



**Features**

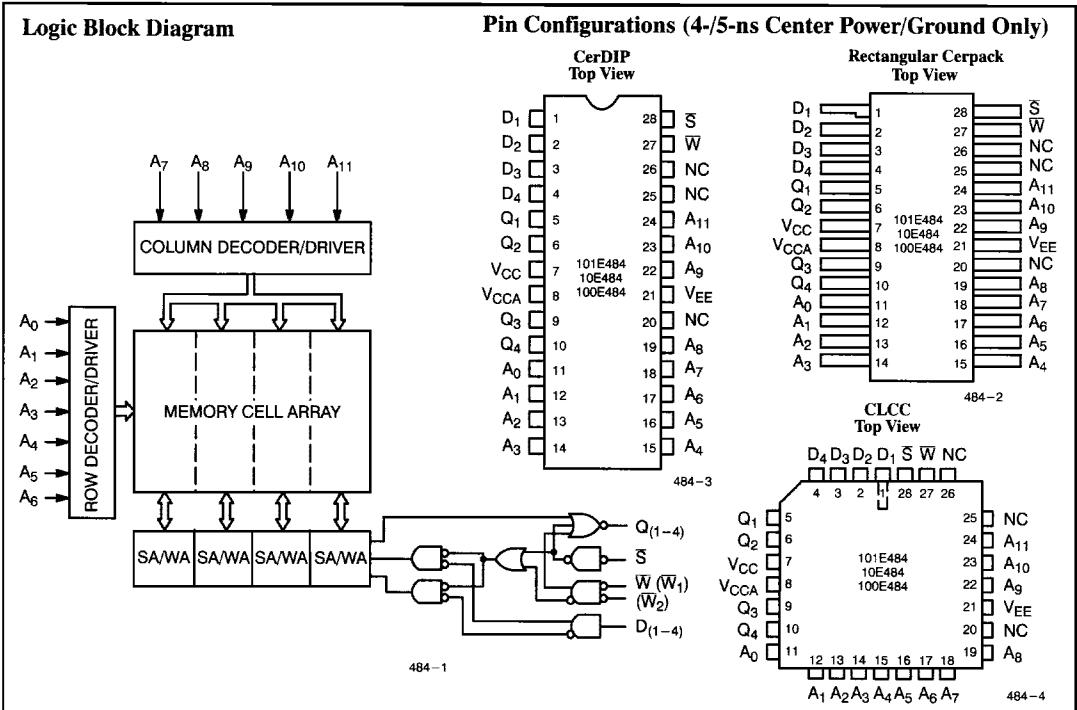
- 4096 x 4-bit organization
- Ultra high speed/standard power
  - $t_{AA} = 4, 5 \text{ ns}$
  - $I_{EE} = 320 \text{ mA}$
- Low-power version
  - $t_{AA} = 7, 10 \text{ ns}$
  - $I_{EE} = 200 \text{ mA}$
- Both 10KH/10K- and 100K-compatible I/O versions
- On-chip voltage compensation for improved noise margin
- Capable of withstanding >2001V ESD

- Open emitter output for ease of memory expansion
- Industry-standard pinout

**Functional Description**

The Cypress CY101E484, CY10E484, and CY100E484 are 4K x 4 ECL RAMs designed for scratch pad, control, and buffer storage applications. These parts are fully decoded random access memories organized as 4K words by 4 bits. The CY10E484 is 10KH/10K-compatible. The CY100E484 is 100K-compatible, and the CY101E484 is 100K-compatible with a -5.2V supply.

