



HN27C256FP Series

■ MODE SELECTION

T-46-13-25

Mode	Pins	$\overline{CE}$ (20)	$\overline{OE}$ (22)	A9 (24)	$V_{PP}$ (1)	$V_{CC}$ (28)	I/O (11 - 13, 15 - 19)
Read		$V_{IL}$	$V_{IL}$	X	$V_{CC}$	$V_{CC}$	Dout
Output Disable		$V_{IL}$	$V_{IH}$	X	$V_{CC}$	$V_{CC}$	High Z
Standby		$V_{IH}$	X	X	$V_{CC}$	$V_{CC}$	High Z
High Performance Program		$V_{IL}$	$V_{IH}$	X	$V_{PP}$	$V_{CC}$	Din
Program Verify		$V_{IH}$	$V_{IL}$	X	$V_{PP}$	$V_{CC}$	Dout
Optional Verify		$V_{IL}$	$V_{IL}$	X	$V_{PP}$	$V_{CC}$	Dout
Program Inhibit		$V_{IH}$	$V_{IH}$	X	$V_{PP}$	$V_{CC}$	High Z
Identifier		$V_{IL}$	$V_{IL}$	$V_H^{*2}$	$V_{CC}$	$V_{CC}$	Code

Notes) \*1. X: Don't care.  
\*2.  $V_H$ :  $12.0 \pm 0.5V$ .

■ ABSOLUTE MAXIMUM RATINGS

Item	Symbol	Value	Unit
Operating Temperature Range	$T_{opr}$	0 to +70	°C
Storage Temperature Range	$T_{stg}$	-55 to +125	°C
Storage Temperature Range Under Bias	$T_{bias}$	-10 to +80	°C
All Input and Output Voltage*1	$V_{IN}, V_{OUT}$	-0.6*2 to +7	V
Voltage on Pin 24 (A9)*1	$V_{ID}$	-0.6*2 to +13.5	V
$V_{PP}$ Voltage*1	$V_{PP}$	-0.6 to +14	V
$V_{CC}$ Voltage*1	$V_{CC}$	-0.6 to +7	V

Notes) \*1. With respect to  $V_{SS}$ .  
\*2. -1.0V for pulse width  $\leq 50ns$ .

■ READ OPERATION

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

Parameter	Symbol	Test Condition	min	typ	max	Unit
Input Leakage Current	$I_{LI}$	$V_{in} = 5.25V$	-	-	2	$\mu A$
Output Leakage Current	$I_{LO}$	$V_{out} = 5.25V/0.45V$	-	-	2	$\mu A$
$V_{PP}$ Current	$I_{PP1}$	$V_{PP} = 5.5V$	-	1	20	$\mu A$
$V_{CC}$ Current (Standby)	$I_{SB1}$	$\overline{CE} = V_{IH}$	-	-	1	mA
	$I_{SB2}$	$\overline{CE} = V_{CC} \pm 0.3V$	-	1	20	$\mu A$
$V_{CC}$ Current (Active)	$I_{CC1}$	$\overline{CE} = V_{IL}, I_{out} = 0 mA$	-	-	30	mA
	$I_{CC2}$	$f = 5 MHz, I_{out} = 0 mA$	-	-	30	mA
	$I_{CC3}$	$f = 1 MHz, I_{out} = 0 mA$	-	-	8	mA
Input Voltage	$V_{IL}$		-0.3*1	-	0.8	V
	$V_{IH}$		2.2	-	$V_{CC} + 1.0^{*2}$	V
Output Voltage	$V_{OL}$	$I_{OL} = 2.1 mA$	-	-	0.45	V
	$V_{OH1}$	$I_{OH} = -400 \mu A$	2.4	-	-	V
	$V_{OH2}$	$I_{OH} = -100 \mu A$	$V_{CC} - 0.7$	-	-	V

Notes) \*1. -1.0V for pulse width  $\leq 50ns$ .  
\*2.  $V_{CC} + 1.5V$  for pulse width  $\leq 20ns$ . If  $V_{IH}$  is over the specified maximum value, read operation cannot be guaranteed.



