



CYPRESS
SEMICONDUCTOR

CY10E474
CY100E474

**1K x 4 ECL
Static RAM**

Features

- 1024 x 4-bit organization
- Ultra high speed/standard power
 - $t_{AA} = 3.5$ ns
 - $I_{EE} = 275$ mA
- Low-power version
 - $t_{AA} = 5$ ns
 - $I_{EE} = 190$ 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

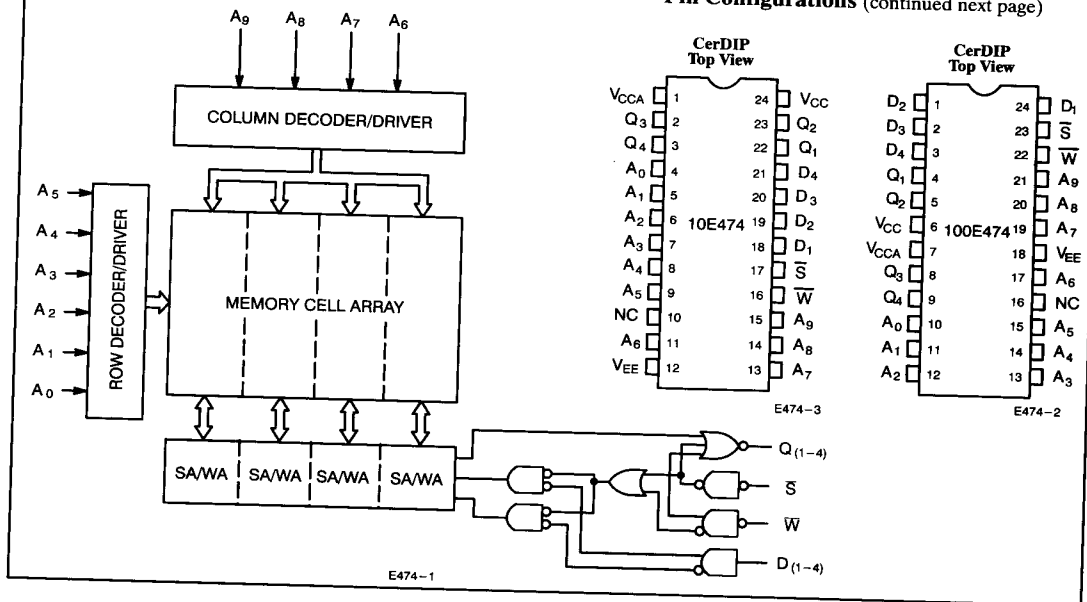
The Cypress CY10E474 and CY100E474 are 1K x 4 ECL RAMs designed for scratch pad, control, and buffer storage applications. These RAMs are developed by Aspen Semiconductor Corporation, a subsidiary of Cypress Semiconductor. Both parts are fully decoded random access

memories organized as 1024 words by 4 bits. The CY10E474 is 10KH/10K compatible and is available in a military version. The CY100E474 is 100K compatible.

The active LOW chip select (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 (W) input. With W and $\bar{S}$ LOW, the data at $D_{(1-4)}$ is written into the addressed location. To read, W is held HIGH while $\bar{S}$ is held LOW. Open emitter outputs allow for wired-OR connection to expand the memory.

Logic Block Diagram

Pin Configurations (continued next page)



ECL

Selection Guide

		10E474-4 100E474-3.5	10E474-5 100E474-5	10E474-7 100E474-7
Maximum Access Time (ns)		3.5/4	5	7
I_{EE} Max. (mA)	Commercial	275	275	
	L		190	190
	Military (10K/10KH only)		190	190



