



CY62256

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

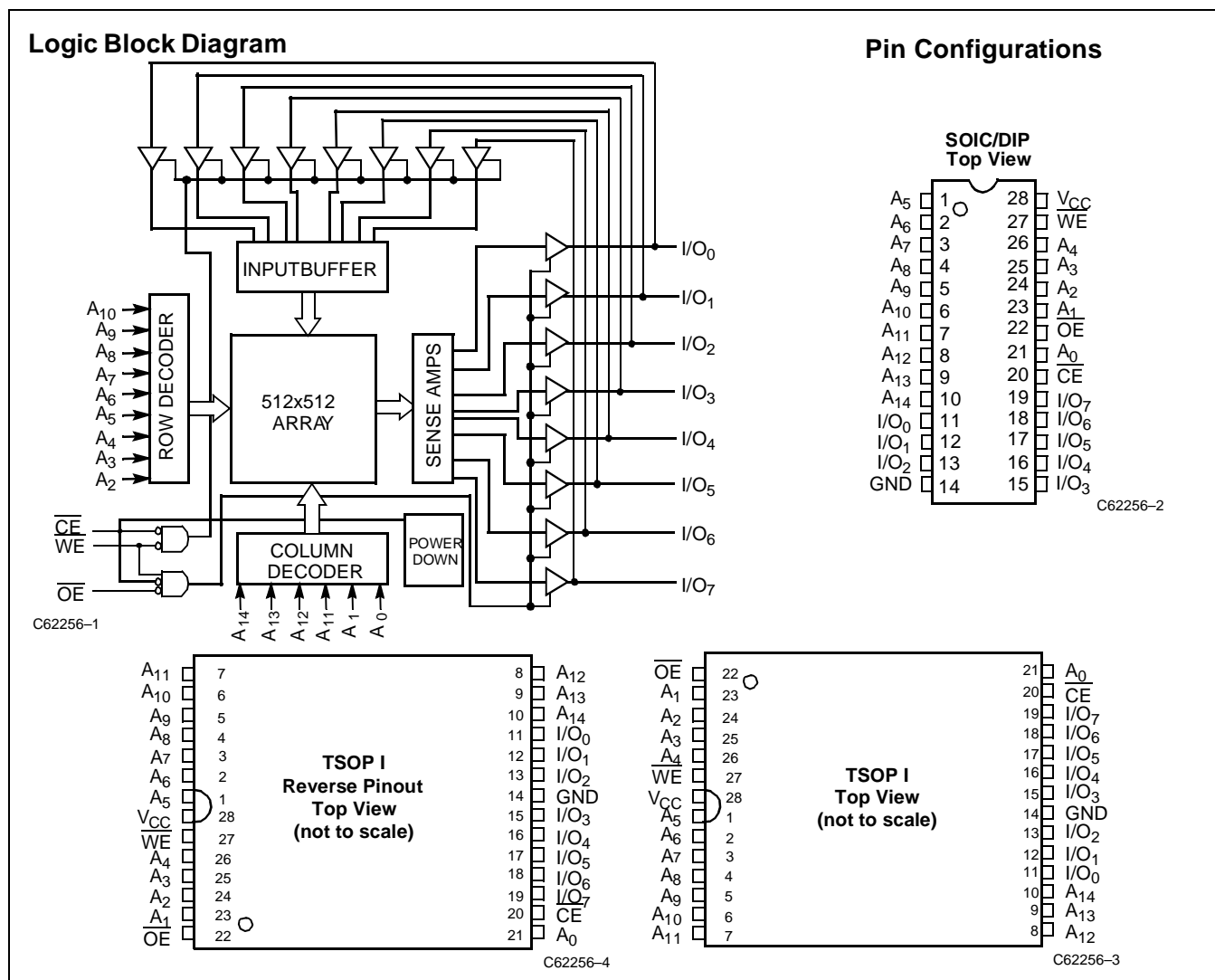
Functional Description

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

Shaded area contains preliminary information.

