MK3732-08
ADSL Clock Source

Description

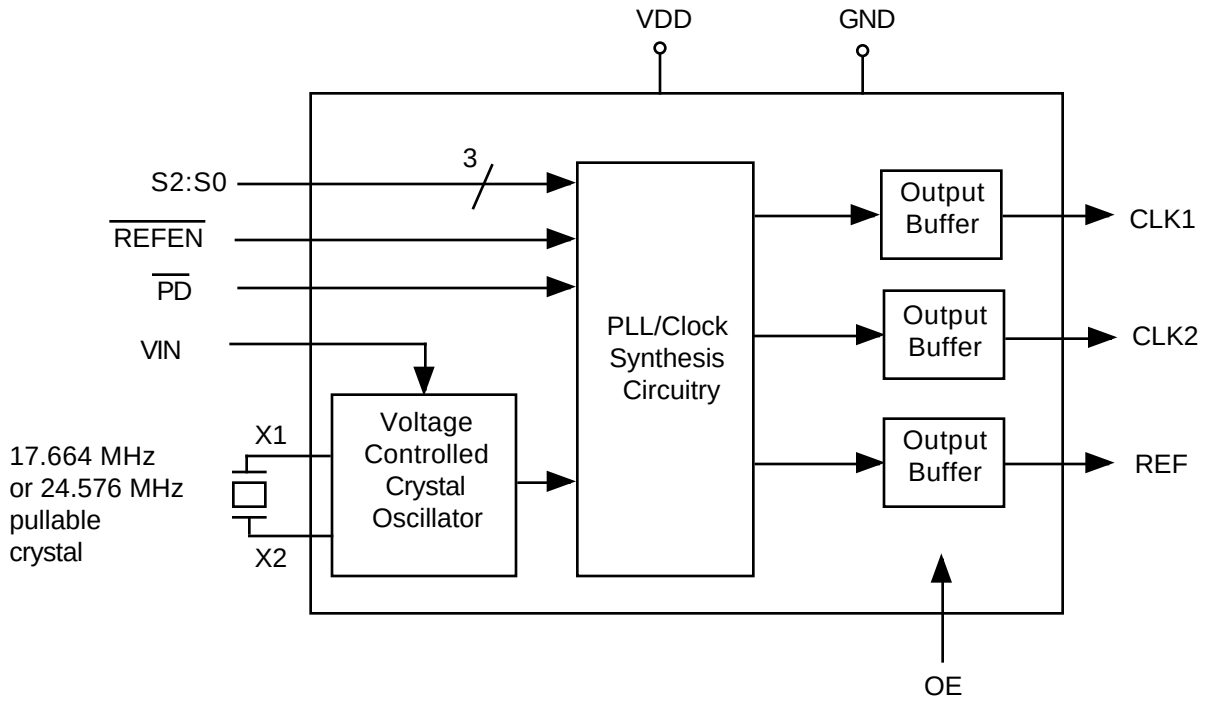
The MK3732-08 is a low cost, low jitter, high performance VCXO and PLL clock synthesizer designed to replace expensive discrete VCXOs and multipliers. The on-chip Voltage Controlled Crystal Oscillator (VCXO) accepts a 0 to 3.3 V input voltage to cause the output clocks to vary by ±100 ppm. Using ICS/MicroClock's patented VCXO and analog/digital Phase-Locked Loop (PLL) techniques, the device uses an inexpensive 17.664 MHz or 24.576 MHz pullable crystal input to produce one or two output clocks.

ICS manufactures the largest variety of xDSL clock synthesizers for all applications. Consult ICS to eliminate VCXOs, crystals and oscillators from your board.

