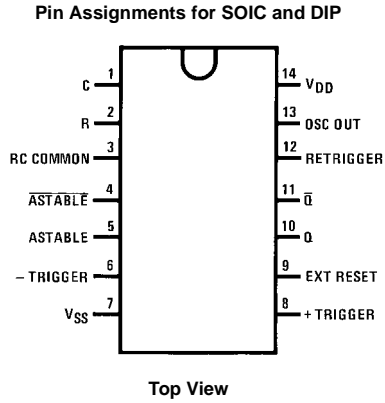


### Connection Diagram

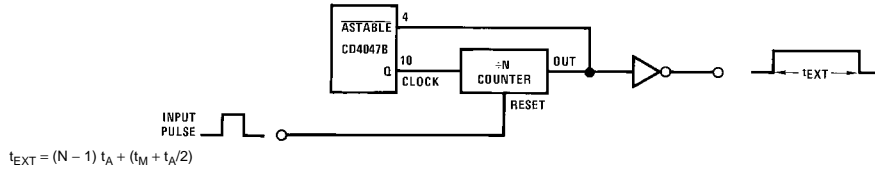


### Function Table

Function	Terminal Connections			Output Pulse From	Typical Output Period or Pulse Width
	To V <sub>DD</sub>	To V <sub>SS</sub>	Input Pulse To		
Astable Multivibrator					
Free-Running	4, 5, 6, 14	7, 8, 9, 12		10, 11, 13	$t_A(10, 11) = 4.40 RC$
True Gating	4, 6, 14	7, 8, 9, 12	5	10, 11, 13	$t_A(13) = 2.20 RC$
Complement Gating	6, 14	5, 7, 8, 9, 12	4	10, 11, 13	
Monostable Multivibrator					
Positive-Edge Trigger	4, 14	5, 6, 7, 9, 12	8	10, 11	$t_M(10, 11) = 2.48 RC$
Negative-Edge Trigger	4, 8, 14	5, 7, 9, 12	6	10, 11	
Retriggerable	4, 14	5, 6, 7, 9	8, 12	10, 11	
External Countdown (Note 1)	14	5, 6, 7, 8, 9, 12	Figure 1	Figure 1	Figure 1

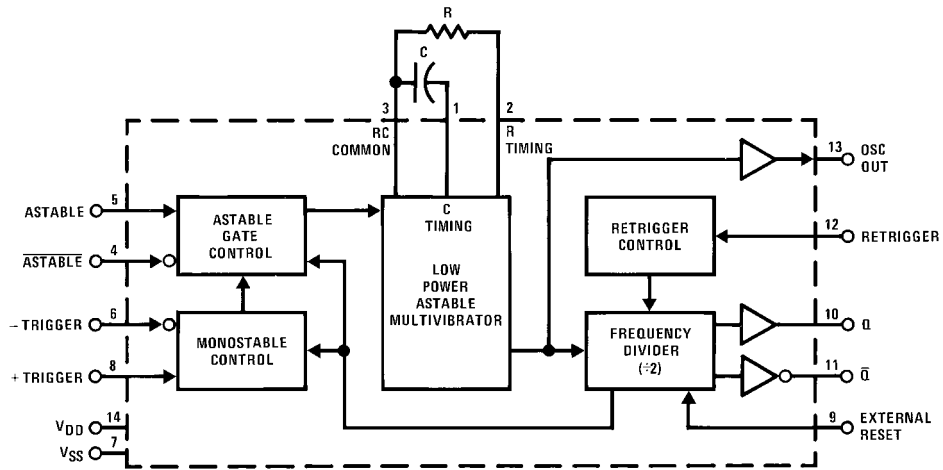
Note 1: External resistor between terminals 2 and 3. External capacitor between terminals 1 and 3.

