CY7C197N

256 K × 1 Static RAM

Features

- High speed
  - 25 ns
- CMOS for optimum speed/power
- Low active power
  - 880 mW
- Low standby power
  - 220 mW
- Transistor-transistor logic (TTL)-compatible inputs and outputs
- Automatic power-down when deselected

Functional Description

The CY7C197N is a high-performance CMOS static RAM organized as 256 K words by 1 bit. Easy memory expansion is provided by an active LOW Chip Enable ($\overline{CE}$) and three-state drivers. The CY7C197N has an automatic power-down feature, reducing the power consumption by 75% when deselected.

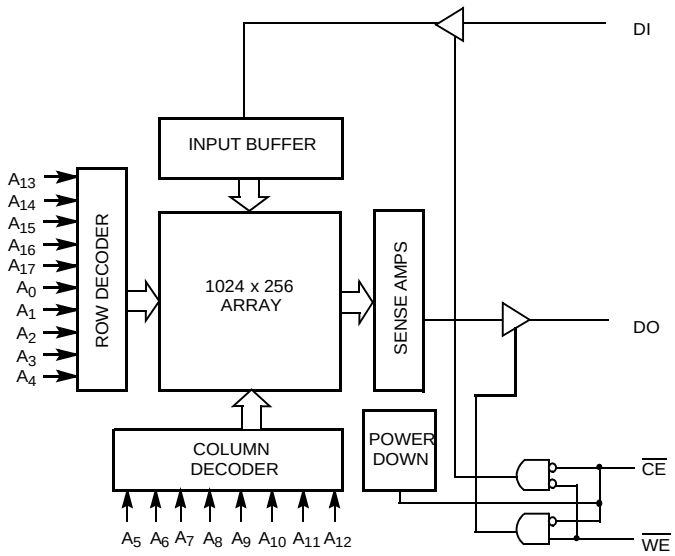
Writing to the device is accomplished when the Chip Enable ($\overline{CE}$) and Write Enable ($\overline{WE}$) inputs are both LOW. Data on the input pin (D_{IN}) is written into the memory location specified on the address pins (A_0 through A_{17}).

Reading the device is accomplished by taking chip enable ($\overline{CE}$) LOW while Write Enable ($\overline{WE}$) remains HIGH. Under these conditions the contents of the memory location specified on the address pins will appear on the data output (D_{OUT}) pin.

The output pin stays in a high-impedance state when Chip Enable ($\overline{CE}$) is HIGH or Write Enable ($\overline{WE}$) is LOW.

The CY7C197N uses a die coat to insure alpha immunity.

Logic Block Diagram



Downloaded from Arrow.com.

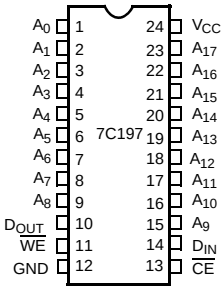
Contents

Pin Configurations **3**
Selection Guide **3**
Maximum Ratings **4**
Operating Range **4**
Electrical Characteristics **4**
Capacitance **4**
Switching Characteristics **5**
Switching Waveforms **6**
Typical DC and AC Characteristics **8**
CY7C197N Truth Table **9**
Ordering Information **9**
Ordering Code Definitions 9
Package Diagram **10**
Acronyms **11**
Document Conventions **11**
Units of Measure 11
Document History Page **12**
Sales, Solutions, and Legal Information **13**
Worldwide Sales and Design Support 13
Products 13
PSoC Solutions 13

Downloaded from Arrow.com.

Pin Configurations

Figure 1. 24-pin DIP (Top View)



Selection Guide

Description	-25
Maximum access time (ns)	25
Maximum operating current (mA)	95
Maximum standby current (mA)	30

Downloaded from Arrow.com.

