MC14562B

128-Bit Static Shift Register

The MC14562B is a 128–bit static shift register constructed with MOS P–channel and N–channel enhancement mode devices in a single monolithic structure. Data is clocked in and out of the shift register on the positive edge of the clock input. Data outputs are available every 16 bits, from 16 through bit 128. This complementary MOS shift register is primarily used where low power dissipation and/or high noise immunity is desired.

- Diode Protection on All Inputs
- Fully Static Operation
- Cascadable to Provide Longer Shift Register Lengths
- 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

MAXIMUM RATINGS (Voltages Referenced to V_{SS}) (Note 1.)

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 2.)	500	mW
T_A	Ambient Temperature Range	–55 to +125	°C
T_{stg}	Storage Temperature Range	–65 to +150	°C
T_L	Lead Temperature (8–Second Soldering)	260	°C

1. Maximum Ratings are those values beyond which damage to the device may occur.
2. Temperature Derating:
   Plastic “P and D/DW” Packages: – 7.0 mW/°C From 65°C To 125°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 $V_{SS} \le (V_{in}$ or $V_{out}) \le V_{DD}$.

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.

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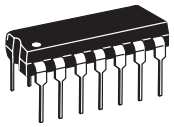
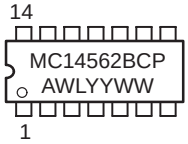
MARKING DIAGRAMS



PDIP–14
P SUFFIX
CASE 646

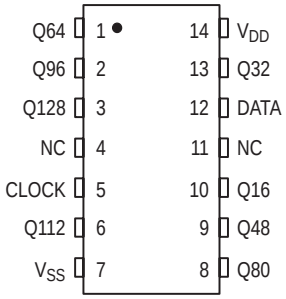


A = Assembly Location
WL or L = Wafer Lot
YY or Y = Year
WW or W = Work Week

ORDERING INFORMATION

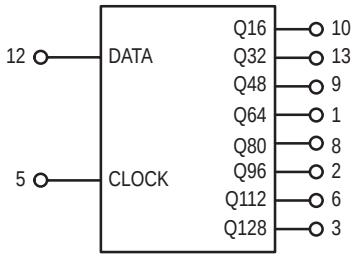
Device	Package	Shipping
MC14562BCP	PDIP–14	25/Rail