Features

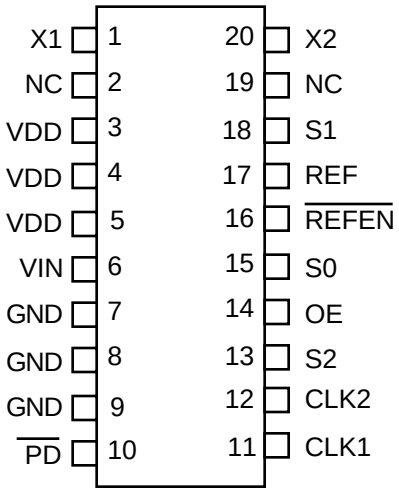
- Packaged in 20 pin SSOP (QSOP)
- Replaces a VCXO and oscillator
- Uses an inexpensive pullable crystal
- On-chip patented VCXO with pull range of 230 ppm (±115 ppm) minimum
- VCXO tuning voltage of 0 to 3.3 V
- Advanced, low power, sub-micron CMOS process
- 3.3V operating voltage
- Available in industrial temperature range

Block Diagram



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Pin Assignment



20 pin (150 mil) SSOP

Clock Select Table

S2	S1	S0	Input	CLK1	CLK2
0	0	0	24.576 *	2.208	OFF
0	0	M	17.664	20.00	OFF
0	0	1	17.664	20.19	35.328
0	1	0	17.664	70.66	35.328
0	1	M	17.664	70.66	35.328
0	1	1	17.664	58.88	35.328
1	0	0	17.664	35.328	52.992
1	0	M	17.664	2.208	35.328
1	0	1	17.664	20.19	OFF
1	1	0	17.664	4.04	35.328
1	1	M	17.664	35.328	61.82
1	1	1	17.664	35.328	56.52

0=connect directly to GND; M=leave unconnected (floating);
1=connect directly to VDD

* In this mode, 12.288 MHz is present on REF

Pin Descriptions

Number	Name	Type	Description
1	X1	XI	Crystal connection. Connect to a pullable crystal of 17.664 MHz or 24.576 MHz..
2, 19	NC	-	No Connect. Do not connect anything to this pin.
3, 4, 5	VDD	P	Power Supply. Connect to +3.3V.
6	VIN	VI	Voltage Input to VCXO. Zero to 3.3V signal which controls the VCXO frequency.
7, 8, 9	GND	P	Connect to ground.
10	$\overline{PD}$	I(PU)	Power Down active low. Turns entire chip off, clocks stop low.
11	CLK1	O	Clock Output #1 per table above.
12	CLK2	O	Clock Output #2 per table above.
13	S2	I(PU)	Select input #2. Selects outputs per table above.
14	OE	I(PU)	Output Enable. Tri-states outputs when low.
15	S0	TI	Select input #0. Selects outputs per table above.
16	$\overline{REFEN}$	I(PU)	Reference Clock Enable. Enables REF Output when low. Connect to VDD for lowest jitter.
17	REF	O	Reference Clock Output. This is the crystal oscillator output clock.
18	S1	I(PU)	Select input #1. Selects outputs per table above.
20	X2	XO	Crystal connection. Connect to a pullable crystal of 17.664 MHz or 24.576 MHz.

Key: I(PU) = Input with internal pull-up resistor; TI = Tri-level Input; O = Output; P = Power Supply Connection; VI = Analog Voltage Input; XI, XO = Crystal Pins.

External Components

The MK3732-08 requires a minimum number of external components for proper operation. Decoupling capacitors of 0.01µF should be connected between VDD and GND pins 3 and 7, pins 4 and 8, and pins 5 and 9, as close to the MK3732-08 as possible. A series termination resistor of 33 Ω may be used for each clock output. The input crystal must be connected as close to the chip as possible. The input crystal should be a fundamental mode, parallel resonant, pullable, AT cut.

Consult ICS for recommended suppliers. IMPORTANT - Consult the Application Note MAN05 for layout guidelines.

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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	Commercial version	0		70	ºC
	Industrial version	-40		85	ºC
Soldering Temperature	Max of 10 seconds			260	ºC
Storage temperature		-65		150	ºC
DC CHARACTERISTICS (VDD = 3.3V unless noted)					
Core Operating Voltage, VDD		3.14	3.3	3.46	V
Input High Voltage, VIH, binary inputs		2			V
Input Low Voltage, VIL, binary inputs				0.8	V
Input High Voltage, VIH, trinary input	S0, pin 15	VDD-0.5			V
Input Low Voltage, VIL, trinary input	S0, pin 15			0.5	V
Output High Voltage, VOH	IOH=-12mA	2.4			V
Output Low Voltage, VOL	IOL=12mA			0.4	V
Output High Voltage, VOH, CMOS level	IOH=-4mA	VDD -0.4			V
Operating Supply Current, IDD	No Load		19		mA
Short Circuit Current	Each output		±50		mA
Input Capacitance	S2:S0, OE		5		pF
Frequency synthesis error	Both clocks			0	ppm
VIN, VCXO control voltage		0		3.3	V
AC CHARACTERISTICS (VDD = 3.3V unless noted)					
Input Crystal Frequency		17.664		24.576	MHz
Output Clock Frequency		2.208		70.656	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	%
Maximum Absolute Short Term Jitter	15 pF load at output		±125		ps
Phase Noise, relative to carrier	10 kHz offset, no REF		-115		dBc/Hz
Output pullability, note 2	0V < VIN < 3.3V	±115			ppm