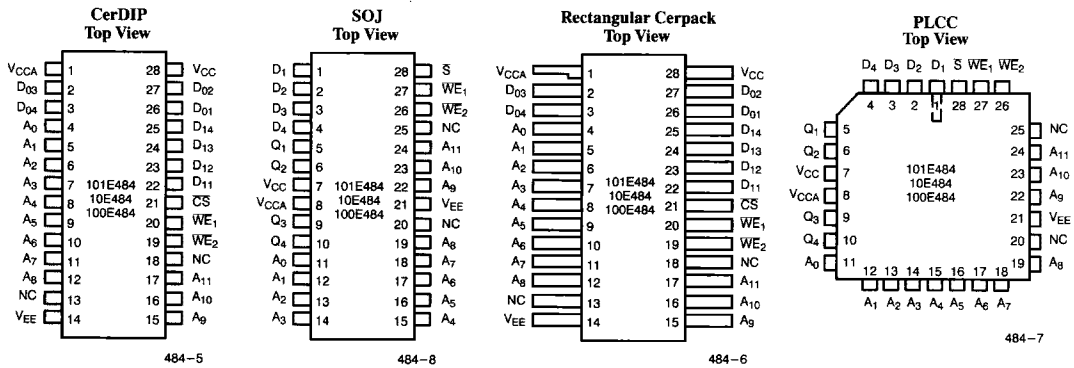
The active LOW chip select ( $\bar{S}$ ) input controls memory selection and allows for memory expansion. The read and write operations are controlled by the state of the active LOW write enable ( $\bar{W}$ ) input. With  $\bar{W}$  and  $\bar{S}$  LOW, the data at  $D_{(1-4)}$  is written into the addressed location. To read,  $\bar{W}$  is held HIGH while  $\bar{S}$  is held LOW. Open emitter outputs allow for wired-OR connection to expand the memory. The 4-ns and 5-ns devices are packaged in 28-pin cerDIPs, CLCCs, and rectangular center power-ground version pin configurations. The 7-ns and 10-ns parts are offered with two write enables ( $\bar{W}E_1, \bar{W}E_2$ ).



**Selection Guide**

		101E484-4 10E484-4 100E484-4	101E484-5 10E484-5 100E484-5	101E484-7 10E484-7 100E484-7	101E484-10 10E484-10 100E484-10
Maximum Access Time (ns)		4	5	7	10
$I_{EE}$ Max. (mA)	Standard	320	320		
	Low Power (L)			200	200
	Military (10K/10KH only)		320	200	200

### Pin Configurations (7 ns, 10 ns)



### 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
Commercial (Standard, L)	101	0°C to 75°C	- 5.2V ±5%
Military (Standard, 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
		100/101K $R_L = 50\Omega$ to - 2V $V_{EE} = - 4.5V$ (5.2V for 101K) $V_{CC} = V_{CCA} = GND$ $V_{IN} = V_{IH}$ Max. or $V_{IL}$ Min.	$T_A = 0^\circ C$ to 85°C (75°C for 101K)	- 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
		100/101K $R_L = 50\Omega$ to - 2V $V_{EE} = - 4.5V$ (5.2V for 101K) $V_{CC} = V_{CCA} = GND$ $V_{IN} = V_{IH}$ Max. or $V_{IL}$ Min.	$T_A = 0^\circ C$ to 85°C (75°C for 101K)	- 1810	- 1620	mV

9 ECL

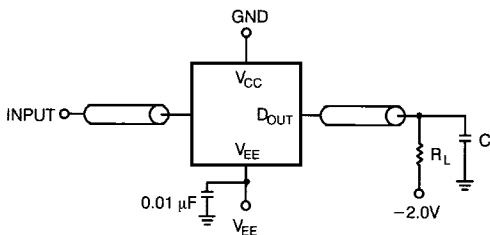
**Electrical Characteristics** Over the Operating Range (continued)

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
			T <sub>C</sub> = +125°C	-1030	-700	mV
		100K V <sub>EE</sub> = - 4.5V (- 5.2V for 101K), V <sub>CC</sub> = V <sub>CCA</sub> = GND	T <sub>A</sub> = 0°C to 85°C (75°C for 101K)	-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
			T <sub>C</sub> = +125°C	-1950	-1450	mV
		100/101K V <sub>EE</sub> = - 4.5V (- 5.2V for 101K), V <sub>CC</sub> = V <sub>CCA</sub> = GND	T <sub>A</sub> = 0°C to 85°C (75°C for 101K)	-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.	5 inputs	0.5	170	μA
			All other inputs	-50		
I <sub>EE</sub>	Supply Current (All inputs and outputs open)	Commercial/Military L (Low Power)		-200		mA
		Commercial and Military Standard Power		-320		mA

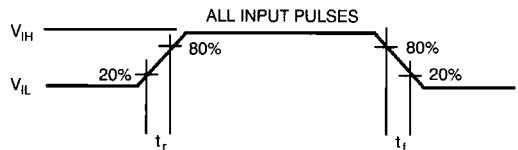
**Capacitance<sup>[3]</sup>**

Parameter	Description	Typ.	Max. <sup>[4]</sup>	Unit
C <sub>IN</sub>	Input Pin Capacitance	4	6	pF
C <sub>OUT</sub>	Output Pin Capacitance	5	7	pF

