CY6264

8K 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**
- **High Speed**
  - **— 55 ns**
- **CMOS for optimum speed/power**
- **Easy memory expansion with $\overline{CE}_1$, CE_2 and $\overline{OE}$ features**
- **TTL-compatible inputs and outputs**
- **Automatic power-down when deselected**
- **Available in Pb-free and non Pb-free 28-lead SNC package**

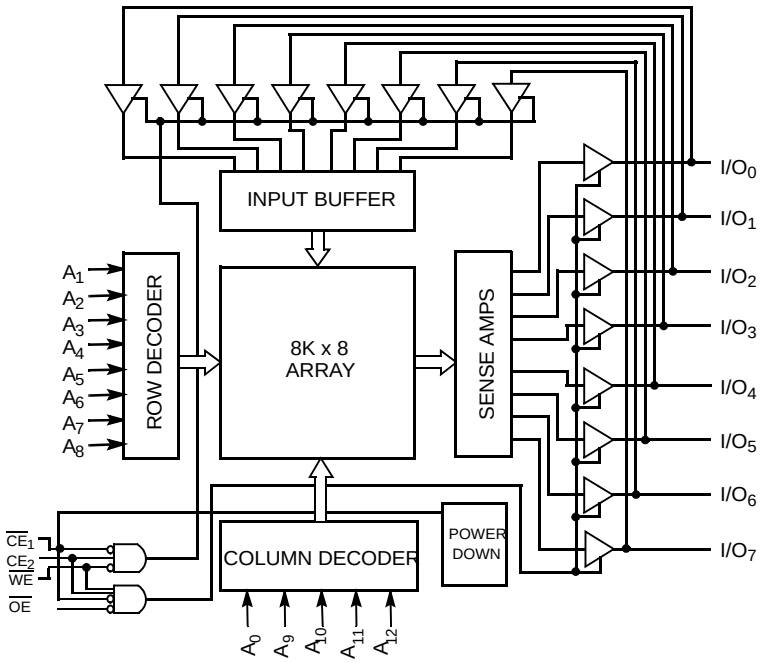
Functional Description

The CY6264 is a high-performance CMOS static RAM organized as 8192 words by 8 bits. Easy memory expansion is provided by an active LOW chip enable ($\overline{CE}_1$), an active HIGH chip enable (CE_2), and active LOW output enable ($\overline{OE}$) and three-state drivers. Both devices have an automatic power-down feature ($\overline{CE}_1$), reducing the power consumption by over 70% when deselected. The CY6264 is packaged in a 450-mil (300-mil body) SOIC.

An active LOW write enable signal ($\overline{WE}$) controls the writing/reading operation of the memory. When $\overline{CE}_1$ and $\overline{WE}$ inputs are both LOW and CE_2 is HIGH, 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_{12}). Reading the device is accomplished by selecting the device and enabling the outputs, $\overline{CE}_1$ and $\overline{OE}$ active LOW, CE_2 active HIGH, while $\overline{WE}$ remains inactive or HIGH. Under these conditions, the contents of the location addressed by the information on address pins is present on the eight data input/output pins.

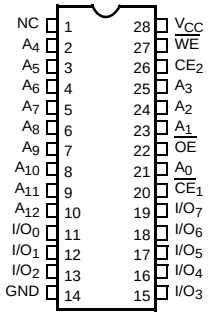
The input/output pins remain in a high-impedance state unless the chip is selected, outputs are enabled, and write enable ($\overline{WE}$) is HIGH. A die coat is used to ensure alpha immunity.

Logic Block Diagram



Pin Configuration

SOIC
Top View



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Selection Guide

	Range	-55	-70	Unit
Maximum Access Time		55	70	ns
Maximum Operating Current	Commercial	100	100	mA
	Industrial	260	200	mA
	Automotive-A		200	mA
Maximum CMOS Standby Current	Commercial	15	15	mA
	Industrial	30	30	mA
	Automotive-A		30	mA

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 ..... –0.5V to +7.0V

DC Voltage Applied to Outputs in High Z State[1] ..... –0.5V to +7.0V

DC Input Voltage[1] ..... –0.5V to +7.0V

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	
Automotive-A	–40°C to +85°C	

