



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

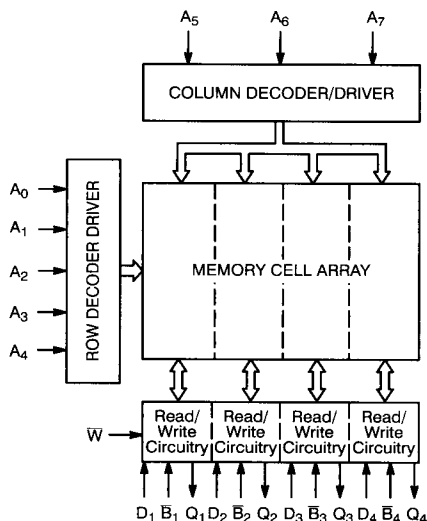
- On-chip voltage compensation for improved noise margin
- Open emitter output for ease of memory expansion
- Industry-standard pinout

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.

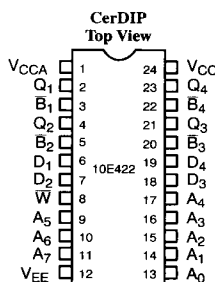
The four independent active LOW block select ($\bar{B}$) inputs control memory selection and allow for memory expansion and re-configuration. Each block select ($\bar{B}_1$ through $\bar{B}_4$), when active, turns off the corresponding output and memory block. The read and write operations are controlled 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

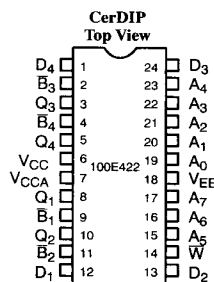


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Pin Configurations (continued on next page)



E422-3

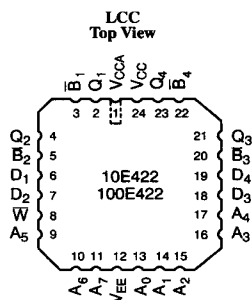


E422-2

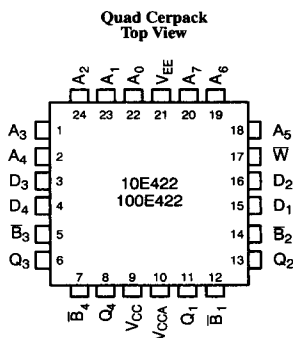
Selection Guide

		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

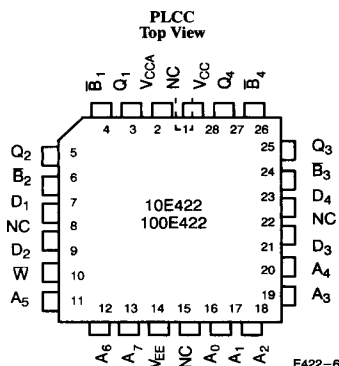
Pin Configurations (continued)



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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} - 7.0V 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] $R_L = 50\Omega$ 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

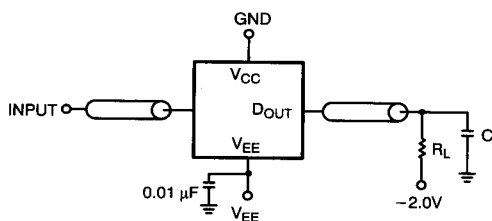
Electrical Characteristics Over the Operating Range (continued)

Parameter	Description	Test Conditions	Temperature ^[1]	Min.	Max.	Unit
V_{IH}	Input HIGH Voltage	10E $V_{EE} = -5.2V$ $V_{CC} = V_{CCA} = GND$	$T_C = -55^\circ C$	-1260	-900	mV
			$T_A = 0^\circ C$	-1170	-840	mV
			$T_A = +25^\circ C$	-1130	-810	mV
			$T_A = +75^\circ C$	-1070	-720	mV
		100K $V_{EE} = -4.5V$ $V_{CC} = V_{CCA} = GND$	$T_C = +125^\circ C$	-1030	-700	mV
			$T_A = 0^\circ C \text{ to } 85^\circ C$	-1165	-880	mV
V_{IL}	Input LOW Voltage	10E $V_{EE} = -5.2V$ $V_{CC} = V_{CCA} = GND$	$T_C = -55^\circ C$	-1950	-1540	mV
			$T_A = 0^\circ C$	-1950	-1480	mV
			$T_A = +25^\circ C$	-1950	-1475	mV
			$T_A = +75^\circ C$	-1950	-1450	mV
		100K $V_{EE} = -4.5V$ $V_{CC} = V_{CCA} = GND$	$T_C = +125^\circ C$	-1950	-1450	mV
			$T_A = 0^\circ C \text{ to } 85^\circ C$	-1810	-1475	mV
I_{IH}	Input HIGH Current	$V_{IN} = V_{IH} \text{ Max.}$			220	μA
I_{IL}	Input LOW Current	$V_{IN} = V_{IL} \text{ Min.}$	$\bar{B}$ 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

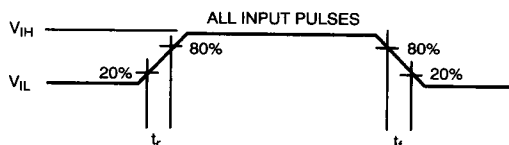
Capacitance^[4]

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]



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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 k Ω , 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 $C_{IN} = 8 \text{ pF}$, $C_{OUT} = 9 \text{ pF}$.
- $V_{IL} = V_{IL} \text{ Min.}$, $V_{IH} = V_{IH} \text{ Max.}$ on 10E version.
- $V_{IL} = -1.7V$, $V_{IH} = -0.9V$ on 100K version.
- $R_L = 50\Omega$, $C < 5 \text{ pF}$ (3-ns grade) or $< 30 \text{ pF}$ (5-, 7-ns grade). Includes fixture and stray capacitance.
- All coaxial cables should be 50 Ω with equal lengths. The delay of the coaxial cables should be "nulled" out of the measurement.
- $t_r = t_f = 0.7 \text{ ns}$.
- All timing measurements are made from the 50% point of all waveforms.

