Truth Table

Pin	State							
	0	1						
5	Auto Reset Operating	Auto Reset Disabled						
6	Timer Operational	Master Reset On						
9	Output Initially Low	Output Initially High						
	after Reset	after Reset						
10	Single Cycle Mode	Recycle Mode						

Division Ratio Table

		Number of	Count				
Α	В	Counter Stages 2 ⁿ					
		n					
0	0	13	8192				
0	1	10	1024				
1	0	8	256				
1	1	16	65536				

Operating Characteristics

With Auto Reset pin set to a "0" the counter circuit is initialized by turning on power. Or with power already on, the counter circuit is reset when the Master Reset pin is set to a "1". Both types of reset will result in synchronously resetting all counter stages independent of counter state.

The RC oscillator frequency is determined by the external RC network, i.e.:

$$f = \frac{1}{2.3 \ R_{tc} C_{tc}} \text{if (1 kHz} \le f \le 100 \ \text{kHz)}$$

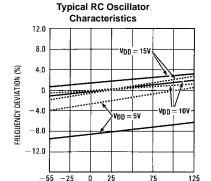
and $R_S\approx 2~R_{tc}$ where $R_S\geq 10~k\Omega$

The time select inputs (A and B) provide a two-bit address to output any one of four counter stages $(2^8, 2^{10}, 2^{13},$ and $2^{16})$. The 2^n counts as shown in the Division Ratio Table represent the Q output of the Nth stage of the counter. When A is "1", 2^{16} is selected for both states of B.

However, when B is "0", normal counting is interrupted and the 9th counter stage receives its clock directly from the oscillator (i.e., effectively outputting 2⁸).

The Q/\overline{Q} select output control pin provides for a choice of output level. When the counter is in a reset condition and Q/\overline{Q} select pin is set to a "0" the Q output is a "0". Correspondingly, when Q/\overline{Q} select pin is set to a "1" the Q output is a "1".

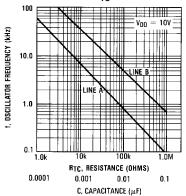
When the mode control pin is set to a "1", the selected count is continually transmitted to the output. But, with mode pin "0" and after a reset condition the RS flip-flop resets (see Logic Diagram), counting commences and after 2^{n-1} counts the RS flip-flop sets which causes the output to change state. Hence, after another 2^{n-1} counts the output will not change. Thus, a Master Reset pulse must be applied or a change in the mode pin level is required to reset the single cycle operation.



TA, AMBIENT TEMPERATURE (°C)

Solid Line = R_{TC} = 56 k Ω , R_S = 1 k Ω and C = 1000 pF f = 10.2 kHz @ V_{DD} = 10V and T_A = 25° Dashed Line = R_{TC} = 56 k Ω , R_S = 120 k Ω and C = 1000 pF f = 7.75 kHz @ V_{DD} = 10V and T_A = 25°

RC Oscillator Frequency as a Function of R_{TC} and C



Line A: f as a function of C and (R_{TC} = 56 k Ω ; R_S = 120k Line B: f as a function of R_{TC} and (C = 100 pF; R_S = 2 R_{TC}

Operating Characteristics (Continued) Oscillator Circuit Using RC Configuration → TO CLOCK **Logic Diagram** 6 Master Heset $V_{DD} = Pin 14$ $V_{SS} = Pin 7$

Absolute Maximum Ratings(Note 1)

(Note 2)

Recommended Operating Conditions (Note 2)

Supply Voltage (V_{DD}) -0.5V to +18V Input Voltage (V_{IN}) -0.5V to V_{DD} +0.5VStorage Temperature Range (T_S)

 -65°C to $+150^{\circ}\text{C}$

Power Dissipation (P_D) Dual-In-Line

700 mW Small Outline 500 mW

Lead Temperature (T_L)

260°C (soldering, 10 seconds)

Supply Voltage (V_{DD}) 3V to 15V Input Voltage (V_{IN}) 0 to V_{DD} -55°C to +125°C Operating Temperature Range

Note 1: "Absolute Maximum Ratings" are those values beyond which the safety of the device cannot be guaranteed. Except for "Operating Temperature Range" they are not meant to imply that the devices should be operated at these limits. The table of "Electrical Characteristics" provides conditions for actual device operation.

