

THIS SPEC IS OBSOLETE

Spec No: 001-08350

Spec Title: CY7C1061DV18, 16-MBIT (1M X 16) STATIC RAM

Replaced by: None



16-Mbit (1M × 16) Static RAM

Features

- High Speed

 □ t_{AA} = 15 ns
- Low Active Power
 □ I_{CC} = 150 mA at 67 MHz
- Low complementary metal oxide semiconductor (CMOS) Standby Power
 - \square I_{SB2} = 25 mA
- Operating voltages of 1.7 V to 2.2 V
- 1.5 V data retention
- Automatic power-down when deselected
- Transistor-transistor logic (TTL) compatible inputs and outputs
- Easy memory expansion with CE₁ and CE₂ features
- Available in Pb-free 54-pin thin small outline package (TSOP) Type II package

Functional Description

The CY7C1061DV18 is a high performance CMOS Static RAM (SRAM) organized as 1,048,576 words by 16 bits.

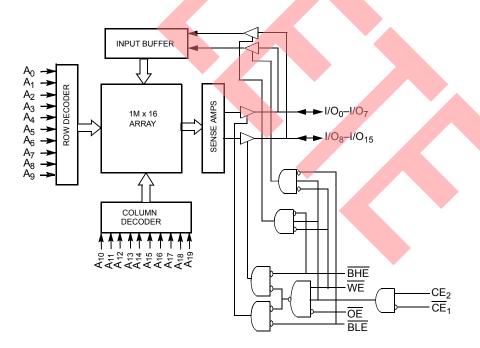
To write to the device, enable the $\underline{\mathrm{chip}}(\overline{\mathrm{CE}_1}\ \mathsf{LOW}\ \mathsf{and}\ \mathsf{CE}_2\ \mathsf{HIGH})$ while forcing the Write Enable (WE) input LOW. If Byte Low Enable (BLE) is LOW, then data from I/O pins (I/O $_0$ through I/O $_7$), is written into the location specified on the address pins (A $_0$ through A $_{19}$). If Byte High Enable (BHE) is LOW, then data from I/O pins (I/O $_8$ through I/O $_{15}$) is written into the location specified on the address pins (A $_0$ through A $_{19}$).

To read from the device, enable the chip by taking \overline{CE}_1 LOW and CE₂ HIGH while forcing the Output Enable (\overline{OE}) LOW and the Write Enable (\overline{WE}) HIGH. If Byte Low Enable (BLE) is LOW, then data from the memory location specified by the address pins appears on I/O₀ to I/O₇. If Byte High Enable (BHE) is LOW, then data from memory appears on I/O₈ to I/O₁₅. See the Truth Table on page 11 for a complete description of Read and Write modes.

The input/output pins (I/O $_0$ through I/O $_{15}$) are placed in a high impedance state when the device is deselected (\overline{CE}_1 HIGH/ \overline{CE}_2 LOW), the outputs are disabled (\overline{OE} HIGH), the BHE and \overline{BLE} are disabled (\overline{BHE} , \overline{BLE} HIGH), or during a Write operation (\overline{CE}_1 LOW, \overline{CE}_2 HIGH, and \overline{WE} LOW).

The CY7C1061DV18 is available in a 54-pin TSOP II pinout. For a complete list of related documentation, click here.

Logic Block Diagram





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Selection Guide

Description	-15	Unit
Maximum access time	15	ns
Maximum operating current	150	mA
Maximum CMOS standby current	25	mA

Pin Configurations

Figure 1. 54-pin TSOP II pinout (Top View)





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 on V_{CC} to relative GND $^{[1]}$ -0.2 V to +2.45 V

DC voltage applied to outputs in High Z state [1]-0.2 V to +2.45 V

DC input voltage [1]	0.2 V to +2.45 V
Current into outputs (LOW)	20 mA
Static discharge voltage (per MIL-STD-883, method 3015)	>2001 V
Latch-up current	>200 mA

