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SEMICONDUCTORT-46-19-07
PRELIMINARY

CY7C341

192-Macrocell MAX® EPLD

Features

- 192 macrocells in 12 LABs
- 8 dedicated inputs, 64 bidirectional I/O pins
- Programmable interconnect array
- 384 expander product terms
- Available in 84-pin HLCC, PLCC, and PGA packages

Functional Description

The CY7C341 is an Erasable Programmable Logic Device (EPLD) in which CMOSEEPROM cells are used to configure logic functions within the device. The MAX architecture is 100% user configurable allowing the devices to accommodate a variety of independent logic functions.

The 192 macrocells in the CY7C341 are divided into 12 Logic Array Blocks (LABs), 16 per LAB. There are 384 expander product terms, 32 per LAB, to be used and shared by the macrocells within each LAB. Each LAB is interconnected with a programmable interconnect array, allowing all signals to be routed throughout the chip.

The speed and density of the CY7C341 allows it to be used in a wide range of applications, from replacement of large amounts of 7400 series TTL logic, to complex controllers and multifunction chips. With greater than 37 times the functionality of 20-pin PLDs, the CY7C341 allows the replacement of over 75 TTL devices. By replacing large amounts of logic, the CY7C341 reduces board space, part count, and increases system reliability.

Each LAB contains 16 macrocells. In LABs A, F, G, and L, 8 macrocells are connected to I/O pins and 8 are buried, while for LABs B, C, D, E, H, I, J, and K, 4 macrocells are connected to I/O pins and 12 are buried. Moreover, in addition to the I/O and buried macrocells, there are 32 single product term logic expanders in each LAB. Their use greatly enhances the capability of the macrocells without increasing the number of product terms in each macrocell.

Selection Guide

		7C341-30	7C341-35	7C341-40
Maximum Access Time (ns)		30	35	40
Maximum Operating Current (mA)	Commercial	380	380	
	Industrial	480	480	
	Military		480	480
Maximum Standby Current (mA)	Commercial	360	360	
	Industrial	435	435	
	Military		435	435

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Logic Array Blocks

There are 12 logic array blocks in the CY7C341. Each LAB consists of a macrocell array containing 16 macrocells, an expander product term array containing 32 expanders, and an I/O block. The LAB is fed by the programmable interconnect array and the dedicated input bus. All macrocell feedbacks go to the macrocell array, the expander array, and the programmable interconnect array. Expanders feed themselves and the macrocell array. All I/O feedbacks go to the programmable interconnect array so that they may be accessed by macrocells in other LABs as well as the macrocells in the LAB in which they are situated.

Externally, the CY7C341 provides 8 dedicated inputs, one of which may be used as a system clock. There are 64 I/O pins that may be individually configured for input, output, or bidirectional data flow.

Programmable Interconnect Array

The Programmable Interconnect Array (PIA) solves interconnect limitations by routing only the signals needed by each logic array block. The inputs to the PIA are the outputs of every macrocell within the device and the I/O pin feedback of every pin on the device.

Unlike masked or programmable gate arrays, which induce variable delay dependent on routing, the PIA has a fixed delay. This eliminates undesired skews among logic signals, which may cause glitches in internal or external logic. The fixed delay, regardless of programmable interconnect array configuration, simplifies design by assuring that internal signal skews or races are avoided. The result is ease of design implementation, often in a single pass, without the multiple internal logic placement and routing iterations required for a programmable gate array to achieve design timing objectives.

Timing Delays

Timing delays within the CY7C341 may be easily determined using MAX+PLUS®

software or by the model shown in Figure 1. The CY7C341 has fixed internal delays, allowing the user to determine the worst case timing delays for any design. For complete timing information, the MAX+PLUS software provides a timing simulator.

Design Recommendations

For proper operation, input and output pins must be constrained to the range $GND \leq (V_{IN} \text{ or } V_{OUT}) \leq V_{CC}$. Unused inputs must always be tied to an appropriate logic level (either V_{CC} or GND). Each set of V_{CC} and GND pins must be connected together directly at the device. Power supply decoupling capacitors of at least 0.2 μF must be connected between V_{CC} and GND . For the most effective decoupling, each V_{CC} pin should be separately decoupled to GND , directly at the device. Decoupling capacitors should have good frequency response, such as monolithic ceramic types.

Design Security

The CY7C341 contains a programmable design security feature that controls the access to the data programmed into the device. If this programmable feature is used, a proprietary design implemented in the device cannot be copied or retrieved. This enables a high level of design control to be obtained since programmed data within EPROM cells is invisible. The bit that controls this function, along with all other program data, may be reset simply by erasing the device.

The CY7C341 is fully functionally tested and guaranteed through complete testing of each programmable EPROM bit and all internal logic elements thus ensuring 100% programming yield.

The erasable nature of these devices allows test programs to be used and erased during early stages of the production flow. The devices also contain on-board logic test circuitry to allow verification of function and AC specification once encapsulated in non-windowed packages.