Note 2: $V_{SS} = 0V$ unless otherwise specified.

DC Electrical Characteristics (Note 2)

Symbol	Parameter	Conditions	–55°C		+25°C			+125°C		Units
		Conditions	Min	Max	Min	Тур	Max	Min	Max	Units
I _{DD}	Quiescent Device Current	$V_{DD} = 5V$, $V_{IN} = V_{DD}$ or V_{SS}		5		0.005	5		150	
		$V_{DD} = 10V$, $V_{IN} = V_{DD}$ or V_{SS}		10		0.010	10		300	μΑ
		$V_{DD} = 15V$, $V_{IN} = V_{DD}$ or V_{SS}		20		0.015	20		600	
V _{OL}	LOW Level Output Voltage	$V_{DD} = 5V$		0.05		0	0.05		0.05	
		$V_{DD} = 10V I_O < 1\mu A$		0.05		0	0.05		0.05	V
		V _{DD} = 15V		0.05		0	0.05		0.05	
V _{OH}	HIGH Level Output Voltage	$V_{DD} = 5V$	4.95		4.95	5		4.95		
		$V_{DD} = 10V I_O < 1 \mu A$	9.95		9.95	10		9.95		V
		V _{DD} = 15V	14.95		14.95	15		14.95		
V _{IL}	LOW Level Input Voltage	$V_{DD} = 5V$, $V_{O} = 0.5V$ or 4.5V		1.5		2	1.5		1.5	
		$V_{DD} = 10V, V_{O} = 1.0V \text{ or } 9.0V$		3.0		4	3.0		3.0	V
		$V_{DD} = 15V, V_{O} = 1.5V \text{ or } 13.5V$		4.0		6	4.0		4.0	
V _{IH}	HIGH Level Input Voltage	$V_{DD} = 5V, V_{O} = 0.5V \text{ or } 4.5V$	3.5		3.5	3		3.5		
		$V_{DD} = 10V, V_{O} = 1.0V \text{ or } 9.0V$	7.0		7.0	6		7.0		V
		$V_{DD} = 15V, V_{O} = 1.5V \text{ or } 13.5V$	11.0		11.0	9		11.0		
I _{OL}	LOW Level Output Current	$V_{DD} = 5V, V_{O} = 0.4V$	2.85		2.27	3.6		1.6		
	(Note 3)	$V_{DD} = 10V, V_{O} = 0.5V$	4.16		4.0	9.0		2.8		mA
		$V_{DD} = 15V, V_{O} = 1.5V$	19.3		15.6	34.0		10.9		
I _{OH}	HIGH Level Output Current	$V_{DD} = 5V, V_{O} = 2.5V$	7.96		6.42	130		4.49		
	(Note 3)	$V_{DD} = 10V, V_{O} = 9.5V$	4.19		3.38	8.0		2.37		mA
		$V_{DD} = 15V, V_{O} = 13.5V$	16.3		13.2	30.0		9.24		
I _{IN}	Input Current	$V_{DD} = 15V, V_{IN} = 0V$		-0.1		-10 ⁻⁵	-0.1		-1.0	μА
		$V_{DD} = 15V, V_{IN} = 15V$		0.1		10 ⁻⁵	0.1		1.0	μΑ

Note 3: I_{OH} and I_{OL} are tested one output at a time.

