



**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 >201V ESD

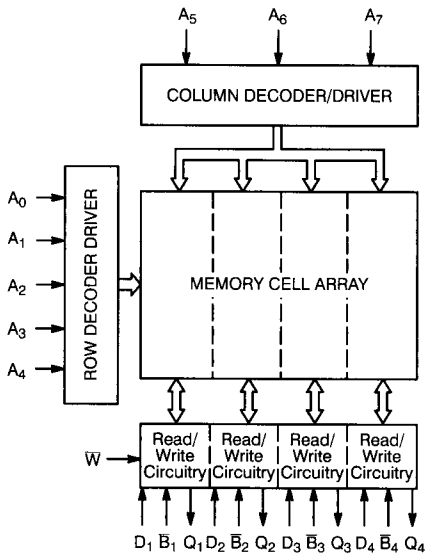
- On-chip voltage compensation for improved noise margin
- Open emitter output for ease of memory expansion
- Industry-standard pinout

**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.

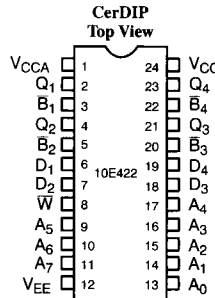
The four independent active LOW block select ( $\bar{B}$ ) inputs control memory selection and allow for memory expansion and re-configuration. Each block select ( $\bar{B}_1$  through  $\bar{B}_4$ ), when active, turns off the corresponding output and memory block. The read and write operations are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

**Logic Block Diagram**

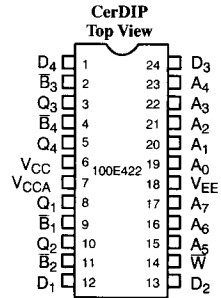


E422-1

**Pin Configurations (continued on next page)**



E422-3



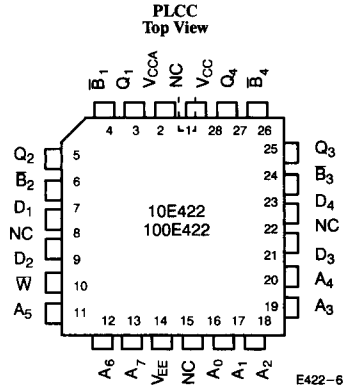
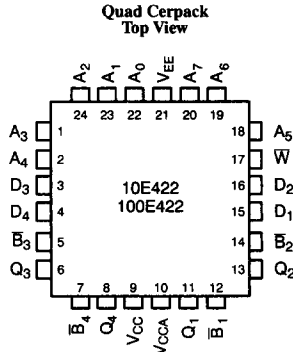
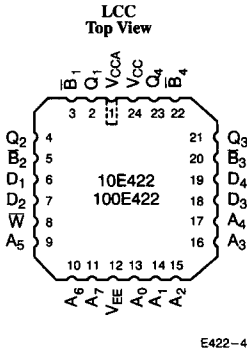
E422-2

ECL 9

**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	
	L (Low Power)		150
	Military (10K/10KH only)		150

**Pin Configurations (continued)**



**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 <sup>[1]</sup>	Min.	Max.	Unit
$V_{OH}$	Output HIGH Voltage	10E <sup>[2]</sup> $R_L = 50\Omega$ to - 2V $V_{EE} = - 5.2V$ , $V_{CC} = V_{CCA} = GND$ $V_{IN} = V_{IH}$ Max. or $V_{IL}$ Min.	$T_C = - 55^\circ C$	- 1140	- 900	mV
			$T_A = 0^\circ C$	- 1000	- 840	mV
			$T_A = +25^\circ C$	- 960	- 810	mV
			$T_A = +75^\circ C$	- 900	- 735	mV
			$T_C = +125^\circ C$	- 880	- 700	mV
		$100K R_L = 50\Omega$ to - 2V, $V_{EE} = - 4.5V, V_{CC} = V_{CCA} = GND$ $V_{IN} = V_{IH}$ Max. or $V_{IL}$ Min.	$T_A = 0^\circ C$ to 85°C	- 1025	- 880	mV
$V_{OL}$	Output LOW Voltage	10E $R_L = 50\Omega$ to - 2V $V_{EE} = - 5.2V$ , $V_{CC} = V_{CCA} = GND$ $V_{IN} = V_{IH}$ Max. or $V_{IL}$ Min.	$T_C = - 55^\circ C$	- 1920	- 1670	mV
			$T_A = +0^\circ C$	- 1870	- 1665	mV
			$T_A = +25^\circ C$	- 1850	- 1650	mV
			$T_A = +75^\circ C$	- 1830	- 1625	mV
			$T_C = +125^\circ C$	- 1830	- 1610	mV
		$100K R_L = 50\Omega$ to - 2V, $V_{EE} = - 4.5V, V_{CC} = V_{CCA} = GND$ $V_{IN} = V_{IH}$ Max. or $V_{IL}$ Min.	$T_A = 0^\circ C$ to 85°C	- 1810	- 1620	mV

