CYPRESS SEMICONDUCTOR

PRELIMINARY

CY1E494
CY10E494
CY100E494

CYPRESS SEMICONDUCTOR T-46-23-10

16,384 x 4 ECL Static RAM

Features

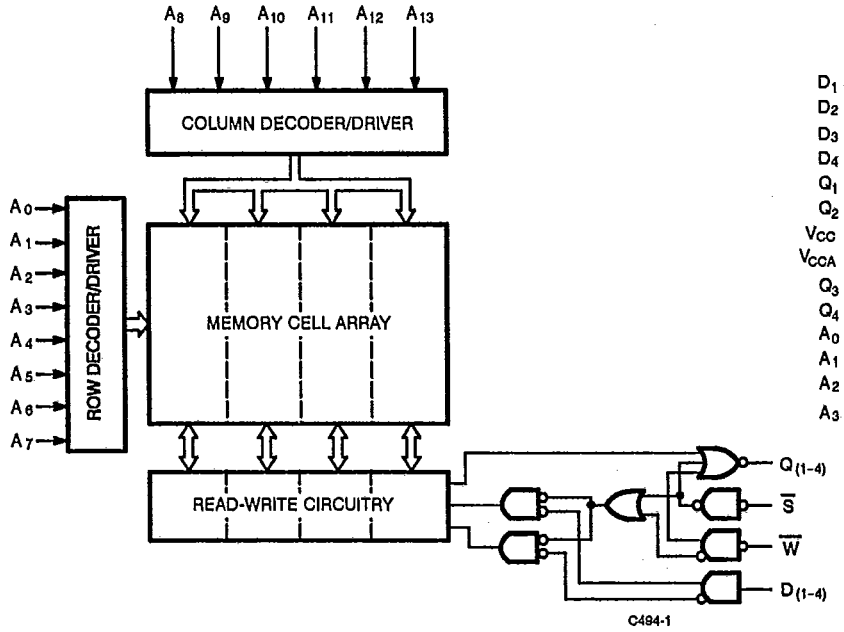
- 16,384 x 4 bits organization
- Ultra high speed/standard power
  - t_{AA} = 7 ns
  - I_{EE} = 180 mA
- Low-power version
  - t_{AA} = 12 ns
  - I_{EE} = 135 mA
- Both 10KH/10K and 100K compatible I/O versions as well as 100K with 10K supplies
- On-chip voltage compensation for improved noise margin
- Open emitter output for ease of memory expansion
- Industry standard pinout

Functional Description

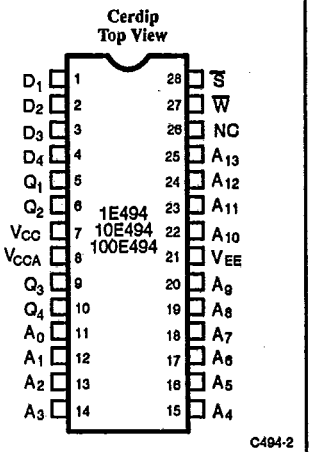
The Cypress CY1E494, CY10E494 and CY100E494 are 16K x 4 ECL RAMs designed for scratch pad, control, and buffer storage applications. These RAMs are developed by Aspen Semiconductor Corporation, a subsidiary of Cypress Semiconductor. Both parts are fully decoded random access memories organized as 16,384 words by 4 bits. The CY10E494 is 10KH-/10K-compatible. The CY100E494 is 100K-compatible, and the CY1E494 has 100K-compatible levels with a -5.2V supply voltage.

The active LOW chip select ($\overline{S}$) input controls memory selection and allows for memory expansion. The read and write operations are controlled by the state of the active LOW write enable ($\overline{W}$) input. With $\overline{W}$ and $\overline{S}$ LOW, the data at $D_{(1-4)}$ is written into the addressed location. To read $\overline{W}$ is held HIGH, while $\overline{S}$ is held LOW. Open emitter outputs allow for wired-OR connection to expand the memory.

