MK3235
Handheld System Clock Synthesizer

Description

The MK3235 is the smallest size, lowest power system clock synthesizer available. It is the ideal way to generate clocks for handheld computers, such as PDAs, PICs, and other devices where low power is required. Using analog Phase-Locked Loop (PLL) techniques, the device operates from a single 32.768 kHz crystal to produce the 32.768kHz, 14.318MHz, and serial communications output clocks.

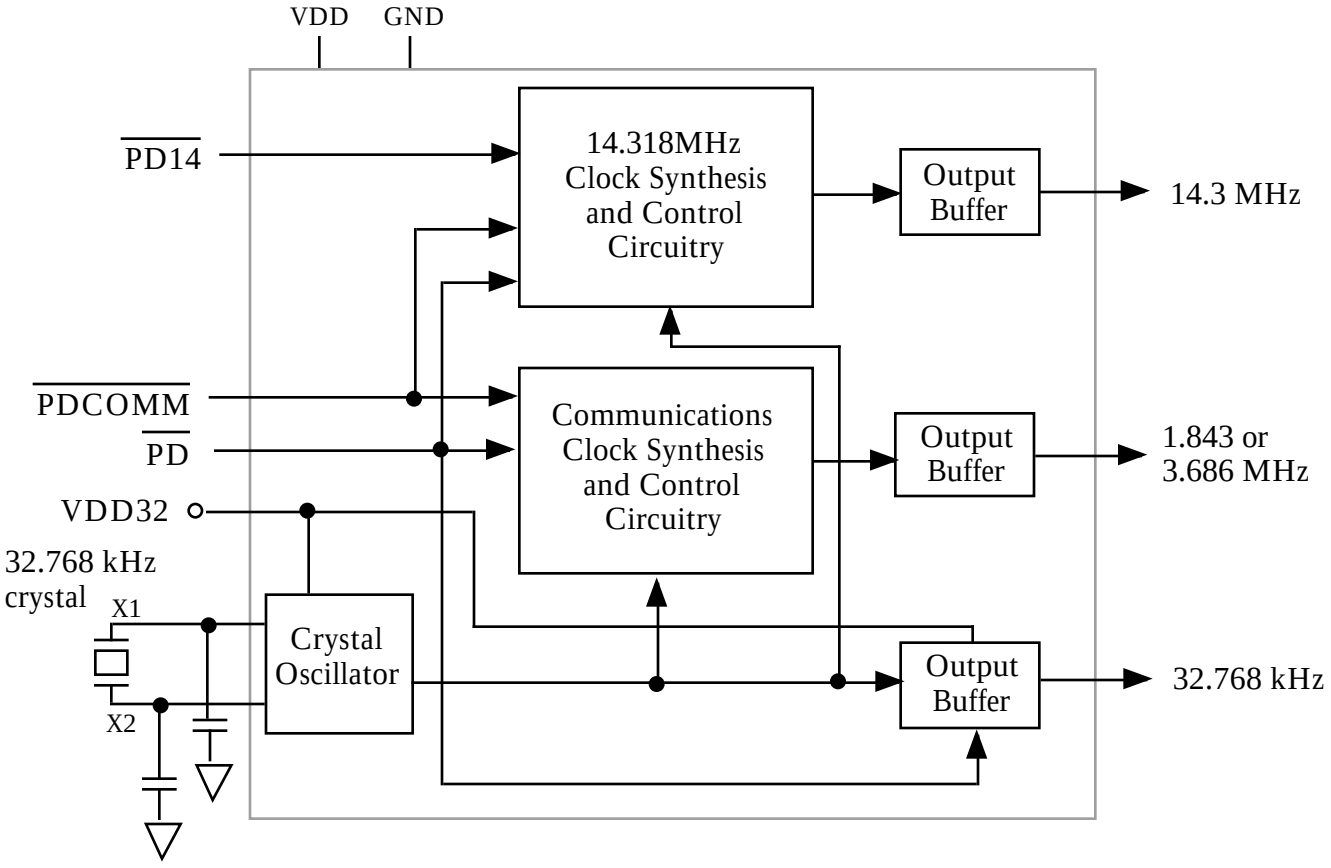
The device has three power down modes for the 14.3MHz, communications, and 32.768kHz clocks.

The MK3235 can save board space and cost even if it only replaces the 32kHz oscillator circuitry and one additional surface mount crystal or oscillator. The extremely low IDD, the ease of surface mounting, and the power down capability are added benefits in using the part.

