

32Kx8 Static RAM

Features

- 4.5V–5.5V Operation
- Low active power (70 ns, LL version)
— 275 mW (max.)
- Low standby power (70 ns, LL version)
— 28 μ W (max.)
- 55, 70 ns access time
- Easy memory expansion with CE and OE features
- TTL-compatible inputs and outputs
- Automatic power-down when deselected
- CMOS for optimum speed/power

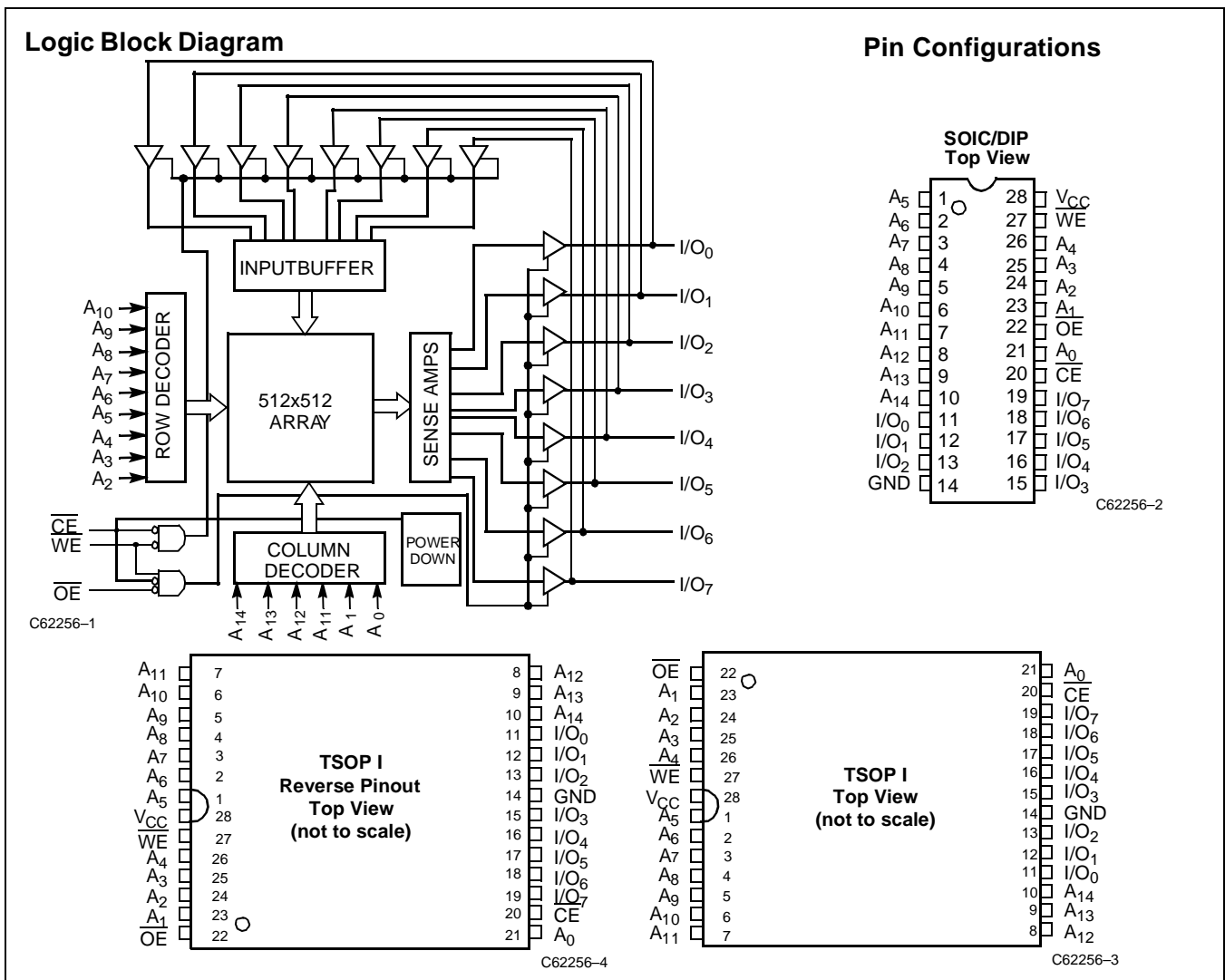
Functional Description

The CY62256 is a high-performance CMOS static RAM organized as 32,768 words by 8 bits. Easy memory expansion is provided by an active LOW chip enable (CE) and active LOW

output enable (\overline{OE}) and three-state drivers. This device has an automatic power-down feature, reducing the power consumption by 99.9% when deselected. The CY62256 is in the standard 450-mil-wide (300-mil body width) SOIC, TSOP, and 600-mil PDIP packages.

An active LOW write enable signal (\overline{WE}) controls the writing/reading operation of the memory. When \overline{CE} and \overline{WE} inputs are both LOW, data on the eight data input/output pins (I/O_0 through I/O_7) is written into the memory location addressed by the address present on the address pins (A_0 through A_{14}). Reading the device is accomplished by selecting the device and enabling the outputs, \overline{CE} and \overline{OE} active LOW, while \overline{WE} remains inactive or HIGH. Under these conditions, the contents of the location addressed by the information on address pins are present on the eight data input/output pins.

