Synertek

SY2147H

4096 x 1 Static Random Access Memory

Features

- 35 ns Maximum Access Time
- No Clocks or Strobes Required
- Automatic $\overline{CE}$ Power Down
- Identical Cycle and Access Times
- Single +5V Supply (±10%)
- Pinout and Function Compatible to SY2147
- Direct Performance Upgrade For SY2147
- Totally TTL Compatible All Inputs and Outputs
- Separate Data Input and Output
- High Density 18-Pin Package
- Three-State Output

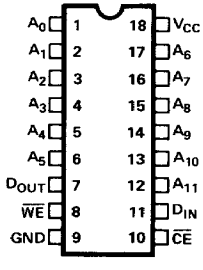
Description

The Synertek SY2147H is a 4096-Bit Static Random Access Memory organized 4096 words by 1-bit and is fabricated using Synertek's new scaled n-channel silicon gate technology. It is designed using fully static circuitry, therefore requiring no clock or refreshing to operate. Address set-up times are not required and the data is read out non-destructively with the same polarity as the input data. Separate data input and output pins provide maximum design flexibility. The three-state output facilitates memory expansion by allowing the outputs to be OR-tied to other devices.

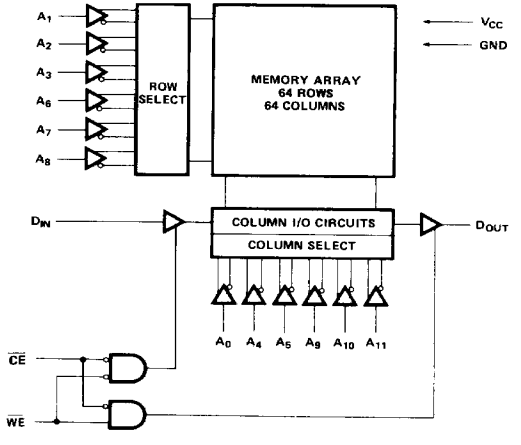
The SY2147H offers an automatic power down feature. Power down is controlled by the Chip Enable input. When Chip Enable ($\overline{CE}$) goes high, thus deselecting the SY2147H, the device will automatically power down and remain in a standby power mode as long as $\overline{CE}$ remain high. This unique feature provides system level power savings as much as 80%.

The SY2147H is packaged in an 18-pin DIP for the highest possible density. The device is fully TTL compatible and has a single +5V power supply.

Pin Configuration



Block Diagram



Absolute Maximum Ratings

Temperature Under Bias . . . . . -10°C to 85°C
Storage Temperature . . . . . -65°C to 150°C
Voltage on Any Pin with
Respect to Ground . . . . . -3.5V to +7V
Power Dissipation 1.2W
Electrostatic Discharge Rating (ESD)**
Inputs to Ground . . . . . ±2000V

Comment*

Stresses above those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied.

**Test Condition: MIL-STD-883B Method 3015.1.

D.C. Characteristics

$T_A = 0°C$ to $+70°C$, $V_{CC} = 5V \pm 10\%$ (Unless otherwise specified) (Note 8)

Symbol	Parameter	2147HL/L-3 Min.	2147HL/L-3 Max.	2147H/-1/-2/-3 Min.	2147H/-1/-2/-3 Max.	Unit	Conditions
I_{LI}	Input Load Current (All input pins)		10		10	µA	V_{CC} = Max, V_{IN} = Gnd to V_{CC}
$\|I_{LO}\|$	Output Leakage Current		50		50	µA	$\overline{CE} = V_{IH}$, V_{CC} = Max, V_{OUT} = Gnd to 4.5V
I_{CC}	Power Supply Current		115		150	mA	$T_A = 25°C$; V_{CC} = Max, $\overline{CE} = V_{IL}$, Outputs Open
			125		160	mA	$T_A = 0°C$; V_{CC} = Max, $\overline{CE} = V_{IL}$, Outputs Open
I_{SB}	Standby Current		10		20	mA	V_{CC} = Min to Max, $\overline{CE} = V_{IH}$
I_{PO}	Peak Power-on Current (Note 9)		30		50	mA	V_{CC} = Gnd to V_{CC} Min, $\overline{CE}$ = Lower of V_{CC} or V_{IH} Min
V_{IL}	Input Low Voltage	-3.0	0.8	-3.0	0.8	V	
V_{IH}	Input High Voltage	2.0	6.0	2.0	6.0	V	
V_{OL}	Output Low Voltage		0.4		0.4	V	I_{OL} = 8mA
V_{OH}	Output High Voltage	2.4		2.4		V	I_{OH} = -4.0mA