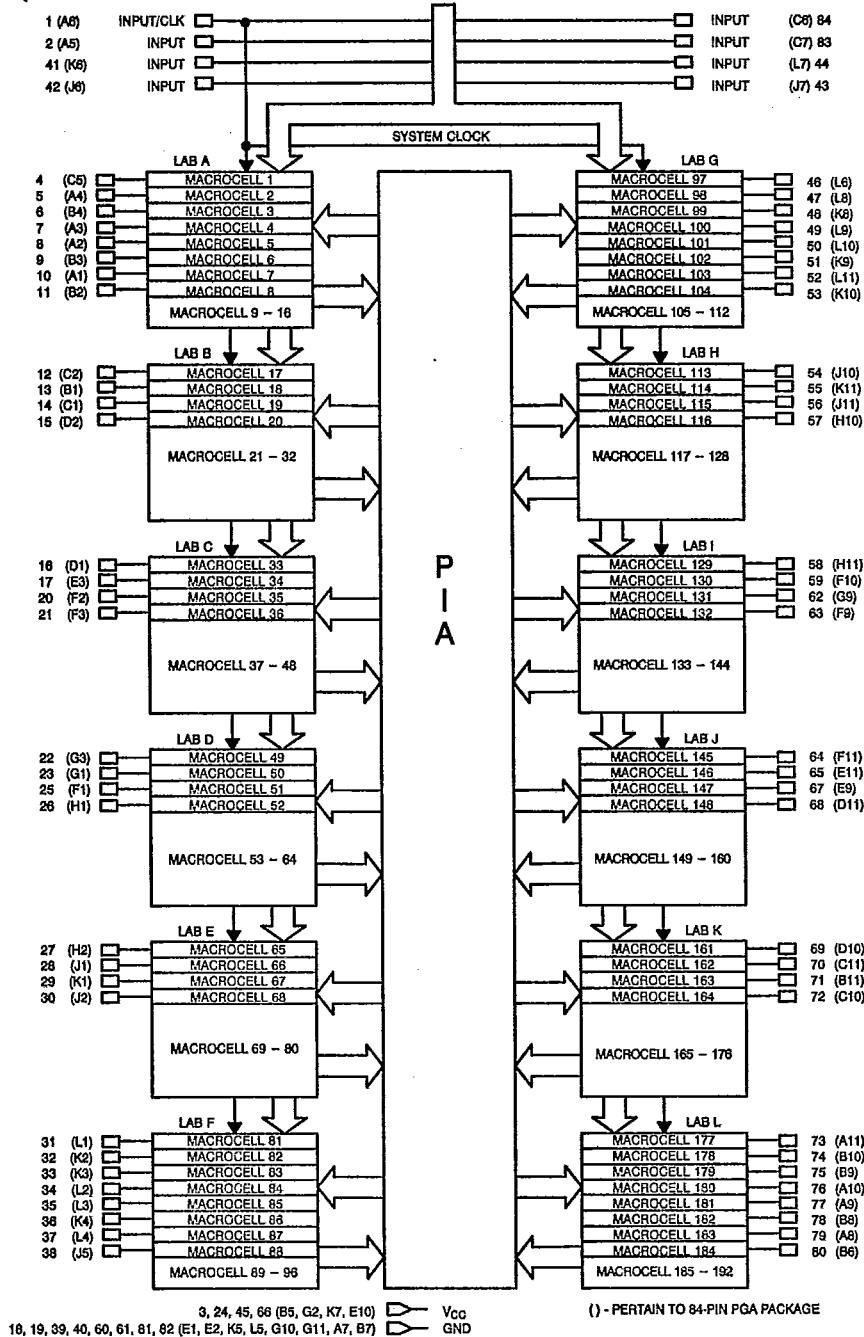
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Logic Block Diagram



PLDS

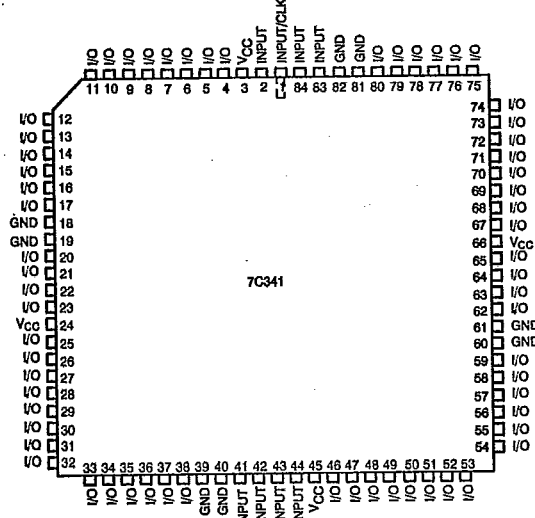
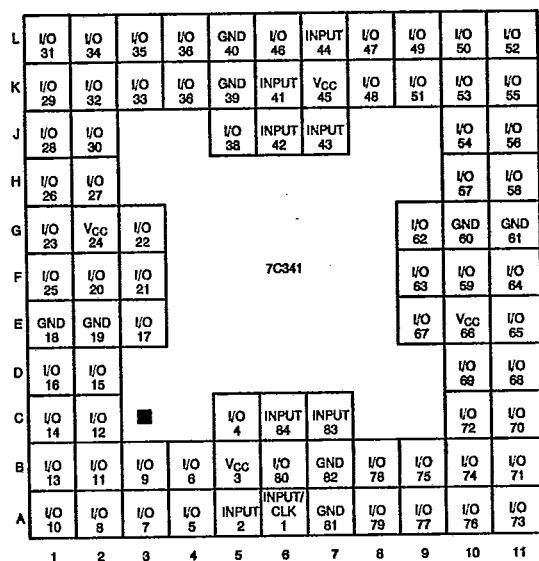


