CY10E422
CY100E422
256 x 4 ECL Static RAM

Features

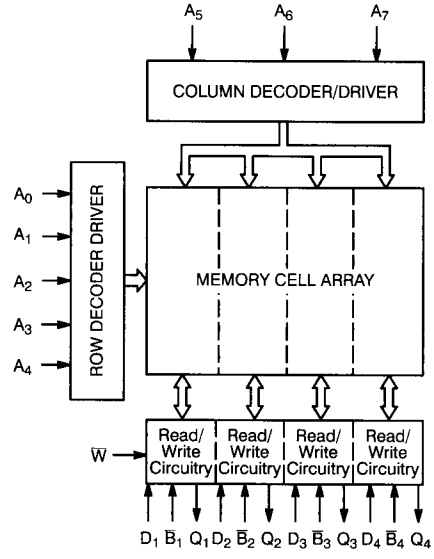
- 256 x 4-bit organization
- Ultra high speed/standard power
  - t_{AA} = 3.5 ns
  - I_{EE} = 220 mA
- Low-power version
  - t_{AA} = 5 ns
  - I_{EE} = 150 mA
- Both 10KH/10K- and 100K-compatible I/O versions
- 10K/10KH military version
- Capable of withstanding >2001V ESD
- On-chip voltage compensation for improved noise margin
- Open emitter output for ease of memory expansion
- Industry-standard pinout

Functional Description

The Cypress CY10E422 and CY100E422 are 256 x 4 ECL RAMs designed for scratch pad, control, and buffer storage applications. Both parts are fully decoded random access memories organized as 1024 words by 4 bits. The CY10E422 is 10KH/10K compatible and is available in a military version.. The CY100E422 is 100K compatible.

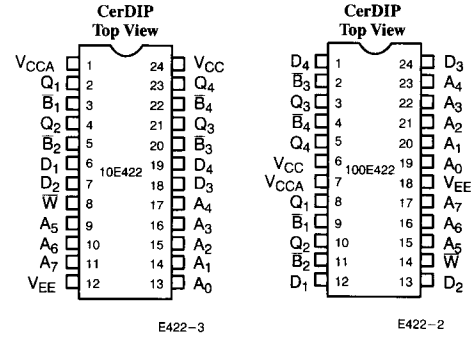
The four independent active LOW block select ($\overline{B}$) inputs control memory selection and allow for memory expansion and reconfiguration. Each block select ($\overline{B}_1$ through $\overline{B}_4$), when active, turns off the corresponding output and memory block. The read and write operations are controlled by the state of the active LOW write enable ($\overline{W}$) input. With $\overline{W}$ and $\overline{B}_X$ LOW, the corresponding data at D_X is written into the addressed location. To read, $\overline{W}$ is held HIGH, while $\overline{B}$ is held LOW. Open emitter outputs allow for wired-OR connection to expand or reconfigure the memory.

Logic Block Diagram



E422-1

Pin Configurations (continued on next page)

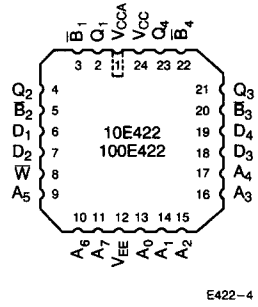


Selection Guide

		10E422-4 100E422-3.5	10E422-5 100E422-5	10E422-7 100E422-7
Maximum Access Time (ns)		3.5/4	5	7
I_{EE} Max. (mA)	Commercial	220	220	
	L (Low Power)		150	150
	Military (10K/10KH only)		150	150

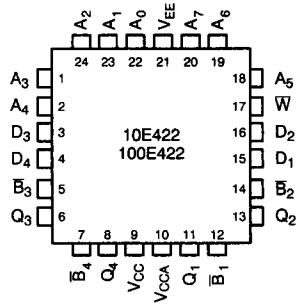
Pin Configurations (continued)