The input/output pins remain in a high-impedance state unless the chip is selected, outputs are enabled, and write enable (\overline{WE}) is HIGH.



Maximum Ratings

(Above which the useful life may be impaired. For user guidelines, not tested.)

Storage Temperature -65°C to +150°C

Ambient Temperature with Power Applied 0°C to +70°C

Supply Voltage to Ground Potential (Pin 28 to Pin 14) -0.5V to +7.0V

DC Voltage Applied to Outputs in High Z State^[1] -0.5V to $V_{CC} + 0.5V$

DC Input Voltage^[1] -0.5V to $V_{CC} + 0.5V$

Output Current into Outputs (LOW) 20 mA

Static Discharge Voltage >2001V (per MIL-STD-883, Method 3015)

Latch-Up Current >200 mA

Operating Range

Range	Ambient Temperature	V_{CC}
Commercial	0°C to +70°C	5V ± 10%
Industrial	-40°C to +85°C	5V ± 10%

Electrical Characteristics Over the Operating Range

Parameter	Description	Test Conditions	CY62256-55			CY62256-70			Unit
			Min.	Typ ^[2]	Max.	Min.	Typ ^[2]	Max.	
V_{OH}	Output HIGH Voltage	$V_{CC} = \text{Min.}, I_{OH} = -1.0 \text{ mA}$	2.4			2.4			V
V_{OL}	Output LOW Voltage	$V_{CC} = \text{Min.}, I_{OL} = 2.1 \text{ mA}$			0.4			0.4	V
V_{IH}	Input HIGH Voltage		2.2		$V_{CC} + 0.5V$	2.2		$V_{CC} + 0.5V$	V
V_{IL}	Input LOW Voltage		-0.5		0.8	-0.5		0.8	V
I_{IX}	Input Load Current	$GND \leq V_I \leq V_{CC}$	-0.5		+0.5	-0.5		+0.5	μA
I_{OZ}	Output Leakage Current	$GND \leq V_O \leq V_{CC}$, Output Disabled	-0.5		+0.5	-0.5		+0.5	μA
I_{CC}	V_{CC} Operating Supply Current	$V_{CC} = \text{Max.}, I_{OUT} = 0 \text{ mA}, f = f_{MAX} = 1/t_{RC}$		28	55		28	55	mA
			L	25	50		25	50	mA
			LL	25	50		25	50	mA
I_{SB1}	Automatic CE Power-Down Current—TTL Inputs	Max. V_{CC} , $\overline{CE} \geq V_{IH}$, $V_{IN} \geq V_{IH}$ or $V_{IN} \leq V_{IL}$, $f = f_{MAX}$		0.5	2		0.5	2	mA
			L	0.4	0.6		0.4	0.6	mA
			LL	0.3	0.5		0.3	0.5	mA
I_{SB2}	Automatic CE Power-Down Current—CMOS Inputs	Max. V_{CC} , $\overline{CE} \geq V_{CC} - 0.3V$, $V_{IN} \geq V_{CC} - 0.3V$ or $V_{IN} \leq 0.3V$, $f = 0$		1	5		1	5	mA
			L	2	50		2	50	μA
			LL	0.1	5		0.1	5	μA
		Indust'l Temp Range	LL	0.1	10		0.1	10	μA

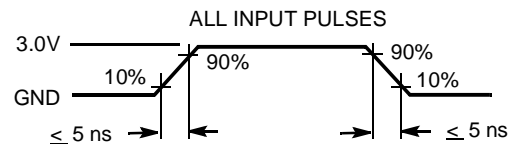
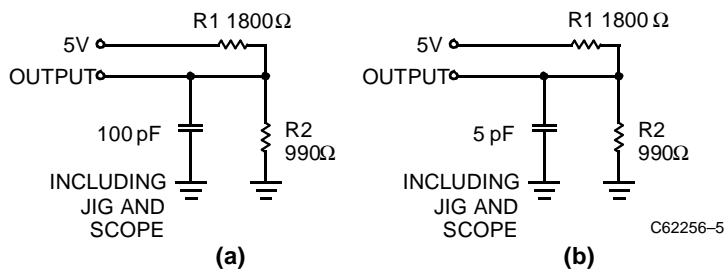
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Capacitance^[3]

Parameter	Description	Test Conditions	Max.	Unit
C_{IN}	Input Capacitance	$T_A = 25^\circ\text{C}, f = 1 \text{ MHz}, V_{CC} = 5.0V$	6	pF
C_{OUT}	Output Capacitance		8	pF

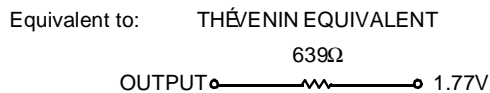
Note:

- V_{IL} (min.) = -2.0V for pulse durations of less than 20 ns.
- Typical specifications are the mean values measured over a large sample size across normal production process variations and are taken at nominal conditions ($T_A = 25^\circ\text{C}, V_{CC}$). Parameters are guaranteed by design and characterization, and not 100% tested.
- Tested initially and after any design or process changes that may affect these parameters.