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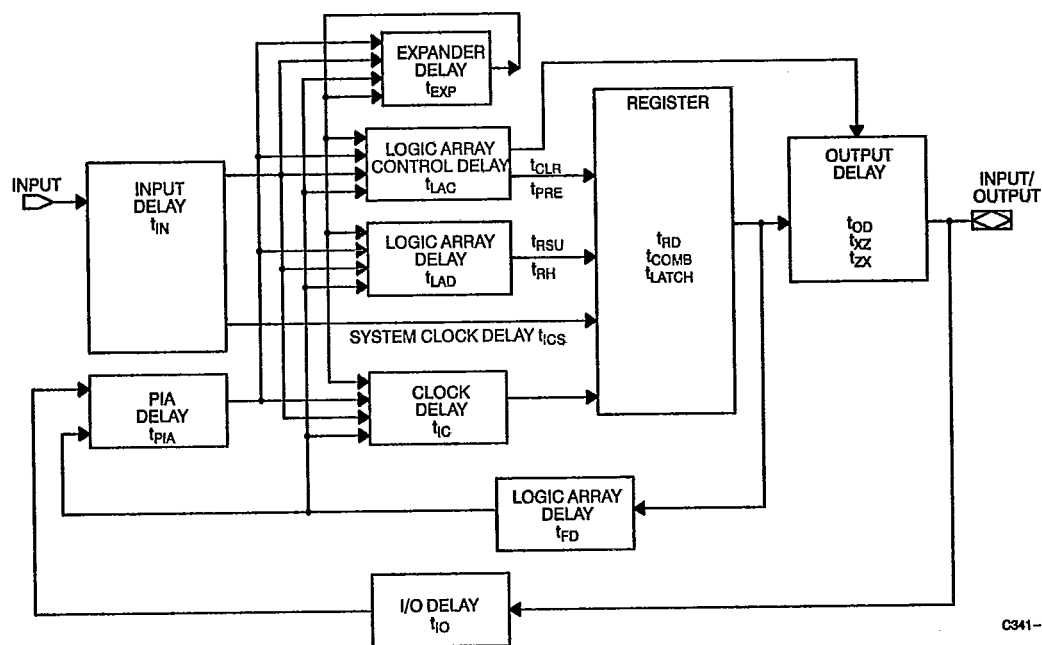
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Pin Configurations

PLCC/HLCC
Top ViewPGA
Bottom View

C341-2

C341-3



C341-4

Figure 1. CY7C341 Internal Timing Model

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Maximum Ratings

(Above which the useful life may be impaired. For user guidelines, not tested.)

Storage Temperature -65°C to $+150^{\circ}\text{C}$
 Ambient Temperature with
 Power Applied 0°C to $+70^{\circ}\text{C}$
 Maximum Junction Temperature
 (Under Bias) 150°C
 Supply Voltage to Ground Potential -2.0V to $+7.0\text{V}$
 Maximum Power Dissipation 2500 mW
 DC V_{CC} or GND Current 500 mA

DC Output Current, per Pin -25 mA to $+25\text{ mA}$
 DC Input Voltage^[1] -2.0V to $+7.0\text{V}$
 DC Program Voltage -2.0V to $+13.5\text{V}$

Operating Range

Range	Ambient Temperature	V_{CC}
Commercial	0°C to $+70^{\circ}\text{C}$	$5\text{V} \pm 5\%$
Industrial	-40°C to $+85^{\circ}\text{C}$	$5\text{V} \pm 10\%$
Military	-55°C to $+125^{\circ}\text{C}$ (Case)	$5\text{V} \pm 10\%$

Electrical Characteristics Over the Operating Range^[2]

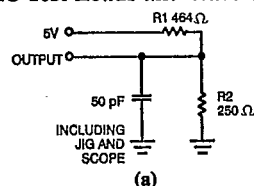
Parameters	Description	Test Conditions	CY7C341		Units
			Min.	Max.	
V_{OH}	Output HIGH Voltage	$V_{\text{CC}} = \text{Min.}, I_{\text{OH}} = -4.0\text{ mA}$	2.4		V
V_{OL}	Output LOW Voltage	$V_{\text{CC}} = \text{Min.}, I_{\text{OL}} = 8\text{ mA}$		0.45	V
V_{IH}	Input HIGH Level		2.2	$V_{\text{CC}} + 0.3$	V
V_{IL}	Input LOW Level		-0.3	0.8	V
I_{IX}	Input Current	$\text{GND} \leq V_{\text{IN}} \leq V_{\text{CC}}$	-10	+10	μA
I_{OZ}	Output Leakage Current	$V_{\text{O}} = V_{\text{CC}}$ or GND	-40	+40	μA
I_{OS}	Output Short Circuit Current	$V_{\text{CC}} = \text{Max.}, V_{\text{OUT}} = \text{GND}^{[3,4]}$	-30	-90	mA
I_{CC1}	Power Supply Current (Standby)	$V_{\text{I}} = V_{\text{CC}}$ or GND (No Load)	Com'l	360	mA
			Mil/Ind	435	mA
I_{CC2}	Power Supply Current ^[5]	$V_{\text{I}} = V_{\text{CC}}$ or GND (No Load) $f = 1.0\text{ MHz}^{[3,5]}$	Com'l	380	mA
			Mil/Ind	480	mA
t_{R} (Recommended)	Input Rise Time			100	ns
t_{F} (Recommended)	Input Fall Time			100	ns

