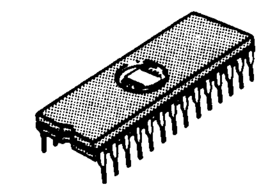
HN27C64G Series

8192-word x 8-bit U.V. Erasable and Programmable CMOS ROM

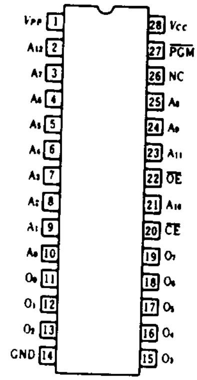
■ FEATURES

- Low Power Dissipation ..... 20mW/MHz typ. (Active Mode)
  5μW typ. (Stand by Mode)
- Access Time .... 150ns max. (HN27C64G-15)
  200ns max. (HN27C64G-20)
  250ns max. (HN27C64G-25)
- Single Power Supply .... +5V±10%
- Simple Programming .... Program Voltage; +21V D.C.
  Program with One 50ms Pulse
- 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
- Compatible with Intel 2764



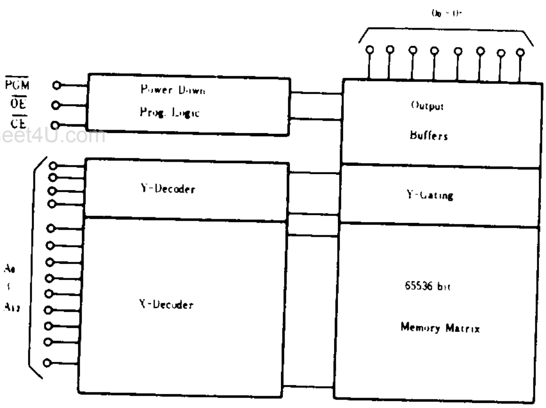
(DG-28)

■ PIN ARRANGEMENT



(Top View)

■ BLOCK DIAGRAM



■ 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

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■ 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}	−65 ~ + 125	°C

* With respect to GND
**Pulse Width: 50ns, DC: −0.6V

■ READ OPERATION

● DC AND OPERATING CHARACTERISTICS ($Ta = 0 \sim +70°C$, $V_{CC} = 6V \pm 0.25V$, $V_{PP} = V_{CC} \pm 0.6V$)

Parameter	Symbol	Test Conditions	min	typ	max	Unit
Input Leakage Current	I_{LI}	V_{CC}=5.5V, V_{in}=GND to V_{CC}	–	–	2	μA
Output Leakage Current	I_{LO}	V_{CC}=5.5V, 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}	$\overline{CE} = V_{CC} \pm 0.3V$	–	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}= −400μA	2.4	–	–	V

* Pulse Width: 50ns, DC: V_{IL} min = −0.3V
** Pulse Width ≤ 20ns, DC V_{IH} max = V_{CC} + 1.0 V. Mode selection is unfixed between $V_{IH} = V_{CC} + 1V$ and 11.5 V

● AC CHARACTERISTICS ($Ta = 0 \sim +70°C$, $V_{CC} = 5V \pm 10\%$, $V_{PP} = V_{CC} \pm 0.6V$)

Parameter	Symbol	Test Condition	HN27C64G-15		HN27C64G-20		HN27C64G-25		Unit
			min	max	min	max	min	max	
Address to Output Delay	t_{ACC}	$\overline{CE} = \overline{OE} = V_{IL}$, $\overline{PGM} = V_{IH}$	–	150	–	200	–	250	ns
$\overline{CE}$ to Output Delay	t_{CE}	$\overline{OE} = V_{IL}$, $\overline{PGM} = V_{IH}$	–	150	–	200	–	250	ns
$\overline{OE}$ to Output Delay	t_{OE}	$\overline{CE} = V_{IL}$, $\overline{PGM} = V_{IH}$	10	60	10	70	10	100	ns
$\overline{OE}$ High to Output Float	t_{DF}	$\overline{CE} = V_{IL}$, $\overline{PGM} = V_{IH}$	0	50	0	60	0	90	ns
Address to Output Hold	t_{OH}	$\overline{CE} = \overline{OE} = V_{IL}$, $\overline{PGM} = V_{IH}$	0	–	0	–	0	–	ns

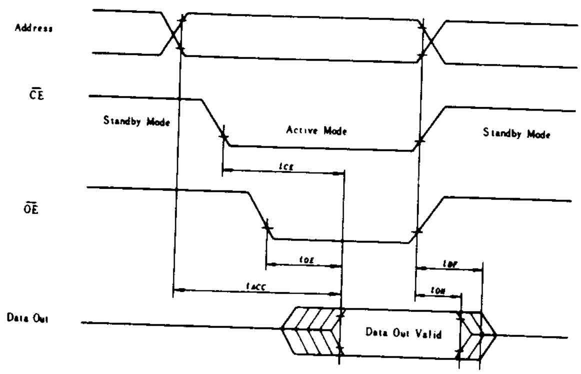
● CAPACITANCE ($Ta = 25°C$, f=1MHz)

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

- **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}	$V_{IN}=5.25V/0.45V$	–	–	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	–	$V_{CC}+1.0$	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.

