

# HN62321 Series

# HN62331 Series

## 1M (128K x 8-bit) Mask ROM

### ■ DESCRIPTION

The Hitachi HN62321/HN62331 Series is a 1-Megabit CMOS Mask Programmable Read Only Memory organized as 131,072 x 8-bit.

The low power consumption of this device makes it ideal for battery powered, portable systems. In addition, the high speed provides enough capacity and high performance to be used as a character generator in laser printers.

Hitachi's HN62321/HN62331 Series is offered with pinouts in 28-pin Plastic DIP and 28-lead Plastic SOP packages.

### ■ FEATURES

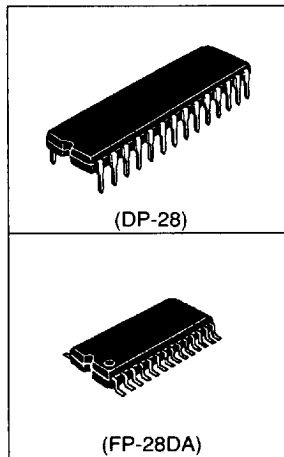
- Single Power Supply:  
 $V_{CC} = 5V \pm 10\%$
- Fast Access Times:  
120/150/200 ns (max)
- Low Power Consumption:  
Active Current: 100 mW (typ)  
Standby Current: 5  $\mu$ W (typ)
- Byte-Wide Data Organization
- TTL-Compatible Inputs and Outputs
- Three-State Data Outputs
- Packages:  
28-pin Plastic DIP  
28-lead Plastic SOP

### ■ ORDERING INFORMATION

| Type No.  | Access Time | Package                  |
|-----------|-------------|--------------------------|
| HN62331P  | 120/150 ns  | 28-pin                   |
| HN62331BP | 200 ns      | Plastic DIP<br>(DP-28)   |
| HN62331F  | 120/150 ns  | 28-lead                  |
| HN62331BF | 200 ns      | Plastic SOP<br>(FP-28DA) |

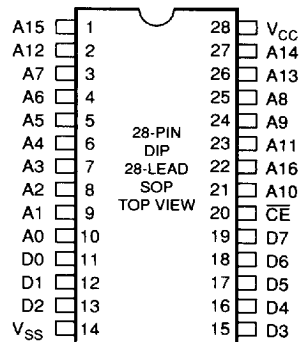
### ■ PIN DESCRIPTION

| Pin Name        | Function     |
|-----------------|--------------|
| $A_0 - A_{16}$  | Address      |
| $D_0 - D_7$     | Output       |
| $\overline{CE}$ | Chip Enable  |
| $V_{CC}$        | Power Supply |
| $V_{SS}$        | Ground       |



### ■ PIN ARRANGEMENT

HN62321/331P Series  
HN62321BP Series  
HN62321/331F Series  
HN62321BF Series



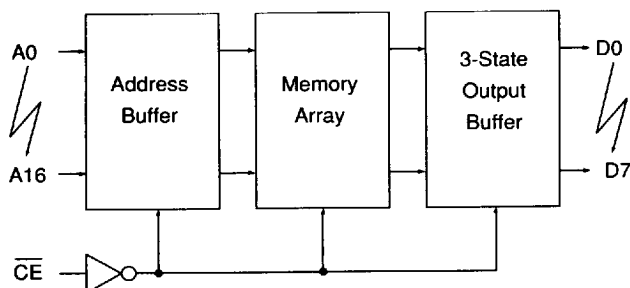
(PinD28.HN62321/331)

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**■ BLOCK DIAGRAM**


(BD.HN62321/331)

**■ ABSOLUTE MAXIMUM RATINGS**

| Item                          | Symbol     | Value                  | Unit |
|-------------------------------|------------|------------------------|------|
| Supply Voltage <sup>1</sup>   | $V_{CC}$   | -0.3 to +7.0           | V    |
| Terminal Voltage <sup>1</sup> | $V_T$      | -0.3 to $V_{CC} + 0.3$ | V    |
| Operating Temperature Range   | $T_{OPR}$  | 0 to +70               | °C   |
| Storage Temperature Range     | $T_{STG}$  | -55 to +125            | °C   |
| Temperature Under Bias        | $T_{BIAS}$ | -20 to +85             | °C   |

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

**■ CAPACITANCE**

 ( $V_{CC} = 5V \pm 10\%$ ,  $V_{SS} = 0V$ ,  $T_a = 25^\circ C$ ,  $V_{IN} = 0V$ ,  $f = 1MHz$ )

| Item                            | Symbol    | Min. | Max. | Unit |
|---------------------------------|-----------|------|------|------|
| Input Capacitance <sup>1</sup>  | $C_{IN}$  | -    | 10   | pF   |
| Output Capacitance <sup>1</sup> | $C_{OUT}$ | -    | 15   | pF   |

Notes: 1. This parameter is sampled and not 100% tested.

