

MC14528B

Dual Monostable Multivibrator

The MC14528B is a dual, retriggerable, resettable monostable multivibrator. It may be triggered from either edge of an input pulse, and produces an output pulse over a wide range of widths, the duration of which is determined by the external timing components, C_X and R_X .

- Separate Reset Available
- Diode Protection on All Inputs
- Triggerable from Leading or Trailing Edge Pulse
- Supply Voltage Range = 3.0 Vdc to 18 Vdc
- Capable of Driving Two Low-power TTL Loads or One Low-power Schottky TTL Load Over the Rated Temperature Range
- Pin-for-Pin Replacement with the MC14538B

MAXIMUM RATINGS (Voltages Referenced to V_{SS}) (Note 2.)

Symbol	Parameter	Value	Unit
V_{DD}	DC Supply Voltage Range	-0.5 to +18.0	V
V_{in}, V_{out}	Input or Output Voltage Range (DC or Transient)	-0.5 to $V_{DD} + 0.5$	V
I_{in}, I_{out}	Input or Output Current (DC or Transient) per Pin	± 10	mA
P_D	Power Dissipation, per Package (Note 3.)	500	mW
T_A	Ambient Temperature Range	-55 to +125	$^{\circ}C$
T_{stg}	Storage Temperature Range	-65 to +150	$^{\circ}C$
T_L	Lead Temperature (8-Second Soldering)	260	$^{\circ}C$

2. Maximum Ratings are those values beyond which damage to the device may occur.

3. Temperature Derating:
Plastic "P and D/DW" Packages: - 7.0 mW/ $^{\circ}C$ From 65 $^{\circ}C$ To 125 $^{\circ}C$

This device contains protection circuitry to guard against damage due to high static voltages or electric fields. However, precautions must be taken to avoid applications of any voltage higher than maximum rated voltages to this high-impedance circuit. For proper operation, V_{in} and V_{out} should be constrained to the range $V_{SS} \leq (V_{in} \text{ or } V_{out}) \leq V_{DD}$.

Unused inputs must always be tied to an appropriate logic voltage level (e.g., either V_{SS} or V_{DD}). Unused outputs must be left open.



ON Semiconductor

<http://onsemi.com>

MARKING DIAGRAMS

PDIP-16
P SUFFIX
CASE 648

16
MC14528BCP
o AWLYYYWW
1

SOIC-16
D SUFFIX
CASE 751B

16
14528B
o AWLYYYWW
1

SOEIAJ-16
F SUFFIX
CASE 966

16
MC14528B
o AWLYYYWW
1

A = Assembly Location
WL or L = Wafer Lot
YY or Y = Year
WW or W = Work Week

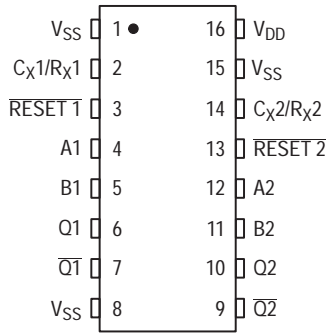
ORDERING INFORMATION

Device	Package	Shipping
MC14528BCP	PDIP-16	2000/Box
MC14528BD	SOIC-16	48/Rail
MC14528BDR2	SOIC-16	2500/Tape & Reel
MC14528BF	SOEIAJ-16	See Note 1.
MC14528BFEL	SOEIAJ-16	See Note 1.

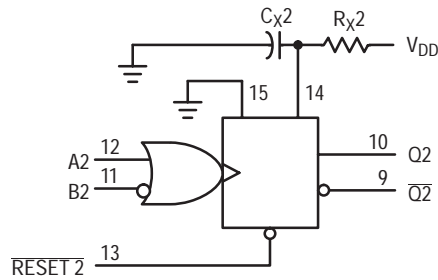
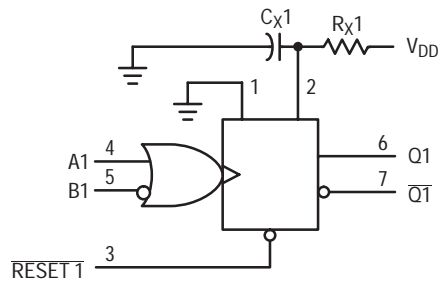
1. For ordering information on the EIAJ version of the SOIC packages, please contact your local ON Semiconductor representative.