- **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_{VS}		2	–	–	μs
$\overline{PGM}$ Pulse Width During Programming	t_{PW}		25	50	55	ms
$\overline{CE}$ Setup Time	t_{CES}		2	–	–	μs
Data Valid from $\overline{OE}$	t_{OE}		–	–	150	ns

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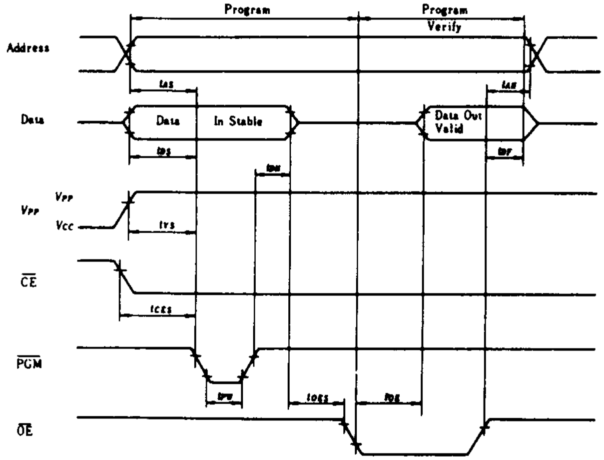
• SWITCHING CHARACTERISTICS

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

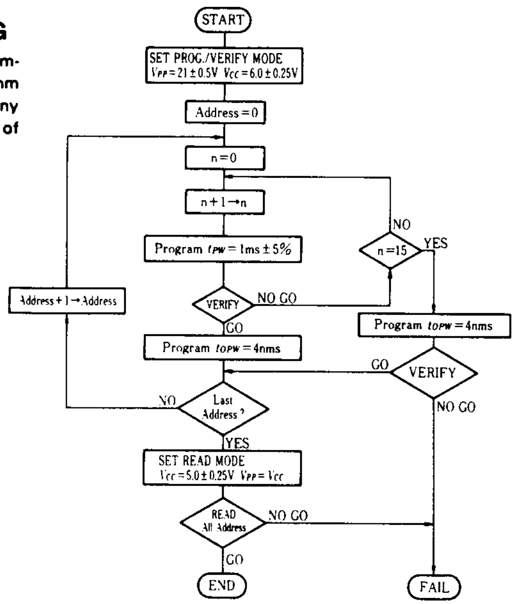


■ ERASE

Erasure of HN27C64 is performed by exposure to ultraviolet light of 2537Å and all the output data are changed to "1" after this erasure procedure. The minimum integrated dose (i.e. UV intensity x exposure time) for erasure is 15W-sec/cm²

■ 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.

