

### Features

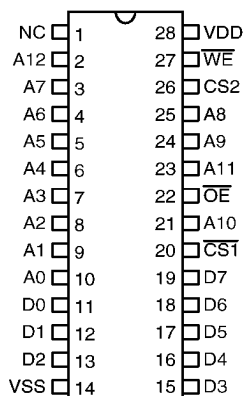
- Single 5V power supply
- Low power consumption
  - Operating: 200mW (Typ.)
  - Standby: 5μW (Typ.)
- 70ns (Max.) high speed access time
- Memory expansion by pin  $\overline{OE}$
- Common I/O using tri-state outputs
- TTL compatible interface levels
- Fully static operation
- Pin-compatible with standard 8K×8 bits of EPROM/MASK ROM
- 28-pin DIP/SDIP/SOP package

### General Description

The HT6264-70 is a 65,536-bit static random access memory organized as 8192 words by 8 bits and operates from a single 5-volt power supply. It is built with HOLTEK's high performance CMOS 0.8μm SPDM process.

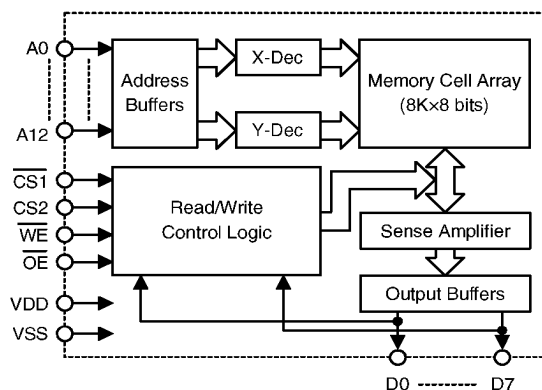
Six-transistor full COMS memory cell provides low standby current and high-reliability. Inputs and tri-state outputs are TTL compatible and allow for direct interfacing with common system bus structures.

### Pin Assignment



**HT6264-70**  
- 28 DIP/SDIP/SOP

### Block Diagram



## Pin Description

Pin No.	Pin Name	I/O	Description
10~3, 25, 24, 21, 23, 2	A0~A12	I	Address input pins
11~13, 15~19	D0~D2, D3~D7	I/O	Data input and output signal pins
26, 20	CS2, $\overline{\text{CS1}}$	I	Chip select signal pin
22	$\overline{\text{OE}}$	I	Output enable signal pin
27	$\overline{\text{WE}}$	I	Write enable signal pin
28	VDD	I	Positive power supply pin
14	GND	I	Negative power supply pin
1	NC		No connection

## Absolute Maximum Ratings\*

VDD to GND .....-0.3V to +7.0V

IN, IN/OUT Voltage to GND,  $V_T$ .....-0.3V to  $V_{CC}+0.5V$

Operating Temperature,  $T_{opr}$ .....-40°C to +85°C

Storage Temperature (Plastic),  $T_{stg}$ .....-55°C to +125°C

Temperature Under Bias,  $T_{bias}$ .....-10°C to +85°C

Power Dissipation,  $P_T$  .....1.0W

\* Note: Stresses above those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. These are stress ratings only. Functional operation of this device at these or any other conditions above those indicated in the operational sections of this specification is not implied and exposure to absolute maximum rating conditions for extended periods may affect device reliability.

