

# 1:5 Clock Distribution Chip

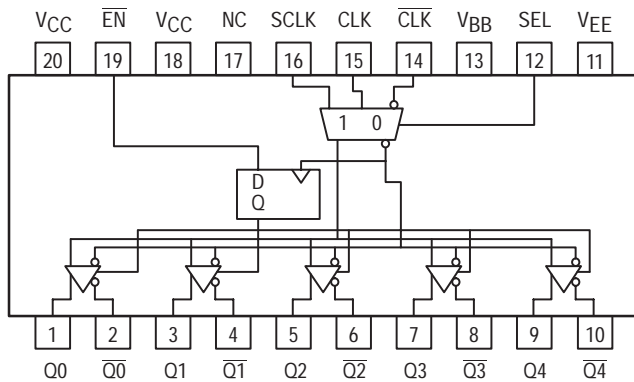
The MC100LVEL/100EL14 is a low skew 1:5 clock distribution chip designed explicitly for low skew clock distribution applications. The device can be driven by either a differential or single-ended ECL or, if positive power supplies are used, PECL input signal. The LVEL14 is functionally and pin compatible with the EL14 but is designed to operate in ECL or PECL mode for a voltage supply range of  $-3.0V$  to  $-3.8V$  ( or  $3.0V$  to  $3.8V$ ). If a single-ended input is to be used the  $V_{BB}$  output should be connected to the  $\overline{CLK}$  input and bypassed to ground via a  $0.01\mu F$  capacitor. The  $V_{BB}$  output is designed to act as the switching reference for the input of the LVEL14 under single-ended input conditions, as a result this pin can only source/sink up to  $0.5mA$  of current.

The LVEL14 features a multiplexed clock input to allow for the distribution of a lower speed scan or test clock along with the high speed system clock. When LOW (or left open and pulled LOW by the input pulldown resistor) the SEL pin will select the differential clock input.

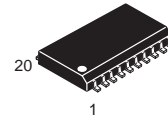
The common enable ( $\overline{EN}$ ) is synchronous so that the outputs will only be enabled/disabled when they are already in the LOW state. This avoids any chance of generating a runt clock pulse when the device is enabled/disabled as can happen with an asynchronous control. The internal flip flop is clocked on the falling edge of the input clock, therefore all associated specification limits are referenced to the negative edge of the clock input.

- 50ps Output-to-Output Skew
- Synchronous Enable/Disable
- Multiplexed Clock Input
- $75k\Omega$  Internal Input Pulldown Resistors
- $>2000V$  ESD Protection
- $V_{EE}$  Range of  $-3.0V$  to  $-5.5V$

## LOGIC DIAGRAM AND PINOUT ASSIGNMENT



# MC100LVEL14 MC100EL14



**DW SUFFIX**  
PLASTIC SOIC PACKAGE  
CASE 751D-04

## PIN DESCRIPTION

PIN	FUNCTION
CLK	Diff Clock Inputs
SCLK	Scan Clock Input
$\overline{EN}$	Sync Enable
SEL	Clock Select Input
$V_{BB}$	Reference Output
Q0-4	Diff Clock Outputs

## FUNCTION TABLE

CLK	SCLK	SEL	$\overline{EN}$	Q
L	X	L	L	L
H	X	L	L	H
X	L	H	L	L
X	H	H	L	H
X	X	X	H	L*

\* On next negative transition of CLK or SCLK



**ABSOLUTE MAXIMUM RATINGS<sup>1</sup>**

Symbol	Characteristic	Rating	Unit
V <sub>EE</sub>	Power Supply (V <sub>CC</sub> = 0V)	-8.0 to 0	VDC
V <sub>I</sub>	Input Voltage (V <sub>CC</sub> = 0V)	0 to -6.0	VDC
I <sub>out</sub>	Output Current Continuous Surge	50 100	mA
T <sub>A</sub>	Operating Temperature Range	-40 to +85	°C
V <sub>EE</sub>	Operating Range <sup>1,2</sup>	-5.7 to -4.2	V

1. Absolute maximum rating, beyond which, device life may be impaired, unless otherwise specified on an individual data sheet.
2. Parametric values specified at:  
 100EL Series: -4.20V to -5.50V  
 10EL Series: -4.94V to -5.50V

