MK2745-21

DVD/MPEG CLOCK SOURCE

Description

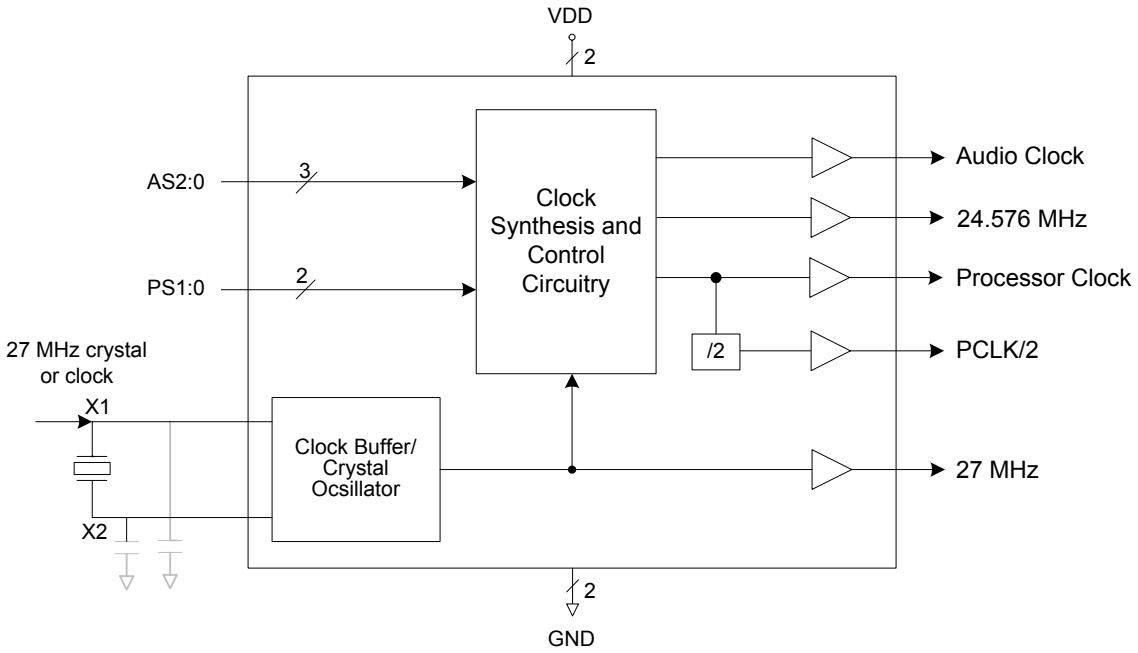
The MK2745-21 is a low-cost, low-jitter, high-performance clock synthesizer for DVD and other MPEG 2-based applications. Using analog Phase-Locked Loop (PLL) techniques, the device accepts a 27 MHz fundamental mode crystal or clock input to produce multiple audio output clocks, a processor clock, the processor clock divided by two, 27 MHz, 24.576 MHz, and a selectable audio clock. The audio clocks are frequency-locked to the 27 MHz using our patented zero ppm error techniques. This allows audio and video to track exactly, thereby eliminating the need for large buffer memory.

ICS manufactures a large variety of DVD, Set-top Box, and multimedia clock synthesizers for all applications. Consult ICS to eliminate crystals and oscillators from your board.

Features

- Packaged in a 16-pin narrow (150 mil) SOIC
- Ideal for LuxSonor's DVD solutions
- 3.3 V upgrade to the MK2744
- Patented zero ppm audio clock error for 256x and 384x sampling rates
- Selectable audio sampling frequencies support 32, 44.1, and 48 kHz in most DACs
- 27 MHz fundamental crystal or clock input
- Eight selectable processor frequencies
- Fixed clocks of 27 and 24.576 MHz
- Zero ppm in all clocks
- 25 mA output drive capability at TTL levels
- Advanced, low-power, sub-micron CMOS process
- Operating voltage of 3.0 V to 5.5 V
- See also the MK2712 for NTSC/PAL clocks

