

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
- High Speed: 55 ns
- Voltage Range: 4.5V to 5.5V Operation
- Low Active Power
 - 275 mW (max)
- Low Standby Power (LL version)
 - 82.5 μ W (max)
- Easy Memory Expansion with $\overline{\text{CE}}$ and $\overline{\text{OE}}$ Features
- TTL-Compatible Inputs and Outputs
- Automatic Power Down when Deselected
- CMOS for Optimum Speed and Power
- Available in Pb-free and Non Pb-free 28-Pin (600-mil) PDIP, 28-Pin (300-mil) Narrow SOIC, 28-Pin TSOP-I, and 28-Pin Reverse TSOP-I Packages

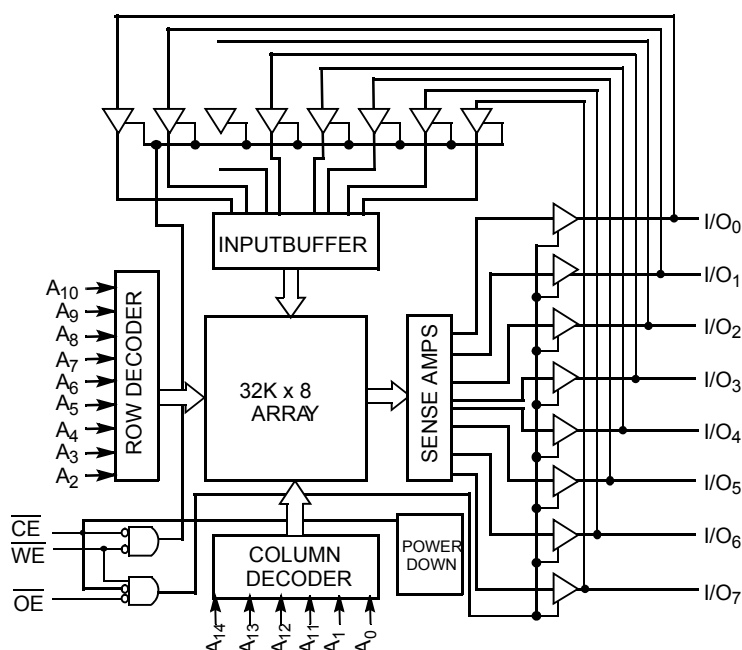
Functional Description

The CY62256N^[1] is a high performance CMOS static RAM organized as 32K words by 8 bits. Easy memory expansion is provided by an active LOW chip enable ($\overline{\text{CE}}$) and active LOW output enable ($\overline{\text{OE}}$) and tristate drivers. This device has an automatic power down feature, reducing the power consumption by 99.9 percent when deselected.

An active LOW write enable signal ($\overline{\text{WE}}$) controls the writing/reading operation of the memory. When $\overline{\text{CE}}$ and $\overline{\text{WE}}$ 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, $\overline{\text{CE}}$ and $\overline{\text{OE}}$ active LOW, while $\overline{\text{WE}}$ 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 ($\overline{\text{WE}}$) is HIGH.

Logic Block Diagram



Note

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

Product Portfolio

Product		V _{CC} Range (V)			Speed (ns)	Power Dissipation			
						Operating, I _{CC} (mA)		Standby, I _{SB2} (μA)	
		Min	Typ ^[2]	Max		Typ ^[2]	Max	Typ ^[2]	Max
CY62256NL	Commercial / Industrial	4.5	5.0	5.5	70	25	50	2	50
CY62256NLL	Commercial				70	25	50	0.1	5
CY62256NLL	Industrial				55/70	25	50	0.1	10
CY62256NLL	Automotive-A				55/70	25	50	0.1	10
CY62256NLL	Automotive-E				55	25	50	0.1	15

Pin Configurations

Figure 1. 28-Pin DIP and Narrow SOIC

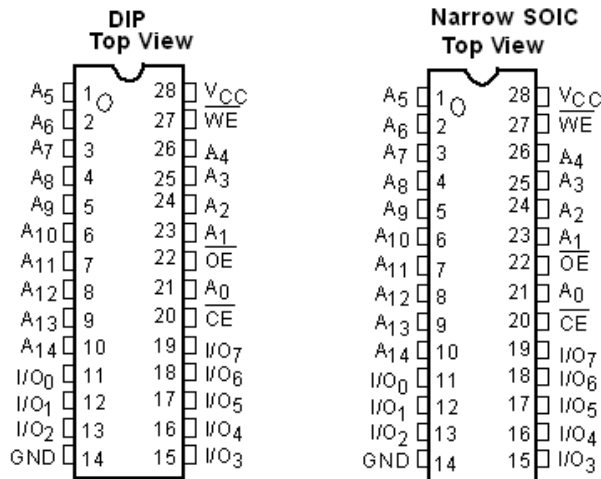


Figure 2. 28-Pin TSOP I and Reverse TSOP I

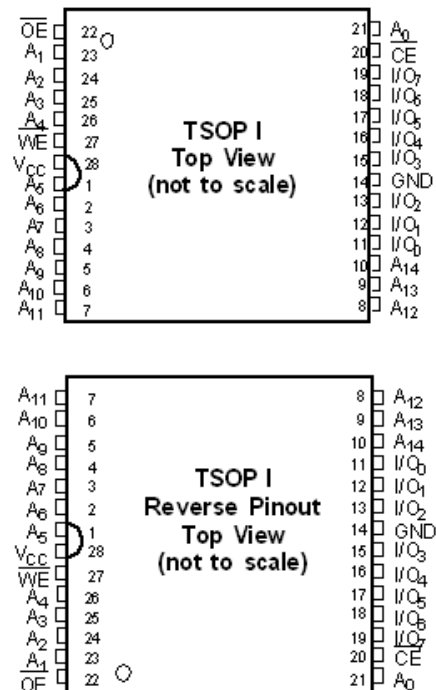


Table 1. Pin Definitions

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 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°C, V_{CC}). Parameters are guaranteed by design and characterization, and not 100% tested.