Operating Range

Range	Ambient Temperature	V _{CC}
Industrial	–40 °C to +85 °C	1.7 V to 2.2 V

DC Electrical Characteristics

Over the Operating Range

Doromotor	Description	Test Conditions	-1	Unit	
Parameter	Description	Test Conditions	Min	Max	Unit
V _{OH}	Output HIGH voltage	$Min V_{CC}, I_{OH} = -0.1 \text{ mA}$	1.4	-	V
V _{OL}	Output LOW voltage	$Min V_{CC}, I_{OL} = 0.1 mA$	-	0.2	V
V _{IH}	Input HIGH voltage		1.4	V _{CC} + 0.2	V
V _{IL}	Input LOW voltage ^[1]		-0.2	0.4	V
I _{IX}	Input leakage current	$GND \le V_{IN} \le V_{CC}$	-1	+1	μΑ
l _{OZ}	Output leakage current	$GND \le V_{OUT} \le V_{CC}$, output disabled	-1	+1	μΑ
I _{CC}	V _{CC} operating supply current	Max V _{CC} , f = f _{MAX} = 1/t _{RC} , I _{OUT} = 0 mA CMOS levels	_	150	mA
I _{SB1}	Automatic CE power-down current – TTL inputs	$\overline{CE}_1 \ge V_{IH}$, $CE_2 \le V_{IL}$, $Max V_{CC}$, $V_{IN} \ge V_{IH}$ or $V_{IN} \le V_{IL}$, $f = f_{MAX}$	-	30	mA
I _{SB2}	Automatic CE power-down current – CMOS inputs			25	mA



^{1.} V_{IL} (min) = -2.0 V for pulse durations of less than 20 ns.



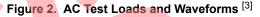
Capacitance

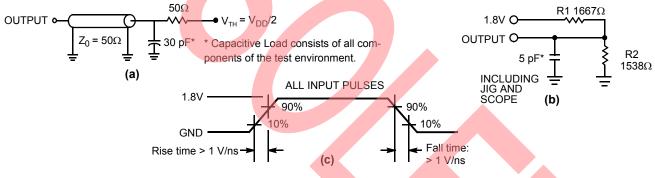
Parameter [2]	Description	Test Conditions	54-pin TSOP II	Unit
C _{IN}	Input capacitance	$T_A = 25 ^{\circ}\text{C}$, $f = 1 \text{MHz}$, $V_{CC} = 1.8 \text{V}$.	6	pF
C _{OUT}	I/O capacitance		8	pF

Thermal Resistance

Parameter	[2]	Description	Test Conditions	54-pin TSOP II	Unit
Θ_{JA}		Thermal resistance (junction to ambient)	Still Air, soldered on a 3 × 4.5 inch, four-layer printed circuit board	76.15	°C/W
$\Theta_{\sf JC}$		Thermal resistance (junction to case)		14.15	°C/W

AC Test Loads and Waveforms





- Tested initially and after any design or process changes that may affect these parameters.
 Valid SRAM operation does not occur until the power supplies have reached the minimum operating V_{DD} (1.5 V). 150 μs (t_{power}) after reaching the minimum operating V_{DD}, normal SRAM operation can begin including reduction in V_{DD} to the data retention (V_{CCDR}, 1.5 V) voltage.



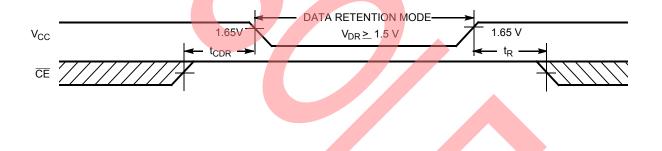
Data Retention Characteristics

Over the Operating Range

Parameter	Description	Conditions	Min	Typ ^[4]	Max	Unit
V_{DR}	V _{CC} for data retention		1.5	-	-	V
I _{CCDR}	Data retention current	V _{CC} = 1.5 V,			25	mA
		$\overline{CE}_1 \ge V_{CC} - 0.2 \text{ V}, CE_2 \le 0.2 \text{ V},$	_	_		
		$V_{IN} \ge V_{CC} - 0.2 \text{ V}, \text{ or } V_{IN} \le 0.2 \text{ V}$				
t _{CDR} ^[5]	Chip deselect to data retention time		0	_	_	ns
t _R ^[6]	Operation recovery time		t _{RC}	_	_	ns

Data Retention Waveform

Figure 3. Data Retention Waveform



Notes

- 4. 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.
 5. Tested initially and after any design or process changes that may affect these parameters.
 6. Full device operation requires linear V_{CC} ramp from V_{DR} to V_{CC(min)} ≥ 100 μs or stable at V_{CC(min)} ≥ 100 μs.