Capacitance^[6]

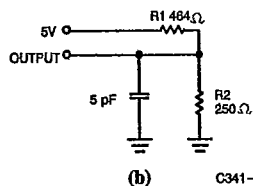
Parameters	Description	Test Conditions	Max.	Units
C_{IN}	Input Capacitance	$T_{\text{A}} = 25^{\circ}\text{C}, f = 1\text{ MHz},$ $V_{\text{CC}} = 5.0\text{V}$	10	pF
C_{OUT}	Output Capacitance		20	pF

Notes:

- Minimum DC input is -0.3V . During transitions, the inputs may undershoot to -2.0V for periods less than 20 ns .
- Typical values are for $T_{\text{A}} = 25^{\circ}\text{C}$ and $V_{\text{CC}} = 5\text{V}$.
- Guaranteed but not 100% tested.
- Not more than one output should be tested at a time. Duration of the short circuit should not be more than one second. $V_{\text{OUT}} = 0.5\text{V}$ has been chosen to avoid test problems caused by tester ground degradation.
- This parameter is measured with device programmed as a 16-bit counter in each LAB and is tested periodically by sampling production material.
- Part (a) in AC Test Load and Waveforms is used for all parameters except t_{R} and t_{F} , which is used for part (b) in AC Test Load and Waveforms. All external timing parameters are measured referenced to external pins of the device.

AC Test Loads and Waveforms

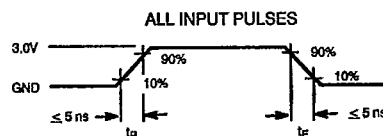
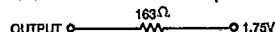
(a)



(b)

C341-5

Equivalent to: THÉVENIN EQUIVALENT (commercial/military)



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External Synchronous Switching Characteristics Over the Operating Range^[4]

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Parameters	Description		7C341-30		7C341-35		7C341-40		Units
			Min.	Max.	Min.	Max.	Min.	Max.	
t _{PD1}	Dedicated Input to Combinatorial Output Delay ^[7]	Com'l		30		35			ns
		Mil				35		40	
t _{PD2}	I/O Input to Combinatorial Output Delay ^[8]	Com'l		45		55			ns
		Mil				55		65	
t _{PD3}	Dedicated Input to Combinatorial Output Delay with Expander Delay ^[9]	Com'l		44		55			ns
		Mil				55		65	
t _{PD4}	I/O Input to Combinatorial Output Delay with Expander Delay ^[3, 10]	Com'l		59		75			ns
		Mil				75		90	
t _{EA}	Input to Output Enable Delay ^[3, 7]	Com'l		30		35			ns
		Mil				35		40	
t _{ER}	Input to Output Disable Delay ^[6]	Com'l		30		35			ns
		Mil				35		40	
t _{CO1}	Synchronous Clock Input to Output Delay	Com'l		16		20			ns
		Mil				20		23	
t _{CO2}	Synchronous Clock to Local Feedback to Combinatorial Output ^[3, 11]	Com'l		35		42			ns
		Mil				42		48	
t _{S1}	Dedicated Input or Feedback Set-up Time to Synchronous Clock Output ^[6, 12]	Com'l	20		25				ns
		Mil			25		28		
t _{S2}	I/O Input Set-up Time to Synchronous Clock Input ^[8]	Com'l	39		45				ns
		Mil			45		52		
t _H	Input Hold Time from Synchronous Clock Input ^[6]	Com'l	0		0				ns
		Mil			0		0		
t _{WH}	Synchronous Clock Input High Time	Com'l	10		12.5				ns
		Mil			12.5		15		
t _{WL}	Synchronous Clock Input Low Time	Com'l	10		12.5				ns
		Mil			12.5		15		
t _{RW}	Asynchronous Clear Width ^[3, 6]	Com'l	30		35				ns
		Mil			35		40		
t _{RR}	Asynchronous Clear Recovery ^[3, 7]	Com'l	30		35				ns
		Mil			35		40		
t _{RO}	Asynchronous Clear to Registered Output Delay ^[5]	Com'l		30		35			ns
		Mil				35		40	
t _{PW}	Asynchronous Preset Width ^[3, 6]	Com'l	30		35				ns
		Mil			35		40		
t _{PR}	Asynchronous Preset Recovery Time ^[3, 6]	Com'l	30		35				ns
		Mil			35		40		



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External Synchronous Switching Characteristics Over the Operating Range⁽⁴⁾(continued)

Parameter	Description		7C341-30		7C341-35		7C341-40		Units
			Min.	Max.	Min.	Max.	Min.	Max.	
t _{PO}	Asynchronous Preset to Registered Output Delay ^[6]	Com'l		30		35			ns
		Mil				35		40	
t _{CF}	Synchronous Clock to Local Feedback Input ^[3, 13]	Com'l		3		5			ns
		Mil				5		7	
t _P	External Synchronous Clock Period (1/t _{MAX3}) ^[3]	Com'l	20		25				ns
		Mil			25		30		
f _{MAX1}	External Feedback Maximum Frequency (1/(t _{CO1} + t _{S1})) ^[3, 14]	Com'l	27.7		22.2				MHz
		Mil			22.2		19.6		
f _{MAX2}	Internal Local Feedback Maximum Frequency, lesser of (1/(t _{S1} + t _{CE})) or (1/t _{CO1}) ^[3, 15]	Com'l	43		33				MHz
		Mil			33		28.5		
f _{MAX3}	Data Path Maximum Frequency, least of 1/(t _{WL} + t _{WH}), 1/(t _{S1} + t _H), or (1/t _{CO1}) ^[3, 16]	Com'l	50		40.0				MHz
		Mil			40.0		33.3		
f _{MAX4}	Maximum Register Toggle Frequency (1/(t _{WL} + t _{WH})) ^[3, 17]	Com'l	50.0		40.0				MHz
		Mil			40.0		33.3		
t _{OH}	Output Data Stable Time from Synchronous Clock Input ^[3, 18]	Com'l	3		3				ns
		Mil			3		3		