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) -0.5V to +7.0V

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

Range	Ambient Temperature (T_A) ^[4]	V_{CC}
Commercial	0°C to +70°C	5V ± 10%
Industrial	-40°C to +85°C	5V ± 10%
Automotive-A	-40°C to +85°C	5V ± 10%
Automotive-E	-40°C to +125°C	5V ± 10%

Electrical Characteristics Over the Operating Range

Parameter	Description	Test Conditions		-55			-70			Unit
				Min	Typ ^[2]	Max	Min	Typ ^[2]	Max	
V _{OH}	Output HIGH Voltage	V _{CC} = Min., I _{OH} = −1.0 mA		2.4			2.4			V
V _{OL}	Output LOW Voltage	V _{CC} = Min., I _{OL} = 2.1 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 Leakage Current	GND ≤ V _I ≤ V _{CC}		−0.5		+0.5	−0.5		+0.5	μA
I _{OZ}	Output Leakage Current	GND ≤ V _O ≤ V _{CC} ; Output Disabled		−0.5		+0.5	−0.5		+0.5	μA
I _{CC}	V _{CC} Operating Supply Current	V _{CC} = Max., I _{OUT} = 0 mA, f = f _{MAX} = 1/t _{RC}	L-Commercial/ Industrial					25	50	mA
			LL-Commercial					25	50	mA
			LL - Industrial		25	50		25	50	mA
			LL - Auto-A		25	50		25	50	mA
			LL - Auto-E		25	50				mA
I _{SB1}	Automatic CE Power down Current— TTL Inputs	Max. V _{CC} , CE ≥ V _{IH} , V _{IN} ≥ V _{IH} or V _{IN} ≤ V _{IL} , f = f _{MAX}	L					0.4	0.6	mA
			LL-Commercial					0.3	0.5	mA
			LL - Industrial		0.3	0.5		0.3	0.5	mA
			LL - Auto-A		0.3	0.5		0.3	0.5	mA
			LL - Auto-E		0.3	0.5				mA
I _{SB2}	Automatic CE Power down Current— CMOS Inputs	Max. V _{CC} , CE ≥ V _{CC} − 0.3V V _{IN} ≥ V _{CC} − 0.3V, or V _{IN} ≤ 0.3V, f = 0	L					2	50	μA
			LL-Commercial					0.1	5	μA
			LL - Industrial		0.1	10		0.1	10	μA
			LL - Auto-A		0.1	10		0.1	10	μA
			LL - Auto-E		0.1	15				μA

Capacitance

Parameter	Description	Test Conditions ^[5]	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

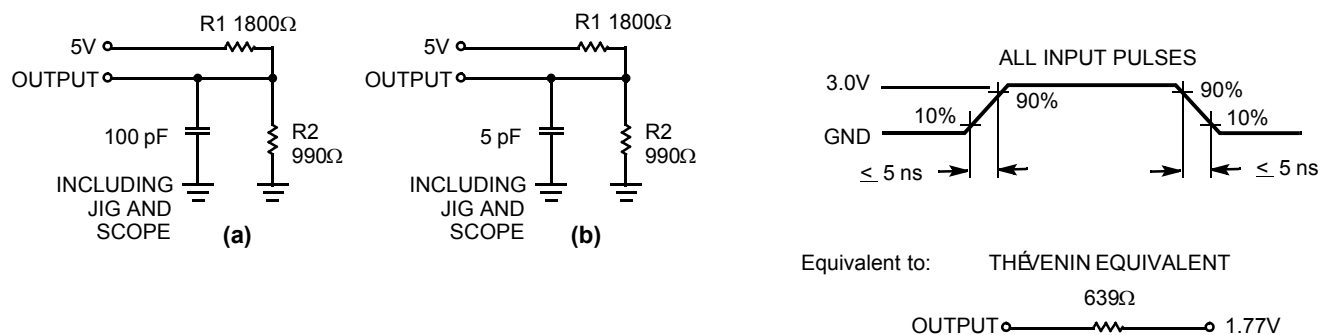
Notes

- $V_{IL} (\text{min.}) = -2.0V$ for pulse durations of less than 20 ns.
- T_A is the "Instant-On" case temperature.
- Tested initially and after any design or process changes that may affect these parameters.