Logic Block Diagram



Pin Configuration



Selection Guide

		1E494-7 10E494-7	1E494-10 10E494-10	10E494-12 100E494-12
Maximum Access Time (ns)		7	10	12
Max, I_{EE} (mA)	Commercial	180	180	
	L			135

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Maximum Ratings

(Above which the useful life may be impaired. Exposure to absolute maximum rated conditions for extended periods may affect device reliability. For user guidelines, not tested.)

Storage Temperature ..... −65°C to +150°C

Ambient Temperature with Power Applied ..... −55°C to +125°C

Supply Voltage V_{EE} to V_{CC} ..... −7.0 to +0.5V

Input Voltage ..... V_{EE} to +0.5V

Output Current ..... −50 mA

Operating Range Referenced to V_{CC}

Range	I/O	Ambient Temperature	V_{EE}
Commercial (Standard, "L")	10KH/10K	0°C to 75°C	−5.2V ± 5%
Commercial (Standard, "L")	100K 1E	0°C to 85°C 0°C to 75°C	−4.5V ± 0.3V −5.2V ± 5%

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Electrical Characteristics

Parameters	Description	Test Conditions	Temperature [1]	Min.	Max.	Units
V_{OH}	Output HIGH Voltage	10E[2] R_L = 50 Ω to −2V V_{EE} = −5.2V V_{IN} = V_{IH} Max. or V_{IL} Min.	T_A = 0°C	−1000	−840	mV
			T_A = +25°C	−960	−810	mV
			T_A = +75°C	−900	−735	mV
		100E R_L = 50 Ω to −2V V_{EE} = −4.5V, 1E[3] V_{EE} = −5.2V V_{IN} = V_{IH} Max. or V_{IL} Min.	T_A = 0°C to 85°C	−1025	−880	mV
V_{OL}	Output LOW Voltage	10E R_L = 50 Ω to −2V V_{EE} = −5.2V V_{IN} = V_{IH} Max. or V_{IL} Min.	T_A = 0°C	−1870	−1665	mV
			T_A = +25°C	−1850	−1650	mV
			T_A = +75°C	−1830	−1625	mV
		100E R_L = 50 Ω to −2V V_{EE} = −4.5V, 1E[3] V_{EE} = −5.2V V_{IN} = V_{IH} Max. or V_{IL} Min.	T_A = 0°C to 85°C	−1810	−1620	mV
V_{IH}	Input HIGH Voltage	10E V_{EE} = −5.2V	T_A = 0°C	−1170	−840	mV
			T_A = +25°C	−1130	−810	mV
			T_A = +75°C	−1070	−720	mV
		100E V_{EE} = −4.5V 1E[3] V_{EE} = −5.2V	T_A = 0°C to 85°C	−1165	−880	mV
V_{IL}	Input LOW Voltage	10E V_{EE} = −5.2V	T_A = 0°C	−1950	−1480	mV
			T_A = +25°C	−1950	−1475	mV
			T_A = +75°C	−1950	−1450	mV
		100E V_{EE} = −4.5V 1E[3] V_{EE} = −5.2V	T_A = 0°C to 85°C	−1810	−1475	mV
I_{IH}	Input HIGH Current	V_{IN} = V_{IH} Max.			220	µA
I_{IL}	Input LOW Current	V_{IN} = V_{IL} Min.	$\overline{S}$	0.5	170	µA
			All others	−50		
I_{EE}	Supply Current (All inputs and outputs open)	Commercial L (Low Power)			−135	mA
		Commercial Standard			−180	mA

Notes:

1. Commercial grade is specified as ambient temperature with transverse air flow greater than 500 linear feet per minute.
2. 10E specifications support both 10K and 10KH compatibility.
3. 1E specifications support 100K compatibility with V_{EE} = −5.2V, T_A = 0°C to 75°C.

Capacitance[3]

Parameters	Description	Typ.	Max.[4]	Units
C_{IN}	Input Pin Capacitance	3	6	pF
C_{OUT}	Output Pin Capacitance	5	7	pF

Notes:
3. Tested initially and after any design or process changes that may affect these parameters.
4. For all packages except Cerdip (D42), which has maximums of C_{IN} = 8 pF, C_{OUT} = 9 pF.

