# MK2014A
Fast Ethernet Clock Source

ICS MICROCLOCK

Description

The MK2014A is the ideal way to generate clocks for Fast Ethernet cards or systems. It provides 20MHz and 25MHz clocks from an inexpensive 14.31818 MHz crystal or clock. In an 8 pin SOIC, the MK2014A can save component count, board space, and cost over surface mount crystals and oscillators, and increase reliability by eliminating mechanical devices from the board.
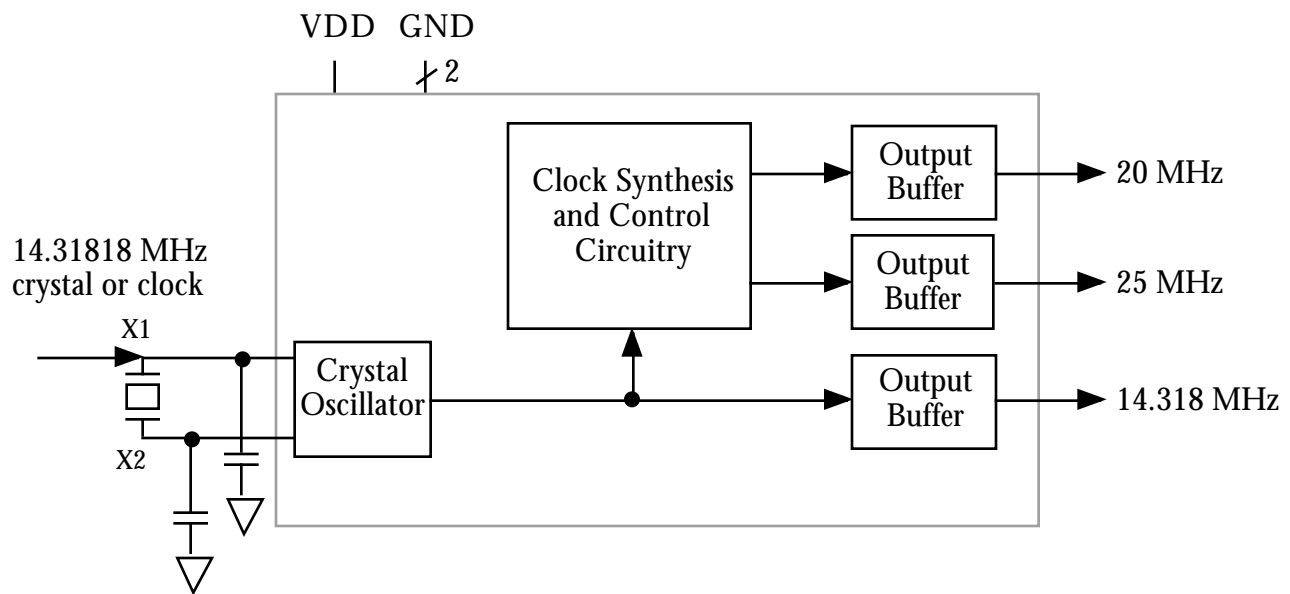
The MK2014A is a functionally identical update of the MK2014 and should be used in all designs. The only change is in crystal load capacitance as stated on page 2.

MicroClock offers many other clocks for computers and computer peripherals. Consult your MicroClock representative when you need to remove crystals and oscillators from your board.
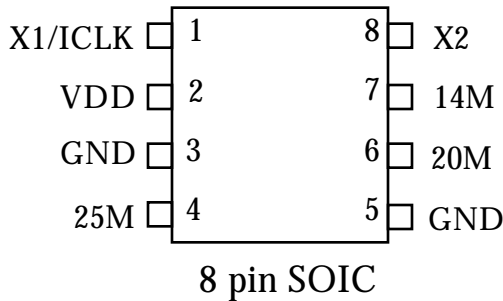
Features

• Packaged in 8 pin SOIC

• Input crystal or clock frequency of 14.318 MHz

• Lowest jitter in the industry reliably clocks

  sensitive Ethernet devices.