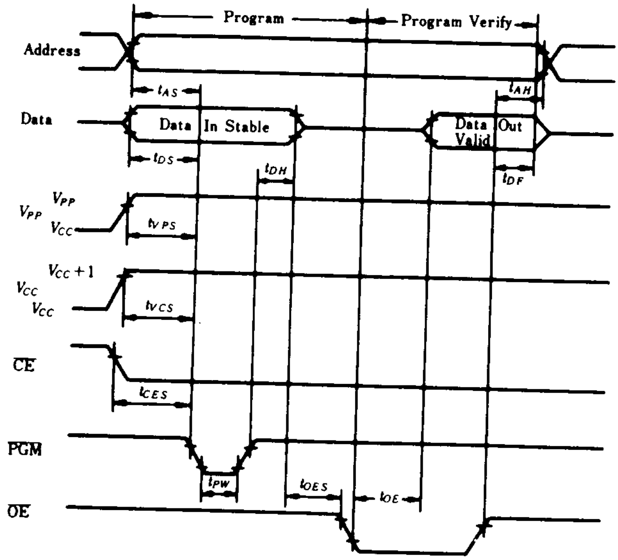
• SWITCHING CHARACTERISTICS

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



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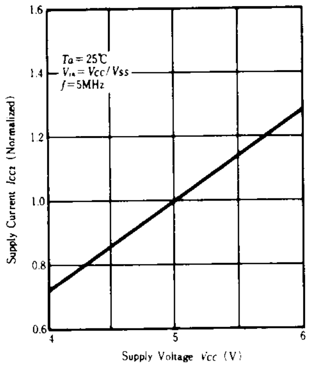
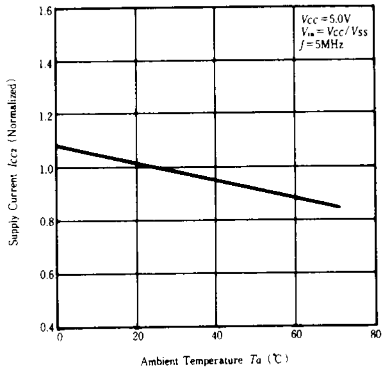
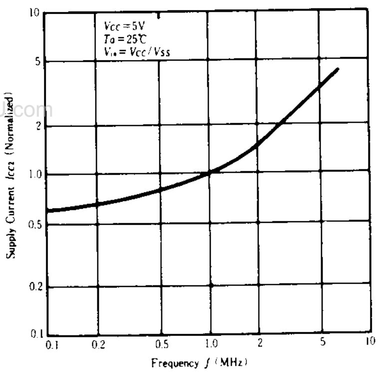
SUPPLY CURRENT VS. SUPPLY VOLTAGE



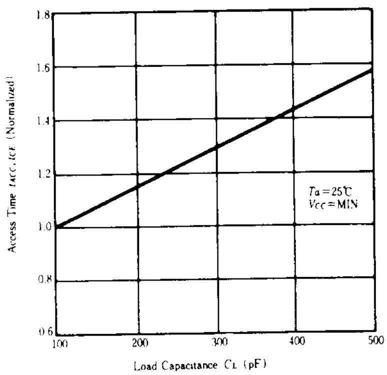
SUPPLY CURRENT VS. AMBIENT TEMPERATURE



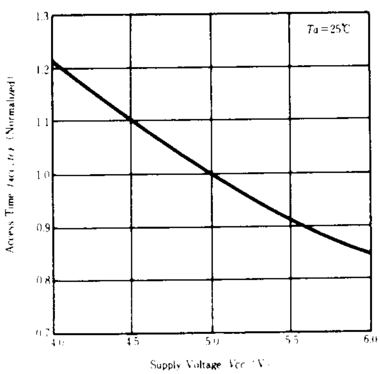
SUPPLY CURRENT VS. FREQUENCY



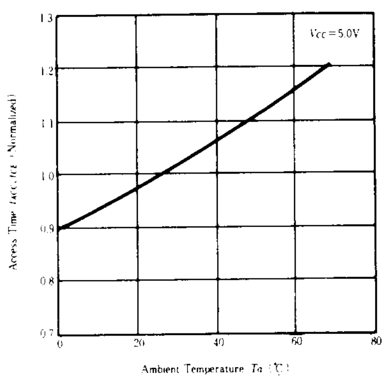
ACCESS TIME VS. LOAD CAPACITANCE



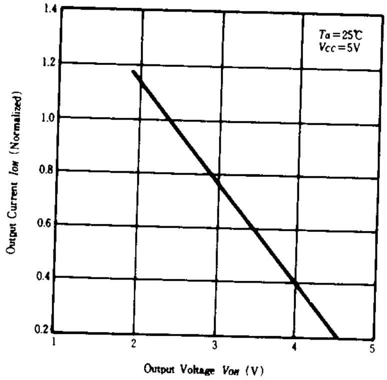
ACCESS TIME VS. SUPPLY VOLTAGE



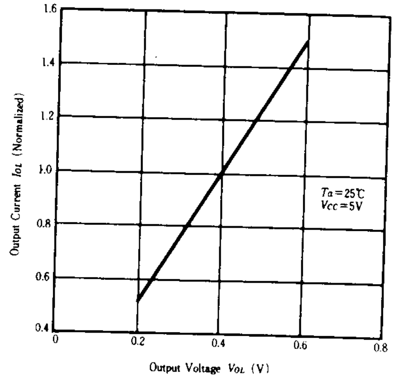
ACCESS TIME VS. AMBIENT TEMPERATURE



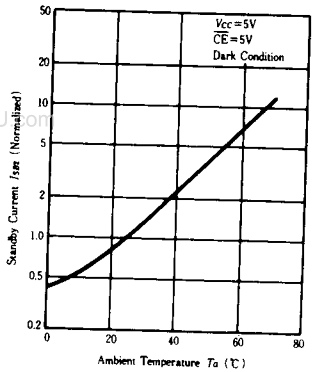
OUTPUT CURRENT VS. OUTPUT VOLTAGE



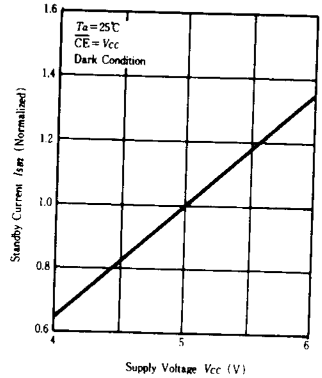
OUTPUT CURRENT VS. OUTPUT VOLTAGE



•STANDBY CURRENT VS. AMBIENT TEMPERATURE



STANDBY CURRENT VS. SUPPLY VOLTAGE



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