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 24 to Pin 12).....–0.5 V to +7.0 V

DC voltage applied to outputs in High Z state[1] .....–0.5 V to V_{CC} + 0.5 V

DC input voltage[1].....–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

Range	Ambient Temperature	V_{CC}
Commercial	0 °C to +70 °C	5 V ± 10%

Electrical Characteristics

Over the Operating Range

Parameter	Description	Test Conditions	-25		Unit
			Min	Max	
V_{OH}	Output HIGH voltage	V_{CC} = Min, I_{OH} = –4.0 mA	2.4	–	V
V_{OL}	Output LOW voltage	V_{CC} = Min, I_{OL}=12.0 mA	–	0.4	V
V_{IH}	Input HIGH voltage		2.2	V_{CC} + 0.3 V	V
V_{IL}	Input LOW voltage[1]		–0.5	0.8	V
I_{IX}	Input load current	GND ≤ V_I ≤ V_{CC}	–5	+5	µA
I_{OZ}	Output leakage current	GND ≤ V_O ≤ V_{CC}, Output Disabled	–5	+5	µA
I_{OS}	Output short circuit current[2]	V_{CC} = Max, V_{OUT} = GND	–	–300	mA
I_{CC}	V_{CC} operating supply current	V_{CC} = Max, I_{OUT} = 0 mA, f = f_{MAX} = $1/t_{RC}$	–	95	mA
I_{SB1}	Automatic $\overline{CE}$ power-down current—TTL inputs[3]	Max V_{CC}, $\overline{CE}$ ≥ V_{IH}, V_{IN} ≥ V_{IH} or V_{IN} ≤ V_{IL}, f = f_{MAX}	–	30	mA
I_{SB2}	Automatic $\overline{CE}$ power-down current—CMOS inputs[3]	Max V_{CC}, $\overline{CE}$ ≥ V_{CC} – 0.3 V, V_{IN} ≥ V_{CC} – 0.3 V or V_{IN} < 0.3 V	–	15	mA

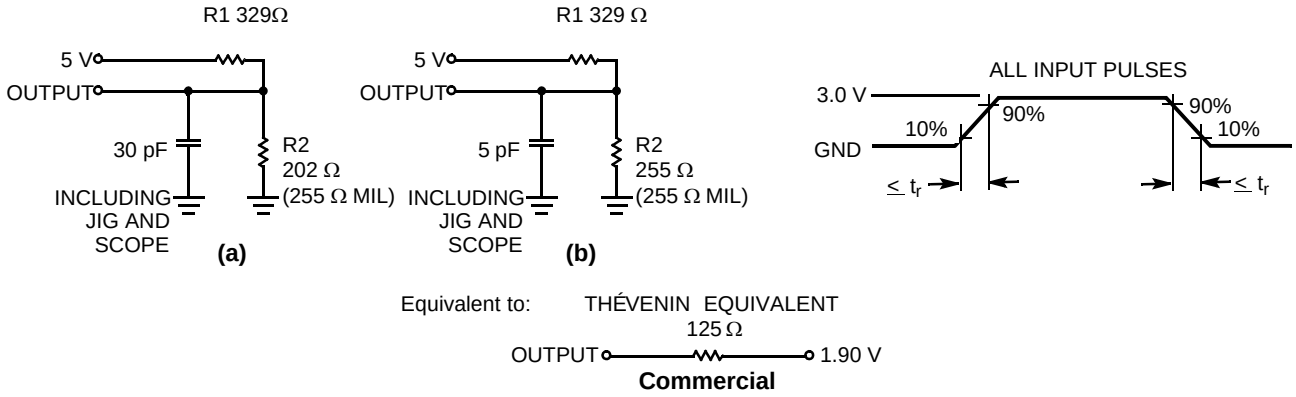
Capacitance[4]

Parameter	Description	Test Conditions	Max	Unit
C_{IN}	Input capacitance	T_A = 25 °C, f = 1 MHz, V_{CC} = 5.0 V	8	pF
C_{OUT}	Output capacitance		10	pF

Notes
1. $V_{(min.)}$ = -2.0 V for pulse durations of less than 20 ns.
2. Not more than one output should be shorted at one time. Duration of the short circuit should not exceed 30 seconds.
3. A pull-up resistor to V_{CC} on the $\overline{CE}$ input is required to keep the device deselected during V_{CC} power-up, otherwise I_{SB} will exceed values given.
4. Tested initially and after any design or process changes that may affect these parameters.

Downloaded from Arrow.com.

