

256K (32K x 8) Static RAM

Features

- **Temperature Ranges**
 - Commercial: 0°C to 70°C
 - Industrial: -40°C to 85°C
 - Automotive-A: -40°C to 85°C
 - Automotive-E: -40°C to 125°C
- **Speed: 70 ns**
- **Low voltage range: 2.7V–3.6V**
- **Low active power and standby power**
- **Easy memory expansion with \overline{CE} and \overline{OE} features**
- **TTL-compatible inputs and outputs**
- **Automatic power-down when deselected**
- **CMOS for optimum speed/power**
- **Available in standard Pb-free and non Pb-free 28-lead (300-mil) narrow SOIC, 28-lead TSOP-I and 28-lead Reverse TSOP-I packages**

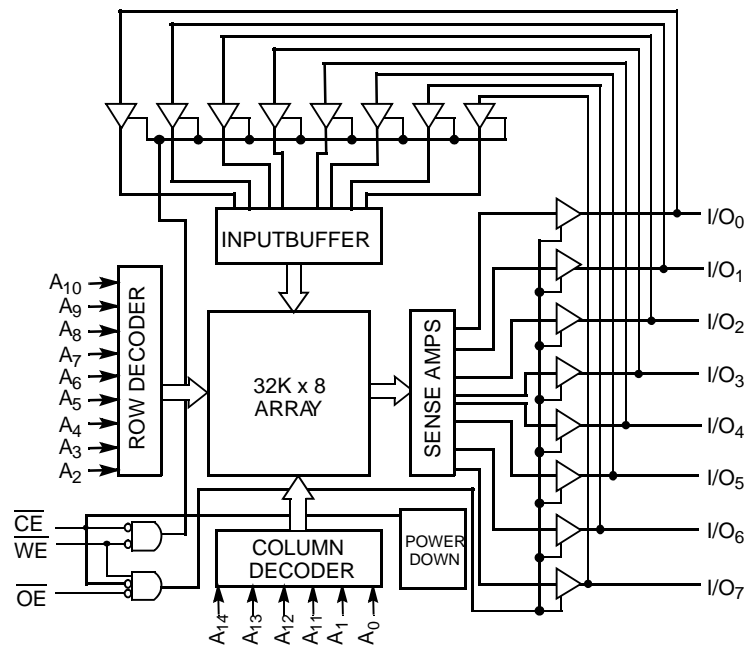
Functional Description^[1]

The CY62256VN family is composed of two high-performance CMOS static RAM's organized as 32K words by 8 bits. Easy memory expansion is provided by an active LOW chip enable (\overline{CE}) and active LOW output enable (\overline{OE}) and tri-state drivers. These devices have an automatic power-down feature, reducing the power consumption by over 99% when deselected.

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.

Logic Block Diagram



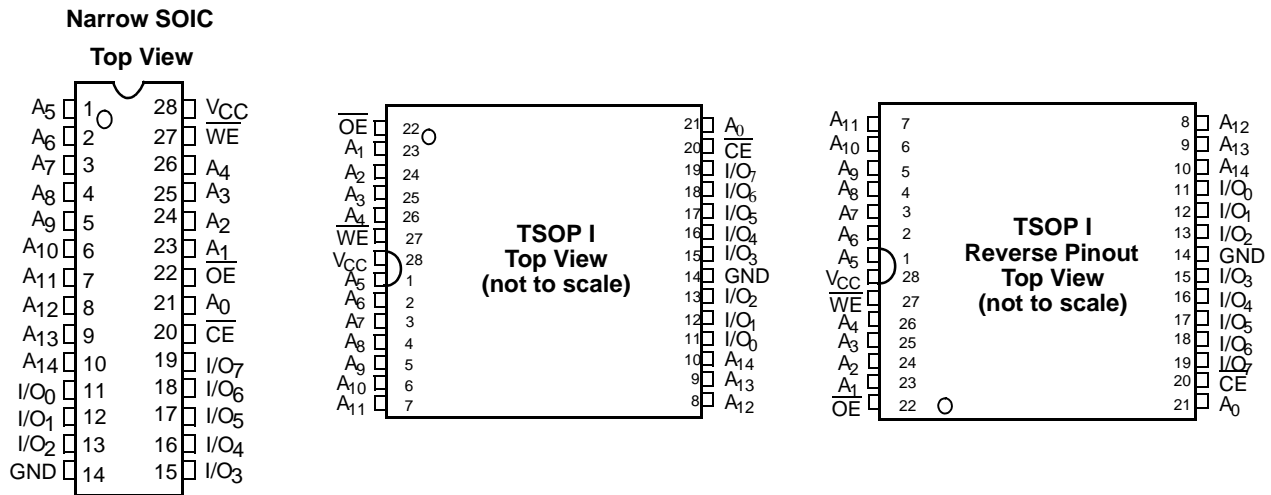
Note:

1. For best practice recommendations, please refer to the Cypress application note "System Design Guidelines" on <http://www.cypress.com>.