MC14528B

PIN ASSIGNMENT

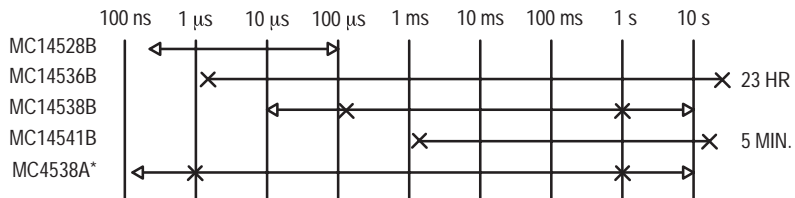


BLOCK DIAGRAM



V_{DD} = PIN 16
V_{SS} = PIN 1, PIN 8, PIN 15
R_X AND C_X ARE EXTERNAL COMPONENTS

ONE-SHOT SELECTION GUIDE



*LIMITED OPERATING VOLTAGE (2-6 V)

TOTAL OUTPUT PULSE WIDTH RANGE ←————→
RECOMMENDED PULSE WIDTH RANGE ×————×

MC14528B

ELECTRICAL CHARACTERISTICS (Voltages Referenced to V_{SS})

Characteristic	Symbol	V _{DD} Vdc	- 55°C		25°C			125°C		Unit
			Min	Max	Min	Typ (4.)	Max	Min	Max	
Output Voltage V _{in} = V _{DD} or 0 V _{in} = 0 or V _{DD}	"0" Level V _{OL}	5.0	—	0.05	—	0	0.05	—	0.05	Vdc
		10	—	0.05	—	0	0.05	—	0.05	
		15	—	0.05	—	0	0.05	—	0.05	
	"1" Level V _{OH}	5.0	4.95	—	4.95	5.0	—	4.95	—	Vdc
		10	9.95	—	9.95	10	—	9.95	—	
		15	14.95	—	14.95	15	—	14.95	—	
Input Voltage (V _O = 4.5 or 0.5 Vdc) (V _O = 9.0 or 1.0 Vdc) (V _O = 13.5 or 1.5 Vdc) (V _O = 0.5 or 4.5 Vdc) (V _O = 1.0 or 9.0 Vdc) (V _O = 1.5 or 13.5 Vdc)	"0" Level V _{IL}	5.0	—	1.5	—	2.25	1.5	—	1.5	Vdc
		10	—	3.0	—	4.50	3.0	—	3.0	
		15	—	4.0	—	6.75	4.0	—	4.0	
	"1" Level V _{IH}	5.0	3.5	—	3.5	2.75	—	3.5	—	Vdc
		10	7.0	—	7.0	5.50	—	7.0	—	
		15	11	—	11	8.25	—	11	—	
Output Drive Current (V _{OH} = 2.5 Vdc) (V _{OH} = 4.6 Vdc) (V _{OH} = 9.5 Vdc) (V _{OH} = 13.5 Vdc) (V _{OL} = 0.4 Vdc) (V _{OL} = 0.5 Vdc) (V _{OL} = 1.5 Vdc)	Source I _{OH}	5.0	-1.2	—	-1.0	-1.7	—	-0.7	—	mAdc
		5.0	-0.64	—	-0.51	-0.88	—	-0.36	—	
		10	-1.6	—	-1.3	-2.25	—	-0.9	—	
		15	-4.2	—	-3.4	-8.8	—	-2.4	—	
	Sink I _{OL}	5.0	0.64	—	0.51	0.88	—	0.36	—	mAdc
		10	1.6	—	1.3	2.25	—	0.9	—	
15		4.2	—	3.4	8.8	—	2.4	—		
Input Current	I _{in}	15	—	±0.1	—	±0.00001	±0.1	—	±1.0	μAdc
Input Capacitance (V _{in} = 0)	C _{in}	—	—	—	—	5.0	7.5	—	—	pF
Quiescent Current (Per Package)	I _{DD}	5.0	—	5.0	—	0.005	5.0	—	150	μAdc
		10	—	10	—	0.010	10	—	300	
		15	—	20	—	0.015	20	—	600	
Total Supply Current at an external load Capacitance (C _L) and at external timing capacitance (C _X), use the formula — (5.)	I _T	—	$I_T(C_L, C_X) = [(C_L + 0.36C_X)V_{DD}f + 2 \times 10^{-8} R_X C_X (V_{DD}^{-2})^2] \times 10^{-3}$ where: I _T in μA (per circuit), C _L and C _X in pF, R _X in megohms, V _{DD} in Vdc, f in kHz is input frequency.							μAdc