Thermal Resistance

Parameter	Description ^[5]	Test Conditions	DIP	SOIC	TSOP	RTSOP	Unit
Θ_{JA}	Thermal Resistance (Junction to Ambient)	Still Air, soldered on a 4.25 x 1.125 inch, 4-layer printed circuit board	75.61	76.56	93.89	93.89	°C/W
Θ_{JC}	Thermal Resistance (Junction to Case)		43.12	36.07	24.64	24.64	°C/W

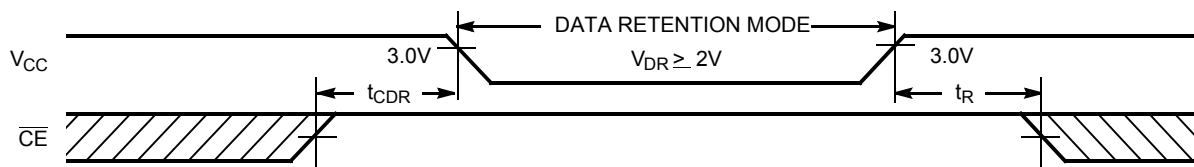
Figure 3. AC Test Loads and Waveforms



Data Retention Characteristics

Parameter	Description	Conditions ^[6]	Min	Typ ^[2]	Max	Unit
V_{DR}	V_{CC} for Data Retention		2.0			V
I_{CCDR}	Data Retention Current	L	$V_{CC} = 2.0V, \overline{CE} \geq V_{CC} - 0.3V,$ $V_{IN} \geq V_{CC} - 0.3V, \text{ or } V_{IN} \leq 0.3V$	2	50	μA
		LL-Commercial		0.1	5	μA
		LL - Industrial/Auto-A		0.1	10	μA
		LL - Auto-E		0.1	10	μA
$t_{CDR}^{[8]}$	Chip Deselect to Data Retention Time		0			ns
$t_R^{[8]}$	Operation Recovery Time		t_{RC}			ns

Figure 4. Data Retention Waveform

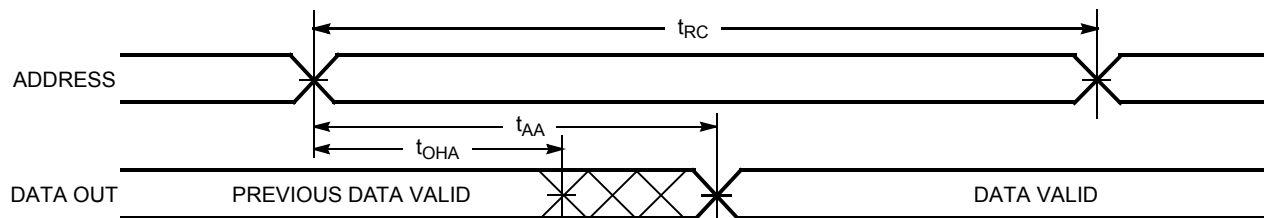


Note

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

Switching Characteristics Over the Operating Range^[7]

Parameter	Description	CY62256N-55		CY62256N-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 ^[8]	5		5		ns
t _{HZOE}	$\overline{OE}$ HIGH to High-Z ^[8, 9]		20		25	ns
t _{LZCE}	$\overline{CE}$ LOW to Low-Z ^[8]	5		5		ns
t _{HZCE}	$\overline{CE}$ HIGH to High-Z ^[8, 9]		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 ^[10, 11]						
t _{WC}	Write Cycle Time	55		70		ns
t _{SCE}	$\overline{CE}$ LOW to Write End	45		60		ns
t _{AW}	Address Setup to Write End	45		60		ns
t _{HA}	Address Hold from Write End	0		0		ns
t _{SA}	Address Setup to Write Start	0		0		ns
t _{PWE}	$\overline{WE}$ Pulse Width	40		50		ns
t _{SD}	Data Setup to Write End	25		30		ns
t _{HD}	Data Hold from Write End	0		0		ns
t _{HZWE}	$\overline{WE}$ LOW to High-Z ^[8, 9]		20		25	ns
t _{LZWE}	$\overline{WE}$ HIGH to Low-Z ^[8]	5		5		ns

Switching Waveforms
Figure 5. Read Cycle No. 1^[12, 13]

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 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 device.
- t_{HZOE} , t_{HZCE} , and t_{HZWE} are specified with $C_L = 5$ pF as in (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 setup 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)

Figure 6. Read Cycle No. 2^[13, 14]

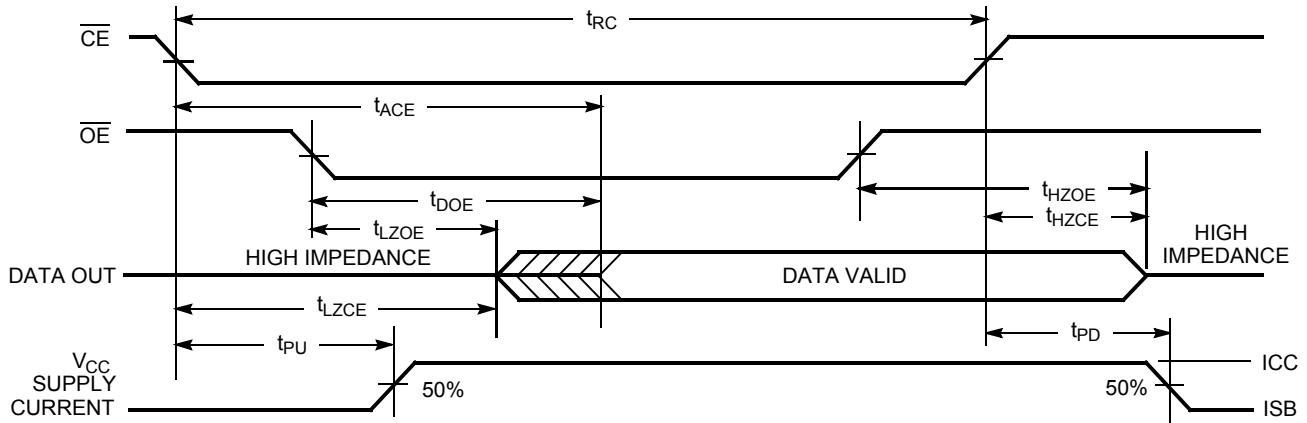


Figure 7. Write Cycle No. 1 ($\overline{WE}$ Controlled)^[10, 15, 16]

