

# 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

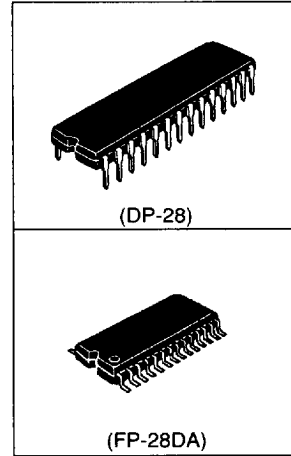
- Single Power Supply:  
 $V_{CC} = 5V \pm 10\%$
- Fast Access Times:  
 120/150/200 ns (max)
- Low Power Consumption:  
 Active Current: 100 mW (typ)  
 Standby Current: 5  $\mu$ W (typ)
- Byte-Wide Data Organization
- TTL-Compatible Inputs and Outputs
- Three-State Data Outputs
- Packages:  
 28-pin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

### ORDERING INFORMATION

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

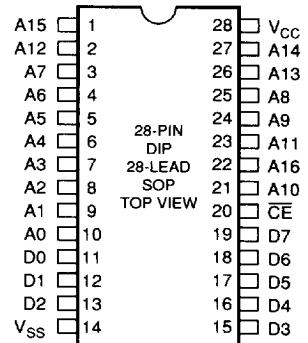
### PIN DESCRIPTION

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)

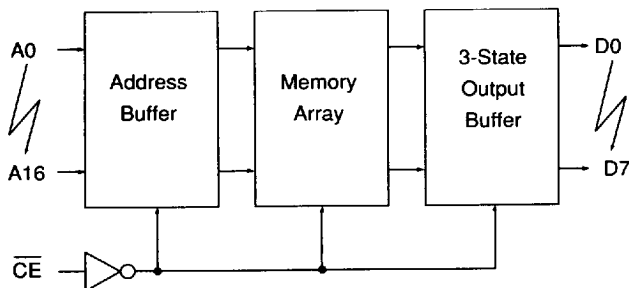
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■ BLOCK DIAGRAM



(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	$V_{CC} = 5.5 V$ , $I_{DOUT} = 0$ mA, $t_{RC} = \text{Min.}$
Standby $V_{CC}$ Current	$I_{SB}$	-	30	$\mu A$	$V_{CC} = 5.5 V$ , $\overline{CE} \geq V_{CC} - 0.2V$
Input Voltage	$V_{IH}$	2.2 <sup>1</sup>	$V_{CC} + 0.3$	V	
	$V_{IL}$	-0.3	0.8 <sup>1</sup>	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  $V_{IH} = 2.4 V$  (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  $70^\circ C$ )

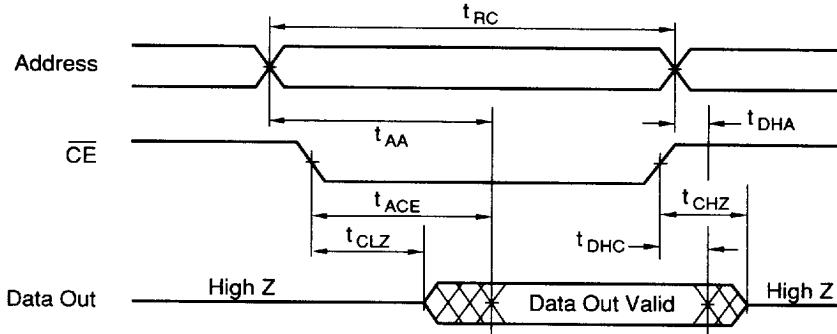
Test Conditions

- 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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