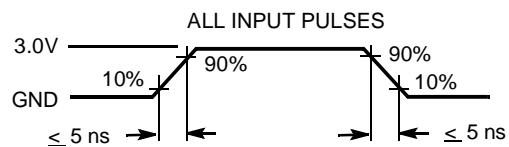
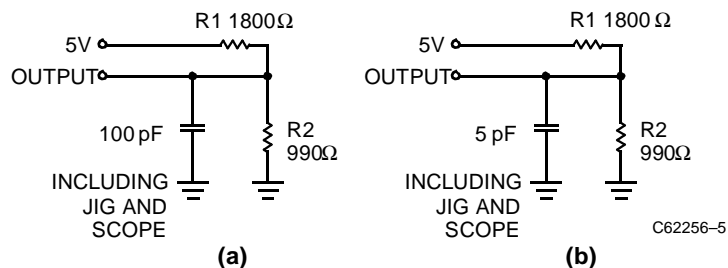
Capacitance^[3]

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:

- $V_{IL}(\text{min.}) = -2.0V$ 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



C62256-6

Equivalent to: THEVENIN EQUIVALENT

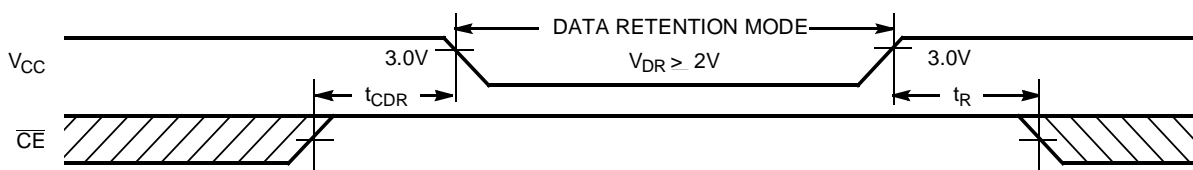
639Ω

OUTPUT ——— 1.77V

Data Retention Characteristics

Parameter	Description		Conditions ^[4]	Min.	Typ. ^[2]	Max.	Unit
V _{DR}	V _{CC} for Data Retention		V _{CC} = 3.0V, CE ≥ V _{CC} − 0.3V, V _{IN} ≥ V _{CC} − 0.3V or V _{IN} ≤ 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

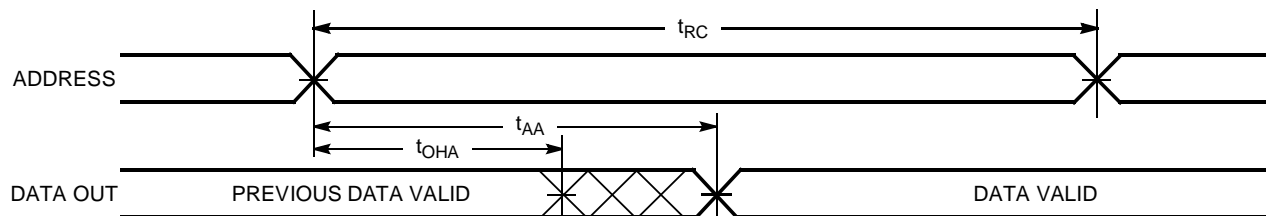
Note:

4. 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

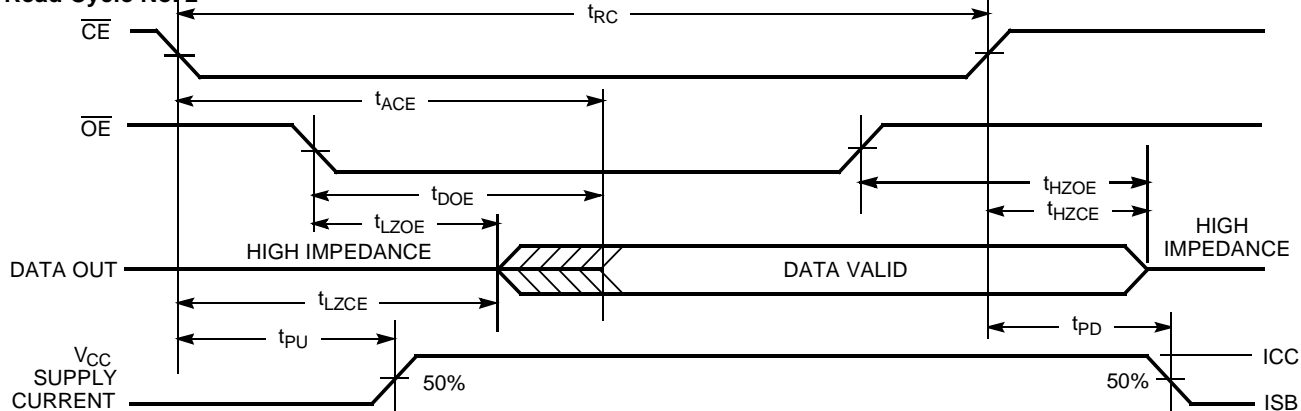
Shaded area contains preliminary information.