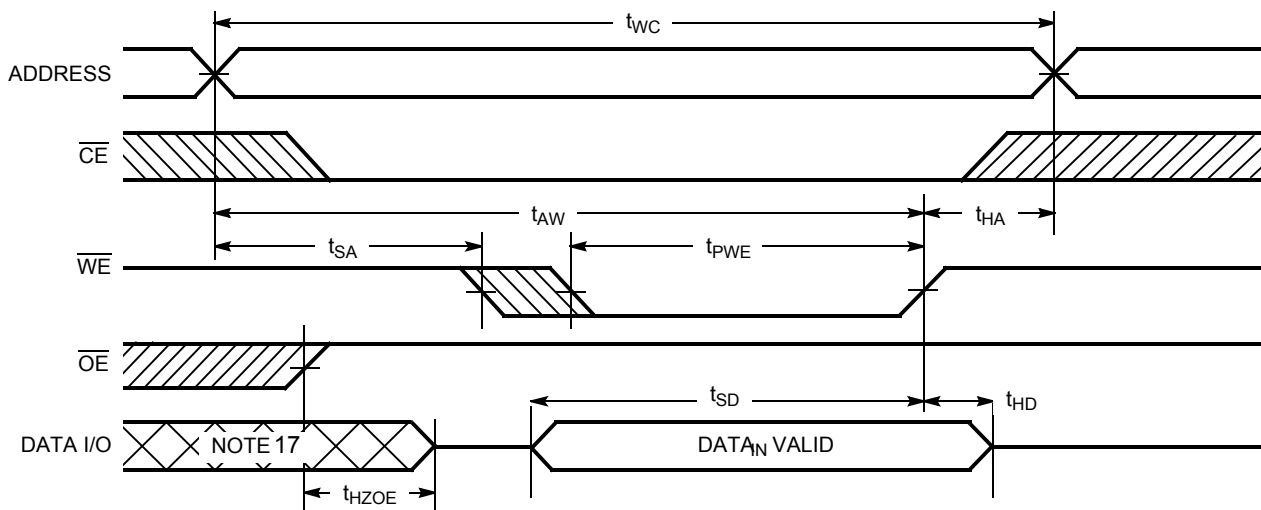
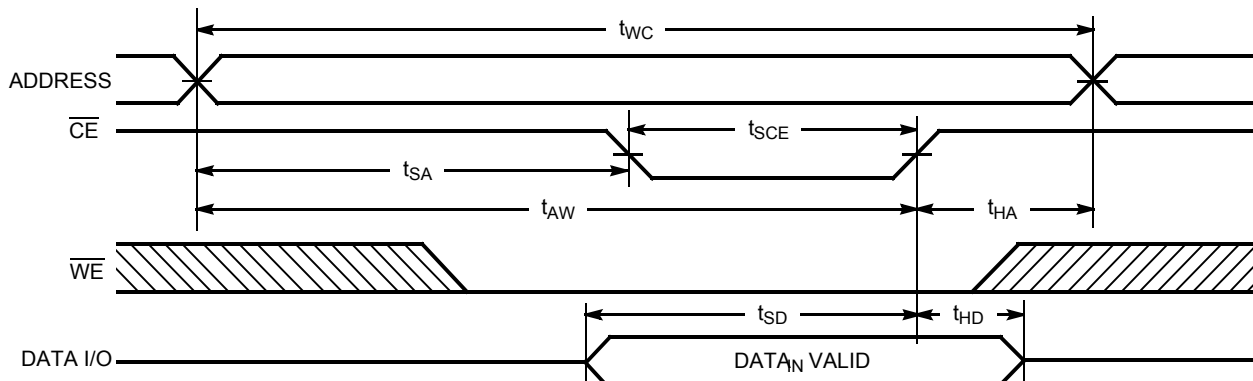


Figure 8. Write Cycle No. 2 ($\overline{CE}$ Controlled)^[10, 15, 16]

