

1:5 Clock Distribution Chip

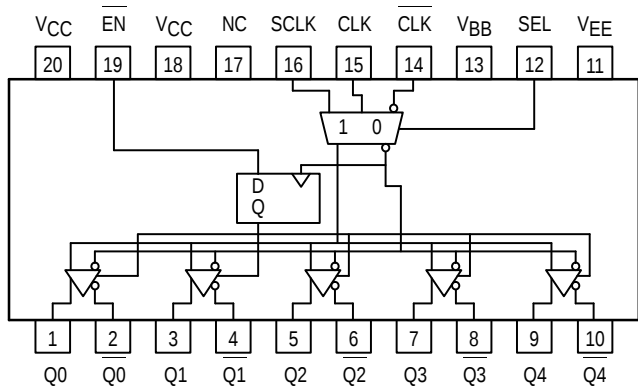
The MC100LVEL/100EL14 is a low skew 1:5 clock distribution chip designed explicitly for low skew clock distribution applications. The device can be driven by either a differential or single-ended ECL or, if positive power supplies are used, PECL input signal. The LVEL14 is functionally and pin compatible 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 CLK input and bypassed to ground via a 0.01μF 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.

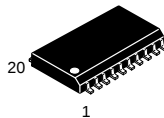
The common enable (EN) is synchronous so that the outputs will only be enabled/disabled when they are already in the LOW state. This avoids any chance of generating a runt clock pulse when the device is enabled/disabled as can happen with an asynchronous control. The internal flip flop is clocked on 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
- 75kΩ 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
EN	Sync Enable
SEL	Clock Select Input
V _{BB}	Reference Output
Q0-4	Diff Clock Outputs

FUNCTION TABLE

CLK	SCLK	SEL	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 RATINGS¹

Symbol	Characteristic	Rating	Unit
V_{EE}	Power Supply ($V_{CC} = 0V$)	-8.0 to 0	VDC
V_I	Input Voltage ($V_{CC} = 0V$)	0 to -6.0	VDC
I_{out}	Output Current Continuous Surge	50 100	mA
T_A	Operating Temperature Range	-40 to +85	°C
V_{EE}	Operating Range ^{1,2}	-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 ($V_{EE} = V_{EE}(\min) - V_{EE}(\max)$; $V_{CC} = GND$ ¹)

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

1. This table replaces the three tables traditionally seen in ECL 100K data books. The same DC parameter values at $V_{EE} = -4.5V$ now apply across the full V_{EE} 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	μA
t_{PLH} t_{PHL}	Prop Delay CLK to Q (Diff) CLK to Q (SE) SCLK to Q	520 470 470		720 770 770	550 500 500		750 800 800	580 530 530	680 680 680	780 830 830	630 580 580		830 880 880	ps
t_{SKEW}	Part-to-Part Skew Within-Device Skew ¹			200 50			200 50			200 50			200 50	ps
t_S	Setup Time EN	0			0			0			0			ps
t_H	Hold Time EN	0			0			0			0			ps
V_{PP}	Minimum Input Swing CLK	150			150			150			150			mV
V_{CMR}	Common Mode Range ² $V_{PP} < 500mV$ $V_{PP} \geq 500mV$	-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 $-5.5V$; $V_{CC} = GND$)