4. Data labelled "Typ" is not to be used for design purposes but is intended as an indication of the IC's potential performance.

5. The formulas given are for the typical characteristics only at 25°C.

MC14528B

SWITCHING CHARACTERISTICS ^(8.) ($C_L = 50 \text{ pF}$, $T_A = 25^\circ\text{C}$)

Characteristic	Symbol	C_X pF	R_X k Ω	V_{DD} Vdc	Min	Typ ^(9.)	Max	Unit
Output Rise and Fall Time $t_{TLH}, t_{THL} = (1.5 \text{ ns/pF}) C_L + 25 \text{ ns}$ $t_{TLH}, t_{THL} = (0.75 \text{ ns/pF}) C_L + 12.5 \text{ ns}$ $t_{TLH}, t_{THL} = (0.55 \text{ ns/pF}) C_L + 9.5 \text{ ns}$	$t_{TLH},$ t_{THL}	—	—	5.0 10 15	— — —	100 50 40	200 100 80	ns
Turn-Off, Turn-On Delay Time — A or B to Q or \bar{Q} $t_{PLH}, t_{PHL} = (1.7 \text{ ns/pF}) C_L + 240 \text{ ns}$ $t_{PLH}, t_{PHL} = (0.66 \text{ ns/pF}) C_L + 87 \text{ ns}$ $t_{PLH}, t_{PHL} = (0.5 \text{ ns/pF}) C_L + 65 \text{ ns}$	$t_{PLH},$ t_{PHL}	15	5.0	5.0 10 15	— — —	325 120 90	650 240 180	ns
Turn-Off, Turn-On Delay Time — A or B to Q or \bar{Q} $t_{PLH}, t_{PHL} = (1.7 \text{ ns/pF}) C_L + 620 \text{ ns}$ $t_{PLH}, t_{PHL} = (0.66 \text{ ns/pF}) C_L + 257 \text{ ns}$ $t_{PLH}, t_{PHL} = (0.5 \text{ ns/pF}) C_L + 185 \text{ ns}$	$t_{PLH},$ t_{PHL}	1000	10	5.0 10 15	— — —	705 290 210	— — —	ns
Input Pulse Width — A or B	t_{WH}	15	5.0	5.0 10 15	150 75 55	70 30 30	— — —	ns
	t_{WL}	1000	10	5.0 10 15	— — —	70 30 30	— — —	ns
Output Pulse Width — Q or \bar{Q} (For $C_X < 0.01 \mu\text{F}$ use graph for appropriate V_{DD} level.)	t_W	15	5.0	5.0 10 15	— — —	550 350 300	— — —	ns
Output Pulse Width — Q or \bar{Q} (For $C_X > 0.01 \mu\text{F}$ use formula: $t_W = 0.2 R_X C_X \text{Ln} [V_{DD} - V_{SS}]$ ^(6.))	t_W	10,000	10	5.0 10 15	15 10 15	30 50 55	45 90 95	μs
Pulse Width Match between Circuits in the same package	$t_1 - t_2$	10,000	10	5.0 10 15	— — —	6.0 8.0 8.0	25 35 35	%
Reset Propagation Delay — $\bar{\text{Reset}}$ to Q or \bar{Q}	$t_{PLH},$ t_{PHL}	15	5.0	5.0 10 15	— — —	325 90 60	600 225 170	ns
		1000	10	5.0 10 15	— — —	1000 300 250	— — —	ns
Retrigger Time	t_{rr}	15	5.0	5.0 10 15	0 0 0	— — —	— — —	ns
		1000	10	5.0 10 15	0 0 0	— — —	— — —	ns
External Timing Resistance	R_X	—	—	—	5.0	—	1000	k Ω
External Timing Capacitance	C_X	—	—	—	No Limits ^(7.)			μF