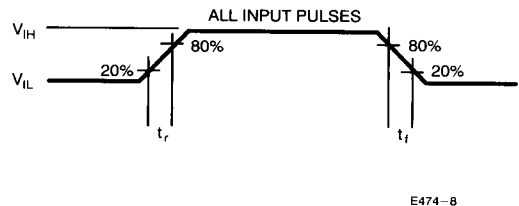
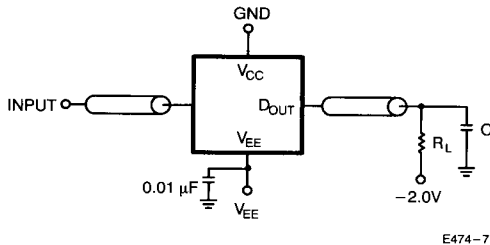
Electrical Characteristics Over the Operating Range (continued)

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
			$T_C = +125^\circ C$	-1030	-700	mV
		100K $V_{EE} = -4.5V$	$T_A = 0^\circ C$ 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
			$T_C = +125^\circ C$	-1950	-1450	mV
		100K $V_{EE} = -4.5V$ $V_{CC} = V_{CCA} = GND$	$T_C = 0^\circ C$ to $85^\circ C$	-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.	8 inputs	0.5	170	μA
			All other inputs	-50		
I_{EE}	Supply Current (All inputs and outputs open)	Commercial/Military Standard L (Low Power)		-190		mA
		Commercial Standard		-275		mA

Capacitance^[3]

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

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



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.
- Tested initially and after any design or process changes that may affect these parameters.
- For all packages except cerDIP (D40), which has maximums of $C_{IN} = 8$ pF, $C_{OUT} = 9$ pF.
- $V_{IL} = V_{IL}$ Min., $V_{IH} = V_{IH}$ Max. on 10E version.
- $V_{IL} = -1.7V$, $V_{IH} = -0.9V$ on 100K version.
- $R_L = 50\Omega$ $C < 5$ pF (3.5/4-ns grade) or < 30 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.
- $t_r = t_f = 0.7$ ns.
- All timing measurements are made from the 50% point of all waveforms.

Switching Characteristics Over the Commercial Operating Range

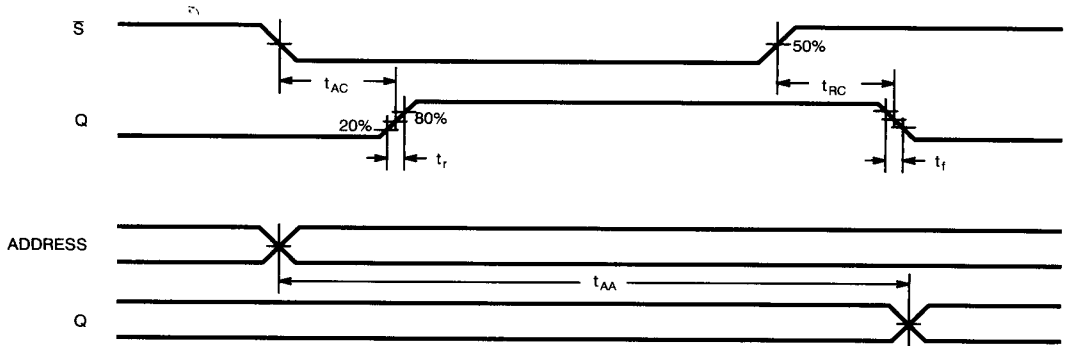
Parameter	Description	100E474–3.5		10E474–4		10E474–5 100E474–5		10E474–7 100E474–7		Unit
		Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
t _{AC}	Input to Output Delay		2.5		2.5	0.5	3.0	0.5	5.0	ns
t _{RC}	Chip Select Recovery		2.5		2.5	0.5	3.0	0.5	5.0	ns
t _{AA}	Address Access Time		3.5		4.0	1.2	5.0	1.2	7.0	ns
t _{WW}	Write Pulse Width	5.0		5.0		5.0		5.0		ns
t _{SD}	Data Set-Up to Write	0		0		0		0		ns
t _{HD}	Data Hold to Write	0		0		0		1.0		ns
t _{SA}	Address Set-Up/Write	0		0		0		1.0		ns
t _{HA}	Address Hold/Write	0		0		0		1.0		ns
t _{SC}	Chip Select Set-Up/Write	0		0		0		0		ns
t _{HC}	Chip Select Hold/Write	0		0		0		1.0		ns
t _{WS}	Write Disable	0.3	2.5	0.3	2.5	0.3	3.0	0.3	6.5	ns
t _{WR}	Write Recovery	0.5	3.5	0.5	3.5	0.5	5.0	0.5	7.0	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	10E474–5		10E474–7		Unit
		Min.	Max.	Min.	Max.	
t _{AC}	Input to Output Delay	0.5	4.0	0.5	5.0	ns
t _{RC}	Chip Select Recovery	0.5	4.0	0.5	5.0	ns
t _{AA}	Address Access Time	1.2	5.0	1.2	7.0	ns
t _{WW}	Write Pulse Width	5.0		5.0		ns
t _{SD}	Data Set-Up to Write	0		0		ns
t _{HD}	Data Hold to Write	1.0		1.0		ns
t _{SA}	Address Set-Up/Write	1.0		1.0		ns
t _{HA}	Address Hold/Write	1.0		1.0		ns
t _{SC}	Chip Select Set-Up/Write	0		0		ns
t _{HC}	Chip Select Hold/Write	1.0		1.0		ns
t _{WS}	Write Disable	0.3	4.0	0.3	6.5	ns
t _{WR}	Write Recovery	0.5	5.0	0.5	7.0	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