LCC
Top View



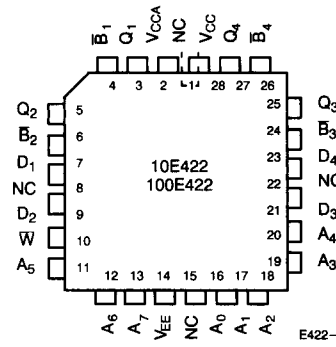
E422–4

Quad Cerpack
Top View



E422–5

PLCC
Top View



E422–6

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} ..... – 7.0V 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	0°C to +85°C	– 4.5V±0.3V
Military (L)	10KH/ 10K	–55°C to +125°C Case	–5.2V±5%

Electrical Characteristics Over the Operating Range

Parameter	Description	Test Conditions	Temperature[1]	Min.	Max.	Unit
V_{OH}	Output HIGH Voltage	10E[2] R_L = 50Ω to – 2V V_{EE} = – 5.2V, V_{CC} = V_{CCA} = GND V_{IN} = V_{IH} Max. or V_{IL} Min.	T_C = – 55°C	– 1140	– 900	mV
			T_A = 0°C	– 1000	– 840	mV
			T_A = +25°C	– 960	– 810	mV
			T_A = +75°C	– 900	– 735	mV
			T_C = +125°C	– 880	– 700	mV
		100K R_L = 50Ω to – 2V, V_{EE} = – 4.5V, V_{CC} = V_{CCA} = GND 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 = 50Ω to – 2V V_{EE} = – 5.2V, V_{CC} = V_{CCA} = GND V_{IN} = V_{IH} Max. or V_{IL} Min.	T_C = – 55°C	– 1920	– 1670	mV
			T_A = +0°C	– 1870	– 1665	mV
			T_A = +25°C	– 1850	– 1650	mV
			T_A = +75°C	– 1830	– 1625	mV
		100K R_L = 50Ω to – 2V, V_{EE} = – 4.5V, V_{CC} = V_{CCA} = GND V_{IN} = V_{IH} Max. or V_{IL} Min.	T_C = +125°C	– 1830	– 1610	mV
			T_A = 0°C to 85°C	– 1810	– 1620	mV

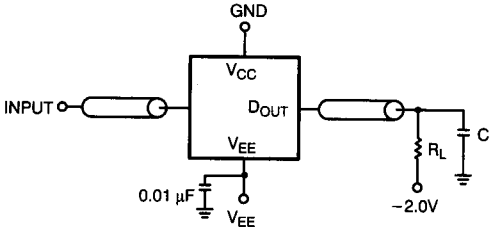
Electrical Characteristics Over the Operating Range (continued)

Parameter	Description	Test Conditions	Temperature[1]	Min.	Max.	Unit
V_{IH}	Input HIGH Voltage	10E V_{EE} = − 5.2V V_{CC} = V_{CCA} = GND	T_C = − 55°C	− 1260	− 900	mV
			T_A = 0°C	− 1170	− 840	mV
			T_A = +25°C	− 1130	− 810	mV
			T_A = +75°C	− 1070	− 720	mV
		100K V_{EE} = − 4.5V V_{CC} = V_{CCA} = GND	T_C = +125°C	− 1030	− 700	mV
			T_A = 0°C to 85°C	− 1165	− 880	mV
V_{IL}	Input LOW Voltage	10E V_{EE} = − 5.2V V_{CC} = V_{CCA} = GND	T_C = − 55°C	− 1950	− 1540	mV
			T_A = 0°C	− 1950	− 1480	mV
			T_A = +25°C	− 1950	− 1475	mV
			T_A = +75°C	− 1950	− 1450	mV
			T_C = +125°C	− 1950	− 1450	mV
		100K V_{EE} = − 4.5V V_{CC} = V_{CCA} = GND	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.	$\overline{B}$ inputs[3]	0.5	170	µA
			All other inputs	− 50		
I_{EE}	Supply Current (All inputs and outputs open)	Commercial/Military L (Low Power)		− 150		mA
		Commercial Standard		− 220		mA

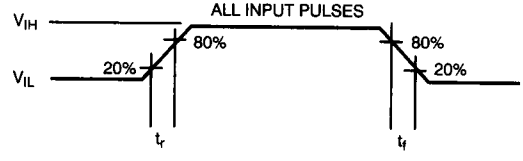
Capacitance[4]