**AC Test Loads and Waveforms<sup>[5, 6, 7, 8, 9, 10]</sup>**



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484-10

**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 (D42), 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 (4-, 5-ns grade) or < 30 pF (7-, 10-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

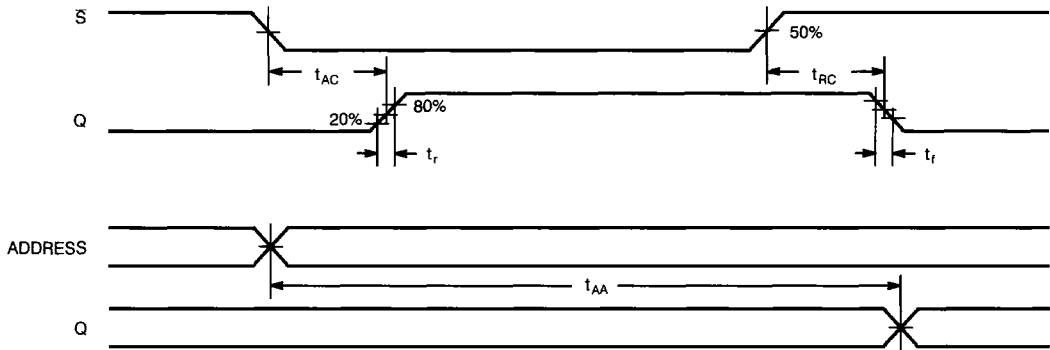
Parameter	Description	101E484-4 10E484-4 100E484-4		101E484-5 10E484-5 100E484-5		101E484-7 10E484-7 100E484-7		101E484-10 10E484-10 100E484-10		Unit
		Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
t <sub>AC</sub>	Input to Output Delay		3		3	0.5	4	0.5	5	ns
t <sub>RC</sub>	Chip Select Recovery		3		3	0.5	4	0.5	5	ns
t <sub>AA</sub>	Address Access Time		4		5	1.2	7	1.2	10	ns
t <sub>WW</sub>	Write Pulse Width	5		5		5		6		ns
t <sub>NWW</sub>	Non-Write Pulse		1.5		1.5		1.5		1.5	ns
t <sub>SD</sub>	Data Set-Up to Write	0		0		1		2		ns
t <sub>HD</sub>	Data Hold to Write	0		0		1		2		ns
t <sub>SA</sub>	Address Set-Up/Write	0		0		1		2		ns
t <sub>HA</sub>	Address Hold/Write	0		0		1		2		ns
t <sub>SC</sub>	Chip Select Set-Up/Write	0		0		1		2		ns
t <sub>HC</sub>	Chip Select Hold/Write	0		0		1		2		ns
t <sub>WS</sub>	Write Disable	0.3	3	0.3	3	0.3	5	0.3	5	ns
t <sub>WR</sub>	Write Recovery	0.5	4	0.5	5	0.5	8	0.5	12	ns
t <sub>r</sub>	Output Rise Time	0.35	1.5	0.35	1.5	1	2.5	1	2.5	ns
t <sub>f</sub>	Output Fall Time	0.35	1.5	0.35	1.5	1	2.5	1	2.5	ns

**Switching Characteristics** Over the Military Operating Range

Parameter	Description	10E484-5		10E484-7		10E484-10		Unit
		Min.	Max.	Min.	Max.	Min.	Max.	
t <sub>AC</sub>	Input to Output Delay		3	0.5	4	0.5	5	ns
t <sub>RC</sub>	Chip Select Recovery		3	0.5	4	0.5	5	ns
t <sub>AA</sub>	Address Access Time		5	1.2	7	1.2	10	ns
t <sub>WW</sub>	Write Pulse Width	5		5		6		ns
t <sub>NWW</sub>	Non-Write Pulse		1.5		1.5		1.5	ns
t <sub>SD</sub>	Data Set-Up to Write	1		1		2		ns
t <sub>HD</sub>	Data Hold to Write	1		1		2		ns
t <sub>SA</sub>	Address Set-Up/Write	1		1		2		ns
t <sub>HA</sub>	Address Hold/Write	1		1		2		ns
t <sub>SC</sub>	Chip Select Set-Up/Write	1		1		2		ns
t <sub>HC</sub>	Chip Select Hold/Write	1		1		2		ns
t <sub>WS</sub>	Write Disable	0.3	3	0.3	5	0.3	5	ns
t <sub>WR</sub>	Write Recovery	0.5	5	0.5	8	0.5	12	ns
t <sub>r</sub>	Output Rise Time	0.35	1.5	1	2.5	1	2.5	ns
t <sub>f</sub>	Output Fall Time	0.35	1.5	1	2.5	1	2.5	ns