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


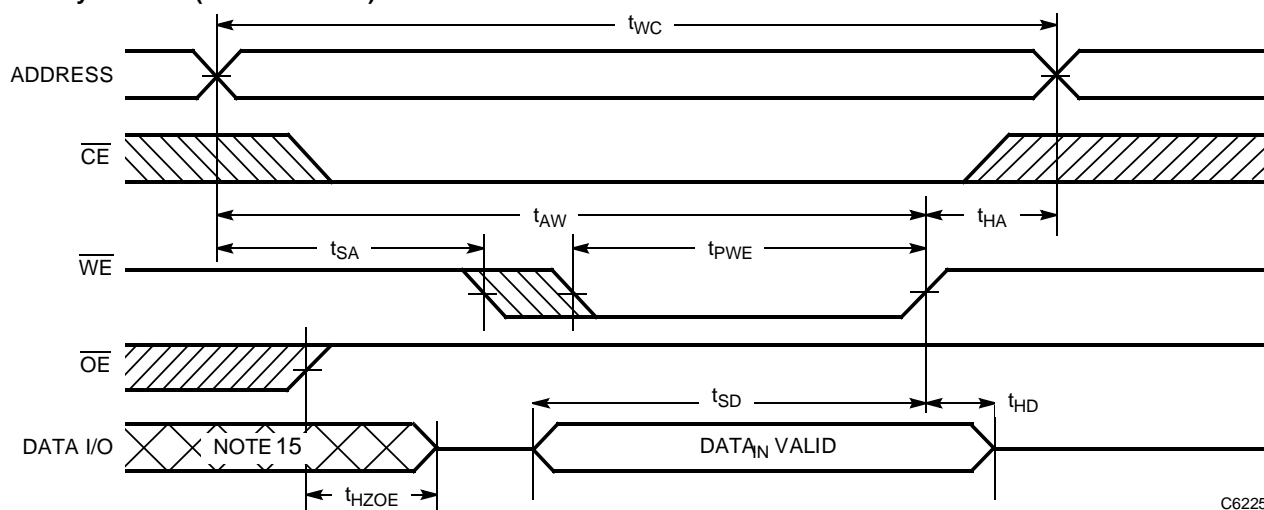
C62256-8

Notes:

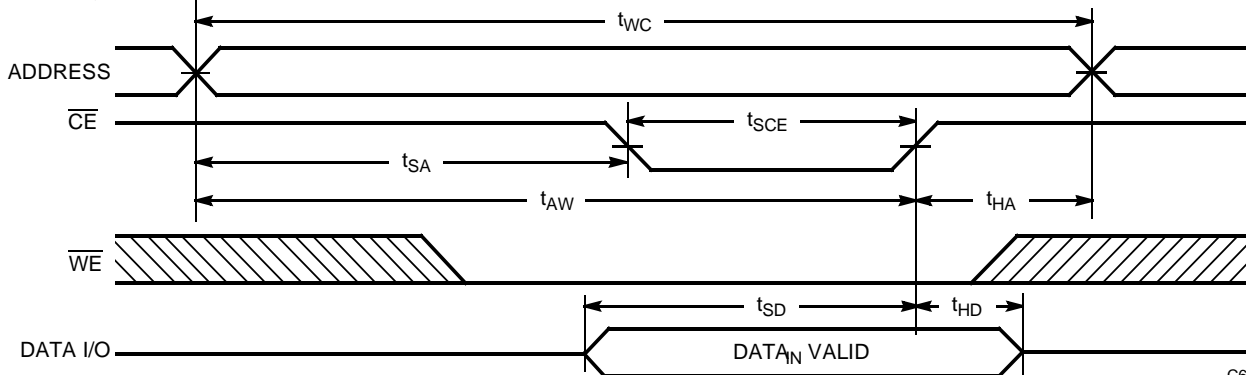
- Test conditions assume signal transition time of 5 ns or less, timing reference levels of 1.5V, input pulse levels of 0 to 3.0V, and output loading of the specified I_{OL}/I_{OH} and 100-pF load capacitance.
- At any given temperature and voltage condition, t_{HZCE} is less than t_{LZCE} , t_{HZOE} 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)
Read Cycle No. 2 [11,12]