## D.C. Characteristics

(VDD=5V±10%, GND=0V, Ta=-40°C to 85°C)

Symbol	Parameter		Min.	Typ.*	Max.	Unit
VDD	Operating Voltage	—	4.5	5.0	5.5	V
IDD1	Operating Current	$T_{CYC}=\text{Min. Cycle,}$ $I_{OUT}=0\text{mA}$	—	—	45	mA
IDD2		$T_{CYC}=1\mu\text{s, } I_{OUT}=0\text{mA}$	—	—	15	mA
ISB1	Standby Current	$\overline{\text{CS1}}=V_{IH}$ or $\text{CS2}=V_{IL}$	—	—	10	mA
ISB2		$\overline{\text{CS1}}=\text{CS2}\geq V_{DD}-0.2V$ , $V_{IN}\geq V_{DD}-0.2V$ or $V_{IN}\leq 0.2V$	—	—	50	μA
VOH	Output High Voltage	$I_{OH}=-1.0\text{mA}$	2.4	—	—	V
VOL	Output Low Voltage	$I_{OL}=4\text{mA}$	—	—	0.4	V

Symbol	Parameter		Min.	Typ.*	Max.	Unit
V <sub>IH</sub>	Input High Voltage	—	2.2	—	V <sub>DD</sub> +0.3	V
V <sub>IL</sub>	Input Low Voltage	—	−0.3	—	0.8	V
I <sub>LI</sub>	Input Leakage Current	V <sub>DD</sub> =5.5V, V <sub>IN</sub> =GND to V <sub>DD</sub>	—	—	1	μA
I <sub>LO</sub>	Output Leakage Current	$\overline{CS1}=V_{IH}$ or $CS2=V_{IL}$ or $\overline{OE}=V_{IH}$ , V <sub>OUT</sub> =GND to V <sub>DD</sub>	—	—	1	μA

\*V<sub>DD</sub>=5V, Ta=25°C

## A.C. Characteristics

### Read cycle

(V<sub>DD</sub>=5V±10%, Ta=−40°C to 85°C)

Symbol	Parameter	Min.	Typ.	Max.	Unit
t <sub>RC</sub>	Read Cycle Time	70	—	—	ns
t <sub>AA</sub>	Address Access Time	—	—	70	ns
t <sub>ACS</sub>	Chip Selection Access Time	—	—	70	ns
t <sub>OE</sub>	Output Enabled to Outputs Valid	—	—	40	ns
t <sub>OH</sub>	Outputs Hold from Address Change	5	—	—	ns
t <sub>CLZ</sub>	Chip select to Outputs in Low-Z	10	—	—	ns
t <sub>OLZ</sub>	Output Enabled to Outputs in Low-Z	10	—	—	ns
t <sub>CHZ</sub>	Chip Disabled to Outputs in High-Z	0	—	30	ns
t <sub>OHZ</sub>	Output Disabled to Outputs in High-Z	0	—	30	ns

Notes: 1. A read occurs during the overlap of a low  $\overline{CS1}$ , a high CS2, a low  $\overline{OE}$ , and a high  $\overline{WE}$ .

2. t<sub>CLZ</sub> is specified from  $\overline{CS1}$  or CS2 whichever occurs last.

3. t<sub>CHZ</sub> is specified from  $\overline{CS1}$  or CS2 whichever occurs first.

4. t<sub>CHZ</sub> and t<sub>OHZ</sub> are specified by the time when DATA OUT is floating

Write cycle

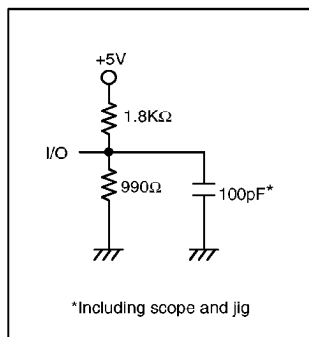
( $V_{DD}=5V\pm10\%$ ,  $T_a=-40^{\circ}C$  to  $85^{\circ}C$ )

