

# HN482764G, HN482764G-2, HN482764G-3

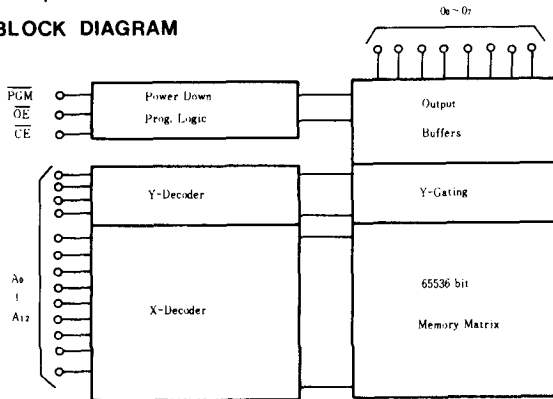
## 8192-word x 8-bit UV Erasable and Programmable Read Only Memory

The HN482764 is a 8192 word by 8 bit erasable and electrically programmable ROM. This device is packaged in a 28 pin dual-in-line package with transparent lid. The transparent lid on the package allows the memory content to be erased with ultraviolet light.

### FEATURES

- Single Power Supply . . . . . +5V  $\pm$  5%
- Simple Programming . . . . . Program Voltage: +21V D.C.  
Program with one 50ms Pulse
- Static . . . . . No Clocks Required
- Inputs and Outputs TTL Compatible During Both Read and Program Mode.
- Access Time . . . . . HN482764G-2 200ns max  
HN482764G 250ns max  
HN482764G-3 300ns max
- High Performance Programming Available
- Low Standby Current . . . . . 35mA max.
- Compatible with Intel 2764

### BLOCK DIAGRAM



### MODE SELECTION

Mode	Pins	CE (20)	OE (22)	PGM (27)	V <sub>PP</sub> (1)	V <sub>CC</sub> (28)	Outputs (11~13, 15~19)
Read		V <sub>IL</sub>	V <sub>IL</sub>	V <sub>IH</sub>	V <sub>CC</sub>	V <sub>CC</sub>	Dout
Stand-by		V <sub>IH</sub>	x	x	V <sub>CC</sub>	V <sub>CC</sub>	High Z
Program		V <sub>IL</sub>	x	V <sub>IL</sub>	V <sub>PP</sub>	V <sub>CC</sub>	Din
Program Verify		V <sub>IL</sub>	V <sub>IL</sub>	V <sub>IH</sub>	V <sub>PP</sub>	V <sub>CC</sub>	Dout
Program Inhibit		V <sub>IH</sub>	x	x	V <sub>PP</sub>	V <sub>CC</sub>	High Z

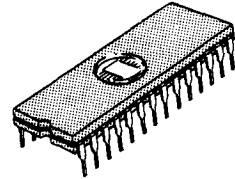
x : don't care

### ABSOLUTE MAXIMUM RATINGS

Item	Symbol	Value	Unit
Operating Temperature Range	T <sub>opr.</sub>	0 to +70	°C
Storage Temperature Range	T <sub>stg.</sub>	-65 to +125	°C
All Input and Output Voltage*	V <sub>T</sub>	-0.6 to +7	V
V <sub>PP</sub> Voltage	V <sub>PP</sub>	-0.6 to +26.5	V

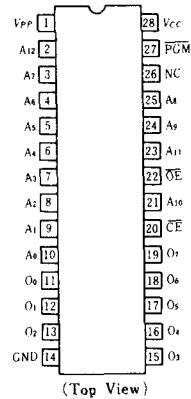
\* : with respect to GND

HN482764G, HN482764G-2  
HN482764G-3



(DG-28)

### PIN ARRANGMENT



■ READ OPERATION

● DC AND OPERATING CHARACTERISTICS ( $T_a=0$  to  $+70^\circ\text{C}$ ,  $V_{CC}=5\text{V}\pm 5\%$ ,  $V_{PP}=V_{CC}\pm 0.6\text{V}$ )

