

# MC74AC4040

## 12-Stage Binary Ripple Counter

The MC74AC4040 consists of 12 master-slave flip-flops. The output of each flip-flop feeds the next and the frequency at each output is half that of the preceding one. The state of the counter advances on the negative-going edge of the Clock input. Reset is asynchronous and active-high.

State changes of the Q outputs do not occur simultaneously because of internal ripple delays. Therefore, decoded output signals are subject to decoding spikes and may have to be gated with the Clock of the MC74AC4040 for some designs.

### Features

- 140 MHz Typ. Clock
- Outputs Source/Sink 24 mA
- Operating Voltage Range: 2.0 to 6.0 V
- High Noise Immunity
- Pb-Free Packages are Available

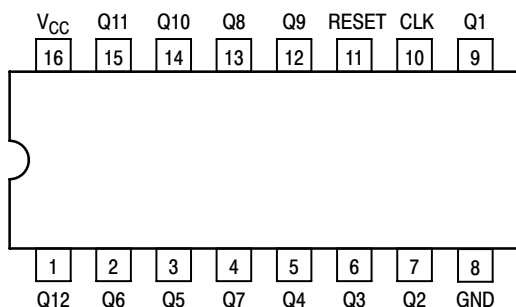


Figure 1. Pinout: 16-Lead Packages Conductors (Top View)

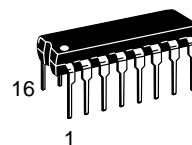
### FUNCTION TABLE

Clock	Reset	Output State
	L	No Change
	L	Advance to next state
X	H	All Outputs are low

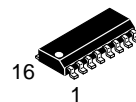


ON Semiconductor®

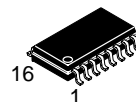
<http://onsemi.com>



PDIP-16  
N SUFFIX  
CASE 648



SOIC-16  
D SUFFIX  
CASE 751B



SOEIAJ-16  
M SUFFIX  
CASE 966

### ORDERING INFORMATION

Device	Package	Shipping†
MC74AC4040N	PDIP-16	25 Units/Rail
MC74AC4040NG	PDIP-16 (Pb-Free)	25 Units/Rail
MC74AC4040D	SOIC-16	48 Units/Rail
MC74AC4040DG	SOIC-16 (Pb-Free)	48 Units/Rail
MC74AC4040DR2	SOIC-16	2500 Tape & Reel
MC74AC4040DR2G	SOIC-16 (Pb-Free)	2500 Tape & Reel
MC74AC4040M	SOEIAJ-16	50 Units/Rail

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

### DEVICE MARKING INFORMATION

See general marking information in the device marking section on page 4 of this data sheet.

# MC74AC4040

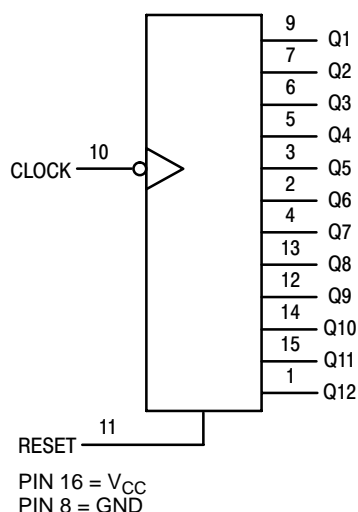


Figure 2. Logic Diagram

## MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
$V_{CC}$	DC Supply Voltage (Referenced to GND)	-0.5 to +7.0	V
$V_{IN}$	DC Input Voltage (Referenced to GND)	-0.5 to $V_{CC} + 0.5$	V
$V_{OUT}$	DC Output Voltage (Referenced to GND)	-0.5 to $V_{CC} + 0.5$	V
$I_{IN}$	DC Input Current, per Pin	$\pm 20$	mA
$I_{OUT}$	DC Output Current, per Pin	$\pm 50$	mA
$I_{CC}$	DC $V_{CC}$ or GND Current per Output Pin	$\pm 50$	mA
$P_D$	Power Dissipation in Still Air Plastic† SOIC Package†	750 500	mW
$T_{stg}$	Storage Temperature	-65 to +150	°C
$T_L$	Lead Temperature, 1 mm from Case for 10 seconds (Plastic DIP or SOIC Package)	260	°C

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

†Derating: Plastic DIP: - 10mW/°C from 65°C to 125°C SOIC Package: -7.0 mW/°C from 65°C to 125°C

## RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Min	Max	Unit
$V_{CC}$	DC Supply Voltage (Referenced to GND)	2.0	6.0	V
$V_{IN}/V_{OUT}$	Input Voltage, Output Voltage (Referenced to GND)	0	$V_{CC}$	-
$T_A$	Operating Temperature, All Package Types	-40	+85	°C
$t_r/t_f$	Input Rise/Fall Time (Figure 1) $V_{CC} = 3.0\text{ V}$ $V_{CC} = 4.5\text{ V}$ $V_{CC} = 5.5\text{ V}$	0	150 40 25	ns/V

# MC74AC4040

## DC CHARACTERISTICS (unless otherwise specified)

Symbol	Parameter	Value	Unit	
$I_{CC}$	Maximum Quiescent Supply Voltage	80	$\mu A$	$V_{in} = V_{CC}$ or GND $V_{CC} = 5.5 V, T_A = \text{Worst Case}$
$I_{CC}$	Maximum Quiescent Supply Current	8.0	$\mu A$	$V_{in} = V_{CC}$ or GND $V_{CC} = 5.5 V, T_A = 25^\circ C$

## DC CHARACTERISTICS

Symbol	Parameter	$V_{CC}$ (V)	74AC		74AC		Unit	Conditions
			$T_A = +25^\circ C$		$T_A = -40^\circ C$ to $+85^\circ C$			
			Typ	Guaranteed Limits				
$V_{IH}$	Minimum High Level Input Voltage	3.0	–	2.1	2.1		V	$V_{OUT} = 0.1 V$ or $V_{CC} - 0.1 V$
		4.5	–	3.15	3.15			
		5.5	–	3.85	3.85			
$V_{IL}$	Maximum Low Level Input Voltage	3.0	–	0.9	0.9		V	$V_{OUT} = 0.1 V$ or $V_{CC} - 0.1 V$
		4.5	–	1.35	1.35			
		5.5	–	1.65	1.65			
$V_{OH}$	Minimum High Level Output Voltage	3.0	2.99	2.9	2.9		V	$I_{OUT} = -50 \mu A$
		4.5	4.49	4.4	4.4			
		5.5	5.49	5.4	5.4			
		3.0	–	2.56	2.46		V	* $V_{IN} = V_{IL}$ or $V_{IH}$ –12 mA $I_{OH}$ –24 mA –24 mA
		4.5	–	3.86	3.76			
		5.5	–	4.86	4.76			
$V_{OL}$	Maximum Low Level Output Voltage	3.0	0.002	0.1	0.1		V	$I_{OUT} = 50 \mu A$
		4.5	0.001	0.1	0.1			
		5.5	0.001	0.1	0.1			
		3.0	–	0.36	0.44		V	* $V_{IN} = V_{IL}$ or $V_{IH}$ 12 mA $I_{OL}$ 24 mA 24 mA
		4.5	–	0.36	0.44			
		5.5	–	0.36	0.44			
$I_{IN}$	Maximum Input Leakage Current	5.5	–	$\pm 0.1$	$\pm 1.0$		$\mu A$	$V_I = V_{CC}, GND$
$I_{OLD}$	Minimum Dynamic Output Current†	5.5	–	–	75		mA	$V_{OLD} = 1.65 V \text{ Max}$
$I_{OHD}$		5.5	–	–	–75		mA	$V_{OHD} = 3.85 V \text{ Min}$

\*All outputs loaded; thresholds on input associated with output under test.

†Maximum test duration 2.0 ms, one output loaded at a time.

