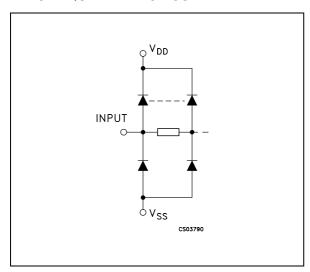
inputs are high at the time of zero count, the counters will jump to the maximum count, giving a counting sequence of 256 clock pulses long.

IINPUT EQUIVALENT CIRCUIT

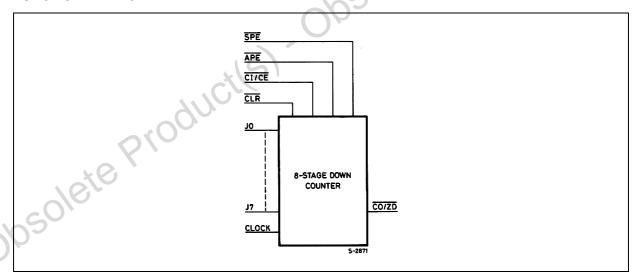


HCF40103B may be cascaded using the $\overline{\text{CI/CE}}$ input and the $\overline{\text{CO/ZD}}$ output, in either a synchronous or ripple mode.

PIN DESCRIPTION

PIN No	SYMBOL	NAME AND FUNCTION
1	CLOCK	Clock Input (LOW to HIGH edge triggered)
2	CLEAR	Asynchronous Master Reset Input (Active Low)
3	CI/CE	Terminal Enable Input
4, 5, 6, 7, 10, 11, 12, 13	J0 to J7	Jam Inputs
9	APE	Asynchronous Preset Enable Inputs(Active Low)
14	CO/ZD	Terminal Count Output (Active Low)
15	SPE	Synchronous Preset Enable Input (Active Low)
8	V_{SS}	Negative Supply Voltage
16	V_{DD}	Positive Supply Voltage

FUNCTIONAL DIAGRAM

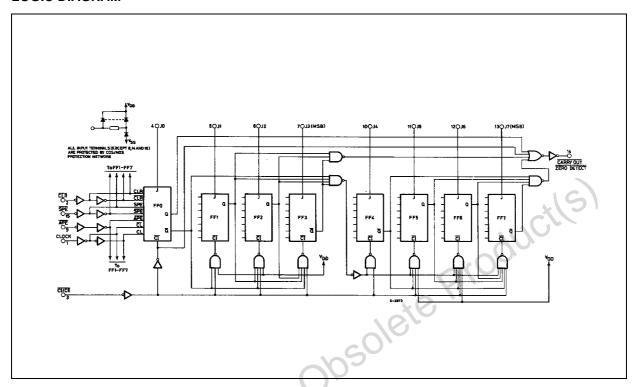


TRUTH TABLES

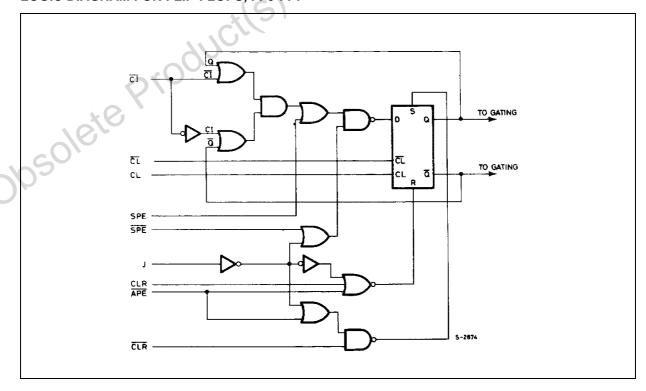
	CONTRO	L INPUTS		PRESET MODE	ACTION		
CLR	APE	SPE	CI/CE	PRESEI MODE	ACTION		
Н	Н	Н	Н		Inhibit Counter		
Н	Н	Н	L	Synchronous	Count Down		
Н	Н	L	Х		Preset on Next Positive Clock Transition		
Н	L	Х	Х	Agynahranaya	Preset Asynchronously		
L	Х	Х	Х	Asynchronous	Clear to Maximum Count		

X : Don't Care
Clock connected to Clock input
Synchronous Operation : changes occur on negative to positive clock transitions.

