DVD/MPEG CLOCK SOURCE

MK2745-24

Description

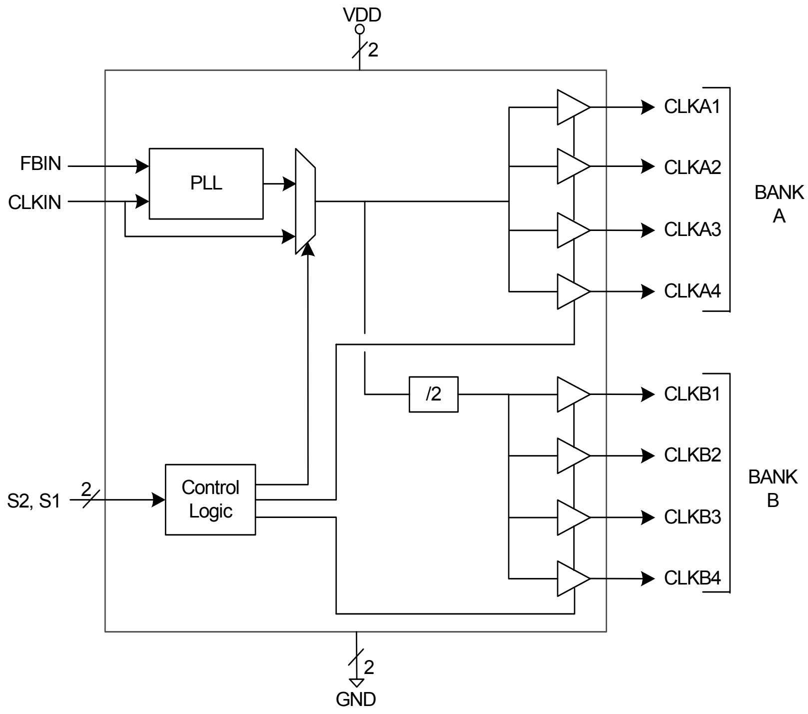
The MK2745-24 is a low-cost, low-jitter, high-performance clock synthesizer for DVD and other MPEG 2-based applications. Using analog Phase-Locked Loop (PLL) techniques, the device accepts a 27 MHz fundamental mode crystal or clock input to produce multiple audio output clocks, a processor clock, and two 27 MHz clocks. 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.

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

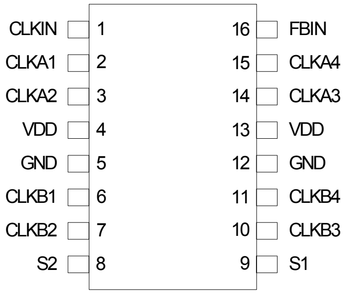
Features

- Packaged in a 16-pin narrow (150 mil) SOIC
- Ideal for AuraVision's notebook DVD solutions
- Patented zero ppm audio clock error for exact audio clock sampling rates, plus 32x and 256x clocks of the sampling frequencies
- Selectable audio sampling frequencies support 32, 44.1, and 96 kHz in most DACs
- 27 MHz fundamental crystal or clock input
- Selectable processor frequencies
- Two clocks of 27 MHz
- Zero ppm in all clocks
- 25 mA output drive capability at TTL levels
- Advanced, low-power, sub-micron CMOS process
- Operating voltage of 3.3 V to 5 V
- See also the MK2712 for NTSC/PAL clocks

Block Diagram



Pin Assignment



16-pin (150 mil) SOIC

Feedback Configuration Table

Feedback From	CLKA1:A4	CLKB1:B4
Bank A	CLKIN	CLKIN/2
Bank B	2XCLKIN	CLKIN

Output Clock Mode Select Table

S2	S1	Clocks A1:A4	Clocks B1:B4	Internet Generation	PLL Status
0	0	Tri-state (high impedance)	Tri-state (high impedance)	None	On
0	1	Running	Tri-state (high impedance)	PLL	On
1	0	Running	Running	Buffer only (no zero delay)	Off
1	1	Running	Running	PLL	On

Pin Descriptions

Pin Number	Pin Name	Pin Type	Pin Description
1	CLKIN	Input	Clock input. Connect to input clock source.
2, 3	CLKA1:A4	Output	Clock A bank of four outputs.
4	VDD	Power	Power supply. Connect pin to same voltage as pin 13 (either 3.3 V or 5 V).
5	GND	Power	Connect to ground.
6, 7	CLKB1:B4	Output	Clock B bank of four outputs. These are low skew divide by two of bank A.
8	S2	Input	Select input 2. Selects mode for outputs per table above.
9	S1	Input	Select input 1. Selects mode for outputs per table above.
10, 11	CLKB1:B4	Output	Clock B bank of four outputs. These are low skew divide by two of bank A.
12	GND	Power	Connect to ground.
13	VDD	Power	Power supply. Connect pin to same voltage as pin 4 (either 3.3 V or 5 V).
14, 15	CLKA1:A4	Output	Clock A bank of four outputs.
16	FBIN	Input	Feedback input. Determines outputs per table above.