PIN ASSIGNMENT



NC = NO CONNECTION

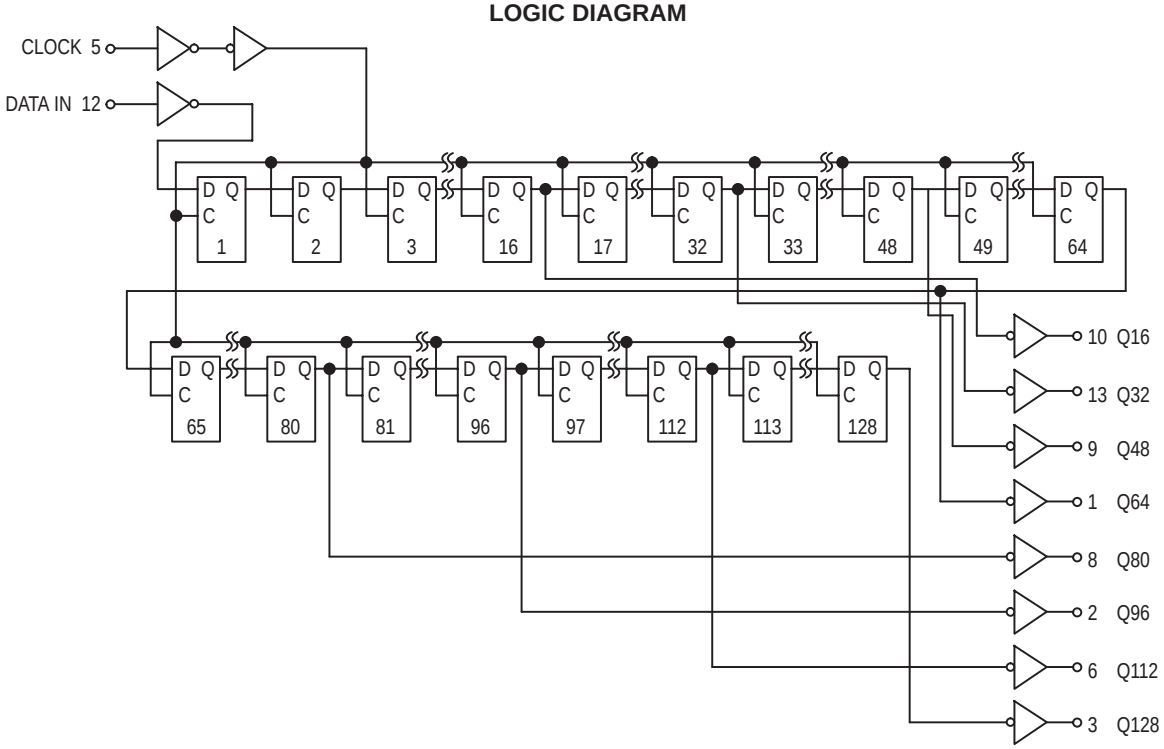
BLOCK DIAGRAM



Pins 4 and 11 not used.

V_{DD} = PIN 14
V_{SS} = PIN 7

LOGIC DIAGRAM



ELECTRICAL CHARACTERISTICS (Voltages Referenced to V_{SS})

Characteristic	Symbol	V_{DD} Vdc	– 55°C Min	– 55°C Max	25°C Min	25°C Typ (3.)	25°C Max	125°C Min	125°C Max	Unit
Output Voltage “0” Level	V_{OL}	5.0	—	0.05	—	0	0.05	—	0.05	Vdc
V_{in} = V_{DD} or 0		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
V_{in} = 0 or V_{DD}		10	9.95	—	9.95	10	—	9.95	—	
		15	14.95	—	14.95	15	—	14.95	—	
Input Voltage “0” Level	V_{IL}									Vdc
(V_O = 4.5 or 05 Vdc)		5.0	—	1.5	—	2.25	1.5	—	1.5	
(V_O = 9.0 or 1.0 Vdc)		10	—	3.0	—	4.50	3.0	—	3.0	
(V_O = 13.5 or 1.5 Vdc)		15	—	4.0	—	6.75	4.0	—	4.0	
“1” Level	V_{IH}									Vdc
(V_O = 0.5 or 4.5 Vdc)		5.0	3.5	—	3.5	2.75	—	3.5	—	
(V_O = 1.0 or 9.0 Vdc)		10	7.0	—	7.0	5.50	—	7.0	—	
(V_O = 1.5 or 13.5 Vdc)		15	11	—	11	8.25	—	11	—	
Output Drive Current	I_{OH}									mAdc
(V_{OH} = 2.5 Vdc) Source		5.0	– 3.0	—	– 2.4	– 4.2	—	– 1.7	—	
(V_{OH} = 4.6 Vdc)		5.0	– 0.64	—	– 0.51	– 0.88	—	– 0.36	—	
(V_{OH} = 9.5 Vdc)		10	– 1.6	—	– 1.3	– 2.25	—	– 0.9	—	
(V_{OH} = 13.5 Vdc)		15	– 4.2	—	– 3.4	– 8.8	—	– 2.4	—	
(V_{OL} = 0.4 Vdc) Sink	I_{OL}	5.0	0.64	—	0.51	0.88	—	0.36	—	mAdc
(V_{OL} = 0.5 Vdc)		10	1.6	—	1.3	2.25	—	0.9	—	
(V_{OL} = 1.5 Vdc)		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	—	0.010	5.0	—	150	µAdc
		10	—	10	—	0.020	10	—	300	
		15	—	20	—	0.030	20	—	600	
Total Supply Current (4.) (5.) (Dynamic plus Quiescent, Per Package) (C_L = 50 pF on all outputs, all buffers switching)	I_T	5.0	I_T = (1.94 µA/kHz) f + I_{DD}							µAdc
		10	I_T = (3.81 µA/kHz) f + I_{DD}							
		15	I_T = (5.52 µA/kHz) f + I_{DD}							

3. Data labelled “Typ” is not to be used for design purposes but is intended as an indication of the IC’s potential performance.
4. The formulas given are for the typical characteristics only at 25°C.
5. To calculate total supply current at loads other than 50 pF:

$$I_T(C_L) = I_T(50\ pF) + (C_L - 50)\ Vfk$$

where: I_T is in µA (per package), C_L in pF, V = (V_{DD} – V_{SS}) in volts, f in kHz is input frequency, and k = 0.004.