Notes:

- This specification is a measure of the delay from input signal applied to a dedicated input to combinational output on any output pin. This delay assumes no expander terms are used to form the logic function. When this note is applied to any parameter specification it indicates that the signal (data, asynchronous clock, asynchronous clear, and/or asynchronous preset) is applied to a dedicated input only and no signal path (either clock or data) employs expander logic. If an input signal is applied to an I/O pin an additional delay equal to t_{PIA} should be added to the comparable delay for a dedicated input. If expanders are used, add the maximum expander delay t_{EXP} to the overall delay for the comparable delay without expanders.
- This specification is a measure of the delay from input signal applied to an I/O macrocell pin to any output. This delay assumes no expander terms are used to form the logic function.
- This specification is a measure of the delay from an input signal applied to a dedicated input to combinational output on any output pin. This delay assumes expander terms are used to form the logic functions and includes the worst-case expander logic delay for one pass through the expander logic.
- This specification is a measure of the delay from an input signal applied to an I/O macrocell pin to any output. This delay assumes expander terms are used to form the logic function and includes the worst-case expander logic delay for one pass through the expander logic. This parameter is tested periodically by sampling production material.
- This specification is a measure of the delay from synchronous register clock to internal feedback of the register output signal to the input of the LAB logic array and then to a combinational output. This delay assumes no expanders are used, register is synchronously clocked and all feedback is within the same LAB. This parameter is tested periodically by sampling production material.
- If data is applied to an I/O input for capture by a macrocell register, the I/O pin set-up time minimums should be observed. These parameters are t_{S2} for synchronous operation and t_{AS2} for asynchronous operation.
- This specification is a measure of the delay associated with the internal register feedback path. This is the delay from synchronous clock to LAB logic array input. This delay plus the register set-up time, t_{S1}, is the minimum internal period for an internal synchronous state machine configuration. This delay is for feedback within the same LAB. This parameter is tested periodically by sampling production material.
- This specification indicates the guaranteed maximum frequency, in synchronous mode, at which a state machine configuration with external feedback can operate. It is assumed that all data inputs and feedback signals are applied to dedicated inputs. All feedback is assumed to be local originating within the same LAB.
- This specification indicates the guaranteed maximum frequency at which a state machine, with internal-only feedback, can operate. If register output states must also control external points, this frequency can still be observed as long as this frequency is less than 1/t_{CO1}.
- This frequency indicates the maximum frequency at which the device may operate in data path mode (dedicated input pin to output pin). This assumes data input signals are applied to dedicated input pins and no expander logic is used. If any of the data inputs are I/O pins, t_{S2} is the appropriate t_S for calculation.
- This specification indicates the guaranteed maximum frequency, in synchronous mode, at which an individual output or buried register can be cycle by a clock signal applied to the dedicated clock input pin.
- This parameter indicates the minimum time after a synchronous register clock input that the previous register output data is maintained on the output pin.

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External Asynchronous Switching Characteristics Over the Operating Range^[4] (continued)

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Parameters	Description		7C341-30		7C341-35		7C341-40		Units
			Min.	Max.	Min.	Max.	Min.	Max.	
t_{ACO1}	Dedicated Asynchronous Clock Input to Output Delay ^[6]	Com'l		30		35			ns
		Mil				35		45	
t_{ACO2}	Asynchronous Clock Input to Local Feedback to Combinatorial Output ^[19]	Com'l		46		55			ns
		Mil				55		64	
t_{AS1}	Dedicated Input or Feedback Set-up Time to Asynchronous Clock Input ^[6]	Com'l	6		8				ns
		Mil			8		10		
t_{AS2}	I/O Input Set-Up Time to Asynchronous Clock Input ^[6]	Com'l	27		30				ns
		Mil			30		33		
t_{AH}	Input Hold Time from Asynchronous Clock Input ^[6]	Com'l	8		10				ns
		Mil			10		12		
t_{AWH}	Asynchronous Clock Input HIGH Time ^[6]	Com'l	14		16				ns
		Mil			16		20		
t_{AWL}	Asynchronous Clock Input LOW Time ^[6,20]	Com'l	11		14				ns
		Mil			14		20		
t_{ACF}	Asynchronous Clock to Local Feedback Input ^[21]	Com'l		18		22			ns
		Mil				22		26	
t_{AP}	External Asynchronous Clock Period ($1/t_{MAX4}$)	Com'l	25		30				ns
		Mil			30		40		
f_{MAXA1}	External Feedback Maximum Frequency in Asynchronous Mode $1/(t_{ACO1} + t_{AS1})$ ^[22]	Com'l	27		23				MHz
		Mil			23		18		
f_{MAXA2}	Maximum Internal Asynchronous Frequency ^[23]	Com'l	40		33.3				MHz
		Mil			33.3		25		
f_{MAXA3}	Data Path Maximum Frequency in Asynchronous Mode ^[24]	Com'l	33.3		28.5				MHz
		Mil			28.5		22.2		
f_{MAXA4}	Maximum Asynchronous Register Toggle Frequency $1/(t_{AWH} + t_{AWL})$ ^[25]	Com'l	40		33.3				MHz
		Mil			33.3		25		
t_{AOH}	Output Data Stable Time from Asynchronous Clock Input ^[26]	Com'l	15		15				ns
		Mil			15		15		

