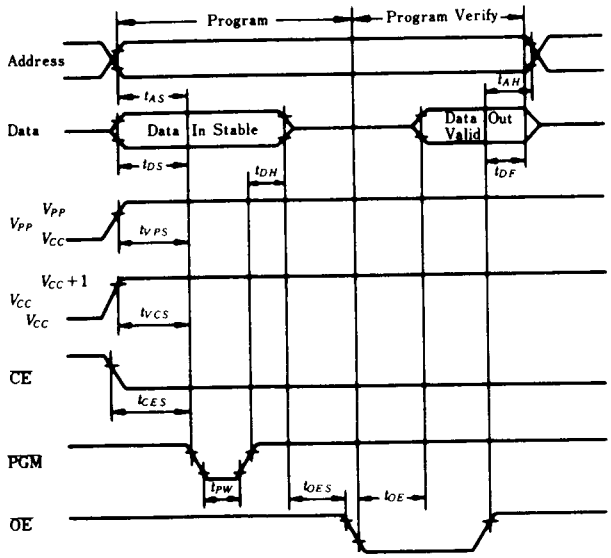
Parameter	Symbol	Test Condition	min	typ	max	Unit
Address Setup Time	t_{AS}		2	—	—	μs
$\overline{OE}$ Setup Time	t_{OES}		2	—	—	μs
Data Setup Time	t_{DS}		2	—	—	μs
Address Hold Time	t_{AH}		0	—	—	μs
Data Hold Time	t_{DH}		2	—	—	μs
$\overline{OE}$ to Output Float Delay*	t_{DF}		0	—	130	ns
V_{PP} Setup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

• SWITCHING CHARACTERISTICS

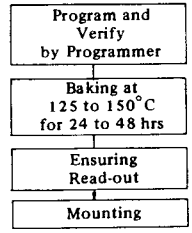
Test Condition

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