SET-TOP CLOCK SOURCE

MK2761A

Description

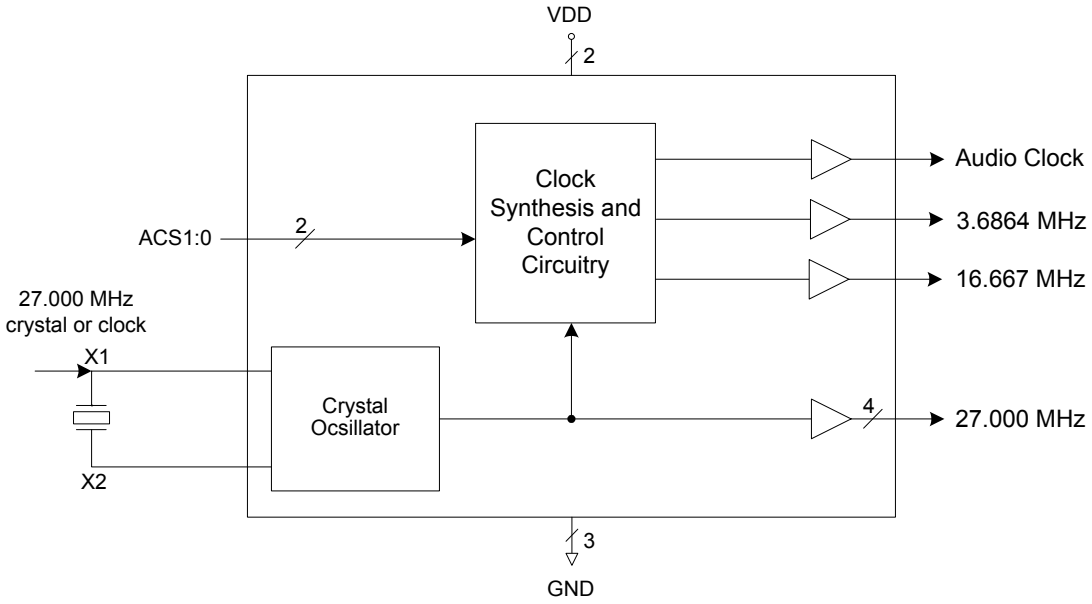
The MK2761A is a low-cost, low-jitter, high-performance clock synthesizer for set-top box applications. Using analog Phase-Locked Loop (PLL) techniques, the device accepts a 27 MHz crystal or clock input to produce multiple output clocks including the processor clock, the UART clock, a selectable audio clock, and four low skew copies of the 27 MHz. 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 Set-top Box and multimedia 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
- Pb (lead) free package
- Selectable audio sampling frequencies support 32, 44.1, and 48 kHz in most DACs
- 27 MHz crystal or clock input
- Processor frequency of 16.67 MHz
- Fixed clocks of 27 and 3.6864 MHz
- Zero ppm in audio clocks exactly track video frequency
- 25 mA output drive capability at TTL levels
- Advanced, low-power, sub-micron CMOS process
- Operating voltage of 5.0 V ±10%

Block Diagram



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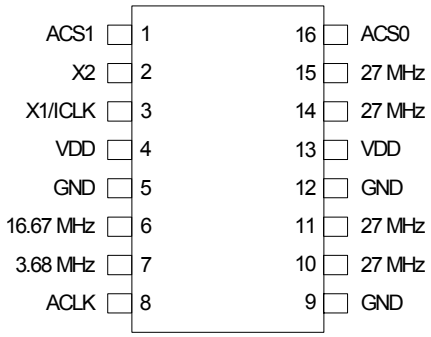
Pin Assignment



16-pin (150 mil) SOIC

Audio Clock (MHz) DecodingTable

ACS1	ACS0	ACLK
0	0	8.192
0	1	11.2896
1	0	12.288
1	1	5.6448

Pin Descriptions

Pin Number	Pin Name	Pin Type	Pin Description
1	ACS1	Input	Audio clock Select 1. Selects ACLK on pin 8. See 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 +5 V.
5	GND	Power	Connect to ground.
6	16.67M	Output	16.667 MHz processor clock output.
7	3.68M	Output	3.6864 MHz clock output.
8	ACLK	Output	Audio clock output. Determined by status of ACS1, ACS0. See table above
9	GND	Power	Connect to ground.
10	27M	Output	27 MHz buffered reference clock output. Duty cycle matches input clock.
11	27M	Output	27 MHz buffered reference clock output. Duty cycle matches input clock.
12	GND	Power	Connect to ground.
13	VDD	Power	Connect to +5 V.
14	27M	Output	27 MHz buffered reference clock output. Duty cycle matches input clock.
15	27M	Output	27 MHz buffered reference clock output. Duty cycle matches input clock.
16	ACS0	Input	Audio clock Select 0. Selects audio clock on pin 8. See table above.