Switching Characteristics Over the Commercial Operating Range

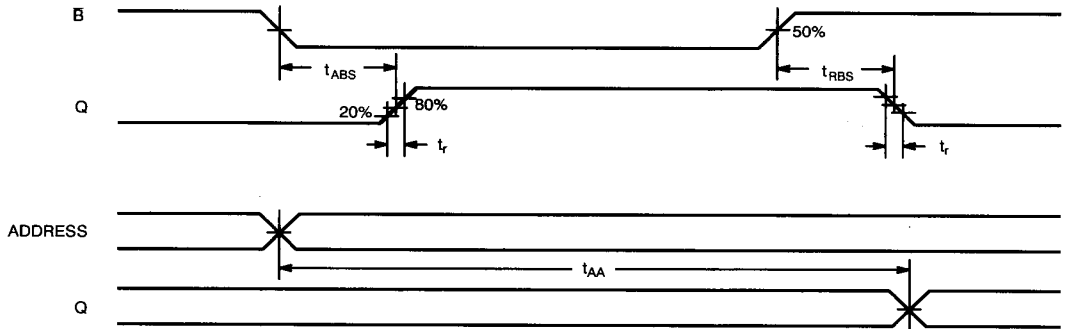
Parameter	Description	100E422–3.5		10E422–4		10E422–5 100E422–5		10E422–7 100E422–7		Unit
		Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
t _{ABS}	Block Select to Output Delay		2.5		2.5	0.5	3.0	0.5	4.0	ns
t _{RBS}	Block Select Recovery		2.5		2.5	0.5	3.0	0.5	4.0	ns
t _{AA}	Address Access Time		3.5		4.0	1.2	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

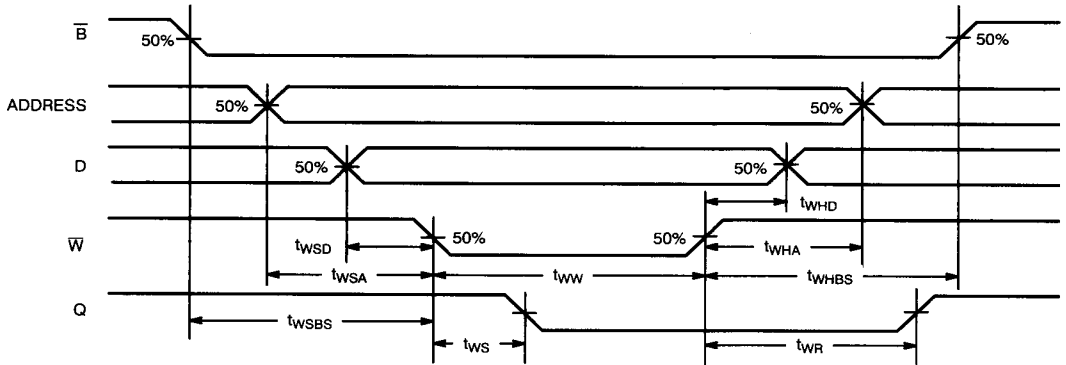
Switching Waveforms

Read Mode



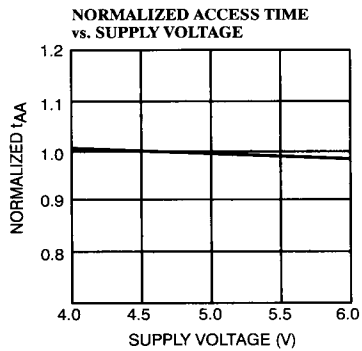
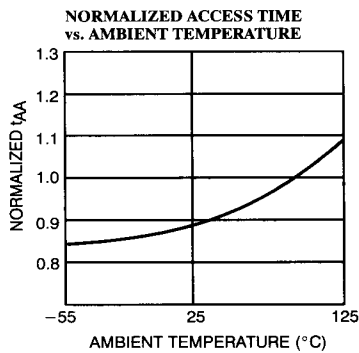
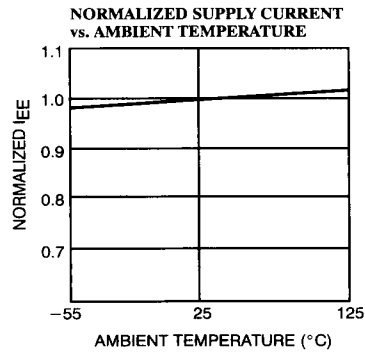
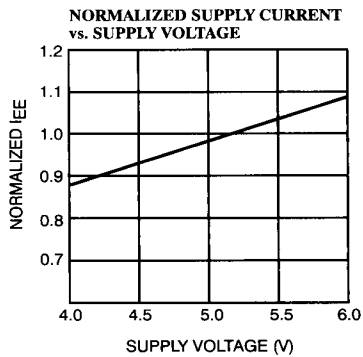
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Write Mode



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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 _{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) 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	Military
			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	Military
			CY10E422L-7DMB	D40	24-Lead (400-Mil) Sidebrazed DIP	
			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