


Description

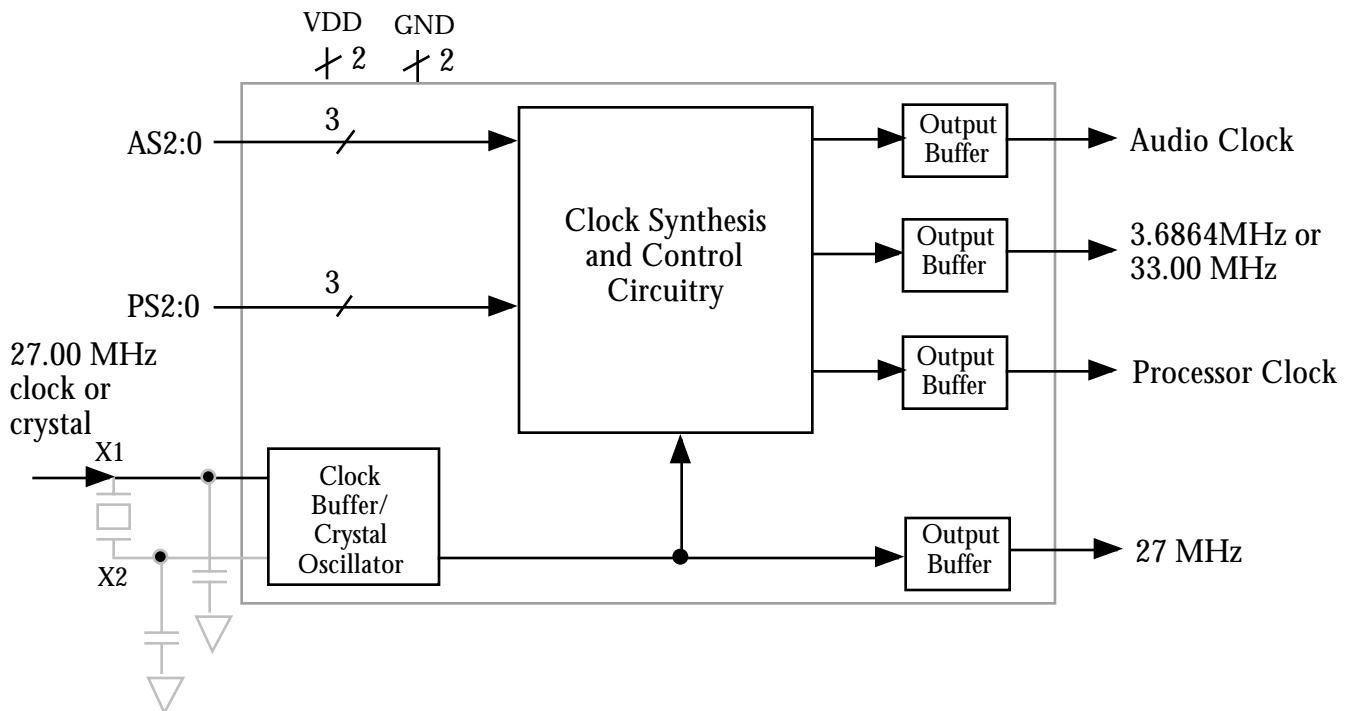
The MK2744 is a low cost, low jitter, high performance clock synthesizer for MPEG I, MPEG II, and set-top box based applications. Using analog Phase-Locked Loop (PLL) techniques, the device accepts a 27.00MHz fundamental mode crystal or clock input to produce multiple output clocks including the processor clock, 27MHz, 3.6864MHz, and a selectable audio clock. The audio clocks are exactly frequency locked to the 27.00MHz input with zero ppm error, allowing audio and video to track exactly, thereby eliminating the need for large buffer memory.

MicroClock manufactures the largest variety of Set-Top Box and multimedia clock synthesizers for all applications. Consult MicroClock to eliminate crystals and oscillators from your board.