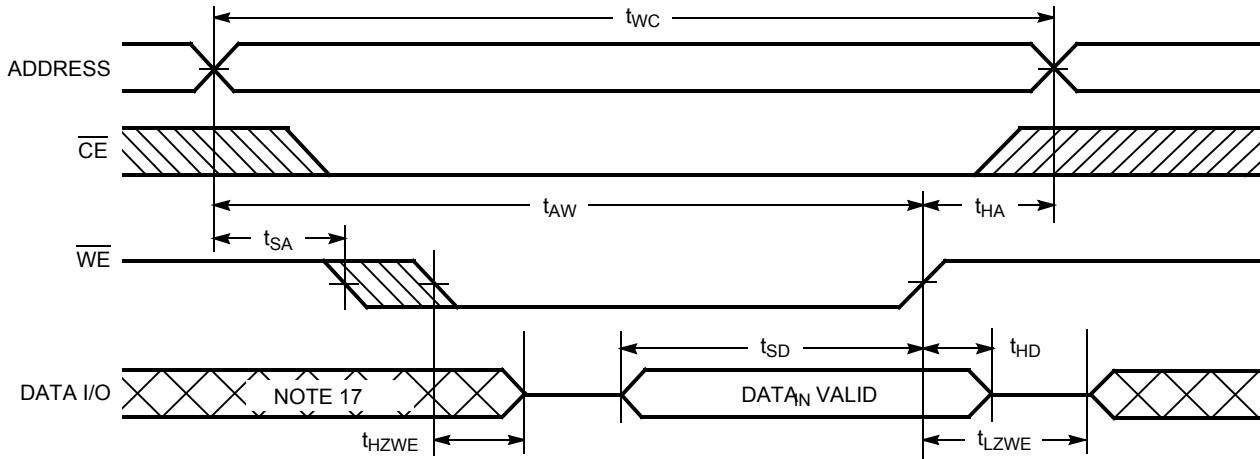


Notes

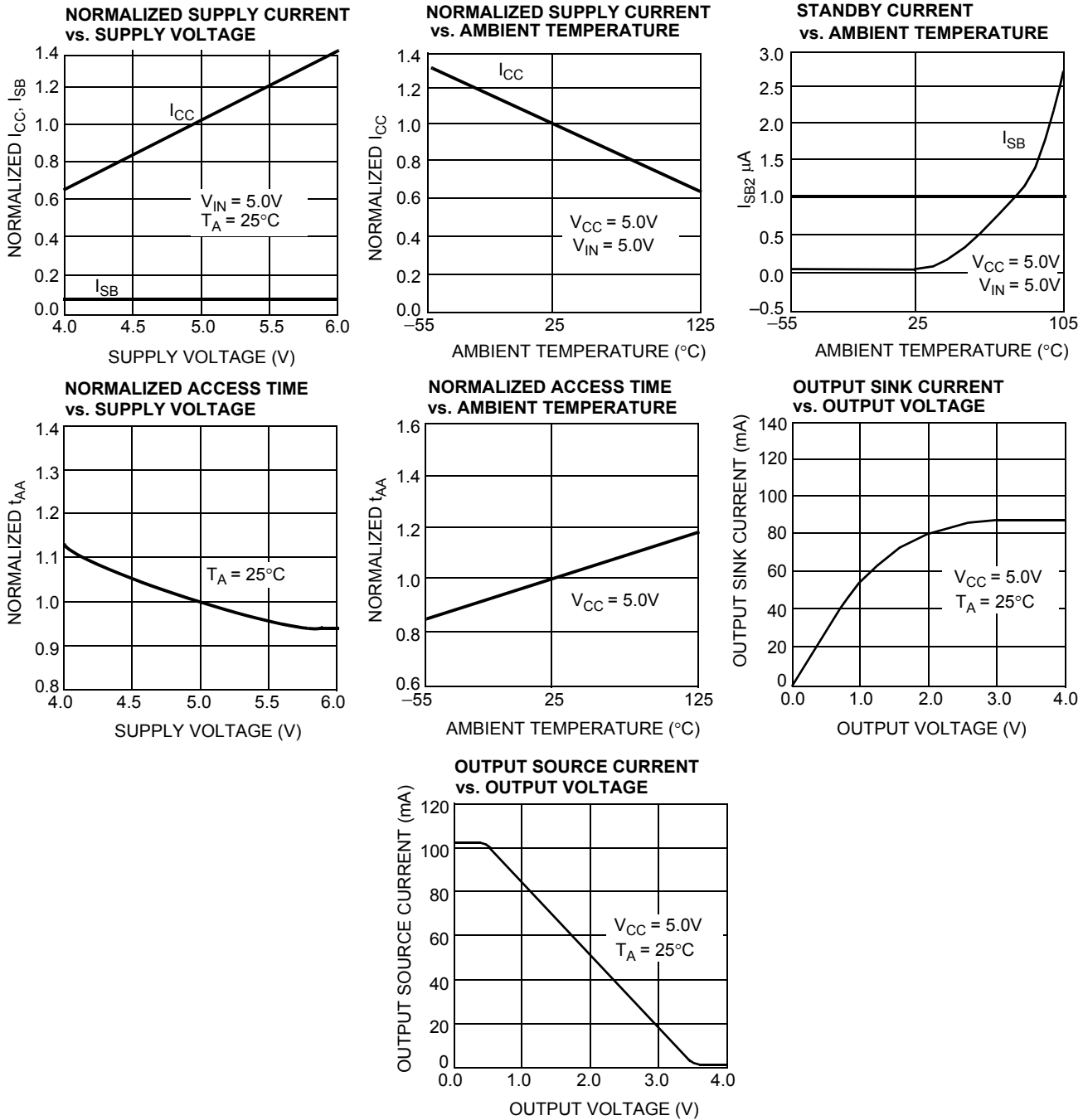
14. Address valid prior to or coincident with $\overline{CE}$ transition LOW.
15. Data I/O is high impedance if $\overline{OE} = V_{IH}$.
16. If $\overline{CE}$ goes HIGH simultaneously with $\overline{WE}$ HIGH, the output remains in a high-impedance state.
17. During this period, the I/Os are in output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