Symbol	Parameter	Min.	Typ.	Max.	Unit
t <sub>WC</sub>	Write Cycle Time	70	—	—	ns
t <sub>CW</sub>	Chip Select to End of Write	35	—	—	ns
t <sub>AW</sub>	Address Valid to End of Write	50	—	—	ns
t <sub>AS</sub>	Address Setup Time	0	—	—	ns
t <sub>WP</sub>	Write Pulse Width	25	—	—	ns
t <sub>WR</sub>	Write Recovery Time	0	—	—	ns
t <sub>DW</sub>	Data to Write Time Overlap	20	—	—	ns
t <sub>DH</sub>	Data Hold from Write Time	0	—	—	ns
t <sub>OW</sub>	Outputs Active from End of Write	5	—	—	ns
t <sub>OHZ</sub>	Outputs Disable to Outputs in High-Z	0	—	40	ns
t <sub>WHZ</sub>	Write to Outputs in High-Z	0	—	50	ns

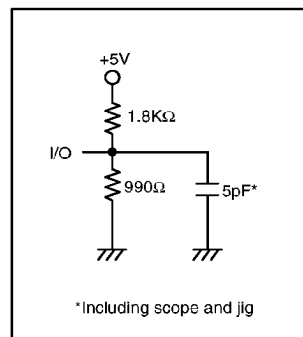
- Notes: 1. A write cycle occurs during the overlap of a low  $\overline{CS1}$ , a high  $CS2$ , and a low  $\overline{WE}$ .  
2.  $\overline{OE}$  may be both high and low in a write cycle.  
3. t<sub>AS</sub> is specified from  $\overline{CS1}$ ,  $CS2$ , or  $\overline{WE}$ , whichever occurs last.  
4. t<sub>WP</sub> is an overlap time of a low  $\overline{CS1}$ , a high  $CS2$ , and a low  $\overline{WE}$ .  
5. t<sub>WR</sub>, t<sub>DW</sub> and t<sub>DH</sub> is specified from  $\overline{CS1}$ ,  $CS2$ , or  $\overline{WE}$ , whichever occurs first.  
6. t<sub>WHZ</sub> is specified by the time when DATA OUT is floating, not defined by output level.  
7. When I/O pins are data output mode, don't force inverse signals to those pins.

A.C. Test Conditions

Item	Condition
Input Pluse Levels	0V to 3.0V
Input Rise and Fall Time	5ns
Input and Output Timing Reference Levels	1.5V
Output Load	See Figures below



Output Load



Output Load for  
t<sub>CLZ</sub>, t<sub>OLZ</sub>, t<sub>CHZ</sub>, t<sub>OHZ</sub>, t<sub>WHZ</sub> and t<sub>OW</sub>

## Operation Truth Table

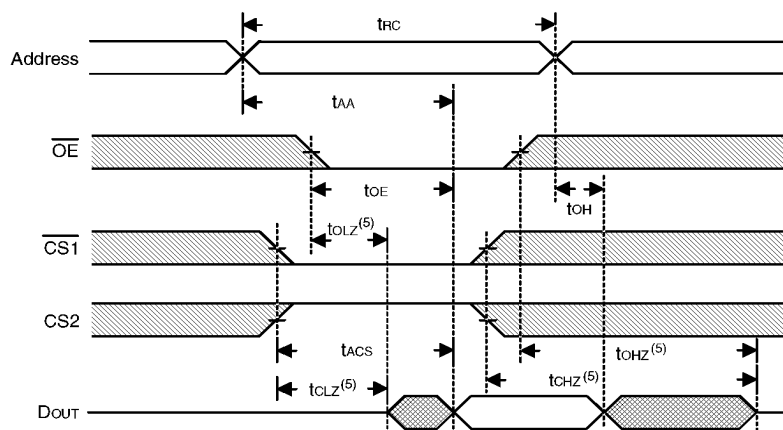
All relations between  $\overline{WE}$ ,  $\overline{OE}$ ,  $\overline{CS1}$  and CS2 can be described as the following truth table

$\overline{CS1}$	CS2	$\overline{OE}$	$\overline{WE}$	Mode	D0~D7
H	X*	X	X	Standby	High-Z
X	L	X	X		
L	H	L	H	Read	Dout
L	H	H	H	Read	High-Z
L	H	X	L	Write	Din