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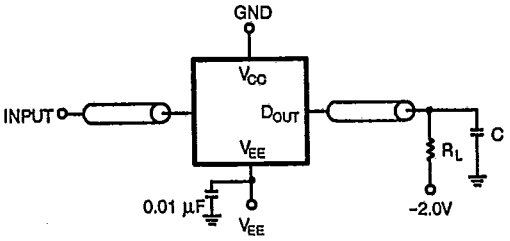
AC Test Loads and Waveforms [5, 6, 7, 8, 9, 10]



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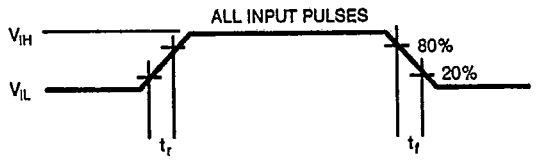

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Notes:
5. V_{IL} = V_{IL} Min., V_{IH} = V_{IH} Max. on 10E version.
6. V_{IL} = -1.7V, V_{IH} = -0.9V on 100K version.
7. R_L = 50Ω, C < 5 pF (7 ns grade) or < 30 pF (10, 12 ns grade) (includes fixture and stray capacitance).
8. All coaxial cables should be 50Ω with equal lengths. The delay of the coaxial cables should be "nulled" out of the measurement.
9. t_r = t_f = 0.7 ns.
10. All timing measurements are made from the 50% point of all waveforms.

Switching Characteristics Over the Operating Range

Parameters	Description	1E494-7 10E494-7		1E494-10 10E494-10		10E494-12 100E494-12		Units
		Min.	Max.	Min.	Max.	Min.	Max.	
t_{AC}	Input to Output delay		5.0		5.0		5.0	ns
t_{RC}	Chip Select Recovery		5.0		5.0		5.0	ns
t_{AA}	Address Access Time		7.0		10.0		12.0	ns
t_{WW}	Write Pulse Width	5.0		6.0		8.0		ns
t_{SD}	Data Set-Up to Write	1.0		2.0		2.0		ns
t_{HD}	Data Hold to Write	1.0		2.0		2.0		ns
t_{SA}	Address Set-Up/Write	1.0		2.0		2.0		ns
t_{HA}	Address Hold/Write	1.0		2.0		2.0		ns
t_{SC}	Chip Select Set-Up/Write	1.0		2.0		2.0		ns
t_{HC}	Chip Select Hold/Write	1.0		2.0		2.0		ns
t_{WS}	Write Disable		5.0		5.0		5.0	ns
t_{WR}	Write Recovery		8.0		12.0		14.0	ns
t_r	Output Rise Time	0.35	1.5	0.35	2.5	0.75	2.5	ns
t_f	Output Fall Time	0.35	1.5	0.35	2.5	0.75	2.5	ns

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Switching Waveforms

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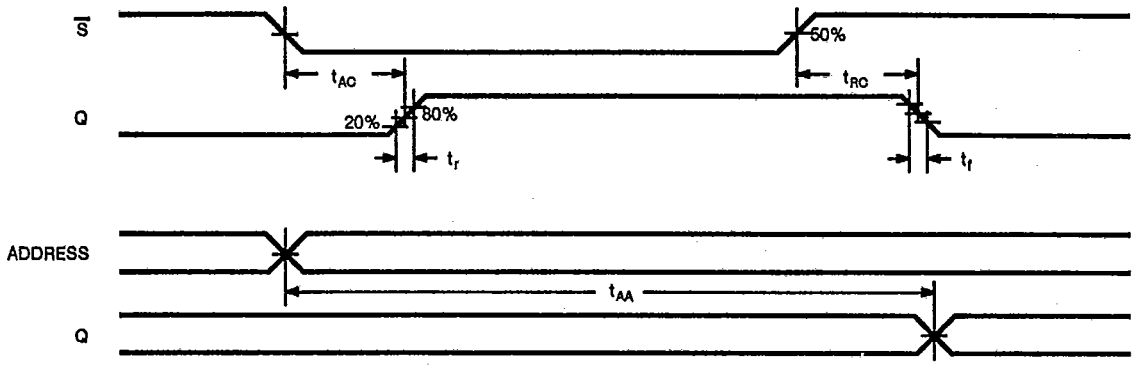
Read Mode