6. R_X is in Ohms, C_X is in farads, V_{DD} and V_{SS} in volts, PW_{out} in seconds.

7. If $C_X > 15 \mu\text{F}$, Use Discharge Protection Diode D_X , per Fig. 9.

8. The formulas given are for the typical characteristics only at 25°C .

9. Data labelled "Typ" is not to be used for design purposes but is intended as an indication of the IC's potential performance.

MC14528B

FUNCTION TABLE

Inputs			Outputs	
Reset	A	B	Q	\bar{Q}
H		H		
H	L			
H		L	Not Triggered	Not Triggered
H	H		Not Triggered	Not Triggered
H	L, H,	H	Not Triggered	Not Triggered
H	L	L, H,	Not Triggered	Not Triggered
L	X	X	L	H
	X	X	Not Triggered	Not Triggered

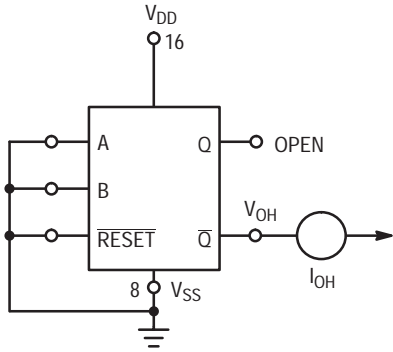


Figure 1. Output Source Current Test Circuit

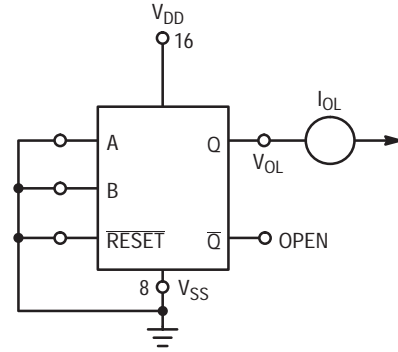


Figure 2. Output Sink Current Test Circuit

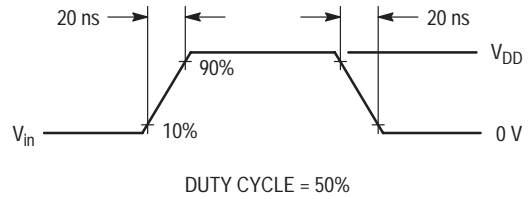
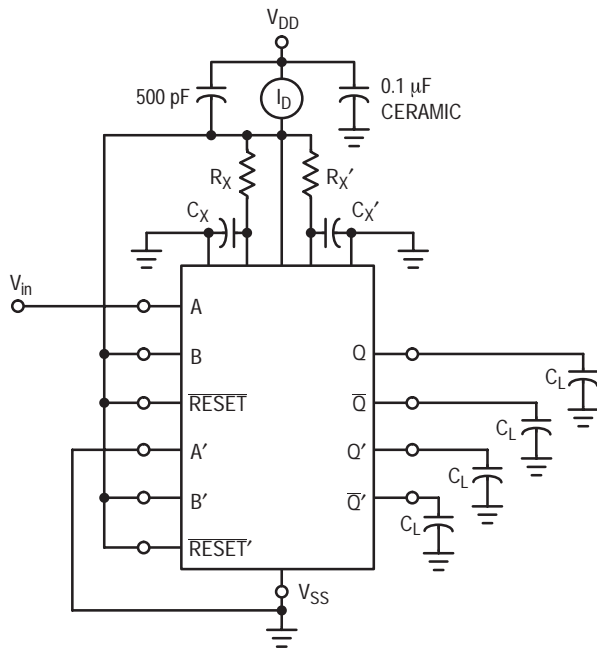
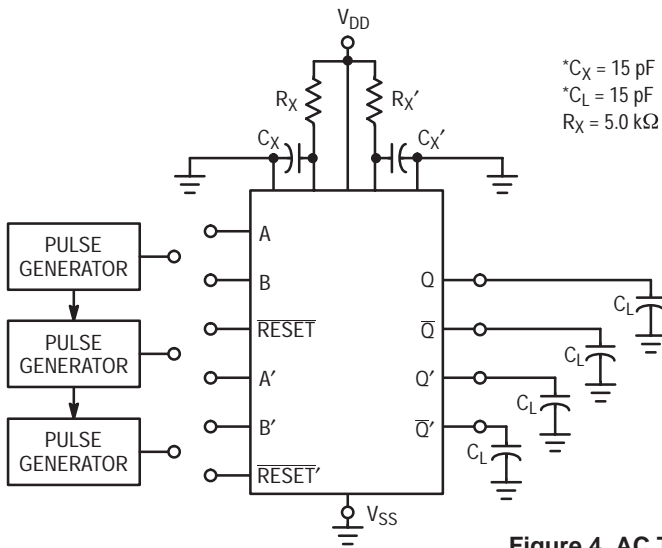