Notes:

19. This specification is a measure of the delay from an asynchronous register clock input to internal feedback of the register output signal to the input of the LAB logic array and then to a combinatorial output. This delay assumes no expanders are used in the logic of combinatorial output or the asynchronous clock input. The clock signal is applied to the dedicated clock input pin and all feedback is within a single LAB. This parameter is tested periodically by sampling production material.
20. This parameter is measured with a positive-edge-triggered clock at the register. For negative-edge triggering, the t_{AWH} and t_{AWL} parameters must be swapped. If a given input is used to clock multiple registers with both positive and negative polarity, t_{AWH} should be used for both t_{AWH} and t_{AWL} .
21. This specification is a measure of the delay associated with the internal register feedback path for an asynchronous register set to LAB logic array input. This delay plus the asynchronous register set-up time, t_{AS1} , is the minimum internal period for an internal asynchronously clocked state machine configuration. This delay is for feedback within the same LAB, and assumes there is no expander logic in the clock path and the clock input signal is applied to a dedicated input pin. This parameter is tested periodically by sampling production material.
22. This specification indicates the guaranteed maximum frequency at which an asynchronously clocked state machine configuration with ex-

ternal feedback can operate. It is assumed that all data inputs, clock inputs, and feedback signals are applied to dedicated inputs, and that no expander logic is employed in the clock signal path or data path.

23. This specification indicates the guaranteed maximum frequency at which an asynchronously clocked state machine with internal-only feedback can operate. This parameter is determined by the lesser of $(1/(t_{ACF} + t_{AS1}))$ or $(1/(t_{AWH} + t_{AWL}))$. If register output states must also control external points, this frequency can still be observed as long as this frequency is less than $1/t_{ACO1}$.
24. This frequency is the maximum frequency at which the device may operate in the asynchronously clocked data path mode. This specification is determined by the least of $1/(t_{AWH} + t_{AWL})$, $1/(t_{AS1} + t_{AH})$ or $1/t_{ACO1}$. It assumes data and clock input signals are applied to dedicated input pins and no expander logic is used.
25. This specification indicates the guaranteed maximum frequency at which an individual output or buried register can be cycled in asynchronously clocked mode by a clock signal applied to an external dedicated input pin.
26. This parameter indicates the minimum time that the previous register output data is maintained on the output after an asynchronous register clock input applied to an external dedicated input pin.

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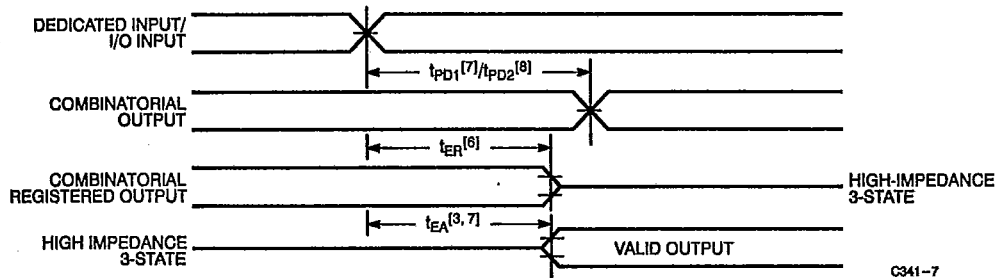
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Switching Waveforms

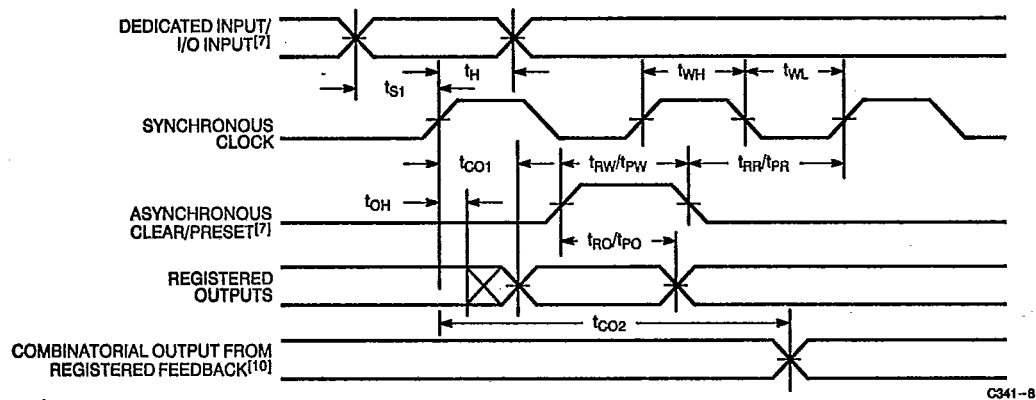
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External Combinatorial