• Output clock frequencies of 20.00 MHz and

  25.00 MHz

• Zero ppm synthesis error in the output clocks

• Full CMOS outputs with 25mA drive capability

  at TTL levels

• 3.3V or 5V±10% supply voltage

• Advanced, low power CMOS process
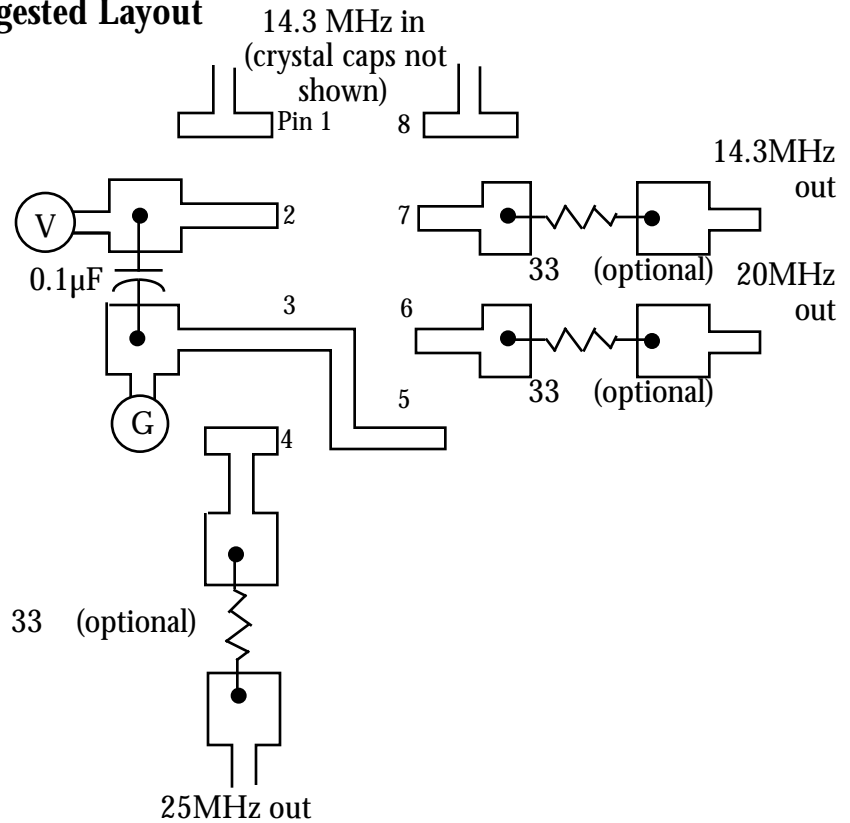
• Insensitive to input clock duty cycle

Block Diagram

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Pin Assignment

Suggested Layout

14.3 MHz in
(crystal caps not
shown)

8 pin SOIC

X1/ICLK — 1   8 — X2
VDD — 2   7 — 14M
GND — 3   6 — 20M
25M — 4   5 — GND

Pin Descriptions

Number	Name	Type	Description
1	X1/ICLK	XI	Crystal Connection. Connect to a 14.31818 MHz crystal or clock.
2	VDD	P	Connect to +5V.
3	GND	P	Connect to ground.
4	25M	O	25.000 MHz clock output.
5	GND	P	Connect to ground.
6	20M	O	20.000 MHz clock output.
7	14M	O	14.31818 MHz buffered crystal clock output.
8	X2	XO	Crystal Connection to a 14.31818 MHz crystal, or leave unconnected for clock input.

Key: I = Input, O = output, P = power supply connection

External Components/Crystal Selection

A minimum number of external components are required for proper oscillation. A decoupling capacitor of 0.1 µF should be connected between VDD and GND on pins 2 and 3, and 33 Ω terminating resistors should be used on clock outputs with traces longer than 1 inch. For a clock input, connect to X1 and leave X2 unconnected. For a crystal input, a parallel resonant 14.31818 MHz crystal is recommended. The frequency accuracy of the crystal should be 30 ppm or better. External capacitors from each of the X1 and X2 pins to ground should be added with a value in pF equal to $(C_L-13)*2$, where C_L is the crystal load capacitance in pF. So for a crystal with load capacitance of 16 pF, 6 pF capacitors should be used. [Note that the MK2014S required crystal load capacitors of $(C_L-4)*2$.]

