



# MK1412 MPEG Audio Clock Synthesizer


## Description

The MK1412 is the ideal way to generate clocks for MPEG audio devices in computers. The device uses ICS/MicroClock's proprietary mixture of analog and digital Phase-Locked Loop (PLL) technology to synthesize one of eight frequencies (four on each output) from the 14.31818 MHz reference. In an 8 pin SOIC, the MK1412 can save component count, board space, and cost over crystals and oscillators, and increase reliability by eliminating three expensive mechanical devices from the board.

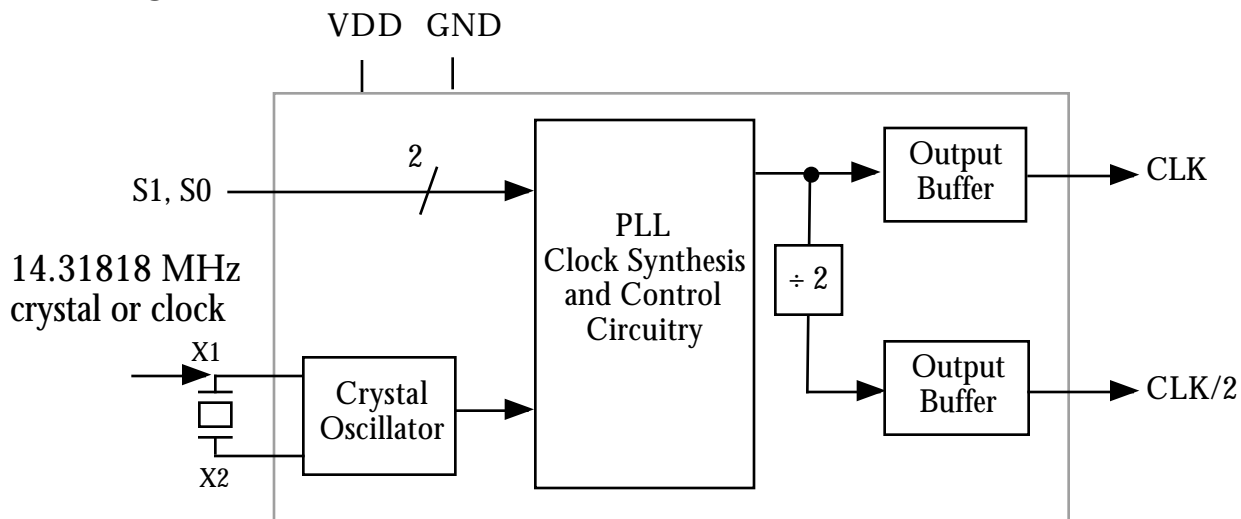
We offer many other clocks for computers and computer peripherals. Consult us when you need to remove crystals and oscillators from your board.

Due to a long lead time in the original wafer fab that makes the MK1412S, we have retooled the die and now call the part the MK1412A. All functional parameters are the same as or better than the original part.

## Features

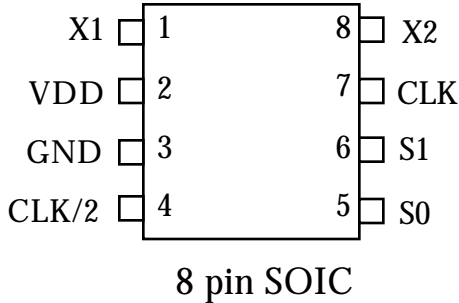
- Packaged in 8 pin SOIC 
- Input crystal or clock frequency of 14.31818 MHz
- Provides master MPEG clocks for 32 kHz, 44.1 kHz, 48 kHz and 96 kHz sampling rates
- Output clock frequencies of 256x and 512x of the audio sampling rates compatible with most DACs
- Low jitter
- Full CMOS output swing with 25mA drive capability at TTL levels
- 3.3V or 5V±10% supply voltage
- Advanced, low power CMOS process
- The A version is the newest version in a more advanced manufacturing process

## Block Diagram





### Pin Assignment



**Audio Clock Outputs Select Table (MHz)**

S1	S0	CLK	CLK/2	Accuracy
0	0	16.384	8.192	1 ppm
0	1	22.5792	11.2896	25 ppm
1	0	24.576	12.288	1 ppm
1	1	49.152	24.576	1 ppm