**DC CHARACTERISTICS (V<sub>EE</sub> = V<sub>EE</sub>(min) - V<sub>EE</sub>(max); V<sub>CC</sub> = GND<sup>1</sup>)**

Symbol	Characteristic	-40°C			0°C to 85°C			Unit	Condition
		Min	Typ	Max	Min	Typ	Max		
V <sub>OH</sub>	Output HIGH Voltage	-1085	-1005	-880	-1025	-955	-880	mV	V <sub>IN</sub> = V <sub>IH</sub> (max) or V <sub>IL</sub> (min)
V <sub>OL</sub>	Output LOW Voltage	-1830	-1695	-1555	-1810	-1705	-1620	mV	
V <sub>OHA</sub>	Output HIGH Voltage	-1095	—	—	-1035	—	—	mV	V <sub>IN</sub> = V <sub>IH</sub> (max) or V <sub>IL</sub> (min)
V <sub>OLA</sub>	Output LOW Voltage	—	—	-1555	—	—	-1610	mV	
V <sub>IH</sub>	Input HIGH Voltage	-1165	—	-880	-1165	—	-880	mV	
V <sub>IL</sub>	Input LOW Voltage	-1810	—	-1475	-1810	—	-1475	mV	
I <sub>IL</sub>	Input LOW Current CLK Others	-300 0.5	—	—	-300 0.5	—	—	μA	V <sub>IN</sub> = V <sub>IL</sub> (max)

1. This table replaces the three tables traditionally seen in ECL 100K data books. The same DC parameter values at V<sub>EE</sub> = -4.5V now apply across the full V<sub>EE</sub> range of -3.0V to -5.5V. Outputs are terminated through a 50Ω resistor to -2.0V except where otherwise specified on the individual data sheets.

MC100LVEL14 AC/DC CHARACTERISTICS ( $V_{EE} = -3.8V$  to  $-3.0V$ ;  $V_{CC} = GND$ )

Symbol	Characteristic	-40°C			0°C			25°C			85°C			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
$I_{EE}$	Power Supply Current 100LVEL 100EL		32 32	40 40		32 32	40 40		32 32	40 40		34 34	42 42	mA
$V_{BB}$	Output Ref Voltage 100LVEL 100EL	-1.43 -1.38		-1.30 -1.26	-1.38 -1.38		-1.27 -1.26	-1.35 -1.38		-1.25 -1.26	-1.31 -1.38		-1.19 -1.26	V
$I_{IH}$	Input High Current			150			150			150			150	$\mu A$
$t_{PLH}$ $t_{PHL}$	Prop Delay CLK to Q (Diff) CLK to Q (SE) SCLK to Q	520		720	550		750	580	680	780	630		830	ps
$t_{SKEW}$	Part-to-Part Skew Within-Device Skew <sup>1</sup>			200 50			200 50			200 50			200 50	ps
$t_S$	Setup Time $\overline{EN}$	0			0			0			0			ps
$t_H$	Hold Time $\overline{EN}$	0			0			0			0			ps
$V_{PP}$	Minimum Input Swing CLK	150			150			150			150			mV
$V_{CMR}$	Common Mode Range <sup>2</sup> $V_{PP} < 500mV$ $V_{PP} \geq 500mV$	-2.0 -1.8		-0.4 -0.4	-2.1 -1.9		-0.4 -0.4	-2.1 -1.9		-0.4 -0.4	-2.1 -1.9		-0.4 -0.4	V
$t_r$ $t_f$	Output Rise/Fall Times Q (20% – 80%)	230		500	230		500	230		500	230		500	ps

1. Skews are specified for identical LOW-to-HIGH or HIGH-to-LOW transitions.

2. The CMR range is referenced to the most positive side of the differential input signal. Normal operation is obtained if the HIGH level falls within the specified range and the peak-to-peak voltage lies between  $V_{ppmin}$  and 1V. The lower end of the CMR range varies 1:1 with  $V_{EE}$ . The numbers in the spec table assume a nominal  $V_{EE} = -3.3V$ . Note for PECL operation, the  $V_{CMR(min)}$  will be fixed at  $3.3V - |V_{CMR(min)}|$ .