Figure 2. AC Test Loads and Waveforms[5]



Switching Characteristics

Over the Operating Range[6]

Parameter	Description	-25		Unit
		Min	Max	
READ CYCLE				
t_{RC}	Read cycle time	25	–	ns
t_{AA}	Address to data valid	–	25	ns
t_{OHA}	Output hold from address change	3	–	ns
t_{ACE}	$\overline{CE}$ LOW to data valid	–	25	ns
t_{LZCE}	$\overline{CE}$ LOW to low Z[7]	3	–	ns
t_{HZCE}	$\overline{CE}$ HIGH to high Z[7, 8]	0	11	ns
t_{PU}	$\overline{CE}$ LOW to power-up	0	–	ns
t_{PD}	$\overline{CE}$ HIGH to power-down	–	20	ns
WRITE CYCLE[9]				
t_{WC}	Write cycle time	25	–	ns
t_{SCE}	$\overline{CE}$ LOW to write end	20	–	ns
t_{AW}	Address setup to write end	20	–	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	20	–	ns
t_{SD}	Data setup to write end	15	–	ns
t_{HD}	Data hold from write end	0	–	ns
t_{LZWE}	$\overline{WE}$ HIGH to low Z[7]	3	–	ns
t_{HZWE}	$\overline{WE}$ LOW to high Z[7, 8]	0	11	ns

Notes

5. t_r = ≤ 5 ns for the -25 and slower speeds.
6. Test conditions assume signal transition time of 5 ns or less for -25 and slower speeds, timing reference levels of 1.5 V, input pulse levels of 0 to 3.0 V, and output loading of the specified I_{OL}/I_{OH} and 30-pF load capacitance.
7. At any given temperature and voltage condition, t_{HZCE} is less than t_{LZCE} and t_{HZWE} is less than t_{LZWE} for any given device.
8. t_{HZCE} and t_{HZWE} are specified with C_L = 5 pF as in part (b) in AC Test Loads and Waveforms. Transition is measured ±500 mV from steady-state voltage.
9. 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.

Downloaded from Arrow.com.

Switching Waveforms

Figure 3. Read Cycle No. 1[10, 11]

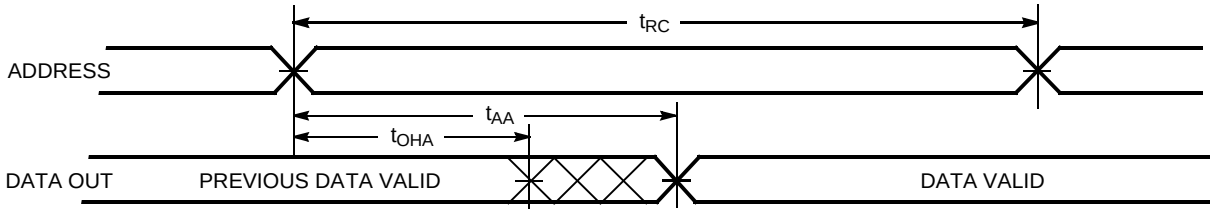


Figure 4. Read Cycle No. 2[10]

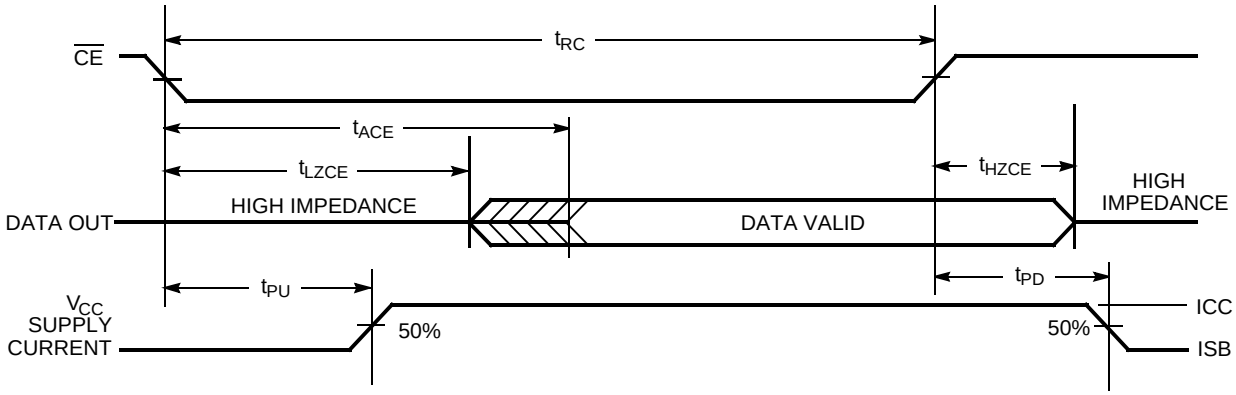
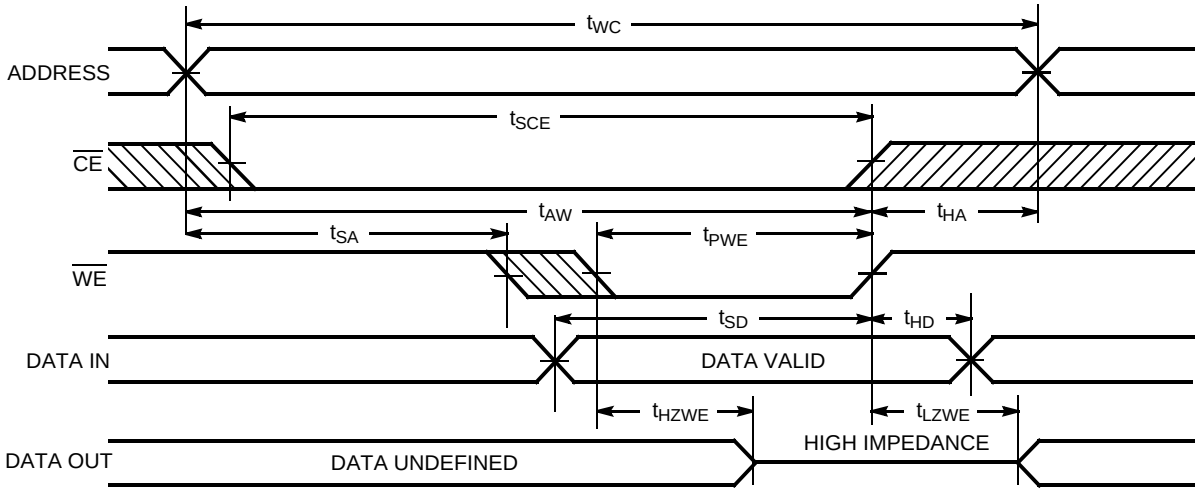