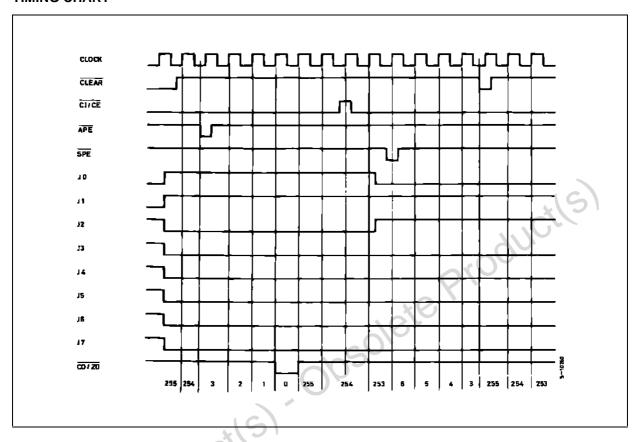
LOGIC DIAGRAM



LOGIC DIAGRAM FOR FLIP-FLOPS, FF0-FF7



TIMING CHART



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V _{DD}	Supply Voltage	-0.5 to +22	V
VI	DC Input Voltage	-0.5 to V _{DD} + 0.5	V
l _l	DC Input Current	± 10	mA
P _D	Power Dissipation per Package	200	mW
60.	Power Dissipation per Output Transistor	100	mW
T _{op}	Operating Temperature	-55 to +125	°C
T _{stg}	Storage Temperature	-65 to +150	°C

Absolute Maximum Ratings are those values beyond which damage to the device may occur. Functional operation under these conditions is not implied.

All voltage values are referred to V_{SS} pin voltage.

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Value	Unit
V_{DD}	Supply Voltage	3 to 20	V
V _I	Input Voltage	0 to V _{DD}	V
T _{op}	Operating Temperature	-55 to 125	°C

DC SPECIFICATIONS

			Test Con	dition		Value							
Symbol	Parameter	VI	٧o	v _o Io	V _{DD}	T _A = 25°C			-40 to 85°C		-55 to 125°C		Unit
		(V)	(V)	(μ A)	(V)	Min.	Тур.	Max.	Min.	Max.	Min.	Max.	
ΙL	Quiescent Current	0/5			5		0.04	5		150		150	
		0/10			10		0.04	10		300		300	μΑ
		0/15			15		0.04	20		600		600	μΑ
		0/20			20		0.08	100		3000		3000	
V _{OH}	High Level Output	0/5		<1	5	4.95			4.95		4.95		
	Voltage	0/10		<1	10	9.95			9.95		9.95	/	V
		0/15		<1	15	14.95			14.95		14.95	S	
V _{OL}	Low Level Output	5/0		<1	5		0.05			0.05		0.05	1
Voltage	10/0		<1	10		0.05			0.05	10	0.05	V	
		15/0		<1	15		0.05			0.05	O.	0.05	
V _{IH}	High Level Input		0.5/4.5	<1	5	3.5			3.5		3.5		V
	Voltage		1/9	<1	10	7			7		7		
			1.5/13.5	<1	15	11			11		11		
V_{IL}	Low Level Input		4.5/0.5	<1	5			1.5		1.5		1.5	
	Voltage		9/1	<1	10		7/6	3		3		3	V
			13.5/1.5	<1	15		0,	4		4		4	
I _{OH}	Output Drive	0/5	2.5	<1	5	-1.36	-3.2		-1.1		-1.1		
	Current	0/5	4.6	<1	5	-0.44	-1		-0.36		-0.36		 Λ
		0/10	9.5	<1	10	-1.1	-2.6		-0.9		-0.9		mA
		0/15	13.5	<1	15	-3.0	-6.8		-2.4		-2.4		
I _{OL}	Output Sink	0/5	0.4	<1	5	0.44	1		0.36		0.36		
	Current	0/10	0.5	<1	10	1.1	2.6		0.9		0.9		mA
		0/15	1.5	<1	15	3.0	6.8		2.4		2.4		
I _I	Input Leakage Current	0/18	Any In	put	18		±10 ⁻⁵	±0.1		±1		±1	μΑ
Cı	Input Capacitance		Any In	put			5	7.5					pF

The Noise Margin for both "1" and "0" level is: 1V min. with V_{DD}=5V, 2V min. with V_{DD}=10V, 2.5V min. with V_{DD}=15V

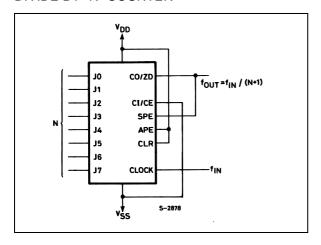
$\textbf{DYNAMIC ELECTRICAL CHARACTERISTICS} \; (\textbf{T}_{amb} = 25^{\circ} \textbf{C}, \;\; \textbf{C}_{L} = 50 \text{pF}, \; \textbf{R}_{L} = 200 \text{K}\Omega, \;\; \textbf{t}_{r} = \textbf{t}_{f} = 20 \; \text{ns})$