Features

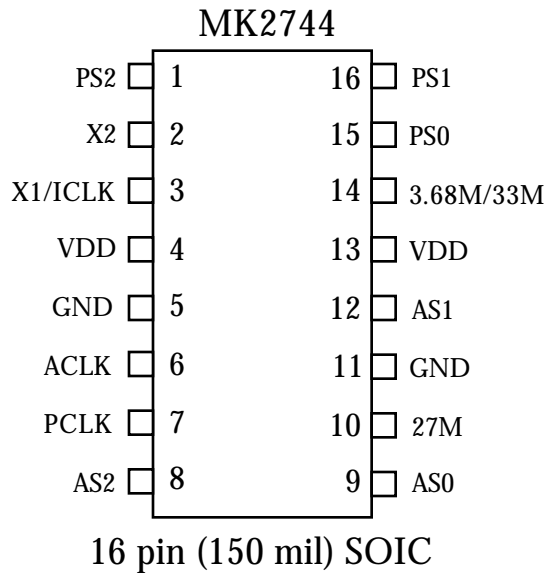
- Packaged in 16 pin narrow (150 mil) SOIC 
- Zero ppm audio clock error for 256X and 384X
- Selectable audio sampling frequencies support 32 kHz, 44.1 kHz, and 48 kHz in most DACs
- 27.00 MHz fundamental crystal or clock input
- Selectable processor frequencies
- Fixed clocks of 27, and 3.6864 or 33MHz
- Zero ppm error in 3.686 MHz clock
- 25mA output drive capability at TTL levels
- Advanced, low power, sub-micron CMOS process
- 5V±10% operating voltage
- See also the MK2712 for NTSC/PAL clocks

Block Diagram





Pin Assignment



Audio Clock (in MHz) Decoding Table

AS2	AS1	AS0	ACLK
0	0	0	12.288
0	0	1	11.2896
0	1	0	8.192
0	1	1	24.576
1	0	0	8.192
1	0	1	16.9344
1	1	0	18.432
1	1	1	11.2896

Pin 14 Clock MK2744

-07, -08	-09, -10
3.6864 MHz	33.00 MHz

Processor Clock (in MHz) MK2744-07, -08, -09, -10

Address \ Version		-07, -09	-08, -10
PS2	PS1	PS0	PCLK
0	0	0	16.67
0	0	1	27
0	1	0	33.33
0	1	1	40
1	0	0	16
1	0	1	40.5
1	1	0	25
1	1	1	20

0 = connect directly to ground
1 = connect directly to VDD

Pin Descriptions

Number	Name	Type	Description
1	PS2	I	Processor clock Select 2. Selects processor clock on pin 7 per table above.
2	X2	O	Crystal connection. Connect to 27 MHz crystal. Leave unconnected for clock input.
3	X1/ICLK	I	Crystal connection. Connect to 27 MHz crystal or connect to 27 MHz input clock.
4	VDD	P	Connect to +5V.
5	GND	P	Connect to ground.
6	ACLK	O	Audio Clock output. Determined by status of AS2, AS1, AS0. See table above.
7	PCLK	O	Processor Clock output. Determined by status of PS2, PS1, PS0. See table above.
8	AS2	I	Audio clock Select 2. Selects audio clock on pin 6 per table above.
9	AS0	I	Audio clock Select 0. Selects audio clock on pin 6 per table above.
10	27M	O	27.00 MHz clock output.
11	GND	P	Connect to ground.
12	AS1	NI	Audio clock Select 1. Selects audio clock on pin 6 per table above.
13	VDD	P	Connect to +5V.
14	3.68M/33M	O	3.6864 MHz or 33.00 MHz clock output. See table above.
15	PS0	I	Processor clock Select 0. Selects processor clock on pin 7 per table above.
16	PS1	I	Processor clock Select 1. Selects processor clock on pin 7 per table above.