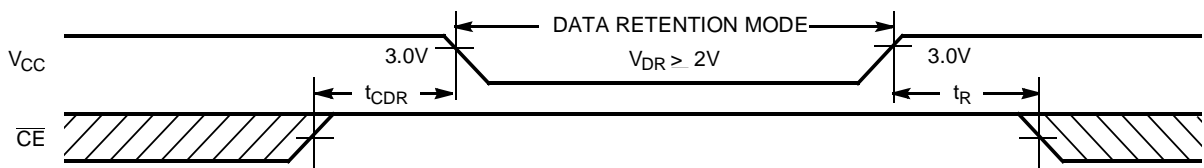
AC Test Loads and Waveforms


C62256-5

C62256-6


Data Retention Characteristics

Parameter	Description	Conditions ^[4]	Min.	Typ. ^[2]	Max.	Unit	
V_{DR}	V_{CC} for Data Retention	$V_{CC} = 3.0V,$ $CE \geq V_{CC} - 0.3V,$ $V_{IN} \geq V_{CC} - 0.3V$ or $V_{IN} \leq 0.3V$	2.0			V	
I_{CCDR}	Data Retention Current		L		2	50	μA
			LL		0.1	5	μA
			LL Indust'l		0.1	10	μA
$t_{CDR}^{[3]}$	Chip Deselect to Data Retention Time		0			ns	
$t_R^{[3]}$	Operation Recovery Time		t_{RC}			ns	

Data Retention Waveform


C62256-7

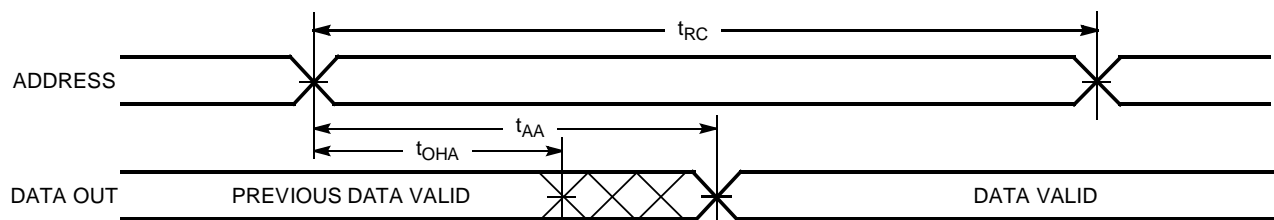
Note:

- No input may exceed $V_{CC} + 0.5V$.

Switching Characteristics Over the Operating Range^[5]

Parameter	Description	CY62256-55		CY62256-70		Unit
		Min.	Max.	Min.	Max.	
READ CYCLE						
t_{RC}	Read Cycle Time	55		70		ns
t_{AA}	Address to Data Valid		55		70	ns
t_{OHA}	Data Hold from Address Change	5		5		ns
t_{ACE}	\overline{CE} LOW to Data Valid		55		70	ns
t_{DOE}	\overline{OE} LOW to Data Valid		25		35	ns
t_{LZOE}	\overline{OE} LOW to Low Z ^[6]	5		5		ns
t_{HZOE}	\overline{OE} HIGH to High Z ^[6, 7]		20		25	ns
t_{LZCE}	\overline{CE} LOW to Low Z ^[6]	5		5		ns
t_{HZCE}	\overline{CE} HIGH to High Z ^[6, 7]		20		25	ns
t_{PU}	\overline{CE} LOW to Power-Up	0		0		ns
t_{PD}	\overline{CE} HIGH to Power-Down		55		70	ns
WRITE CYCLE^[8, 9]						
t_{WC}	Write Cycle Time	55		70		ns
t_{SCE}	\overline{CE} LOW to Write End	45		60		ns
t_{AW}	Address Set-Up to Write End	45		60		ns
t_{HA}	Address Hold from Write End	0		0		ns
t_{SA}	Address Set-Up to Write Start	0		0		ns
t_{PWE}	\overline{WE} Pulse Width	40		50		ns
t_{SD}	Data Set-Up to Write End	25		30		ns
t_{HD}	Data Hold from Write End	0		0		ns
t_{HZWE}	\overline{WE} LOW to High Z ^[6, 7]		20		25	ns
t_{LZWE}	\overline{WE} HIGH to Low Z ^[6]	5		5		ns

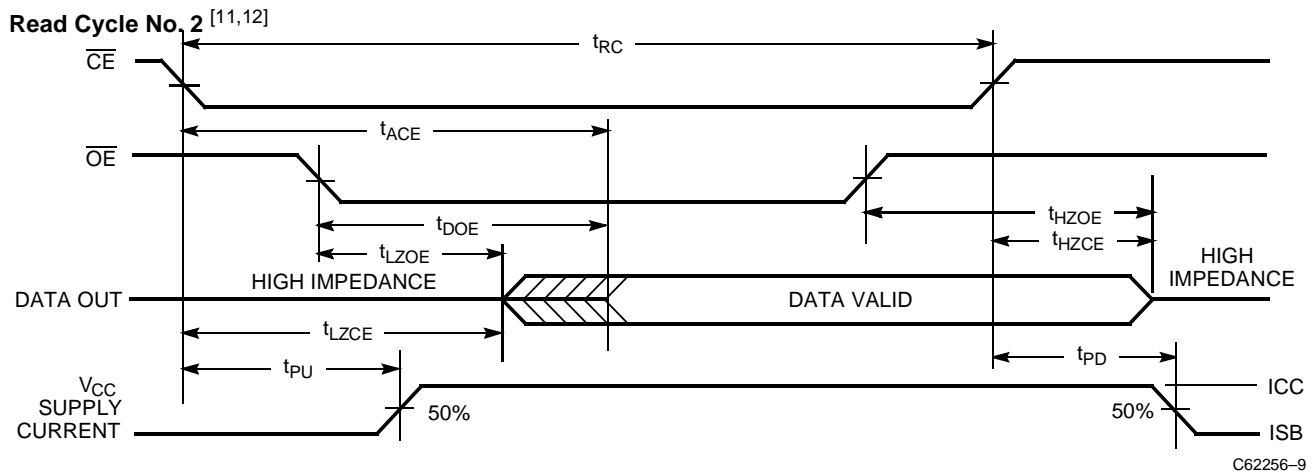
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Switching Waveforms
Read Cycle No. 1^[10,11]


