HN27512P Series

65536-word × 8-bit One Time Electrically Programmable Read Only Memory

The HN27512P is a 65536-word by 8-bit one time electrically programmable ROM. Initially, all bits of the HN27512P 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 dual in-line package. Therefore, this device can not be re-written.

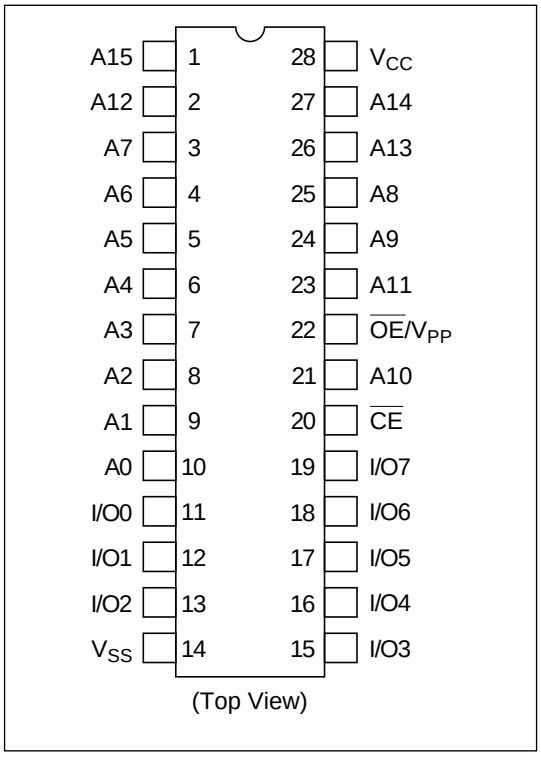
Features

- Single power supply: +5V ±5%
- High performance programming:
  Program voltage: +12.5 V D.C.
  High performance programming operations
- Static: No clocks required
- Inputs and outputs TTL compatible during both read and program modes
- Access time: 250/300 ns (max)
- Absolute max. rating of V_{PP} pin: 14.0V (max)
- Device identifier mode: Manufacturer code and device code.

Ordering Information

Type No.	Access time	Package
HN27512P-25	250ns	600 mil 28-pin plastic DIP (DP-28)
HN27512P-30	300ns	