AC Switching Characteristics

Over the Operating Range

Parameter [7]	Description	-1	-15	
Parameter 111	Description	Min	Max	Unit
Read Cycle				
t _{power}	V _{CC} (typical) to the first access [8]	150	_	μS
t _{RC}	Read cycle time	15	-	ns
t _{AA}	Address to data valid	-	15	ns
t _{OHA}	Data hold from address change	3	_	ns
t _{ACE}	CE ₁ LOW/CE ₂ HIGH to data valid	-	15	ns
t _{DOE}	OE LOW to data valid	-	7	ns
t _{LZOE}	OE LOW to Low Z	1	_	ns
t _{HZOE}	OE HIGH to High Z [9]	_	7	ns
t _{LZCE}	CE ₁ LOW/CE ₂ HIGH to Low Z ^[9]	3	_	ns
t _{HZCE}	CE ₁ HIGH/CE ₂ LOW to High Z [9]	_	7	ns
t _{PU}	CE ₁ LOW/CE ₂ HIGH to Power-up [10]	0	_	ns
t _{PD}	CE ₁ HIGH/CE ₂ LOW to Power-down [10]	_	15	ns
t _{DBE}	Byte Enable to data valid	_	7	ns
t _{LZBE}	Byte Enable to Low Z	1	_	ns
t _{HZBE}	Byte Disable to High Z	_	7	ns
Write Cycle [11	, 12]			•
t _{WC}	Write cycle time	15	_	ns
t _{SCE}	CE ₁ LOW/CE ₂ HIGH to write end	10	_	ns
t _{AW}	Address setup to write end	10	_	ns
t _{HA}	Address hold from write end	0	_	ns
t _{SA}	Address setup to write start	0	_	ns
t _{PWE}	WE pulse width	10		ns
t _{SD}	Data setup to write end	7	-	ns
t _{HD}	Data hold from write end	0	-	ns
t _{LZWE}	WE HIGH to Low Z ^[13]	3	-	ns
t _{HZWE}	WE LOW to High Z ^[13]	-	7	ns
t _{BW}	Byte enable to end of write	10	_	ns

- Test conditions assume signal transition time of 3 ns or less, timing reference levels of 0.9 V, input pulse levels of 0 to 1.8 V. Test conditions for the Read cycle use output loading shown in part a) of the Figure 2, unless specified otherwise.
 t_{POWER} gives the minimum amount of time that the power supply should be at typical V_{CC} values until the first memory access can be performed.
 t_{HZOE}, t_{HZVE}, t_{HZBE}, and t_{LZOE}, t_{LZCE}, t_{LZWE}, t_{LZBE} are specified with a load capacitance of 5 pF as in (b) of Figure 2. Transition is measured ±200 mV from steady-state voltage.
 These parameters are guaranteed by design and are not tested.
 The internal Write time of the memory is defined by the overlap of CE₁ LOW (CE₂ HIGH) and WE LOW. Chip enables must be active and WE and byte enables must be LOW to initiate a Write, and the transition of any of these signals can terminate the Write. The input data set-up and hold timing should be referenced to the leading edge of the signal that terminates the Write. edge of the signal that terminates the Write.
- The minimum Write cycle time for Write Cycle No. 3 (WE controlled, OE LOW) is the sum of t_{HZWE} and t_{SD}.
 t_{HZOE}, t_{HZWE}, t_{HZWE}, t_{HZWE}, t_{HZWE}, t_{LZCE}, t_{LZWE}, t_{LZWE}, are specified with a load capacitance of 5 pF as in (b) of Figure 2. Transition is measured ±200 mV from steady-state voltage.