C62256-9

Write Cycle No. 1 (WE Controlled) [8,13,14]


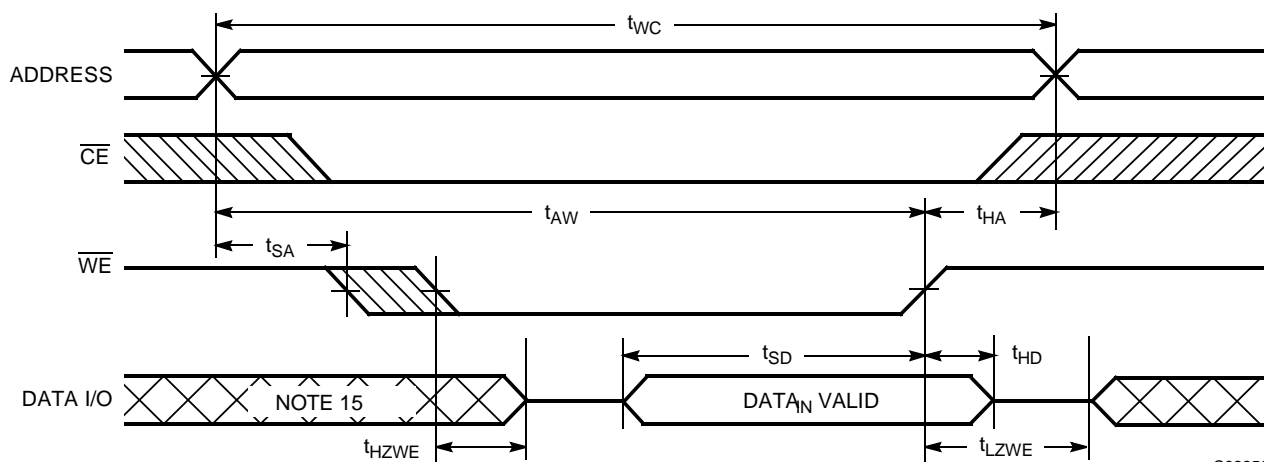
C62256-10

Write Cycle No. 2 (CE Controlled) [8,13,14]


C62256-11

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 ($\overline{\text{WE}}$ Controlled, $\overline{\text{OE}}$ LOW) ^[9,14]


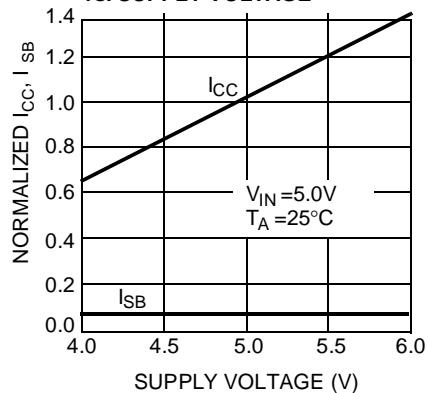
C62256-12

Note:

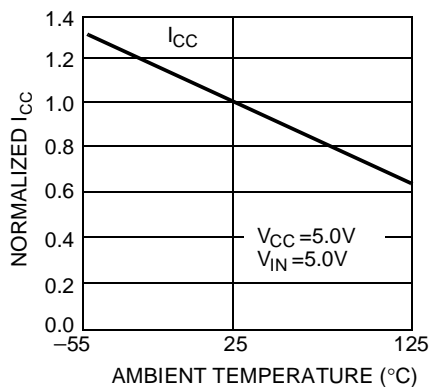
15. During this period, the I/Os are in output state and input signals should not be applied.

