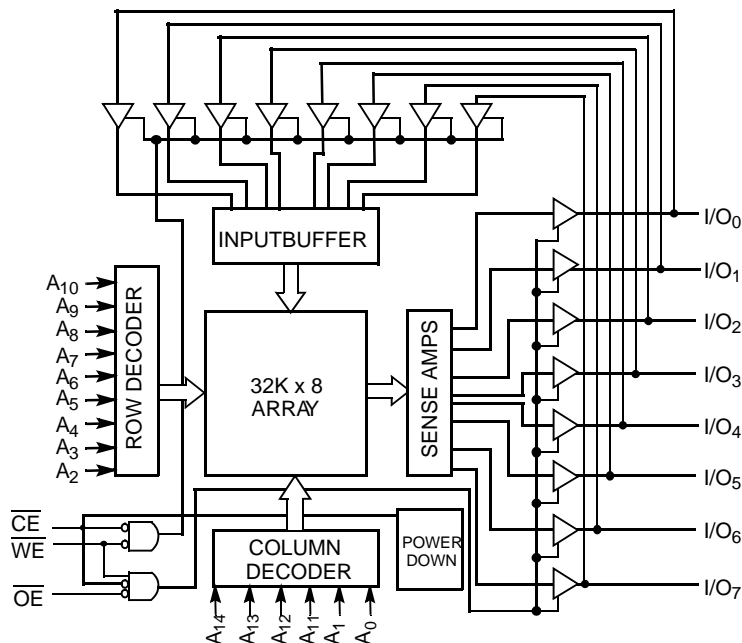


Features

- 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: 2.7 V to 3.6 V
- 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 and power
- Available in standard Pb-free and non Pb-free 28-pin (300-mil) narrow SOIC, 28-pin TSOP-I, and 28-pin reverse TSOP-I packages

Logic Block Diagram



Functional Description

The CY62256VN^[1] 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 tristate 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.

Note

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

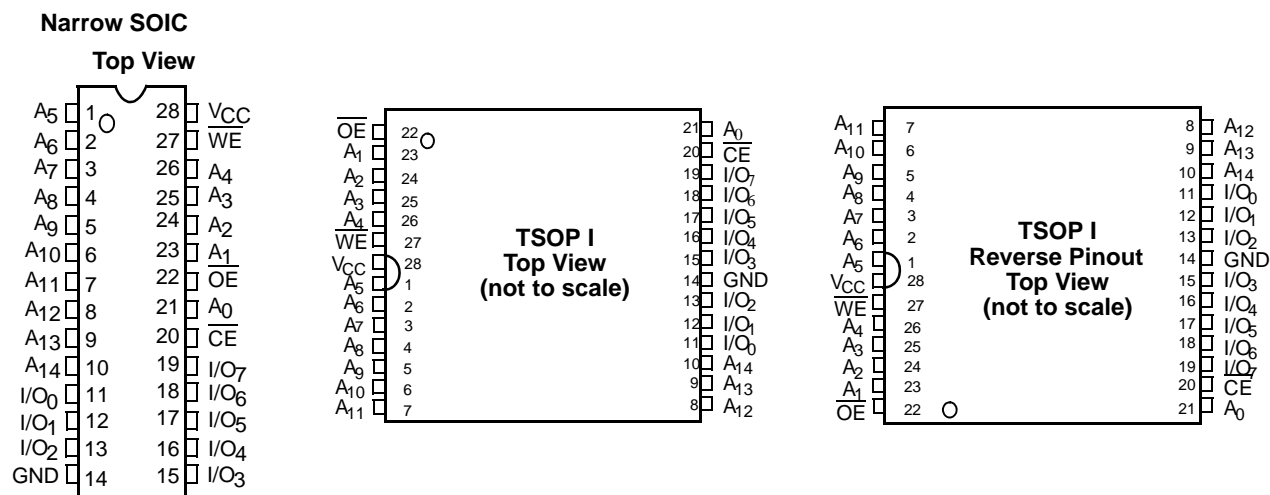
Contents

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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	Commercial	2.7	3.0	3.6	11	30	0.1	5
CY62256VNLL	Industrial	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 tristated, 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

Exceeding maximum ratings may impair the useful life of the device. These user guidelines are 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).....-0.5 V to +4.6 V
- DC voltage applied to outputs in high Z State^[3]-0.5 V to V_{CC} + 0.5 V
- DC input voltage^[3]-0.5 V to V_{CC} + 0.5 V
- Output current into outputs (LOW) 20 mA