SWITCHING CHARACTERISTICS [6.] (C_L = 50 pF, T_A = 25°C)

Characteristic	Symbol	V_{DD}	Min	Typ [7.]	Max	Unit
Output Rise and Fall Time	t_{TLH},					ns
t_{TLH}, t_{THL} = (1.5 ns/pF) C_L + 25 ns	t_{THL}	5.0	—	100	200	
t_{TLH}, t_{THL} = (0.75 ns/pF) C_L + 12.5 ns		10	—	50	100	
t_{TLH}, t_{THL} = (0.55 ns/pF) C_L + 9.5 ns		15	—	40	80	
Propagation Delay Time	t_{PLH},					ns
Clock to Q	t_{PHL}					
t_{PLH}, t_{PHL} = (1.7 ns/pF) C_L + 515 ns		5.0	—	600	1200	
t_{PLH}, t_{PHL} = (0.66 ns/pF) C_L + 217 ns		10	—	250	500	
t_{PLH}, t_{PHL} = (0.5 ns/pF) C_L + 145 ns		15	—	170	340	
Clock Pulse Width	t_{WH}	5.0	600	300	—	ns
(50% Duty Cycle)		10	220	110	—	
		15	150	75	—	
Clock Pulse Frequency	f_{cl}	5.0	—	1.9	1.1	MHz
		10	—	5.6	3.0	
		15	—	8.0	4.0	
Data to Clock Setup Time	$t_{su(1)}$	5.0	– 20	– 170	—	ns
		10	– 10	– 64	—	
		15	0	– 60	—	
	$t_{su(0)}$	5.0	– 20	– 91	—	ns
		10	– 10	– 58	—	
		15	0	– 48	—	
Data to Clock Hold Time	$t_{h(1)}$	5.0	350	263	—	ns
		10	165	109	—	
		15	155	100	—	
	$t_{h(0)}$	5.0	350	267	—	ns
		10	200	140	—	
		15	140	93	—	
Clock Input Rise and Fall Times	t_r, t_f	5.0	—	—	15	μs
		10	—	—	5	
		15	—	—	4	

6. The formulas given are for the typical characteristics only at 25°C.
7. Data labelled “Typ” is not to be used for design purposes but is intended as an indication of the IC’s potential performance.