Typical DC and AC Characteristics

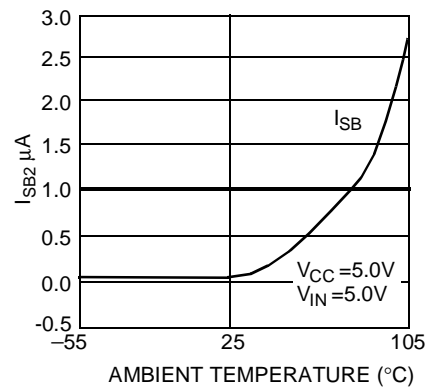
NORMALIZED SUPPLY CURRENT vs. SUPPLY VOLTAGE



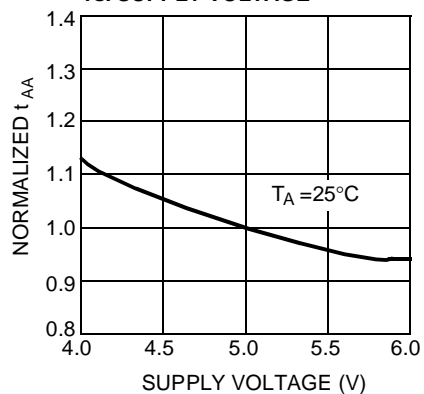
NORMALIZED SUPPLY CURRENT vs. AMBIENT TEMPERATURE



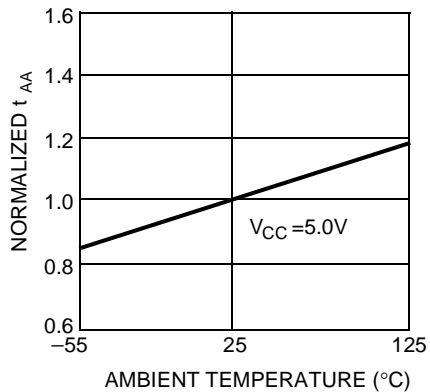
STANDBY CURRENT vs. AMBIENT TEMPERATURE



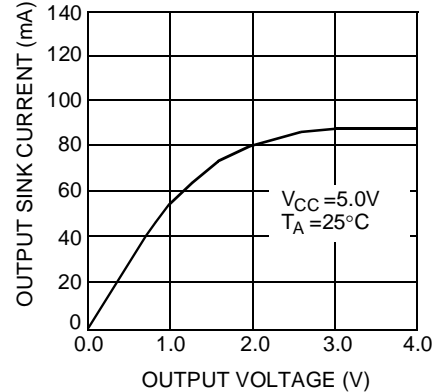
NORMALIZED ACCESS TIME vs. SUPPLY VOLTAGE



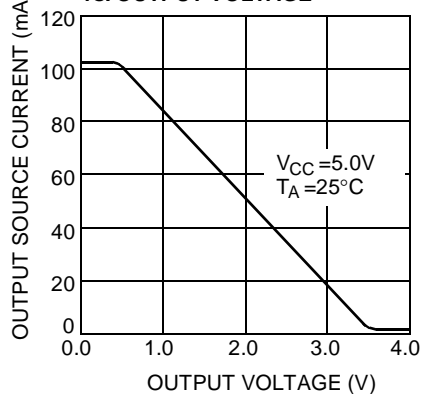
NORMALIZED ACCESS TIME vs. AMBIENT TEMPERATURE

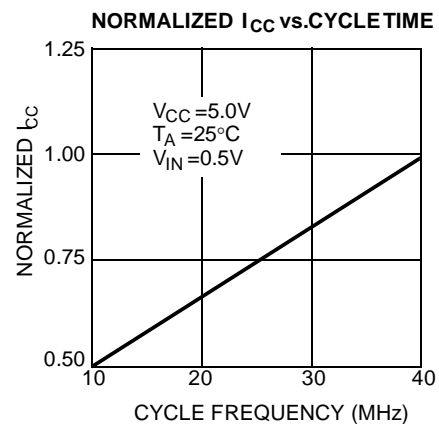
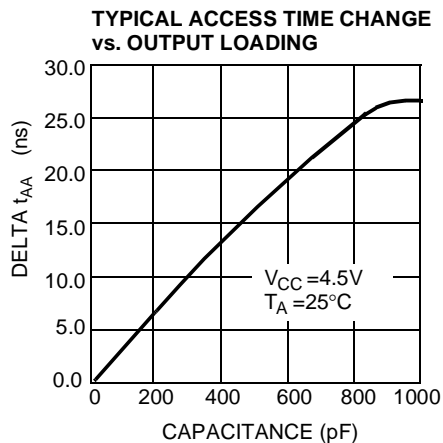
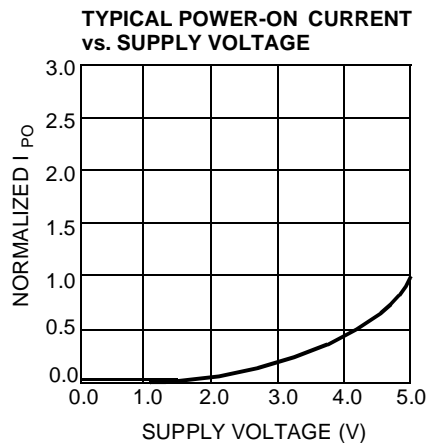