Static discharge voltage..... > 2001 V (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	2.7 V to 3.6 V
	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 ^[5]	Max		
V _{OH}	Output HIGH voltage	I _{OH} = -1.0 mA V _{CC} = 2.7 V	2.4	-	-	V	
V _{OL}	Output LOW voltage	I _{OL} = 2.1 mA V _{CC} = 2.7 V	-	-	0.4	V	
V _{IH}	Input HIGH voltage		2.2	-	V _{CC} + 0.3V	V	
V _{IL}	Input LOW voltage		-0.5	-	0.8	V	
I _{IX}	Input leakage current	GND ≤ V _{IN} ≤ V _{CC}	Commercial/ Industrial/ Automotive-A	-1	-	+1	μA
			Automotive-E	-10	-	+10	μA
I _{OZ}	Output leakage current	GND ≤ V _{IN} ≤ V _{CC} , Output Disabled	Commercial/ Industrial/ Automotive-A	-1	-	+1	μA
			Automotive-E	-10	-	+10	μA
I _{CC}	V _{CC} operating supply current	V _{CC} = 3.6 V, 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} = 3.6 V, $\overline{CE} \geq V_{IH}$, 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} = 3.6 V, $\overline{CE} \geq V_{CC} - 0.3 V$, V _{IN} ≥ V _{CC} - 0.3 V or V _{IN} ≤ 0.3 V, f = 0	Commercial	-	0.1	5	μA
			Industrial/ Automotive-A	-		10	
			Automotive-E	-		130	

Notes

3. V_{IL} (min) = -2.0 V for pulse durations of less than 20 ns.
4. T_A is the "Instant-On" case temperature.
5. 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.

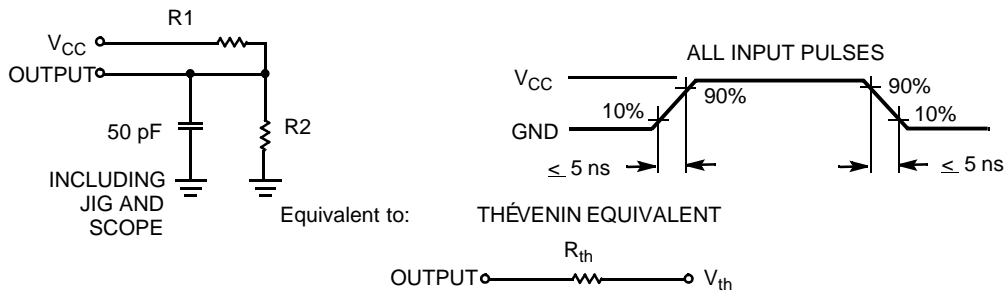
Capacitance

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

Thermal Resistance

Parameter ^[6]	Description	Test Conditions	SOIC	TSOPI	RTSOPI	Unit
Θ _{JA}	Thermal resistance (junction to ambient)	Still air, soldered on a 3 x 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

Figure 1. AC Test Loads and Waveforms



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

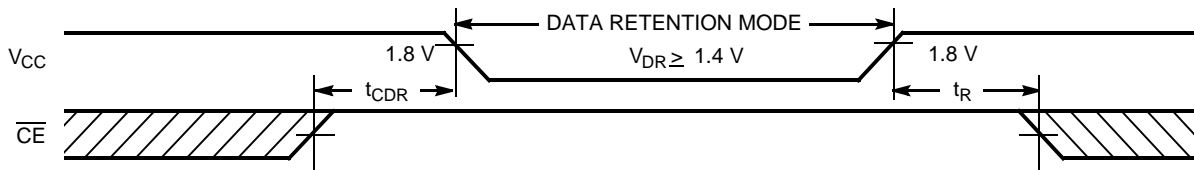
Data Retention Characteristics

(Over the Operating Range)

Parameter	Description	Conditions ^[7]	Min	Typ ^[8]	Max	Unit
V _{DR}	V _{CC} for data retention		1.4	–	–	V
I _{CCDR}	Data retention current	V _{CC} = 1.4 V, CE ≥ V _{CC} – 0.3 V, V _{IN} ≥ V _{CC} – 0.3 V or V _{IN} ≤ 0.3 V	Commercial Industrial/ Automotive-A Automotive-E	– 0.1 –	3 6 50	μA
t _{CDR} ^[6]	Chip deselect to data retention time		0	–	–	ns
t _R ^[6]	Operation recovery time		t _{RC}	–	–	ns

Notes

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

Figure 2. Data Retention Waveform


Switching Characteristics

 Over the Operating Range^[9]

