



MK1442/MK1443 SCSI and Ethernet Clock Source

Description

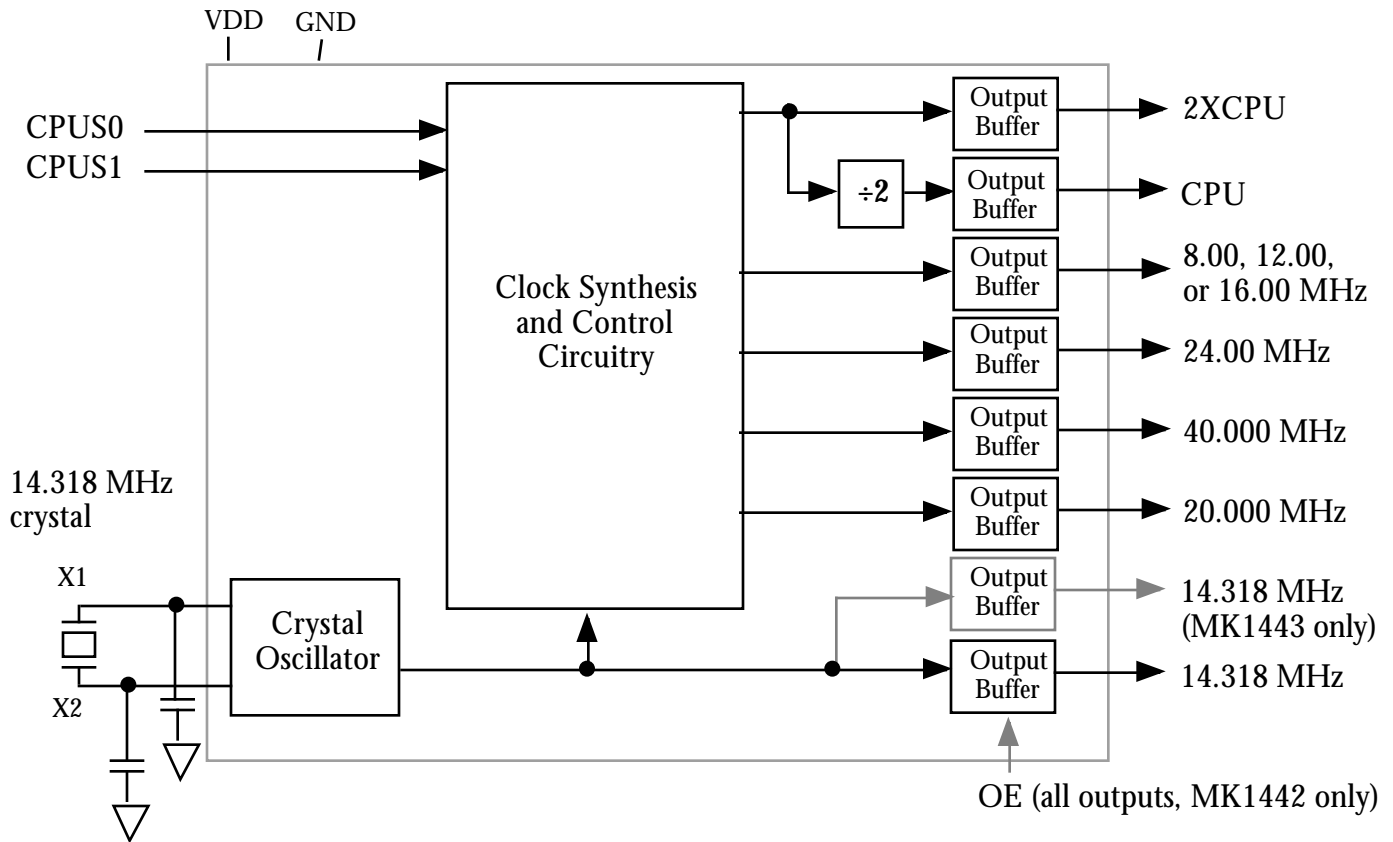
The MK1442/3 are the ideal way to generate clocks for desktop computer motherboards and LAN workstations. Using analog Phase-Locked Loop (PLL) techniques, the devices accept a 14.318 MHz crystal input to produce multiple output clocks up to 100 MHz. They provide 2XCPU, CPU, floppy controller, keyboard, system, SCSI and Ethernet clocks. The MK1442/3 are perfect for new Pentium™ Processor, PCI bus and 486 systems. The devices can operate at 5V or 3.3V up to and including 80MHz on the CPU clock.