Figure 5. Write Cycle No. 1 (WE Controlled)[12]

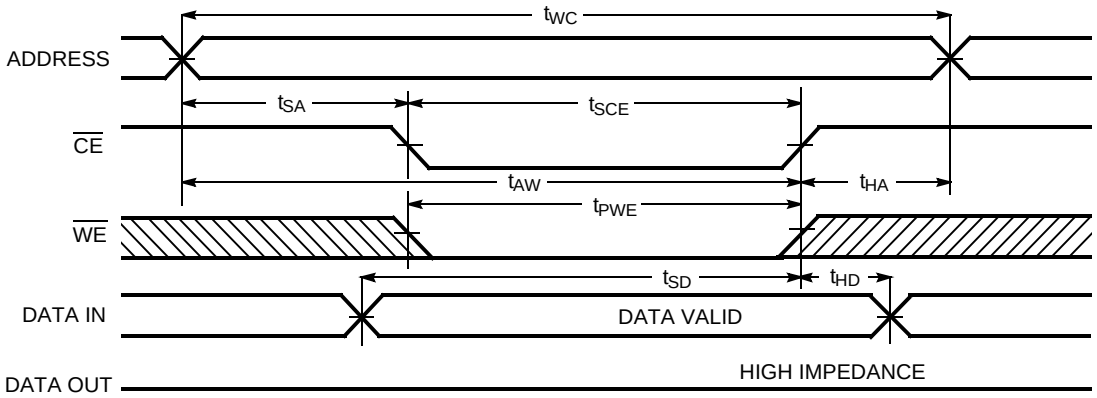


Notes
10. WE is HIGH for read cycle.
11. Device is continuously selected, CE = V_{IL}.
12. If CE goes HIGH simultaneously with WE HIGH, the output remains in a high-impedance state.

Downloaded from Arrow.com.

Switching Waveforms (continued)

Figure 6. Write Cycle No. 2 ($\overline{CE}$ Controlled)[13, 14]



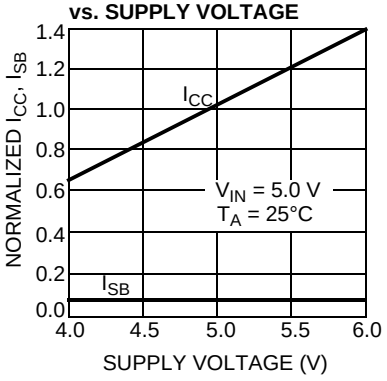
Notes

13. 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.
14. If $\overline{CE}$ goes HIGH simultaneously with $\overline{WE}$ HIGH, the output remains in a high-impedance state.