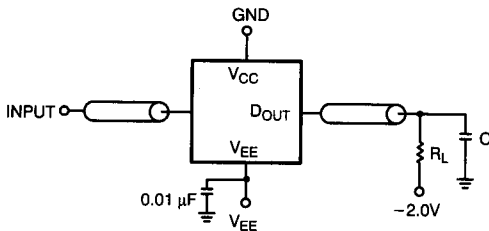
**Electrical Characteristics** Over the Operating Range (continued)

Parameter	Description	Test Conditions	Temperature <sup>[1]</sup>	Min.	Max.	Unit
V <sub>IH</sub>	Input HIGH Voltage	10E V <sub>EE</sub> = - 5.2V V <sub>CC</sub> = V <sub>CCA</sub> = GND	T <sub>C</sub> = - 55°C	- 1260	- 900	mV
			T <sub>A</sub> = 0°C	- 1170	- 840	mV
			T <sub>A</sub> = +25°C	- 1130	- 810	mV
			T <sub>A</sub> = +75°C	- 1070	- 720	mV
		100K V <sub>EE</sub> = - 4.5V V <sub>CC</sub> = V <sub>CCA</sub> = GND	T <sub>C</sub> = +125°C	- 1030	- 700	mV
			T <sub>A</sub> = 0°C to 85°C	- 1165	- 880	mV
V <sub>IL</sub>	Input LOW Voltage	10E V <sub>EE</sub> = - 5.2V V <sub>CC</sub> = V <sub>CCA</sub> = GND	T <sub>C</sub> = - 55°C	- 1950	- 1540	mV
			T <sub>A</sub> = 0°C	- 1950	- 1480	mV
			T <sub>A</sub> = +25°C	- 1950	- 1475	mV
			T <sub>A</sub> = +75°C	- 1950	- 1450	mV
		100K V <sub>EE</sub> = - 4.5V V <sub>CC</sub> = V <sub>CCA</sub> = GND	T <sub>C</sub> = +125°C	- 1950	- 1450	mV
			T <sub>A</sub> = 0°C to 85°C	- 1810	- 1475	mV
I <sub>IH</sub>	Input HIGH Current	V <sub>IN</sub> = V <sub>IH</sub> Max.			220	μA
I <sub>IL</sub>	Input LOW Current	V <sub>IN</sub> = V <sub>IL</sub> Min.	$\bar{B}$ inputs <sup>[3]</sup>	0.5	170	μA
			All other inputs	- 50		
I <sub>EE</sub>	Supply Current (All inputs and outputs open)	Commercial/Military L (Low Power)		- 150		mA
		Commercial Standard		- 220		mA

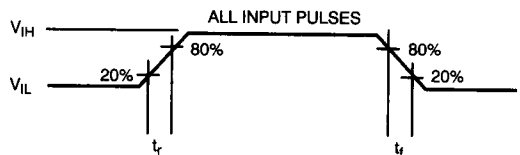
**Capacitance<sup>[4]</sup>**

Parameter	Description	Typ.	Max. <sup>[5]</sup>	Unit
C <sub>IN</sub>	Input Pin Capacitance	4	5	pF
C <sub>OUT</sub>	Output Pin Capacitance	5	6	pF

**AC Test Loads and Waveforms<sup>[6, 7, 8, 9, 10, 11]</sup>**



E422-7



E422-8

**Notes:**

- 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.
- 10E specifications support both 10K and 10KH compatibility.
- $\bar{B}$  inputs have pull-down resistors, all other inputs do not have pull-downs. The value of the resistors is nominally 50 kΩ, so the  $\bar{B}$  inputs are active when left floating.
- Tested initially and after any design or process changes that may affect these parameters.
- For all packages except cerDIP (D40), which has maximums of C<sub>IN</sub> = 8 pF, C<sub>OUT</sub> = 9 pF.
- V<sub>IL</sub> = V<sub>IL</sub> Min., V<sub>IH</sub> = V<sub>IH</sub> Max. on 10E version.
- V<sub>IL</sub> = -1.7V, V<sub>IH</sub> = -0.9V on 100K version.
- R<sub>L</sub> = 50Ω, C < 5 pF (3-ns grade) or < 30 pF (5-, 7-ns grade). Includes fixture and stray capacitance.
- All coaxial cables should be 50Ω with equal lengths. The delay of the coaxial cables should be "nulled" out of the measurement.
- t<sub>r</sub> = t<sub>f</sub> = 0.7 ns.
- All timing measurements are made from the 50% point of all waveforms.

