FemtoClock® NG Universal Frequency Translators

Integrated Device Technology

FUNCTIONS

IDT FemtoClock® NG Universal Frequency Translator products offer:

- Frequency synthesis
- High-bandwidth frequency translation
- Low-bandwidth frequency translation and jitter attenuation

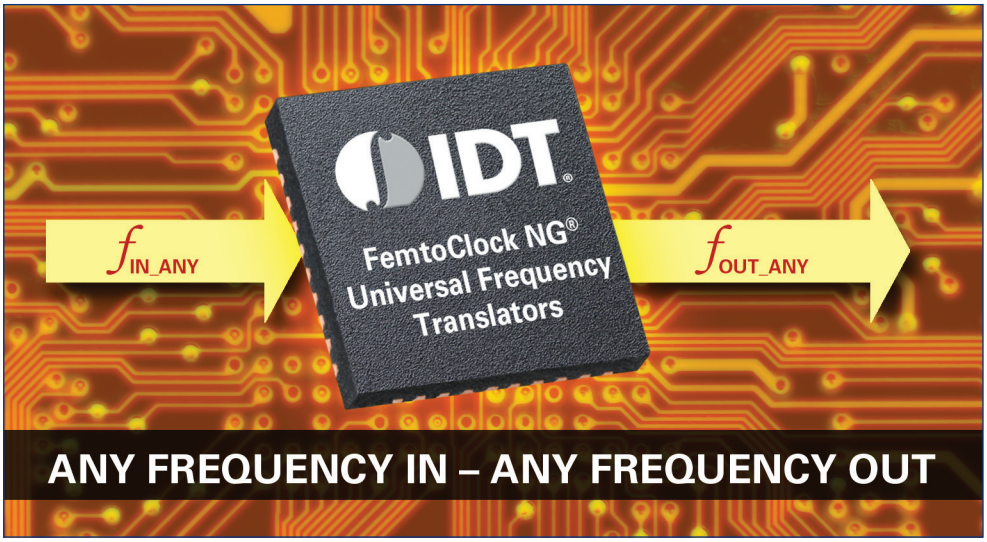
BENEFITS AND FEATURES

- Fully programmable clock source
- Any frequency in to any frequency out
- Input frequency range: 8 kHz to 710 MHz
- Output frequency range: 1 MHz to 1300 MHz
- Two clock inputs with automatic hitless switching
- Two outputs, supporting single-ended, LVPECL or LVDS levels
- On-die non-volatile memory allows device to be fully functional at power-up without requiring complicated user programming
- Very low RMS jitter on all outputs
- I^2C programming interface
- -40°C to +85°C temperature range
- 40-Lead VFQFN package, 6x6 mm
- Available in Lead-Free (RoHS 6) package

TARGET APPLICATIONS

- Communication and wireless systems
- ADC clocking
- Industrial automation
- Video and image processing systems
- Medical devices
- Test and instrumentation
- Serial RapidIO 1.3 and 2.0
- Jitter attenuation
- Phase-noise sensitive applications
- Enterprise Networking

Addressing the Frequency Translation and Jitter Attenuation Needs of the Most Demanding Applications



Description

IDT FemtoClock® NG Universal Frequency Translators (UFT) cover all your frequency synthesis and translation needs. As a frequency synthesizer, a low-cost, readily-available fundamental-mode crystal can be used to generate any output frequency from 1MHz to 1.3GHz. The internal architecture of the device allows any frequency of crystal from 16MHz to 40MHz to be used regardless of the frequency desired.

As a frequency translator, this family of devices accepts 1 or 2 input reference clocks from 8 kHz to 710 MHz, switching between them as necessary and generates any output frequency from 1 MHz to 1.3 GHz with no frequency translation error in most cases. Two different pin-selectable configurations may be pre-loaded into the internal One-Time Programmable (OTP) non-volatile memory for automatic operation directly from power-up, or an I^2C serial interface can be used to set the desired configurations.

In addition to a crystal input, the UFT features two clock inputs and provides two copies of the output frequency. Each output is individually programmable as LVPECL or LVDS. Versions of the UFT with single-ended outputs are also available. Selection between the two input references may be performed manually via either pin or register, or it may be performed automatically with revertive or non-revertive recovery.

Part Number	Output Frequency Range	Output Style	Xtal	Input Frequency Range	OTP Configs.	Package and Temp. Range	Samples
849N202	1 MHz to 1300 MHz	2x LVDS/LVPECL	Fundamental	8 kHz to 710 MHz	2	40 QFN, -40 to +85°C	Available
849N212	1 MHz to 250 MHz	1x LVDS/LVPECL 1x LVCMOS					
840N202	1 MHz to 250 MHz	2x LVCMOS					

STATUS MONITORING

The UFT monitors a number of conditions and reports their status via both output pins and register bits, such as:

- **Lock indicator:** this status is asserted when the PLL is locked to the appropriate input reference for the chosen mode of operation
- **Holdover:** indicates that the device is not locked to a valid input reference clock