# MC74AC4040

**AC CHARACTERISTICS** (For Figures and Waveforms – See Section 3 of the ON Semiconductor FACT Data Book, DL138/D)

Symbol	Parameter	V <sub>CC</sub> * (V)	74AC			74AC		Unit	Fig. No.
			T <sub>A</sub> = +25°C C <sub>L</sub> = 50 pF			T <sub>A</sub> = -40°C to +85°C C <sub>L</sub> = 50 pF			
			Min	Typ	Max	Min	Max		
f <sub>max</sub>	Maximum Clock Frequency	3.3 5.0	110 130	120 140	– –	100 120	– –	MHz	–
t <sub>CP</sub> to Q1	Propagation Delay n <sub>CP</sub> to Q1	3.3 5.0	2.0 2.0	– –	11 8.0	2.0 2.0	14 10	ns	–
Q <sub>n</sub> to Q <sub>n+1</sub>	Propagation Delay Q <sub>n</sub> to Q <sub>n+1</sub>	3.3 5.0	0 0	– –	5.5 3.5	0 0	6.5 4.5	ns	–
MR to Q t <sub>HL</sub>	Propagation Delay MR to Q	3.3 5.0	3.0 3.0	– –	12 10	3.0 3.0	15 12	ns	–
t <sub>rec</sub> n <sub>CP</sub> to MR	Recovery Time	3.3 5.0	0 0	-2.5 -1.5	– –	0 0	– –	ns	–
t <sub>w</sub> n <sub>CP</sub>	Minimum Pulse Width Clock Pin	3.3 5.0	4.0 3.0	3.5 2.5	– –	4.5 3.5	– –	ns	–
t <sub>w</sub> MR	Minimum Pulse Width Master Reset	3.3 3.0	4.0 3.0	3.5 2.5	– –	4.5 3.5	– –	ns	–

\*Voltage Range 3.3 V is 3.3 V ±0.3 V.

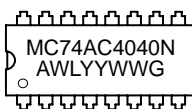
\*Voltage Range 5.0 V is 5.0 V ±0.5 V.

## CAPACITANCE

Symbol	Parameter	Value Typ	Unit	Test Conditions
C <sub>IN</sub>	Input Capacitance	4.5	pF	V <sub>CC</sub> = 5.0 V
C <sub>PD</sub>	Power Dissipation Capacitance	50	pF	V <sub>CC</sub> = 5.0 V

## MARKING DIAGRAMS

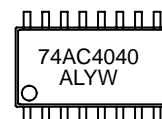
**PDIP-16**



**SOIC-16**



**SOEIAJ-16**

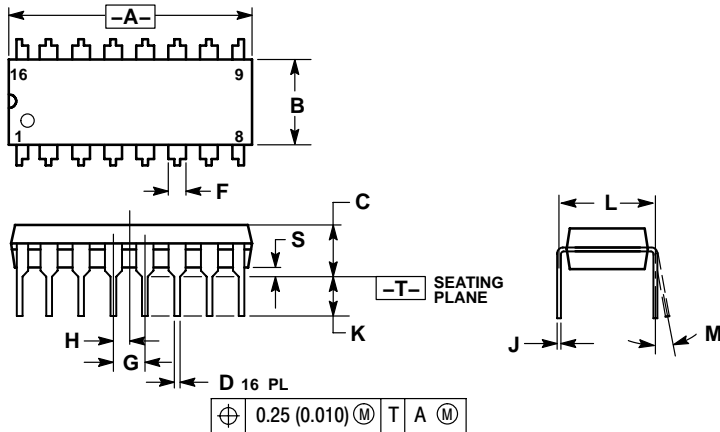


A = Assembly Location  
 WL, L = Wafer Lot  
 YY, Y = Year  
 WW, W = Work Week  
 G = Pb-Free Package

# MC74AC4040

## PACKAGE DIMENSIONS

### PDIP-16 CASE 648-08 ISSUE T



#### NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSION L TO CENTER OF LEADS WHEN FORMED PARALLEL.
4. DIMENSION B DOES NOT INCLUDE MOLD FLASH.
5. ROUNDED CORNERS OPTIONAL.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.740	0.770	18.80	19.55
B	0.250	0.270	6.35	6.85
C	0.145	0.175	3.69	4.44
D	0.015	0.021	0.39	0.53
F	0.040	0.70	1.02	1.77
G	0.100 BSC		2.54 BSC	
H	0.050 BSC		1.27 BSC	
J	0.008	0.015	0.21	0.38
K	0.110	0.130	2.80	3.30
L	0.295	0.305	7.50	7.74
M	0° 10°		0° 10°	
S	0.020	0.040	0.51	1.01