Figure 3. Power Dissipation Test Circuit and Waveforms

MC14528B



INPUT CONNECTIONS

Characteristics	Reset	A	B
t_{PLH} , t_{PHL} , t_{TLH} , t_{THL} t_W	V_{DD}	PG1	V_{DD}
t_{PLH} , t_{PHL} , t_{TLH} , t_{THL} t_W	V_{DD}	V_{SS}	PG2
$t_{PLH(R)}$, $t_{PHL(R)}$, t_W	PG3	PG1	PG2

* Includes capacitance of probes, wiring, and fixture parasitic.

NOTE: AC test waveforms for PG1, PG2, and PG3 on next page.

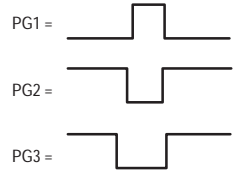


Figure 4. AC Test Circuit

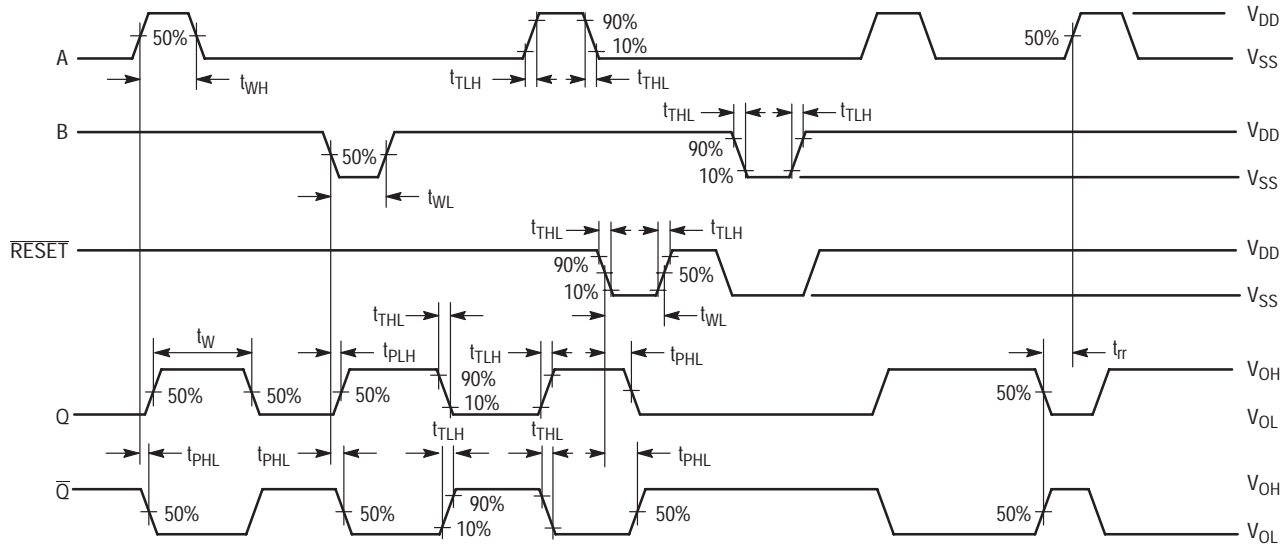


Figure 5. AC Test Waveforms

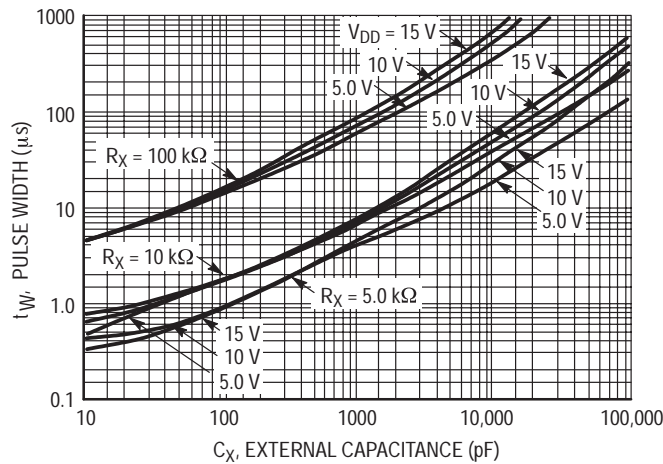


Figure 6. Pulse Width versus C_X

MC14528B

TYPICAL APPLICATIONS

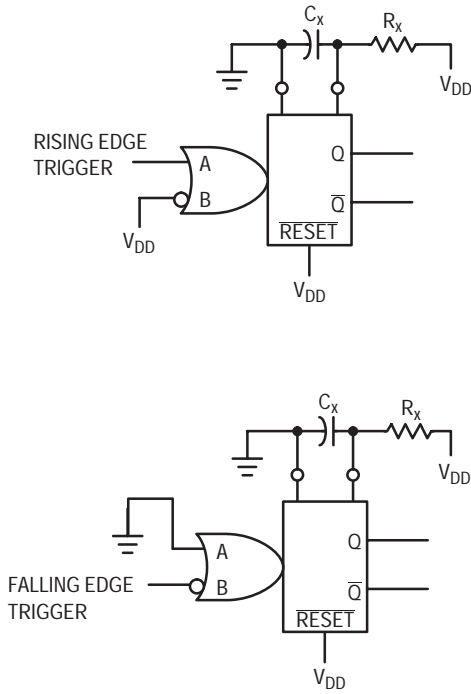


Figure 7. Retriggerable Monostables Circuitry

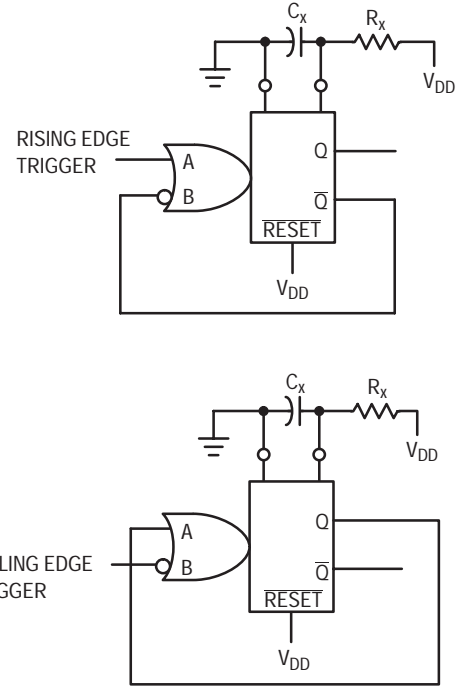


Figure 8. Non-Retriggerable Monostables Circuitry

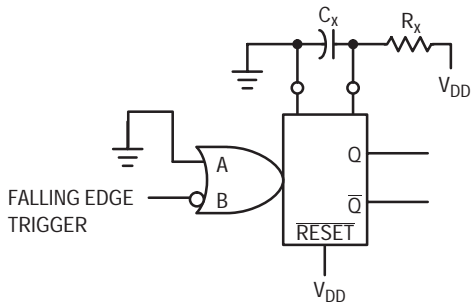


Figure 9. Use of a Diode to Limit Power Down Current Surge