Block Diagram



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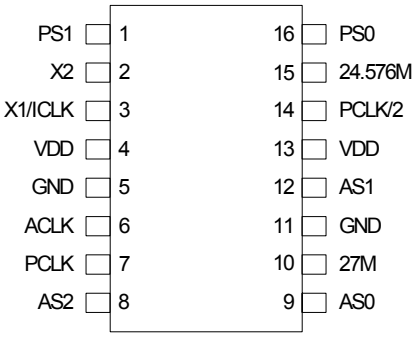
Pin Assignment



16-pin (150 mil) SOIC

Audio Clock (MHz) DecodingTable

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

Processor Clock (MHz)

PS1	PS0	PCLK	PCLK/2
0	0	66.66	33.33
0	1	80	40
1	0	50	25
1	1	60	30

0 = connect directly to ground

1 = connect directly to VDD

Pin Descriptions

Pin Number	Pin Name	Pin Type	Pin Description
1	PS1	Input	Processor clock Select 1. Selects processor clock outputs per table above.
2	X2	XO	Crystal connection. Connect to 27 MHz crystal. Leave unconnected for clock input.
3	X1/ICLK	XI	Crystal connection. Connect to 27 MHz crystal or to a 27 MHz input clock.
4	VDD	Power	Connect to +3.3 V or +5 V. Must be same as other VDD.
5	GND	Power	Connect to ground.
6	ACLK	Output	Audio Clock output. Determined by status of AS2, AS1, AS0. See table above.
7	PCLK	Output	Processor Clock output. Determined by status of PS1, PS0. See table above.
8	AS2	Input	Audio clock Select 2. Selects audio clock on pin 6 per table above.
9	AS0	Input	Audio clock Select 0. Selects audio clock on pin 6 per table above.
10	27M	Output	27 MHz clock output.
11	GND	Power	Connect to ground.
12	AS1	Input	Audio clock Select 1. Selects audio clock on pin 6 per table above.
13	VDD	Power	Connect to +3.3 V or +5 V. Must be same as other VDD.

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Pin Number	Pin Name	Pin Type	Pin Description
14	PCLK/2	Output	Processor Clock divided by two output. Determined by status of PS1, PS0. See table above.
15	24.576M	Output	24.576 MHz clock output.
16	PS0	Input	Processor clock Select 0. Selects processor clock outputs per table above.

External Components

The MK2745-21 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 MK2745-21 as possible. A series termination resistor of 33Ω may be used for each clock output. If a clock input is not used, the 27 MHz crystal must be connected as close to the chip as possible. The crystal should be a fundamental mode (do not use third overtone), parallel resonant, 50 ppm 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 CL is the crystal load capacitance: Crystal caps (pF) = (CL-6) x 2. So, for a crystal with 16 pF load capacitance, two 20 pF caps should be used.

Absolute Maximum Ratings

Stresses above the ratings listed below can cause permanent damage to the MK2745-21. These ratings, which are standard values for ICS commercially rated parts, are stress ratings only. Functional operation of the device at these or any other conditions above those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods can affect product reliability. Electrical parameters are guaranteed only over the recommended operating temperature range.

Item	Rating
Supply Voltage, VDD	7 V
All Inputs and Outputs	-0.5 V to VDD+0.5 V
Ambient Operating Temperature	0 to +70°C
Storage Temperature	-65 to +150°C
Junction Temperature	125°C
Soldering Temperature	260°C

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Recommended Operation Conditions

Parameter	Min.	Typ.	Max.	Units
Ambient Operating Temperature	0		+70	°C
Power Supply Voltage (measured in respect to GND)	+3.0		+5.5	V

DC Electrical Characteristics

VDD = 5.0 V (unless noted), Temp 0 to +70°C

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Operating Voltage	VDD		3.0		5.5	V
Input High Voltage	V_{IH}	X1/ICLK pin only	(VDD/2)+1			V
Input Low Voltage	V_{IL}	X1/ICLK pin only			(VDD/2)-1	V
Input High Voltage	V_{IH}		2			V
Input Low Voltage	V_{IL}				0.8	V
Output High Voltage	V_{OH}	I_{OH} = -25 mA	2.4			V
Output Low Voltage	V_{OL}	I_{OL} = 25 mA			0.4	V
Output High Voltage	V_{OH}	I_{OH} = -8 mA	VDD-0.4			V
Operating Supply Current	IDD	No Load, Note 1		37		mA
Short Circuit Current	I_{OS}	Each output		±100		mA
Input Capacitance	C_{IN}			7		pF

Note 1: With processor clock at 50 MHz and ACLK at 16.93 MHz.