Switching Waveforms

Figure 4. Read Cycle No. 1 [14, 15]

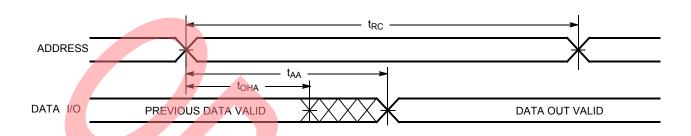
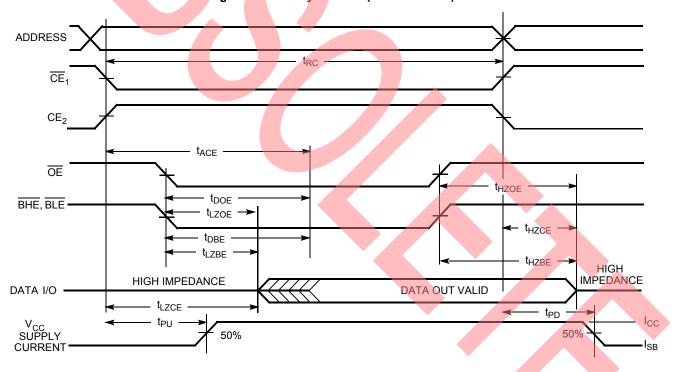


Figure 5. Read Cycle No. 2 (OE Controlled) [16, 17]



- 14. Full device operation requires linear V_{CC} ramp from V_{DR} to V_{CC(min)} ≥ 100 μs or stable at V_{CC(min)} ≥ 100 μs.
 15. Device is continuously selected. OE, OE, BHE and/or BHE = V_{IL}. CE₂ = V_{IH}.
- 16. WE is HIGH for Read cycle.
- 17. Address valid prior to or coincident with $\overline{\text{CE}}_1$ transition LOW and CE_2 transition HIGH.



Switching Waveforms(continued)

Figure 6. Write Cycle No. 1 ($\overline{\text{CE}}$ Controlled) [18, 19, 20]

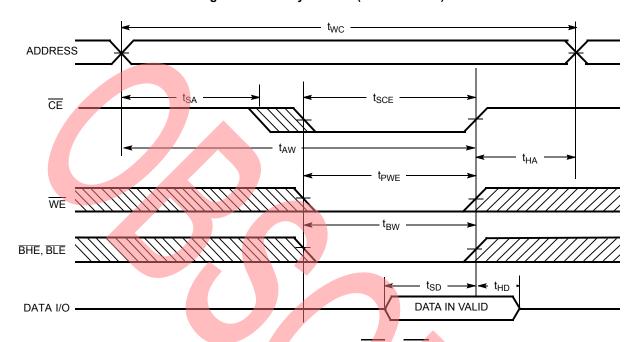
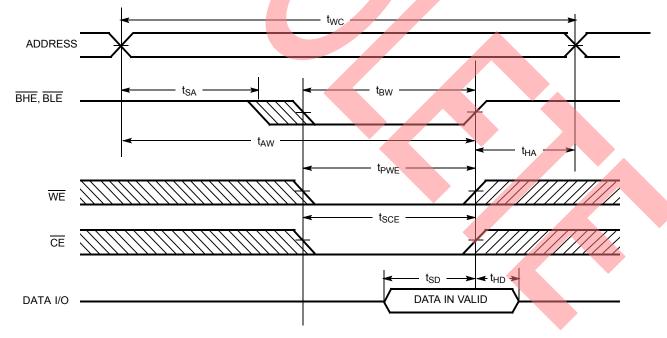


Figure 7. Write Cycle No. 2 (BLE or BHE Controlled)



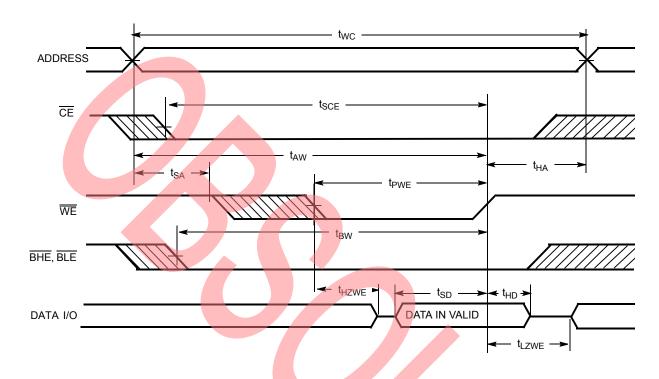
Notes
18. Data I/O is high impedance if \overline{OE} or \overline{BHE} and/or $\overline{BLE} = V_{IH}$.