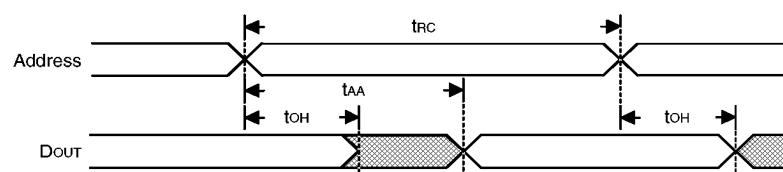
\*X: Don't Care, Logical High or Low

## Timing Diagrams

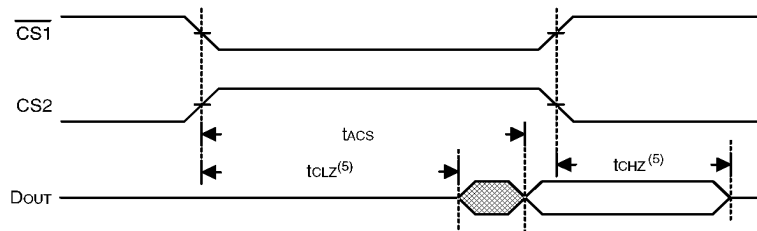
### Read cycle 1<sup>(1)</sup>



### Read cycle 2<sup>(1, 2, 4)</sup>

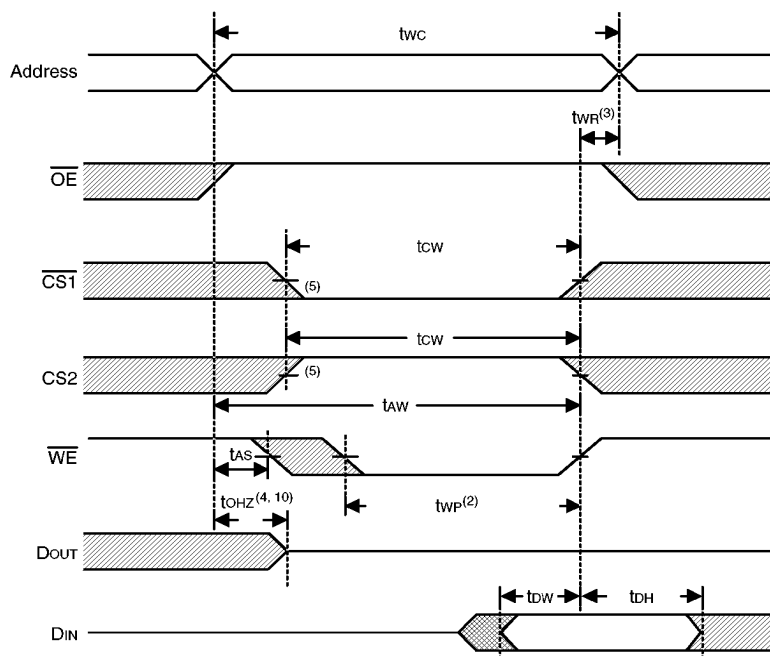


Read cycle 3<sup>(1, 3, 4)</sup>

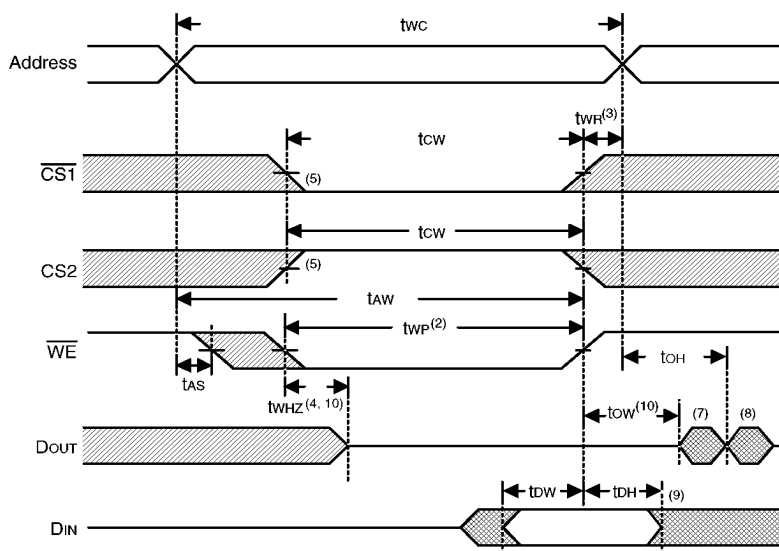


- Notes:
1.  $\overline{WE}$  is High for Read Cycle
  2. Device is continuously enabled,  $\overline{CS1}=V_{IL}$  &  $\overline{CS2}=V_{IH}$
  3. Address valid prior to or coincident with  $\overline{CS1}$  transition low &  $\overline{CS2}$  transition high
  4.  $\overline{OE}=V_{IL}$
  5. Transition is measured  $\pm 500mV$  from steady state

Write cycle 1<sup>(1)</sup>



Write cycle 2<sup>(1, 6)</sup>



- Notes:
1.  $\overline{WE}$  must be high during all address transitions
  2. A write occurs during the overlap ( $t_{WP}$ ) of a low  $\overline{CS1}$ , a high  $\overline{CS2}$  and a low  $\overline{WE}$
  3.  $t_{WR}$  is measured from the earlier of  $\overline{CS1}$  or  $\overline{WE}$  going high and  $\overline{CS2}$  going low to the end of write cycle
  4. During this period, I/O pins are in the output state so the input signals of opposite phase to the outputs must not be applied