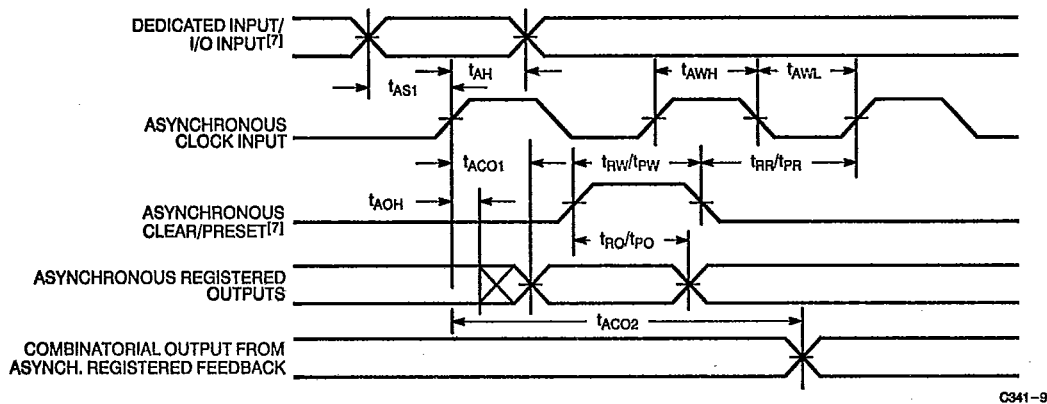


PLDS

External Synchronous



External Asynchronous





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Internal Switching Characteristics Over the Operating Range^[1]

Parameters	Description		7C341-30		7C341-35		7C341-40		Units
			Min.	Max.	Min.	Max.	Min.	Max.	
t _{IN}	Dedicated Input Pad and Buffer Delay	Com'l		7		9			ns
		Mil				9		11	
t _{IO}	I/O Input Pad and Buffer Delay	Com'l		6		9			ns
		Mil				9		12	
t _{EXP}	Expander Array Delay	Com'l		14		20			ns
		Mil				20		25	
t _{LAD}	Logic Array Data Delay	Com'l		14		16			ns
		Mil				16		18	
t _{LAC}	Logic Array Control Delay	Com'l		12		13			ns
		Mil				13		14	
t _{OD}	Output Buffer and Pad Delay	Com'l		5		6			ns
		Mil				6		7	
t _{ZX}	Output Buffer Enable Delay ^[27]	Com'l		11		13			ns
		Mil				13		15	
t _{XZ}	Output Buffer Disable Delay	Com'l		11		13			ns
		Mil				13		15	
t _{RSU}	Register Set-Up Time Relative to Clock Signal at Register	Com'l	8		10				ns
		Mil			10		12		
t _{RH}	Register Hold Time Relative to Clock Signal at Register	Com'l	8		10				ns
		Mil			10		12		
t _{LATCH}	Flow-Through Latch Delay	Com'l		4		4			ns
		Mil				4		4	
t _{RD}	Register Delay	Com'l		2		2			ns
		Mil				2		2	
t _{COMB}	Transparent Mode Delay ^[28]	Com'l		4		4			ns
		Mil				4		4	
t _{CH}	Clock High Time	Com'l	10		12.5				ns
		Mil			12.5		15		
t _{CL}	Clock Low Time	Com'l	10		12.5				ns
		Mil			12.5		15		
t _{IC}	Asynchronous Clock Logic Delay	Com'l		16		18			ns
		Mil				18		20	
t _{ICS}	Synchronous Clock Delay	Com'l		2		3			ns
		Mil				3		4	
t _{FD}	Feedback Delay	Com'l		1		2			ns
		Mil				2		3	
t _{PRE}	Asynchronous Register Preset Time	Com'l		6		7			ns
		Mil				7		8	
t _{CLR}	Asynchronous Register Clear Time	Com'l		6		7			ns
		Mil				7		8	
t _{PCW}	Asynchronous Preset and Clear Pulse Width	Com'l	6		7				ns
		Mil			7		8		
t _{PCR}	Asynchronous Preset and Clear Recovery Time	Com'l	6		7				ns
		Mil			7		8		
t _{PIA}	Programmable Interconnect Array Delay Time	Com'l		16		20			ns
		Mil				20		24	

Notes:

27. Sample tested only for an output change of 500 mV.

28. This specification guarantees the maximum combinatorial delay associated with the macrocell register bypass when the macrocell is configured for combinatorial operation.



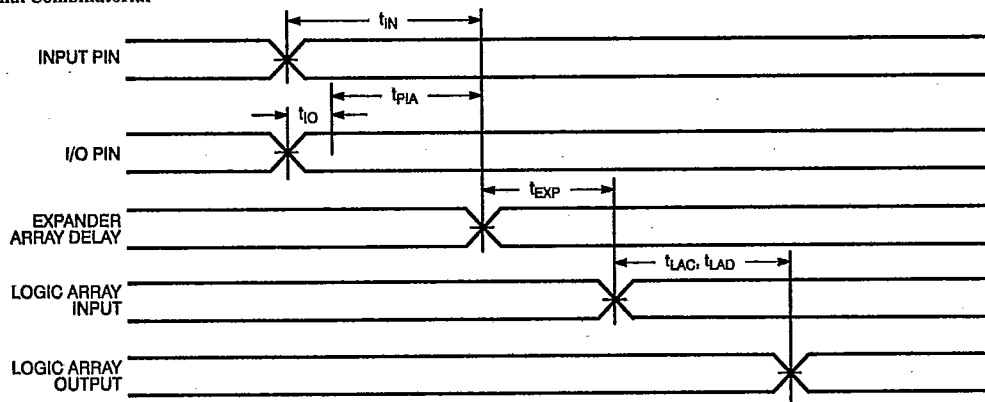
PRELIMINARY

CY7C341

Switching Waveforms (continued)