FREQUENCY SYNTHESIZER MODE

- Uses a 16 MHz to 40 MHz fundamental mode crystal
- Output frequency range: from 1 MHz to 1300 MHz
- Any frequency output
- Very low RMS jitter

HIGH-BANDWIDTH FREQUENCY TRANSLATOR MODE

- Input frequency range: from 16 MHz to 710 MHz
- Output frequency range: from 1 MHz to 1300 MHz
- Any frequency output
- Internally selectable bandwidth
- Fast lock time and quick response to frequency changes
- Allows tracking of Spread-Spectrum clocks

LOW-BANDWIDTH FREQUENCY TRANSLATOR MODE

- Input frequency range: from 8 kHz to 710 MHz
- Output frequency range: from 1 MHz to 1300 MHz
- Any frequency output
- Internally selectable bandwidth
- External loop filter may be used

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Frequency Synthesizer Mode

Frequency Synthesizer Mode allows an arbitrary output frequency to be generated from a fundamental mode crystal input. The PLL feedback loop supports a second-order delta-sigma fractional feedback divider. This allows the VCO operating frequency to be a non-integer multiple of the crystal frequency.

High-Bandwidth Frequency Translator Mode

High-Bandwidth Frequency Translator Mode is used to translate one or two input clocks of the same nominal frequency into a specified output frequency, attenuating cycle-to-cycle jitter. As seen on Fig. 1, only the High-Bandwidth PLL loop is used. A pre-divider stage is available, enabling input frequencies up to 710 MHz.

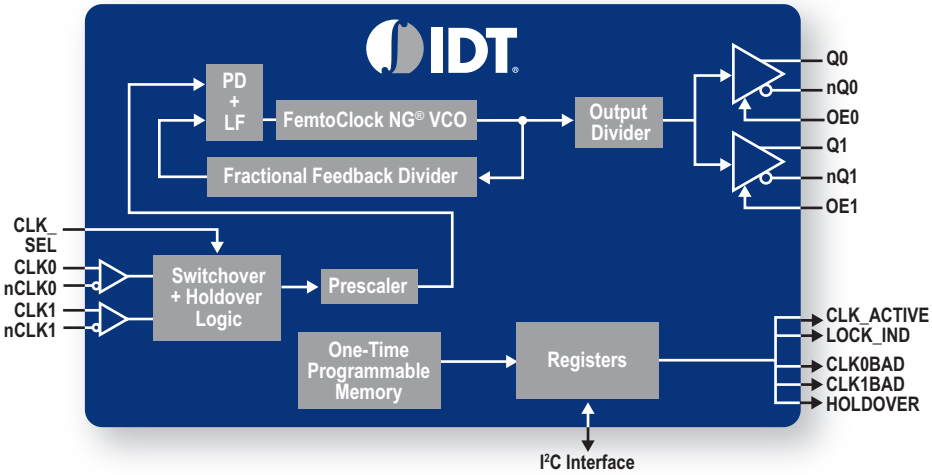

Fig.1: High-Bandwidth Frequency Translator Mode

Low-Bandwidth Frequency Translator Mode (Jitter Attenuator Mode)

Low-Bandwidth Frequency Translator Mode involves two PLL loops and is typically used to achieve large output-to-input frequency translation ratios. The Low-Bandwidth PLL loop drives a digitally controlled crystal oscillator (DCXO) loop via an analog-to-digital converter. The phase detector is optimized to work with frequencies starting at 8 kHz. An external low-pass filter can be used, as shown on Fig. 2.

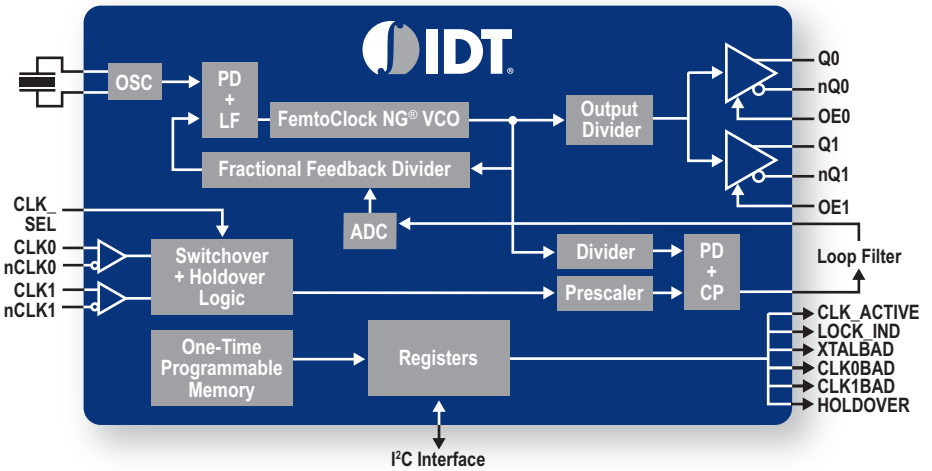

Fig.2: Low -Bandwidth Frequency Translator Mode

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