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

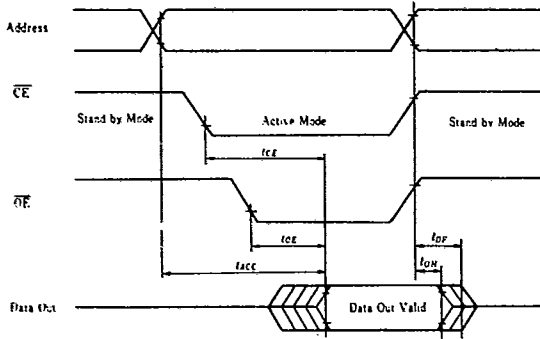
T-46-13-25

Parameter	Symbol	Test Condition	HN27C256FP-25T		HN27C256FP-30T		Unit
			Min	Max	Min	Max	
Address to Output Delay	$t_{ACC}$	$\overline{CE} = \overline{OE} = V_{IL}$	—	250	—	300	ns
$\overline{CE}$ to Output Delay	$t_{CE}$	$\overline{OE} = V_{IL}$	—	250	—	300	ns
$\overline{OE}$ to Output Delay	$t_{OE}$	$\overline{CE} = V_{IL}$	10	100	0	120	ns
$\overline{OE}$ High to Output Float	$t_{DF}$	$\overline{CE} = V_{IL}$	0	60	0	105	ns
Address to Output Hold	$t_{OH}$	$\overline{CE} = \overline{OE} = V_{IL}$	0	—	0	—	ns

Note:  $t_{DF}$  is defined as the time at which the Output achieves the open circuit condition and Data is no longer driven.

● SWITCHING CHARACTERISTICS  
TEST CONDITION

- Input pulse levels: 0.45V to 2.4V
- Input rise and fall time:  $\leq 20\text{ns}$
- Output load: 1 TTL Gate +100pF
- Reference level for measuring timing: 0.8V and 2.0V



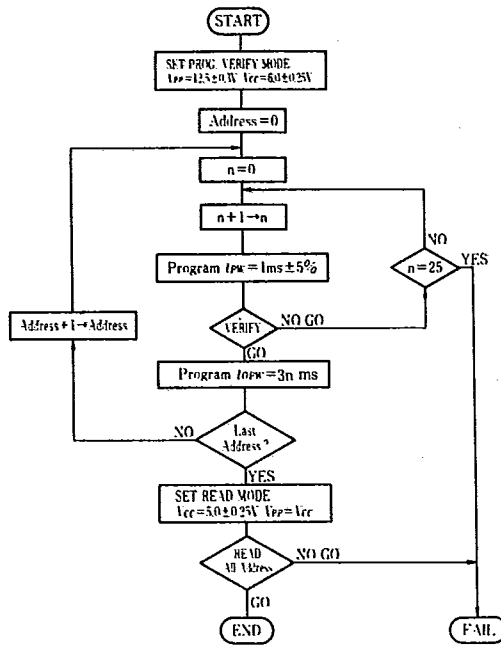
● CAPACITANCE ( $T_a=25^\circ\text{C}$ ,  $f=1\text{MHz}$ )

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



■ 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

■ HIGH PERFORMANCE PROGRAMMING OPERATION

● DC PROGRAMMING CHARACTERISTICS (Ta=25°C±5°C, VCC=6V±0.25V, VPP=12.5V±0.3V)

Parameter	Symbol	Test Condition	min.	typ.	max.	Unit
Input Leakage Current	$I_{LI}$	$V_{IN} = 6.25V/0.45V$	-	-	2	$\mu A$
Output Low Voltage During Verify	$V_{OL}$	$I_{OL} = 2.1 mA$	-	-	0.45	V
Output High Voltage During Verify	$V_{OH}$	$I_{OH} = -400 \mu A$	2.4	-	-	V
VCC Current (Active)	$I_{CC2}$		-	-	30	mA
Input Low Level	$V_{IL}$		-0.1*5	-	0.8	V
Input High Level	$V_{IH}$		2.2	-	$V_{CC}+0.5^*6$	V
VPP Supply Current	$I_{PP2}$	$\overline{CE} = V_{IL}$	-	-	40	mA

- Notes) \*1.  $V_{CC}$  must be applied before  $V_{PP}$  and removed after  $V_{PP}$ .  
 \*2.  $V_{PP}$  must not exceed 14V including overshoot.  
 \*3. An influence may be had upon device reliability if the device is installed or removed while  $V_{PP} = 12.5V$ .  
 \*4. Do not alter  $V_{PP}$  either  $V_{IL}$  to 12.5V or 12.5V to  $V_{IL}$  when  $\overline{CE} = Low$ .  
 \*5. -0.6V for pulse width  $\leq 20ns$ .  
 \*6. If  $V_{IH}$  is over the specified maximum value, programming operation cannot be guaranteed.