Parameter	Symbol	Test Condition	min	typ	max	Unit
Input Leakage Current	$I_{LI}$	$V_{CC}=5.25\text{V}$ , $V_{iL}=5.25\text{V}$	—	—	10	$\mu\text{A}$
Output Leakage Current	$I_{LO}$	$V_{CC}=5.25\text{V}$ , $V_{out}=5.25\text{V}/0.45\text{V}$	—	—	10	$\mu\text{A}$
$V_{PP}$ Current	$I_{PP1}$	$V_{PP}=V_{CC}+0.6\text{V}$	—	—	15	$\text{mA}$
$V_{CC}$ Current (Standby)	$I_{CC1}$	$\overline{\text{CE}}=V_{IH}$	—	—	35	$\text{mA}$
$V_{CC}$ Current (Active)	$I_{CC2}$	$\overline{\text{CE}}=\overline{\text{OE}}=V_{iL}$	—	40	100	$\text{mA}$
Input Low Voltage	$V_{iL}$		-0.1	—	0.8	$\text{V}$
Input High Voltage	$V_{iH}$		2.0	—	$V_{CC}+1$	$\text{V}$
Output Low Voltage	$V_{oL}$	$I_{oL}=2.1\text{mA}$	—	—	0.45	$\text{V}$
Output High Voltage	$V_{oH}$	$I_{oH}=-400\mu\text{A}$	2.4	—	—	$\text{V}$

● AC CHARACTERISTICS ( $T_a=0$  to  $+70^\circ\text{C}$ ,  $V_{CC}=5\text{V}\pm 5\%$ ,  $V_{PP}=V_{CC}\pm 0.6\text{V}$ )

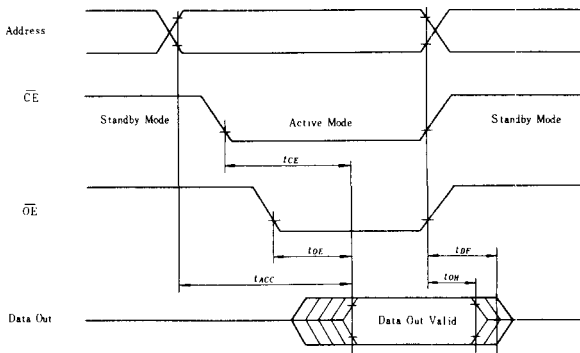
Parameter	Symbol	Test Conditions	HN482764G-2		HN482764G		HN482764G-3		Unit
			min	max	min	max	min	max	
Address to Output Delay	$t_{ACC}$	$\overline{\text{CE}}=\overline{\text{OE}}=V_{iL}$	—	200	—	250	—	300	ns
CE to Output Delay	$t_{CE}$	$\overline{\text{OE}}=V_{iL}$	—	200	—	250	—	300	ns
OE to Output Delay	$t_{OE}$	$\overline{\text{CE}}=V_{iL}$	10	80	10	100	10	150	ns
OE High to Output Float	$t_{DF}$	$\overline{\text{CE}}=V_{iL}$	0	70	0	90	0	130	ns
Address to Output Hold	$t_{OH}$	$\overline{\text{CE}}=\overline{\text{OE}}=V_{iL}$	0	—	0	—	0	—	ns

Note :  $t_{OH}$  defines the time at which the output achieves the open circuit condition and is not referenced to output voltage levels.