Comple of	-		Test Condition	\	Unit		
Symbol	Parameter	V _{DD} (V)		Min.	Тур.	Max.	
t _{PHL} t _{PLH}	Propagation Delay Time	5			300	600	
	Clock To Out	10			130	260	ns
		15			95	190	
t _{PHL} t _{PLH}	Propagation Delay Time	5			200	400	
	Carry In/counter Enable To	10			90	180	ns
	Output	15			65	130	
t _{PHL} t _{PLH}	Propagation Delay Time	5			650	1300	
	Asynchronous Preset	10			300	600	ns
	Enable To Output	15			200	400	1
t _{PHL} t _{PLH}	Propagation Delay Time	5			375	750	
	Clear To Output	10			180	360	ns
		15		$\Delta 0$	100	200	
t _{THL} t _{TLH}	Transition Time	5		0	100	200	
		10		Þ	50	100	ns
		15	.0,		40	80	
t _W	Clock Pulse Width	5	10	300	150		
		10		180	90		ns
		15	1250	80	40		
t _W	Clear Pulse Width	5		320	160		
		10	0.	160	80		ns
		15		100	50		
t _W	APE Pulse Width	5		360	180		
		10		160	80		ns
	(15		120	60		
t _{setup}	SPE Setup Time	5		280	140		
ootap	- 400	10		140	70		ns
		15		100	50		
t _{setup}	JAM Setup Time	5		200	100		
	70	10		80	40		ns
	6	15		60	30		
f _{CL}	Maximum Clock Input	5		0.7	1.4		
	Frequency	10		1.8	3.6		MHz
		15		2.4	4.8		

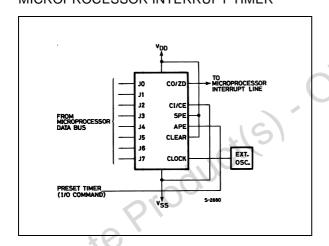
^(*) Typical temperature coefficient for all V_{DD} value is 0.3 %/°C.

TYPICAL APPLICATIONS

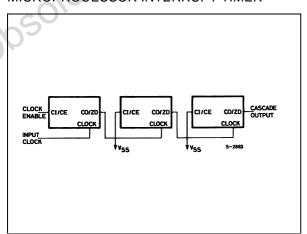
DIVIDE BY "N" COUNTER



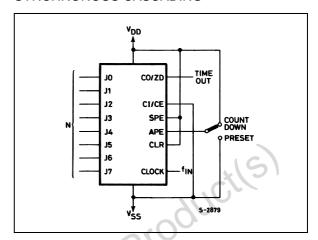
MICROPROCESSOR INTERRUPT TIMER



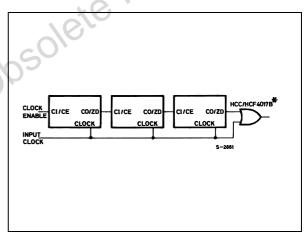
MICROPROCESSOR INTERRUPT TIMER



SYNCHRONOUS CASCADING

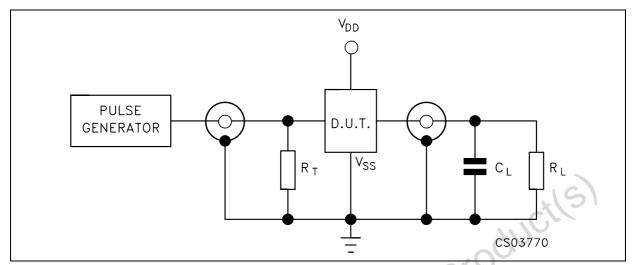


SYNCHRONOUS CASCADING



 * An Output spike (160ns at V_DD = 5V) occurs whenever two or more devices are cascaded in the parallel clocked mode because the clock-to-carry out delay is greater than the carry-in-to-carry-out delay. This spike is eliminated by gating the output of the last device with the clock as shown.