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 $Z^{[10]}$	5	–	ns
t_{HZOE}	\overline{OE} HIGH to high $Z^{[10, 11]}$	–	25	ns
t_{LZCE}	\overline{CE} LOW to low $Z^{[10]}$	10	–	ns
t_{HZCE}	\overline{CE} HIGH to high $Z^{[10, 11]}$	–	25	ns
t_{PU}	\overline{CE} LOW to power up	0	–	ns
t_{PD}	\overline{CE} HIGH to power down	–	70	ns
Write Cycle^[12, 13]				
t_{WC}	Write cycle time	70	–	ns
t_{SCE}	\overline{CE} LOW to write end	60	–	ns
t_{AW}	Address setup to write end	60	–	ns
t_{HA}	Address hold from write end	0	–	ns
t_{SA}	Address setup to write start	0	–	ns
t_{PWE}	\overline{WE} pulse width	50	–	ns
t_{SD}	Data setup to write end	30	–	ns
t_{HD}	Data hold from write end	0	–	ns
t_{HZWE}	\overline{WE} LOW to high $Z^{[10, 11]}$	–	25	ns
t_{LZWE}	\overline{WE} HIGH to low $Z^{[10]}$	10	–	ns

Notes

9. 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.
10. 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.
11. 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.
12. 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.
13. 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

Figure 3. Read Cycle No. 1^[14, 15]

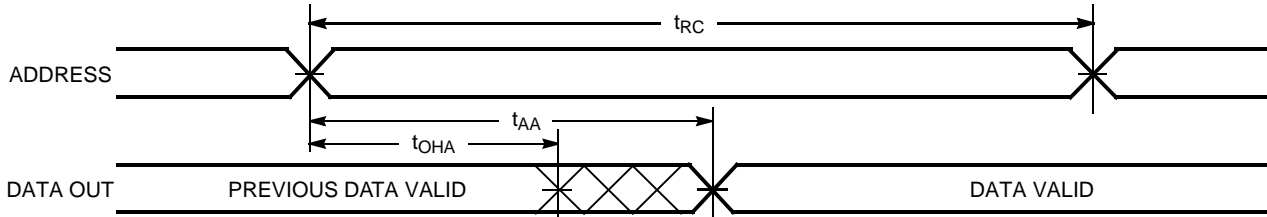


Figure 4. Read Cycle No. 2^[15, 16]

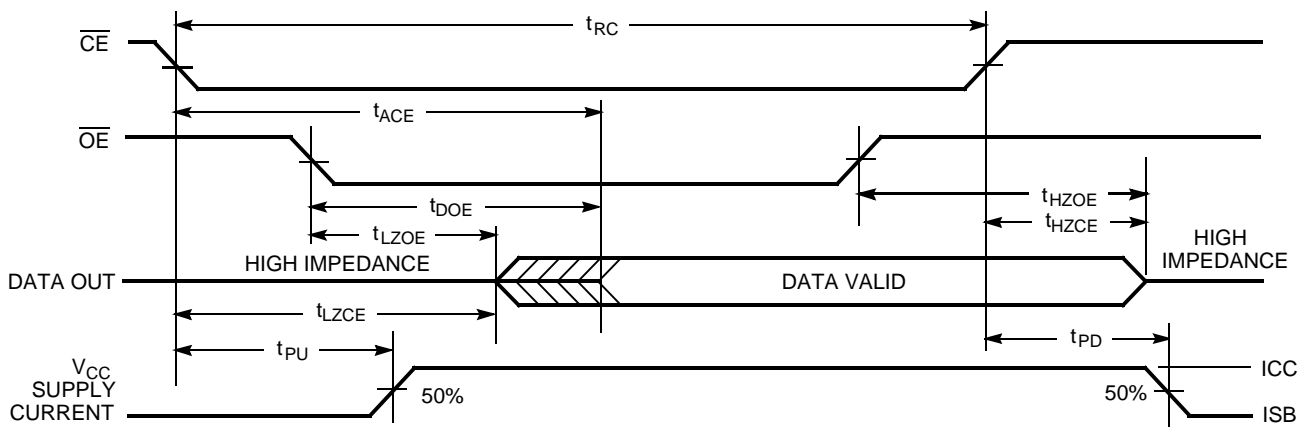
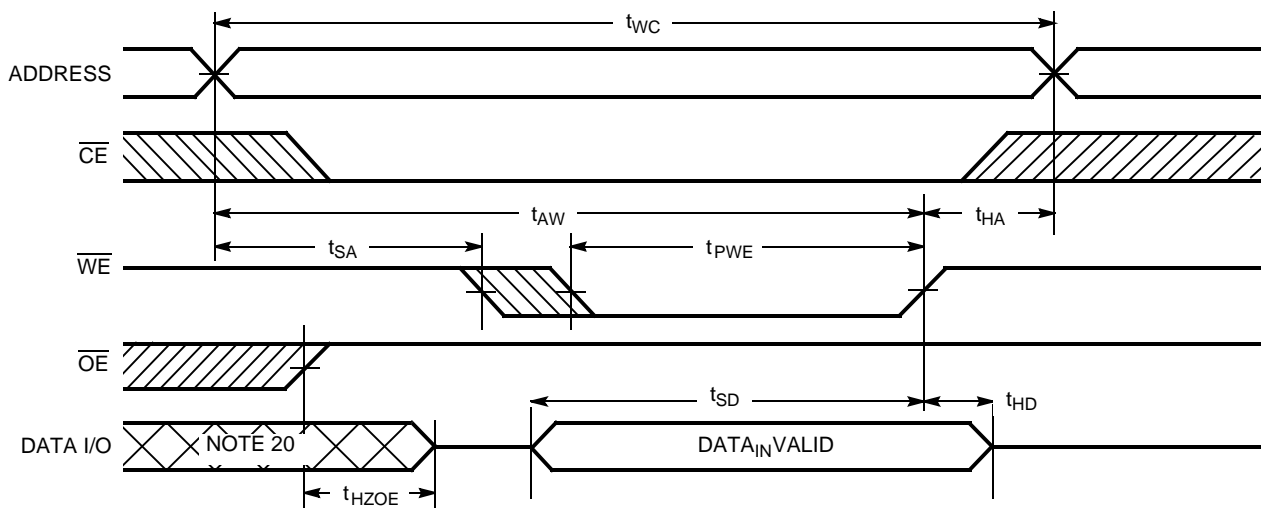