Electrical Characteristics Over the Operating Range

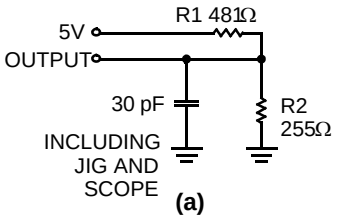
Parameter	Description	Test Conditions		-55 Min.	-55 Max.	-70 Min.	-70 Max.	Unit
V_{OH}	Output HIGH Voltage	V_{CC} = Min., I_{OH} = –4.0 mA		2.4		2.4		V
V_{OL}	Output LOW Voltage	V_{CC} = Min., I_{OL} = 8.0 mA			0.4		0.4	V
V_{IH}	Input HIGH Voltage			2.2	V_{CC}	2.2	V_{CC}	V
V_{IL}	Input LOW Voltage[1]			–0.5	0.8	–0.5	0.8	V
I_{IX}	Input Leakage Current	GND ≤ V_I ≤ V_{CC}		–5	+5	–5	+5	µA
I_{OZ}	Output Leakage Current	GND ≤ V_I ≤ V_{CC}, Output Disabled		–5	+5	–5	+5	µA
I_{CC}	V_{CC} Operating Supply Current	V_{CC} = Max., I_{OUT} = 0 mA	Com'l		100		100	mA
			Ind'l		260		200	
			Auto-A				200	
I_{SB1}	Automatic $\overline{CE}_1$ Power–Down Current	Max. V_{CC}, $\overline{CE}_1$ ≥ V_{IH}, Min. Duty Cycle = 100%	Com'l		20		20	mA
			Ind'l		50		40	
			Auto-A				40	
I_{SB2}	Automatic $\overline{CE}_1$ Power–Down Current	Max. V_{CC}, $\overline{CE}_1$ ≥ V_{CC} – 0.3V, V_{IN} ≥ V_{CC} – 0.3V or V_{IN} ≤ 0.3V	Com'l		15		15	mA
			Ind'l		30		30	
			Auto-A				30	

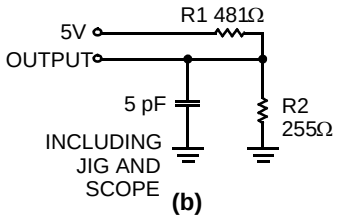
Capacitance[2]

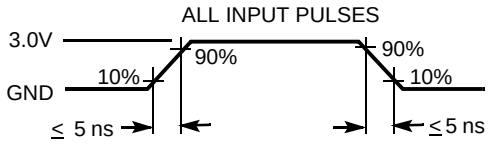
Parameter	Description	Test Conditions	Max.	Unit
C_{IN}	Input Capacitance	T_A = 25°C, f = 1 MHz, V_{CC} = 5.0V	7	pF
C_{OUT}	Output Capacitance		7	pF

Notes:
1. Minimum voltage is equal to –3.0V for pulse durations less than 30 ns.
2. Tested initially and after any design or process changes that may affect these parameters.

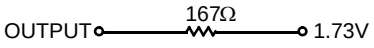
AC Test Loads and Waveforms







Equivalent to: THEVENIN EQUIVALENT



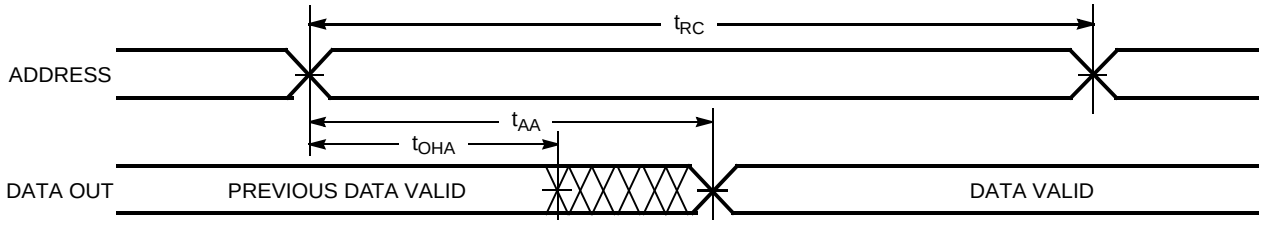
Switching Characteristics Over the Operating Range[3]