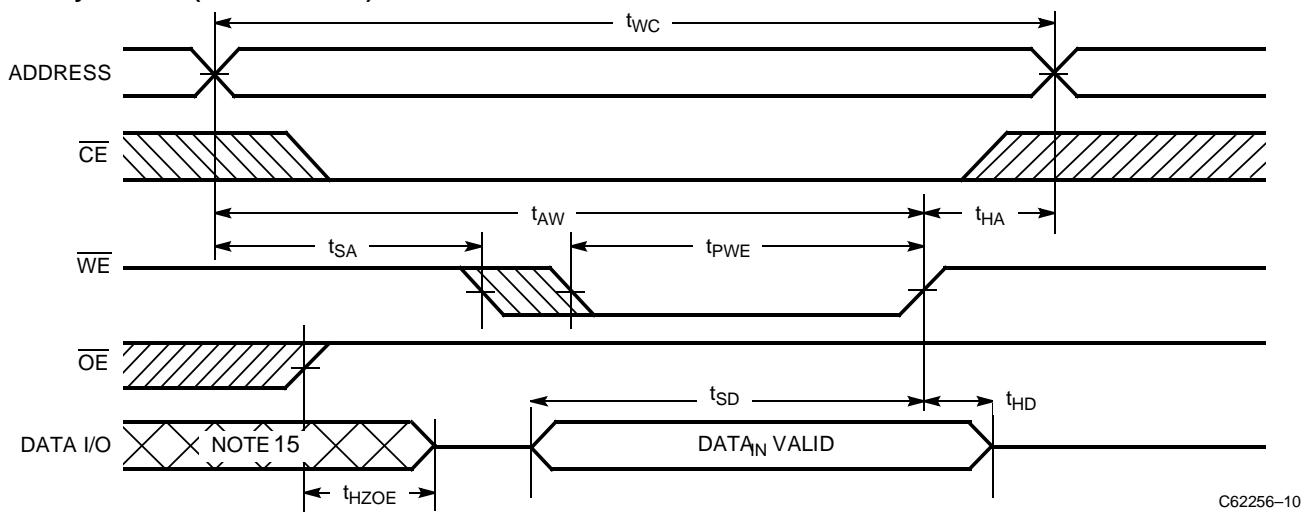
C62256-8

Notes:

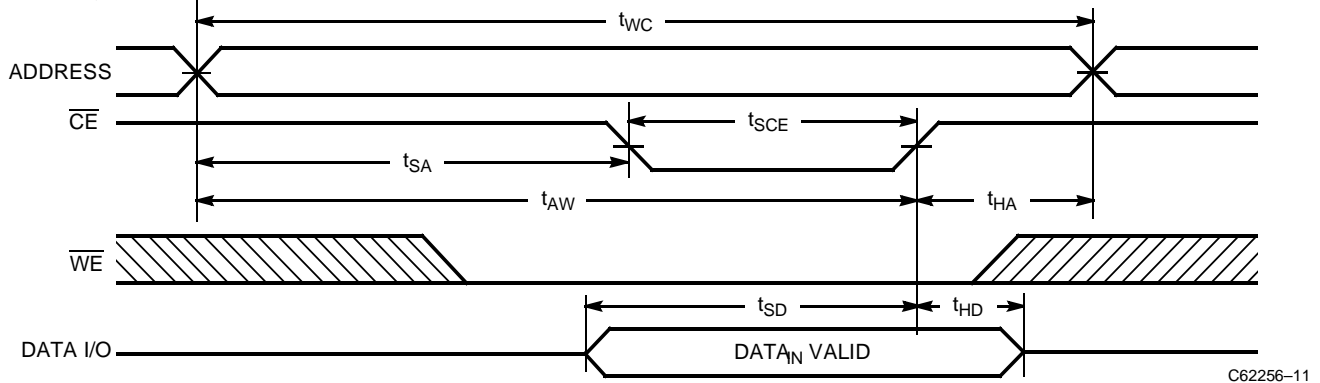
- Test conditions assume signal transition time of 5 ns or less, timing reference levels of 1.5V, input pulse levels of 0 to 3.0V, and output loading of the specified I_{OL}/I_{OH} and 100-pF load capacitance.
- At any given temperature and voltage condition, t_{HZCE} is less than t_{LZCE} ; t_{HZOE} is less than t_{LZOE} ; and t_{HZWE} is less than t_{LZWE} for any given device.
- t_{HZOE} , t_{HZCE} , and t_{HZWE} are specified with $C_L = 5$ pF as in part (b) of AC Test Loads. Transition is measured ± 500 mV from steady-state voltage.
- The internal write time of the memory is defined by the overlap of \overline{CE} LOW and \overline{WE} LOW. Both signals must be LOW to initiate a write and either signal can terminate a write by going HIGH. The data input set-up and hold timing should be referenced to the rising edge of the signal that terminates the write.
- The minimum write cycle time for write cycle #3 (\overline{WE} controlled, \overline{OE} LOW) is the sum of t_{HZWE} and t_{SD} .
- Device is continuously selected. \overline{OE} , $\overline{CE} = V_{IL}$.
- \overline{WE} is HIGH for read cycle.

