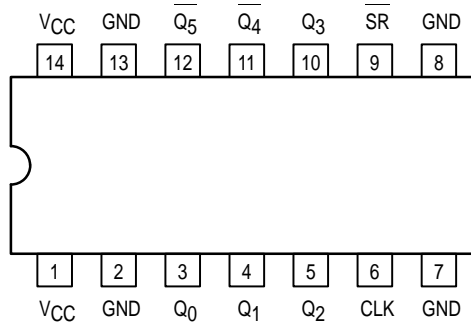


# Low Skew CMOS Clock Driver With Reset

The MC88914 is a high-speed, low power, hex divide-by-two D-type flip-flop with matched propagation delays, an internal power-on-reset, and external synchronous reset. With TTL compatible buffered clock and external reset inputs that are common to all flip-flops, the MC88914 is ideal for use in high-frequency systems as a clock driver, providing multiple outputs that are synchronous.

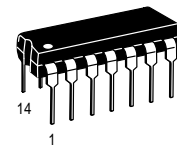
- Power-on-Reset and External Synchronous Reset
- TTL Compatible Positive Edge-Triggered Clock
- Matched Outputs for Synchronous Applications
- Outputs Source/Sink 24mA
- Part-to-Part Skew of Less Than 3.0ns
- Guaranteed Rise and Fall Times for a Given Capacitive Load

**Pinout: 14-Lead Plastic (Top View)**

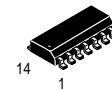


**MC88914**

**LOW SKEW CMOS  
CLOCK DRIVER  
WITH RESET**

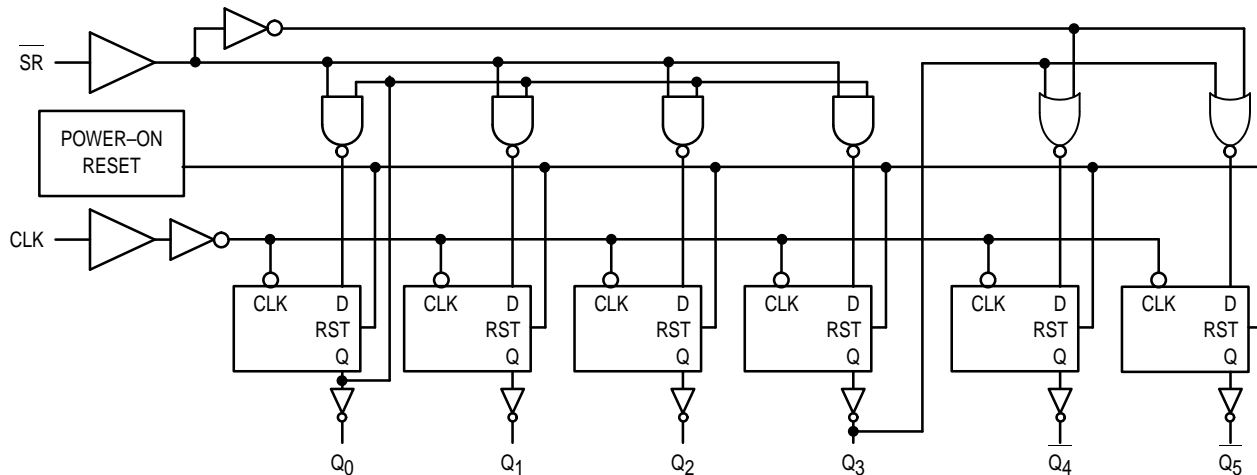


**N SUFFIX**  
PLASTIC PACKAGE  
CASE 646-06



**D SUFFIX**  
PLASTIC PACKAGE  
CASE 751A-03

**LOGIC DIAGRAM**



NOTE: This diagram is provided only for understanding of logic operation and should **not** be used to estimate propagation delays



## DC CHARACTERISTICS (unless otherwise specified)

Symbol	Parameter		Unit	Condition
I <sub>CC</sub>	Maximum Quiescent Supply Current	80	μA	V <sub>IN</sub> = V <sub>CC</sub> or GND V <sub>CC</sub> = 5.5V, T <sub>A</sub> = Worst Case
I <sub>CC</sub>	Maximum Quiescent Supply Current	8.0	μA	V <sub>IN</sub> = V <sub>CC</sub> or GND V <sub>CC</sub> = 5.5V, T <sub>A</sub> = 25°C
I <sub>CCT</sub>	Maximum Additional I <sub>CC</sub> /Input	1.5	mA	V <sub>IN</sub> = V <sub>CC</sub> - 2.1V V <sub>CC</sub> = 5.5V, T <sub>A</sub> = Worst Case