Parameter	Description	-55		-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_{ACE1}	$\overline{CE}_1$ LOW to Data Valid		55		70	ns
t_{ACE2}	CE_2 HIGH to Data Valid		40		70	ns
t_{DOE}	$\overline{OE}$ LOW to Data Valid		25		35	ns
t_{LZOE}	$\overline{OE}$ LOW to Low Z	3		5		ns
t_{HZOE}	$\overline{OE}$ HIGH to High Z[4]		20		30	ns
t_{LZCE1}	$\overline{CE}_1$ LOW to Low Z[5]	5		5		ns
t_{LZCE2}	CE_2 HIGH to Low Z	3		5		ns
t_{HZCE}	$\overline{CE}_1$ HIGH to High Z[4, 6] CE_2 LOW to High Z		20		30	ns
t_{PU}	$\overline{CE}_1$ LOW to Power-Up	0		0		ns
t_{PD}	$\overline{CE}_1$ HIGH to Power-Down		25		30	ns
WRITE CYCLE[6]						
t_{WC}	Write Cycle Time	50		70		ns
t_{SCE1}	$\overline{CE}_1$ LOW to Write End	40		60		ns
t_{SCE2}	CE_2 HIGH to Write End	30		50		ns
t_{AW}	Address Set-Up to Write End	40		55		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	25		40		ns
t_{SD}	Data Set-Up to Write End	25		35		ns
t_{HD}	Data Hold from Write End	0		0		ns
t_{HZWE}	$\overline{WE}$ LOW to High Z[4]		20		30	ns
t_{LZWE}	$\overline{WE}$ HIGH to Low Z	5		5		ns

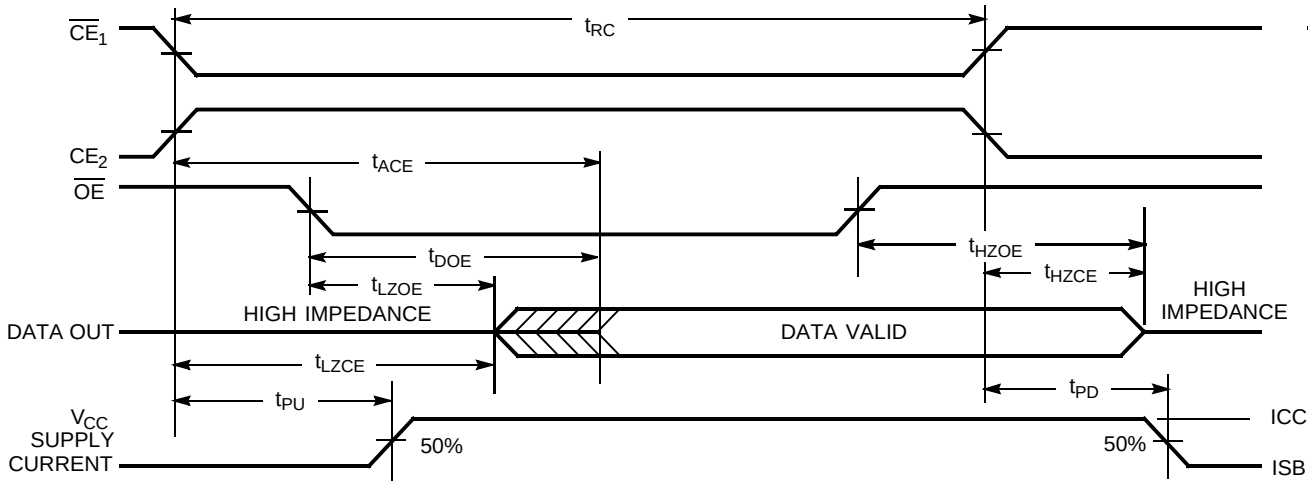
Notes:
3. Test conditions assume signal transition time of 5 ns or less, timing reference levels of 1.5V, input pulse levels of 0 to 3.0V, and output loading of the specified I_{OL}/I_{OH} and 30-pF load capacitance.
4. t_{HZOE}, t_{HZCE}, and t_{HZWE} are specified with C_L = 5 pF as in part (b) of AC Test Loads. Transition is measured ±500 mV from steady-state voltage.
5. At any given temperature and voltage condition, t_{HZCE} is less than t_{LZCE} for any given device.
6. The internal write time of the memory is defined by the overlap of $\overline{CE}_1$ LOW, CE_2 HIGH, 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.