Pin Arrangement

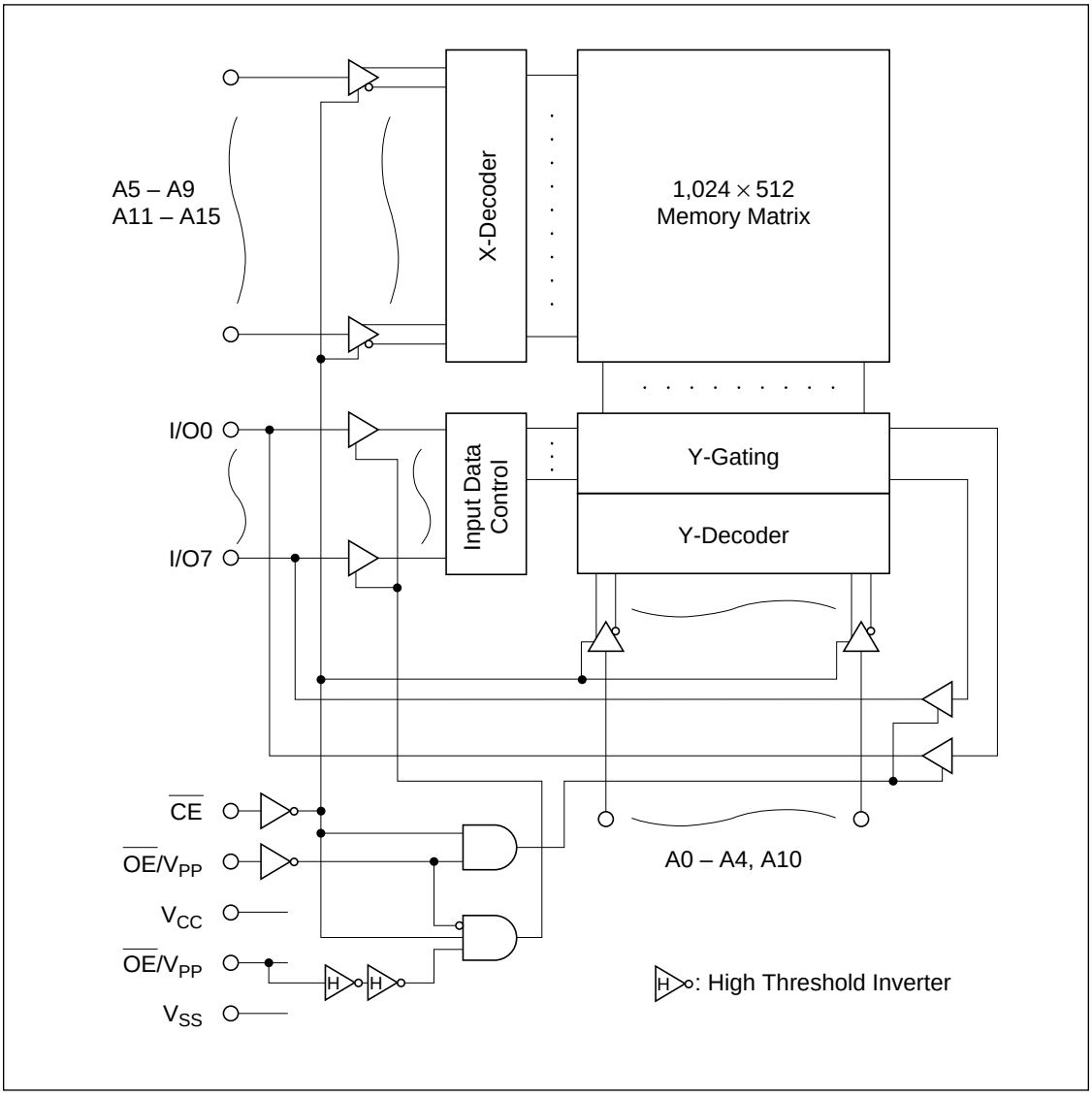


(Top View)

Pin Description

Pin name	Function
A0 – A15	Address
I/O0 – I/O7	Input/output
$\overline{CE}$	Chip enable
$\overline{OE}$	Output enable
V_{CC}	Power supply
V_{PP}	Programming power supply
V_{SS}	Ground

Block Diagram



Mode Selection

Mode	$\overline{CE}$ (20)	$\overline{OE}/V_{PP}$ (22)	A9 (24)	V_{CC} (28)	I/O (11 – 13, 15 – 19)
Read	V_{IL}	V_{IL}	×	V_{CC}	Dout
Output disable	V_{IL}	V_{IH}	×	V_{CC}	High-Z
Standby	V_{IH}	×	×	V_{CC}	High-Z
High performance program	V_{IL}	V_{PP}	×	V_{CC}	Din
Program verify	V_{IL}	V_{IL}	×	V_{CC}	Dout
Program inhibit	V_{IH}	V_{PP}	×	V_{CC}	High-Z
Identifier	V_{IL}	V_{IL}	V_H*2	V_{CC}	Code

Notes: 1. ×: Don't care.
2. V_H : 12.0 V ± 0.5 V.

Absolute Maximum Ratings

Item	Symbol	Value	Unit
Operating temperature range	Topr	0 to +70	°C
Storage temperature range	Tstg	–55 to +125	°C
Storage temperature range under bias	Tbias	–10 to +80	°C
All input and output voltages*1	Vin, Vout	–0.6 to +7.0	V
Voltage on Pin 24 (A9)*1	V_{ID}	–0.6 to +13.5	V
V_{PP} voltage*1	V_{PP}	–0.6 to +14.0	V
V_{CC} voltage*1	V_{CC}	–0.6 to +7.0	V

Notes: 1. With respect to V_{SS}.