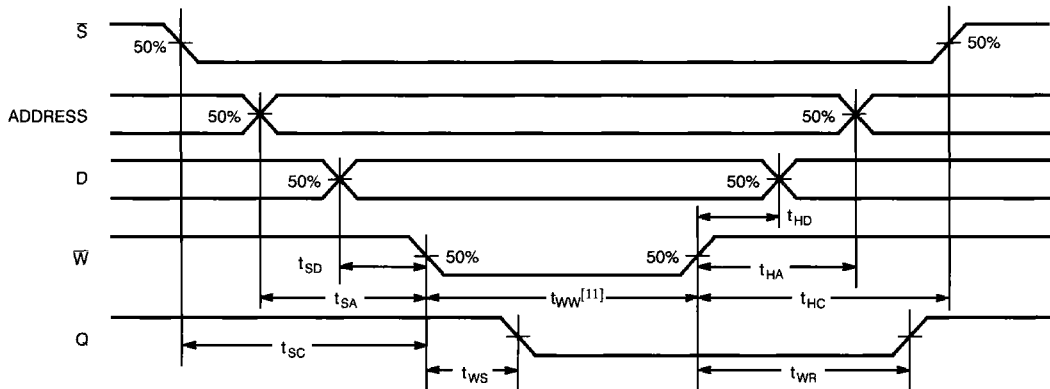
## Switching Waveforms

### Read Mode



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### Write Mode



484-12

## Truth Table

Inputs			Output	Mode
$\bar{S}$	$\bar{W}$	D	Q	
H	X	X	L	Disabled
L	L	H	L	Write H
L	L	L	L	Write L
L	H <sup>[12]</sup>	X	D <sub>OUT</sub>	Read

### Notes:

11. If  $t_{WW} \leq t_{NWW}$  the device will not write data to the addressed location.

12. The 7-ns and 10-ns parts have two  $\bar{WE}$  pins. Both  $\bar{WE}_1$  and  $\bar{WE}_2$  must be LOW to initiate write operation.



**Ordering Information**

I/O	I <sub>EE</sub> (mA)	t <sub>AA</sub> (ns)	Ordering Code	Package Name	Package Type/ Pinout	Operating Range
101E <sup>[13]</sup>	320	4	CY101E484-4DC	D42	28-Lead (400-Mil) CerDIP Center Power/Ground	Commercial
			CY101E484-4KC	K80	28-Lead Rectangular Cerpack Center Power/Ground	
			CY101E484-4YC	Y64	28-Pin Ceramic Leaded Chip Carrier Center Power/Ground	
		5	CY101E484-5DC	D42	28-Lead (400-Mil) CerDIP Center Power/Ground	
			CY101E484-5KC	K80	28-Lead Rectangular Cerpack Center Power/Ground	
			CY101E484-5YC	Y64	28-Pin Ceramic Leaded Chip Carrier Center Power/Ground	
	200	7	CY101E484L-7DC	D42	28-Lead (400-Mil) CerDIP Corner Power/Ground	Commercial
			CY101E484L-7JC	J64	28-Lead Plastic Leaded Chip Carrier Corner Power/Ground	
			CY101E484L-7KC	K80	28-Lead Rectangular Cerpack Corner Power/Ground	
			CY101E484L-7VC	V21	28-Lead Molded SOJ Center Power/Ground	
		10	CY101E484L-10DC	D42	28-Lead (400-Mil) CerDIP Corner Power/Ground	
			CY101E484L-10JC	J64	28-Lead Plastic Leaded Chip Carrier Corner Power/Ground	
			CY101E484L-10KC	K80	28-Lead Rectangular Cerpack Corner Power/Ground	
			CY101E484L-10VC	V21	28-Lead Molded SOJ Center Power/Ground	