External Components

The MK2745-24 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 part as possible. A 33Ω series terminating resistor should be used on each clock output to reduce reflections.

Absolute Maximum Ratings

Stresses above the ratings listed below can cause permanent damage to the MK2745-24. These ratings, which are standard values for IDT 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 (Commercial)	0 to +70° C
Ambient Operating Temperature (Industrial)	-40 to +85° C
Storage Temperature	-65 to +150° C
Junction Temperature	125° C
Soldering Temperature	260° C

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=3.3 V ±10%, Temp 0 to +70° / -40 to +85° C

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Operating Voltage	VDD		3.0		5.5	V
Input High Voltage	V_{IH}	CLKIN pin only	(VDD/2)+1	VDD/2		V
Input Low Voltage	V_{IL}	CLKIN pin only		VDD/2	(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} = -18 mA	2.4			V
Output Low Voltage	V_{OL}	I_{OL} = 18 mA			0.4	V
Output High Voltage	V_{OH}	I_{OH} = -5 mA	VDD-0.4			V
Operating Supply Current 100 MHz, CLKIN	IDD	No Load S1=S2=1		44		mA
Short Circuit Current	I_{OS}	Each output		± 65		mA
Input Capacitance	C_{IN}	S1, S1, FBIN		7		pF

AC Electrical Characteristics

VDD = 3.3V ±10%, Temp 0 to +70°/ -40 to +85° C

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Input Frequency		FBIN to CLKA1 S1=S2=1	20		160	MHz
Output Frequency		FBIN to CLKA1 S1=S2=1	20		160	MHz
Output Rise Time	t_{OR}	0.8 to 2.0 V, C_L=30 pF			1.5	ns
Output Fall Time	t_{OF}	0.8 to 2.0 V, C_L=30 pF			1.5	ns
Output Clock Duty Cycle		at 1.4V	40	50	60	%
Device-to-Device skew, equally loaded		Rising edges at VDD/2			700	ps
Output-to-Output skew, equally loaded		Rising edges at VDD/2			200	ps
Maximum Absolute Jitter				300		ps
Cycle-to-Cycle Jitter		30 pF loads 66.67 MHz outputs			400	ps
		15 pF loads 66.67 MHz outputs			400	ps

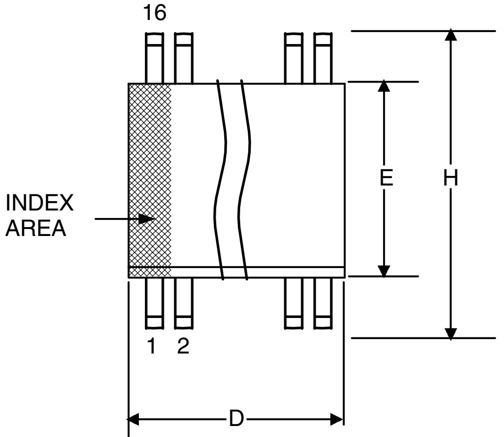
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Skew from Output Bank A to Output Bank B		All outputs equally loaded			400	ps
Delay CLKIN Rising Edge to FBIN Rising Edge		Measured at VDD/2			±250	ps
PLL Lock Time	t_{LOCK}	Stable power supply, valid clocks on CLKIN, FBIN			1	ms

Thermal Characteristics

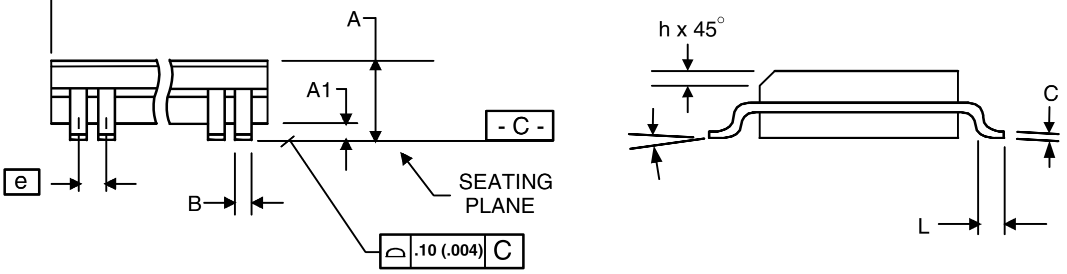
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Thermal Resistance Junction to Ambient	θ_{JA}	Still air		120		°C/W
	θ_{JA}	1 m/s air flow		115		°C/W
	θ_{JA}	3 m/s air flow		105		°C/W
Thermal Resistance Junction to Case	θ_{JC}			58		°C/W

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
MK2745-24SLF	2745-24SL	Tubes	16-pin SOIC	0 to 70° C
MK2745-24SLFT	2745-24SL	Tape and Reel	16-pin SOIC	0 to 70° C
MK2745-24SILF	2745-24SIL	Tubes	16-pin SOIC	-40 to +85° C
MK2745-24SILFT	2745-24SIL	Tape and Reel	16-pin SOIC	-40 to +85° C

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