Capacitance (Ta = 25°C, f = 1 MHz)

Parameter		Symbol	Min	Typ	Max	Unit	Test conditions
Input capacitance	except $\overline{OE}/V_{PP}$	Cin1	—	4	6	pF	Vin = 0 V
	$\overline{OE}/V_{PP}$ pin	Cin2	—	12	20	pF	Vin = 0 V
Output capacitance		Cout	—	8	12	pF	Vout = 0 V

Read Operation

DC and Operating Characteristics (Ta = 0 to +70°C, V_{CC} = 5 V ± 5%)

Parameter	Symbol	Min	Typ	Max	Unit	Test conditions
Input leakage current	I_{LI}	—	—	10	µA	Vin = 5.25 V
Output leakage current	I_{LO}	—	—	10	µA	Vout = 5.25/0.45 V
V_{CC} current (Standby)	I_{CC1}	—	—	40	mA	$\overline{CE}$ = V_{IH}
V_{CC} current (Active)	I_{CC2}	—	45	100	mA	$\overline{CE}$ = $\overline{OE}$ = V_{IL}
Input low voltage	V_{IL}	–0.1[*1]	—	0.8	V	
Input high voltage	V_{IH}	2.0	—	V_{CC} + 1[*2]	V	
Output low voltage	V_{OL}	—	—	0.45	V	I_{OL} = 2.1 mA
Output high voltage	V_{OH}	2.4	—	—	V	I_{OH} = –400 µA

Notes: 1. –0.6 V for pulse width ≤ 20 ns
2. V_{CC} + 1.5 V for pulse width ≤ 20 ns. If V_{IH} is over the specified maximum value, read operation cannot be guaranteed.

AC Characteristics (Ta = 0 to +70°C, V_{CC} = 5 V ± 5%)

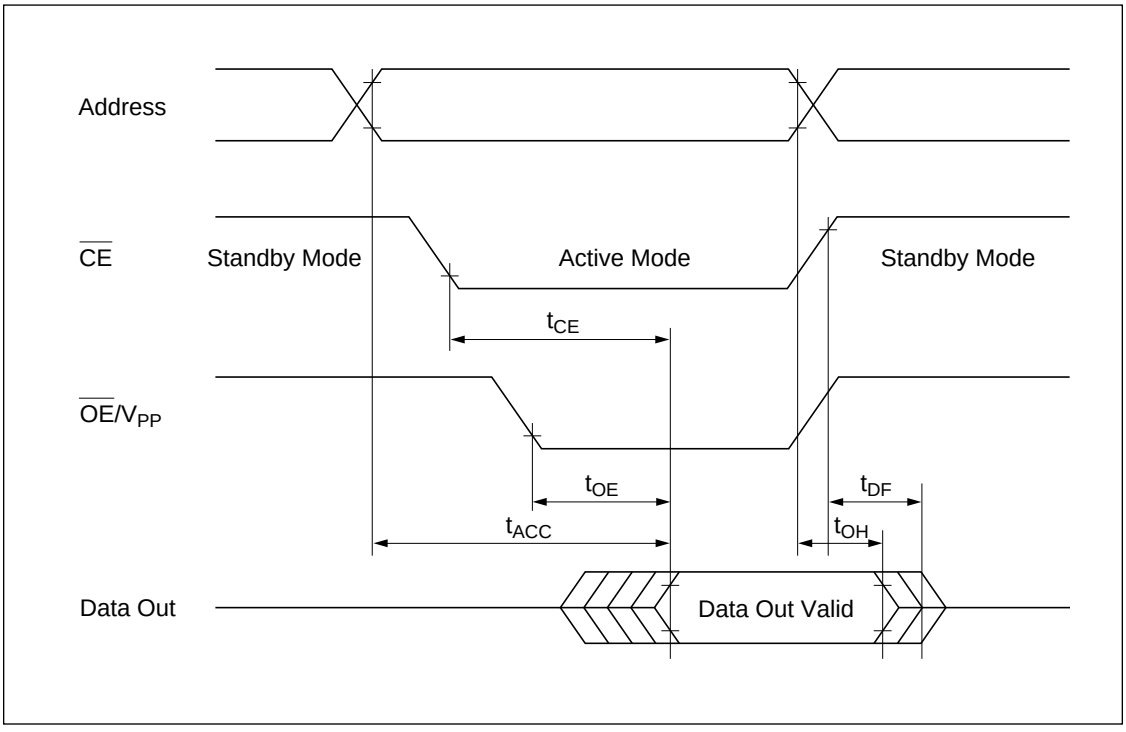
		HN27512P-25		HN27512P-30			
Parameter	**Symbol**	**Min**	**Max**	**Min**	**Max**	**Unit**	**Test conditions**
Address to output delay	t_{ACC}	—	250	—	300	ns	$\overline{CE}$ = $\overline{OE}$ = V_{IL}
$\overline{CE}$ to output delay	t_{CE}	—	250	—	300	ns	$\overline{OE}$ = V_{IL}
$\overline{OE}$ to output delay	t_{OE}	—	100	—	120	ns	$\overline{CE}$ = V_{IL}
$\overline{OE}$ high output float	t_{DF}	0	60	0	105	ns	$\overline{CE}$ = V_{IL}
Address to output hold	t_{OH}	0	—	0	—	ns	$\overline{CE}$ = $\overline{OE}$ = V_{IL}