● AC PROGRAMMING CHARACTERISTICS ( $T_a=25^{\circ}\text{C}\pm 5^{\circ}\text{C}$ ,  $V_{CC}=6\text{V}\pm 0.25\text{V}$ ,  $V_{PP}=12.5\text{V}\pm 0.3\text{V}$ )

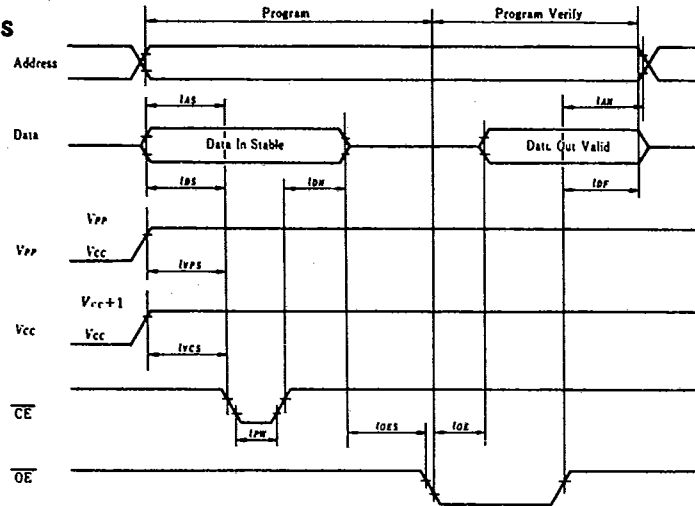
Parameter	Symbol	Test Condition	min.	typ.	max.	Unit
Address Setup Time	$t_{AS}$		2	—	—	$\mu\text{s}$
$\overline{\text{OE}}$ Setup Time	$t_{OES}$		2	—	—	$\mu\text{s}$
Data Setup Time	$t_{DS}$		2	—	—	$\mu\text{s}$
Address Hold Time	$t_{AH}$		0	—	—	$\mu\text{s}$
Data Hold Time	$t_{DH}$		2	—	—	$\mu\text{s}$
$\overline{\text{OE}}$ to Output Float Delay	$t_{DF}^{*1}$		0	—	130	ns
$V_{PP}$ Setup Time	$t_{VPS}$		2	—	—	$\mu\text{s}$
$V_{CC}$ Setup Time	$t_{VCS}$		2	—	—	$\mu\text{s}$
$\overline{\text{CE}}$ Pulse Width During Initial Programming	$t_{PW}$		0.95	1.0	1.05	ms
$\overline{\text{CE}}$ Pulse Width During Overprogramming	$t_{OPW}^{*2}$		2.85	—	78.75	ms
Data Valid from $\overline{\text{OE}}$	$t_{OE}$		0	—	150	ns

Notes: \*1.  $t_{DF}$  is defined as the time at which the output achieves the open circuit condition and data is no longer driven.  
\*2. Refer to the programming flowchart for  $t_{OPW}$ .

● 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



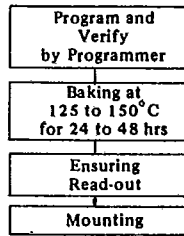
● HN27C256FP IDENTIFIER MODES

Identifier	Pins	$A_0$ (10)	$I/O_7$ (19)	$I/O_8$ (18)	$I/O_9$ (17)	$I/O_{10}$ (16)	$I/O_{11}$ (15)	$I/O_{12}$ (13)	$I/O_{13}$ (12)	$I/O_{14}$ (11)	Hex Data
Manufacturer Code	$V_{IL}$	0	0	0	0	0	0	1	1	1	07
Device Code	$V_{IH}$	1	0	1	1	0	0	0	0	0	B0

Notes: 1.  $A_0 = 12.0\text{V} \pm 0.5\text{V}$ .  
2.  $A_1 - A_9, A_{10} - A_{14}, \overline{\text{CE}}, \overline{\text{OE}} = V_{IL}$ .