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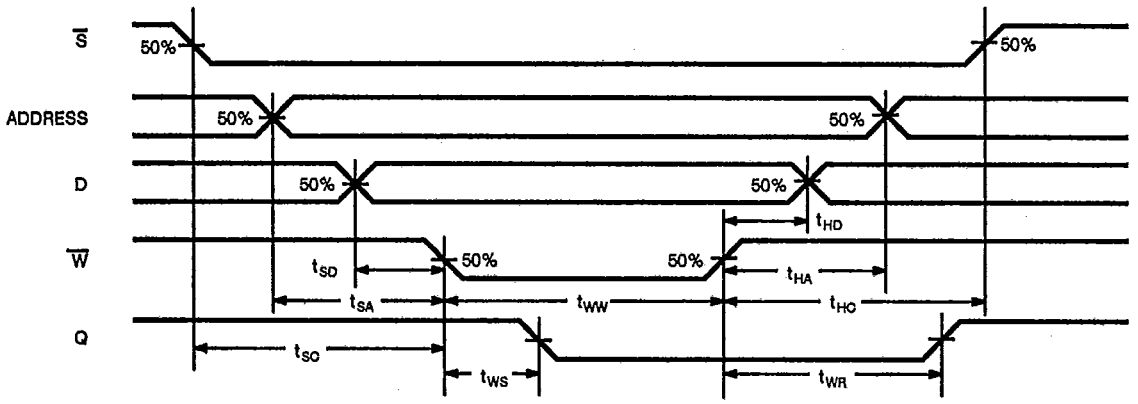
Write Mode



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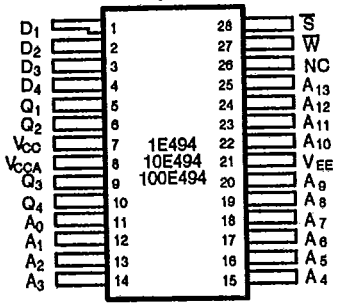
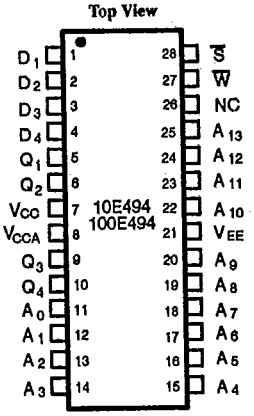
Pin Configurations

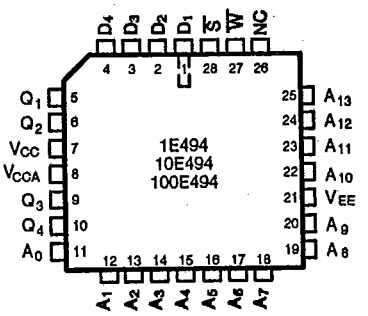
Rectangular Cerpak
Top View



SOJ
Top View



PLCC
Top View



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Truth Table

Input			Output	Mode
$\overline{S}$	$\overline{W}$	D	Q	
H	X	X	L	Disabled
L	L	H	L	Write "H"
L	L	L	L	Write "L"
L	H	X	D_{OUT}	Read

H = High Voltage Level
L = Low Voltage Level
X = Don't Care

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Ordering Information

I/O	I_{EE} (mA)	t_{AA} (ns)	Ordering Code	Package Type	Operating Range
1E	180	7	CY1E494-7JC	J64	Commercial
			CY1E494-7KC	K74	
			CY1E494-7DC	D42	
		10	CY1E494-10JC	J64	
			CY1E494-10KC	K74	
			CY1E494-10DC	D42	
10K	180	7	CY10E494-7JC	J64	Commercial
			CY10E494-7KC	K74	
			CY10E494-7DC	D42	
		10	CY10E494-10JC	J64	
			CY10E494-10KC	K74	
			CY10E494-10DC	D42	
	135	12	CY10E494L-12JC	J64	Commercial
			CY10E494L-12KC	K74	
			CY10E494L-12VC	V21	
			CY10E494L-12DC	D42	
100K	135	12	CY100E494L-12JC	J64	Commercial
			CY100E494L-12KC	K74	
			CY100E494L-12VC	V21	
			CY100E494L-12DC	D42	

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