MC100EL14 AC/DC CHARACTERISTICS ( $V_{EE} = -4.2V$  to  $-5.5V$ ;  $V_{CC} = GND$ )

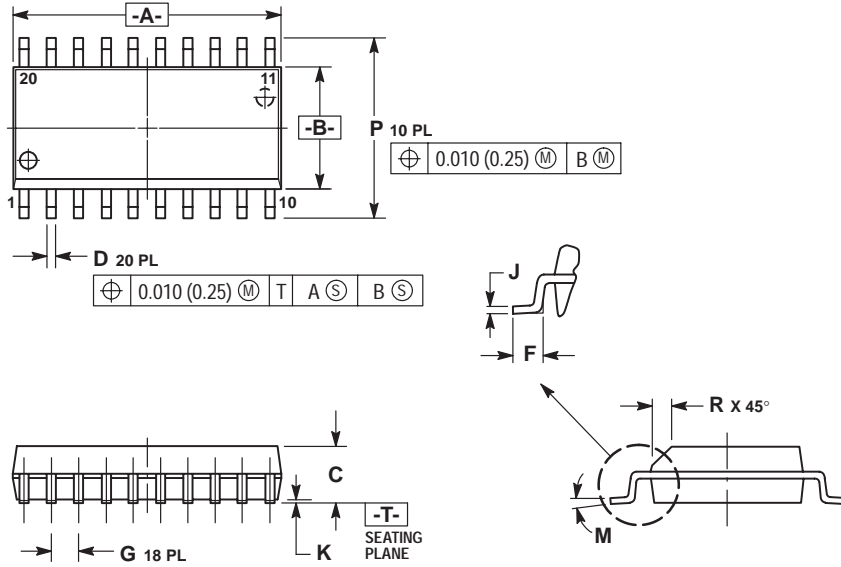
Symbol	Characteristic	-40°C			0°C			25°C			85°C			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
$I_{EE}$	Power Supply Current 100LVEL 100EL		32 32	40 40		32 32	40 40		32 32	40 40		34 34	42 42	mA
$V_{BB}$	Output Ref Voltage 100LVEL 100EL	-1.43 -1.38		-1.30 -1.26	-1.38 -1.38		-1.27 -1.26	-1.35 -1.38		-1.25 -1.26	-1.31 -1.38		-1.19 -1.26	V
$I_{IH}$	Input High Current			150			150			150			150	$\mu A$
$t_{PLH}$ $t_{PHL}$	Prop Delay CLK to Q (Diff) CLK to Q (SE) SCLK to Q	520		720	550		750	580	680	780	630		830	ps
$t_{SKEW}$	Part-to-Part Skew Within-Device Skew <sup>1</sup>			200 50			200 50			200 50			200 50	ps
$t_S$	Setup Time $\overline{EN}$	0			0			0			0			ps
$t_H$	Hold Time $\overline{EN}$	0			0			0			0			ps
$V_{PP}$	Minimum Input Swing CLK	150			150			150			150			mV
$V_{CMR}$	Common Mode Range <sup>2</sup> $V_{PP} < 500mV$ $V_{PP} \geq 500mV$	-3.2 -3.0		-0.4 -0.4	-3.3 -3.1		-0.4 -0.4	-3.3 -3.1		-0.4 -0.4	-3.3 -3.1		-0.4 -0.4	V
$t_r$ $t_f$	Output Rise/Fall Times Q (20% – 80%)	230		500	230		500	230		500	230		500	ps

1. Skews are specified for identical LOW-to-HIGH or HIGH-to-LOW transitions.

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OUTLINE DIMENSIONS

D SUFFIX  
PLASTIC SOIC PACKAGE  
CASE 751D-04  
ISSUE E



- 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 0.150 (0.006) PER SIDE.
  5. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.13 (0.005) TOTAL IN EXCESS OF D DIMENSION AT MAXIMUM MATERIAL CONDITION.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	12.65	12.95	0.499	0.510
B	7.40	7.60	0.292	0.299
C	2.35	2.65	0.093	0.104
D	0.35	0.49	0.014	0.019
F	0.50	0.90	0.020	0.035
G	1.27 BSC		0.050 BSC	
J	0.25	0.32	0.010	0.012
K	0.10	0.25	0.004	0.009
M	0°	7°	0°	7°
P	10.05	10.55	0.395	0.415
R	0.25	0.75	0.010	0.029

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