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External Components

The MK2761A 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 MK2761A 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-4) x 2. So, for a crystal with 16 pF load capacitance, the crystal caps should be 24 pF each.

Absolute Maximum Ratings

Stresses above the ratings listed below can cause permanent damage to the MK2761A. 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	0 to +70° 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)	+4.5		+5.5	V

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DC Electrical Characteristics

VDD = 5.0 V ±10% (unless otherwise noted), Temp 0 to +70° C

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Operating Voltage	VDD		4.5		5.5	V
Input High Voltage	V_{IH}	X1/ICLK pin only	3.5	2.5		V
Input Low Voltage	V_{IL}	X1/ICLK pin only		2.5	1.5	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, CMOS level	V_{OH}	I_{OH} = -8 mA	VDD-0.4			V
Operating Supply Current	IDD	No load, Note 1		65		mA
Short Circuit Current	I_{OS}	Each output		±100		mA
Input Capacitance	C_{IN}			7		pF
Frequency Error, ACLK					0	ppm

Note 1: With ACLK clock at 12.28 MHz.

AC Electrical Characteristics

VDD = 5.0 V ±10% (unless otherwise 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 1.4 V	40		60	%
Absolute Jitter, short term		Variation from mean		±250		ps
Skew of 27 MHz Outputs		Rising edges at 1.4 V	-500	0	500	ps

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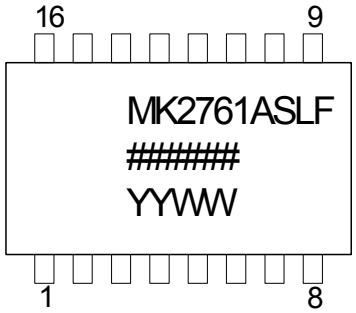
Thermal Characteristics

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

Marking Diagram (MK2761ASLF)



Notes:

1. ###### is the lot number.
2. YYWW is the last two digits of the year and week that the part was assembled.
3. “LF” denotes Pb (lead) free package.
4. Bottom marking: (origin). Origin = country of origin if not USA.

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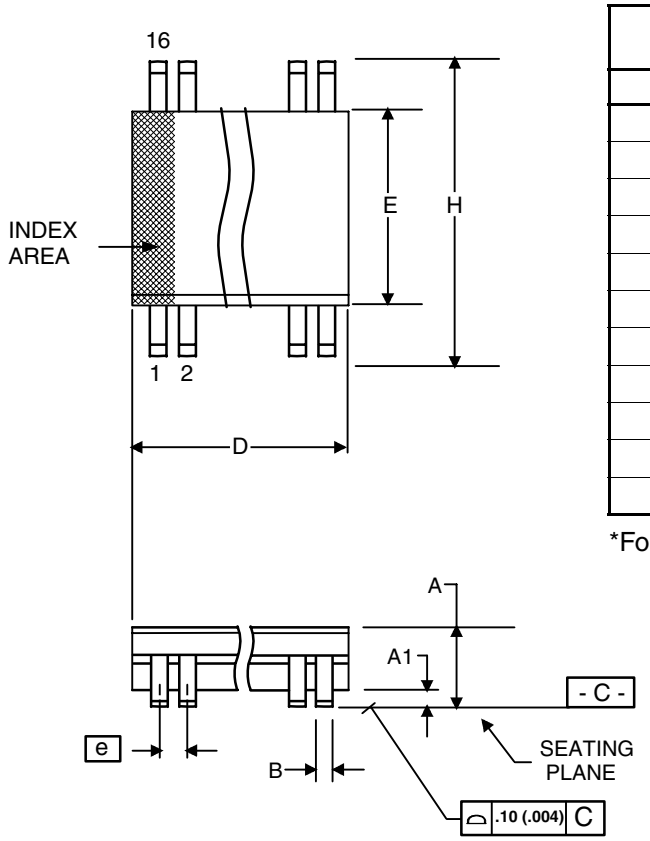
Package Outline and Package Dimensions (16-pin SOIC, 150 Mil. Narrow Body)

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°

*For reference only. Controlling dimensions in mm.

Ordering Information

Part / Order Number	Marking	Shipping Packaging	Package	Temperature
MK2761ASLF	see page 5	Tubes	16-pin SOIC	0 to +70° C
MK2761ASLFTR		Tape and Reel	16-pin SOIC	0 to +70° C

"LF" suffix to the part number are the Pb-Free configuration and are RoHS compliant.

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Corporate Headquarters

TOYOSU FORESIA, 3-2-24 Toyosu,
Koto-ku, Tokyo 135-0061, Japan

www.renesas.com

Contact Information

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