

Crystal oscillator 32.768kHz

SPECIFICATION

1 FEATURES

- TSMC CMOS 65 nm
- Precise frequency 32.768 kHz
- Low power consumption (<1uA)
- Supported foundries: TSMC, UMC, Global Foundries, iHP

2 APPLICATION

- RTC generator
- Electronic metering for electricity, water, and gas
- Timekeeping instruments with high precision
- GPS equipment to reduce time to first fix
- Applications that require an accurate process timing
- Products with long automated unattended operation time

3 OVERVIEW

The oscillator is a CMOS inverter of a pierce-type variation with an integrated Crystal (Xtal) oscillator that is optimized in parallel mode for very high accuracy and very low power consumption.

4 STRUCTURE

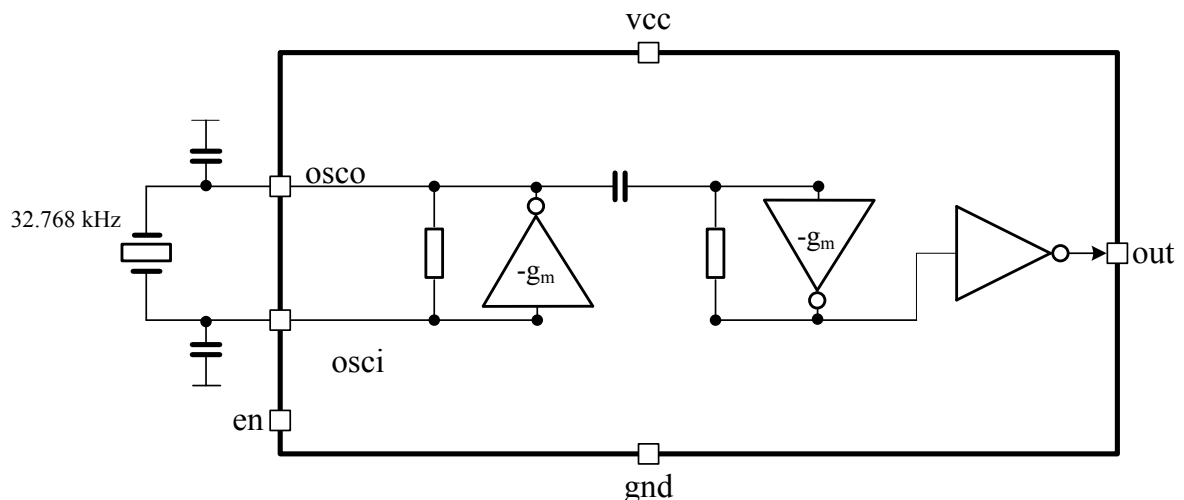


Figure 1: Crystal oscillator 32.768kHz structure

5 PIN DESCRIPTION

Name	Direction	Description
osci	IO	Quartz crystal connection
osco	IO	
en	I	Enable/disable oscillator
out	O	Oscillator digital output
vcc	IO	Supply voltage 1.2 V
gnd	IO	Ground

6 LAYOUT DESCRIPTION

The block oscillator dimensions are given in the table 1.