Features

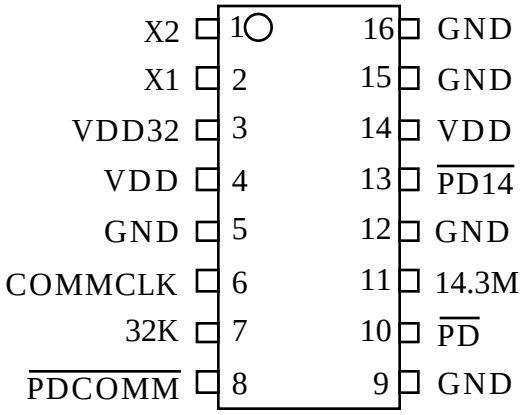
- Input crystal frequency of 32.768 kHz
- Lowest power solution available
- Lowest profile clock solution where height is critical
- Three output clocks
- 3.3V or 5.0V operation
- Duty cycle of 45/55
- 14.3MHz or 14.3MHz+Comm clock power downs
- Separate battery supply pin for 32 kHz runs to 2V
- IDD less than 4µA when 32 kHz running
- Packaged in 16 pin narrow SOIC

Block Diagram



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Pin Assignment



Pin Descriptions

Number	Name	Type	Description
1	X2	O	Crystal connection. Connect to 32.768 kHz crystal.
2	X1	I	Crystal connection. Connect to 32.768 kHz crystal.
3	VDD32	P	Separate power supply connection for 32.768kHz clock. Will operate to 2.0V.
4	VDD	P	Connect to +3.3V or +5V. Must be the same voltage as pin 14.
5	GND	P	Connect to ground.
6	COMMCLK	O	Serial communications (1.84 on -01 version, or 3.68MHz on -02 version) clock output.
7	32K	O	32.768 kHz square wave clock output.
8	$\overline{\text{PDCOMM}}$	I	Power Down serial Communications and 14.3M clock outputs (stop low) when low.
9	GND	P	Connect to ground.
10	$\overline{\text{PD}}$	I	Powers Down everything but 32kHz oscillator internally. 32kHz output buffer is off.
11	14.3M	O	14.318 MHz output clock.
12	GND	P	Connect to ground.
13	$\overline{\text{PD14}}$	I	Power Down 14.318MHz clock output (stops low) when low.
14	VDD	P	Connect to +3.3V or +5V. Must be the same voltage as pin 4.
15	GND	P	Connect to ground.
16	GND	P	Connect to ground.

Type: I = Input, O = output, P = power supply connection
Power Down status: Output clocks will stop in a low state when powered down

External Components

The MK3235 requires a minimum number of external components for proper operation. Decoupling capacitors of 0.1µF should be connected between VDD and GND, and VDD32 and GND, as close to the MK3235 as possible. A series resistor should be used on the VDD32 supply. A series termination resistor of 33Ω may be used for each clock output, except the 32.768 kHz. For tuning the real time clock output, use a 32.768 kHz crystal with a load capacitance of 12.5pF, and connect a 20pF±5% (NPO dielectric) capacitor between each crystal pin and ground. The 32.768 kHz crystal must be connected as close to the chip as possible. Consult MicroClock for a recommended external circuit schematic.

