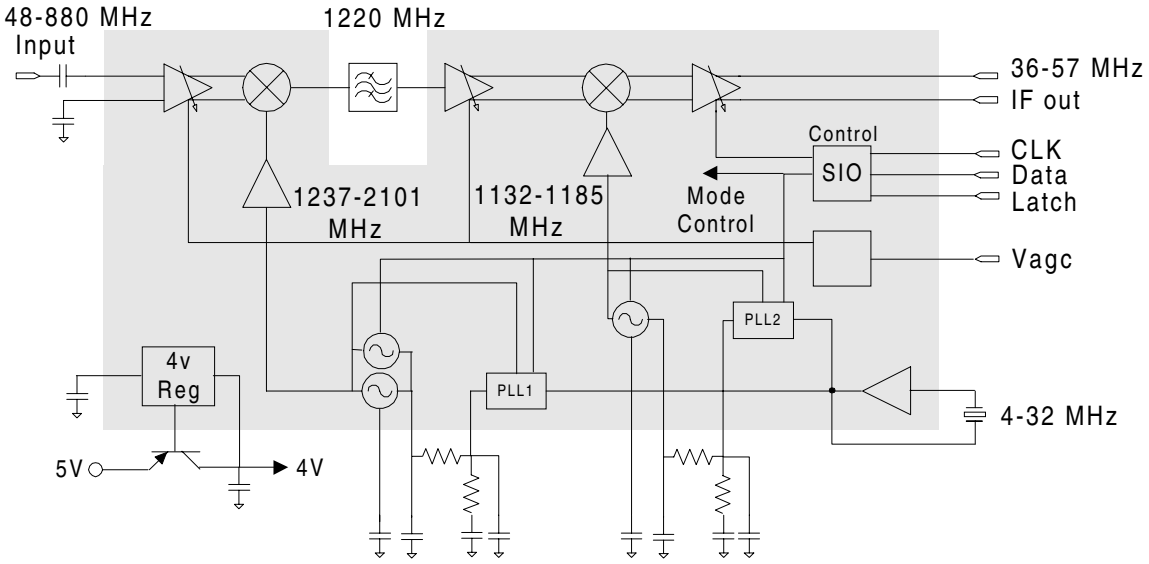
SiW1000™ Cable Tuner Integrated Circuit

INTRODUCTION

Silicon Wave's Sentinel™ SiW1000 chip is a highly integrated downstream cable tuner designed for the CATV and broadband access markets. It is suitable for mixed analog and digital systems.

The first tuner to completely integrate all performance-critical RF elements onto a single, low-power device, the SiW1000 chip includes a front-end low-noise amplifier (LNA) and variable gain control. The integrated frequency synthesizers include the VCOs and require no external resonator elements. The PLLs require only simple external loop filters.



Integrated Cable Tuner Block Diagram

FEATURES

- Highly integrated downstream cable tuner IC for mixed analog and digital systems.
- Fully integrated VCO with no external tank components.
- PLL requires only a simple external loop filter.
- Power consumption of less than one watt under worst-case conditions.
- Supports sleep modes: each of the four main blocks (up-converter, down-converter, PLL1, and PLL2) can be put into low-power and standby modes independently.
- High performance results over the full outdoor-industrial temperature range (–40°C to +85°C).
- Supports DOCSIS, 256 QAM CATV operation.
- 48 MHz to 880 MHz tuning range.
- Programmable IF output from 36 MHz to 57 MHz to cover worldwide usage.
- 48-pin, 7-by-7 mm leadless plastic package.
- 3.3 V and 4 V operation, or 5 V using on-chip regulator.
- Three-wire serial interface with clock, data, and latch enable, or an I^2C compatible two-wire interface.

APPLICATIONS

The SiW1000 Cable Tuner IC is suitable for all applications requiring a broadband tuning function in a low-power and cost-effective implementation. Applications include:

- Digital cable set-top boxes
- Digital cable modems
- Digital cable telephony
- International analog set-top boxes
- MMDS receivers

DESCRIPTION

The input signal is up-converted to an IF of 1220 MHz, and the desired channel is pre-selected using a standard SAW filter. The signal is then down-converted to an IF of 36 MHz to 57 MHz.

PLL1 tunes from 1237 to 2101 MHz in 1-MHz steps using a fully integrated VCO with no external tank components. The VCO is a multi-band design with selectable tuning elements. The VCO consists of a low-band and a high-band VCO, each covering half of the tuning range. Either the low- or the high-band VCO is selected based on the programmed frequency.

Fine-tuning is done with PLL2, which operates at a frequency of 1132 to 1185 MHz (depending on IF frequencies) using a fully integrated VCO with no external tank components. This PLL is set to tune in 62.5-kHz steps and can also be programmed for other step sizes.

The IC is controlled with either a 3.3-volt, three-wire serial bus or with an I2C compatible two-wire bus. The control functions include frequency setting, power-down modes, and PLL lock-detect status.

The IC uses 3.3 volts for the down-converter, digital logic, and serial interface. The up-converter and analog PLL circuits use 4 volts. The IC has an on-chip regulator that can be used to convert 5 volts to 4 volts. The regulator requires an external low cost PNP transistor.

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