Product Portfolio

Product	Range	V _{CC} Range (V)			Power Dissipation			
					Operating, I _{CC} (mA)		Standby, I _{SB2} (μA)	
		Min.	Typ. ^[2]	Max.	Typ. ^[2]	Max.	Typ. ^[2]	Max.
CY62256VNLL	Com'l	2.7	3.0	3.6	11	30	0.1	5
CY62256VNLL	Ind'l	2.7	3.0	3.6	11	30	0.1	10
CY62256VNLL	Automotive-A	2.7	3.0	3.6	11	30	0.1	10
CY62256VNLL	Automotive-E	2.7	3.0	3.6	11	30	0.1	130

Pin Configurations



Pin Definitions

Pin Number	Type	Description
1–10, 21, 23–26	Input	A ₀ –A ₁₄ . Address Inputs
11–13, 15–19	Input/Output	I/O ₀ –I/O ₇ . Data lines. Used as input or output lines depending on operation
27	Input/Control	WE. When selected LOW, a WRITE is conducted. When selected HIGH, a READ is conducted
20	Input/Control	CE. When LOW, selects the chip. When HIGH, deselects the chip
22	Input/Control	OE. Output Enable. Controls the direction of the I/O pins. When LOW, the I/O pins behave as outputs. When deasserted HIGH, I/O pins are tri-stated, and act as input data pins
14	Ground	GND. Ground for the device
28	Power Supply	V _{CC} . Power supply for the device

Note:

2. Typical values are included for reference only and are not guaranteed or tested. Typical values are measured at V_{CC} = V_{CC} Typ., T_A = 25°C, and t_{AA} = 70 ns.

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..... -55°C to + 125°C
 Supply Voltage to Ground Potential (Pin 28 to Pin 14) -0.5V to + 4.6V
 DC Voltage Applied to Outputs in High-Z State^[3] -0.5V to $V_{CC} + 0.5V$
 DC Input Voltage^[3] -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

Device	Range	Ambient Temperature (T _A) ^[4]	V _{CC}
CY62256VN	Commercial	0°C to +70°C	2.7V to 3.6V
	Industrial	-40°C to +85°C	
	Automotive-A	-40°C to +85°C	
	Automotive-E	-40°C to +125°C	

Electrical Characteristics Over the Operating Range

Parameter	Description	Test Conditions	-70			Unit	
			Min.	Typ. ^[2]	Max.		
V _{OH}	Output HIGH Voltage	I _{OH} = -1.0 mA	V _{CC} = 2.7V		2.4		V
V _{OL}	Output LOW Voltage	I _{OL} = 2.1 mA	V _{CC} = 2.7V			0.4	V
V _{IH}	Input HIGH Voltage		2.2		V _{CC} + 0.3V		V
V _{IL}	Input Leakage Voltage		-0.5		0.8		V
I _{IX}	Input Leakage Current	GND ≤ V _{IN} ≤ V _{CC}	Com'l/Ind'l/Auto-A	-1	+1		μA
			Auto-E	-10	+10		μA
I _{OZ}	Output Leakage Current	GND ≤ V _{IN} ≤ V _{CC} , Output Disabled	Com'l/Ind'l/Auto-A	-1	+1		μA
			Auto-E	-10	+10		μA
I _{CC}	V _{CC} Operating Supply Current	V _{CC} = 3.6V, I _{OUT} = 0 mA, f = f _{MAX} = 1/t _{RC}	All Ranges		11	30	mA
I _{SB1}	Automatic CE Power down Current - TTL Inputs	V _{CC} = 3.6V, $\overline{CE} \geq V_{IH}$, V _{IN} ≥ V _{IH} or V _{IN} ≤ V _{IL} , f = f _{MAX}	All Ranges		100	300	μA
I _{SB2}	Automatic CE Power-down Current-CMOS Inputs	V _{CC} = 3.6V, $\overline{CE} \geq V_{CC} - 0.3V$, V _{IN} ≥ V _{CC} - 0.3V or V _{IN} ≤ 0.3V, f = 0	Com'l	0.1	5		μA
			Ind'l/Auto-A		10		
			Auto-E		130		

Notes:

3. V_{IL} (min.) = -2.0V for pulse durations of less than 20 ns.

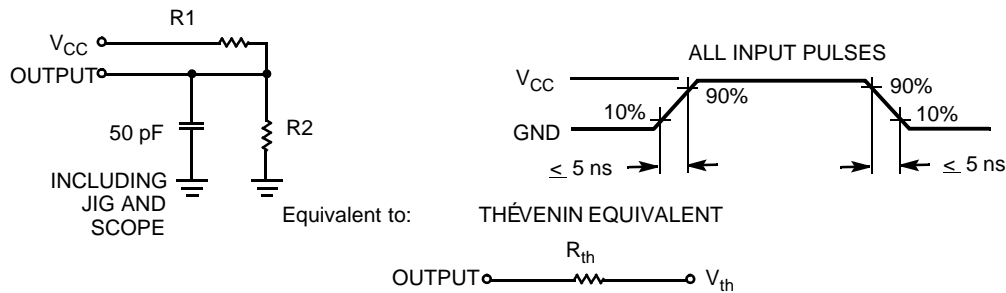
4. T_A is the "Instant-On" case temperature

Capacitance^[5]

Parameter	Description	Test Conditions	Max.	Unit
C _{IN}	Input Capacitance	T _A = 25°C, f = 1 MHz, V _{CC} = 3.0V	6	pF
C _{OUT}	Output Capacitance		8	pF