Figure 5. Write Cycle No. 1 (\overline{WE} Controlled)^[17, 18, 19]



Notes

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

Switching Waveforms (continued)

Figure 6. Write Cycle No. 2 ($\overline{\text{CE}}$ Controlled)^[21, 22, 23]

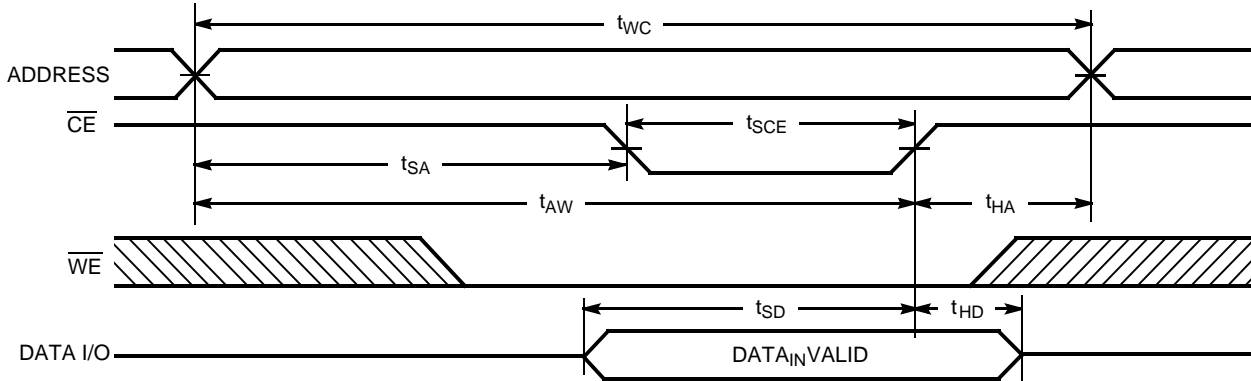
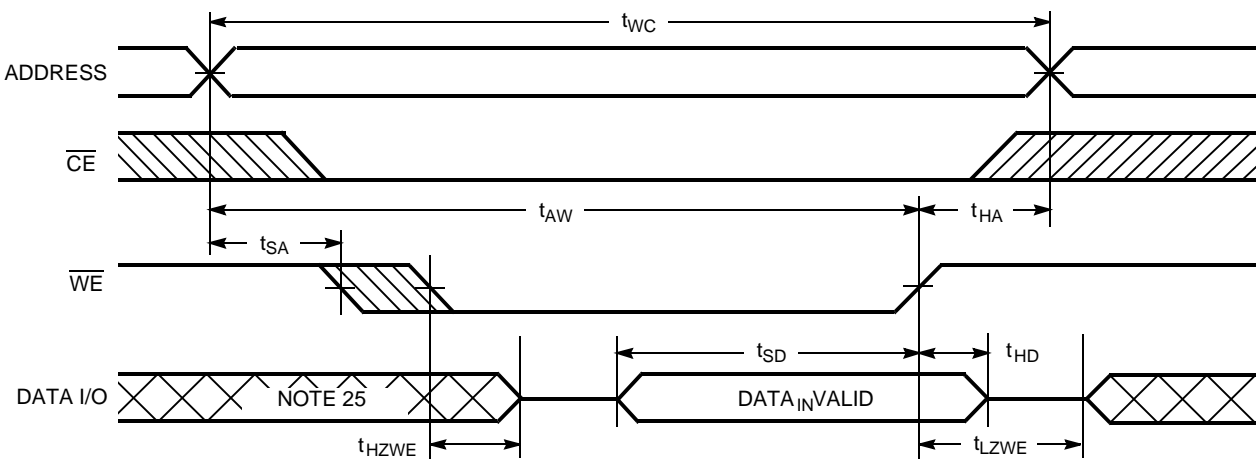