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

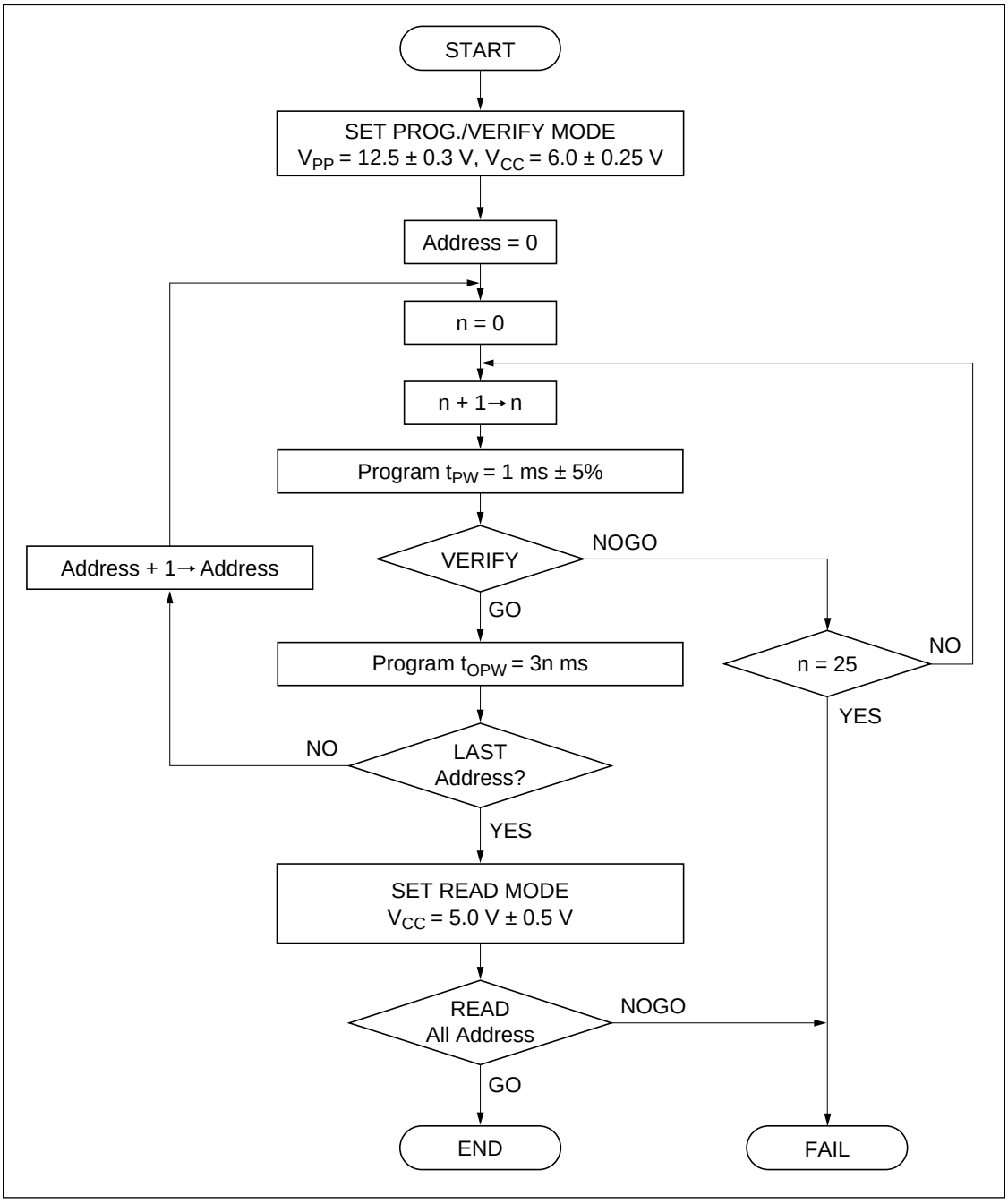
Test Conditions

- Input pulse levels: 0.45 V to 2.4 V
- Input rise and fall time: ≤ 20 ns
- Output load: 1TTL gate + 100 pF
- Reference level for measuring timing: 0.8 V and 2.0 V



High Performance Programming

This device can be applied the High Performance Programming algorithm show 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.



DC Programming Characteristics (Ta = 25°C ± 5°C, V_{CC} = 6 V ± 0.25 V, V_{PP} = 12.5 V ± 0.3 V)

Parameter	Symbol	Min	Typ	Max	Unit	Test conditions
Input leakage current	I_{LI}	—	—	10	µA	Vin = 5.25 V
Output low voltage during verify	V_{OL}	—	—	0.45	V	I_{OL} = 2.1 mA
Output high voltage during verify	V_{OH}	2.4	—	—	V	I_{OH} = –400 µA
V_{CC} current (Active)	I_{CC2}	—	—	100	mA	
Input low voltage	V_{IL}	–0.1*1	—	0.8	V	
Input high voltage	V_{IH}	2.0	—	V_{CC} + 0.5*2	V	
V_{PP} supply current	I_{PP}	—	—	50	mA	$\overline{CE}$ = V_{IL}

Notes: 1. –0.6 V for pulse width ≤ 20 ns
2. If V_{IH} is over the specified maximum value, programming operation cannot be guaranteed.

AC Programming Characteristics (Ta = 25°C ± 5°C, V_{CC} = 6 V ± 0.25 V, V_{PP} = 12.5 V ± 0.3 V)