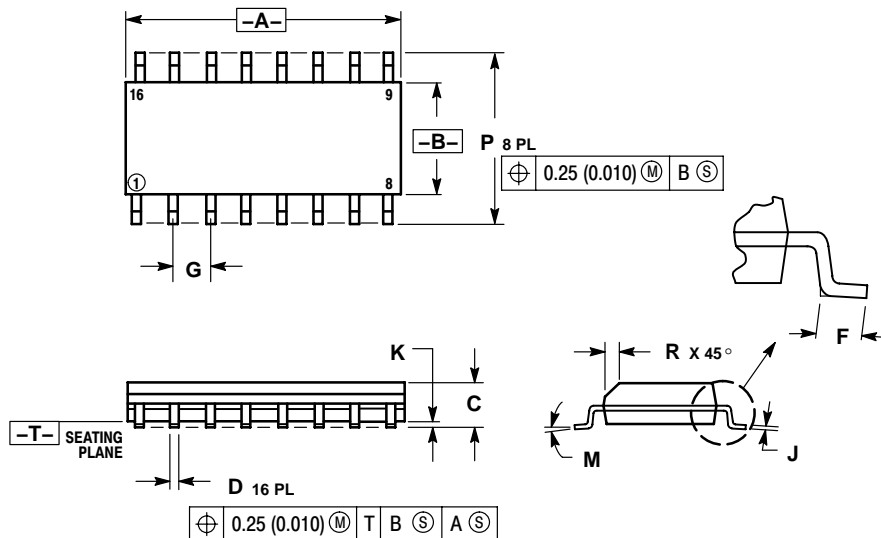
#### STYLE 1:

- PIN 1. CATHODE
2. CATHODE
3. CATHODE
4. CATHODE
5. CATHODE
6. CATHODE
7. CATHODE
8. CATHODE
9. ANODE
10. ANODE
11. ANODE
12. ANODE
13. ANODE
14. ANODE
15. ANODE
16. ANODE

#### STYLE 2:

- PIN 1. COMMON DRAIN
2. COMMON DRAIN
3. COMMON DRAIN
4. COMMON DRAIN
5. COMMON DRAIN
6. COMMON DRAIN
7. COMMON DRAIN
8. COMMON DRAIN
9. GATE
10. SOURCE
11. GATE
12. SOURCE
13. GATE
14. SOURCE
15. GATE
16. SOURCE

### SOIC CASE 751B-05 ISSUE J



#### NOTES:

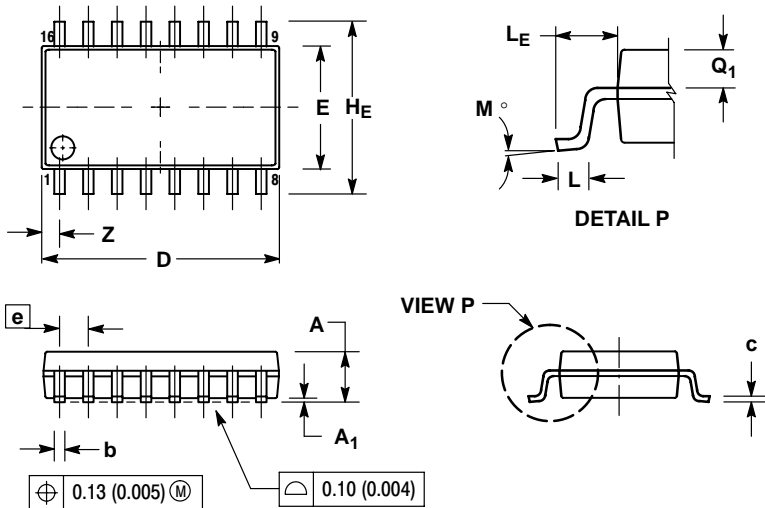
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSIONS A AND B DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.
5. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.127 (0.005) TOTAL IN EXCESS OF THE D DIMENSION AT MAXIMUM MATERIAL CONDITION.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	9.80	10.00	0.386	0.393
B	3.80	4.00	0.150	0.157
C	1.35	1.75	0.054	0.068
D	0.35	0.49	0.014	0.019
F	0.40	1.25	0.016	0.049
G	1.27 BSC		0.050 BSC	
J	0.19	0.25	0.008	0.009
K	0.10	0.25	0.004	0.009
M	0° 7°		0° 7°	
P	5.80	6.20	0.229	0.244
R	0.25	0.50	0.010	0.019

# MC74AC4040

## PACKAGE DIMENSIONS

SOEIAJ-16  
CASE 966-01  
ISSUE A



### NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH OR PROTRUSIONS AND ARE MEASURED AT THE PARTING LINE. MOLD FLASH OR PROTRUSIONS SHALL NOT EXCEED 0.15 (0.006) PER SIDE.
4. TERMINAL NUMBERS ARE SHOWN FOR REFERENCE ONLY.
5. THE LEAD WIDTH DIMENSION (b) DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.08 (0.003) TOTAL IN EXCESS OF THE LEAD WIDTH DIMENSION AT MAXIMUM MATERIAL CONDITION. DAMBAR CANNOT BE LOCATED ON THE LOWER RADIUS OR THE FOOT. MINIMUM SPACE BETWEEN PROTRUSIONS AND ADJACENT LEAD TO BE 0.46 (0.018).