Thermal Resistance^[5]

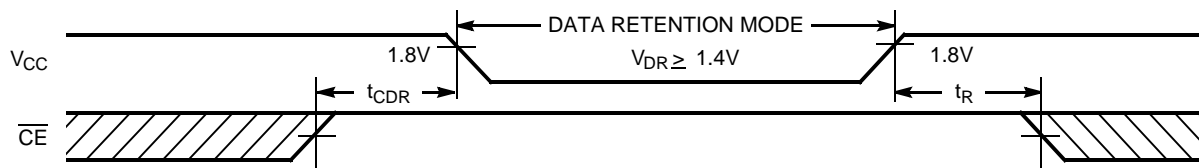
Parameter	Description	Test Conditions	SOIC	TSOPI	RTSOPI	Unit
Θ _{JA}	Thermal Resistance (Junction to Ambient)	Still Air, soldered on a 3 × 4.5 inch, two-layer printed circuit board	68.45	87.62	87.62	°C/W
Θ _{JC}	Thermal Resistance (Junction to Case)		26.94	23.73	23.73	°C/W

AC Test Loads and Waveforms


Parameter	Value	Units
R1	1100	Ohms
R2	1500	Ohms
R _{TH}	645	Ohms
V _{TH}	1.750	Volts

Data Retention Characteristics (Over the Operating Range)

Parameter	Description	Conditions ^[6]	Min.	Typ. ^[2]	Max.	Unit
V _{DR}	V _{CC} for Data Retention		1.4			V
I _{CCDR}	Data Retention Current	V _{CC} = 1.4V, CE ≥ V _{CC} - 0.3V, V _{IN} ≥ V _{CC} - 0.3V or V _{IN} ≤ 0.3V	Com'l	0.1	3	μA
			Ind'l/Auto-A		6	
			Auto-E		50	
t _{CDR} ^[6]	Chip Deselect to Data Retention Time		0			ns
t _R ^[5]	Operation Recovery Time		t _{RC}			ns

Data Retention Waveform

Note:

5. Tested initially and after any design or process changes that may affect these parameters.
6. No input may exceed V_{CC} + 0.3V.

Switching Characteristics Over the Operating Range^[7]

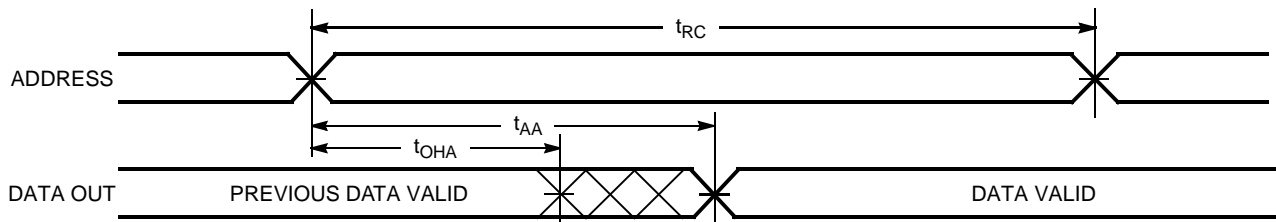
Parameter	Description	CY62256VN-70		Unit
		Min.	Max.	
Read Cycle				
t _{RC}	Read Cycle Time	70		ns
t _{AA}	Address to Data Valid		70	ns
t _{OHA}	Data Hold from Address Change	10		ns
t _{ACE}	\overline{CE} LOW to Data Valid		70	ns
t _{DOE}	\overline{OE} LOW to Data Valid		35	ns
t _{LZOE}	\overline{OE} LOW to Low-Z ^[8]	5		ns
t _{HZOE}	\overline{OE} HIGH to High-Z ^[8, 9]		25	ns
t _{LZCE}	\overline{CE} LOW to Low-Z ^[8]	10		ns
t _{HZCE}	\overline{CE} HIGH to High-Z ^[8, 9]		25	ns
t _{PU}	\overline{CE} LOW to Power-up	0		ns
t _{PD}	\overline{CE} HIGH to Power-down		70	ns
Write Cycle ^[10, 11]				
t _{WC}	Write Cycle Time	70		ns
t _{SCE}	\overline{CE} LOW to Write End	60		ns
t _{AW}	Address Set-up to Write End	60		ns
t _{HA}	Address Hold from Write End	0		ns
t _{SA}	Address Set-up to Write Start	0		ns
t _{PWE}	\overline{WE} Pulse Width	50		ns
t _{SD}	Data Set-up to Write End	30		ns
t _{HD}	Data Hold from Write End	0		ns
t _{HZWE}	\overline{WE} LOW to High-Z ^[8, 9]		25	ns
t _{LZWE}	\overline{WE} HIGH to Low-Z ^[8]	10		ns

Notes:

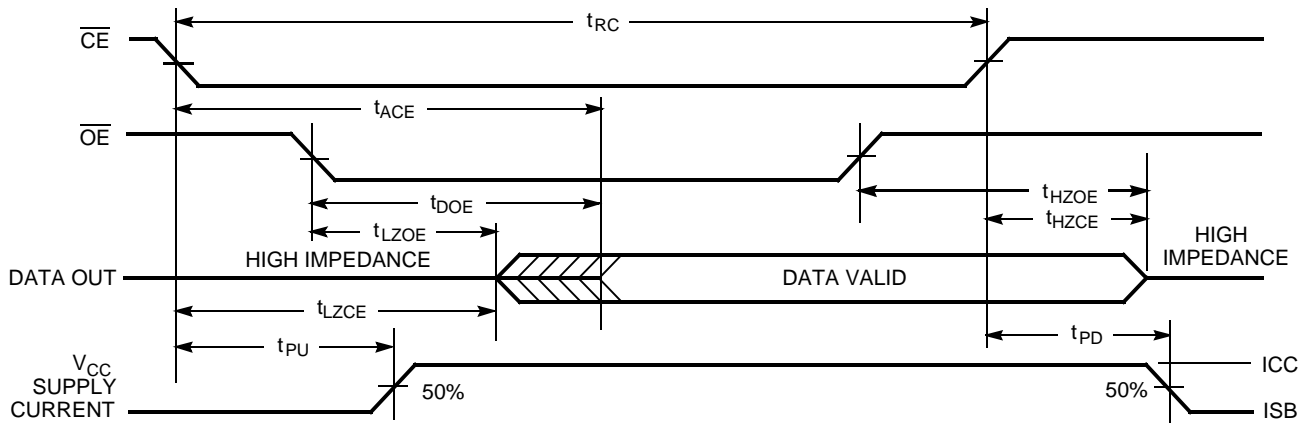
7. Test conditions assume signal transition time of 5 ns or less timing reference levels of $V_{CC}/2$, input pulse levels of 0 to V_{CC} , and output loading of the specified I_{OL}/I_{OH} and 100-pF load capacitance.
8. At any given temperature and voltage condition, t_{HZCE} is less than t_{LZCE}, t_{HZOE} is less than t_{LZOE}, and t_{HZWE} is less than t_{LZWE} for any given device.
9. t_{HZOE}, t_{HZCE}, and t_{HZWE} are specified with C_L = 5 pF as in (b) of AC Test Loads. Transition is measured ± 200 mV from steady-state voltage.
10. 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.
11. The minimum write cycle time for write cycle #3 (\overline{WE} controlled, \overline{OE} LOW) is the sum of t_{HZWE} and t_{SD}.

Switching Waveforms

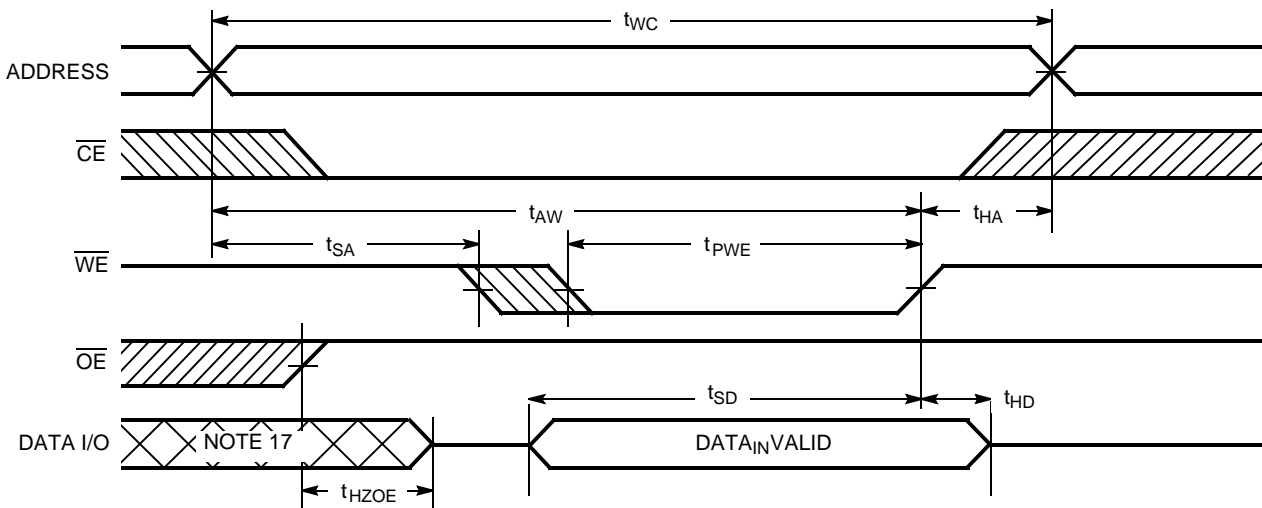
Read Cycle No. 1^[12, 13]



Read Cycle No. 2^[13, 14]



Write Cycle No. 1 (\overline{WE} Controlled)^[10, 15, 16]