TEST CIRCUIT

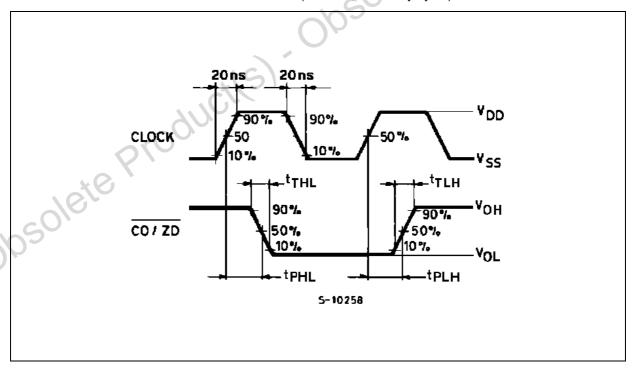


 $C_L = 50 pF$ or equivalent (includes jig and probe capacitance)

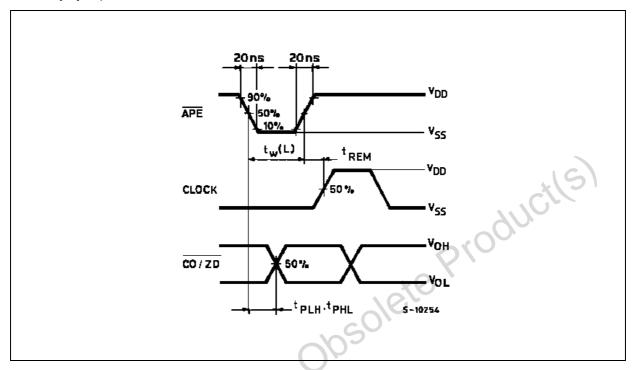
 $R_L = 200 K\Omega$

 $R_T = Z_{OUT}$ of pulse generator (typically 50 Ω)

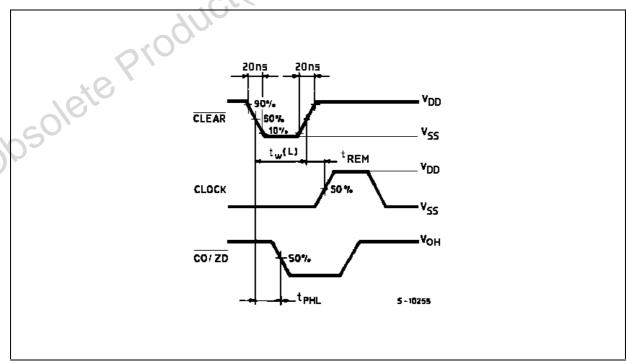
WAVEFORM 1: PROPAGATION DELAY TIME (f=1MHz; 50% duty cycle)



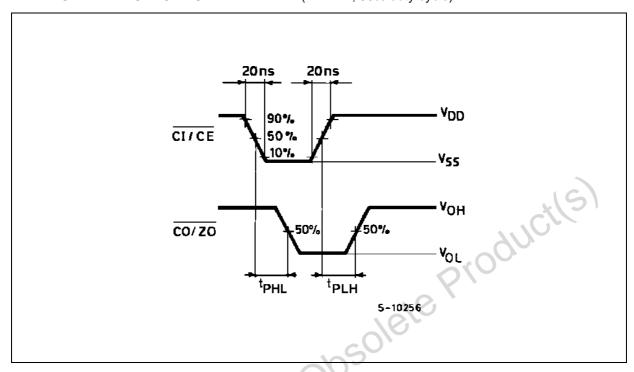
WAVEFORM 2 : PROPAGATION DELAY, MINIMUM PULSE WIDTH AND REMOVAL TIME (f=1MHz; 50% duty cycle)



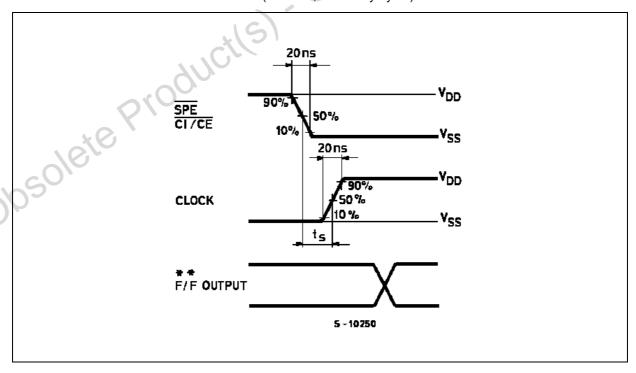
WAVEFORM 3 : PROPAGATION DELAY, MINIMUM PULSE WIDTH AND REMOVAL TIME (f=1MHz; 50% duty cycle)