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	---	2.05	---	0.081
A <sub>1</sub>	0.05	0.20	0.002	0.008
b	0.35	0.50	0.014	0.020
c	0.10	0.20	0.007	0.011
D	9.90	10.50	0.390	0.413
E	5.10	5.45	0.201	0.215
e	1.27 BSC		0.050 BSC	
H <sub>E</sub>	7.40	8.20	0.291	0.323
L	0.50	0.85	0.020	0.033
L <sub>E</sub>	1.10	1.50	0.043	0.059
M	0°	10°	0°	10°
Q <sub>1</sub>	0.70	0.90	0.028	0.035
Z	---	0.78	---	0.031

ON Semiconductor and are registered trademarks of Semiconductor Components Industries, LLC (SCILLC). SCILLC reserves the right to make changes without further notice to any products herein. SCILLC makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does SCILLC assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. "Typical" parameters which may be provided in SCILLC data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. SCILLC does not convey any license under its patent rights nor the rights of others. SCILLC products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the SCILLC product could create a situation where personal injury or death may occur. Should Buyer purchase or use SCILLC products for any such unintended or unauthorized application, Buyer shall indemnify and hold SCILLC and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that SCILLC was negligent regarding the design or manufacture of the part. SCILLC is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

### PUBLICATION ORDERING INFORMATION

**LITERATURE FULFILLMENT:**  
Literature Distribution Center for ON Semiconductor  
P.O. Box 5163, Denver, Colorado 80217 USA  
**Phone:** 303-675-2175 or 800-344-3860 Toll Free USA/Canada  
**Fax:** 303-675-2176 or 800-344-3867 Toll Free USA/Canada  
**Email:** orderlit@onsemi.com

**N. American Technical Support:** 800-282-9855 Toll Free  
USA/Canada  
**Europe, Middle East and Africa Technical Support:**  
Phone: 421 33 790 2910  
**Japan Customer Focus Center**  
Phone: 81-3-5773-3850

**ON Semiconductor Website:** [www.onsemi.com](http://www.onsemi.com)  
**Order Literature:** <http://www.onsemi.com/orderlit>

For additional information, please contact your local Sales Representative

## Данный компонент на территории Российской Федерации

### Вы можете приобрести в компании MosChip.

Для оперативного оформления запроса Вам необходимо перейти по данной ссылке:

<http://moschip.ru/get-element>

Вы можете разместить у нас заказ для любого Вашего проекта, будь то серийное производство или разработка единичного прибора.

В нашем ассортименте представлены ведущие мировые производители активных и пассивных электронных компонентов.

Нашей специализацией является поставка электронной компонентной базы двойного назначения, продукции таких производителей как XILINX, Intel (ex.ALTERA), Vicor, Microchip, Texas Instruments, Analog Devices, Mini-Circuits, Amphenol, Glenair.

Сотрудничество с глобальными дистрибьюторами электронных компонентов, предоставляет возможность заказывать и получать с международных складов практически любой перечень компонентов в оптимальные для Вас сроки.

На всех этапах разработки и производства наши партнеры могут получить квалифицированную поддержку опытных инженеров.

Система менеджмента качества компании отвечает требованиям в соответствии с ГОСТ Р ИСО 9001, ГОСТ РВ 0015-002 и ЭС РД 009

### Офис по работе с юридическими лицами:

105318, г.Москва, ул.Щербаковская д.3, офис 1107, 1118, ДЦ «Щербаковский»

Телефон: +7 495 668-12-70 (многоканальный)

Факс: +7 495 668-12-70 (доб.304)

E-mail: [info@moschip.ru](mailto:info@moschip.ru)

Skype отдела продаж:

moschip.ru

moschip.ru\_4

moschip.ru\_6

moschip.ru\_9