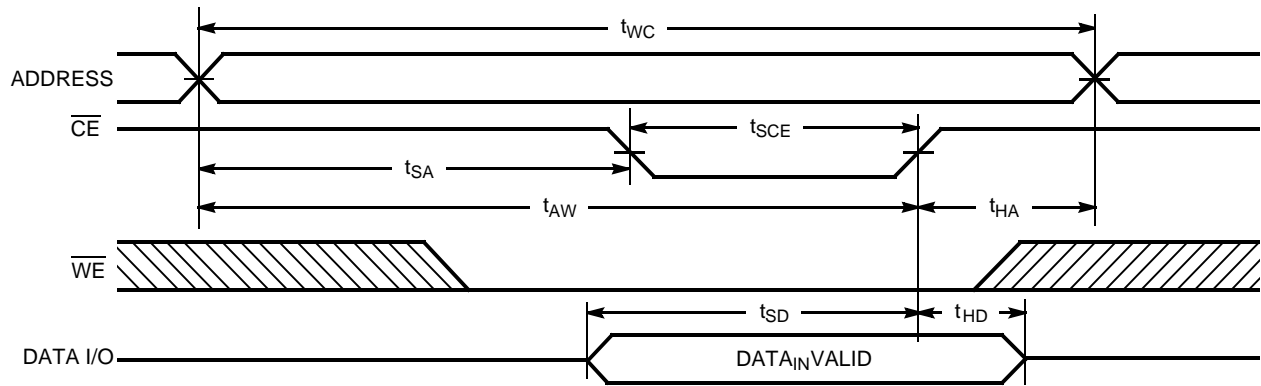


Notes:

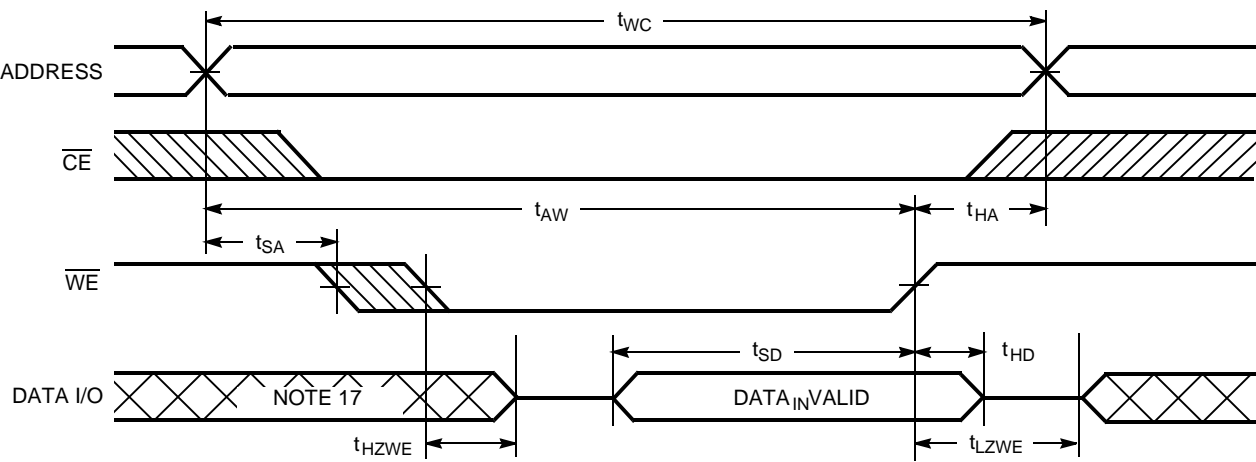
- 12. Device is continuously selected. \overline{OE} , $\overline{CE} = V_{IL}$.
- 13. \overline{WE} is HIGH for read cycle.
- 14. Address valid prior to or coincident with \overline{CE} transition LOW.
- 15. Data I/O is high impedance if $\overline{OE} = V_{IL}$.
- 16. If \overline{CE} goes HIGH simultaneously with \overline{WE} HIGH, the output remains in a high-impedance state.
- 17. During this period, the I/Os are in output state and input signals should not be applied.

Switching Waveforms (continued)