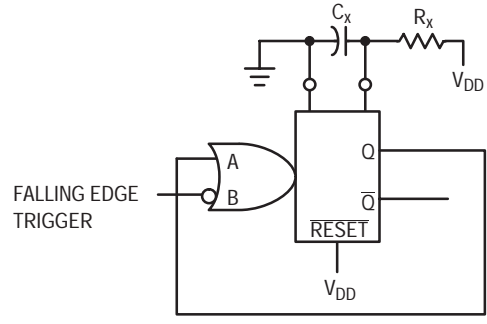
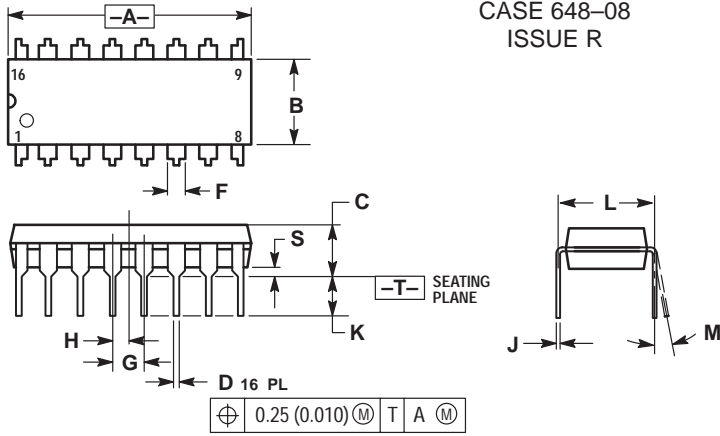


Figure 10. Connection of Unused Sections

MC14528B

PACKAGE DIMENSIONS

PDIP-16
P SUFFIX
PLASTIC DIP PACKAGE
CASE 648-08
ISSUE R



NOTES:

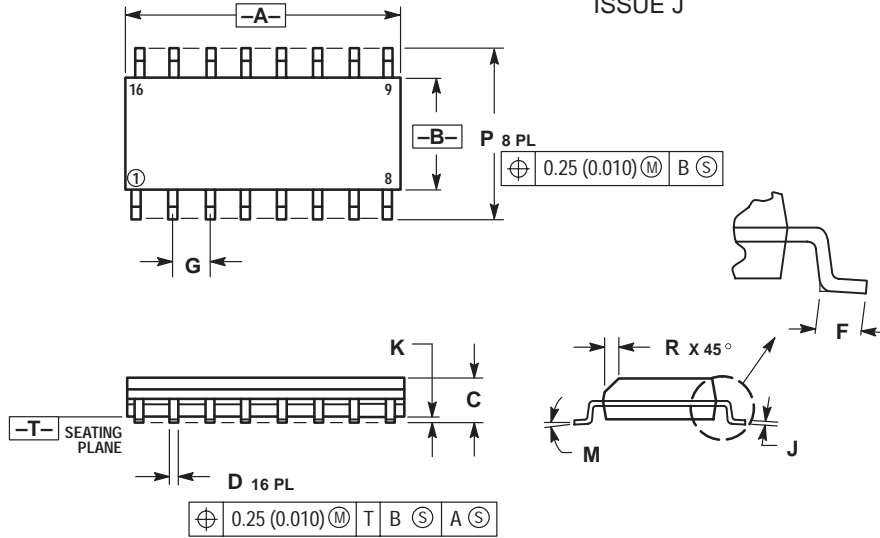
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSION L TO CENTER OF LEADS WHEN FORMED PARALLEL.
4. DIMENSION B DOES NOT INCLUDE MOLD FLASH.
5. ROUNDED CORNERS OPTIONAL.

