


### Description

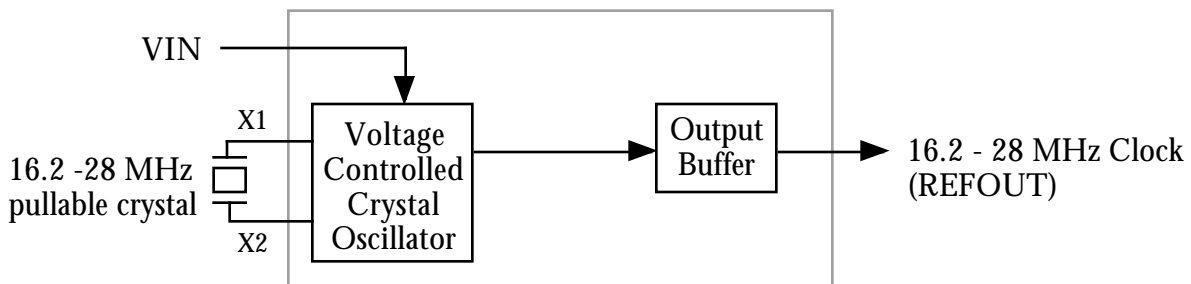
The MK3721 is ICS/MicroClock's lowest cost, low jitter, high performance 3.3 volt VCXO designed to replace expensive VCXO modules. The on-chip Voltage Controlled Crystal Oscillator accepts a 0 to 3.3 V input voltage to cause the output clocks to vary by  $\pm 100$  ppm. Using ICS/MicroClock's patented VCXO techniques, the device uses an inexpensive external pullable crystal in the range of 16.2 - 28 MHz to produce a VCXO output clock at that same frequency.

ICS/MicroClock manufactures the largest variety of Set-Top Box and multimedia clock synthesizers for all applications. If more clock outputs are needed, see the MK3732 or MK377x family of parts. Consult ICS/MicroClock to eliminate VCXOs, crystals and oscillators from your board.

### Features

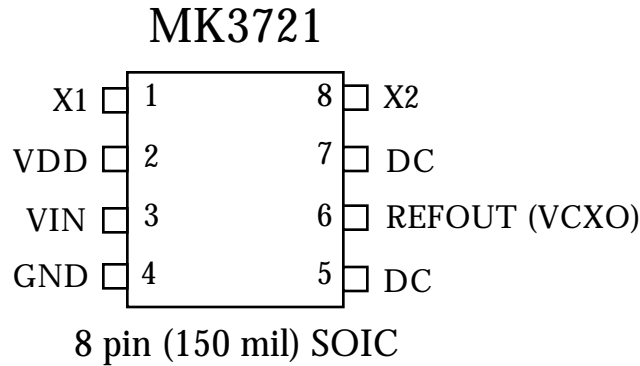
- Packaged in 8 pin SOIC 
- 3.3 V operating voltage
- 16.2 MHz to 28 MHz operation
- Uses an inexpensive external crystal
- On-chip VCXO (patented) with pull range of 200 ppm (minimum)
- VCXO tuning voltage of 0 to 3.3 V
- 12 mA output drive capability at TTL levels
- Advanced, low power, sub-micron CMOS process
- For frequencies between 8 MHz to 16 MHz, use the MK3711A. For frequencies between 1 MHz and 8 MHz, use the MK3713. For higher than 28 MHz, use the MK3732-05

### Block Diagram





### Pin Assignment



### Pin Descriptions

Number	Name	Description
1	X1	Crystal connection. Connect to a pullable 16.2 - 28 MHz crystal.
2	VDD	VDD. Connect to + 3.3 V.
3	VIN	Voltage input to VCXO. Zero to 3.3 V analog input which controls the frequency of the VCXO.
4	GND	Connect to ground.
5	DC	Don't Connect anything to this pin.
6	REFOUT	VCXO CMOS level clock output matches the nominal frequency of the crystal.
7	DC	Don't Connect anything to this pin.
8	X2	Crystal connection. Connect to a pullable 16.2 - 28 MHz crystal.