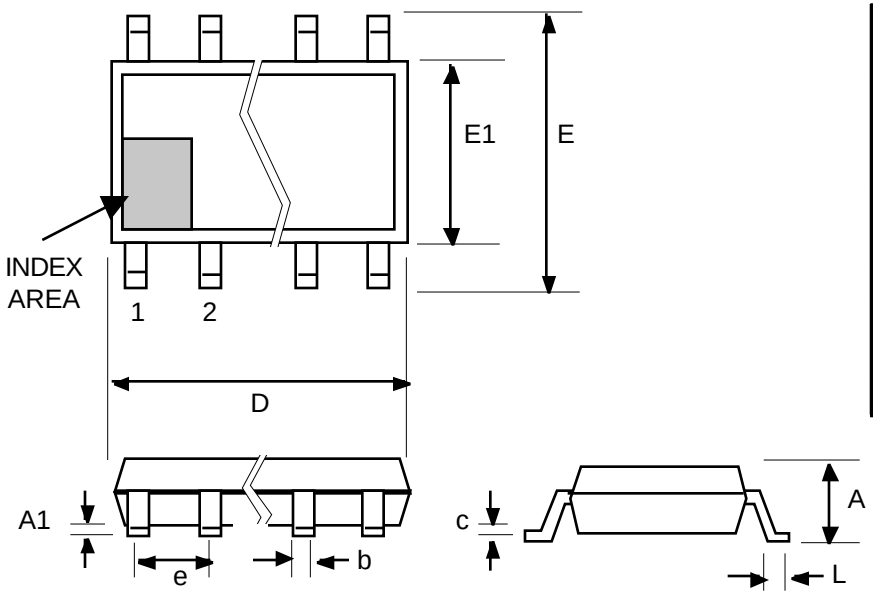
Notes: 1. Stresses beyond those listed under Absolute Maximum Ratings could cause permanent damage to the device. Prolonged exposure to levels above the operating limits but below the Absolute Maximums may affect device reliability.
2. With an ICS approved pullable crystal.

Pullable Crystal Specifications:

Correlation (load) Capacitance	14 pF
C0/C1	250 max
ESR	35 Ω max
Operating Temperature	0 to 70 °C or -40 to 85 °C
Initial Accuracy	±20 ppm
Temperature plus Aging Stability	±50 ppm

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Package Outline and Package Dimensions
(For current dimensional specifications, see JEDEC Publication No. 95.)



20 pin SSOP

	Inches		Millimeters	
Symbol	Min	Max	Min	Max
A	0.053	0.069	1.35	1.75
A1	0.004	0.010	0.10	0.25
b	0.008	0.012	0.20	0.30
c	0.007	0.010	0.19	0.25
D	0.337	0.344	8.56	8.74
e	.025 BSC		0.635 BSC	
E	0.228	0.244	5.79	6.20
E1	0.150	0.157	3.81	3.99
L	0.016	0.050	0.41	1.27

Ordering Information

Part/Order Number	Marking	Shipping packaging	Package	Temperature
MK3732-08R	MK3732-08R	tubes	20 pin SSOP	0 to 70 °C
MK3732-08RTR	MK3732-08R	tape and reel	20 pin SSOP	0 to 70 °C
MK3732-08RI	MK3732-08RI	tubes	20 pin SSOP	-40 to 85 °C
MK3732-08RITR	MK3732-08RI	tape and reel	20 pin SSOP	-40 to 85 °C

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