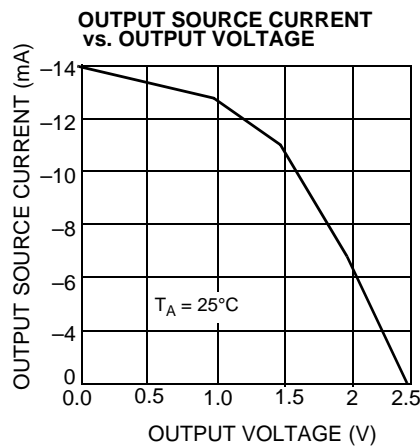
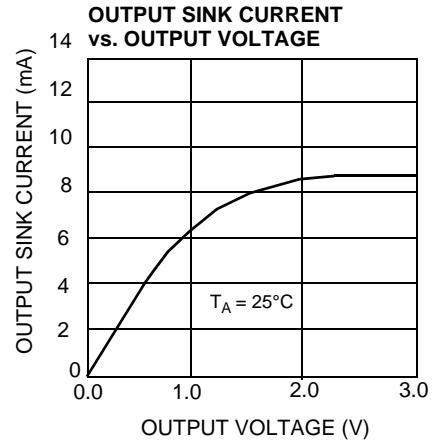
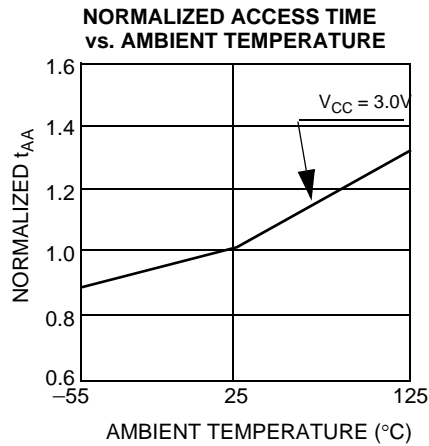
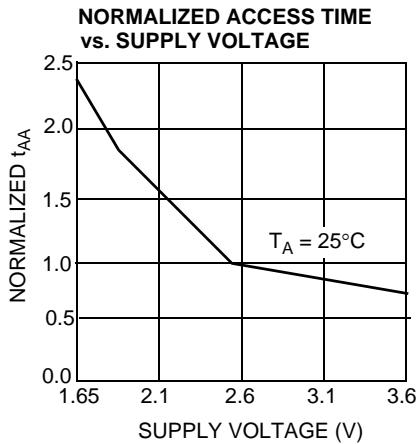
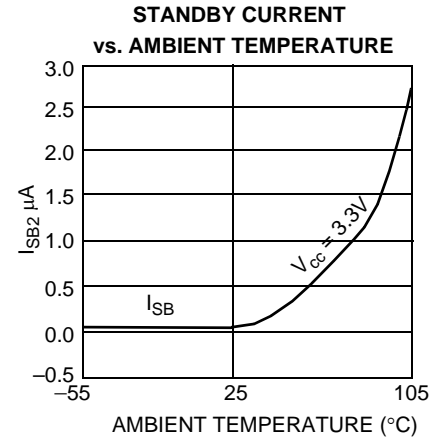
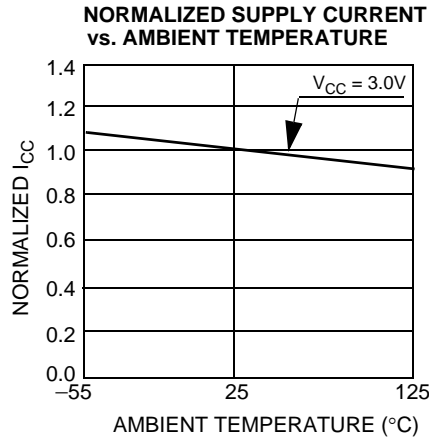
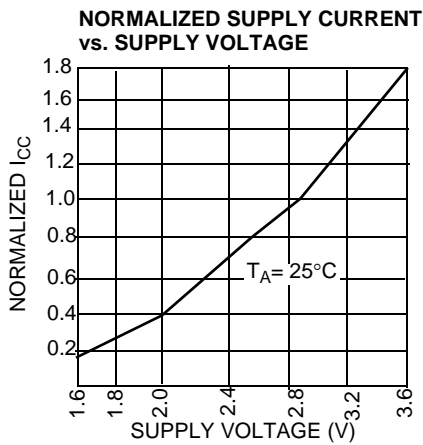
Figure 7. Write Cycle No. 3 ($\overline{\text{WE}}$ Controlled, $\overline{\text{OE}}$ LOW)^[23, 24]