Electrical Specifications

| Parameter	Conditions	Minimum	Typical	Maximum	Units
ABSOLUTE MAXIMUM RATINGS (note 1)					
Supply Voltage, VDD	Referenced to GND			7	V
Inputs	Referenced to GND	-0.5		VDD+.5V	V
Clock Outputs	Referenced to GND	-0.5		VDD+.5V	V
Ambient Operating Temperature		0		70	°C
Soldering Temperature	Max of 20 seconds			260	°C
Storage temperature		-65		150	°C
DC CHARACTERISTICS (at 5.0V unless otherwise noted)					
Operating Voltage, VDD		4.5		5.5	V
Input High Voltage, VIH, input clock only	Clock input	3.5	2.5		V
Input Low Voltage, VIL, input clock only	Clock input		2.5	1.5	V
Output High Voltage, VOH	IOH=-4mA	VDD-0.4			V
Output High Voltage, VOH	IOH=-25mA	2.4			V
Output Low Voltage, VOL	IOL=25mA			0.4	V
Operating Supply Current, IDD, 5V	No Load		19		mA
Operating Supply Current, IDD, 3.3V	No Load		10		mA
Input Capacitance			7		pF
Actual Mean Frequency versus Target, note 3	With exact crystal			0	ppm
AC CHARACTERISTICS					
Input Clock or Crystal Frequency			14.31818		MHz
Input Crystal Accuracy				30	ppm
Input Clock Duty Cycle, 14.31818MHz	Time above 2.5V	20		80	%
Output Clock Rise Time	0.8 to 2.0V			1.5	ns
Output Clock Fall Time	2.0 to 0.8V			1.5	ns
Output Clock Duty Cycle	Time above 1.5V	45	50	55	%
Absolute Clock Period Jitter, 14.318 MHz output		-400	250	400	ps
Absolute Clock Period Jitter, 20, 25 MHz outputs		-300	150	300	ps
One Sigma Clock Period Jitter	All outputs		70		ps

Notes:

1. Stresses beyond those listed under Absolute Maximum Ratings could cause permanent damage to the device. Prolonged exposure to levels above the operating limits but below the Absolute Maximums may affect device reliability.
2. Typical values are at 25°C.
3. Provided an exact clock input or a properly tuned crystal is used as the reference.

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Package Outline and Package Dimensions

8 pin SOIC
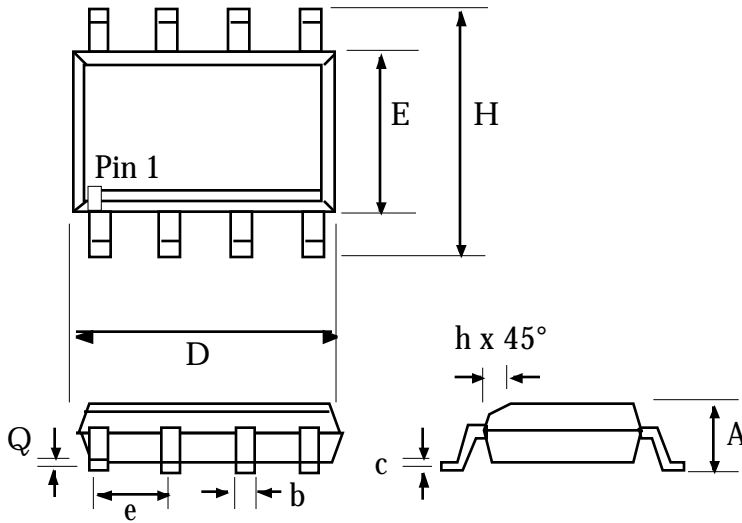
	Inches		Millimeters	
Symbol	Min	Max	Min	Max
A	0.055	0.070	1.397	1.778
b	0.013	0.019	0.330	0.483
D	0.185	0.200	4.699	5.080
E	0.150	0.160	3.810	4.064
H	0.225	0.245	5.715	6.223
e	.050 BSC		1.27 BSC	
h		0.015		0.381
Q	0.004	0.01	0.102	0.254

Ordering Information

Part/Order Number	Marking	Package	Temperature
MK2014A	MK2014A	8 pin SOIC	0 to 70 C
MK2014ATR	MK2014A	Add tape and reel	0 to 70 C