Description
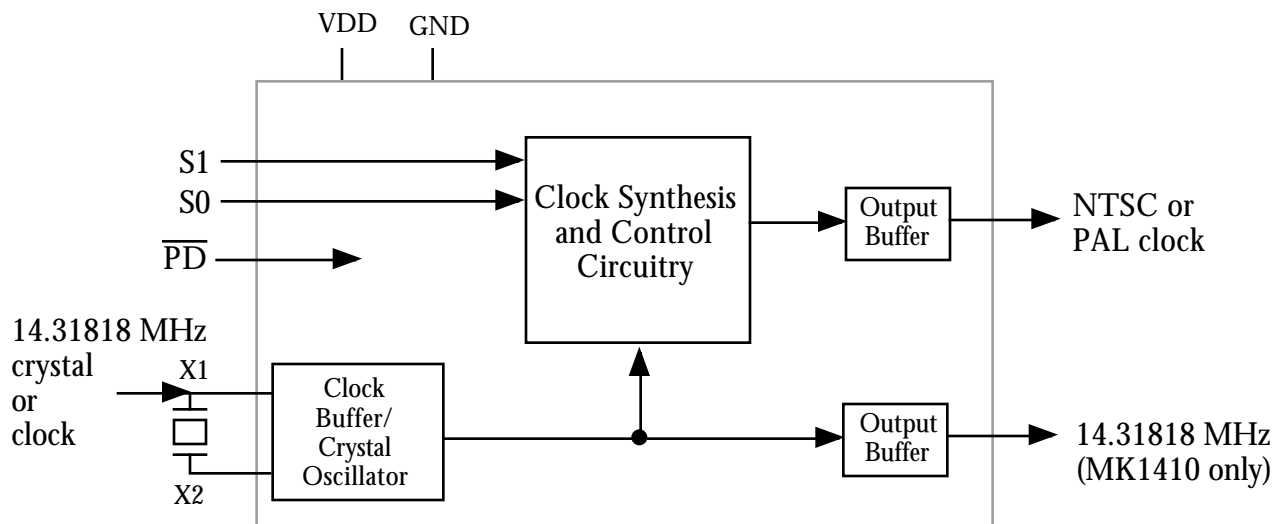
The MK1410 and MK1411 are the ideal way to generate clocks for NTSC/PAL video encoders and decoders. Stored in the devices are two or four popular frequencies for NTSC and PAL. In an 8 pin SOIC, the chips can save component count, board space, and cost over surface mount crystals and oscillators, and increase reliability by eliminating one or two mechanical devices from the board. The power down pin turns off the device, drawing less than 20μA.

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

Features

• Packaged in 8 pin SOIC
• Ideal for devices such as AD722/AD725 from Analog Devices and Brooktree BT819
• Input crystal or clock frequency of 14.31818 MHz
• Power down turns off chip
• Frequencies are within 5 ppm with properly tuned reference crystal or accurate input clock
• Low jitter
• Output clock frequencies of 14.31818MHz, 17.7345MHz, 28.6364MHz, or 35.46896MHz
• 25mA drive capability at TTL levels
• 3.3V or 5V supply voltage
• Advanced, low power CMOS process
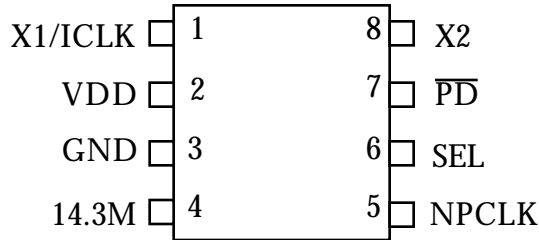• Insensitive to input clock duty cycle
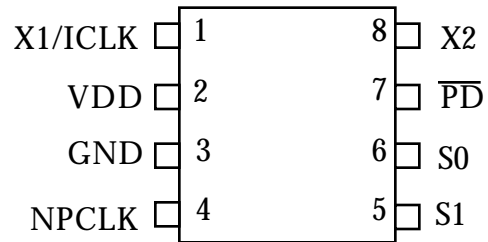
Block Diagram

Pin Assignment

```
X1/ICLK □  1        8  □ X2
  VDD  □  2        7  □ PD̄
  GND  □  3        6  □ SEL
 14.3M □  4        5  □ NPCLK
```
MK1410

```
X1/ICLK □  1        8  □ X2
  VDD  □  2        7  □ PD̄
  GND  □  3        6  □ S0
 NPCLK □  4        5  □ S1
```
MK1411

NTSC/PAL Clock - MK1410

SEL	NPCLK	ppm error
pin 6	pin 5 (MHz)	
0	17.73448	5 ppm
1	14.31818	0 ppm

NTSC/PAL Clock - MK1411

S1	S0	NPCLK	ppm error
pin 5	pin 6	pin 4 (MHz)	
0	0	35.46896	5 ppm
0	1	17.73448	5 ppm
1	0	28.63636	0 ppm
1	1	14.31818	0 ppm

