8 MHz Low PVT sensitivity Oscillator

Features

- +/- 10% frequency variation vs. PVT
- 2.8V to 5.5V supply voltage range with internal LDO
- 1.8V supply with optional external regulator
- 500µA average current consumption without LDO circuit
- Pure 150 nm CMOS technology
- core cell area: 0.28mm² including LDO
- core cell area: 0.18mm^2 without LDO
- Operating temperature range: –40 – +85 °C

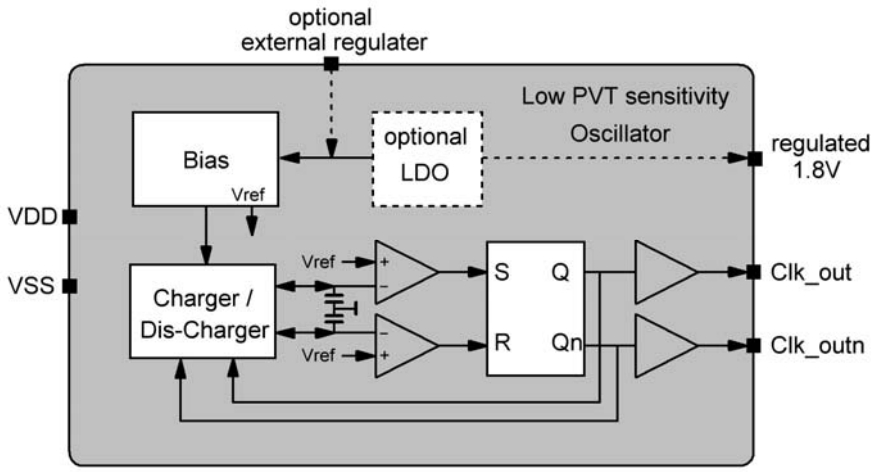
General Description

IMST's 8 MHz low PVT sensitivity oscillator offers a cost saving clock generation circuit without usage of any trimming elements like fuses or OTP cells. Therefore, no post-production process is required to adjust the oscillator frequency. The IP works on a wide supply voltage range from 2.8V up to 5.5V whereas the oscillator core operates on a regulated 1.8V supply. So upon request the IP could be modified to work on lower supply voltages down to 1.8V.

Since the current consumption is dynamic and very low, it drives the LDO to instability without any other loads. The IP considers additional circuits to drive from the LDO. Otherwise a resistive dummy load is required or the use of a different regulated 1.8V supply can be used. In this case the LDO from this IP can be omitted.

The topology is based on R/S flip-flop with comparators sensing the voltage on charged and dis-charged capacitors. The charge and dis-charge command is controlled by the feedback path from the flip-flop. The oscillator frequency is dependent on the capacitor size and can be adjusted for a clock frequency from kHz range up to 10 MHz if required.

The charge capacitors are cmos transistors and the biasing for the charge current is designed to compensate the threshold voltage variation of the process which is the major part of the capacitor variation in transistor based capacitors. Temperature and voltage variation is compensated by the LDO and bias circuit.



Block diagram

ELECTRICAL CHARACTERISTICS

Operating Conditions, Vcc = +2.8 – 5.5 V, T_A = -40 to +85°C, Typical values are taken at Vcc = 3V, T_A = +27°C, (unless otherwise specified)

Parameter	Condition	MIN	TYP	MAX	UNIT
Input Voltage Range (internal LDO option)		2.8	3.0	5.5	V
Average current consumption			500		µA
Output Clk voltage		VSS	/	1.8	V
Output frequency		7.2	8	8.8	MHz
External supply (option)		1.7	1.8	1.9	V
Process	150nm CMOS				
Status	In Fab				