Switching Waveforms (continued)

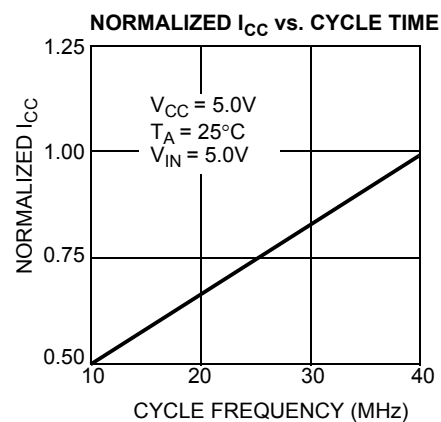
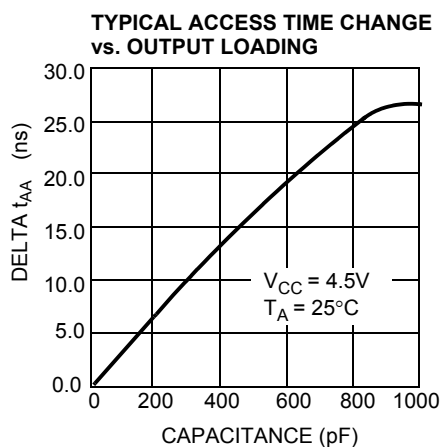
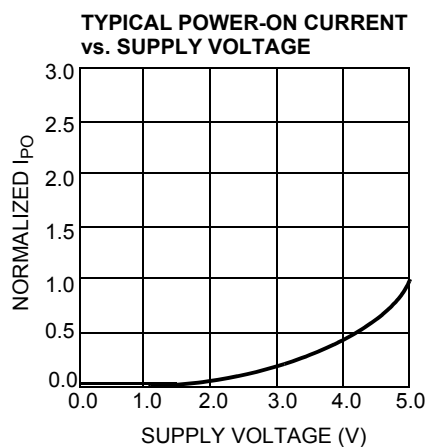
Figure 9. Write Cycle No. 3 ($\overline{WE}$ Controlled, $\overline{OE}$ LOW)^[11, 16]



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	Output Disabled	Active (I_{CC})

Ordering Information

Speed (ns)	Ordering Code	Package Diagram	Package Type	Operating Range
55	CY62256NLL-55SNI	51-85092	28-Pin (300-Mil) Narrow SOIC	Industrial
	CY62256NLL-55SNXI		28-Pin (300-Mil) Narrow SOIC (Pb-Free)	
	CY62256NLL-55ZI	51-85071	28-Pin TSOP I	
	CY62256NLL-55ZXI		28-Pin TSOP I (Pb-Free)	
	CY62256NLL-55ZXA	51-85071	28-Pin TSOP I (Pb-Free)	Automotive-A
	CY62256NLL-55SNXE	51-85092	28-Pin (300-Mil) Narrow SOIC (Pb-Free)	Automotive-E
	CY62256NLL-55ZXE	51-85071	28-Pin TSOP I (Pb-Free)	
	CY62256NLL-55ZRXE	51-85074	28-Pin Reverse TSOP I (Pb-Free)	
70	CY62256NL-70PC	51-85017	28-Pin (600-Mil) Molded DIP	Commercial
	CY62256NL-70PXC		28-Pin (600-Mil) Molded DIP (Pb-Free)	
	CY62256NLL-70PC		28-Pin (600-Mil) Molded DIP	
	CY62256NLL-70PXC		28-Pin (600-Mil) Molded DIP (Pb-Free)	
	CY62256NL-70SNC	51-85092	28-Pin (300-Mil) Narrow SOIC	
	CY62256NL-70SNXC		28-Pin (300-Mil) Narrow SOIC (Pb-Free)	
	CY62256NLL-70SNC		28-Pin (300-Mil) Narrow SOIC	
	CY62256NLL-70SNXC		28-Pin (300-Mil) Narrow SOIC (Pb-Free)	
	CY62256NLL-70ZC	51-85071	28-Pin TSOP I	
	CY62256NLL-70ZXC		28-Pin TSOP I (Pb-Free)	
	CY62256NL-70SNI	51-85092	28-Pin (300-Mil) Narrow SOIC	Industrial
	CY62256NL-70SNXI		28-Pin (300-Mil) Narrow SOIC (Pb-Free)	
	CY62256NLL-70SNI		28-Pin (300-Mil) Narrow SOIC	
	CY62256NLL-70SNXI		28-Pin (300-Mil) Narrow SOIC (Pb-Free)	
	CY62256NLL-70ZI	51-85071	28-Pin TSOP I	
	CY62256NLL-70ZXI		28-Pin TSOP I (Pb-Free)	
	CY62256NLL-70ZRI	51-85074	28-Pin Reverse TSOP I	
	CY62256NLL-70ZRXI		28-Pin Reverse TSOP I (Pb-Free)	
	CY62256NLL-70SNXA	51-85092	28-Pin (300-Mil) Narrow SOIC (Pb-Free)	Automotive-A

Do contact your local Cypress sales representative for availability of these parts

Package Diagrams

Figure 10. 28-Pin (600-Mil) Molded DIP (51-85017)

