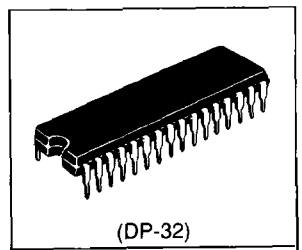
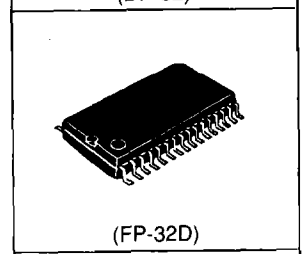
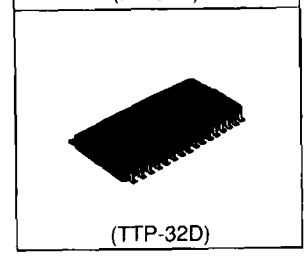
HN62321A Series
HN62331A Series

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


(DP-32)


(FP-32D)


(TTP-32D)

■ DESCRIPTION

The Hitachi HN62321A/HN62331A 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 HN62321A/HN62331A Series is offered in JEDEC-Standard Byte-Wide EPROM pinouts in 32-pin Plastic DIP and 32-lead Plastic SOP packages. This allows socket replacement with Flash Memory and EPROMs.

■ FEATURES

- Single Power Supply:
  V_{CC} = 5 V ± 10%
- Fast Access Times:
  120/150 ns (max)
- Low Power Consumption:
  Active Current: 100 mW (typ)
  Standby Current: 5 µW (typ)
- Byte-Wide Data Organization
- TTL-Compatible Inputs and Outputs
- Three-State Data Outputs
- Pin Arrangements:
  JEDEC Standard Byte-Wide EPROM
  Flash and EPROM Compatible
- Packages:
  32-pin Plastic DIP
  32-lead Plastic SOP

■ ORDERING INFORMATION

Type No.	Access Time	Package
HN62331AP	120 ns	32-pin Plastic DIP
HN62321AP	150 ns	(DP-32)
HN62331AF	120 ns	32-lead Plastic SOP
HN62321AF	150 ns	(FP-32D)
HN62331ATT	120 ns	32-lead Plastic TSOP
HN62321ATT	150 ns	(TTP-32D)

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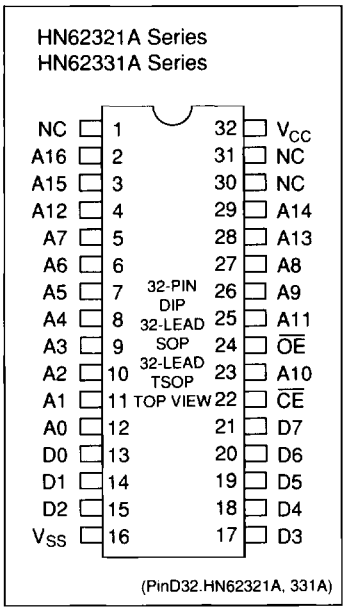
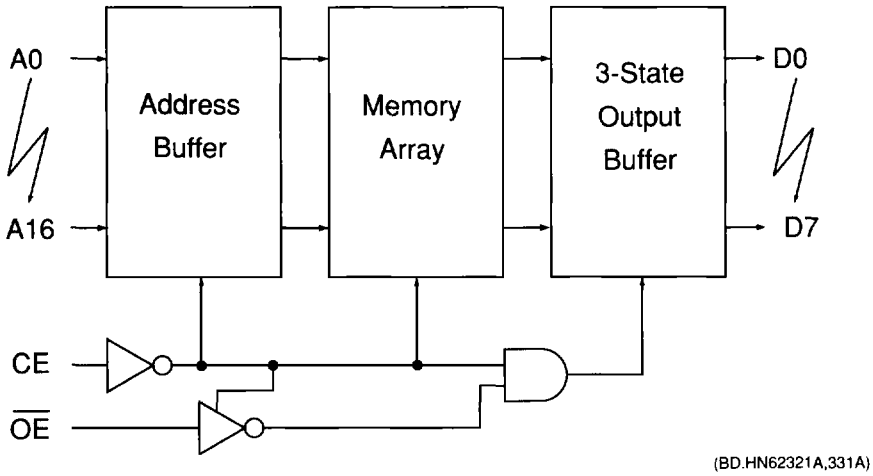
■ PIN DESCRIPTION

Pin Name	Function
A_0 - A_{16}	Address
D_0 - D_7	Output
$\overline{CE}$	Chip Enable
$\overline{OE}$	Output Enable
V_{CC}	Power Supply
V_{SS}	Ground
NC	No Connection