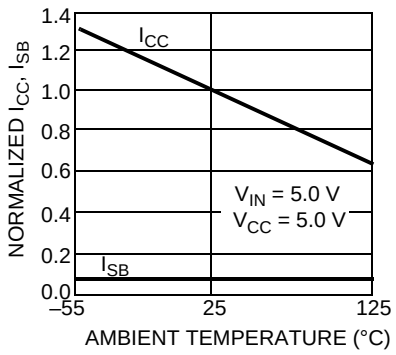
Downloaded from Arrow.com.

Typical DC and AC Characteristics

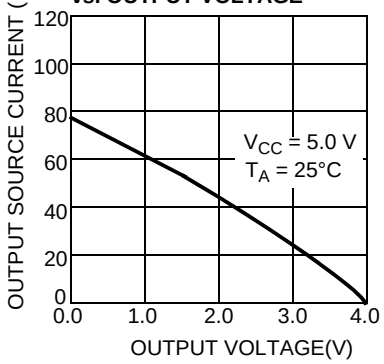
NORMALIZED SUPPLY CURRENT vs. SUPPLY VOLTAGE



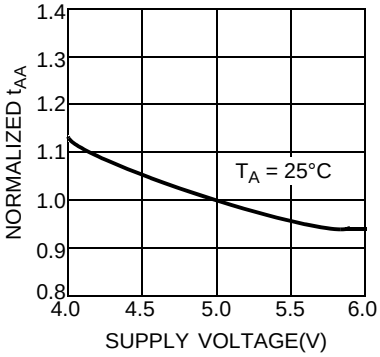
NORMALIZED SUPPLY CURRENT vs. AMBIENT TEMPERATURE



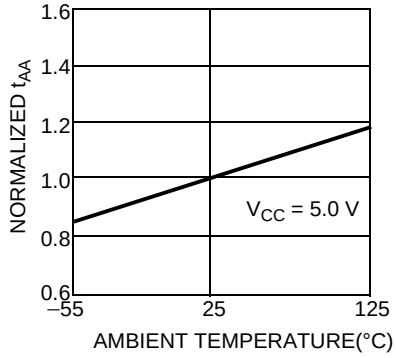
OUTPUT SOURCE CURRENT vs. OUTPUT VOLTAGE



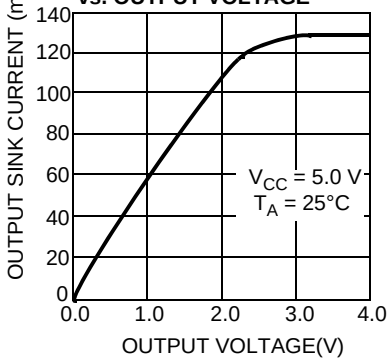
NORMALIZED ACCESS TIME vs. SUPPLY VOLTAGE



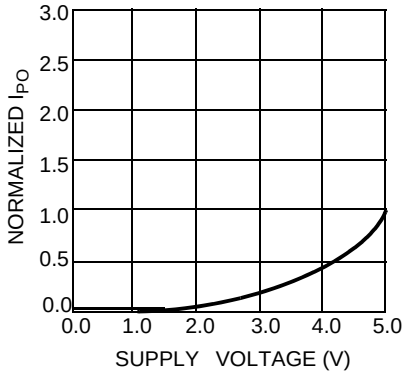
NORMALIZED ACCESS TIME vs. AMBIENT TEMPERATURE



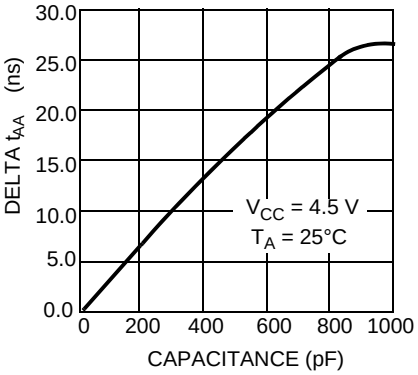
OUTPUT SINK CURRENT vs. OUTPUT VOLTAGE



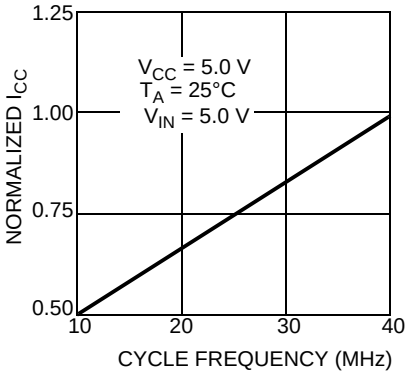
TYPICAL POWER-ON CURRENT vs. SUPPLY VOLTAGE



TYPICAL ACCESS TIME CHANGE vs. OUTPUT LOADING



NORMALIZED I_{CC} vs. CYCLE TIME



Downloaded from Arrow.com.