OUTPUT SINK CURRENT vs. OUTPUT VOLTAGE



OUTPUT SOURCE CURRENT vs. OUTPUT VOLTAGE



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

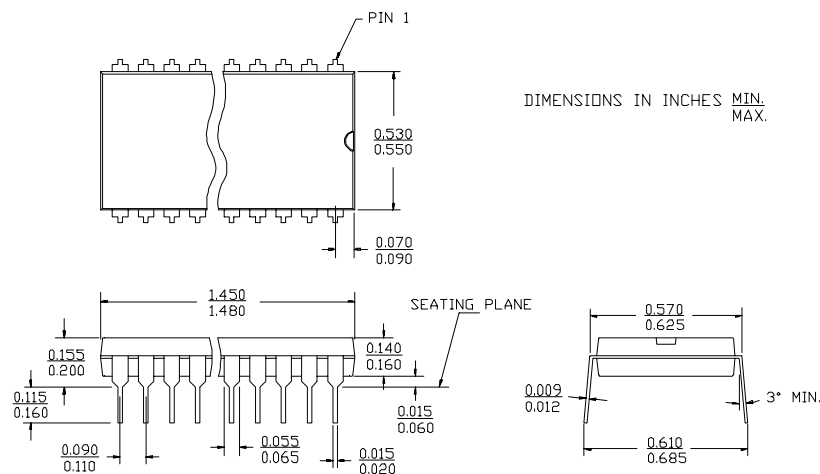
Speed (ns)	Ordering Code	Package Name	Package Type	Operating Range
55	CY62256-55SNC	S22	28-Lead 450-Mil (300-Mil Body Width) SOIC	Commercial
	CY62256L-55SNC	S22	28-Lead 450-Mil (300-Mil Body Width) SOIC	
	CY62256LL-55SNC	S22	28-Lead 450-Mil (300-Mil Body Width) SOIC	
	CY62256-55ZRC	ZR28	28-Lead Reverse 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	

Shaded area contains preliminary information.