^{19.} If \overline{CE}_1 goes HIGH simultaneously with \overline{WE} going HIGH, the output remains in a high impedance state.
20. \overline{CE} is the logical combination of \overline{CE}_1 and \overline{CE}_2 . When \overline{CE}_1 is LOW and \overline{CE}_2 is HIGH, \overline{CE} is LOW; when \overline{CE}_1 is HIGH or \overline{CE}_2 is LOW, \overline{CE} is HIGH.



Switching Waveforms(continued)

Figure 8. Write Cycle No. 3 (WE Controlled, OE Low) [21, 22, 23]

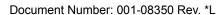


Notes
21. Data I/O is high impedance if \overline{OE} or \overline{BHE} and/or \overline{BLE} = V_{IH} .
22. If \overline{CE}_1 goes HIGH simultaneously with \overline{WE} going HIGH, the output remains in a high impedance state.
23. \overline{CE} is a shorthand combination of both \overline{CE}_1 and CE_2 combined. It is active LOW.



Truth Table

CE ₁	CE ₂	OE	WE	BLE	BHE	I/O ₀ –I/O ₇	I/O ₈ -I/O ₁₅	Mode	Power
Н	Х	Χ	Χ	Χ	X	High Z	High Z	Power-down	Standby (I _{SB})
Х	L	Χ	X	X	Х	High Z	High Z	Power-down	Standby (I _{SB})
L	Н	Г	H	4	L	Data out	Data out	Read all bits	Active (I _{CC})
L	Н	L	H	L	Н	Data out	High Z	Read lower bits only	Active (I _{CC})
L	Н	۲	I	Н	L	High Z	Data out	Read upper bits only	Active (I _{CC})
L	Н	Х	L	L	L	Data in	Data in	Write all bits	Active (I _{CC})
L	Н	Х	L	L	Н	Data in	High Z	Write lower bits only	Active (I _{CC})
L	Н	X	L	Н	L	High Z	Data in	Write upper bits only	Active (I _{CC})
L	Н	Н	Н	X	X	High Z	High Z	Selected, outputs disabled	Active (I _{CC})

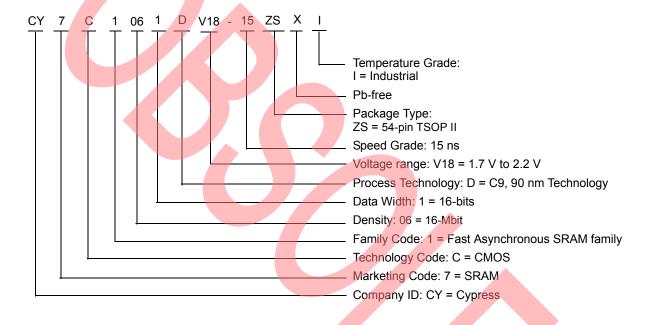




Ordering Information

Speed (ns)	Ordering Code	Package Diagram	Package Type	Operating Range
15	CY7C1061DV18-15ZSXI	51-85160	54-pin TSOP II (Pb-free)	Industrial

Ordering Code Definitions

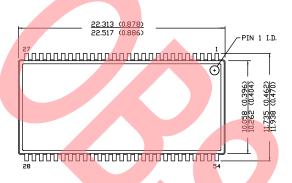


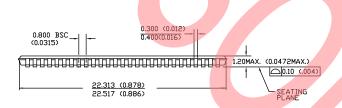


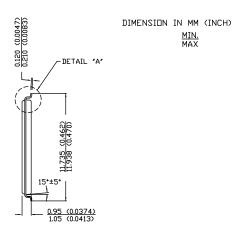
Package Diagram

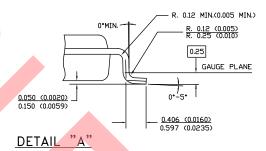
Figure 9. 54-pin TSOP II (22.4 × 11.84 × 1.0 mm) Package Outline, 51-85160