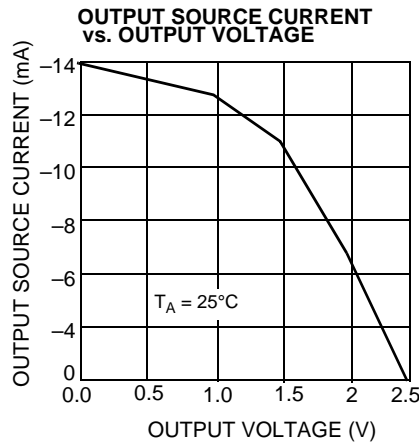
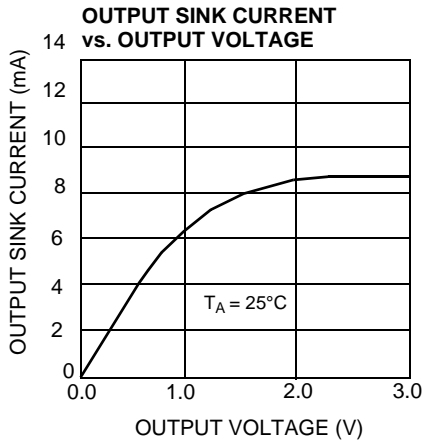
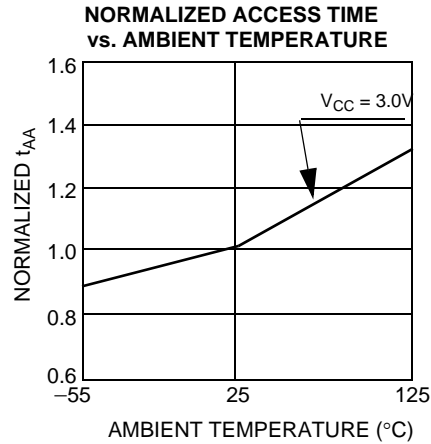
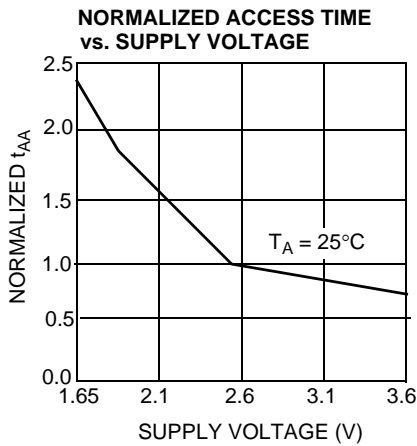
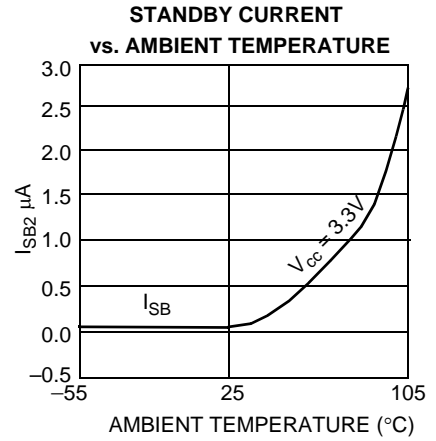
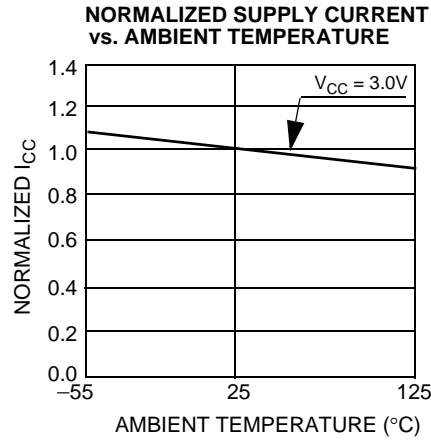
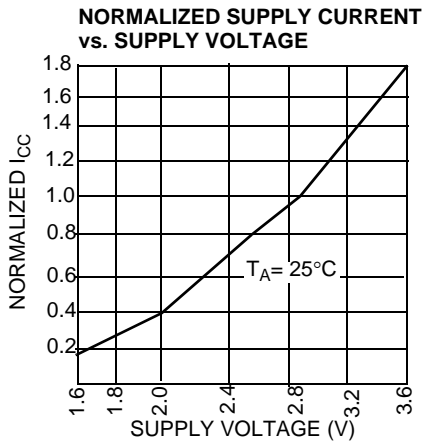
Write Cycle No. 2 (\overline{CE} Controlled)^[10, 15, 16]



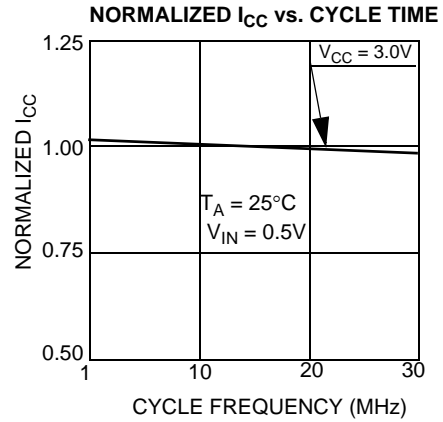
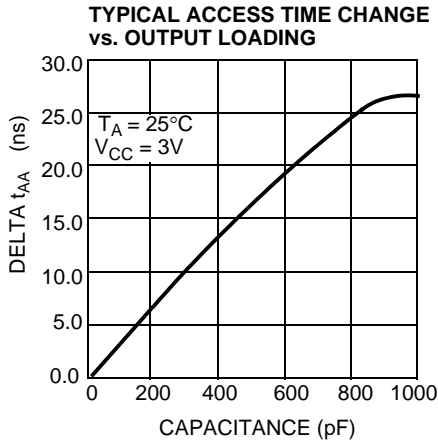
Write Cycle No. 3 (\overline{WE} Controlled, \overline{OE} LOW)^[11, 16]



Typical DC and AC Characteristics



Typical DC and AC Characteristics (continued)



Truth Table

\overline{CE}	\overline{WE}	\overline{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})