The devices are identical except the MK1442 has an Output Enable (OE) pin that tri-states all outputs when taken low, and the MK1443 has an extra 14.318 MHz clock.

Features

- Provides exact frequency Ethernet and SCSI clocks
- 5V or 3.3V (up to 80MHz) operation
- Output clock frequencies up to 100 MHz
- Pentium™ Processor compatible timing
- 486 compatible smooth frequency transitions
- Seven or eight output clocks
- Compatible with X86 and 680X0 CPUs
- Skew controlled 2X and 1X CPU to within 250ps
- Packaged in 16 pin skinny SOIC or PDIP
- Duty cycle of 47.5/52.5 up to 66.66 MHz
- Duty cycle of 45/55 up to 100 MHz
- Total of 15 different selectable CPU frequencies
- Tri-state outputs for board level testing
- 25mA drive capability at TTL levels
- Keyboard frequencies of 12MHz (-01), 8MHz (-02), or 16MHz (-03)
- Advanced, low power CMOS process
- MK1442 - output enable
- MK1443 - two 14.318 MHz outputs

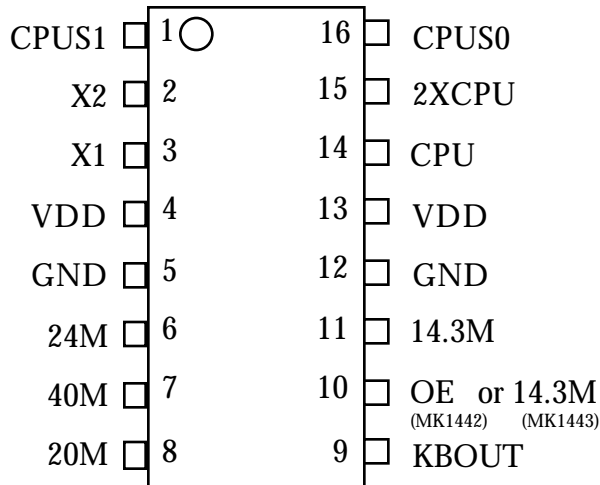
Block Diagram





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Pin Assignment



CPU Clock Decoding

| CPUS1 | CPUS0 | 2XCPU (MHz) | CPU (MHz) |
|-------|-------|-----------------|----------------|
| 0 | 0 | 8.00 | 4.00 |
| 0 | M | 80.00 | 40.00 |
| 0 | 1 | 33.33 | 16.67 |
| M | 0 | 100.00 (note 4) | 50.00 (note 4) |
| M | M | 66.67 | 33.33 |
| M | 1 | 60.00 | 30.00 |
| 1 | 0 | 50.00 | 25.00 |
| 1 | M | 20.00 | 10.00 |
| 1 | 1 | 25.00 | 12.50 |

Notes:

1. M = mid point (input is left floating. See note 5 below)
2. Actual frequencies are within 0.05% of those shown.
3. Transitions between mean frequencies are smooth, and do not violate Intel's 0.1% per cycle specification.
4. These selections are not guaranteed to operate at 3V