**Note:**  
 13. 101E specifications are 100K-compatible with -5.2V supplies.

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**Ordering Information** (continued)

I/O	I <sub>EE</sub> (mA)	t <sub>AA</sub> (ns)	Ordering Code	Package Name	Package Type/ Pinout	Operating Range	
100E	320	4	CY100E484-4DC	D42	28-Lead (400-Mil) CerDIP Center Power/Ground	Commercial	
			CY100E484-4KC	K80	28-Lead Rectangular Cerpack Center Power/Ground		
			CY100E484-4YC	Y64	28-Pin Ceramic Leaded Chip Carrier Center Power/Ground		
		5	CY100E484-5DC	D42	28-Lead (400-Mil) CerDIP Center Power/Ground		
			CY100E484-5KC	K80	28-Lead Rectangular Cerpack Center Power/Ground		
			CY100E484-5YC	Y64	28-Pin Ceramic Leaded Chip Carrier Center Power/Ground		
	200	7	7	CY100E484L-7DC	D42	28-Lead (400-Mil) CerDIP Corner Power/Ground	Commercial
				CY100E484L-7JC	J64	28-Lead Plastic Leaded Chip Carrier Corner Power/Ground	
				CY100E484L-7KC	K80	28-Lead Rectangular Cerpack Corner Power/Ground	
				CY100E484L-7VC	V21	28-Lead Molded SOJ Center Power/Ground	
		10	10	CY100E484L-10DC	D42	28-Lead (400-Mil) CerDIP Corner Power/Ground	
				CY100E484L-10JC	J64	28-Lead Plastic Leaded Chip Carrier Corner Power/Ground	
CY100E484L-10KC	K80			28-Lead Rectangular Cerpack Corner Power/Ground			
CY100E484L-10VC	V21			28-Lead Molded SOJ Center Power/Ground			



**Ordering Information** (continued)

I/O	I <sub>EE</sub> (mA)	t <sub>AA</sub> (ns)	Ordering Code	Package Name	Package Type/ Pinout	Operating Range	
10E <sup>[14]</sup>	320	4	CY10E484-4DC	D42	28-Lead (400-Mil) CerDIP Center Power/Ground	Commercial	
			CY10E484-4KC	K80	28-Lead Rectangular Cerpack Center Power/Ground		
			CY10E484-4YC	Y64	28-Pin Ceramic Leaded Chip Carrier Center Power/Ground		
		5	CY10E484-5DC	D42	28-Lead (400-Mil) CerDIP Center Power/Ground		
			CY10E484-5KC	K80	28-Lead Rectangular Cerpack Center Power/Ground		
			CY10E484-5YC	Y64	28-Pin Ceramic Leaded Chip Carrier Center Power/Ground		
	200	7	4	CY10E484L-7DC	D42	28-Lead (400-Mil) CerDIP Corner Power/Ground	Commercial
				CY10E484L-7JC	J64	28-Lead Plastic Leaded Chip Carrier Corner Power/Ground	
				CY10E484L-7KC	K80	28-Lead Rectangular Cerpack Corner Power/Ground	
			5	CY10E484L-7VC	V21	28-Lead Molded SOJ Center Power/Ground	
				CY10E484L-7DMB	D42	28-Lead (400-Mil) CerDIP Corner Power/Ground	Military
				CY10E484L-7KMB	K80	28-Lead Rectangular Cerpack Corner Power/Ground	
10	7	4	CY10E484L-10DC	D42	28-Lead (400-Mil) CerDIP Corner Power/Ground	Commercial	
			CY10E484L-10JC	J64	28-Lead Plastic Leaded Chip Carrier Corner Power/Ground		
			CY10E484L-10KC	K80	28-Lead Rectangular Cerpack Corner Power/Ground		
		5	CY10E484L-10VC	V21	28-Lead Molded SOJ Center Power/Ground		
			CY10E484L-10DMB	D42	28-Lead (400-Mil) CerDIP Corner Power/Ground	Military	
			CY10E484L-10KMB	K80	28-Lead Rectangular Cerpack Corner Power/Ground		

**Note:**

14. 10E specifications support both 10K and 10KH compatibility.

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