Switching Waveforms (continued)


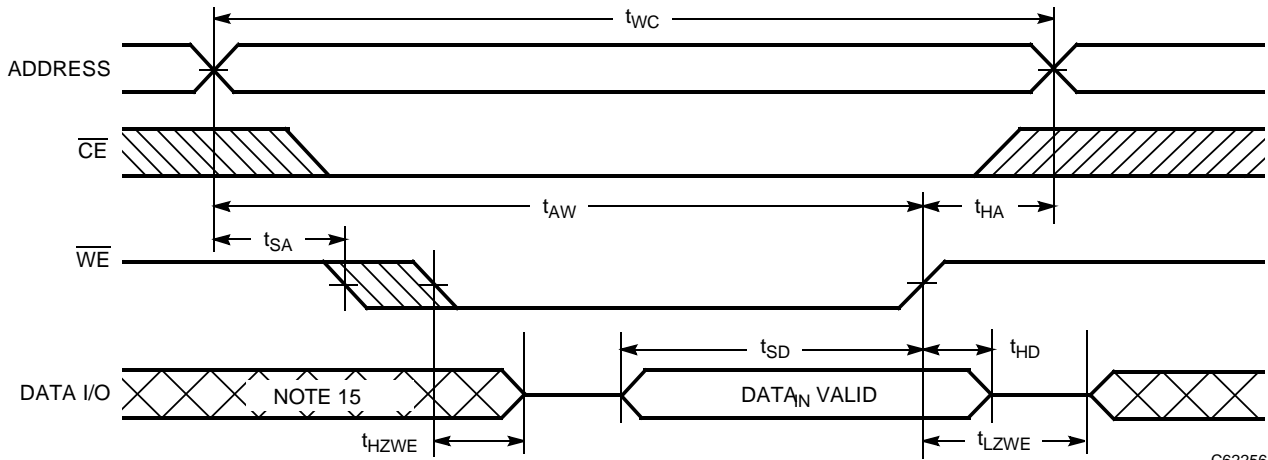
Write Cycle No. 1 (\overline{WE} Controlled) [8,13,14]



Write Cycle No. 2 (\overline{CE} Controlled) [8,13,14]


Notes:

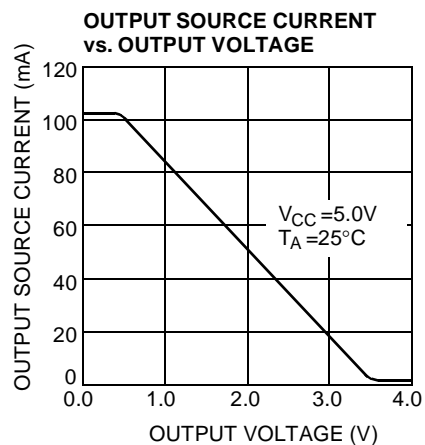
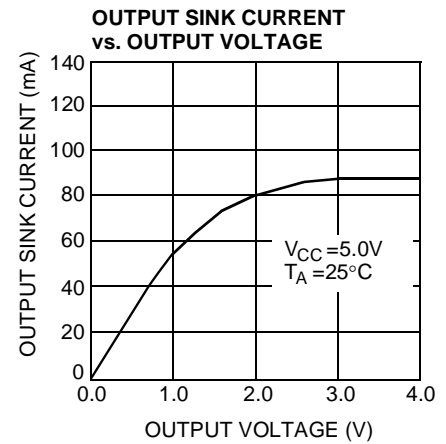
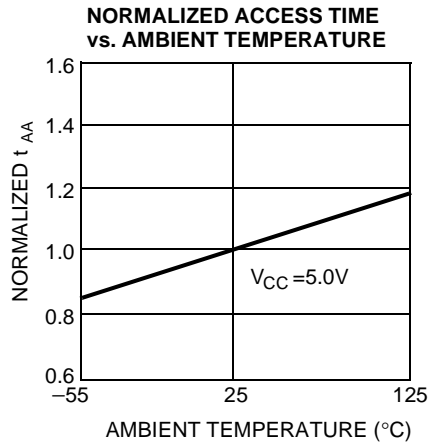
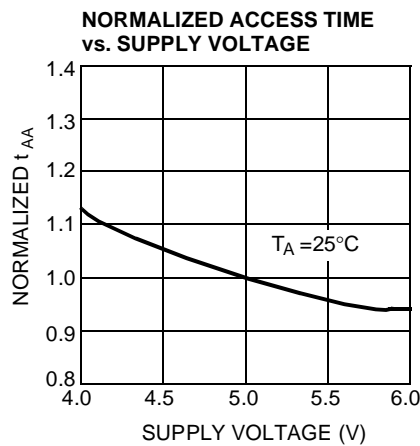
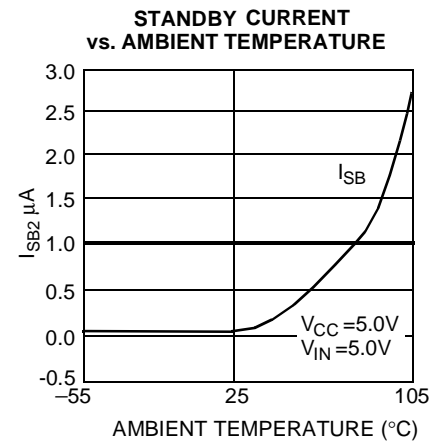
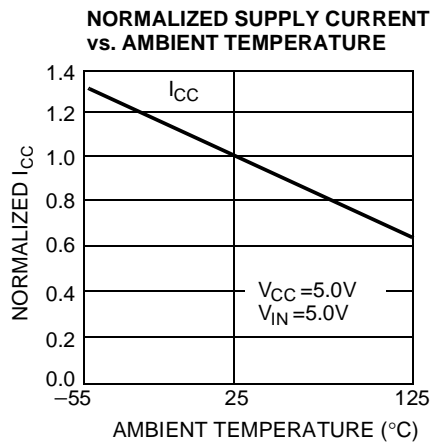
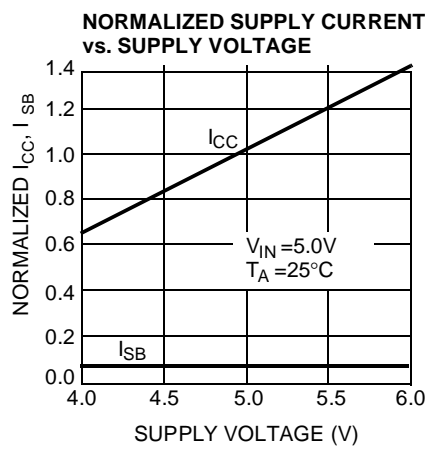
12. Address valid prior to or coincident with \overline{CE} transition LOW.
13. Data I/O is high impedance if $OE = V_{IH}$.
14. If \overline{CE} goes HIGH simultaneously with \overline{WE} HIGH, the output remains in a high-impedance state.

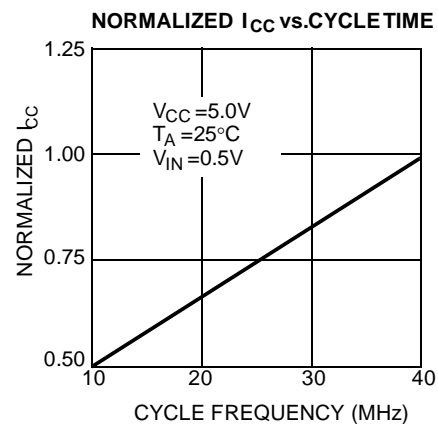
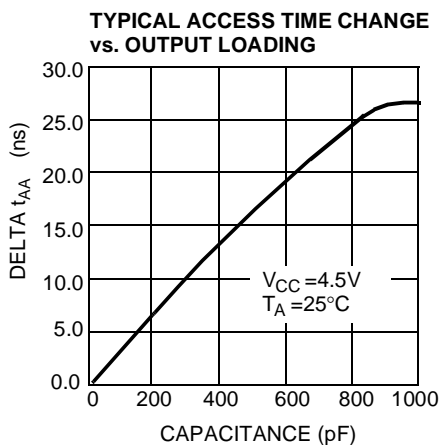
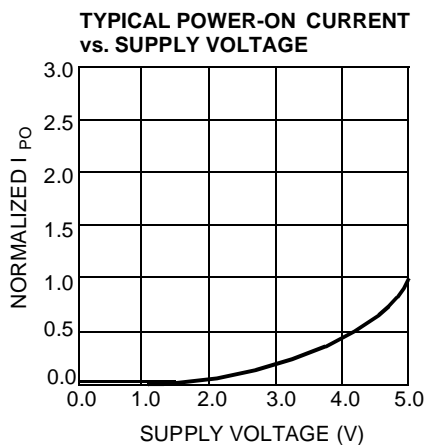
Switching Waveforms (continued)
Write Cycle No. 3 (\overline{WE} Controlled, \overline{OE} LOW) ^[9,14]


C62256-12

Note:

15. During this period, the I/Os are in output state and input signals should not be applied.

Typical DC and AC Characteristics


Typical DC and AC Characteristics (continued)