Document #: 38-00455-C

Package Diagrams

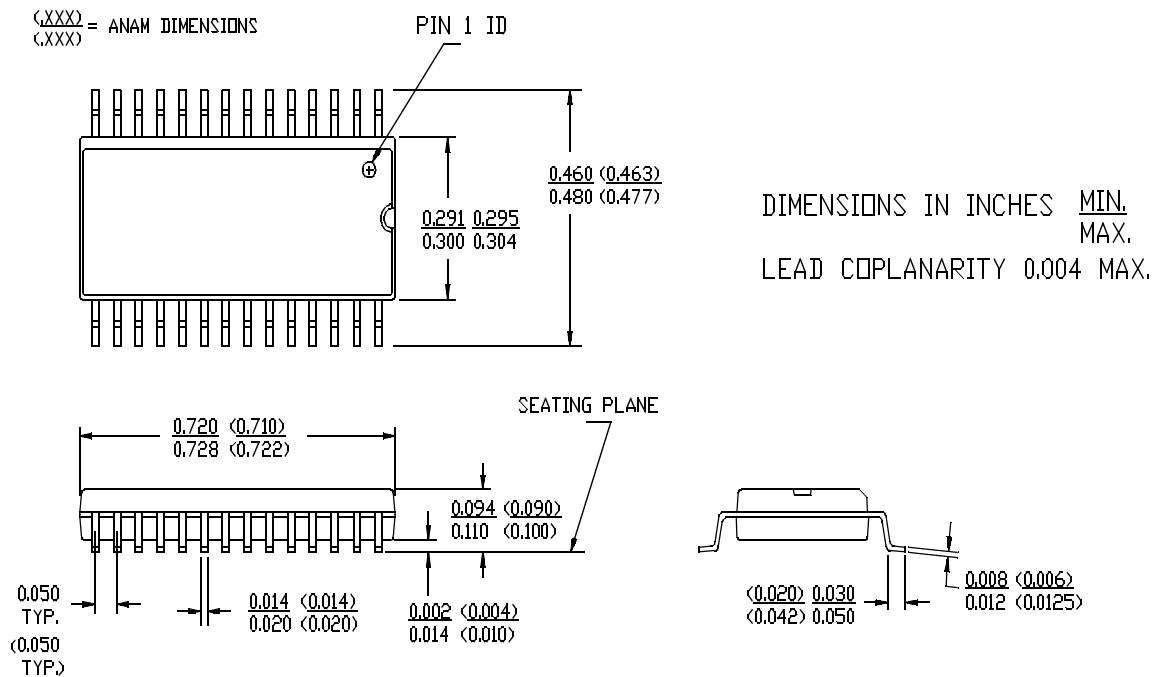
28-Lead (600-Mil) Molded DIP P15



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

.XXX = HYUNDAI DIMENSIONS
.XXX

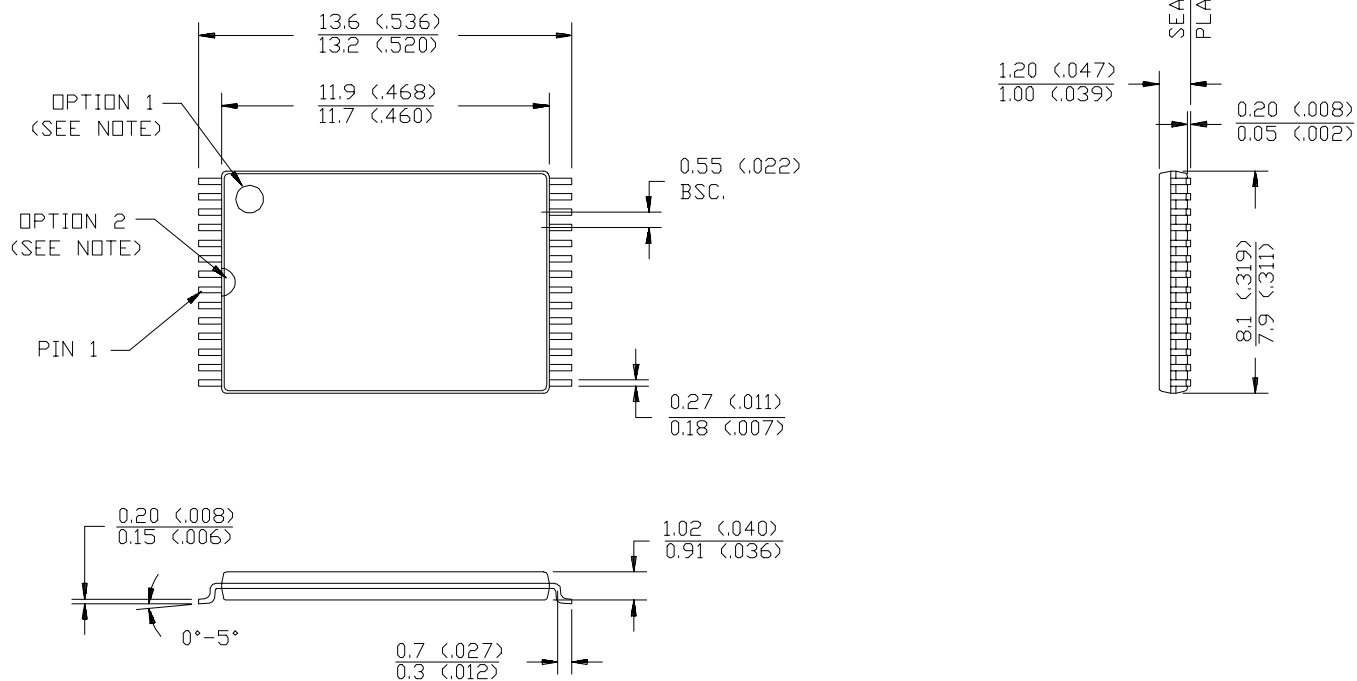
<XXX> = ANAM DIMENSIONS
<XXX>



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.