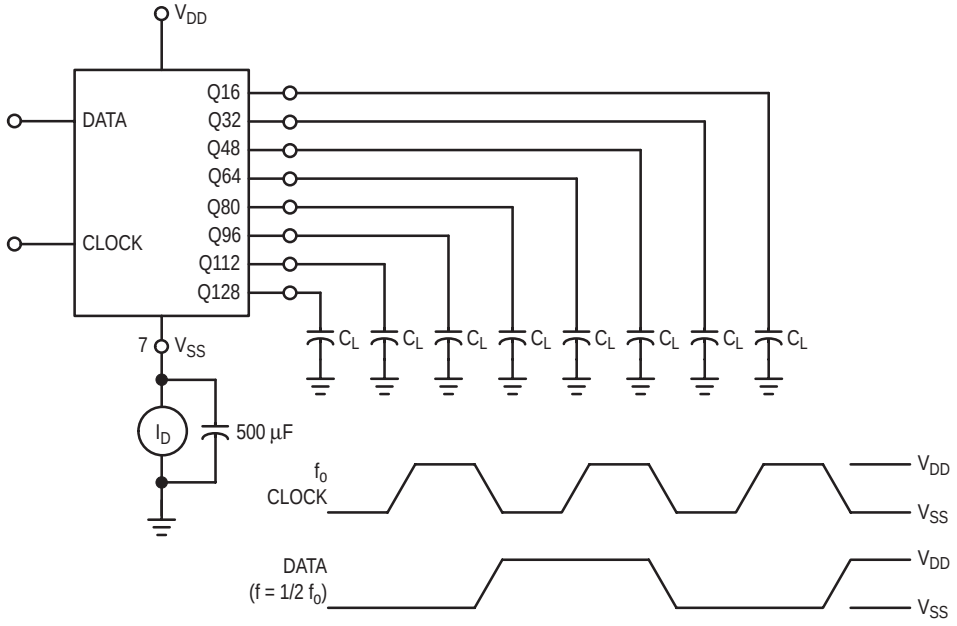
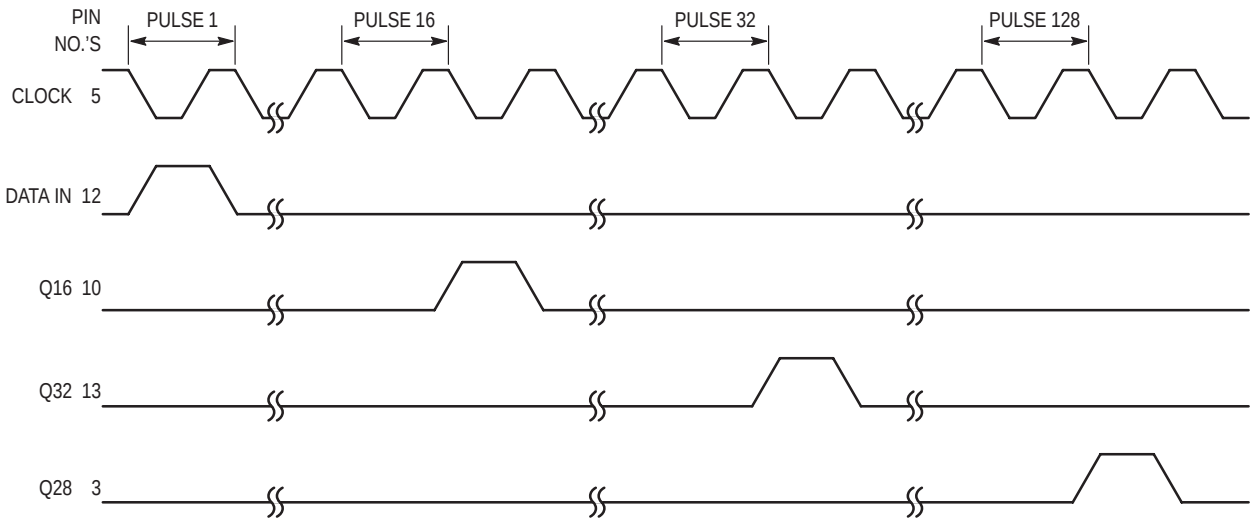
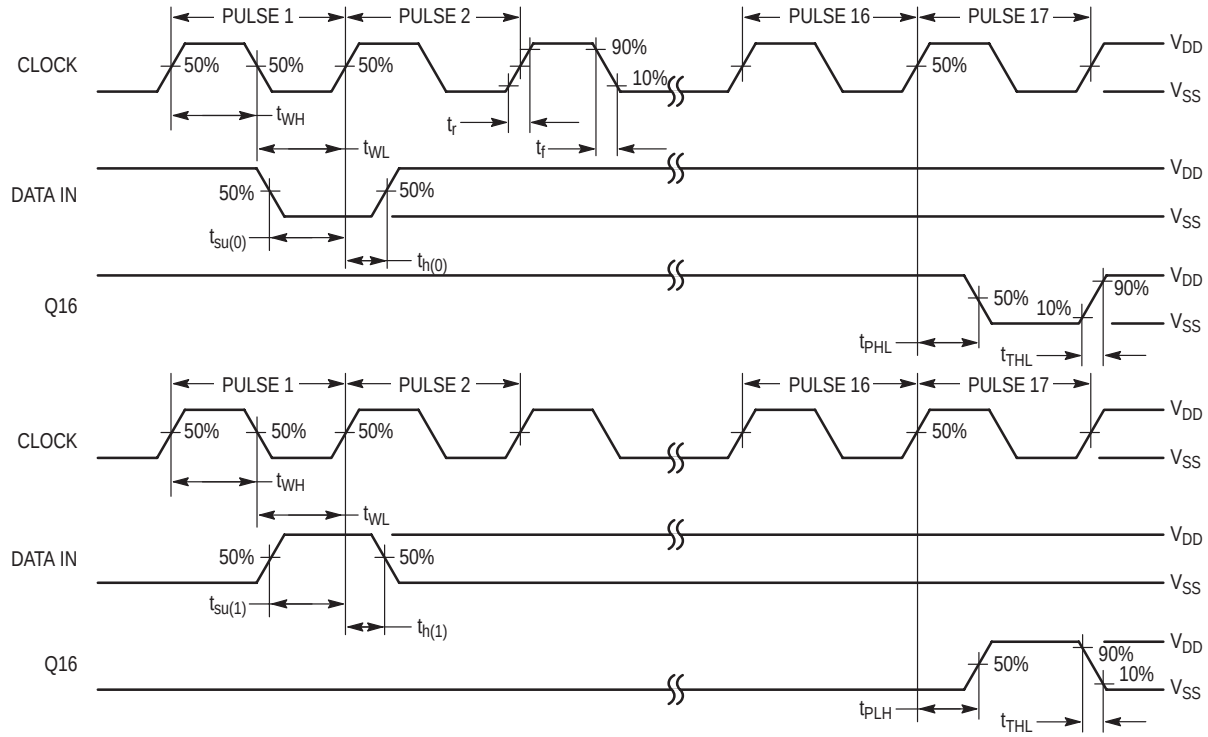