### Typical Implementation of External Countdown Option

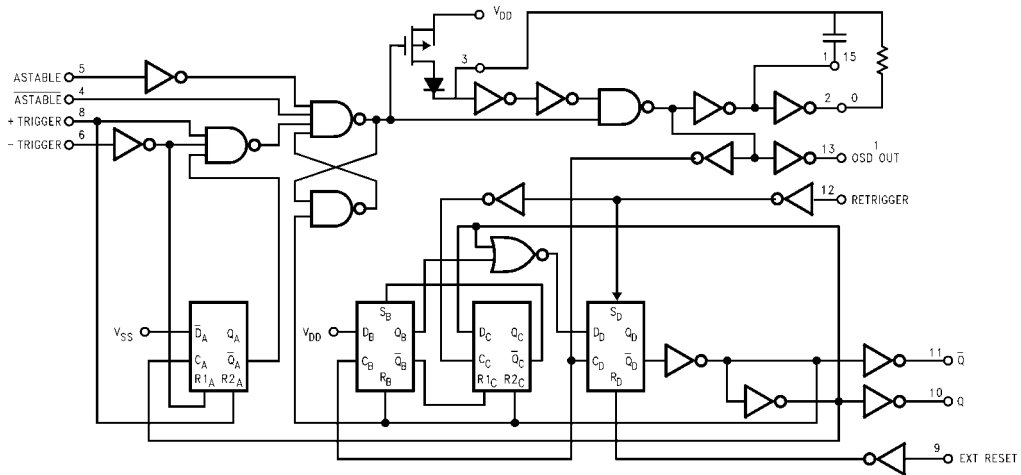


$$t_{EXT} = (N - 1) t_A + (t_M + t_A/2)$$

**Block Diagram**



**Logic Diagram**



\*Special input protection circuit to permit larger input-voltage swings.

**Absolute Maximum Ratings**(Note 2)

(Note 3)

DC Supply Voltage ( $V_{DD}$ )	-0.5V to +18V <sub>DC</sub>
Input Voltage ( $V_{IN}$ )	-0.5V to $V_{DD}$ +0.5V <sub>DC</sub>
Storage Temperature Range ( $T_S$ )	-65°C to +150°C
Power Dissipation ( $P_D$ )	
Dual-In-Line	700 mW
Small Outline	500 mW
Lead Temperature ( $T_L$ )	
(Soldering, 10 seconds)	260°C

**Recommended Operating Conditions** (Note 3)

DC Supply Voltage ( $V_{DD}$ )	3V to 15V <sub>DC</sub>
Input Voltage ( $V_{IN}$ )	0 to $V_{DD}$ V <sub>DC</sub>
Operating Temperature Range ( $T_A$ )	-55°C to +125°C

**Note 2:** "Absolute Maximum Ratings" are those values beyond which the safety of the device cannot be guaranteed. They are not meant to imply that the devices should be operated at these limits. The table of "Recommended Operating Conditions" and "Electrical Characteristics" provides conditions for actual device operation.

**Note 3:**  $V_{SS} = 0V$  unless otherwise specified.

**DC Electrical Characteristics** (Note 3)

Symbol	Parameter	Conditions	-55°C		25°C			125°C		Units
			Min	Max	Min	Typ	Max	Min	Max	
$I_{DD}$	Quiescent Device Current	$V_{DD} = 5V$ $V_{DD} = 10V$ $V_{DD} = 15V$		5 10 20			5 10 20		150 300 600	$\mu A$
$V_{OL}$	LOW Level Output Voltage	$ I_{O}  < 1 \mu A$ $V_{DD} = 5V$ $V_{DD} = 10V$ $V_{DD} = 15V$		0.05 0.05 0.05		0 0 0	0.05 0.05 0.05		0.05 0.05 0.05	V
$V_{OH}$	HIGH Level Output Voltage	$ I_{O}  < 1 \mu A$ $V_{DD} = 5V$ $V_{DD} = 10V$ $V_{DD} = 15V$	4.95 9.95 14.95		4.95 9.95 14.95	5 10 15		4.95 9.95 14.95		V
$V_{IL}$	LOW Level Input Voltage	$V_{DD} = 5V, V_O = 0.5V$ or 4.5V $V_{DD} = 10V, V_O = 1V$ or 9V $V_{DD} = 15V, V_O = 1.5V$ or 13.5V		1.5 3.0 4.0		2.25 4.5 6.75	1.5 3.0 4.0		1.5 3.0 4.0	V
$V_{IH}$	HIGH Level Input Voltage	$V_{DD} = 5V, V_O = 0.5V$ or 4.5V $V_{DD} = 10V, V_O = 1V$ or 9V $V_{DD} = 15V, V_O = 1.5V$ or 13.5V	3.5 7.0 11.0		3.5 7.0 11.0	2.75 5.5 8.25		3.5 7.0 11.0		V
$I_{OL}$	LOW Level Output Current (Note 4)	$V_{DD} = 5V, V_O = 0.4V$ $V_{DD} = 10V, V_O = 0.5V$ $V_{DD} = 15V, V_O = 1.5V$	0.64 1.6 4.2		0.51 1.3 3.4	0.88 2.25 8.8		0.36 0.9 2.4		mA
$I_{OH}$	HIGH Level Output Current (Note 4)	$V_{DD} = 5V, V_O = 4.6V$ $V_{DD} = 10V, V_O = 9.5V$ $V_{DD} = 15V, V_O = 13.5V$	-0.64 -1.6 -4.2		-0.51 -1.3 -3.4	-0.88 -2.25 -8.8		-0.36 -0.9 -2.4		mA
$I_{IN}$	Input Current	$V_{DD} = 15V, V_{IN} = 0V$ $V_{DD} = 15V, V_{IN} = 15V$		-0.1 0.1		$-10^{-5}$ $10^{-5}$	-0.1 0.1		-1.0 1.0	$\mu A$