● SWITCHING CHARACTERISTICS

Test Condition

- Input Pulse Levels: 0.8V to 2.2V
- Input Rise and Fall Time:  $\leq 20\text{ns}$
- Output Load: 1TTL Gate + 100pF
- Reference Level for Measuring Timing: Inputs; 1V and 2V  
Output; 0.8V and 2.0V



● CAPACITANCE ( $T_a=25^\circ\text{C}$ ,  $f=1\text{MHz}$ )

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

**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	$I_{LI}$	$V_{in} = 5.25\text{V}$	—	—	10	$\mu\text{A}$
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)	$I_{CC2}$		—	—	100	mA
Input Low Level	$V_{IL}$		-0.1	—	0.8	V
Input High Level	$V_{IH}$		2.0	—	$V_{CC} + 1$	V
$V_{PP}$ Supply Current	$I_{PP}$	$\overline{\text{CE}} = \text{PGM} = V_{IL}$	—	—	30	mA

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

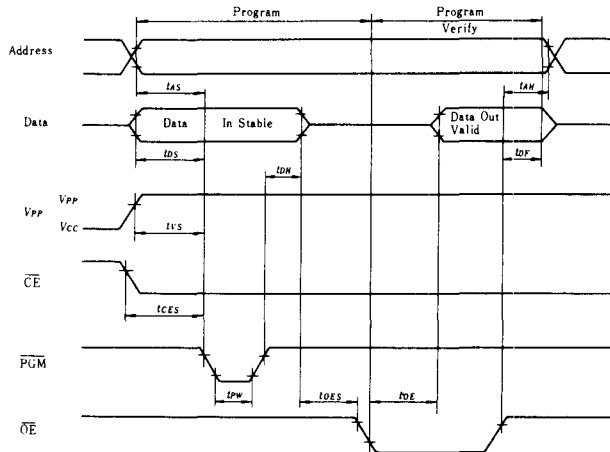
Parameter	Symbol	Test Condition	min	typ	max	Unit
Address Setup Time	$t_{AS}$		2	—	—	$\mu\text{s}$
$\overline{\text{OE}}$ Setup Time	$t_{OES}$		2	—	—	$\mu\text{s}$
Data Setup Time	$t_{DS}$		2	—	—	$\mu\text{s}$
Address Hold Time	$t_{AH}$		0	—	—	$\mu\text{s}$
Data Hold Time	$t_{DH}$		2	—	—	$\mu\text{s}$
$\overline{\text{OE}}$ to Output Float Delay	$t_{DF}$		0	—	130	ns
$V_{PP}$ Setup Time	$t_{VS}$		2	—	—	$\mu\text{s}$
PGM Pulse Width During Programming	$t_{PW}$		45	50	55	ms
$\overline{\text{CE}}$ Setup Time	$t_{CES}$		2	—	—	$\mu\text{s}$
Data Valid from $\overline{\text{OE}}$	$t_{OZ}$		—	—	150	ns

Note:  $t_{DF}$  defines the time at which the output achieves the open circuit condition and is not referenced to output voltage levels.

**SWITCHING CHARACTERISTICS**

Test Condition

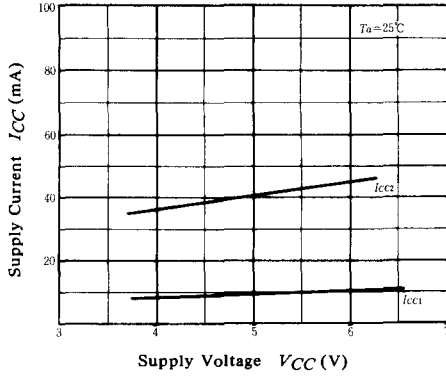
- Input Pulse Level: 0.8V to 2.2V
- Input Rise and Fall Time:  $\leq 20\text{ ns}$
- Reference Level for Measuring Timing: Input; 1V and 2V  
Output; 0.8V and 2V



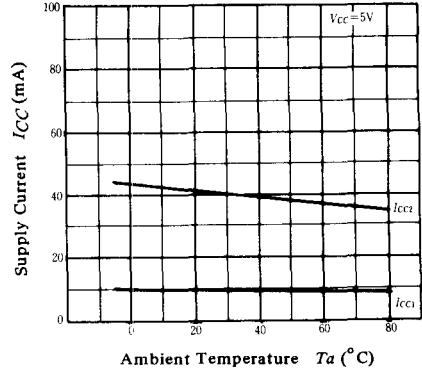
**ERASE**

Erasure of HN482764 is performed by exposure to Ultra-violet 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  $15\text{W} \cdot \text{sec}/\text{cm}^2$