## DC CHARACTERISTICS

Symbol	Parameter	V <sub>CC</sub>	T <sub>A</sub> = +25°C		T <sub>A</sub> =	Unit	Conditions
			Typ	Guaranteed Max	-40 to +85°C		
V <sub>IH</sub>	Minimum High Level Input Voltage	4.5	1.5	2.0	2.0	V	V <sub>OUT</sub> = 0.1V or V <sub>CC</sub> - 0.1V
		5.5	1.5	2.0	2.0		
V <sub>IL</sub>	Maximum Low Level Input Voltage	4.5	1.5	0.8	0.8	V	V <sub>OUT</sub> = 0.1V or V <sub>CC</sub> - 0.1V
		5.5	1.5	0.8	0.8		
V <sub>OH</sub>	Minimum High Level	4.5	4.49	4.4	4.4	V	I <sub>OUT</sub> = -50μA
		5.5	5.49	5.4	5.4		
		4.5		3.86	3.76	V	*V <sub>IN</sub> = V <sub>IL</sub> or V <sub>IH</sub> I <sub>OH</sub> = -24mA -24mA
		5.5		4.86	4.76		
V <sub>OL</sub>	Maximum Low Level Output Voltage	4.5	0.001	0.1	0.1	V	I <sub>OUT</sub> = 50μA
		5.5	0.001	0.1	0.1		
		4.5		0.36	0.44	V	*V <sub>IN</sub> = V <sub>IL</sub> or V <sub>IH</sub> I <sub>OH</sub> = 24mA 24mA
		5.5		0.36	0.44		
I <sub>IN</sub>	Maximum Input	5.5		±0.1	±0.1	μA	V <sub>I</sub> = V <sub>CC</sub> , GND
I <sub>CCT</sub>	Maximum I <sub>CC</sub> /Input	5.5	0.6		1.5	mA	V <sub>I</sub> = V <sub>CC</sub> - 2.1V
I <sub>OLD</sub>	Minimum Dynamic Output Current**	5.5			75	mA	V <sub>OLD</sub> = 1.65V
I <sub>OHD</sub>		5.5			-75	mA	V <sub>OHD</sub> = 3.85V

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

\*\* Maximum test duration 20ms, one output at a time.

**AC CHARACTERISTICS** ( $V_{CC} = 5.0V \pm 10\%$ )

Symbol	Parameter	$V_{CC}$ (V)	$T_A = 25^\circ C$ $C_L = 50$ pF		$T_A = -40$ to $+85^\circ C$ $C_L = 50$ pF		Unit
			Min	Max	Min	Max	
$f_{MAX}$	Maximum Clock Frequency (50% Duty Cycle)	5.0	110		110		MHz
$t_{PLH}$ , $t_{PHL}$	Propagation_Delay CLK to $Q_n$ , $Q_n$	5.0	4.0	9.0	4.0	11	ns
$t_{PV}$	Propagation_Delay Variation CLK to $Q_n$ , $Q_n$ (see Note 1)	5.0		3.0		3.0	ns
$t_{PS}$	Propagation Delay Skew ( $Q_n$ , $Q_n$ ) $ t_{PHL} \text{ Actual} - t_{PLH} \text{ Actual} $	5.0		1.0		1.0	ns
$t_{OS}$	Output-to-Output Skew ( $Q_n$ , $Q_n$ ) $ t_{p Q_n} - t_{p Q_m} $ (see Note 2)	5.0		1.0		1.0	ns
$t_{rise}$ $t_{fall}$	Rise/Fall Time for $Q_n$ , $Q_n$ ( $0.2 \times V_{CC}$ to $0.8 \times V_{CC}$ )	5.0		3.0		4.0	ns

- For a given set of conditions (i.e., capacitive load, temperature and  $V_{CC}$ ) the variation from device to device is guaranteed to be less than or equal to the maximum.
- Where  $t_{p Q_n}$  and  $t_{p Q_m}$  are the actual propagation delays (any combination of HIGH or LOW) for any two separate outputs from a given high transition of CLK.