### Crystal Specifications

Correlation (load) capacitance      14 pF  
 Initial accuracy                        ±20 ppm maximum  
 Drift over temperature and aging    ±50 ppm maximum  
 C0/C1 ratio                                240 maximum  
 ESR                                         35 maximum



## Electrical Specifications

Parameter	Conditions	Minimum	Typical	Maximum	Units
<b>ABSOLUTE MAXIMUM RATINGS (note 1)</b>					
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 10 seconds			260	°C
Storage temperature		-65		150	°C
<b>DC CHARACTERISTICS (VDD = 3.3 V unless noted)</b>					
Operating Voltage, VDD		3.15		3.45	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		4		mA
Short Circuit Current			±50		mA
VIN, VCXO control voltage		0		3.3	V
<b>AC CHARACTERISTICS (VDD = 3.3 V unless noted)</b>					
Input Crystal Frequency		16.2		28	MHz
Input Crystal Accuracy				±30	ppm
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	50	60	%
Maximum Absolute Jitter, short term			±55		ps
Output frequency pullability, note 2	0V VIN 3.3 V	±100			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 a ICS/MicroClock approved pullable crystal.

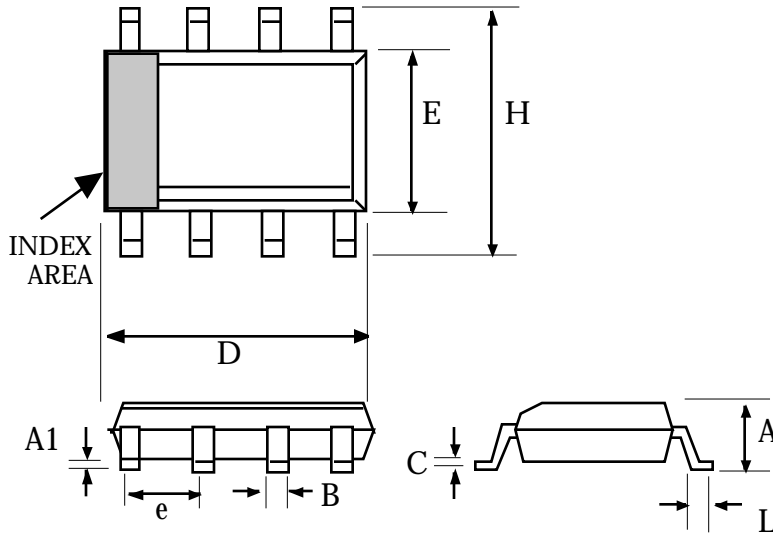
## External Components

The MK3721 requires a minimum number of external components for proper operation. A decoupling capacitor of 0.01µF should be connected between VDD and GND on pins 2 and 4, as close to the MK3721 as possible. A series termination resistor of 33 Ω may be used for the clock output. The input crystal must be connected as close to the chip as possible. The input crystal should be a parallel mode, pullable, AT cut, with 14 pF load capacitance. See previous page for crystal specifications. Consult ICS for recommended suppliers. **IMPORTANT** - read application note MAN05 before laying out the PCB.



## Package Outline and Package Dimensions

(For current dimensional specifications, see JEDEC Publication No. 95.)



## 8 pin SOIC

Symbol	Inches		Millimeters	
	Min	Max	Min	Max
A	0.0532	0.0688	1.35	1.75
A1	0.0040	0.0098	0.10	0.24
B	0.0130	0.0200	0.33	0.51
C	0.0075	0.0098	0.19	0.24
D	0.1890	0.1968	4.80	5.00
E	0.1497	0.1574	3.80	4.00
e	.050 BSC		1.27 BSC	
H	0.2284	0.2440	5.80	6.20
h	0.0099	0.0195	0.25	0.50
L	0.0160	0.0500	0.41	1.27

## Ordering Information

Part/Order Number	Marking	Shipping packaging	Package	Temperature
MK3721S	MK3721S	tubes	8 pin SOIC	0-70 °C
MK3721STR	MK3721S	tape and reel	8 pin SOIC	0-70 °C

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