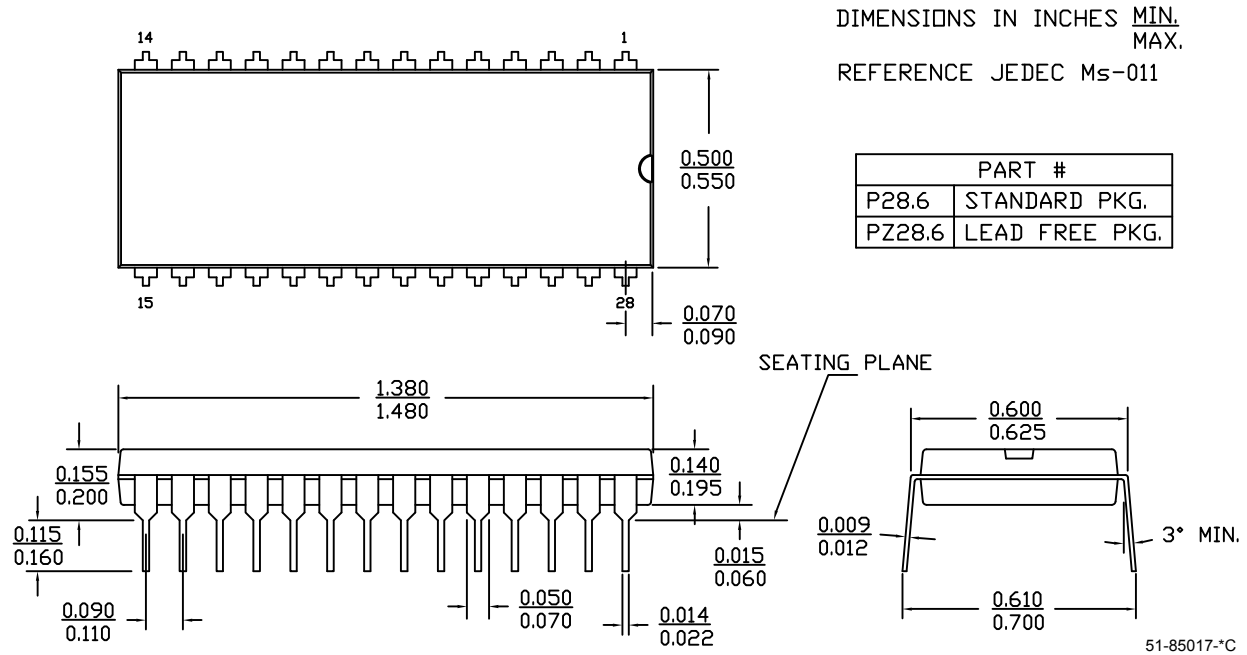


Figure 11. 28-Pin (300-mil) SNC (Narrow Body) (51-85092)

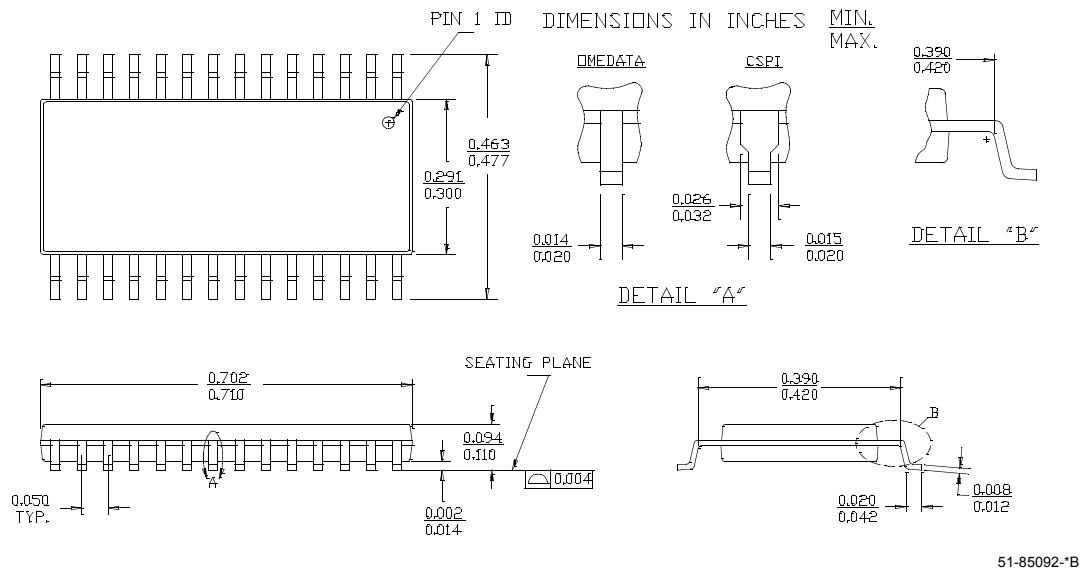


Figure 12. 28-Pin TSOP I (8 x 13.4 mm) (51-85071)

