

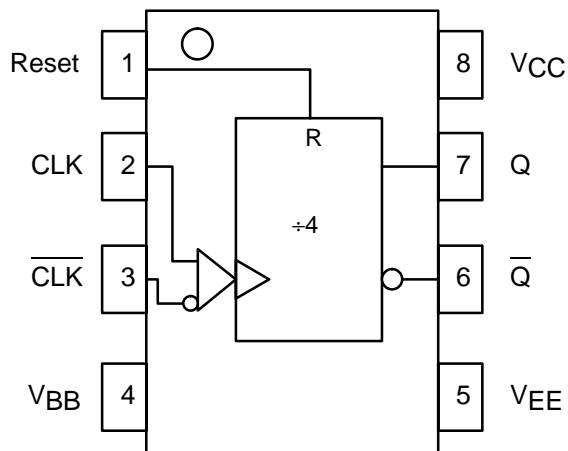
## ÷4 Divider

The MC100LVEL33 is an integrated ÷4 divider. The differential clock inputs and the  $V_{BB}$  allow a differential, single-ended or AC coupled interface to the device. If used, the  $V_{BB}$  output should be bypassed to ground with a 0.01 $\mu$ F capacitor. Also note that the  $V_{BB}$  is designed to be used as an input bias on the EL33 only, the  $V_{BB}$  output has limited current sink and source capability. The LVEL is functionally equivalent to the EL33 and works from a low voltage supply.

The reset pin is asynchronous and is asserted on the rising edge. Upon power-up, the internal flip-flops will attain a random state; the reset allows for the synchronization of multiple LVEL33's in a system.

- 630ps Propagation Delay
- 4.0GHz Toggle Frequency
- High Bandwidth Output Transitions
- Operates from -3.3V (or 3.3V) Supply
- 75k $\Omega$  Internal Input Pulldown Resistors
- >2000V ESD Protection

### LOGIC DIAGRAM AND PINOUT ASSIGNMENT



## MC100LVEL33



**D SUFFIX**  
PLASTIC SOIC PACKAGE  
CASE 751-05

### PIN DESCRIPTION

PIN	FUNCTION
CLK	Clock Inputs
Reset	Asynch Reset
$V_{BB}$	Ref Voltage Output
Q	Data Outputs



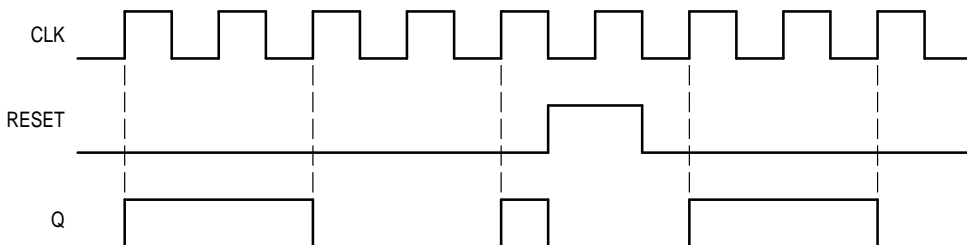
**DC CHARACTERISTICS** ( $V_{EE} = V_{EE}(\text{min})$  to  $V_{EE}(\text{max})$ ;  $V_{CC} = \text{GND}$ )

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		33	37		33	37		33	37		35	39	mA
$V_{EE}$	Power Supply Voltage	-3.0		-3.8	-3.0		-3.8	-3.0		-3.8	-3.0		-3.8	V
$V_{BB}$	Output Reference Voltage	-1.38		-1.26	-1.38		-1.26	-1.38		-1.26	-1.38		-1.26	V
$I_{IH}$	Input HIGH Current			150			150			150			150	$\mu\text{A}$
$I_{IL}$	Input LOW Current CLK Other	-600 0.5			-600 0.5			-600 0.5			-600 0.5			$\mu\text{A}$

**AC CHARACTERISTICS** ( $V_{EE} = V_{EE}(\text{min})$  to  $V_{EE}(\text{max})$ ;  $V_{CC} = \text{GND}$ )

Symbol	Characteristic	-40°C			0°C			25°C			85°C			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
$f_{\text{MAX}}$	Maximum Toggle Frequency	3.4	4.2		3.8	4.2		3.8	4.2		3.8	4.2		GHz
$t_{\text{PLH}}$ $t_{\text{PHL}}$	Propagation Delay CLK to Q (Diff) CLK to Q (SE) Reset to Q	510 460 500		690 740 700	530 480 510		710 760 710	540 490 520		720 770 720	600 550 580		780 830 780	ps
$t_{\text{rr}}$	Reset Recovery	300			300			300			300			ps
$t_{\text{skew}}$	Duty Cycle Skew <sup>2</sup>			20			20			20			20	ps
$V_{\text{PP}}$	Minimum Input Swing <sup>1</sup>	150			150			150			150			mV
$V_{\text{CMR}}$	Common Mode Range <sup>3</sup> $V_{\text{PP}} < 500\text{mV}$ $V_{\text{PP}} \geq 500\text{mV}$	-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
$t_{\text{r}}$ $t_{\text{f}}$	Output Rise/Fall Times Q (20% – 80%)	120		320	120		320	120		320	120		320	ps

1. Minimum input swing for which AC parameters are guaranteed.
2. Duty cycle skew is the difference between  $T_{\text{PLH}}$  and  $T_{\text{PLL}}$ .
3. 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  $V_{\text{ppmin}}$  and 1V. The lower end of the CMR range varies 1:1 with  $V_{\text{EE}}$ . The numbers in the spec table assume a nominal  $V_{\text{EE}} = -3.3\text{V}$ . Note for PECL operation, the  $V_{\text{CMR}(\text{min})}$  will be fixed at  $3.3\text{V} - |V_{\text{CMR}(\text{min})}|$ .



**Figure 1. Timing Diagram**

OUTLINE DIMENSIONS

D SUFFIX  
PLASTIC SOIC PACKAGE  
CASE 751-05  
ISSUE P



NOTES:

1. DIMENSIONS A AND B ARE DATUMS AND T IS A DATUM SURFACE.
2. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
3. DIMENSIONS ARE IN MILLIMETER.
4. DIMENSION A AND B DO NOT INCLUDE MOLD PROTRUSION.
5. MAXIMUM MOLD PROTRUSION 0.15 PER SIDE.
6. DIMENSION D DOES NOT INCLUDE MOLD PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.127 TOTAL IN EXCESS OF THE D DIMENSION AT MAXIMUM MATERIAL CONDITION.

DIM	MILLIMETERS	
	MIN	MAX
A	4.80	5.00
B	3.80	4.00
C	1.35	1.75
D	0.35	0.49
F	0.40	1.25
G	1.27 BSC	
J	0.18	0.25
K	0.10	0.25
M	0°	7°
P	5.80	6.20
R	0.25	0.50

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

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

MFAX: RMFAX0@email.sps.mot.com - TOUCHTONE 602-244-6609  
INTERNET: http://Design-NET.com

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