Pin Descriptions

| Number | Name | Type | Description |
|--------|-------|------|---|
| 1 | CPUS1 | TI | Select 1 for 2XCPU and CPU frequencies. See Table above, note 5 below. |
| 2 | X2 | O | Crystal connection. Connect to 14.318 MHz crystal, or leave unconnected for clock input. |
| 3 | X1 | I | Crystal connection. Connect to 14.318 MHz crystal, or drive with a 14.318MHz clock. |
| 4 | VDD | P | Connect to +5V or 3.3V. Must be same voltage as pin 13. |
| 5 | GND | P | Connect to ground. |
| 6 | 24M | O | 24.00 MHz floppy (or super I/O) clock output. |
| 7 | 40M | O | 40.00 MHz clock output |
| 8 | 20M | O | 20.000 MHz Ethernet clock output |
| 9 | KBOUT | O | Keyboard clock. 12.00 MHz on -01, 8.00 MHz on -02, 16.00 MHz on -03 version. |
| 10 | OE | I | Output Enable on 1442. Tri-states all clock outputs when this input is low. Internal pull-up. |
| 11 | 14.3M | O | 14.318 MHz system clock output. |
| 12 | GND | P | Connect to ground. |
| 13 | VDD | P | Connect to +5V or 3.3V. Must be same voltage as pin 4. |
| 14 | CPU | O | CPU output. See Table above. Rising edge is within 250ps of 2XCPU. |
| 15 | 2XCPU | O | 2XCPU output. See Table above. Rising edge is within 250ps of CPU. |
| 16 | CPUS0 | TI | Select 0 for 2XCPU and CPU frequencies. See Table above, note 5 below. |

Key: I = Input, TI = three level input, O = output, P = power supply connection

Note 5: The TI inputs are internally held at mid-level, so they cannot drift high or low.

Crystal and Capacitor Selection for Ethernet Accuracy

The MK1442/3 requires external crystals between the X1 and X2 pins and ground, as shown on the block diagram on page 1. For an accurate Ethernet frequency of 20.000 MHz, a 14.31818 MHz ± 50 ppm, parallel resonant crystal with a load capacitance of 16pF is recommended, along with 22 pF $\pm 5\%$ (NPO dielectric) chip capacitors. If the 20 MHz output is not used for Ethernet, any 22 pF capacitors will work.



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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 and Clock Outputs | Referenced to GND | -0.5 | | VDD+0.5 | V |
| Ambient Operating Temperature | | 0 | | 70 | °C |
| Soldering Temperature | Max of 20 seconds | | | 260 | °C |
| Storage Temperature | | -65 | | 150 | °C |
| DC CHARACTERISTICS (VDD = 5V unless noted) | | | | | |
| Operating Voltage, VDD | | 3.0 | | 5.5 | V |
| Input High Voltage, VIH | OE (pin 10) | 2.0 | | | V |
| Input Low Voltage, VIL | OE (pin 10) | | | 0.8 | V |
| Input High Voltage, VIH | CPUS0,1 (pins 1,16) | VDD-0.5 | | | V |
| Input Mid-level Voltage | CPUS0,1 (pins 1,16) | Leave pin unconnected or tri-stated | | | V |
| Input Low Voltage, VIL | CPUS0,1 (pins 1,16) | | | 0.5 | 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 |
| Input High Voltage, VIH | VDD=3.3V, OE pin | 1.9 | | | V |
| Input Low Voltage, VIL | VDD=3.3V, OE pin | | | 0.4 | V |
| Output High Voltage, VOH | VDD=3.3V, IOH=-8mA | 2.4 | | | V |
| Output Low Voltage, VOL | VDD=3.3V, IOL=8mA | | | 0.4 | V |
| Operating Supply Current, IDD | No Load, 80 MHz | | 35 | | mA |
| Short Circuit Current | Each output | | ±100 | | mA |
| On-Chip Pull-up Resistor | | | 250 | | k |
| Input Capacitance | | | 7 | | pF |
| Frequency Accuracy of 20.000 MHz clock | 0-70°C, note 2 | -1 | | 1 | ppm |
| AC CHARACTERISTICS (VDD = 5V unless noted) | | | | | |
| Input Frequency | | | 14.31818 | | MHz |
| 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, CPU and 2XCPU | 1.5V, up to 67MHz | 47.5 | 49 to 51 | 52.5 | % |
| Output Clock Duty Cycle | At 1.5V | 45 | 49 to 51 | 55 | % |
| Cycle to Cycle Jitter | 50-80 MHz clocks | | | 250 | ps |
| Skew of 2XCPU with respect to CPU | Rising edges at 1.5V | -250 | 0 | 250 | ps |
| Transition time, 8MHz to 100MHz | VDD=3.3 or 5V | | 4 | | ms |
| Transition time, 100MHz to 8MHz | VDD=3.3 or 5V | | 2.5 | | ms |
| Output Enable Time, OE high to output on | VDD=3.3 or 5V | | | 50 | ns |
| Output Disable Time, OE low to tri-state | VDD=3.3 or 5V | | | 3 | µs |