Capacitance

$T_A = 25°C$, f = 1.0 MHz

Symbol	Test	Typ.	Max.	Unit
C_{OUT}	Output Capacitance		6	pF
C_{IN}	Input Capacitance		5	pF

NOTE: This parameter is periodically sampled and not 100% tested.

A.C. Characteristics

$T_A = 0°C$ to $+70°C$, $V_{CC} = 5V \pm 10\%$ (Unless otherwise specified) (Notes 8, 10)

READ CYCLE

Symbol	Parameter	2147H-1 Min.	2147H-1 Max.	2147H-2 Min.	2147H-2 Max.	2147H-3/HL-3 Min.	2147H-3/HL-3 Max.	2147H/HL Min.	2147H/HL Max.	Unit	Notes
t_{RC}	Read Cycle Time	35		45		55		70		ns	
t_{AA}	Address Access Time		35		45		55		70	ns	
t_{ACE1}	Chip Enable Access Time		35		45		55		70	ns	1
t_{ACE2}	Chip Enable Access Time		35		45		65		80	ns	2
t_{OH}	Output Hold from Address Change	5		5		5		5		ns	
t_{LZ}	Chip Selection to Output in Low Z	5		5		10		10		ns	7
t_{HZ}	Chip Deselection to Output in High Z	0	30	0	30	0	30	0	40	ns	7
t_{PU}	Chip Selection to Power Up Time	0		0		0		0		ns	
t_{PD}	Chip Deselection to Power Down Time		20		20		20		30	ns	

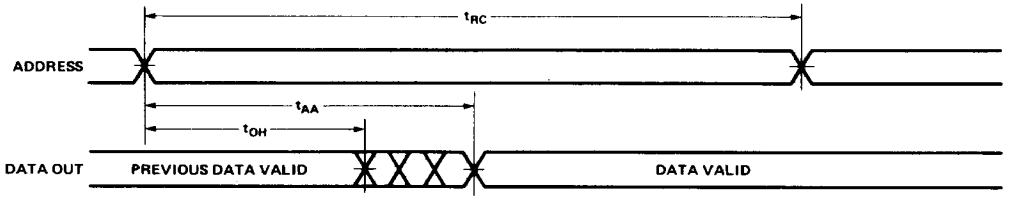
WRITE CYCLE

t_{WC}	Write Cycle Time	35		45		55		70		ns	
t_{CW}	Chip Enabled to End of Write	35		45		45		55		ns	
t_{AW}	Address Valid to End of Write	35		45		45		55		ns	
t_{AS}	Address Setup Time	0		0		0		0		ns	
t_{WP}	Write Pulse Width	20		25		25		40		ns	
t_{WR}	Write Recovery Time	0		0		10		15		ns	
t_{DW}	Data Valid to End of Write	20		25		25		30		ns	
t_{DH}	Data Hold Time	10		10		10		10		ns	
t_{WZ}	Write Enabled to Output in High Z	0	20	0	25	0	25	0	35	ns	7
t_{OW}	Output Active from End of Write	0		0		0		0		ns	7