Truth Table

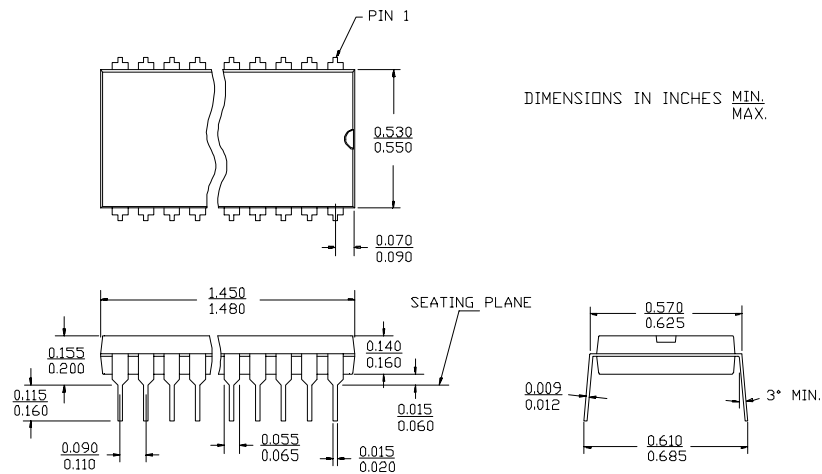
CE	WE	OE	Inputs/Outputs	Mode	Power
H	X	X	High Z	Deselect/Power-Down	Standby (I_{SB})
L	H	L	Data Out	Read	Active (I_{CC})
L	L	X	Data In	Write	Active (I_{CC})
L	H	H	High Z	Deselect, Output Disabled	Active (I_{CC})

Ordering Information

Speed (ns)	Ordering Code	Package Name	Package Type	Operating Range
55	CY62256-55SNC	S22	28-Lead 450-Mil (300-Mil Body Width) SOIC	Commercial
	CY62256L-55SNC	S22	28-Lead 450-Mil (300-Mil Body Width) SOIC	
	CY62256LL-55SNC	S22	28-Lead 450-Mil (300-Mil Body Width) SOIC	
	CY62256-55ZRC	ZR28	28-Lead Reverse Thin Small Outline Package	
	CY62256L-55ZRC	ZR28	28-Lead Reverse Thin Small Outline Package	
	CY62256LL-55ZRC	ZR28	28-Lead Reverse Thin Small Outline Package	
	CY62256-55ZC	Z28	28-Lead Thin Small Outline Package	
	CY62256L-55ZC	Z28	28-Lead Thin Small Outline Package	
	CY62256LL-55ZC	Z28	28-Lead Thin Small Outline Package	
	CY62256-55PC	P15	28-Lead (600-Mil) Molded DIP	
70	CY62256-70SNC	S22	28-Lead 450-Mil (300-Mil Body Width) SOIC	Commercial
	CY62256L-70SNC	S22	28-Lead 450-Mil (300-Mil Body Width) SOIC	
	CY62256LL-70SNC	S22	28-Lead 450-Mil (300-Mil Body Width) SOIC	
	CY62256-70SNI	S22	28-Lead 450-Mil (300-Mil Body Width) SOIC	Industrial
	CY62256L-70SNI	S22	28-Lead 450-Mil (300-Mil Body Width) SOIC	
	CY62256LL-70SNI	S22	28-Lead 450-Mil (300-Mil Body Width) SOIC	
	CY62256-70ZC	Z28	28-Lead Thin Small Outline Package	Commercial
	CY62256L-70ZC	Z28	28-Lead Thin Small Outline Package	
	CY62256LL-70ZC	Z28	28-Lead Thin Small Outline Package	
	CY62256-70ZI	Z28	28-Lead Thin Small Outline Package	Industrial
	CY62256L-70ZI	Z28	28-Lead Thin Small Outline Package	
	CY62256LL-70ZI	Z28	28-Lead Thin Small Outline Package	
	CY62256-70PC	P15	28-Lead (600-Mil) Molded DIP	Commercial
	CY62256L-70PC	P15	28-Lead (600-Mil) Molded DIP	
	CY62256LL-70PC	P15	28-Lead (600-Mil) Molded DIP	
	CY62256-70ZRC	ZR28	28-Lead Reverse Thin Small Outline Package	
	CY62256L-70ZRC	ZR28	28-Lead Reverse Thin Small Outline Package	
	CY62256LL-70ZRC	ZR28	28-Lead Reverse Thin Small Outline Package	