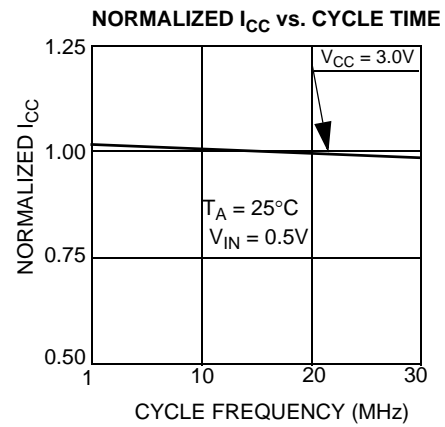
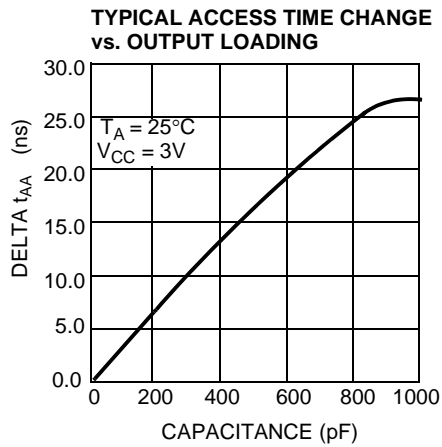
Notes

- 21. The internal write time of the memory is defined by the overlap of $\overline{\text{CE}}$ LOW and $\overline{\text{WE}}$ 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.
- 22. Data I/O is high impedance if $\text{OE} = V_{\text{IH}}$.
- 23. If $\overline{\text{CE}}$ goes HIGH simultaneously with $\overline{\text{WE}}$ HIGH, the output remains in a high impedance state.
- 24. The minimum write cycle time for write cycle #3 ($\overline{\text{WE}}$ controlled, $\overline{\text{OE}}$ LOW) is the sum of t_{HZWE} and t_{SD} .
- 25. 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

$\overline{\text{CE}}$	$\overline{\text{WE}}$	$\overline{\text{OE}}$	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})

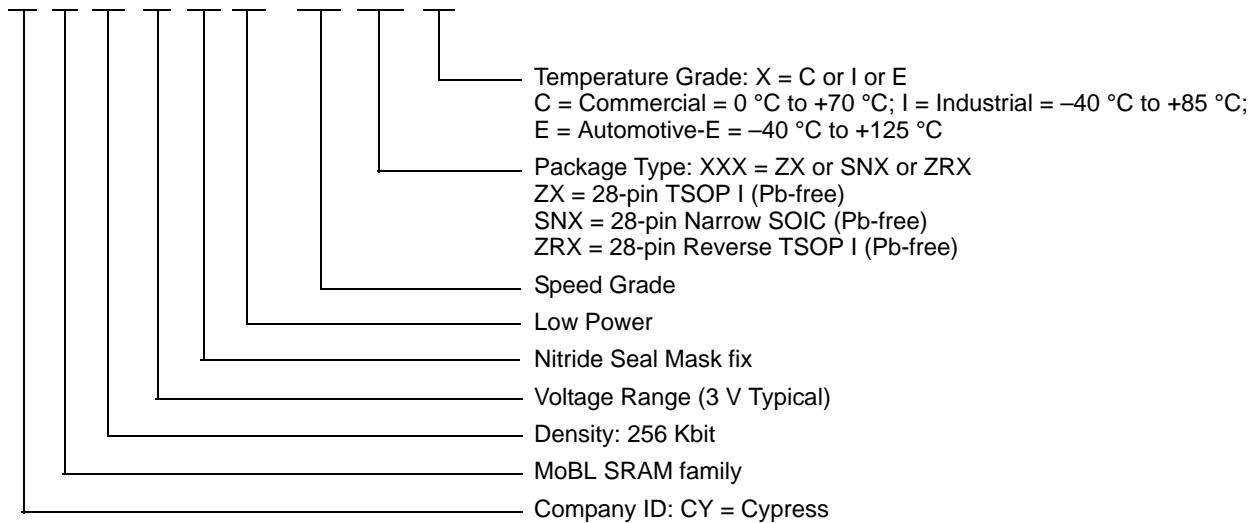
Ordering Information

Speed (ns)	Ordering Code	Package Diagram	Package Type	Operating Range
70	CY62256VNLL-70ZXC	51-85071	28-pin TSOP I (Pb-free)	Commercial
	CY62256VNLL-70SNXI	51-85092	28-pin (300-mil) Narrow SOIC (Pb-free)	Industrial
	CY62256VNLL-70ZXI	51-85071	28-pin TSOP I (Pb-free)	
	CY62256VNLL-70ZRXI	51-85074	28-pin Reverse TSOP I (Pb-free)	
	CY62256VNLL-70SNXE	51-85092	28-pin (300-mil) Narrow SOIC (Pb-free)	Automotive-E
	CY62256VNLL-70ZXE	51-85071	28-pin TSOP I (Pb-free)	