**Switching Characteristics Over the Commercial Operating Range**

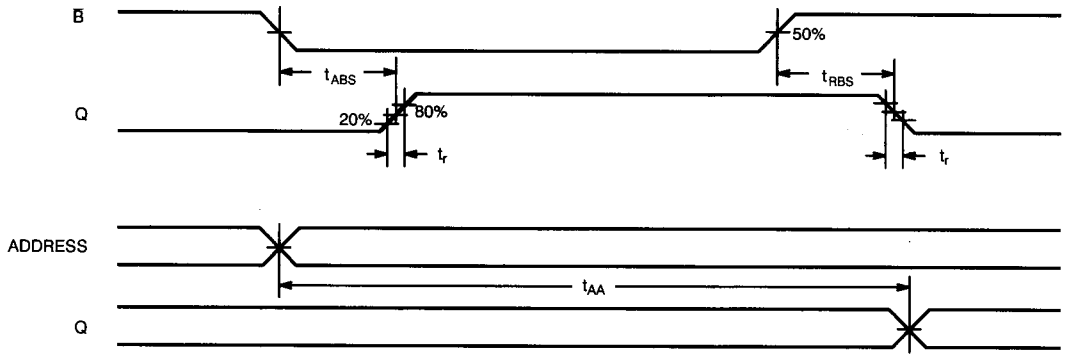
Parameter	Description	100E422-3.5		10E422-4		10E422-5 100E422-5		10E422-7 100E422-7		Unit
		Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
t <sub>ABS</sub>	Block Select to Output Delay		2.5		2.5	0.5	3.0	0.5	4.0	ns
t <sub>RBS</sub>	Block Select Recovery		2.5		2.5	0.5	3.0	0.5	4.0	ns
t <sub>AA</sub>	Address Access Time		3.5		4.0	1.2	5.0	1.2	7.0	ns
t <sub>W</sub>	Write Pulse Width	3.5		3.5		3.5		5.0		ns
t <sub>WSD</sub>	Data Set-Up to Write	0.5		0.5		0.5		1.0		ns
t <sub>WHD</sub>	Data Hold to Write	1.0		1.0		1.0		1.0		ns
t <sub>WSA</sub>	Address Set-Up/Write	0.5		0.5		0.5		1.0		ns
t <sub>WHA</sub>	Address Hold/Write	1.0		1.0		1.0		1.0		ns
t <sub>WSBS</sub>	Block Select Set-Up/Write	0.5		0.5		0.5		1.0		ns
t <sub>WHBS</sub>	Block Select Hold/Write	1.0		1.0		1.0		1.0		ns
t <sub>WS</sub>	Write Disable	0.3	2.5	0.3	2.5	0.3	3.5	0.3	4.0	ns
t <sub>WR</sub>	Write Recovery	0.5	3.5	0.5	3.5	0.5	3.5	0.5	8.0	ns
t <sub>r</sub>	Output Rise Time	0.35	1.5	0.35	1.5	0.35	2.5	1.0	2.5	ns
t <sub>f</sub>	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 <sub>ABS</sub>	Block Select to Output Delay	0.5	4.0	0.5	4.0	ns
t <sub>RBS</sub>	Block Select Recovery	0.5	4.0	0.5	4.0	ns
t <sub>AA</sub>	Address Access Time	1.2	5.0	1.2	7.0	ns
t <sub>W</sub>	Write Pulse Width	5.0		5.0		ns
t <sub>WSD</sub>	Data Set-Up to Write	0		0		ns
t <sub>WHD</sub>	Data Hold to Write	1.0		1.0		ns
t <sub>WSA</sub>	Address Set-Up/Write	1.0		1.0		ns
t <sub>WHA</sub>	Address Hold/Write	1.0		1.0		ns
t <sub>WSBS</sub>	Block Select Set-Up/Write	0		0		ns
t <sub>WHBS</sub>	Block Select Hold/Write	1.0		1.0		ns
t <sub>WS</sub>	Write Disable	0.3	4.0	0.3	4.0	ns
t <sub>WR</sub>	Write Recovery	0.5	5.0	0.5	8.0	ns
t <sub>r</sub>	Output Rise Time	1.0	2.5	1.0	2.5	ns
t <sub>f</sub>	Output Fall Time	1.0	2.5	1.0	2.5	ns