Parameter	Description	Typ.	Max.[5]	Unit
C_{IN}	Input Pin Capacitance	4	5	pF
C_{OUT}	Output Pin Capacitance	5	6	pF

AC Test Loads and Waveforms[6, 7, 8, 9, 10, 11]



E422–7



E422–8

Notes:

1. Commercial grade is specified as ambient temperature with transverse air flow greater than 500 linear feet per minute. Military grade is specified as case temperature.
2. 10E specifications support both 10K and 10KH compatibility.
3. $\overline{B}$ inputs have pull-down resistors, all other inputs do not have pull-downs. The value of the resistors is nominally 50 kΩ, so the $\overline{B}$ inputs are active when left floating.
4. Tested initially and after any design or process changes that may affect these parameters.
5. For all packages except cerDIP (D40), which has maximums of C_{IN} = 8 pF, C_{OUT} = 9 pF.
6. V_{IL} = V_{IL} Min., V_{IH} = V_{IH} Max. on 10E version.
7. V_{IL} = −1.7V, V_{IH} = −0.9V on 100K version.
8. R_L = 50Ω, C < 5 pF (3-ns grade) or < 30 pF (5-, 7-ns grade). Includes fixture and stray capacitance.
9. All coaxial cables should be 50Ω with equal lengths. The delay of the coaxial cables should be "nulled" out of the measurement.
10. t_r = t_f = 0.7 ns.
11. All timing measurements are made from the 50% point of all waveforms.

Switching Characteristics Over the Commercial Operating Range

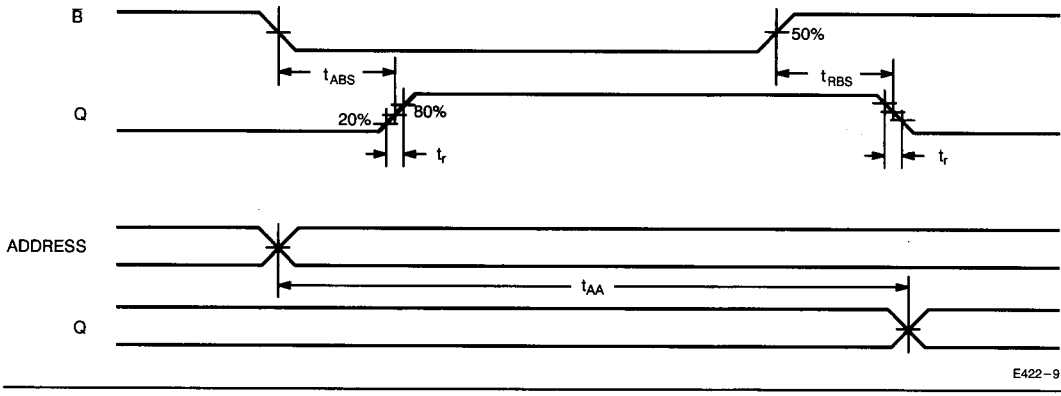
Parameter	Description	100E422–3.5		10E422–4		10E422–5 100E422–5		10E422–7 100E422–7		Unit
		Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
t_{ABS}	Block Select to Output Delay		2.5		2.5	0.5	3.0	0.5	4.0	ns
t_{RBS}	Block Select Recovery		2.5		2.5	0.5	3.0	0.5	4.0	ns
t_{AA}	Address Access Time		3.5		4.0	1.2	5.0	1.2	7.0	ns
t_W	Write Pulse Width	3.5		3.5		3.5		5.0		ns
t_{WSD}	Data Set-Up to Write	0.5		0.5		0.5		1.0		ns
t_{WHD}	Data Hold to Write	1.0		1.0		1.0		1.0		ns
t_{WSA}	Address Set-Up/Write	0.5		0.5		0.5		1.0		ns
t_{WHA}	Address Hold/Write	1.0		1.0		1.0		1.0		ns
t_{WSBS}	Block Select Set-Up/Write	0.5		0.5		0.5		1.0		ns
t_{WHBS}	Block Select Hold/Write	1.0		1.0		1.0		1.0		ns
t_{WS}	Write Disable	0.3	2.5	0.3	2.5	0.3	3.5	0.3	4.0	ns
t_{WR}	Write Recovery	0.5	3.5	0.5	3.5	0.5	3.5	0.5	8.0	ns
t_r	Output Rise Time	0.35	1.5	0.35	1.5	0.35	2.5	1.0	2.5	ns
t_f	Output Fall Time	0.35	1.5	0.35	1.5	0.35	2.5	1.0	2.5	ns