AC Electrical Characteristics (Note 4)

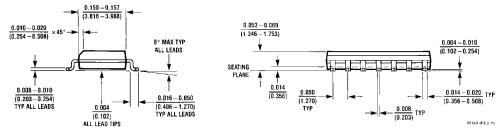
 $T_A = 25$ °C, $C_L = 50$ pF (refer to test circuits)

Symbol	Parameter	Conditions	Min	Тур	Max	Units
t _{TLH}	Output Rise Time	$V_{DD} = 5V$		50	200	
		$V_{DD} = 10V$		30	100	ns
		$V_{DD} = 15V$		25	80	
t _{THL}	Output Fall Time	$V_{DD} = 5V$		50	200	
		$V_{DD} = 10V$		30	100	ns
		$V_{DD} = 15V$		25	80	
t _{PLH} , t _{PHL}	Turn-Off, Turn-On Propagation Delay,	$V_{DD} = 5V$		1.8	4.0	
	Clock to Q (28 Output)	$V_{DD} = 10V$		0.6	1.5	μs
		$V_{DD} = 15V$		0.4	1.0	
t _{PHL} , t _{PLH}	Turn-On, Turn-Off Propagation Delay,	$V_{DD} = 5V$		3.2	8.0	
	Clock to Q (2 ¹⁶ Output)	$V_{DD} = 10V$		1.5	3.0	μs
		$V_{DD} = 15V$		1.0	2.0	
t _{WH(CL)}	Clock Pulse Width	$V_{DD} = 5V$	400	200		
		$V_{DD} = 10V$	200	100		ns
		$V_{DD} = 15V$	150	70		
f _{CL}	Clock Pulse Frequency	$V_{DD} = 5V$		2.5	1.0	
		$V_{DD} = 10V$		6.0	3.0	MHz
		$V_{DD} = 15V$		8.5	4.0	
t _{WH(R)}	MR Pulse Width	$V_{DD} = 5V$	400	170		
		V _{DD} = 10V	200	75		ns
		V _{DD} = 15V	150	50		
CI	Average Input Capacitance	Any Input		5.0	7.5	pF
C _{PD}	Power Dissipation Capacitance (Note 5)			100		pF

Note 4: AC Parameters are guaranteed by DC correlated testing.

Note 5: C_{PD} determines the no load AC power consumption of any CMOS device. For complete explanation, see Family Characteristics application note: AN-90.

Test Circuits and Waveforms Switching Time Test Circuit and Waveforms Power Dissipation Test Circuit and Waveforms PULSE Generator Q/Q SELECT Q/Q SELECT MODE MODE ±vss (R $_{tc}$ and C $_{tc}$ outputs are left open) – †WH(CL) --- tWH(CL) -**←**20 ns -20 ns 90% 50% 50% / - 50% -50% DUTY CYCLE



16-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-012, 0.150" Narrow Package Number M16A

Physical Dimensions inches (millimeters) unless otherwise noted (Continued) 0.740 - 0.770 (18.80 - 19.56)0.090 (2.286) 14 13 12 11 10 9 8 14 13 12 INDEX AREA 0.250 ± 0.010 (6.350 ± 0.254) PIN NO. 1 PIN NO. 1 IDENT 1 2 3 4 5 6 7 1 2 3 $\frac{0.092}{(2.337)}$ DIA $\frac{0.030}{(0.762)}$ MAX OPTION 1 OPTION 02 $\frac{0.135 \pm 0.005}{(3.429 \pm 0.127)}$ 0.300 - 0.320 $\frac{0.620 - 8.128}{(7.620 - 8.128)}$ 0.060 0.145 - 0.2004° TYP Optional (1.651) (3.683 - 5.080) $\frac{0.008 - 0.016}{(0.203 - 0.406)}$ TYP 0.020 (0.508) 0.125 - 0.150 0.075 ± 0.015 $\overline{(3.175 - 3.810)}$ (1.905 ± 0.381) (7.112) MIN 0.014 - 0.0230.100 ± 0.010 (2.540 ± 0.254) (0.356 - 0.584)

14-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300" Wide Package Number N14A

 $\frac{0.050 \pm 0.010}{(1.270 - 0.254)}$ TYP

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0.325 ^{+0.040} -0.015 8.255 + 1.016

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