54 Lead TSOP TYPE II - STANDARD









51-85160 *E



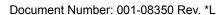
Acronyms

Acronym	Description				
CMOS	Complementary Metal Oxide Semiconductor				
I/O	Input/Output				
SRAM	Static Random Access Memory				
TSOP	Thin Small Outline Package				
TTL	Transistor-Transistor Logic				

Document Conventions

Units of Measure

Symbol	Unit of Measure				
°C	degree Celsius				
MHz	megahertz				
μΑ	microampere				
mA	milliampere				
ns	nanosecond				
Ω	ohm				
pF	picofarad				
V	volt				
W	watt				





Document History Page

	cument Title: CY7C1061DV18, 16-Mbit (1M × 16) Static RAM					
Rev.	ECN No.	Submission Date	Orig. of Change	Description of Change		
**	469420	See ECN	NXR	New data sheet.		
*A	2761557	09/09/2009	VKN	Rearranged sections for better clarity.		
*B	2800121	11/06/2009	VKN	Changed status from Final to Preliminary. Updated Selection Guide: Changed value of "Maximum operating current" from 100 mA to 150 mA. Updated Thermal Resistance: Replaced TBD with values for both Θ_{JA} and Θ_{JC} parameters. Updated Data Retention Characteristics: Changed minimum value of V_{DR} parameter from 1.2 V to 1.5 V. Updated AC Switching Characteristics: Changed minimum value of t_{LZOE} parameter from 0 ns to 1 ns. Changed minimum value of t_{LZDE} parameter from 0 ns to 1 ns. Changed minimum value of t_{LZCE} parameter from 0 ns to 3 ns. Updated Package Diagram: Replaced "6 × 8 × 1 mm FBGA package" with "8 × 9.5 × 1 mm FBGA package" (Removed spec 51-85150 *D and added spec 51-85178 *A).		
*C	2915361	04/16/2010	VKN	Changed status from Preliminary to Final. Removed 48-ball FBGA package related information in all instances across the document. Updated links in Sales, Solutions, and Legal Information		
*D	2923463	04/27/2010	RAME	Post to external web.		
*E	3109102	12/13/2010	PRAS	Added Ordering Code Definitions.		
*F	3147322	01/19/2011	PRAS	Added Acronyms and Units of Measure. Updated to new template.		
*G	3387026	09/29/2011	TAVA	Minor technical edits. Updated Package Diagram.		
*H	4217075	12/11/2013	MEMJ	Updated Features: Added 48-ball VFBGA package related information. Updated Functional Description: Added 48-ball VFBGA package related information. Updated Pin Configurations: Added 48-ball VFBGA package related information. Updated Ordering Information (Updated part numbers). Updated Package Diagram: spec 51-85160 – Changed revision from *C to *D. Added 48-ball VFBGA package related information. Updated to new template.		
*	4548836	10/22/2014	MEMJ	Updated Package Diagram: spec 51-85160 – Changed revision from *D to *E. Completing Sunset Review.		
*J	4573121	11/18/2014	MEMJ	Updated Functional Description: Added "For a complete list of related documentation, click here." at the end.		



Document History Page(continued)

Rev.	ECN No.	Submission Date	Orig. of Change	Description of Change
*K	4987892	10/26/2015	NILE	Removed 48-ball VFBGA package related information in all instances across the document. Updated Thermal Resistance: Changed value of Θ_{JA} parameter corresponding to TSOP II package from 24.18 °C/W to 76.15 °C/W. Changed value of Θ_{JC} parameter corresponding to TSOP II package from 5.40 °C/W to 14.15 °C/W. Updated Ordering Information: Updated part numbers. Updated part numbers. Updated Package Diagram: Removed spec 51-85178 *C. Updated to new template. Completing Sunset Review.
*L	5500113	10/28/2016	NILE	Obsolete document. Completing Sunset Review.



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