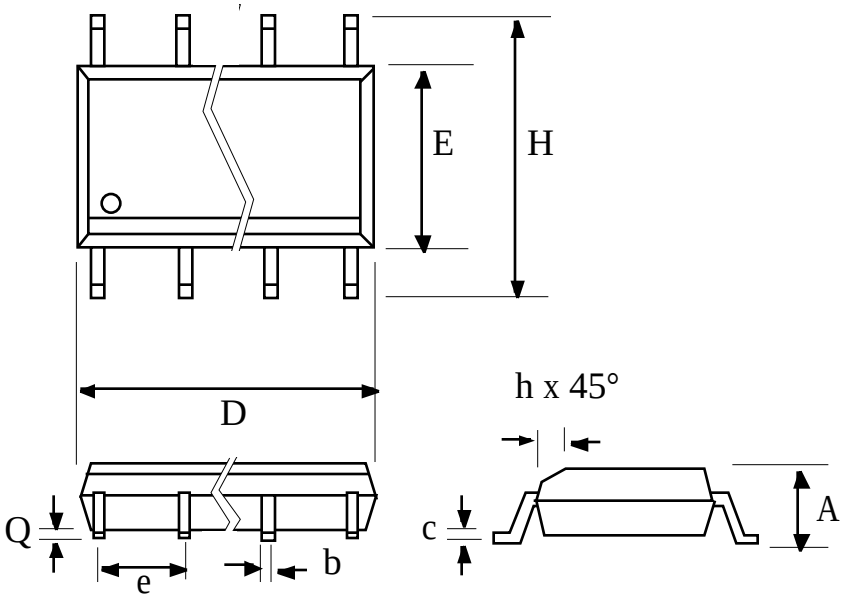
Electrical Specifications

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		0		70	°C
Soldering Temperature	Max of 30 seconds			260	°C
Storage Temperature		-65		150	°C
DC CHARACTERISTICS (at 5.0V unless otherwise noted)					
Operating Voltage, VDD		3.0		5.5	V
Operating Voltage,VDD32		2.0		5.5	V
Input High Voltage, VIH	VDD=5V	2.0			V
Input Low Voltage, VIL	VDD=5V			0.8	V
Output High Voltage, VOH, 3.3V or 5V	IOH=-4mA	VDD-0.4			V
Output High Voltage, VOH	VDD=5V, IOH=-25mA	2.4			V
Output Low Voltage, VOL	VDD=5V, IOL=25mA			0.4	V
Input High Voltage, VIH	VDD=3.3V	1.9			V
Input Low Voltage, VIL	VDD=3.3V			0.4	V
Output High Voltage, VOH	VDD=3.3V, IOH=-8mA	2.4			V
Output Low Voltage, VOL	VDD=3.3V, IOL=8mA			0.4	V
IDD Operating Supply Current, 5V	No Load		9		mA
IDD32 with only 32 kHz running, 5V	No Load		3.5		µA
IDD Operating Supply Current, 3.3V	No Load		6		mA
IDD32 with only 32 kHz output running, 3.3V	No Load		2.5		µA
IDD32, only 32 kHz osc. running, 3.3V, note 2	32kHz output off. $\overline{PD}$=0		1		µA
Short Circuit Current, 5V	32kHz output		±30		mA
Short Circuit Current, 5V	14, 1.8MHz outputs		±80		mA
Input Capacitance			7		pF
AC CHARACTERISTICS (at 5.0V unless otherwise noted)					
Input Frequency			32.768		kHz
Output Clock Rise and Fall Time, 0.2 to 0.8VDD				2	ns
Output Clock Duty Cycle, all MHz clocks	At VDD/2	45	49 to 51	55	%
32.768 kHz Clock Duty Cycle	At VDD32/2		57		%
Absolute Clock Period Jitter	14.318 MHz	-500		500	ps
Power up time, to all clocks stable, 32k running	VDD=3.3 or 5V		9		ms
Power on time,VDD32=0V to all clocks stable	32.768kHz crystal with ESR ≤25kΩ		500	1000	ms
Power on time, all power down pins taken high	32.768kHz oscillator running		15		ms

Note 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.
Note 2: When $\overline{PD}$=0 (low) and VDD32 is greater than 2.0V, then the 32kHz oscillator will continue to run on the chip, but the output is turned off. This allows for a quick power-up (<20ms), while the chip is only consuming approximately 1µA.

Package Outline and Package Dimensions

16 pin SOIC narrow



	Inches		Millimeters	
Symbol	Min	Max	Min	Max
A	0.055	0.068	1.397	1.7272
b	0.013	0.019	0.330	0.483
c	0.007	0.010	0.191	0.254
D	0.385	0.400	9.779	10.160
E	0.150	0.160	3.810	4.064
H	0.225	0.245	5.715	6.223
e	.050 BSC		1.27 BSC	
h		0.016		0.406
Q	0.004	0.01	0.102	0.254

Ordering Information

Part/Order Number	Marking	Communications Clock	Package	Temperature
MK3235-01S	MK3235-01S	1.843 MHz	16 pin SOIC	0-70°C
MK3235-02S	MK3235-02S	3.686 MHz	16 pin SOIC	0-70°C
MK3235-01STR	MK3235-01S	1.843 MHz	Add Tape & Reel	0-70°C
MK3235-02STR	MK3235-02S	3.686 MHz	Add Tape & Reel	0-70°C

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