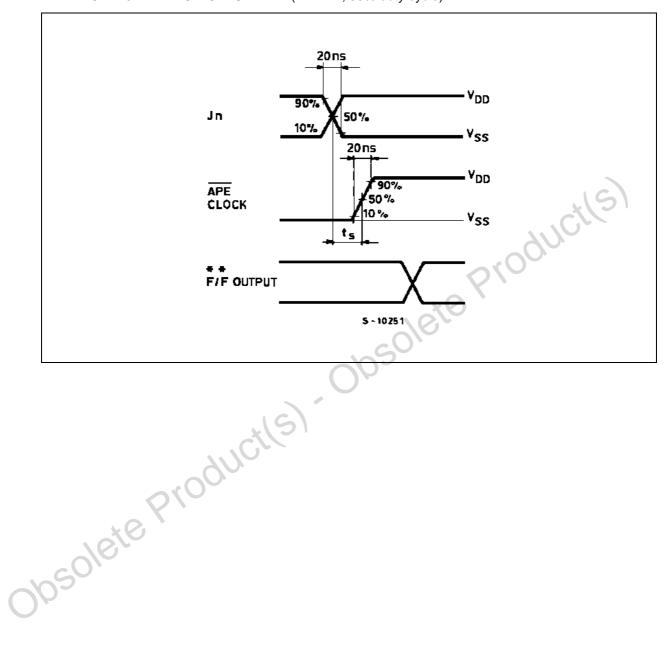
WAVEFORM 4: PROPAGATION DELAY TIME (f=1MHz; 50% duty cycle)



WAVEFORM 5: MINIMUM SETUP TIME (f=1MHz; 50% duty cycle)

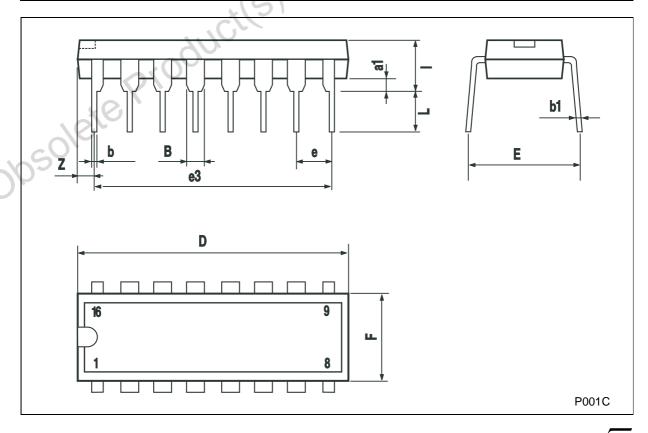


WAVEFORM 6: MINIMUM SETUP TIME (f=1MHz; 50% duty cycle)



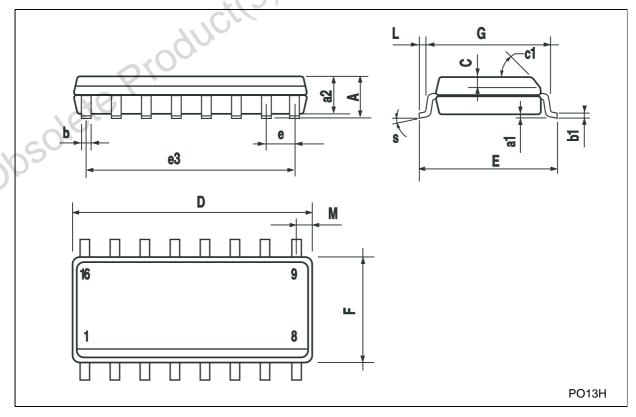
Plastic DIP-16 (0.25) MECHANICAL DATA

DIM		mm.		inch					
DIM.	MIN.	ТҮР	MAX.	MIN.	TYP.	MAX.			
a1	0.51			0.020					
В	0.77		1.65	0.030		0.065			
b		0.5			0.020				
b1		0.25			0.010	19			
D			20		.(0.787			
E		8.5			0.335				
е		2.54			0.100				
e3		17.78		20	0.700				
F			7.1	76/		0.280			
I			5.1	0.		0.201			
L		3.3	Oh	_	0.130				
Z			1.27			0.050			



SO-16 MECHANICAL DATA

DIM		mm.		inch				
DIM.	MIN.	TYP	MAX.	MIN.	TYP.	MAX.		
Α			1.75			0.068		
a1	0.1		0.2	0.003		0.007		
a2			1.65			0.064		
b	0.35		0.46	0.013		0.018		
b1	0.19		0.25	0.007		0.010		
С		0.5			0.019	(15)		
c1			45° (typ.)	,(11		
D	9.8		10	0.385	YO.	0.393		
E	5.8		6.2	0.228	100	0.244		
е		1.27			0.050			
e3		8.89		46	0.350			
F	3.8		4.0	0.149		0.157		
G	4.6		5.3	0.181		0.208		
L	0.5		1.27	0.019		0.050		
М			0.62			0.024		
S			g° (m	nax.)	1			





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