## 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.

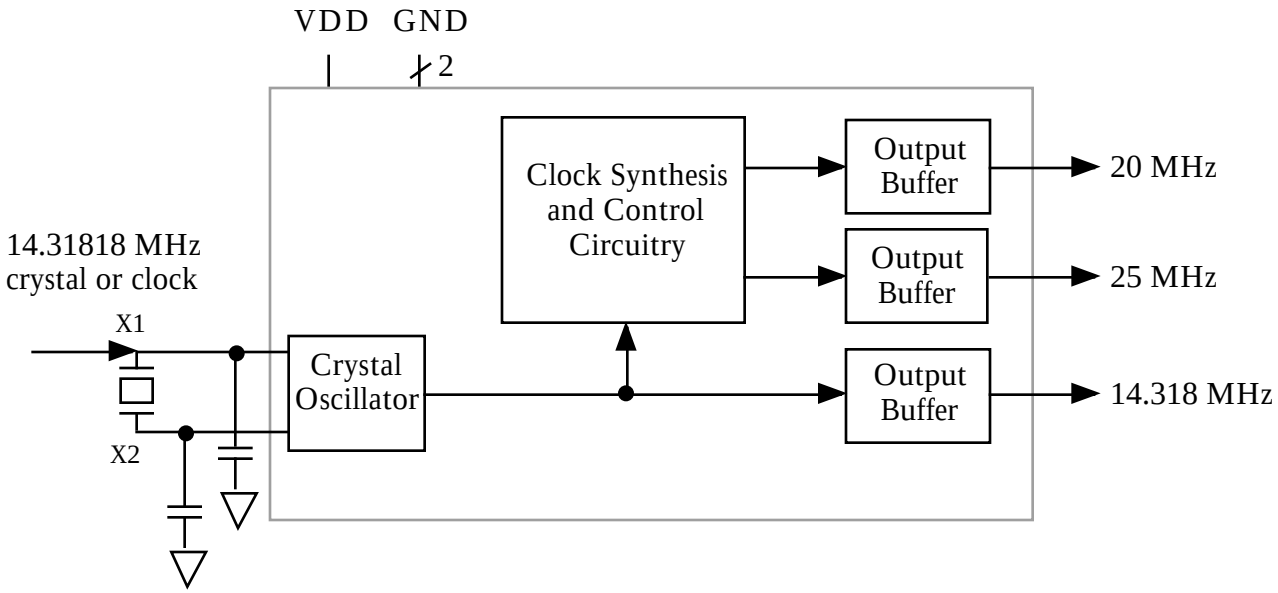
The MK2014A is a functionally identical update of the MK2014 and should be used in all designs. The only change is in crystal load capacitance as stated on page 2.

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

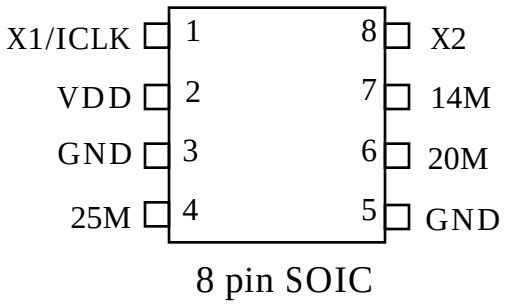
## Block Diagram





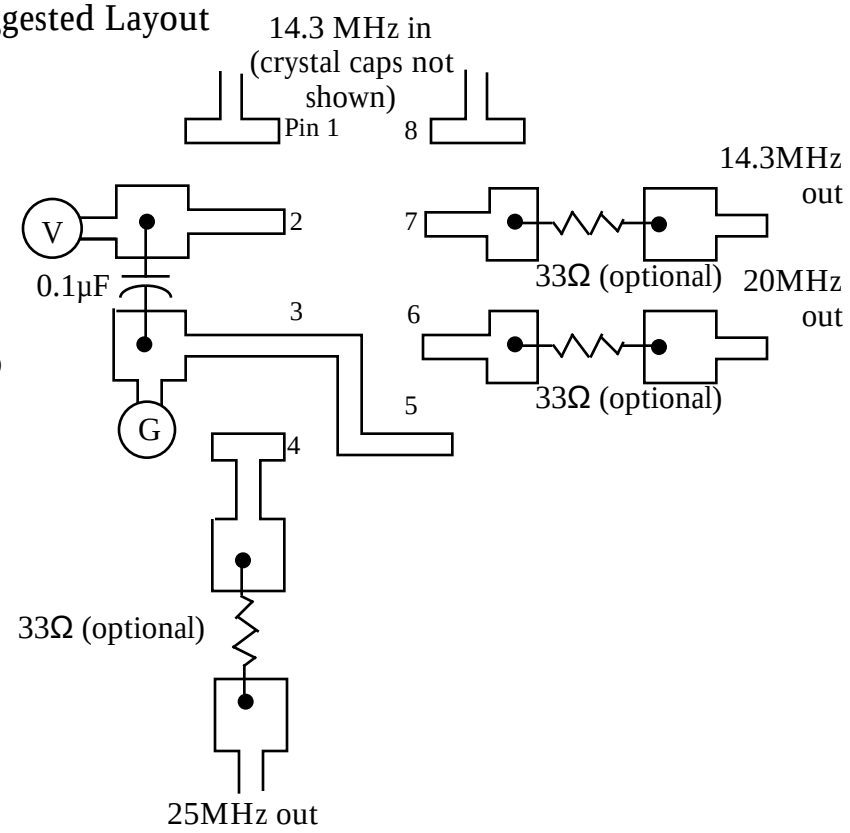
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## Pin Assignment




8 pin SOIC

## Suggested Layout




## 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 $(C_L-4)*2$.]


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## Electrical Specifications

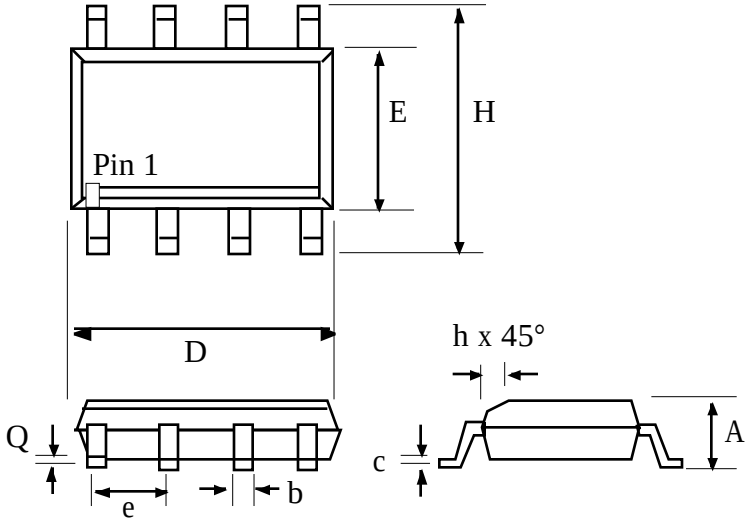
| Parameter | Conditions | Minimum | Typical | Maximum | Units |
|---|---|---|---|---|---|
| ABSOLUTE MAXIMUM RATINGS (note 1) | | | | | |
| Supply Voltage, VDD | Referenced to GND | | | 7 | V |
| Inputs | Referenced to GND | -0.5 | | VDD+.5V | V |
| Clock Outputs | Referenced to GND | -0.5 | | VDD+.5V | 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 |

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