Pin Descriptions

MK1410	MK1411	Name	Type	Description
1	1	X1/ICLK	I	Crystal Connection. Connect to a 14.31818 MHz crystal or clock.
2	2	VDD	P	Connect to +3.3V or +5V.
3	3	GND	P	Connect to ground.
4	-	14.3M	O	14.31818 MHz buffered crystal clock output.
5	4	NPCLK	O	NTSC or PAL output clock. Selected by SEL pin per tables above.
-	5	S1	I	Select pin. Selects NTSC or PAL frequency per tables above.
6	-	SEL	I	Select pin. Selects NTSC or PAL frequency per tables above.
-	6	S0	I	Select pin. Selects NTSC or PAL frequency per tables above. Internal pull-up.
7	7	PD̄	I	Power Down. Active low. Clocks stop low.
8	8	X2	O	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. For a crystal input, a parallel resonant 14.31818 MHz, 18pF load, crystal is recommended. Do not use a crystal with lower load capacitance. It is possible to use a crystal with higher load capacitance. In this case, external capacitors must be connected from each of X1 and X2 to ground. The value of these caps equals $2(C_L-18)$, where C_L is the crystal load capacitance in pF. So for a 20 pF crystal, use 4 pF caps. The frequency tolerance of the crystal should be 30ppm or better. For a clock input, connect to X1 and leave X2 unconnected. A decoupling capacitor of 0.1μF should be connected between VDD and GND on pins 2 and 3, and a 33 terminating resistor should be used on the clock output if the trace is longer than 1 inch.

MK1410/MK1411
NTSC/PAL Clock Source

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 10 seconds			260	°C
Storage temperature		-65		150	°C
DC CHARACTERISTICS (at 5.0V unless otherwise noted)					
Operating Voltage, VDD		3.0		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
Input High Voltage, VIH		2			V
Input Low Voltage, VIL				0.8	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, 5.0V	No Load, 17.7 MHz		16		mA
Operating Supply Current, IDD, 3.0V	No Load, 17.7 MHz		9		mA
Power Down Supply Current, IDDPD, 5V	No Load		25		µA
Input Capacitance	SEL, $\overline{PD}$ pins		7		pF
Actual Mean Frequency versus Target	With exact crystal		5	5	ppm
AC CHARACTERISTICS (at 5.0V unless otherwise noted)					
Input Clock or Crystal Frequency		14.31818		14.31818	MHz
Input Crystal Accuracy				30	ppm
Input Clock Duty Cycle	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 Maximum Clock Period Jitter	Variation from mean		130		ps
One Sigma Clock Period Jitter			40		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.

Application Note
The MK1410/11 is commonly used to drive an AD722/4 NTSC/PAL encoder. If the encoder is not displaying the proper color, this means that the input frequency to the MK1410/11 is incorrect. This is caused by using the wrong type of crystal, or by connecting incorrect capacitors to X1 and X2. To get correct color, specify the crystal as listed on page 2. The MK1410/11 has internal crystal capacitors set for a crystal with 18 pF load capacitance. Contact MicroClock if unable to obtain the listed crystal.

Package Outline and Package Dimensions

8 pin SOIC
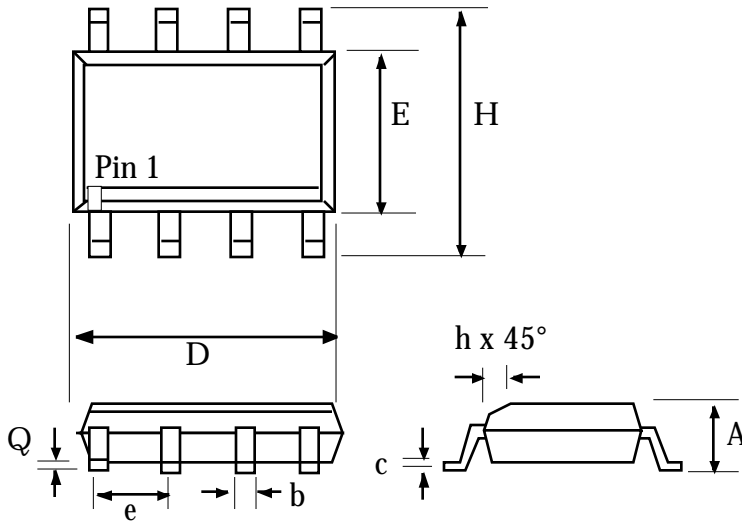
Symbol	Inches		Millimeters	
	Min	Max	Min	Max
A	0.055	0.068	1.397	1.7272
b	0.013	0.019	0.330	0.483
D	0.185	0.200	4.699	5.080
E	0.150	0.160	3.810	4.064
H	0.225	0.245	5.715	6.223
e	.050 BSC		1.27 BSC	
h		0.015		0.381
Q	0.004	0.01	0.102	0.254

Ordering Information

Part/Order Number	Marking	Package	Temperature
MK1410S	MK1410S	8 pin SOIC	0-70°C
MK1410STR	MK1410S	Add tape and reel	0-70°C
MK1411S	MK1411S	8 pin SOIC	0-70°C
MK1411STR	MK1411S	Add tape and reel	0-70°C