**AC OPERATING REQUIREMENTS**

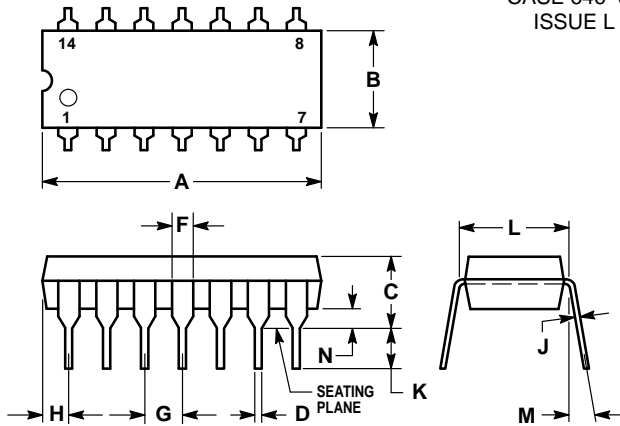
Symbol	Parameter	$V_{CC}$ (V)	$T_A = 25^\circ C$ $C_L = 50$ pF		$T_A = -40$ to $+85^\circ C$ $C_L = 50$ pF		Unit
			Min	Max	Min	Max	
$t_W$	CLK Pulse Width (HIGH to LOW)	5.0	3.0		3.0		ns
$t_{SU}$	Minimum Setup Time, HIGH or LOW SRB to Clock	5.0	3.5		3.5		ns
$t_{HD}$	Minimum Hold Time, HIGH or LOW SRB to Clock	5.0	1.0		1.0		ns

**CAPACITANCE**

Symbol	Parameter	Typ	Unit	Condition
$C_{IN}$	Input Capacitance	4.5	pF	$V_{CC} = 5.0V$
$C_{PD}$	Power Dissipation Capacitance	30	pF	$V_{CC} = 5.0V$

OUTLINE DIMENSIONS

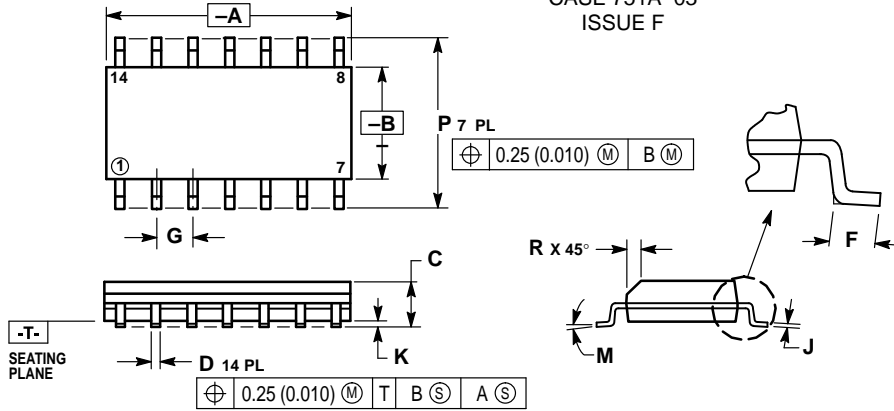
**N SUFFIX**  
**PLASTIC PACKAGE**  
**CASE 646-06**  
**ISSUE L**



- NOTES:
- LEADS WITHIN 0.13 (0.005) RADIUS OF TRUE POSITION AT SEATING PLANE AT MAXIMUM MATERIAL CONDITION.
  - DIMENSION L TO CENTER OF LEADS WHEN FORMED PARALLEL.
  - DIMENSION B DOES NOT INCLUDE MOLD FLASH.
  - ROUNDED CORNERS OPTIONAL.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.715	0.770	18.16	19.56
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	0.300 BSC		7.62 BSC	
M	0°	10°	0°	10°
N	0.015	0.039	0.39	1.01

**D SUFFIX**  
**PLASTIC SOIC PACKAGE**  
**CASE 751A-03**  
**ISSUE F**



- NOTES:
- DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
  - CONTROLLING DIMENSION: MILLIMETER.
  - DIMENSIONS A AND B DO NOT INCLUDE MOLD PROTRUSION.
  - MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.
  - 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	8.55	8.75	0.337	0.344
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	0.228	0.244
R	0.25	0.50	0.010	0.019

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MC88914/D