Switching Waveforms

Read Cycle No. 1[7, 8]



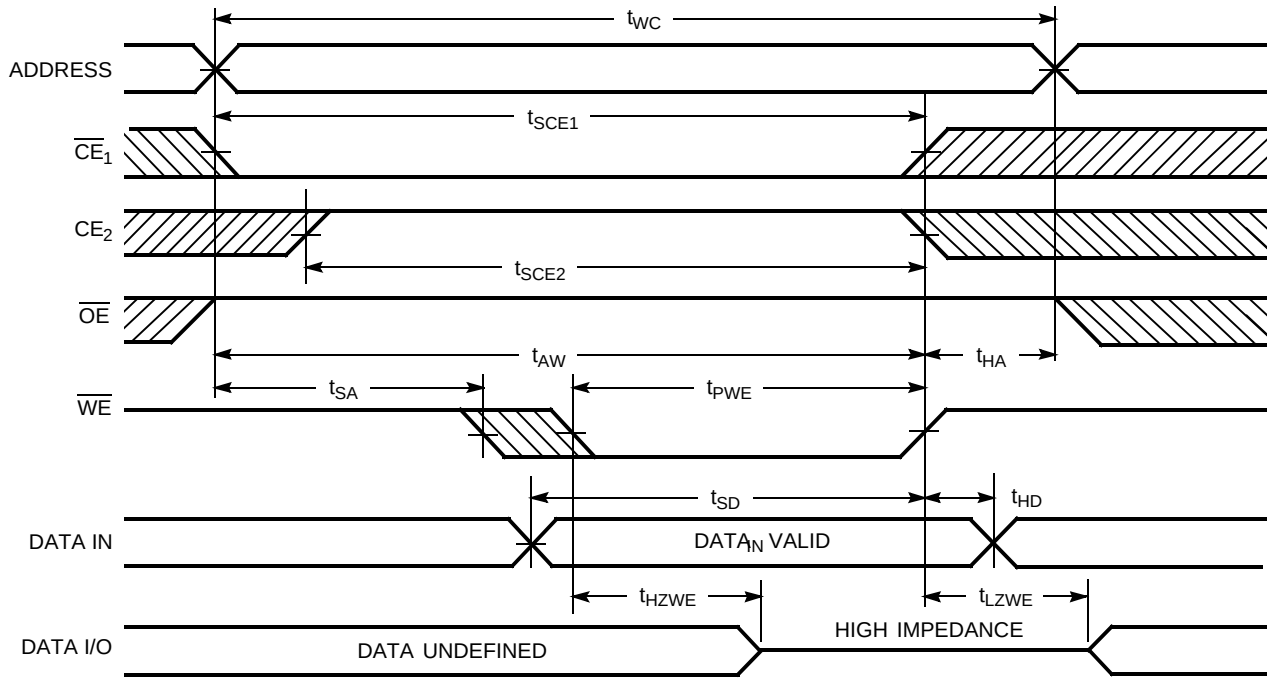
Read Cycle No. 2[9, 10]



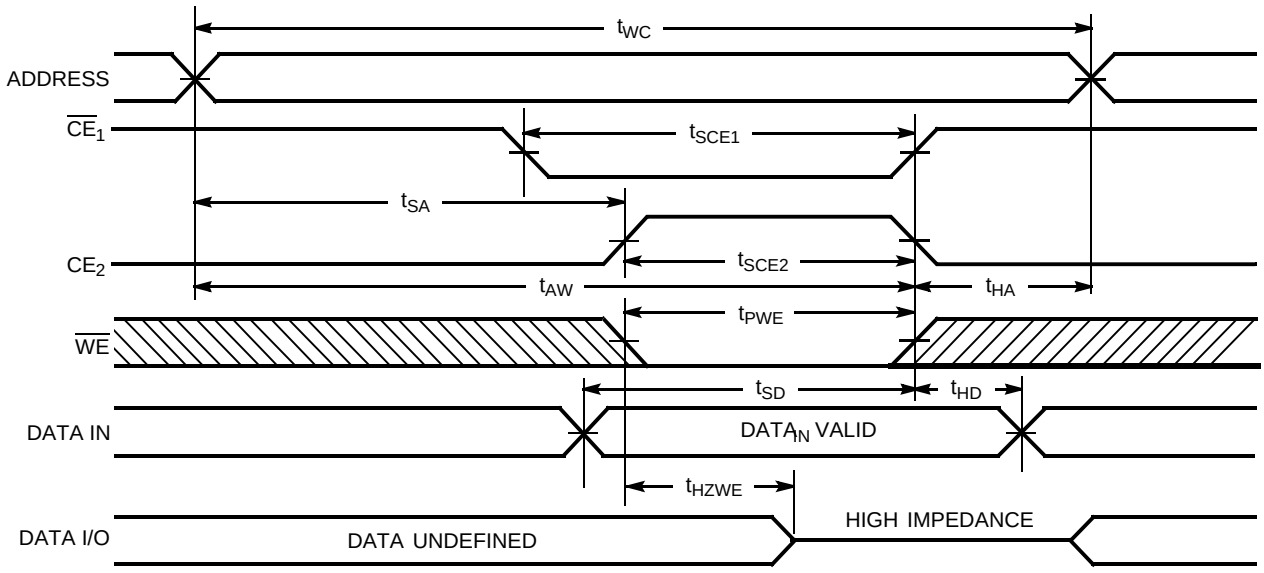
Notes:
7. Device is continuously selected. $\overline{OE}$, $\overline{CE}_1 = V_{IL}$. $CE_2 = V_{IH}$.
8. Address valid prior to or coincident with $\overline{CE}$ transition LOW.
9. $\overline{WE}$ is HIGH for read cycle.
10. Data I/O is High Z if $\overline{OE} = V_{IH}$, $\overline{CE}_1 = V_{IH}$, or $\overline{WE} = V_{IL}$.