CY7C197N Truth Table

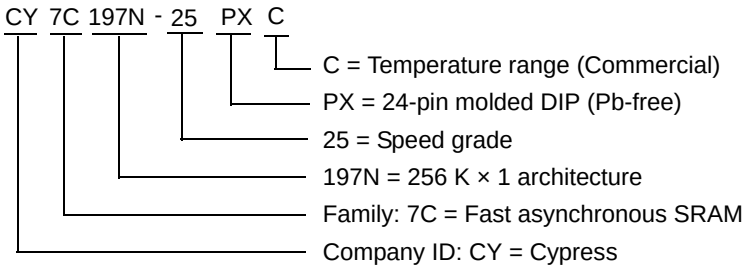
$\overline{CE}$	$\overline{WE}$	Input/Output	Mode
H	X	High Z	Deselect/Power-Down
L	H	Data Out	Read
L	L	Data In	Write

Ordering Information

Speed (ns)	Ordering Code	Package Diagram	Package Type	Operating Range
25	CY7C197N-25PXC	51-85013	24-pin (300-Mil) Molded DIP (Pb-free)	Commercial

Contact your local sales representative regarding availability of these parts.

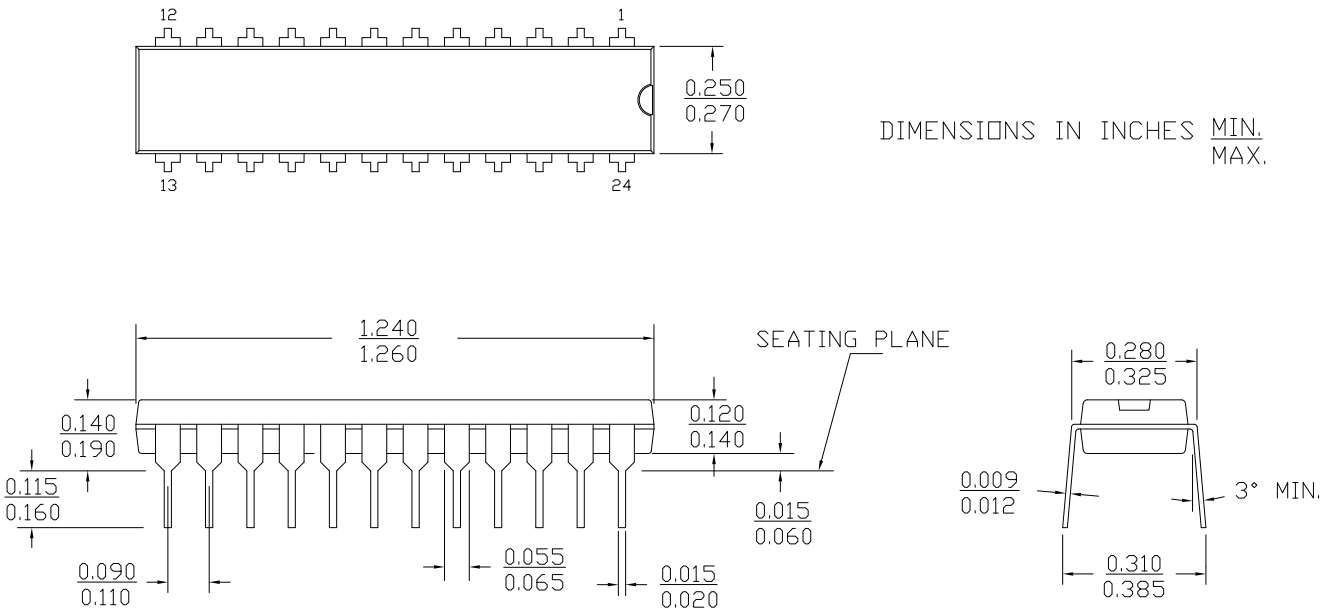
Ordering Code Definitions



Downloaded from Arrow.com.