■ RECOMMENDED SCREENING CONDITIONS

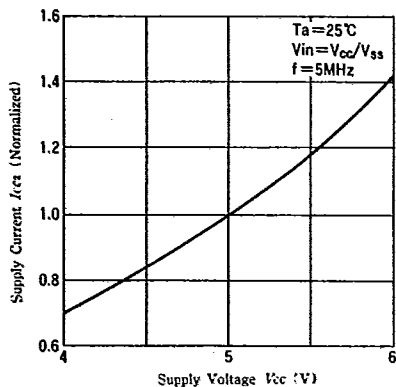
Before mounting, please make the screening (baking without bias) shown in the right.



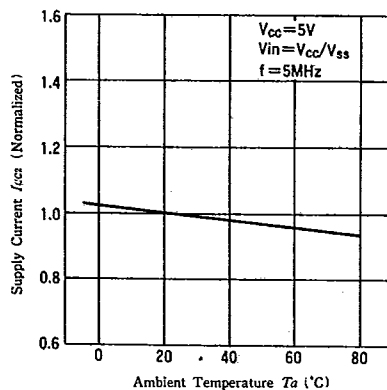
Recommended Screening conditions



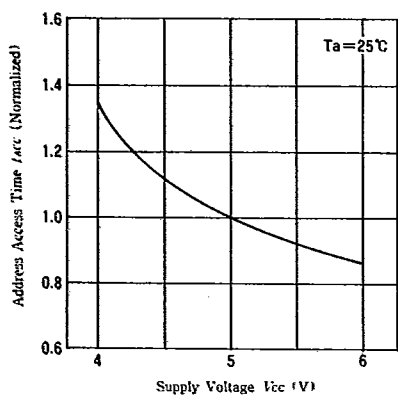
SUPPLY CURRENT vs. SUPPLY VOLTAGE



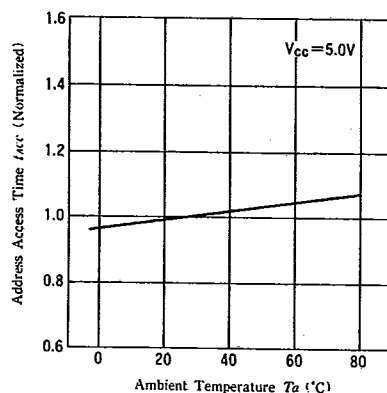
SUPPLY CURRENT vs. AMBIENT TEMPERATURE



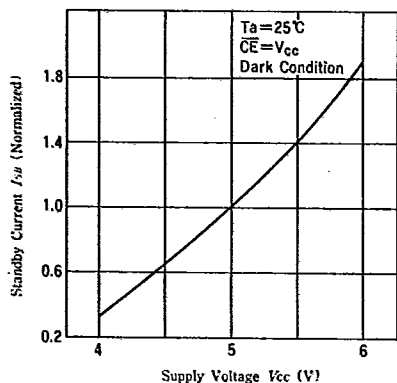
ADDRESS ACCESS TIME vs. SUPPLY VOLTAGE



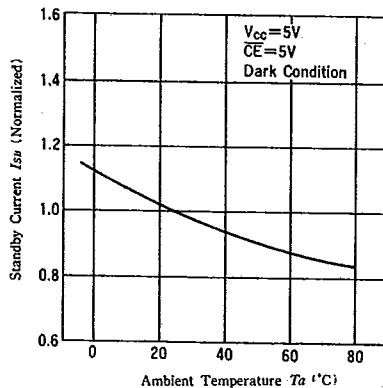
ADDRESS ACCESS TIME vs. AMBIENT TEMPERATURE



STANDBY CURRENT vs. SUPPLY VOLTAGE



STANDBY CURRENT vs. AMBIENT TEMPERATURE



\* See Supply Voltage vs. Active Frequency, Access Time vs. Load Capacitance, and Output Current vs. Output Voltage (1), (2) of HN27C256G.