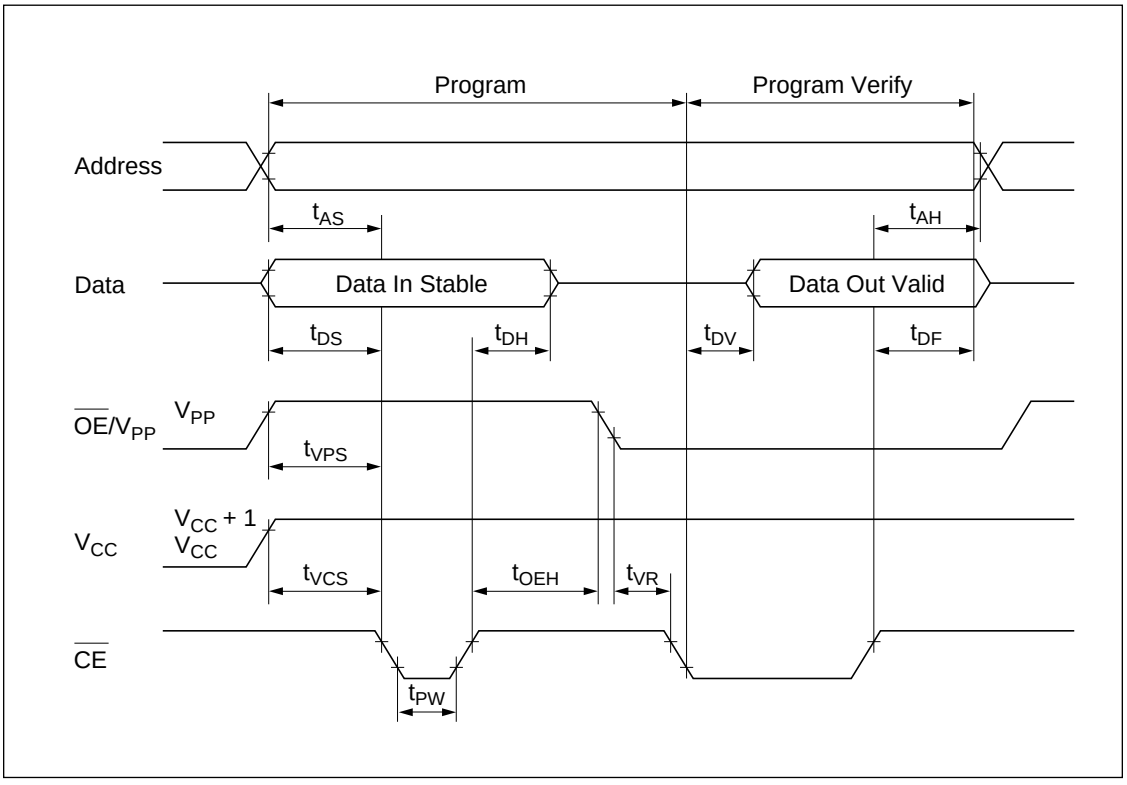
Parameter	Symbol	Min	Typ	Max	Unit	Test conditions
Address setup time	t_{AS}	2	—	—	µs	
Data setup time	t_{DS}	2	—	—	µs	
Address hold time	t_{AH}	0	—	—	µs	
Data hold time	t_{DH}	2	—	—	µs	
$\overline{OE}$ hold time	t_{OEH}	2	—	—	µs	
$\overline{CE}$ to output float delay	t_{DF}*1	0	—	130	ns	
V_{PP} setup time	t_{VPS}	2	—	—	µs	
V_{CC} setup time	t_{VCS}	2	—	—	µs	
$\overline{CE}$ pulse width during initial programming	t_{PW}	0.95	1.0	1.05	ms	
$\overline{CE}$ pulse width during over programming	t_{OPW}*2	2.85	—	78.75	ms	
V_{PP} recovery time	t_{VR}	2	—	—	µs	
Data valid from $\overline{OE}$	t_{DV}	—	—	1	µs	

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: 0.45 V to 2.4 V
- Input rise and fall time: ≤ 20 ns
- Reference level for measuring timing: 0.8 V and 2.0 V



Mode Description

Device Identifier Mode

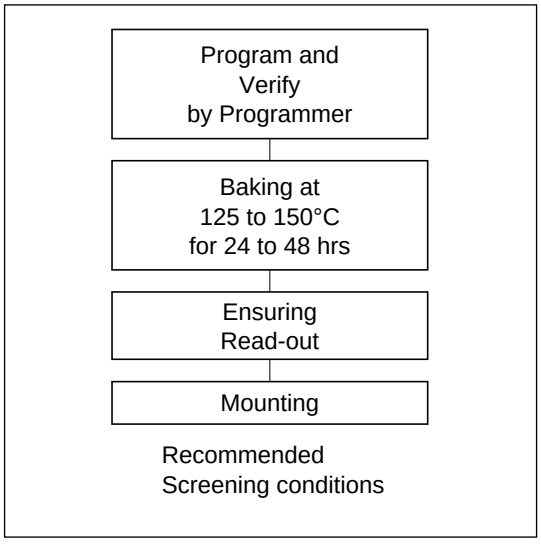
The Identifier Mode allows the reading out of binary codes that identify manufacturer and type of device, from outputs of OTPROM. By this Mode, the device will be automatically matched its own corresponding programming algorithm, using programming equipment.