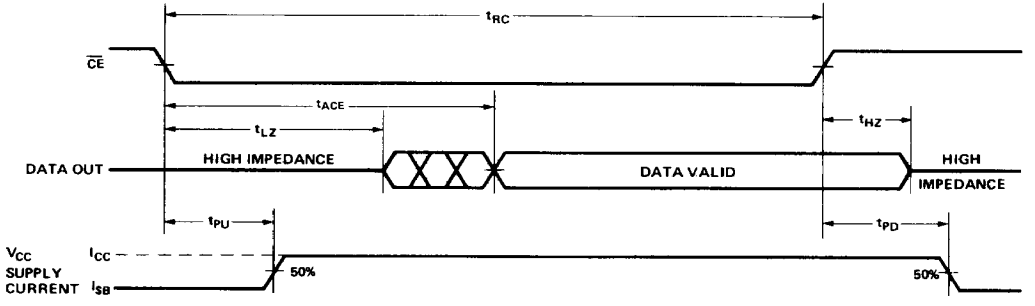
(See following page for notes)

Timing Diagrams

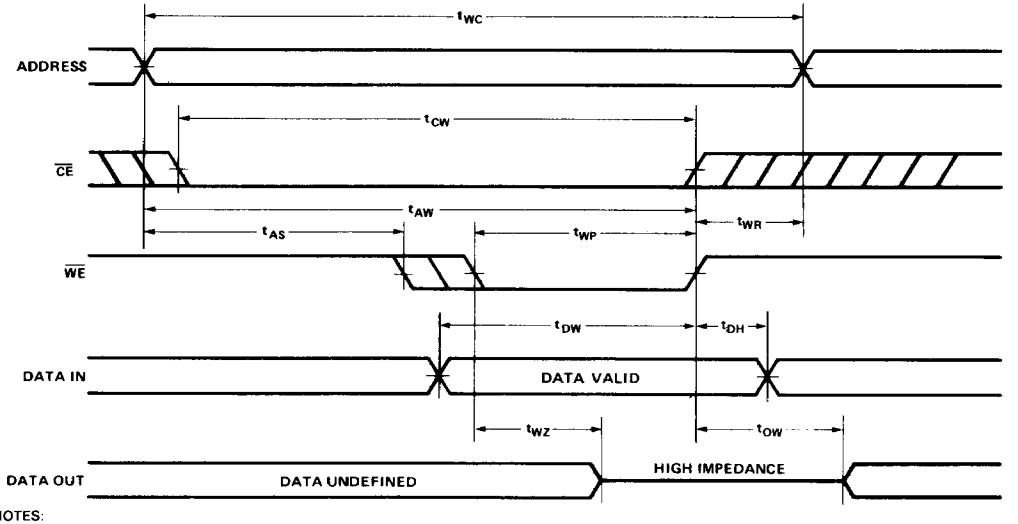
READ CYCLE NO. 1 (NOTES 3 AND 4)



READ CYCLE NO. 2 (NOTES 3 AND 5)



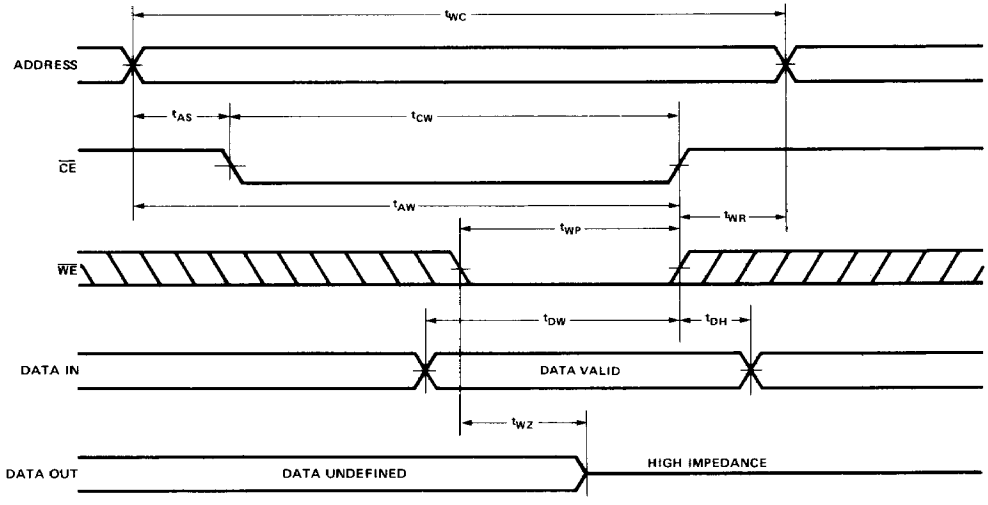
WRITE CYCLE NO. 1 ($\overline{WE}$ CONTROLLED) (NOTE 6)