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

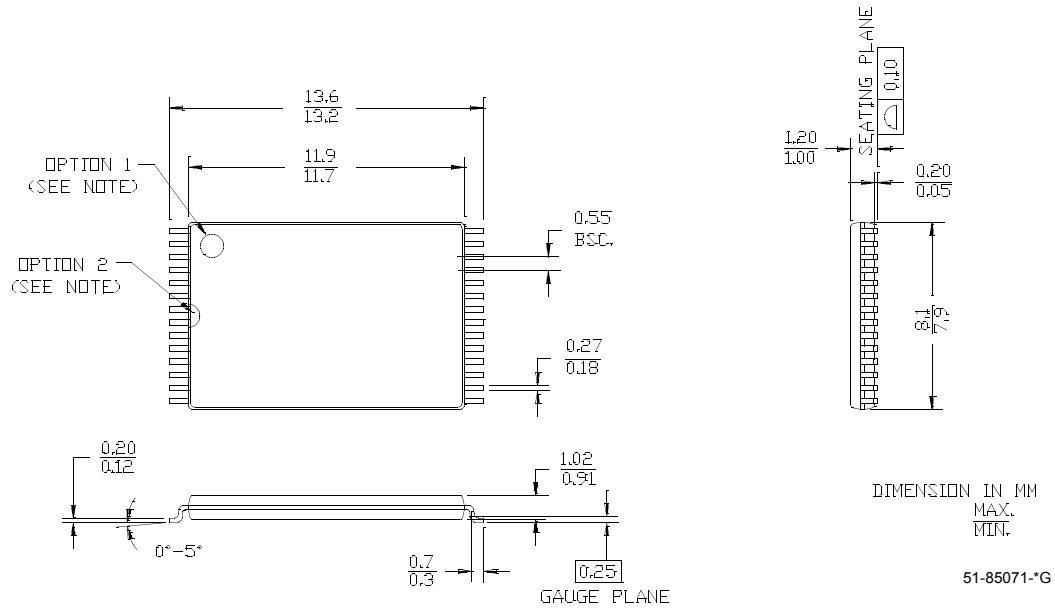
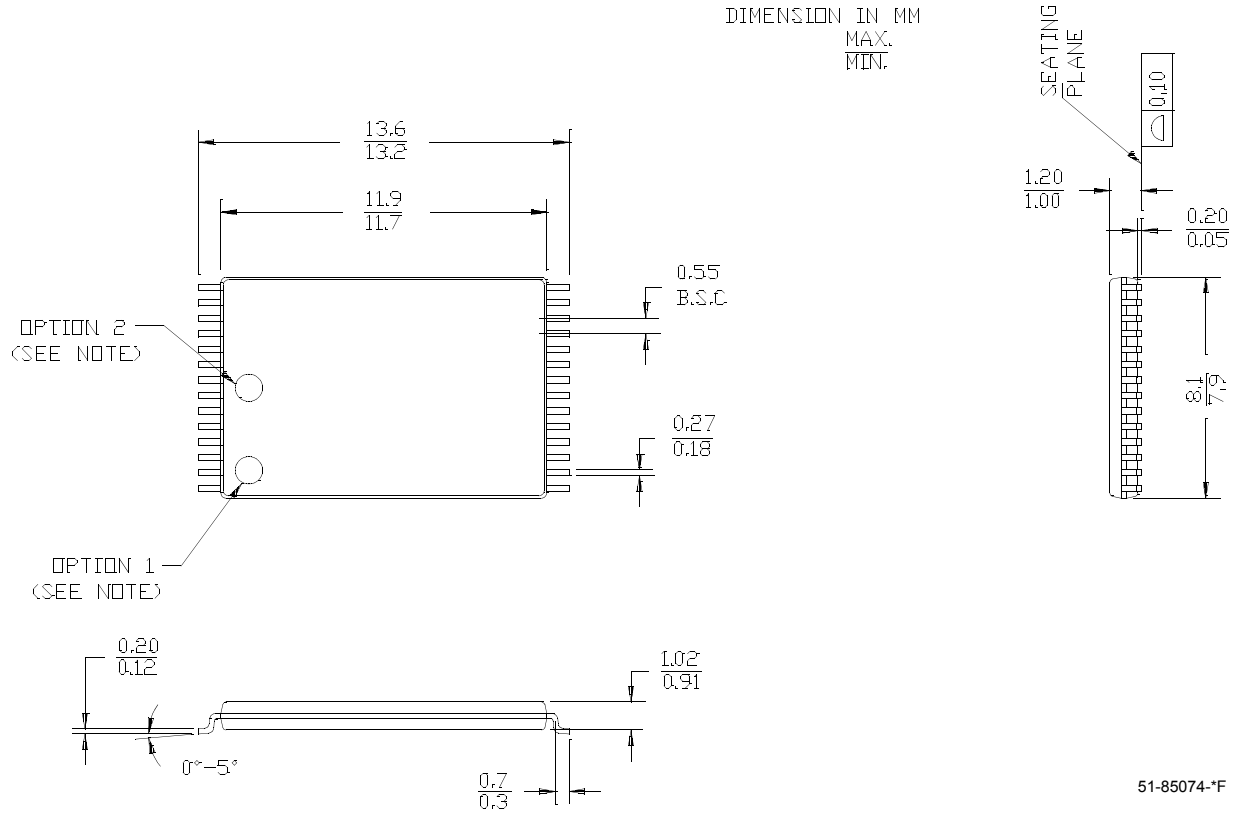


Figure 13. 28-Pin TSOP I (8 x 13.4 mm) (51-85074)

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



Document History Page

Document Title: CY62256N 256K (32K x 8) Static RAM Document Number: 001- 06511				
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	2715270	06/05/2009	VKN/AESA	Updated POD of 28-Pin (600-Mil) Molded DIP package (Spec# 51-85017)

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