Identifier	A0 (10)	I/O7 (19)	I/O6 (18)	I/O5 (17)	I/O4 (16)	I/O3 (15)	I/O2 (13)	I/O1 (12)	I/O0 (11)	Hex data
Manufacturer code	V_{IL}	0	0	0	0	0	1	1	1	07
Device code	V_{IH}	1	0	0	1	0	1	0	0	94

Notes: 1. A9 = 12.0 V ± 0.5 V.
2. A1 – A8, A10 – A15, $\overline{CE}$, $\overline{OE}/V_{PP} = V_{IL}$.

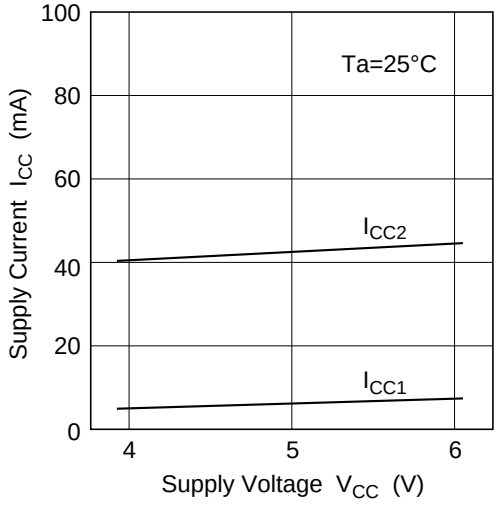
Recommended Screening Conditions

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

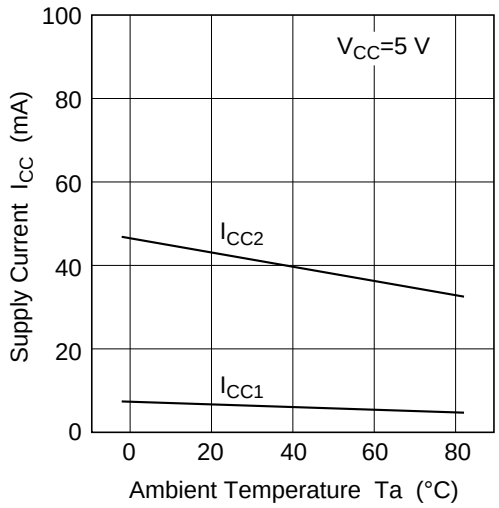


Electrical Characteristics Curves

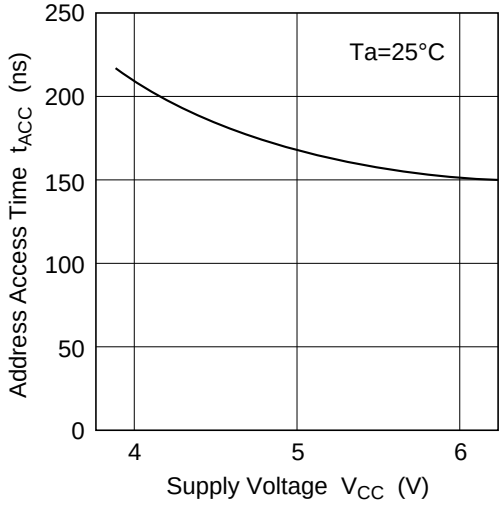
Supply Current vs. Supply Voltage



Supply Current vs. Ambient Temperature



Address Access Time vs. Supply Voltage



Address Access Time vs. Ambient Temperature