Switching Waveforms (continued)

Write Cycle No. 1 ($\overline{WE}$ Controlled)[8, 10]



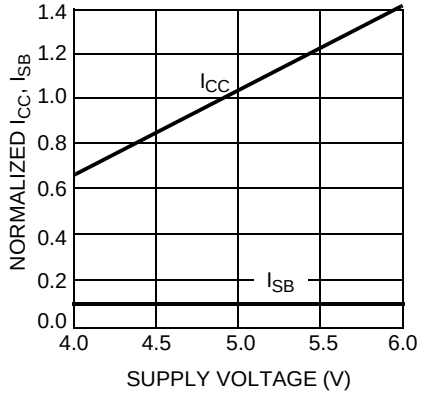
Write Cycle No. 2 ($\overline{CE}$ Controlled)[8, 10, 11]



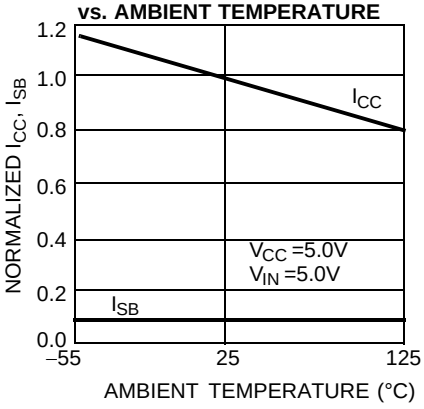
Note:
11. If $\overline{CE}$ goes HIGH simultaneously with $\overline{WE}$ HIGH, the output remains in a high-impedance state.

Typical DC and AC Characteristics

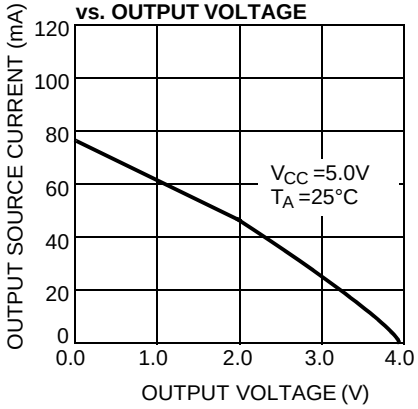
NORMALIZED SUPPLY CURRENT vs. SUPPLY VOLTAGE



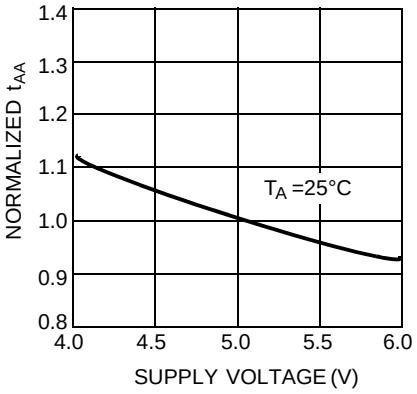
NORMALIZED SUPPLY CURRENT vs. AMBIENT TEMPERATURE