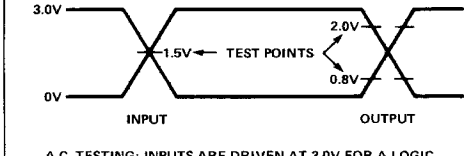
NOTES:

1. Chip deselected for greater than 55ns prior to selection.
2. Chip deselected for a finite time that is less than 55ns prior to selection. (If the deselect time is 0ns, the chip is by definition selected and access occurs according to Read Cycle No. 1.).
3. $\overline{WE}$ is high for Read Cycles.
4. Device is continuously selected, $\overline{CE} = V_{IL}$.
5. Addresses valid prior to or coincident with $\overline{CE}$ transition low.
6. If $\overline{CE}$ goes high simultaneously with $\overline{WE}$ high, the outputs remain in the high impedance state.
7. Transition is measured ±500mV from low or high impedance voltage with load B. This parameter is sampled and not 100% tested.
8. The operating ambient temperature range is guaranteed with transverse air flow exceeding 400 linear feet per minute.
9. A pullup resistor to V_{CC} on the $\overline{CE}$ input is required to keep the device deselected: otherwise, power-on current approaches I_{CC} active.
10. A minimum 0.5 ms time delay is required after application of V_{CC} (+5V) before proper device operation is achieved.

WRITE CYCLE NO. 2 ($\overline{CE}$ CONTROLLED) (NOTE 6)

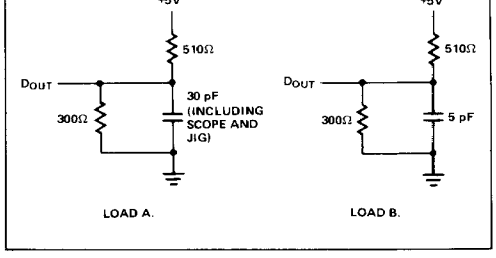


A.C. Testing Input, Output Waveform



A.C. TESTING: INPUTS ARE DRIVEN AT 3.0V FOR A LOGIC "1" AND 0.0V FOR A LOGIC "0". TIMING MEASUREMENTS ARE MADE AT 2.0V FOR A LOGIC "1" AND 0.8V FOR A LOGIC "0" AT THE OUTPUTS. THE INPUTS ARE MEASURED AT 1.5V. INPUT RISE AND FALL TIMES ARE 5 ns.

A.C. Testing Load Circuit



Package Availibility

18 Pin Cerdip
18 Pin Ceramic
18 Pin Plastic

Ordering Information

Order Number	Access Time (Max)	Operating Current (Max)	Standby Package (Max)	*Package Type
SYC2147H-1	35ns	180mA	30mA	Ceramic
SYD2147H-1	35ns	180mA	30mA	Cerdip
SYC2147H-2	45ns	180mA	30mA	Ceramic
SYD2147H-2	45ns	180mA	30mA	Cerdip
SYC2147H-3	55ns	180mA	30mA	Ceramic
SYD2147H-3	55ns	180mA	30mA	Cerdip
SYC2147HL-3	55ns	125mA	15mA	Ceramic
SYD2147HL-3	55ns	125mA	15mA	Cerdip
SYC2147H	70ns	160mA	20mA	Ceramic
SYD2147H	70ns	160mA	20mA	Cerdip
SYC2147HL	70ns	140mA	10mA	Ceramic
SYD2147HL	70ns	140mA	10mA	Cerdip

*Also available in plastic