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.

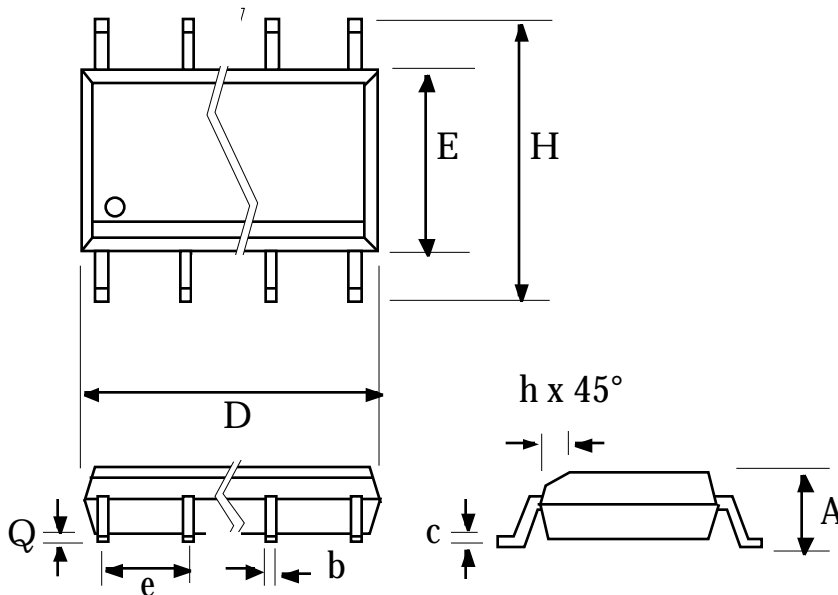
2. Provided proper crystal and capacitor components are used - consult MicroClock.



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Package Outline and Package Dimensions

16 pin SOIC narrow



| Symbol | Inches | | Millimeters | |
|--------|----------|-------|-------------|--------|
| | Min | Max | Min | Max |
| A | 0.055 | 0.070 | 1.397 | 1.778 |
| b | 0.013 | 0.019 | 0.330 | 0.483 |
| c | 0.007 | 0.010 | 0.191 | 0.254 |
| D | 0.385 | 0.400 | 9.779 | 10.160 |
| 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 | | 0.016 | | 0.406 |
| Q | 0.004 | 0.01 | 0.102 | 0.254 |

Ordering Information

| Part/Order Number | Marking | Keyboard frequency | Package | Temperature |
|-------------------|------------|--------------------|-----------------|-------------|
| MK1442-01S | MK1442-01S | 12 MHz | 16 pin SOIC | 0-70°C |
| MK1442-02S | MK1442-02S | 8 MHz | 16 pin SOIC | 0-70°C |
| MK1442-03S | MK1442-03S | 16 MHz | 16 pin SOIC | 0-70°C |
| MK1443-01S | MK1443-01S | 12 MHz | 16 pin SOIC | 0-70°C |
| MK1443-02S | MK1443-02S | 8 MHz | 16 pin SOIC | 0-70°C |
| MK1443-03S | MK1443-03S | 16 MHz | 16 pin SOIC | 0-70°C |
| MK144x-0xSTR | MK144x-0xS | x | Add Tape & Reel | 0-70°C |

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