Package Diagram

Figure 7. 24-pin (300-Mil) PDIP (51-85013)



51-85013 *C

Downloaded from Arrow.com.

Acronyms

Acronym	Description
$\overline{CE}$	chip enable
CMOS	complementary metal oxide semiconductor
DIP	dual inline package
I/O	input/output
PDIP	plastic dual inline package
SRAM	static random access memory
TTL	transistor-transistor logic
$\overline{WE}$	write enable

Document Conventions

Units of Measure

Symbol	Unit of Measure
%	percent
°C	degree Celsius
mA	milliamperes
MHz	megahertz
mV	millivolts
mW	milliwatts
ns	nanoseconds
pF	picofarads
V	volts
Ω	ohms
W	watts
µA	microamperes

Downloaded from Arrow.com.

Document History Page

Document Title: CY7C197N, 256 K × 1 Static RAM Document Number: 001-06495				
REV.	**ECN NO.**	**Submission Date**	**Orig. of Change**	**Description of Change**
**	424111	See ECN	NXR	New Data Sheet
*A	2958594	06/22/10	AJU	The EOL Prune part number CY7C197N-45PXC removed & Updated package diagram.
*B	3095450	11/25/2010	AJU	Updated template. Added Acronyms, Document Conventions, and Ordering Code Definitions Removed –45 information. Changed posting to external web.
*C	3246053	05/02/2011	PRAS	Updated in new template.
*D	3270287	07/01/2011	AJU	Fixed units in Electrical Characteristics table.

Downloaded from Arrow.com.

Sales, Solutions, and Legal Information

Worldwide Sales and Design Support

Cypress maintains a worldwide network of offices, solution centers, manufacturer's representatives, and distributors. To find the office closest to you, visit us at Cypress Locations.

Products

Automotive	cypress.com/go/automotive
Clocks & Buffers	cypress.com/go/clocks
Interface	cypress.com/go/interface
Lighting & Power Control	cypress.com/go/powerpsoc cypress.com/go/plc
Memory	cypress.com/go/memory
Optical & Image Sensing	cypress.com/go/image
PSoC	cypress.com/go/psoc
Touch Sensing	cypress.com/go/touch
USB Controllers	cypress.com/go/USB
Wireless/RF	cypress.com/go/wireless

PSoC Solutions

psoc.cypress.com/solutions

PSoC 1 | PSoC 3 | PSoC 5

© Cypress Semiconductor Corporation, 2006-2011. The information contained herein is subject to change without notice. Cypress Semiconductor Corporation assumes no responsibility for the use of any circuitry other than circuitry embodied in a Cypress product. Nor does it convey or imply any license under patent or other rights. Cypress products are not warranted nor intended to be used for medical, life support, life saving, critical control or safety applications, unless pursuant to an express written agreement with Cypress. Furthermore, Cypress does not authorize its products for use as critical components in life-support systems where a malfunction or failure may reasonably be expected to result in significant injury to the user. The inclusion of Cypress products in life-support systems application implies that the manufacturer assumes all risk of such use and in doing so indemnifies Cypress against all charges.

Any Source Code (software and/or firmware) is owned by Cypress Semiconductor Corporation (Cypress) and is protected by and subject to worldwide patent protection (United States and foreign), United States copyright laws and international treaty provisions. Cypress hereby grants to licensee a personal, non-exclusive, non-transferable license to copy, use, modify, create derivative works of, and compile the Cypress Source Code and derivative works for the sole purpose of creating custom software and or firmware in support of licensee product to be used only in conjunction with a Cypress integrated circuit as specified in the applicable agreement. Any reproduction, modification, translation, compilation, or representation of this Source Code except as specified above is prohibited without the express written permission of Cypress.

Disclaimer: CYPRESS MAKES NO WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, WITH REGARD TO THIS MATERIAL, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. Cypress reserves the right to make changes without further notice to the materials described herein. Cypress does not assume any liability arising out of the application or use of any product or circuit described herein. Cypress does not authorize its products for use as critical components in life-support systems where a malfunction or failure may reasonably be expected to result in significant injury to the user. The inclusion of Cypress' product in a life-support systems application implies that the manufacturer assumes all risk of such use and in doing so indemnifies Cypress against all charges.

Use may be limited by and subject to the applicable Cypress software license agreement.

All products and company names mentioned in this document may be the trademarks of their respective holders.

Downloaded from Arrow.com.