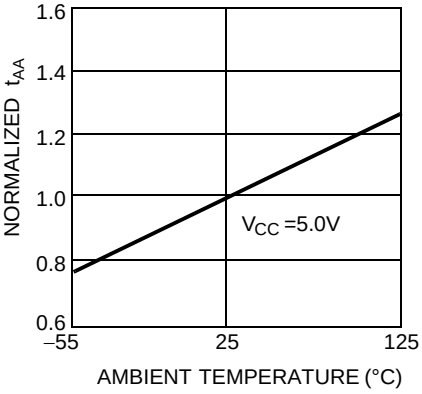
OUTPUT SOURCE CURRENT vs. OUTPUT VOLTAGE



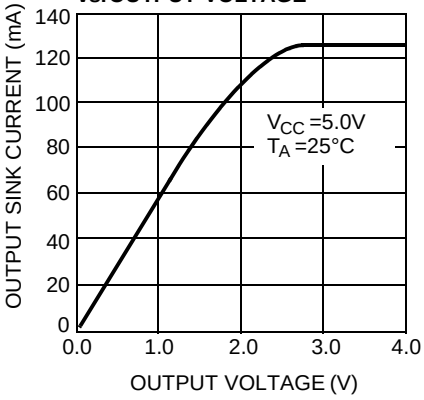
NORMALIZED ACCESS TIME vs. SUPPLY VOLTAGE



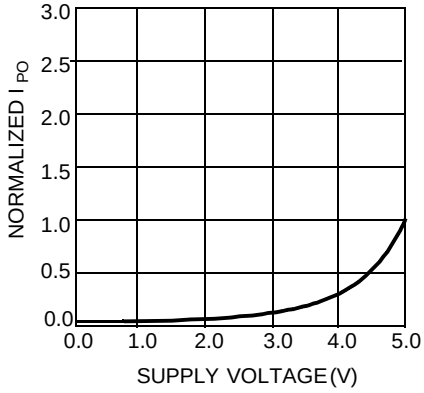
NORMALIZED ACCESS TIME vs. AMBIENT TEMPERATURE



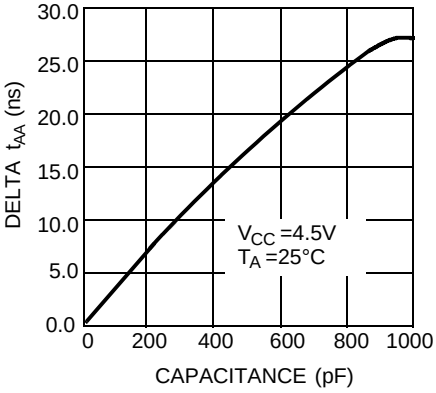
OUTPUT SINK CURRENT vs. OUTPUT VOLTAGE



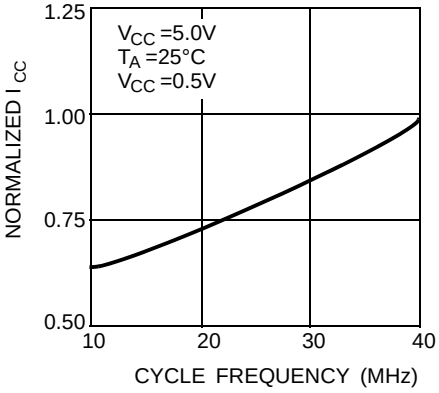
TYPICAL POWER-ON CURRENT vs. SUPPLY VOLTAGE



TYPICAL ACCESS TIME CHANGE vs. OUTPUT LOADING



NORMALIZED I_{CC} vs. CYCLE TIME



Truth Table

$\overline{CE_1}$	CE_2	$\overline{WE}$	$\overline{OE}$	Input/Output	Mode
H	X	X	X	High Z	Deselect/Power-Down
X	L	X	X	High Z	Deselect
L	H	H	L	Data Out	Read
L	H	L	X	Data In	Write
L	H	H	H	High Z	Deselect

Address Designators

Address Name	Address Function	Pin Number
A4	X3	2
A5	X4	3
A6	X5	4
A7	X6	5
A8	X7	6
A9	Y1	7
A10	Y4	8
A11	Y3	9
A12	Y0	10
A0	Y2	21
A1	X0	23
A2	X1	24
A3	X2	25