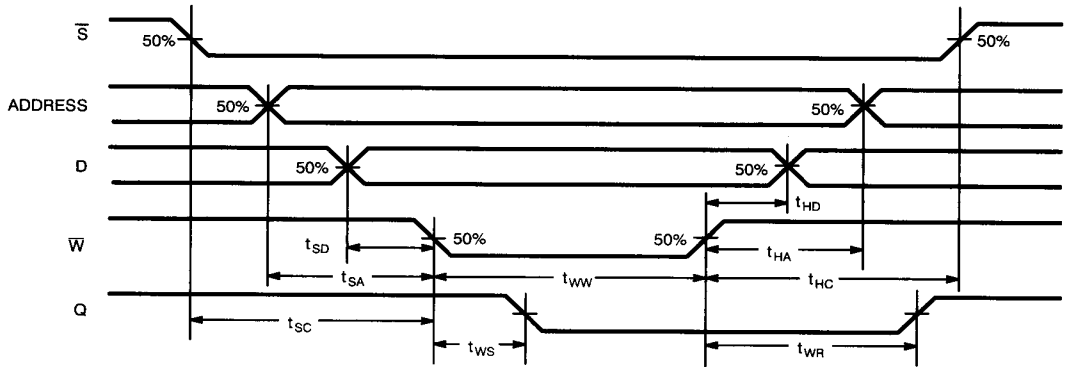
Switching Waveforms

Read Mode



E474-9

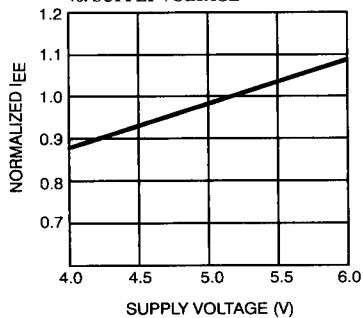
Write Mode



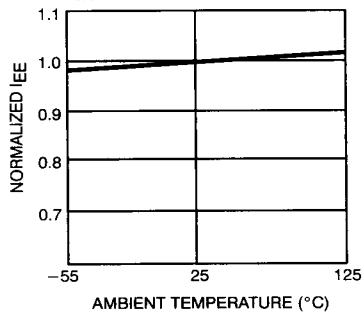
E474-10

Typical DC and AC Characteristics (10E474/10E474L/100E474/100E474L)

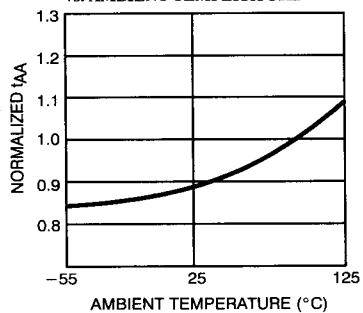
**NORMALIZED SUPPLY CURRENT
vs. SUPPLY VOLTAGE**