■ PIN ARRANGEMENT



■ BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATINGS

Item	Symbol	Value	Unit
Supply Voltage [1]	V_{CC}	-0.3 to +7.0	V
Terminal Voltage [1]	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 ± 10%, V_{SS} = 0V, T_a = 25°C, V_{IN} = 0 V, f = 1MHz)

Item	Symbol	Min.	Max.	Unit
Input Capacitance [1]	C_{IN}	-	10	pF
Output Capacitance [1]	C_{OUT}	-	15	pF

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

■ DC ELECTRICAL CHARACTERISTICS FOR READ OPERATION

(V_{CC} = 5V ± 10%, V_{SS} = 0 V, T_a = 0 to 70°C)

Item	Symbol	Min.	Max.	Unit	Test Condition
Input Leakage Current	I_{LI}	-	10	µA	V_{IN} = 0 to V_{CC}
Output Leakage Current	I_{LO}	-	10	µA	$\overline{CE}$ = 2.2 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} = Min.
Standby V_{CC} Current	I_{SB}	-	30	µA	V_{CC} = 5.5 V, $\overline{CE} \geq V_{CC}$-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 µA
	V_{OL}	-	0.4	V	I_{OL} = 3.2 mA

Notes: 1. HN62331A 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 ± 10%, V_{SS} = 0 V, T_a = 0 to 70°C)

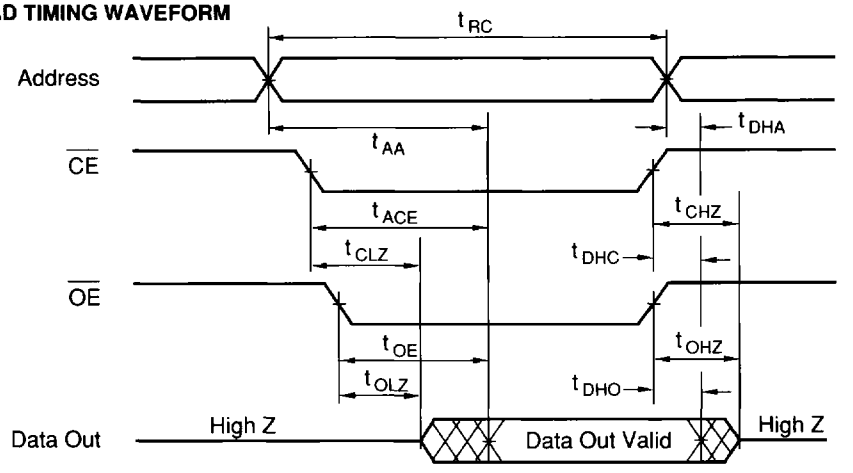
Test Conditions

- Input pulse levels: HN62321A Series: 0.8 V / 2.4 V; HN62331A Series: 0.45 V / 2.4 V
- Input rise and fall times: ≤ 10 ns
- Output load: 1 TTL Gate + CL = 100 pF (Including jig capacitance)
- Input/Output Timing Reference level: 1.5 V

Item	Symbol	HN62331A		HN62321A		Unit
		Min.	Max.	Min.	Max.	
Read Cycle Time	t_{RC}	120	-	150	-	ns
Address Access Time	t_{AA}	-	120	-	150	ns
$\overline{CE}$ Access Time	t_{ACE}	-	120	-	150	ns
$\overline{OE}$ Access Time	t_{OE}	-	60	-	70	ns
Output Hold Time from Address Change	t_{DHA}	0	-	0	-	ns
Output Hold Time from $\overline{CE}$	t_{DHC}	0	-	0	-	ns
Output Hold Time from $\overline{OE}$	t_{DHO}	0	-	0	-	ns
$\overline{CE}$ to Input in High Z	t_{CHZ} [1]	-	60	-	70	ns
$\overline{OE}$ to Input in High Z	t_{OHZ} [1]	-	60	-	70	ns
$\overline{CE}$ to Output in Low Z	t_{CLZ}	5	-	10	-	ns
$\overline{OE}$ to Output in Low Z	t_{OLZ}	5	-	10	-	ns

Note: 1. t_{CHZ} and t_{OHZ} define the time at which the output becomes an open circuit and are not referenced to output voltage levels.

■ READ TIMING WAVEFORM



(TD.HN62321A,331A)

Note: 1. t_{DHA}, t_{DHC}, t_{DHO} are determined by the faster time.
2. t_{AA}, t_{ACE}, t_{OE} are determined by the slower time.
3. t_{CLZ}, t_{OLZ} are determined by the slower time.