Contact your local Cypress sales representative for availability of other parts

Ordering Code Definitions

CY 62 256 V N LL - 70 XXX X



Package Diagrams

Figure 8. 28-pin (300-mil) SNC (Narrow Body), 51-85092

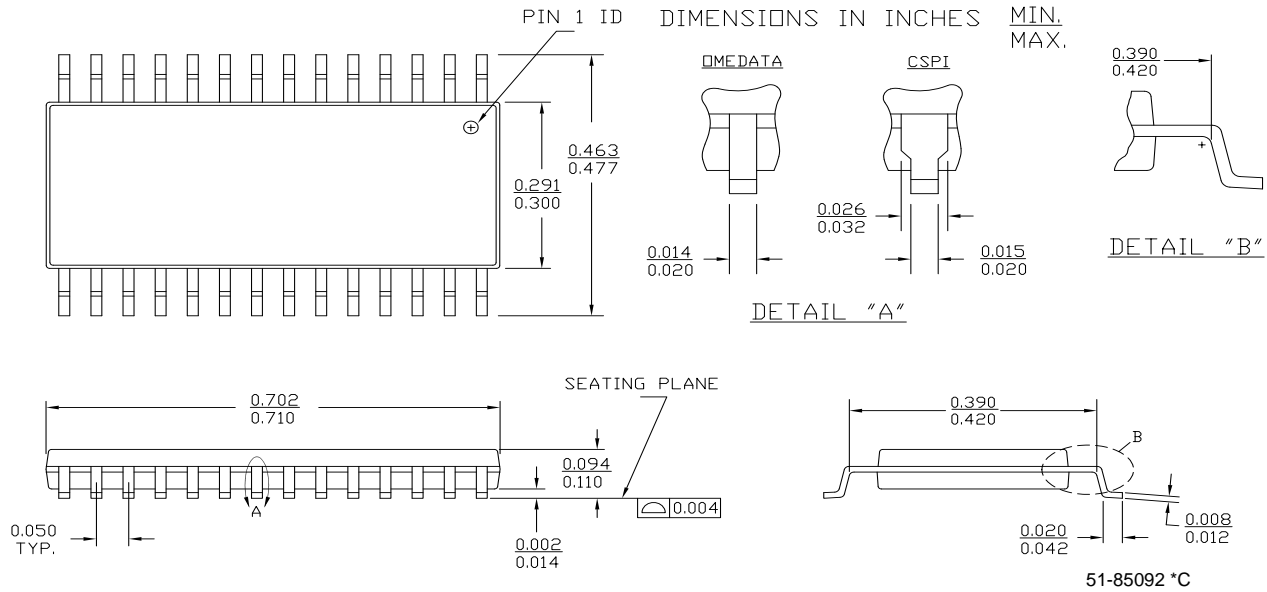


Figure 9. 28-pin TSOP 1 (8 x 13.4 mm), 51-85071

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

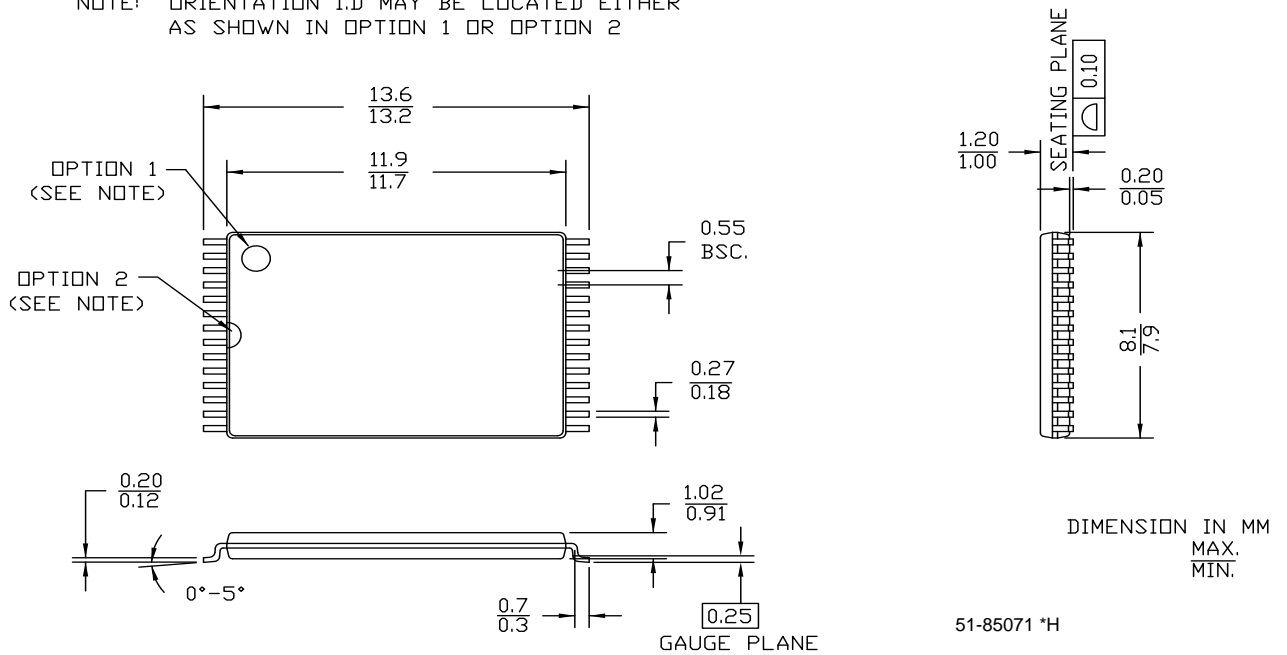
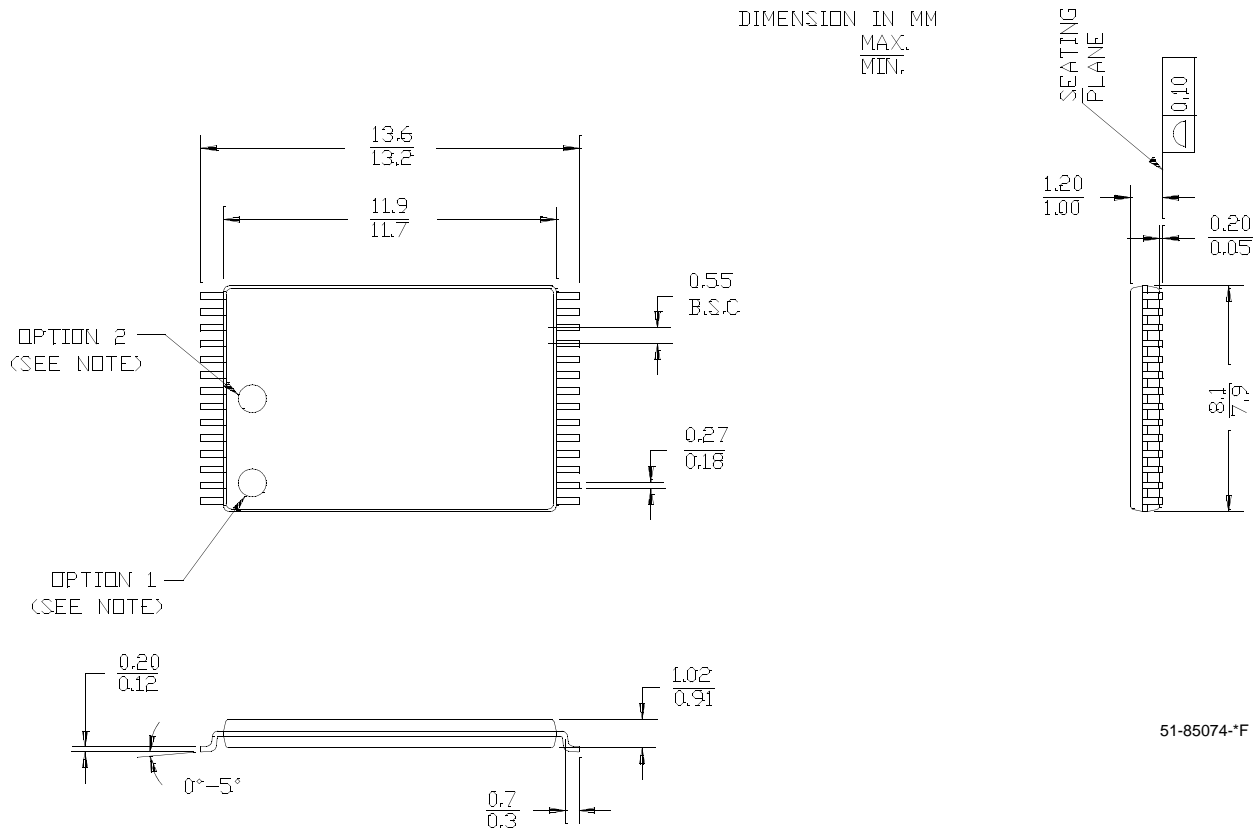


Figure 10. 28-pin Reverse TSOP 1 (8 x 13.4 mm), 51-85074

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



51-85074-F

Document History Page

Document Title: CY62256VN 256K (32K × 8) Static RAM Document Number: 001-06512				
Rev.	ECN No.	Submission 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
*B	2769239	09/25/09	VKN/AESA	Corrected V _{IL} description in the Electrical Characteristics table
*C	2901521	03/30/2010	AJU	Removed inactive parts from Ordering Information. Updated Package Diagram
*D	3119519	01/04/2011	AJU	Updated Ordering Information . Added Ordering Code Definitions .

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