Switching Characteristics Over the Military Operating Range

Parameter	Description	10E422–5		10E422–7		Unit
		Min.	Max.	Min.	Max.	
t_{ABS}	Block Select to Output Delay	0.5	4.0	0.5	4.0	ns
t_{RBS}	Block Select Recovery	0.5	4.0	0.5	4.0	ns
t_{AA}	Address Access Time	1.2	5.0	1.2	7.0	ns
t_W	Write Pulse Width	5.0		5.0		ns
t_{WSD}	Data Set-Up to Write	0		0		ns
t_{WHD}	Data Hold to Write	1.0		1.0		ns
t_{WSA}	Address Set-Up/Write	1.0		1.0		ns
t_{WHA}	Address Hold/Write	1.0		1.0		ns
t_{WSBS}	Block Select Set-Up/Write	0		0		ns
t_{WHBS}	Block Select Hold/Write	1.0		1.0		ns
t_{WS}	Write Disable	0.3	4.0	0.3	4.0	ns
t_{WR}	Write Recovery	0.5	5.0	0.5	8.0	ns
t_r	Output Rise Time	1.0	2.5	1.0	2.5	ns
t_f	Output Fall Time	1.0	2.5	1.0	2.5	ns

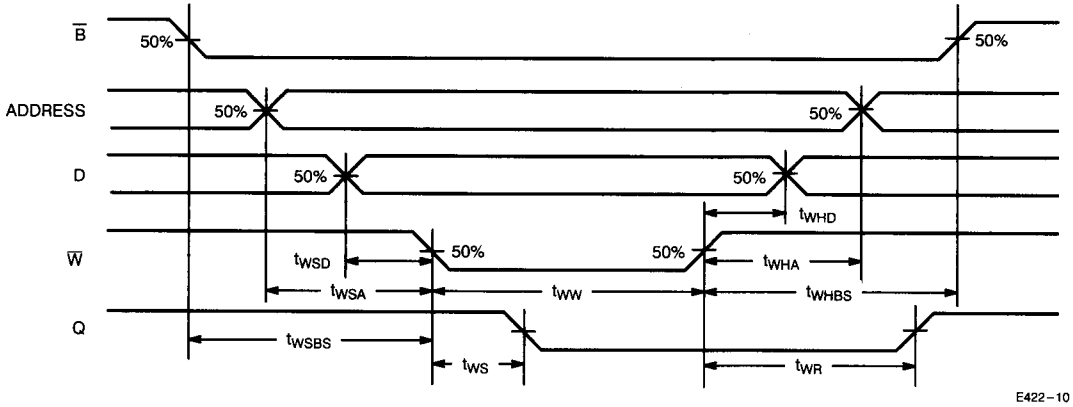
Switching Waveforms

Read Mode



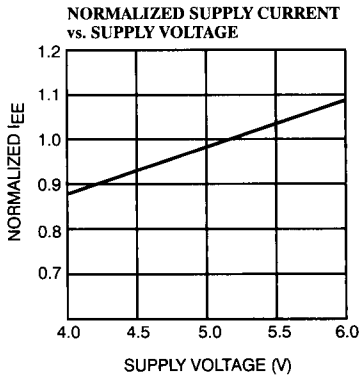
E422–9

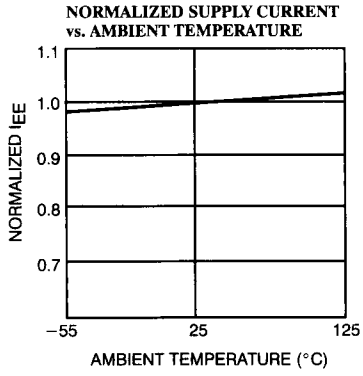
Write Mode

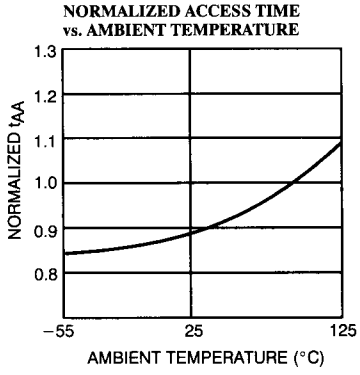


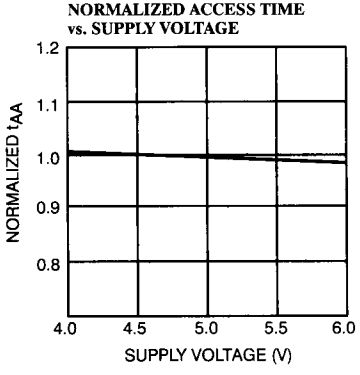
E422–10

Typical DC and AC Characteristics (10E422/10E422L/100E422/100E422L)









Truth Table

Inputs			Output	
$\overline{B_X}$	$\overline{W}$	D_X	Q_X	Mode
H	X	X	L	Disabled
L	L	H	L	Write H
L	L	L	L	Write L
L	H	X	Out	Read

Ordering Information

I/O	I_{EE} (mA)	t_{AA} (ns)	Ordering Code	Package Name	Package Type	Operating Range
10E[12]	220	4	CY10E422–4KC	K63	24-Lead Square Cerpack	Commercial
			CY10E422–4LC	L63	24-Square Leadless Chip Carrier	
		5	CY10E422–5DC	D40	24-Lead (400-Mil) Sidebraze DIP	
			CY10E422–5KC	K63	24-Lead Square Cerpack	