AC Electrical Characteristics

VDD = 5.0 V (unless noted), Temp 0 to +70°C

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Input Frequency				27		MHz
Output Clock Rise Time	t_{OR}	0.8 to 2.0 V			1.5	ns
Output Clock Fall Time	t_{OF}	2.0 to 0.8 V			1.5	ns
Output Clock Duty Cycle		at VDD/2	40		60	%
Frequency Error				0	1	ppm
Absolute Jitter, short term		Variation from mean		200		ps

Thermal Characteristics

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Thermal Resistance Junction to Ambient	θ_{JA}	Still air		120		°C/W
	θ_{JA}	1 m/s air flow		115		°C/W
	θ_{JA}	3 m/s air flow		105		°C/W
Thermal Resistance Junction to Case	θ_{JC}			58		°C/W

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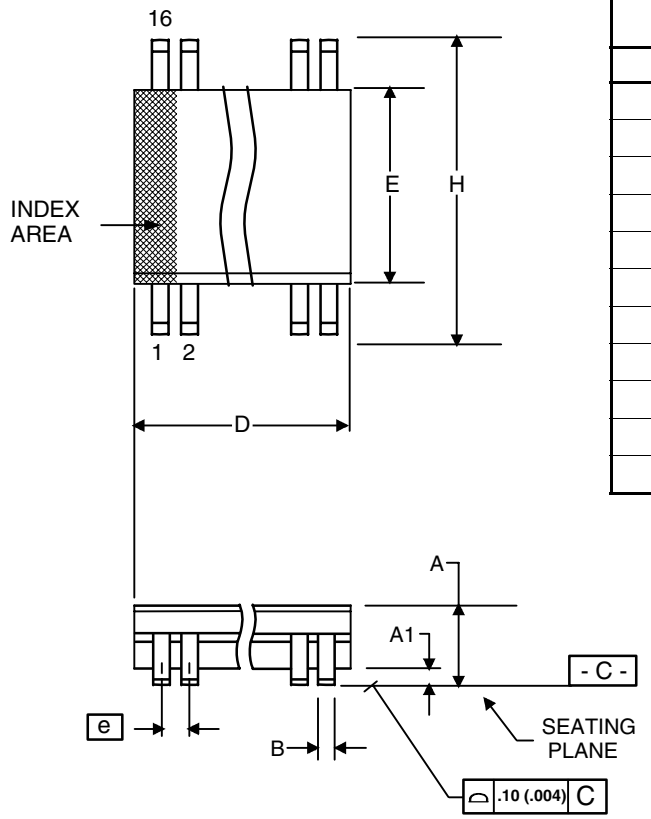
Package Outline and Package Dimensions (16-pin SOIC, 150 Mil. Narrow Body)

Package dimensions are kept current with JEDEC Publication No. 95



	Millimeters		Inches	
Symbol	**Min**	**Max**	**Min**	**Max**
A	1.35	1.75	.0532	.0688
A1	0.10	0.25	.0040	.0098
B	0.33	0.51	.013	.020
C	0.19	0.25	.0075	.0098
D	9.80	10.00	.3859	.3937
E	3.80	4.00	.1497	.1574
e	1.27 BASIC		0.050 BASIC	
H	5.80	6.20	.2284	.2440
h	0.25	0.50	.010	.020
L	0.40	1.27	.016	.050
α	0°	8°	0°	8°

Ordering Information

Part / Order Number	Marking	Shipping Packaging	Package	Temperature
MK2745-21S	2745-21S	Tubes	16-pin SOIC	0 to 70° C
MK2745-21STR	2745-21S	Tape and Reel	16-pin SOIC	0 to 70° C
MK2745-21SLF	2745-21SLF	Tubes	16-pin SOIC	0 to 70° C
MK2745-21SLFTR	2745-21SLF	Tape and Reel	16-pin SOIC	0 to 70° C

"LF" denotes Pb (lead) free package