Key: I = Input, NI = Non-TTL compatible input, O = output, P = power supply connection

**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 = 5.0V unless noted)					
Operating Voltage, VDD		4.5		5.5	V
Input High Voltage, VIH, X1/ICLK pin only		3.5	2.5		V
Input Low Voltage, VIL, X1/ICLK pin only			2.5	1.5	V
Input High Voltage, VIH, AS1 pin	Pin 12 only	VDD-0.5			V
Input High Voltage, VIH		2			V
Input Low Voltage, VIL				0.8	V
Output High Voltage, VOH	IOH=-25mA	2.4			V
Output Low Voltage, VOL	IOL=25mA			0.4	V
Output High Voltage, VOH, CMOS level	IOH=-8mA	VDD-0.4			V
Operating Supply Current, IDD	No Load, note 2		37		mA
Short Circuit Current	Each output		±100		mA
Input Capacitance			7		pF
Frequency error, ACLK and 3.6864MHz clocks	note 3			0	ppm
Frequency error, 24.576 MHz ACLK only			40	40	ppm
AC CHARACTERISTICS (VDD = 5.0V unless noted)					
Input Frequency			27.000		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	At VDD/2	40		60	%
Absolute Jitter, short term	Variation from mean		200		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. With Processor clock at 50MHz, and ACLK at 16.93MHz.
3. The 24.576 MHz audio clock is not 0ppm accurate. It runs at 40ppm high.

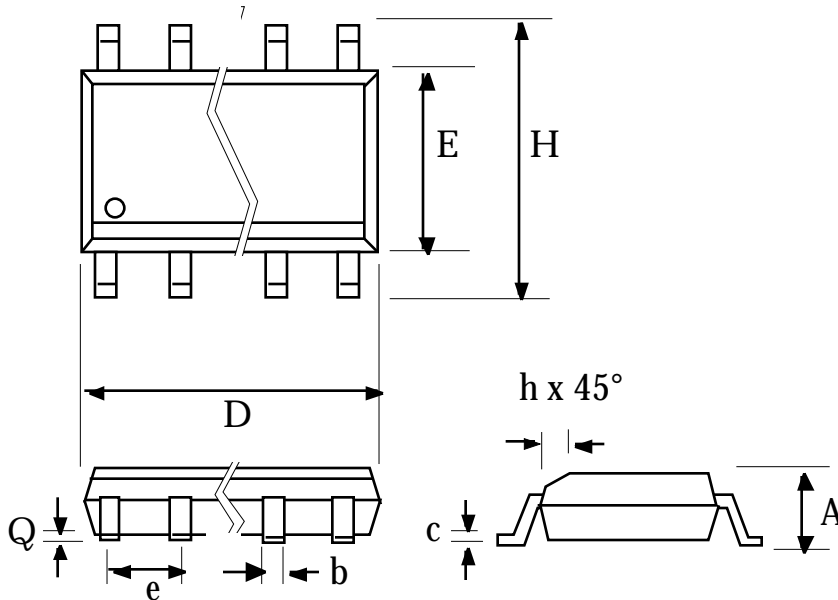
External Components

The MK2744 requires a minimum number of external components for proper operation. Decoupling capacitors of 0.1µF should be connected between VDD and GND, as close to the MK2744 as possible. A series termination resistor of 33 Ω may be used for each clock output. If a clock input is not used, the 27.00 MHz crystal must be connected as close to the chip as possible. The crystal should be a fundamental mode (don't use third overtone), parallel resonant, 50ppm or better. Crystal capacitors should be connected from pins X1 to ground and X2 to ground. The value of these capacitors is given by the following equation, where C_L is the crystal load capacitance: Crystal caps (pF) = $(C_L - 4) \times 2$. So for a crystal with 16pF load capacitance, two 24pF caps should be used.



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	0.190	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	Shipping packaging	Package	Temperature
MK2744-0xS	MK2744-0xS	tubes	16 pin SOIC	0-70°C
MK2744-0xSTR	MK2744-0xS	tape and reel	16 pin SOIC	0-70°C

The -0x signifies the dash number or different version of the MK2744. For instance, if a processor clock of 16.667 MHz is required along with the 33 MHz fixed clock on pin 14, and parts are needed in tape and reel, then the order should call for part number MK2744-09STR.

Rev. 3057, version C added fundamental mode to crystal specs on page 3. Deleted Preliminary.

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