

Applications

- Set-top boxes
- Telecom switching
- HDTV
- MPEG Video clock source

General Description

The Vaishali VT83027 is a single-chip, integrated VCXO and Phase Locked Loop (PLL) clock synthesizer. The device uses the VCXO and an analog Phase-Locked Loop (PLL) to accept a 13.5 MHz, 14 pF (pull range of 200 ppm) crystal input, and produce a 27 MHz output. A 0 to 3V control signal is used to fine tune the output clock frequency in the ± 100 ppm range.

Features

- 3.3V supply operation
- Low jitter PLL Clock Synthesizer
 - Zero ppm synthesis error
- Uses inexpensive pullable crystal
- ± 12 mA drive capability
- On-chip oscillator with 200 ppm pull range (± 100 ppm)
- 8 pin SOIC package

Figure 1. Functional Block Diagram

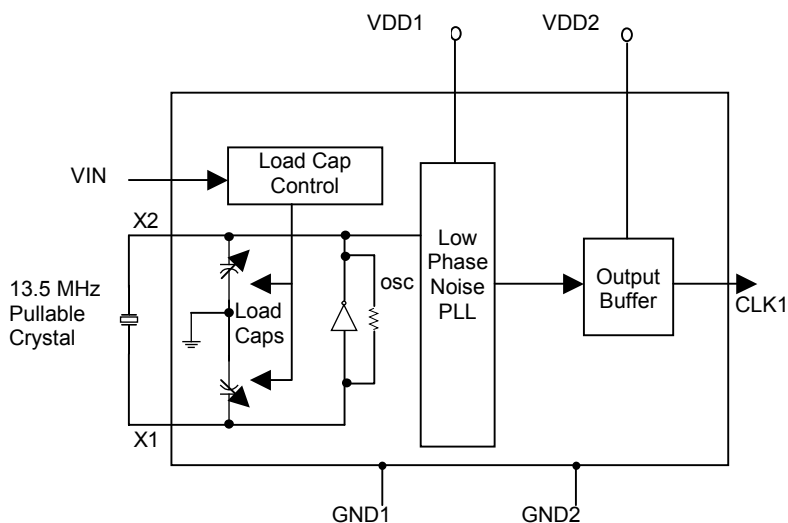


Figure 2. Pin Configuration

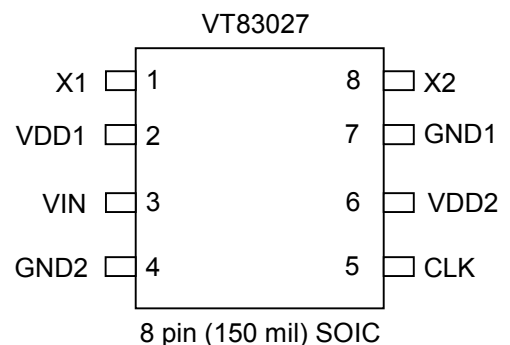


Table 1. Pin Description

Name	Pin #	Type	Description
X1	1	Xi	Crystal connection. Connect to a 13.5 MHz pullable crystal
VDD1	2	P	Core V_{DD} . Connect to 3.3V
VIN	3	I	Voltage input to VCXO. Zero to 3V signal controls the frequency of the VCXO.
GND2	4	P	Connect to ground.
CLK	5	O	Clock output
VDD2	6	P	Output driver V_{DD} . Connect to 3.3V
GND1	7	P	Connect to ground.
X2	8	Xi	Crystal connection. Connect to a 13.5 MHz pullable crystal.

Legend: I = Input
O = Output
P = Power supply connection
Xi = Crystal connections.

Table 2. Pullable Crystal Specifications

Parameter	Value
Correlation (load) capacitance	14 pF
C0/C1	240 max
ESR	35 Ω max
Operating Temperature	0°C to +70°C
Initial Accuracy	± 20 ppm
Temperature + Aging Stability	± 50 ppm

Table 3. Absolute Maximum Ratings

Parameter	Conditions	Min	Typ	Max	Units
Supply voltage, V_{DD}	Referenced to GND			5	V
Inputs and Clock Outputs	Referenced to GND	-0.5		$V_{DD}+0.5$	V
Soldering Temperature	Max of 10 seconds			260	°C
Storage temperature		-65		150	°C

Stresses above those listed under Absolute Maximum Ratings may cause permanent damage to the device. These ratings are stress specifications only and correct functional operation of the device at these or any other conditions above those listed in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect product reliability.

Table 4. Operating Conditions

Parameter	Conditions	Min	Typ	Max	Units
Operating Voltage, V_{DD}		3.15	3.3	3.45	V
Input High Voltage, V_{IH}	X1 pin only	2.5			V
Input Low Voltage, V_{IL}	X1 pin only			0.4	V
Operating Temperature		0		70	°C
VCXO control voltage, V_{IN}		0		3	V

Table 5. DC Electrical Characteristics

$T_A = 0^\circ\text{C}$ to $+70^\circ\text{C}$, $V_{DD} = 3.15\text{ V}$ to 3.45 V

Symbol	Parameter	Condition	Min	Typ ⁽¹⁾	Max	Units
V_{OH}	Output High Voltage	$I_{OH} = -12\text{mA}$	2.4			V
V_{OL}	Output Low Voltage	$I_{OL} = 12\text{mA}$			0.4	V
I_{IL}	Input Low Leakage Current	$V_{IN} = 0\text{V}$	X1 and V_{IN} inputs		-60	μA
I_{IH}	Input High Leakage Current	$V_{IN} = 3.45\text{V}$		60	μA	
I_{OS}	Short Circuit Current	Each output		± 85		mA
C_{IN}	Input Capacitance			7		pF
I_{DDQ}	Quiescent Power Supply Current	No load			18	mA
I_{DD}	Operating Supply Current	No Load		28		mA

Note:

1. Typical values are at $V_{DD} = 3.3\text{V}$ and 25°C

Table 6. AC Electrical Characteristics

$T_A = 0^\circ\text{C}$ to $+70^\circ\text{C}$, $V_{DD} = 3.15\text{ V}$ to 3.45 V

Symbol	Parameter	Condition	Min	Typ	Max	Units
fosc	Input Crystal Frequency			13.500		MHz
t_r	Output Clock Rise Time	0.8 to 2.0V			1.5	ns
t_f	Output Clock Fall Time	2.0 to 0.8V			1.5	ns
t_{od}	Output Clock Duty Cycle	At $V_{DD}/2$	40		60	%
t_{jit} (pk- pk)	Maximum Absolute Jitter (Peak to Peak)			± 100		ps
	Output pullability	$0\text{V} \leq V_{IN} \leq 3\text{V}$	± 100			ppm

Note:

1. Typical values are at $V_{DD} = 3.3\text{V}$ and 25°C

Ordering Information

Part Number	Marking	Shipping/Packaging	No. of Pins	Package	Temperature
VT83027S1	VT83027S1	Tubes	8	SOIC	0°C to $+70^\circ\text{C}$
VT83027S1X	VT83027S1	Tape & Reel	8	SOIC	0°C to $+70^\circ\text{C}$
VT83027/D		Dice in waffle-pack			0°C to $+70^\circ\text{C}$
VT83027/DW		Dice in wafer form			0°C to $+70^\circ\text{C}$