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.
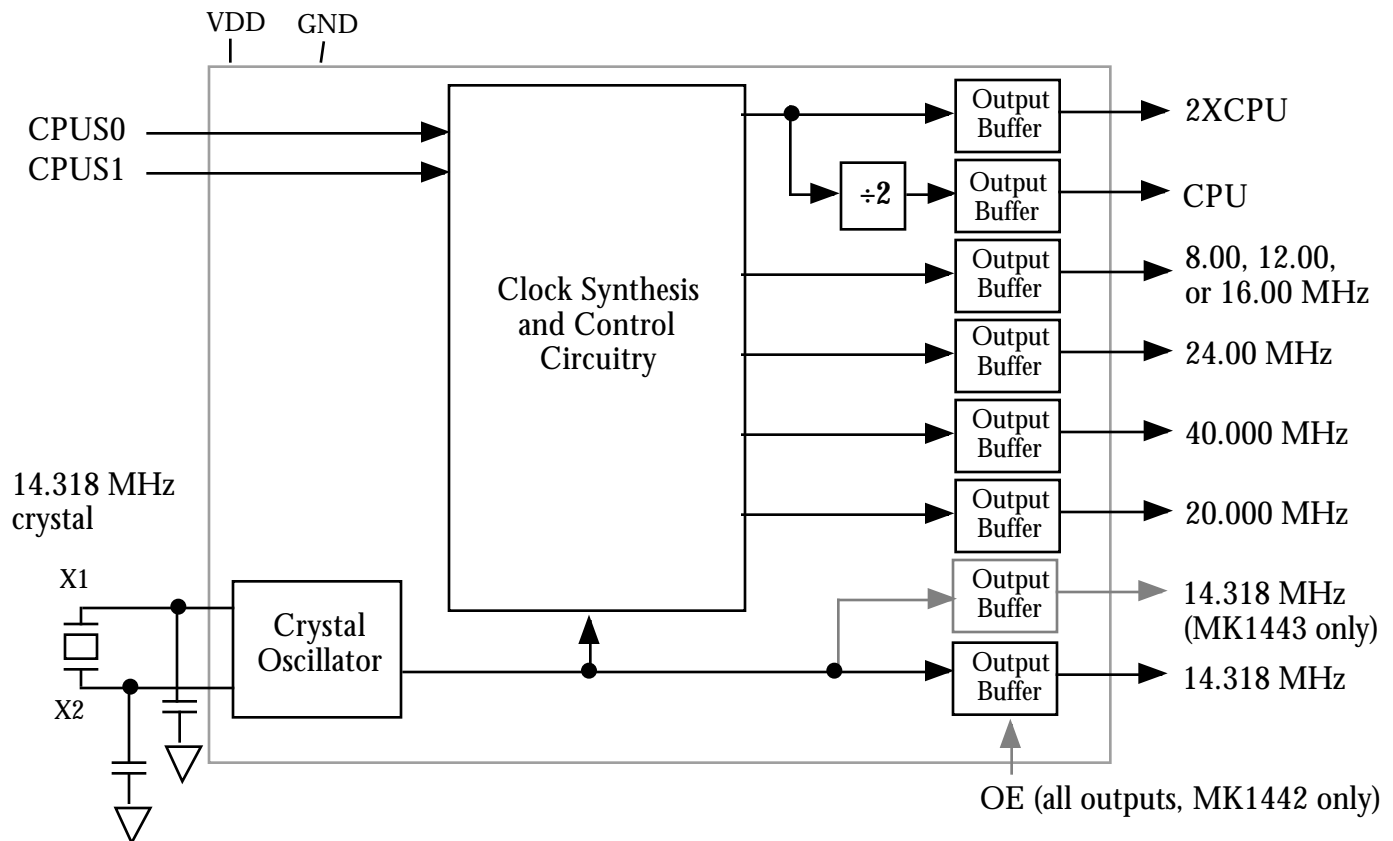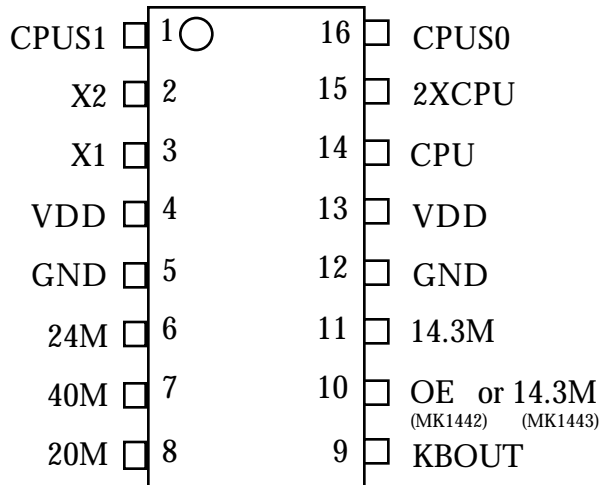
Features

- 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

Integrated Circuit Systems, Inc. • 525 Race Street • San Jose • CA • 95126 •(408)297-1201tel • www.icst.com

Pin Assignment

```
CPUS1  □ 1 ○        16 □  CPUS0
   X2  □ 2           15 □  2XCPU
   X1  □ 3           14 □  CPU
  VDD  □ 4           13 □  VDD
  GND  □ 5           12 □  GND
  24M  □ 6           11 □  14.3M
  40M  □ 7           10 □  OE    or 14.3M
                           (MK1442)   (MK1443)
  20M  □ 8            9 □  KBOUT
```

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 ±5% (NPO dielectric) chip capacitors. If the 20 MHz output is not used for Ethernet, any 22 pF capacitors will work.

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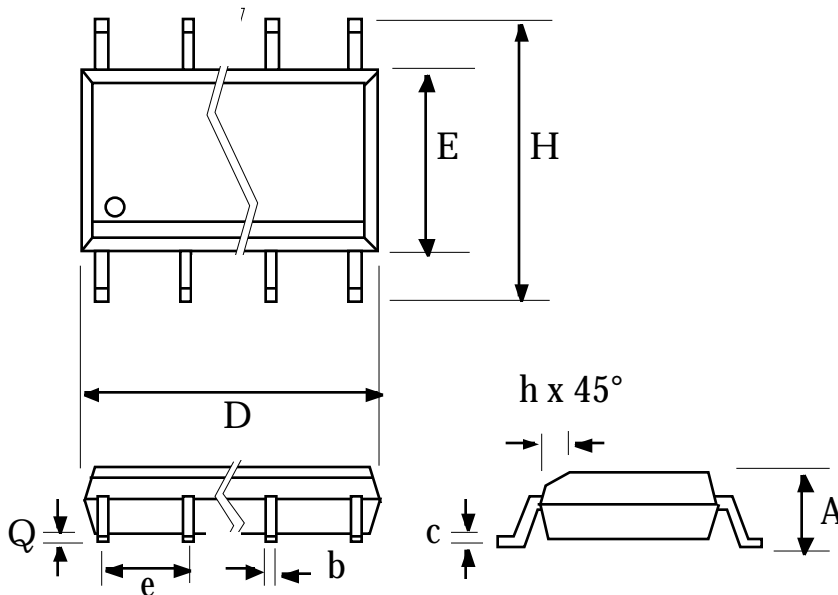
2. Provided proper crystal and capacitor components are used - consult MicroClock.

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

Pentium™ is a registered trademark of Intel Corporation