### Pin Descriptions

Number	Name	Type	Description
1	X1	I	Crystal Connection. Connect to a 14.31818 MHz crystal or clock.
2	VDD	P	Connect to +3.3V or +5V.
3	GND	P	Connect to ground.
4	CLK/2	O	Audio Clock divide by 2 output as per table above.
5	S0	I	Frequency Select 0 Input. Determines CLK and CLK/2 outputs as per table above.
6	S1	I	Frequency Select 0 Input. Determines CLK and CLK/2 outputs as per table above.
7	CLK	O	Audio Clock output as per table above.
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, one load capacitor can be connected to each of the X1 and X2 pins and ground, and a parallel resonant 14.31818 MHz crystal is recommended. The value (in pF) of each crystal load capacitor should equal  $(C_L - 18) * 2$ , where  $C_L$  is the crystal's load (correlation) capacitance in pF. So for crystals with 18 pF load capacitance (or less), no extra capacitors are needed. The frequency tolerance of the crystal should be 50ppm 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 33 terminating resistor may be used on the clock outputs if the trace is longer than 1 inch.



# MK1412

## MPEG Audio Clock Synthesizer

### Electrical Specifications

Parameter	Conditions	Minimum	Typical	Maximum	Units
<b>ABSOLUTE MAXIMUM RATINGS (note 1)</b>					
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
<b>DC CHARACTERISTICS (at 5.0V unless otherwise noted)</b>					
Operating Voltage, VDD		3		5.5	V
Input High Voltage, VIH, input clock only	Clock input	(VDD/2)+1	VDD/2		V
Input Low Voltage, VIL, input clock only	Clock input		VDD/2	(VDD/2)-1	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		12		mA
Operating Supply Current, IDD, 3.3V	No Load		7		mA
Input Capacitance	S0, S1 pins		7		pF
<b>AC CHARACTERISTICS (at 5.0V unless otherwise noted)</b>					
Input Clock or Crystal Frequency			14.31818		MHz
Input Crystal Accuracy				50	ppm
Accuracy (synthesis error)	With exact crystal		See page 2		ppm
Input Clock Duty Cycle	Time above VDD/2	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 VDD/2	40	50	60	%
Absolute Clock Period Jitter			200		ps
One Sigma Clock Period Jitter			70		ps

Notes:

- 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.
- Typical values are at 25°C.

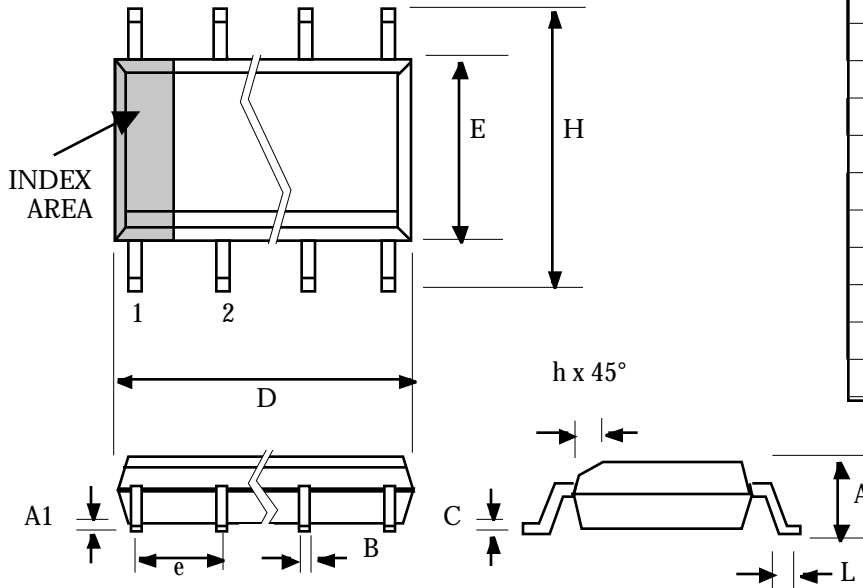


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## Package Outline and Package Dimensions

(For current dimensional specifications, see JEDEC Publication No. 95.)

### 8 pin SOIC



Symbol	Inches		Millimeters	
	Min	Max	Min	Max
A	0.0532	0.0688	1.35	1.75
A1	0.0040	0.0098	0.10	0.24
B	0.0130	0.0200	0.33	0.51
C	0.0075	0.0098	0.19	0.24
D	0.1890	0.1968	4.80	5.00
E	0.1497	0.1574	3.80	4.00
e	.050 BSC		1.27 BSC	
H	0.2284	0.2440	5.80	6.20
h	0.0099	0.0195	0.25	0.50
L	0.0160	0.0500	0.41	1.27

## Ordering Information

Part/Order Number	Marking	Package	Temperature
MK1412A	MK1412A	8 pin SOIC	0-70°C
MK1412ATR	MK1412A	Add tape and reel	0-70°C
MK1412S	MK1412S	8 pin SOIC	0-70°C
MK1412STR	MK1412S	Add tape and reel	0-70°C

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