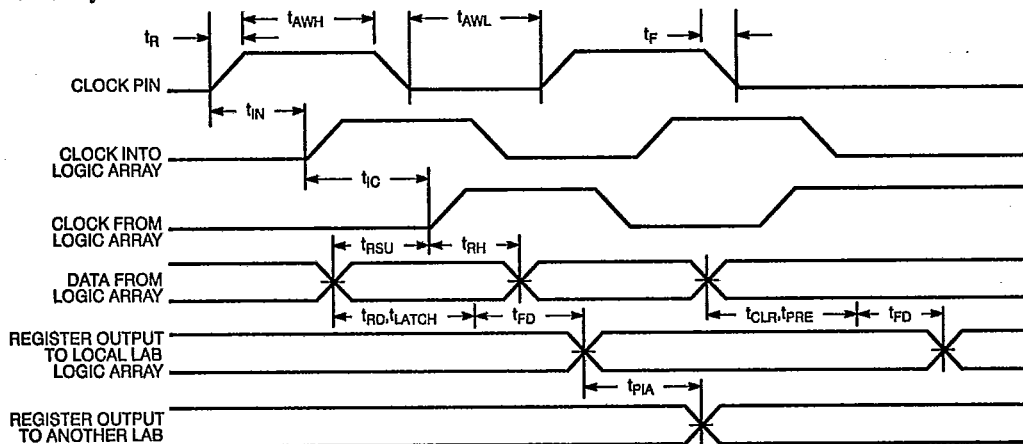
T-46-19-07

Internal Combinatorial



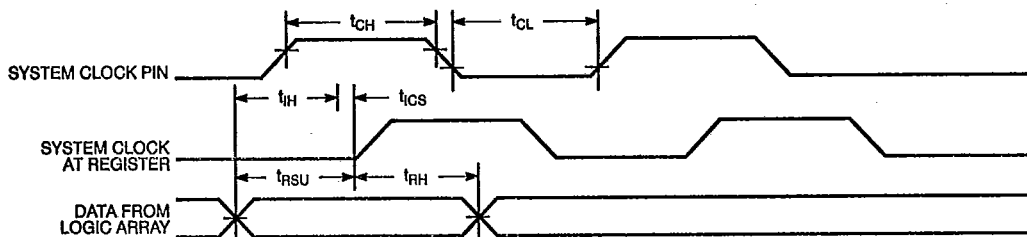
C341-10

Internal Asynchronous



C341-11

External Asynchronous



C341-12



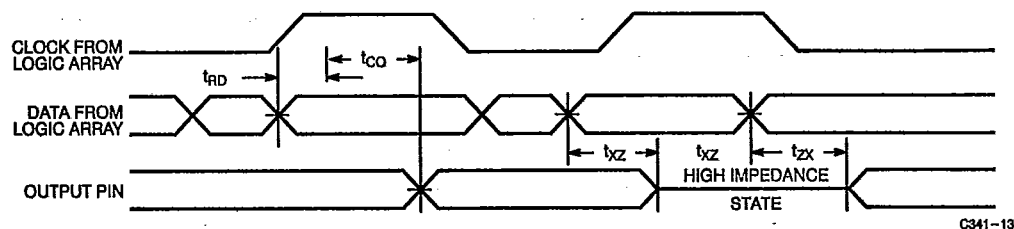
PRELIMINARY

CY7C341

Switching Waveforms (continued)

Internal Synchronous

T-46-19-07



C341-13

Ordering Information

Speed (ns)	Ordering Code	Package Type	Operating Range
30	CY7C341-30GC	G84	Commercial
	CY7C341-30HC	H84	
	CY7C341-30JC	J83	
	CY7C341-30RC	R84	
35	CY7C341-35GC	G84	Commercial
	CY7C341-35HC	H84	
	CY7C341-35JC	J83	
	CY7C341-35RC	R84	
	CY7C341-35HMB	H84	Military
	CY7C341-35RMB	R84	
40	CY7C341-40HMB	H84	Military
	CY7C341-40RMB	R84	

MILITARY SPECIFICATIONS
Group A Subgroup Testing

DC Characteristics

Parameters	Subgroups
V_{OH}	1, 2, 3
V_{OL}	1, 2, 3
V_{IH}	1, 2, 3
V_{IL}	1, 2, 3
I_{IX}	1, 2, 3
I_{OZ}	1, 2, 3
I_{CC1}	1, 2, 3

Switching Characteristics

Parameters	Subgroups
t_{PD1}	7, 8, 9, 10, 11
t_{PD2}	7, 8, 9, 10, 11
t_{PD3}	7, 8, 9, 10, 11
t_{PD4}	7, 8, 9, 10, 11
t_{CO1}	7, 8, 9, 10, 11
t_S	7, 8, 9, 10, 11
t_H	7, 8, 9, 10, 11
t_{ACO1}	7, 8, 9, 10, 11
t_{ACO2}	7, 8, 9, 10, 11
t_{AS}	7, 8, 9, 10, 11
t_{AH}	7, 8, 9, 10, 11

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