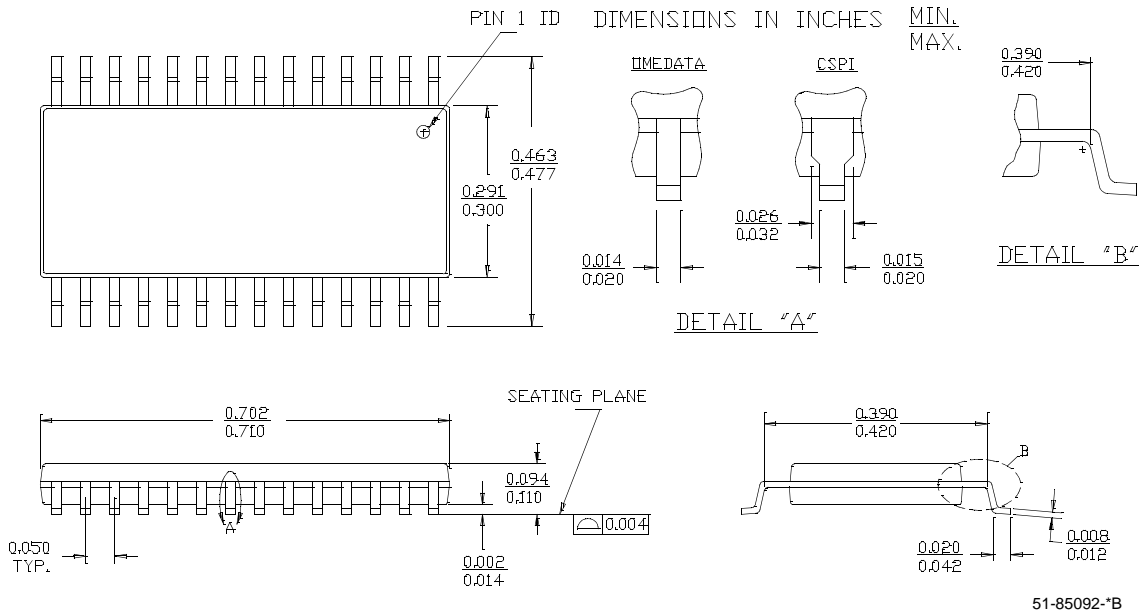
Ordering Information

Speed (ns)	Ordering Code	Package Diagram	Package Type	Operating Range
70	CY62256VNLL-70SNC	51-85092	28-lead (300-mil) Narrow SOIC	Commercial
	CY62256VNLL-70SNXC		28-lead (300-mil) Narrow SOIC (Pb-Free)	
	CY62256VNLL-70ZC	51-85071	28-lead TSOP I	
	CY62256VNLL-70ZXC		28-lead TSOP I (Pb-Free)	
	CY62256VNLL-70SNXI	51-85092	28-lead (300-mil) Narrow SOIC (Pb-Free)	Industrial
	CY62256VNLL-70ZI	51-85071	28-lead TSOP I	
	CY62256VNLL-70ZXI		28-lead TSOP I (Pb-Free)	
	CY62256VNLL-70ZRI	51-85074	28-lead Reverse TSOP I	
	CY62256VNLL-70ZRXI		28-lead Reverse TSOP I (Pb-Free)	
	CY62256VNLL-70ZXA	51-85071	28-lead TSOP I (Pb-Free)	Automotive-A
	CY62256VNLL-70SNXE	51-85092	28-lead (300-mil) Narrow SOIC (Pb-Free)	Automotive-E
	CY62256VNLL-70ZXE	51-85071	28-lead TSOP I (Pb-Free)	
CY62256VNLL-70ZRXE	51-85074	28-lead Reverse TSOP I (Pb-Free)		

Please contact your local Cypress sales representative for availability of other parts

