

HN27C64FP Series

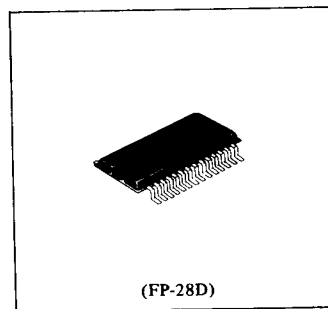
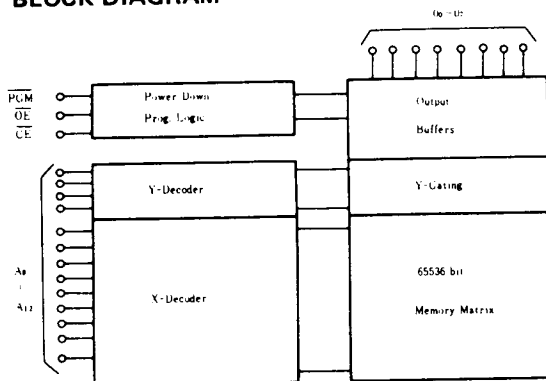
8192-word x 8-bit One Time Electrically Programmable CMOS ROM

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

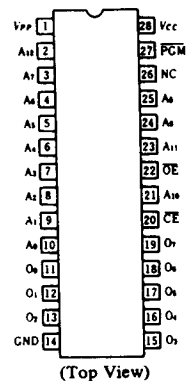
- Low Power Dissipation 20mW/MHz typ. (Active Mode)
5μW typ. (Stand by Mode)
- Access Time 200ns max. (HN27C64FP-20)
250ns max. (HN27C64FP-25)
- Single Power Supply +5V± 5 %
- Simple Programming Program Voltage; +21V D.C.
- Support High Performance Programming
- Static No Clocks Required
- Inputs and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

■ BLOCK DIAGRAM



(FP-28D)

■ PIN ARRANGEMENT



(Top View)



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■ 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	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}	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	Sym- bol	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 _{out}	V _{out} = 0V	-	8	12	pF

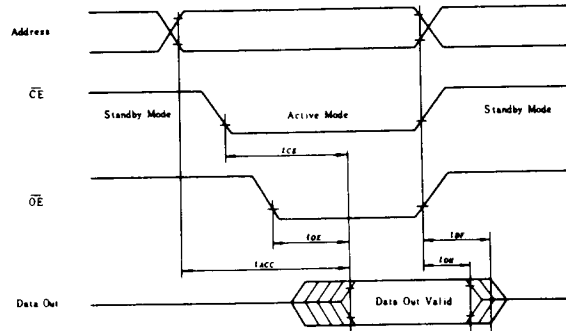


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● SWITCHING CHARACTERISTICS

Test Condition

Input Pulse Levels:	0.45V to 2.4V
Input Rise and Fall Time:	$\leq 20\text{ns}$
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.

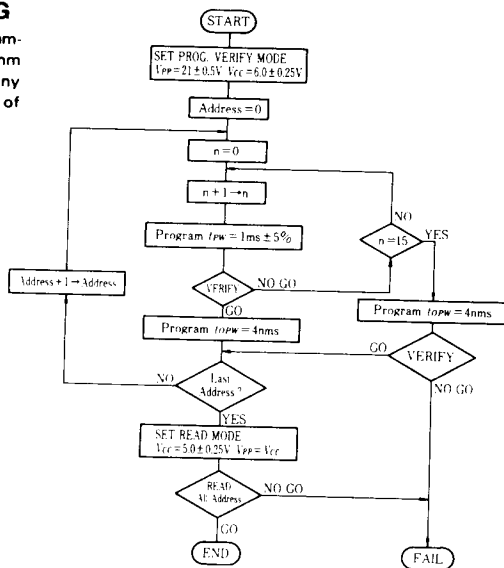
3. An influence may be had upon device reliability if the device is installed or removed while $V_{PP} = 21\text{V}$.

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

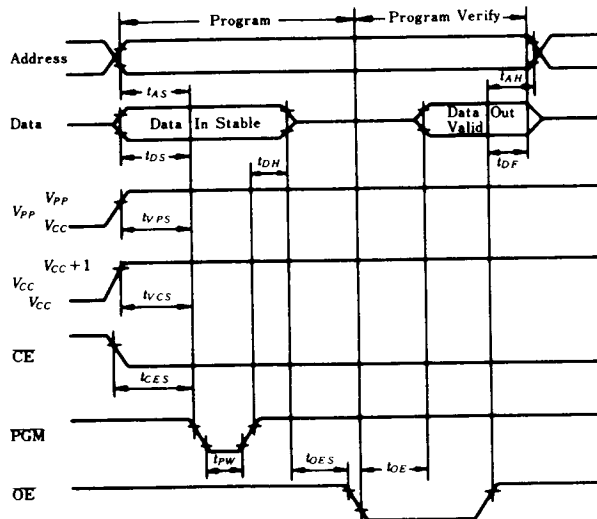
Parameter	Symbol	Test Condition	min	typ	max	Unit
Address Setup Time	t_{AS}		2	—	—	μs
OE Setup Time	t_{OES}		2	—	—	μs
Data Setup Time	t_{DS}		2	—	—	μs
Address Hold Time	t_{AH}		0	—	—	μs
Data Hold Time	t_{DH}		—	—	—	μs
OE to Output Float Delay*	t_{DF}		2	—	—	μs
V_{PP} Setup Time	t_{VPS}		0	—	130	ns
V_{CC} Setup Time	t_{VCS}		2	—	—	μs
PGM Pulse Width during Initial Program	t_{PW}		0.95	1.0	1.05	μs
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 float chart.

● SWITCHING CHARACTERISTICS

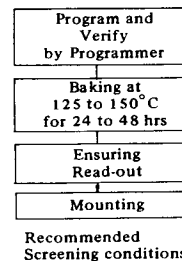
Test Condition

Input Pulse Level:	0.45V to 2.4V
Input Rise and Fall Time:	$\leq 20\text{ns}$
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.



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