Figure 1. Power Dissipation Test Circuit and Waveforms

TIMING DIAGRAM



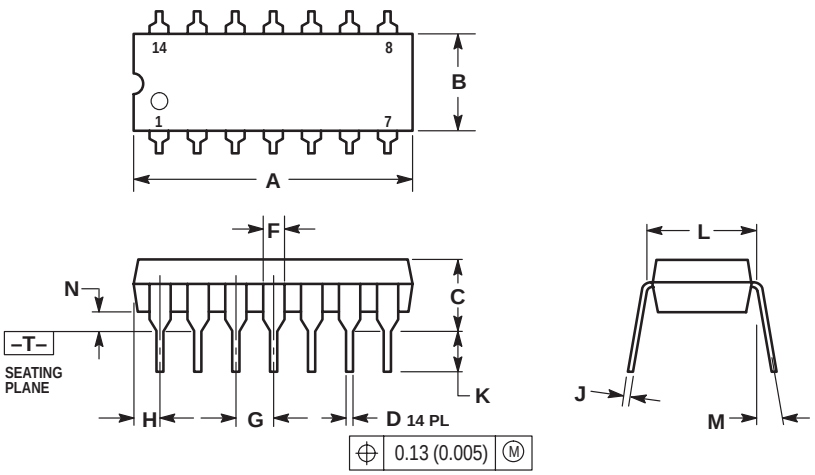
AC TEST WAVEFORMS



NOTE: The remaining Data–Bit Outputs (Q32, Q48, Q64, Q80, Q96, Q112 and Q128) will occur at Clock Pulse 32, 48, 64, 80, 96, 112, 128 in the same relationship as Q16.

PACKAGE DIMENSIONS

P SUFFIX
PLASTIC DIP PACKAGE
CASE 646–06
ISSUE M



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.

	INCHES		MILLIMETERS	
DIM	MIN	MAX	MIN	MAX
A	0.715	0.770	18.16	18.80
B	0.240	0.260	6.10	6.60
C	0.145	0.185	3.69	4.69
D	0.015	0.021	0.38	0.53
F	0.040	0.070	1.02	1.78
G	0.100 BSC		2.54 BSC	
H	0.052	0.095	1.32	2.41
J	0.008	0.015	0.20	0.38
K	0.115	0.135	2.92	3.43
L	0.290	0.310	7.37	7.87
M	—	10°	—	10°
N	0.015	0.039	0.38	1.01

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