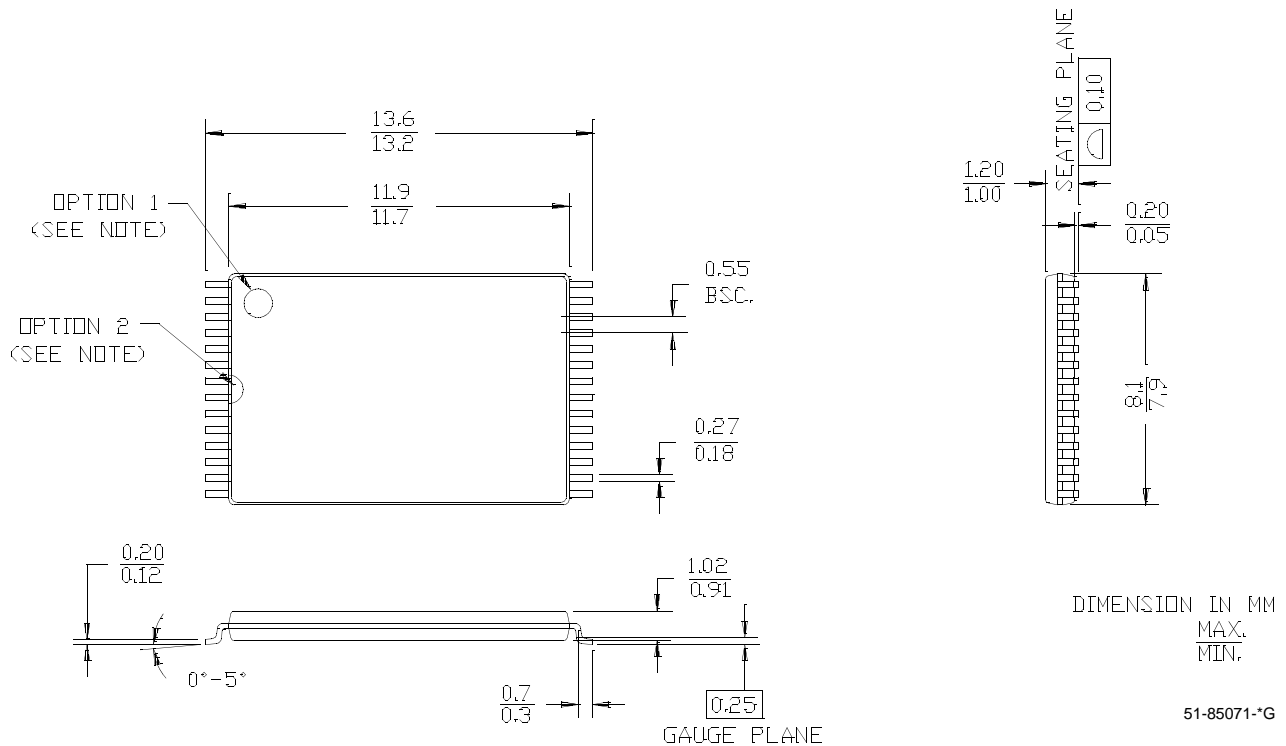
Package Diagrams

28-lead (300-mil) SNC (Narrow Body) (51-85092)



28-lead TSOP 1 (8 x 13.4 mm) (51-85071)

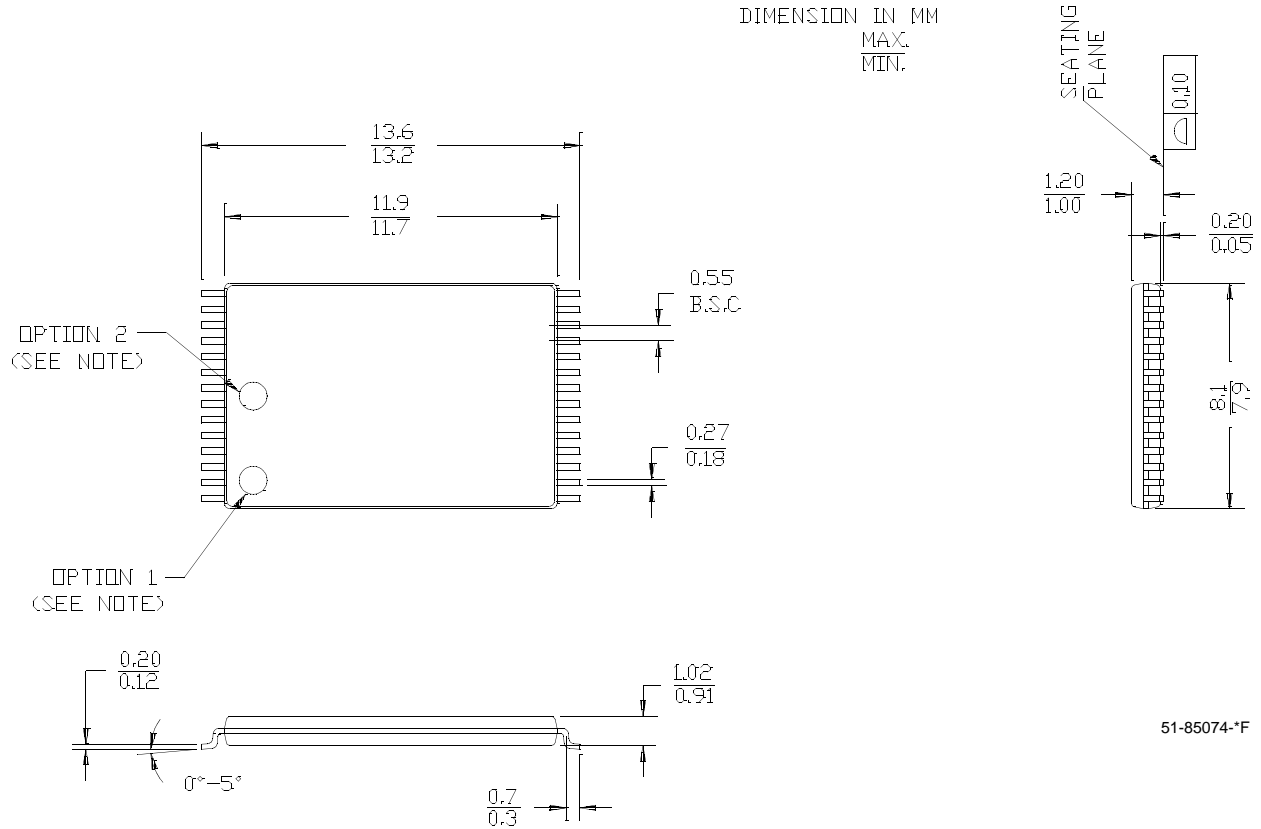
NOTE: ORIENTATION ID MAY BE LOCATED EITHER AS SHOWN IN OPTION 1 OR OPTION 2



Package Diagrams (continued)

28-lead Reverse TSOP 1 (8 x 13.4 mm) (51-85074)

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



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Document History Page

Document Title: CY62256VN 256K (32K x 8) Static RAM Document Number: 001-06512				
REV.	ECN NO.	Issue Date	Orig. of Change	Description of Change
**	426504	See ECN	NXR	New Data Sheet
*A	488954	See ECN	NXR	Added Automotive product Updated ordering Information table