**Note 4:**  $I_{OH}$  and  $I_{OL}$  are tested one output at a time.

**AC Electrical Characteristics** (Note 5)

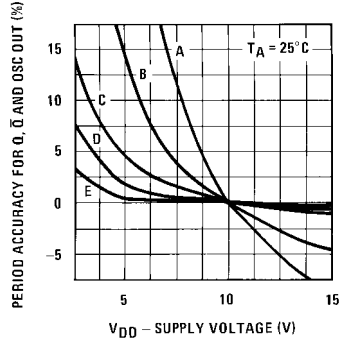
$T_A = 25^\circ\text{C}$ ,  $C_L = 50\text{ pF}$ ,  $R_L = 200\text{ k}$ , input  $t_r = t_f = 20\text{ ns}$ , unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Units
$t_{PHL}$ , $t_{PLH}$	Propagation Delay Time Astable, Astable to Osc Out	$V_{DD} = 5\text{V}$ $V_{DD} = 10\text{V}$ $V_{DD} = 15\text{V}$		200 100 80	400 200 160	ns
$t_{PHL}$ , $t_{PLH}$	Astable, Astable to Q, $\bar{Q}$	$V_{DD} = 5\text{V}$ $V_{DD} = 10\text{V}$ $V_{DD} = 15\text{V}$		550 250 200	900 500 400	ns
$t_{PHL}$ , $t_{PLH}$	+ Trigger, - Trigger to $\bar{Q}$	$V_{DD} = 5\text{V}$ $V_{DD} = 10\text{V}$ $V_{DD} = 15\text{V}$		700 300 240	1200 600 480	ns
$t_{PHL}$ , $t_{PLH}$	+ Trigger, Retrigger to $\bar{Q}$	$V_{DD} = 5\text{V}$ $V_{DD} = 10\text{V}$ $V_{DD} = 15\text{V}$		300 175 150	600 300 250	ns
$t_{PHL}$ , $t_{PLH}$	Reset to Q, $\bar{Q}$	$V_{DD} = 5\text{V}$ $V_{DD} = 10\text{V}$ $V_{DD} = 15\text{V}$		300 125 100	600 250 200	ns
$t_{THL}$ , $t_{TLH}$	Transition Time Q, $\bar{Q}$ , Osc Out	$V_{DD} = 5\text{V}$ $V_{DD} = 10\text{V}$ $V_{DD} = 15\text{V}$		100 50 40	200 100 80	ns
$t_{WL}$ , $t_{WH}$	Minimum Input Pulse Duration	Any Input $V_{DD} = 5\text{V}$ $V_{DD} = 10\text{V}$ $V_{DD} = 15\text{V}$		500 200 160	1000 400 320	ns
$t_{RCL}$ , $t_{FCL}$	+ Trigger, Retrigger, Rise and Fall Time	$V_{DD} = 5\text{V}$ $V_{DD} = 10\text{V}$ $V_{DD} = 15\text{V}$			15 5 5	$\mu\text{s}$
$C_{IN}$	Average Input Capacitance	Any Input		5	7.5	pF