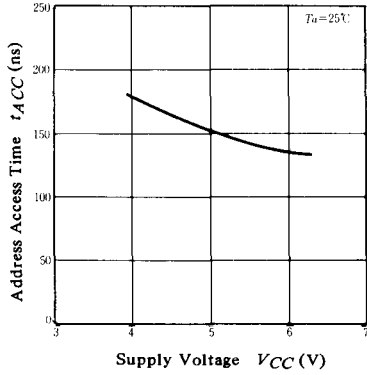
**SUPPLY CURRENT VS. SUPPLY VOLTAGE**



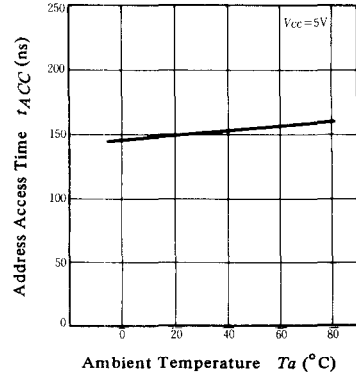
**SUPPLY CURRENT VS. AMBIENT TEMPERATURE**



**ADDRESS ACCESS TIME VS. SUPPLY VOLTAGE**

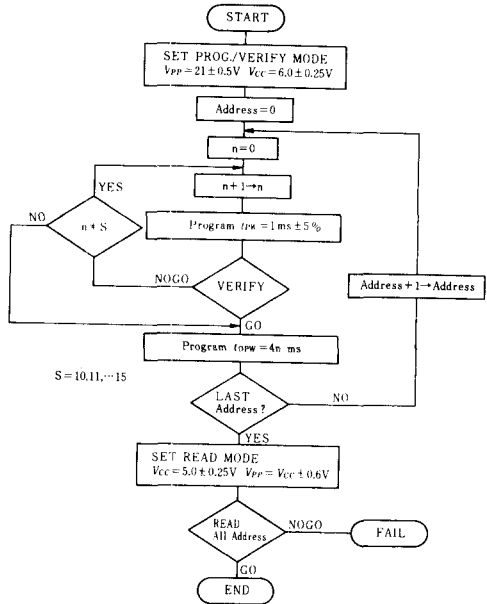


**ADDRESS ACCESS TIME VS. AMBIENT TEMPERATURE**



■ 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, VCC = 6V ± 0.25V, VPP = 21V ± 0.5V)

Parameter	Symbol	Test Condition	min	typ	max	Unit
Address Setup Time	tAS		2	—	—	μs
OE Setup Time	tOES		2	—	—	μs
Data Setup Time	tDS		2	—	—	μs
Address Hold Time	tAH		0	—	—	μs
Data Hold Time	tDH		2	—	—	μs
OE to Output Float Delay*	tDF		0	—	130	ns
VPP Setup Time	tVPS		2	—	—	μs
VCC Setup Time	tVCS		2	—	—	μs
PGM Pulse Width during Initial Program	tPW		0.95	1.0	1.05	ms
PGM Pulse Width during Over Program**	tOPW		3.8	—	63	ms
CE Setup Time	tCES		2	—	—	μs
Data Valid from OE	tOE		—	—	150	ns

Notes) \* tDF defines the time at which the output achieves the open circuit condition and is not referenced to output voltage levels.  
 \*\* tOPW is defined as mentioned in flow chart.

● SWITCHING CHARACTERISTICS

Test Condition

Input Pulse Level: 0.8V to 2.2V  
 Input Rise and Fall Time: ≤ 20 ns  
 Reference Level for Measuring Timing: Input; 1V and 2V  
 Output; 0.8V and 2V