			CY10E422–5LC	L63	24-Square Leadless Chip Carrier	
	150	5	CY10E422L–5DC	D40	24-Lead (400-Mil) Sidebraze DIP	Commercial
			CY10E422L–5JC	J64	28-Lead Plastic Leaded Chip Carrier	
			CY10E422L–5KC	K63	24-Lead Square Cerpack	
			CY10E422L–5LC	L63	24-Square Leadless Chip Carrier	
			CY10E422L–5DMB	D40	24-Lead (400-Mil) Sidebraze DIP	Military
			CY10E422L–5KMB	K63	24-Lead Square Cerpack	
		7	CY10E422L–7DC	D40	24-Lead (400-Mil) Sidebraze DIP	Commercial
			CY10E422L–7JC	J64	28-Lead Plastic Leaded Chip Carrier	
			CY10E422L–7KC	K63	24-Lead Square Cerpack	
			CY10E422L–7LC	L63	24-Square Leadless Chip Carrier	
			CY10E422L–7DMB	D40	24-Lead (400-Mil) Sidebraze DIP	Military
			CY10E422L–7KMB	K63	24-Lead Square Cerpack	
100K	220	3.5	CY100E422–3.5KC	K63	24-Lead Square Cerpack	Commercial
			CY100E422–3.5LC	L63	24-Square Leadless Chip Carrier	
		5	CY100E422–5DC	D40	24-Lead (400-Mil) Sidebraze DIP	
			CY100E422–5KC	K63	24-Lead Square Cerpack	
			CY100E422–5LC	L63	24-Square Leadless Chip Carrier	
	150	5	CY100E422L–5DC	D40	24-Lead (400-Mil) Sidebraze DIP	Commercial
			CY100E422L–5JC	J64	28-Lead Plastic Leaded Chip Carrier	
			CY100E422L–5KC	K63	24-Lead Square Cerpack	
			CY100E422L–5LC	L63	24-Square Leadless Chip Carrier	
		7	CY100E422L–7DC	D40	24-Lead (400-Mil) Sidebraze DIP	
			CY100E422L–7JC	J64	28-Lead Plastic Leaded Chip Carrier	
			CY100E422L–7KC	K63	24-Lead Square Cerpack	
			CY100E422L–7LC	L63	24-Square Leadless Chip Carrier	

Note:
12. 10E specifications support both 10K and 10KH compatibility.

Document #: 38–A–00002–C