  5. If the  $\overline{CS1}$  low transition (or  $\overline{CS2}$  high transition) occurs simultaneously with the  $\overline{WE}$  low transitions or after the  $\overline{WE}$  transition, outputs remain in a high impedance state
  6.  $\overline{OE}$  is continuously low ( $\overline{OE} = V_{IL}$ )
  7.  $D_{OUT}$  is the same phase of write data of this write cycle
  8.  $D_{OUT}$  is the read data of next address
  9. If  $\overline{CS1}$  is low (or  $\overline{CS2}$  is high) during this period, I/O pins are in the output state. Then the data input signals of opposite phase to the outputs must not be applied to them
  10. Transition is measured  $\pm 500\text{mV}$  from steady state

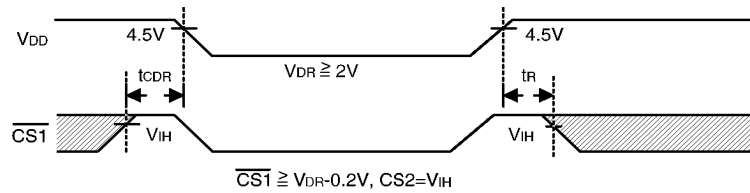
## Data Retention Characteristics

(Ta=−40°C to 85°C)

Symbol	Parameter	Conditions	Min.	Max.	Unit
V <sub>DR</sub>	V <sub>DD</sub> for Data Retention	$\overline{CS1}=CS2 \geq V_{DD}-0.2V$	2	5.5	V
I <sub>CCDR</sub>	Data Retention Current	V <sub>DD</sub> =3V, $\overline{CS1}=CS2 \geq V_{DD}-0.2V$ V <sub>IN</sub> ≥V <sub>DD</sub> −0.2V or V <sub>IN</sub> ≤0.2V	—	50	μA
t <sub>CDR</sub>	Chip Disable Data Retention Time	See Retention Timing	0	—	ns
t <sub>R</sub>	Operation Recovery Time	See Retention Timing	t <sub>RC</sub> *	—	ns

\*t<sub>RC</sub>=Read Cycle Time

## Low V<sub>DD</sub> Data Retention Timing





## Characteristic Curves