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

MC14528B

PACKAGE DIMENSIONS

SOIC-16
D SUFFIX
PLASTIC SOIC PACKAGE
CASE 751B-05
ISSUE J



NOTES:

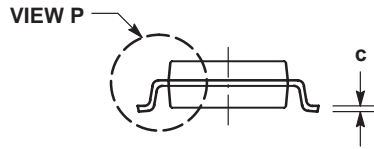
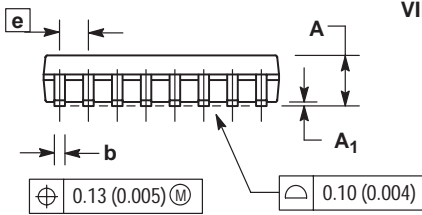
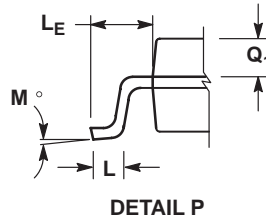
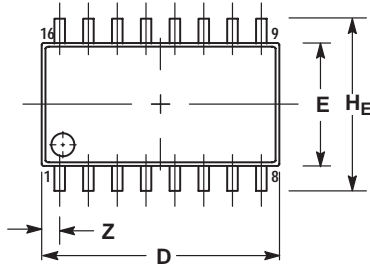
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSIONS A AND B DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.
5. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.127 (0.005) TOTAL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

MC14528B

PACKAGE DIMENSIONS

SOEIAJ-16 F SUFFIX PLASTIC EIAJ SOIC PACKAGE CASE 966-01 ISSUE O



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 ₁	0.05	0.20	0.002	0.008
b	0.35	0.50	0.014	0.020
c	0.18	0.27	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 _E	7.40	8.20	0.291	0.323
L	0.50	0.85	0.020	0.033
L _F	1.10	1.50	0.043	0.059
M	0°	10°	0°	10°
Q ₁	0.70	0.90	0.028	0.035
Z	---	0.78	---	0.031

Notes

ON Semiconductor and  are 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.

PUBLICATION ORDERING INFORMATION

NORTH AMERICA 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: ONlit@hibbertco.com
Fax Response Line: 303-675-2167 or 800-344-3810 Toll Free USA/Canada

N. American Technical Support: 800-282-9855 Toll Free USA/Canada

EUROPE: LDC for ON Semiconductor – European Support

German Phone: (+1) 303-308-7140 (M-F 1:00pm to 5:00pm Munich Time)
Email: ONlit-german@hibbertco.com
French Phone: (+1) 303-308-7141 (M-F 1:00pm to 5:00pm Toulouse Time)
Email: ONlit-french@hibbertco.com
English Phone: (+1) 303-308-7142 (M-F 12:00pm to 5:00pm UK Time)
Email: ONlit@hibbertco.com

EUROPEAN TOLL-FREE ACCESS*: 00-800-4422-3781

*Available from Germany, France, Italy, England, Ireland

CENTRAL/SOUTH AMERICA:

Spanish Phone: 303-308-7143 (Mon-Fri 8:00am to 5:00pm MST)
Email: ONlit-spanish@hibbertco.com

ASIA/PACIFIC: LDC for ON Semiconductor – Asia Support

Phone: 303-675-2121 (Tue-Fri 9:00am to 1:00pm, Hong Kong Time)
Toll Free from Hong Kong & Singapore:
001-800-4422-3781
Email: ONlit-asia@hibbertco.com

JAPAN: ON Semiconductor, Japan Customer Focus Center
4-32-1 Nishi-Gotanda, Shinagawa-ku, Tokyo, Japan 141-8549

Phone: 81-3-5740-2745
Email: r14525@onsemi.com

ON Semiconductor Website: <http://onsemi.com>

For additional information, please contact your local Sales Representative.