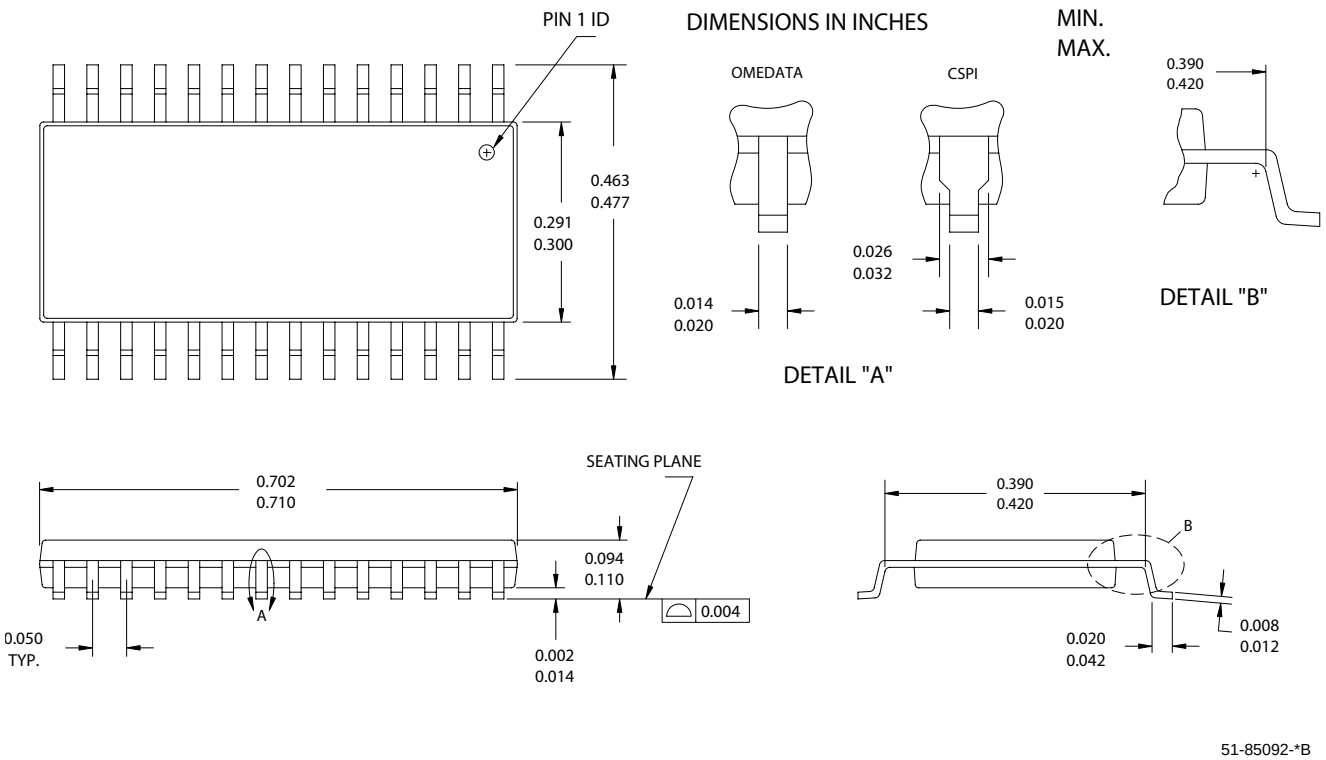
Ordering Information

Speed (ns)	Ordering Code	Package Diagram	Package Type	Operating Range
55	CY6264-55SNXC	51-85092	28-lead (300-mil Narrow Body) SNC (Pb-Free)	Commercial
	CY6264-55SNXI		28-lead (300-mil Narrow Body) SNC (Pb-Free)	Industrial
70	CY6264-70SNC		28-lead (300-mil Narrow Body) SNC	Commercial
	CY6264-70SNXC		28-lead (300-mil Narrow Body) SNC (Pb-Free)	
	CY6264-70SNI		28-lead (300-mil Narrow Body) SNC	Industrial
	CY6264-70SNXI		28-lead (300-mil Narrow Body) SNC (Pb-Free)	
	CY6264-70SNXA		28-lead (300-mil Narrow Body) SNC (Pb-Free)	Automotive-A

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

Package Diagram

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



Document History Page

Document Title: CY6264 8K x 8 Static RAM Document Number: 001-02367				
REV.	**ECN NO.**	**Issue Date**	**Orig. of Change**	**Description of Change**
**	384870	See ECN	PCI	Spec # change from 38-00425 to 001-02367
*A	488954	See ECN	VKN	Added Automotive product Added 55 ns Industrial spec Removed SOIC package from the product offering Changed the description of I_{IX} from Input Load Current to Input Leakage Current in DC Electrical Characteristics table Removed I_{OS} parameter from DC Electrical Characteristics table Updated ordering Information table