**Note 5:** AC Parameters are guaranteed by DC correlated testing.

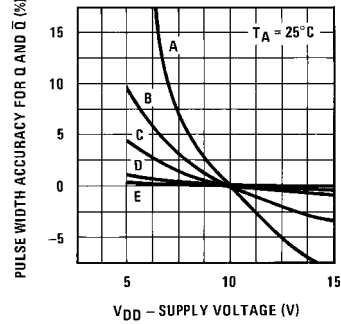
## Typical Performance Characteristics

Typical Q,  $\bar{Q}$ , Osc Out Period Accuracy vs Supply Voltage (Astable Mode Operation)



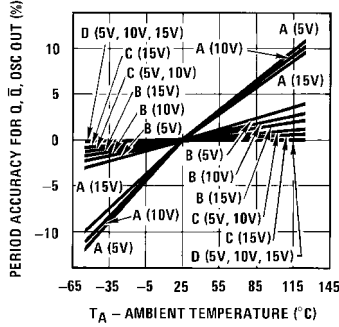
$f_{Q, \bar{Q}}$	R	C
A 1000 kHz	22k	10 pF
B 100 kHz	22k	100 pF
C 10 kHz	220k	100 pF
D 1 kHz	220k	1000 pF
E 100 Hz	2.2M	1000 pF

Typical Q,  $\bar{Q}$ , Pulse Width Accuracy vs Supply Voltage Monostable Mode Operation



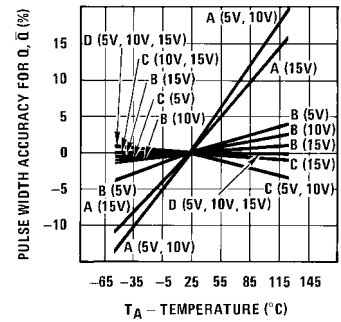
$t_M$	R	C
A 2 $\mu$ s	22k	10 pF
B 7 $\mu$ s	22k	100 pF
C 60 $\mu$ s	220k	100 pF
D 550 $\mu$ s	220k	1000 pF
E 5.5 ms	2.2M	1000 pF

Typical Q,  $\bar{Q}$  and Osc Out Period Accuracy vs Temperature Astable Mode Operation



$f_{Q, \bar{Q}}$	R	C
A 1000 kHz	22k	10 pF
B 100 kHz	22k	100 pF
C 10 kHz	220k	100 pF
D 1 kHz	220k	1000 pF

Typical Q and  $\bar{Q}$  Pulse Width Accuracy vs Temperature Monostable Mode Operation

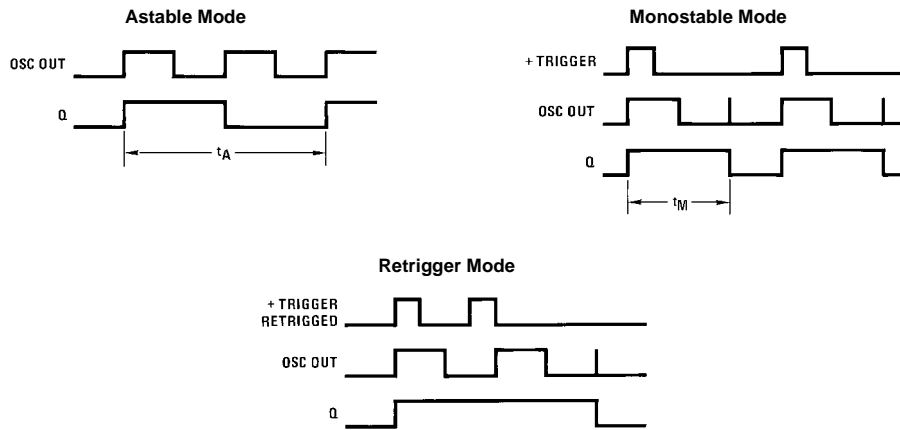


$t_M$	R	C
A 2 $\mu$ s	22k	10 pF
B 7 $\mu$ s	22k	100 pF
C 60 $\mu$ s	220k	100 pF
D 550 $\mu$ s	220k	1000 pF