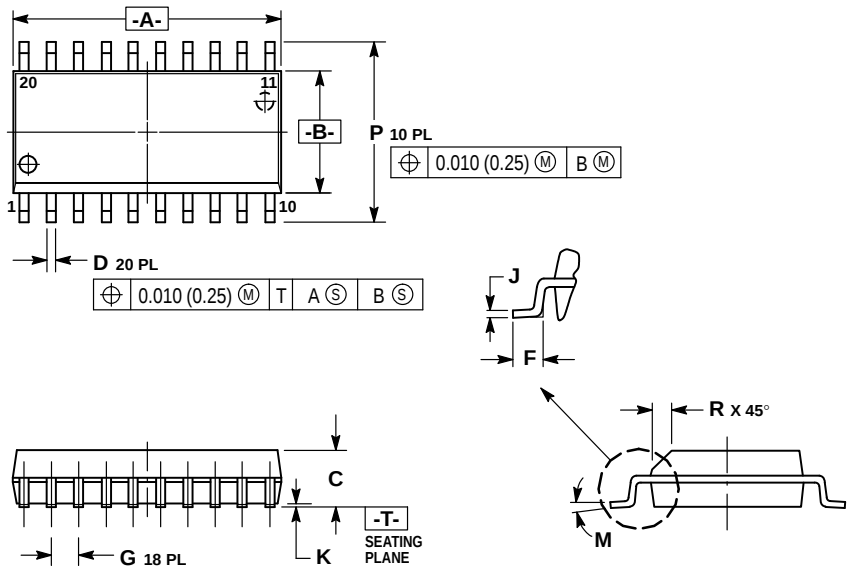
Symbol	Characteristic	-40°C			0°C			25°C			85°C			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
I_{EE}	Power Supply Current 100LVEL 100EL		32 32	40 40		32 32	40 40		32 32	40 40		34 34	42 42	mA
V_{BB}	Output Ref Voltage 100LVEL 100EL	-1.43 -1.38		-1.30 -1.26	-1.38 -1.38		-1.27 -1.26	-1.35 -1.38		-1.25 -1.26	-1.31 -1.38		-1.19 -1.26	V
I_{IH}	Input High Current			150			150			150			150	μA
t_{PLH} t_{PHL}	Prop Delay CLK to Q (Diff) CLK to Q (SE) SCLK to Q	520 470 470		720 770 770	550 500 500		750 800 800	580 530 530	680 680 680	780 830 830	630 580 580		830 880 880	ps
t_{SKEW}	Part-to-Part Skew Within-Device Skew ¹			200 50			200 50			200 50			200 50	ps
t_S	Setup Time EN	0			0			0			0			ps
t_H	Hold Time EN	0			0			0			0			ps
V_{PP}	Minimum Input Swing CLK	150			150			150			150			mV
V_{CMR}	Common Mode Range ² $V_{PP} < 500mV$ $V_{PP} \geq 500mV$	-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.

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 $V_{EE} = -4.5V$. Note for PECL operation, the $V_{CMR(min)}$ will be fixed at $5.0V - |V_{CMR(min)}|$.

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

Motorola reserves the right to make changes without further notice to any products herein. Motorola makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does Motorola 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 consequential or incidental damages. "Typical" parameters which may be provided in Motorola 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. Motorola does not convey any license under its patent rights nor the rights of others. Motorola 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 Motorola product could create a situation where personal injury or death may occur. Should Buyer purchase or use Motorola products for any such unintended or unauthorized application, Buyer shall indemnify and hold Motorola 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 Motorola was negligent regarding the design or manufacture of the part. Motorola and  are registered trademarks of Motorola, Inc. Motorola, Inc. is an Equal Opportunity/Affirmative Action Employer.

How to reach us:
USA/EUROPE/Locations Not Listed: Motorola Literature Distribution;
P.O. Box 20912; Phoenix, Arizona 85036. 1-800-441-2447 or 602-303-5454

MFAX: RMFA00@email.sps.mot.com – TOUCHTONE 602-244-6609
INTERNET: <http://Design-NET.com>

JAPAN: Nippon Motorola Ltd.; Tatsumi-SPD-JLDC, 6F Seibu-Butsuryu-Center,
3-14-2 Tatsumi Koto-Ku, Tokyo 135, Japan. 03-81-3521-8315

ASIA/PACIFIC: Motorola Semiconductors H.K. Ltd.; 8B Tai Ping Industrial Park,
51 Ting Kok Road, Tai Po, N.T., Hong Kong. 852-26629298