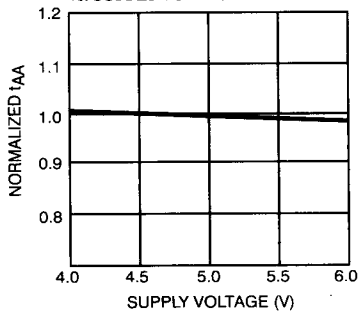
**NORMALIZED SUPPLY CURRENT
vs. AMBIENT TEMPERATURE**



**NORMALIZED ACCESS TIME
vs. AMBIENT TEMPERATURE**



**NORMALIZED ACCESS TIME
vs. SUPPLY VOLTAGE**



Truth Table

Inputs			Output	Mode
$\bar{S}$	$\bar{W}$	$\bar{D}$	Q	
H	X	X	L	Disabled
L	L	H	L	Write H
L	L	L	L	Write L
L	H	X	D _{OUT}	Read

Ordering Information

I/O	I _{EE} (mA)	t _{AA} (ns)	Ordering Code	Package Name	Package Type	Operating Range
100K	275	3.5	CY100E474-3.5KC	K63	24-Lead Square Cerpack	Commercial
			CY100E474-3.5LC	L63	24-Square Leadless Chip Carrier	
		5	CY100E474-5DC	D40	24-Lead (400-Mil) Sidebrazed DIP	
			CY100E474-5KC	K63	24-Lead Square Cerpack	
			CY100E474-5LC	L63	24-Square Leadless Chip Carrier	
	190	5	CY100E474L-5DC	D40	24-Lead (400-Mil) Sidebrazed DIP	Commercial
			CY100E474L-5JC	J64	28-Lead Plastic Leaded Chip Carrier	
			CY100E474L-5KC	K63	24-Lead Square Cerpack	
			CY100E474L-5LC	L63	24-Square Leadless Chip Carrier	
		7	CY100E474L-7DC	D40	24-Lead (400-Mil) Sidebrazed DIP	
			CY100E474L-7JC	J64	28-Lead Plastic Leaded Chip Carrier	
			CY100E474L-7KC	K63	24-Lead Square Cerpack	
			CY100E474L-7LC	L63	24-Square Leadless Chip Carrier	
10E ^[11]	275	4	CY10E474-4KC	K63	24-Lead Square Cerpack	Commercial
			CY10E474-4LC	L63	24-Square Leadless Chip Carrier	
		5	CY10E474-5DC	D40	24-Lead (400-Mil) Sidebrazed DIP	
			CY10E474-5KC	K63	24-Lead Square Cerpack	
			CY10E474-5LC	L63	24-Square Leadless Chip Carrier	
	190	5	CY10E474L-5DC	D40	24-Lead (400-Mil) Sidebrazed DIP	Commercial
			CY10E474L-5JC	J64	28-Lead Plastic Leaded Chip Carrier	
			CY10E474L-5KC	K63	24-Lead Square Cerpack	
			CY10E474L-5LC	L63	24-Square Leadless Chip Carrier	
			CY10E474L-5DMB	D40	24-Lead (400-Mil) Sidebrazed DIP	Military
			CY10E474L-5KMB	K63	24-Lead Square Cerpack	
		7	CY10E474L-7DC	D40	24-Lead (400-Mil) Sidebrazed DIP	Commercial
			CY10E474L-7JC	J64	28-Lead Plastic Leaded Chip Carrier	
			CY10E474L-7KC	K63	24-Lead Square Cerpack	
			CY10E474L-7LC	L63	24-Square Leadless Chip Carrier	
			CY10E474L-7DMB	D40	24-Lead (400-Mil) Sidebrazed DIP	Military
			CY10E474L-7KMB	K63	24-Lead Square Cerpack	

Notes:

11. 10E specifications support both 10K and 10KH compatibility.

Document #: 38-A-00004-D