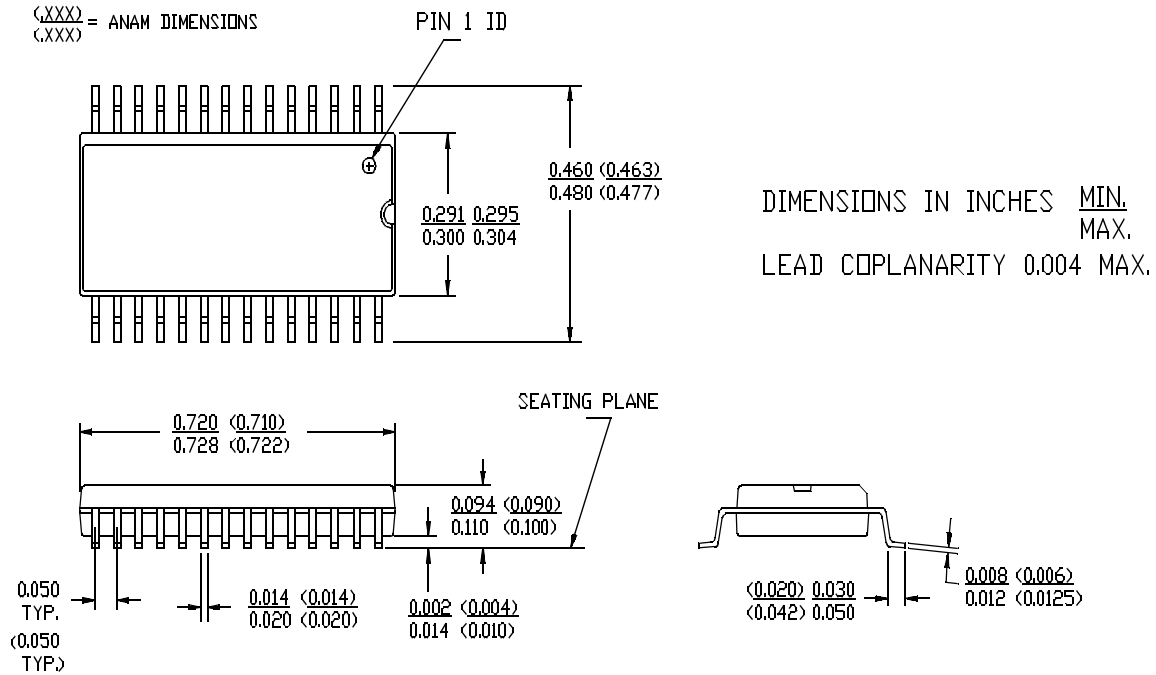
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Package Diagrams
28-Lead (600-Mil) Molded DIP P15

28-Lead 450-Mil (300-Mil Body Width) SOIC S22

.XXX = HYUNDAI DIMENSIONS
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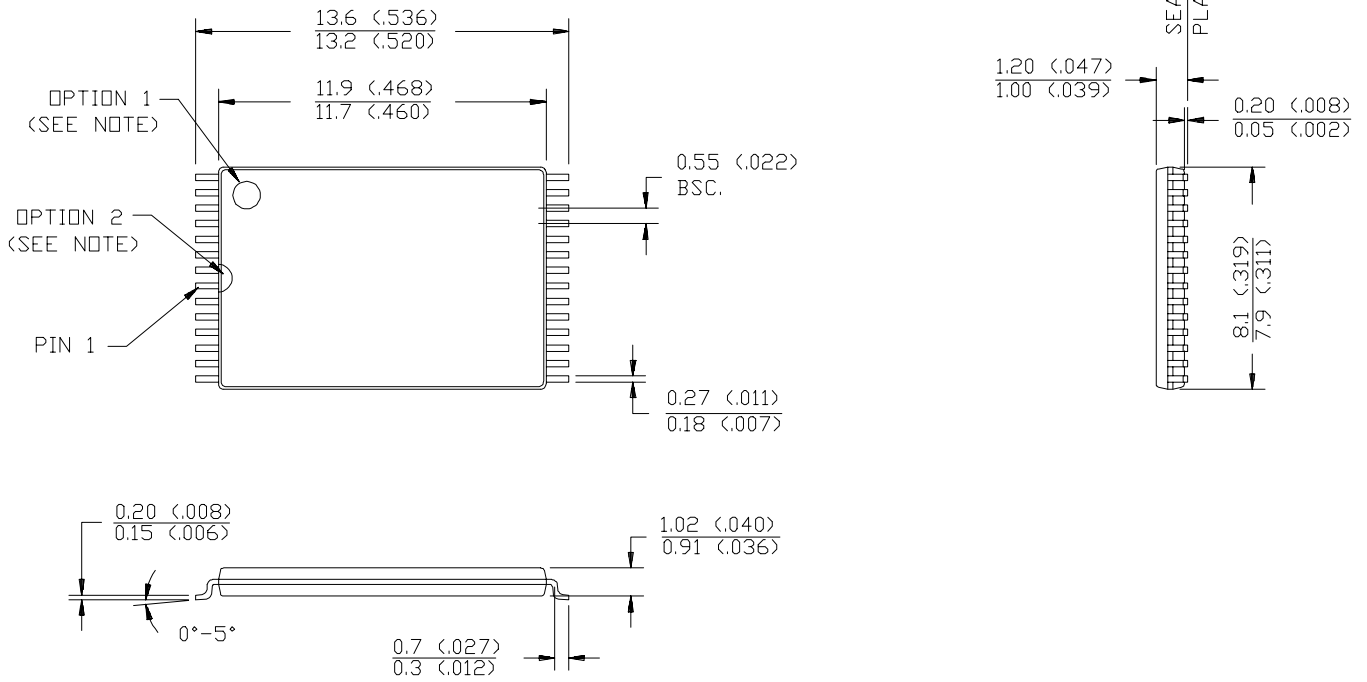
<XXX> = ANAM DIMENSIONS
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Package Diagrams (continued)
28-Lead Thin Small Outline Package Z28

NOTE: ORIENTATION I.D MAY BE LOCATED EITHER AS SHOWN IN OPTION 1 OR OPTION 2

DIMENSION IN MM (INCH)
MAX.
MIN.



Package Diagrams (continued)
28-Lead Reverse Thin Small Outline Package ZR28

NOTE: ORIENTATION I.D. MAY BE LOCATED EITHER AS SHOWN IN OPTION 1 OR OPTION 2

DIMENSION IN MM (INCH)
MAX.
MIN.