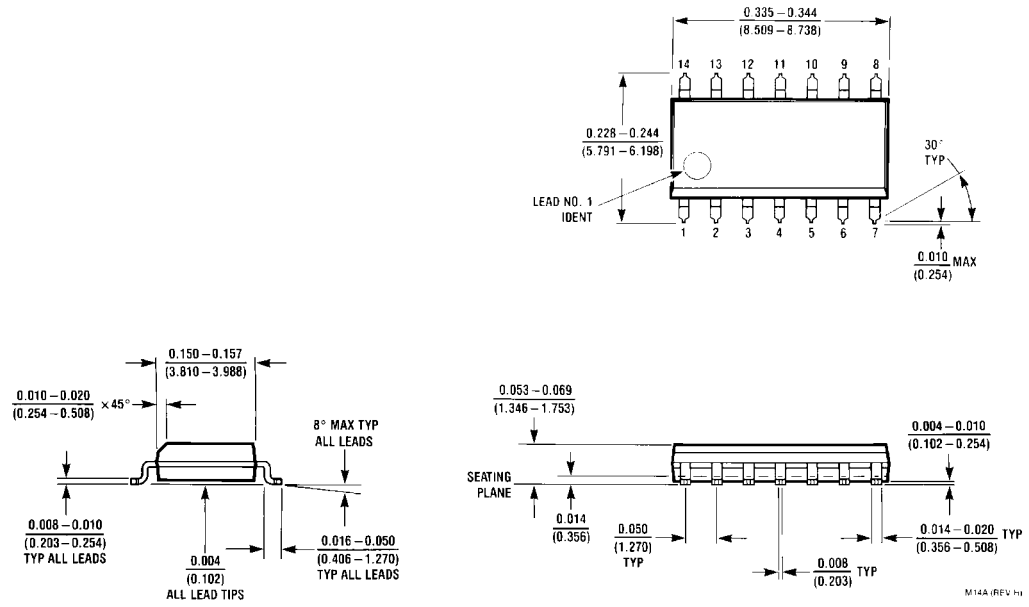
**Note:** Minimum Value of R: 10 K  $\Omega$   
 Maximum Value of R: 1 Meg  $\Omega$   
 Minimum Value of C for Astable Mode: 100 pF  
 Minimum Value of C for Monostable Mode: 1000 pF

**Typical Performance Characteristics** (Continued)

**Timing Diagrams**

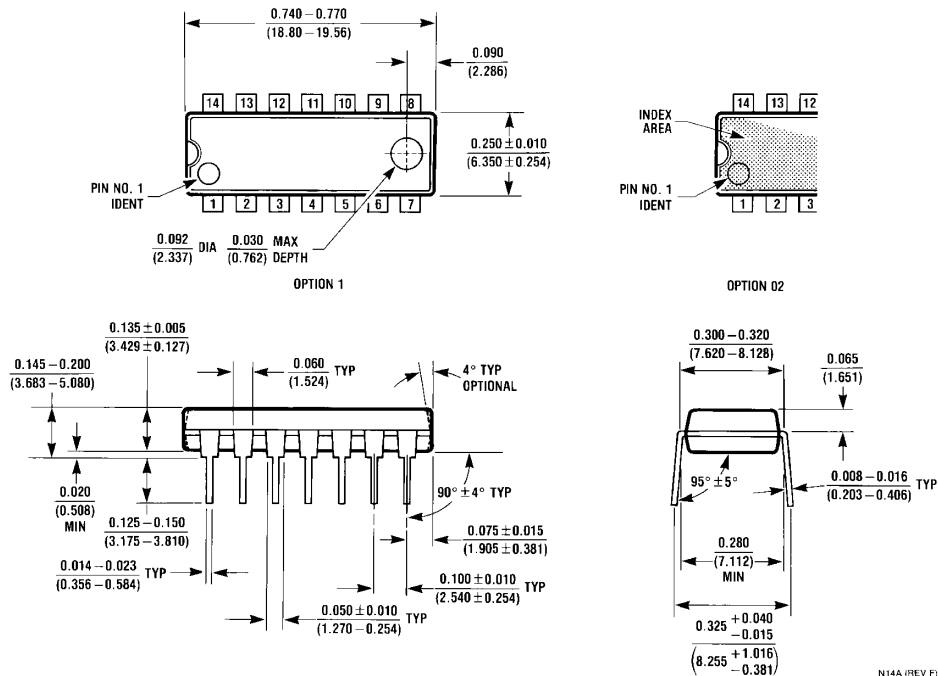


**Physical Dimensions** inches (millimeters) unless otherwise noted



**14-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-012, 0.150" Narrow  
Package Number M14A**

**Physical Dimensions** inches (millimeters) unless otherwise noted (Continued)



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

N14A (REV F)

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