Table 1: Block dimensions

Dimension	Value	Unit
Height	38	μm
Width	73	μm

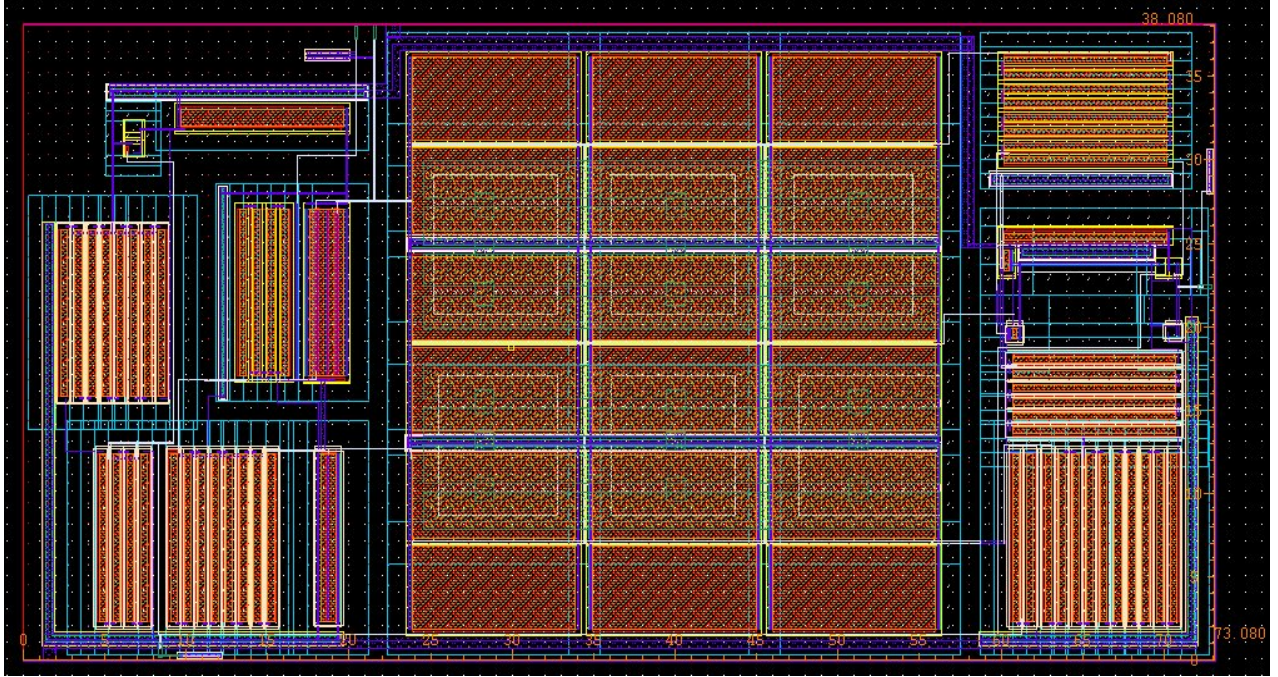


Figure 2: Oscillator layout

7 OPERATING CHARACTERISTICS

7.1 TECHNICAL CHARACTERISTICS

Technology _____ TSMC CMOS 65 nm
 Status _____ silicon proven
 Area _____ 0.003 mm²

7.2 ELECTRICAL CHARACTERISTICS

The values of electrical characteristics are specified for $V_{cc} = 1.1 \div 1.3$ V and $T = -45 \div +85$ °C. Typical values are at $V_{cc}=1.2$ V and $T = +27$ °C, unless otherwise specified.

Parameter	Symbol	Condition	Value			Unit
			min	typ.	max	
Supply voltage	V_{cc}	-	1.0	1.2	1.3	V
Output frequency	F_{out}	-	-	32.768	-	kHz
Oscillator operating temperature range	T	-	-45	27	85	°C
Start time	t_{start}	-	0.3	0.4	1	s
Oscillation frequency tolerance*	dF/F	-	-	20	-	ppm
Current consumption	I_{cc}	-	0.3	0.4	1	uA
Current consumption in a standby mode	I_{stb}	-	-	0.05	0.2	nA
Input logic-high level	V_{IH}	For digital inputs	$0.7 V_{cc}$	-	1.3	V
Input logic-low level	V_{IL}		-0.15	-	0.2	

Note:

* - depended on characteristics external oscillator.

8 DELIVERABLES

Depending on license type IP may include:

- Schematic or NetList
- Abstract view (.lef and .lib files)
- Layout (optional)
- Verilog behavior model
- Extracted view (optional)
- GDSII
- DRC, LVS, antenna report
- Test bench with saved configurations (optional)
- Documentation