**■ DC ELECTRICAL CHARACTERISTICS FOR READ OPERATION**

 ( $V_{CC} = 5V \pm 10\%$ ,  $V_{SS} = 0V$ ,  $T_a = 0$  to  $70^\circ C$ )

| Item                       | Symbol   | Min.    | Max.           | Unit    | Test Condition                                              |
|----------------------------|----------|---------|----------------|---------|-------------------------------------------------------------|
| Input Leakage Current      | $I_{LI}$ | -       | 10             | $\mu A$ | $V_{IN} = 0$ to $V_{CC}$                                    |
| Output Leakage Current     | $I_{LO}$ | -       | 10             | $\mu A$ | $\overline{CE} = 2.2^1 V$ , $V_{OUT} = 0$ to $V_{CC}$       |
| Operating $V_{CC}$ Current | $I_{CC}$ | -       | 50             | mA      | $V_{CC} = 5.5V$ , $I_{DOUT} = 0$ mA, $t_{RC} = \text{Min.}$ |
| Standby $V_{CC}$ Current   | $I_{SB}$ | -       | 30             | $\mu A$ | $V_{CC} = 5.5V$ , $\overline{CE} \geq V_{CC} - 0.2V$        |
| Input Voltage              | $V_{IH}$ | $2.2^1$ | $V_{CC} + 0.3$ | V       |                                                             |
|                            | $V_{IL}$ | -0.3    | $0.8^1$        | V       |                                                             |
| Output Voltage             | $V_{OH}$ | 2.4     | -              | V       | $I_{OH} = -205 \mu A$                                       |
|                            | $V_{OL}$ | -       | 0.4            | V       | $I_{OL} = 3.2$ mA                                           |

 Notes: 1. HN62331 Series is  $V_{IH} = 2.4V$  (min.) and  $V_{IL} = 0.45V$  (max.).

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■ AC ELECTRICAL CHARACTERISTICS FOR READ OPERATION

( $V_{CC} = 5V \pm 10\%$ ,  $V_{SS} = 0V$ ,  $T_a = 0$  to  $70^\circ\text{C}$ )

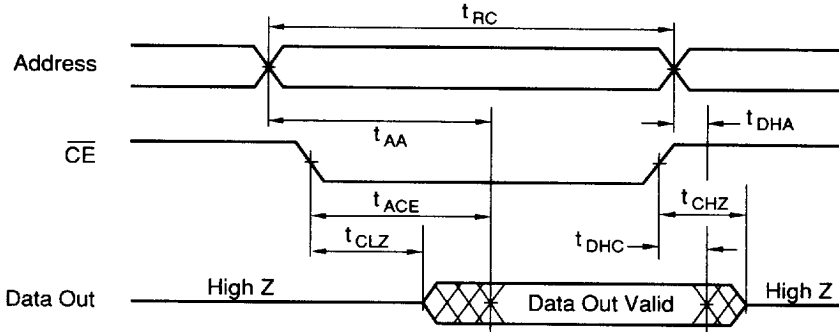
**Test Conditions**

- Input pulse levels: HN62321 Series: 0.8 V / 2.4 V HN62331 Series: 0.45 V / 2.4 V
- Input rise and fall times:  $\leq 10$  ns
- Output load: 1 TTL Gate + CL = 100 pF (Including jig capacitance)
- Input/Output Timing Reference level: 1.5 V

| Item                                  | Symbol      | HN62331 |      | HN62321 |      | HN62321B |      | Unit |
|---------------------------------------|-------------|---------|------|---------|------|----------|------|------|
|                                       |             | Min.    | Max. | Min.    | Max. | Min.     | Max. |      |
| Read Cycle Time                       | $t_{RC}$    | 120     | -    | 150     | -    | 200      | -    | ns   |
| Address Access Time                   | $t_{AA}$    | -       | 120  | -       | 150  | -        | 200  | ns   |
| $\overline{CE}$ Access Time           | $t_{ACE}$   | -       | 120  | -       | 150  | -        | 200  | ns   |
| Output Hold Time from Address Change  | $t_{DHA}$   | 0       | -    | 0       | -    | 0        | -    | ns   |
| Output Hold Time from $\overline{CE}$ | $t_{DHC}$   | 0       | -    | 0       | -    | 0        | -    | ns   |
| $\overline{CE}$ to Output in High Z   | $t_{CHZ}^1$ | -       | 60   | -       | 70   | -        | 100  | ns   |
| $\overline{CE}$ to Output in Low Z    | $t_{CLZ}$   | 5       | -    | 10      | -    | 10       | -    | ns   |

Notes: 1.  $t_{CHZ}$  defines the time at which the output becomes an open circuit and is not referenced to output voltage levels.

■ READ TIMING WAVEFORM



(TD.R.HN62321/331)

- Note: 1.  $t_{DHA}$ ,  $t_{DHC}$  are determined by the faster time.  
2.  $t_{AA}$ ,  $t_{ACE}$  are determined by the slower time.

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