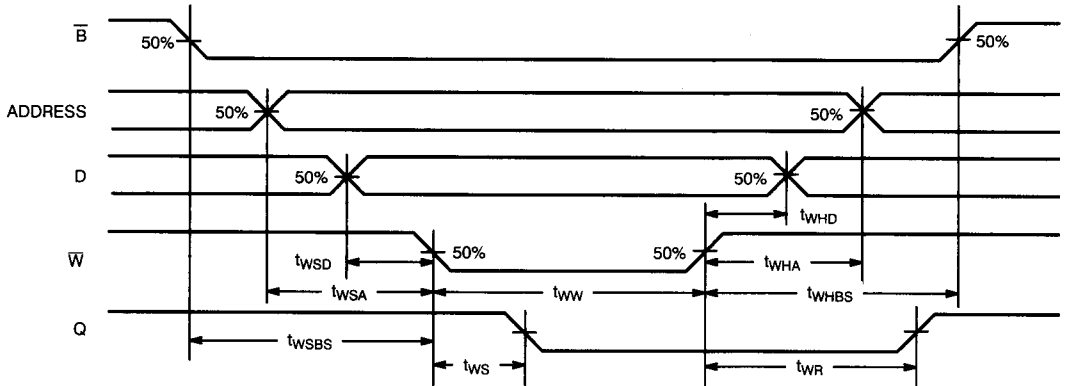
## Switching Waveforms

### Read Mode



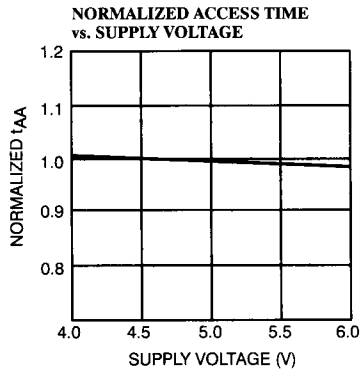
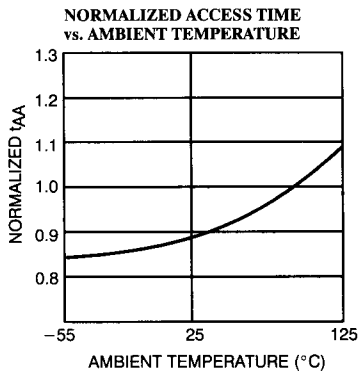
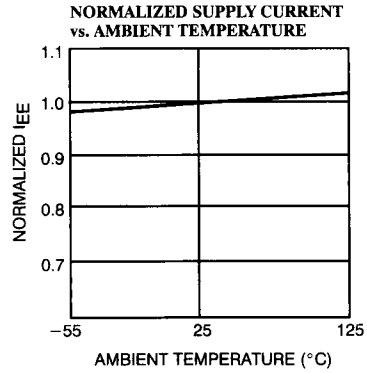
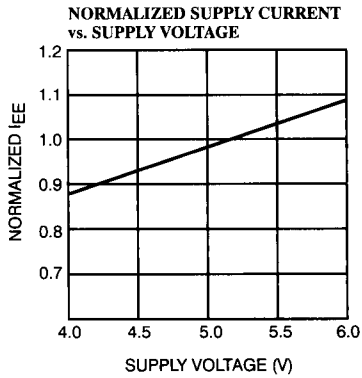
E422-9

### Write Mode



E422-10

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



Truth Table

Inputs			Output	Mode
$\overline{B}_X$	$\overline{W}$	$D_X$	$Q_X$	
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 <sub>EE</sub> (mA)	t <sub>AA</sub> (ns)	Ordering Code	Package Name	Package Type	Operating Range
10E <sup>[12]</sup>	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) Sidebrazed 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) Sidebrazed 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) Sidebrazed DIP	
		CY10E422L-5KMB	K63	24-Lead Square Cerpack		
		7	CY10E422L-7DC	D40	24-Lead (400-Mil) Sidebrazed 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) Sidebrazed 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) Sidebrazed 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) Sidebrazed 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) Sidebrazed 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

**ECL 9**