

"A Fully Integrated Synthesizer Ready for Integration into a TSMC 130 nm Mobile Application"

Product Description

The KR-SDS-36-TSMC-130-01 is an IP cell that performs RF frequency synthesis for a variety of mobile applications.

The small die size and low external component count of this TSMC 130 nm design meets the highly competitive cost and size requirements for building successful mobile products while delivering high performance at low current.

The cell supports both an external reference oscillator or external XTAL with load capacitors and works with an integrated Phase Detector / Charge Pump, VCO, Divider and patented Delta-Sigma ($\Delta\Sigma$) Modulator providing world class phase noise performance.

Additional features include Power Down and a standard I2C serial interface for functional control.

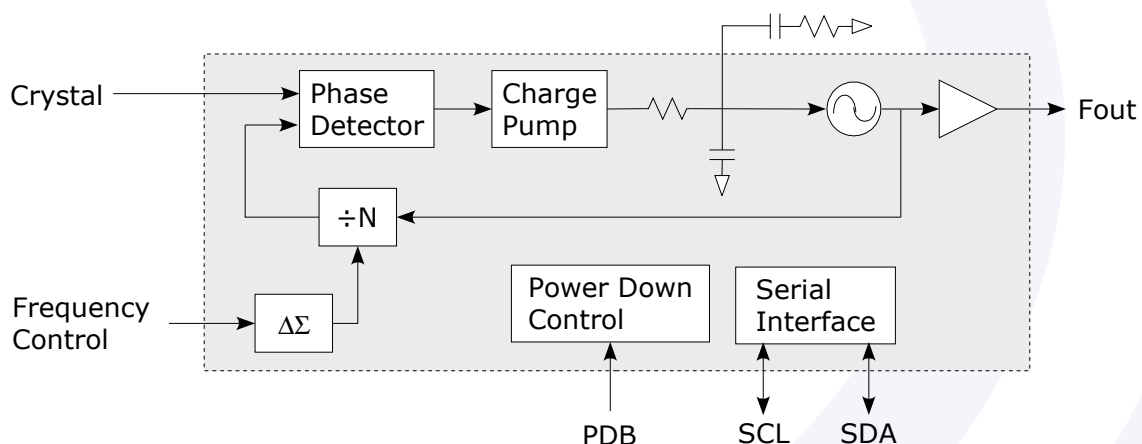
The circuit can be modified for other frequency ranges and phase noise contours can be tailored to address specific requirements.

Applications

- WiFi
- Bluetooth
- GSM/CMDA
- Multi-mode Radios
- Satellite Receivers
- 2-Way Pagers
- Cable Modems
- 2-Way Radios

Features

- 600 MHz to 3.6 GHz Operation
- Fully Integrated VCO
- Fractional-N and Integer-N Modes
- 2 external loop filter components
- Low In-band Phase Noise -83 dBc/Hz
- Fine Step Size of <1 kHz
- Spurious Response -82 dBc
- Reference Frequency 5 to 16 MHz
- Optional Interface for up to 16 MHz Crystal
- 2.9 to 3.6 V Operation
- Low Current Consumption 11 mA
- Standby Current < 1 μ A
- Designed for TSMC 130 nm Process
- Simple integration into existing designs
- I2C Interface
- Optional 3 Wire Interface



Fractional-N Synthesizer 0.6 – 3.6 GHz

KR-SDS-36-TSMC-130-01 Product Brief

Description

The Kaben KR-SDS-36-TSMC-130-01 Delta-Sigma ($\Delta\Sigma$) Fractional-N frequency synthesizer cell provides fine step size, low phase-noise, low spurious levels, fast switching speed, and the ability to easily integrate into your current design. This synthesizer is a key building block in designing high-performance wireless systems that require fine resolution and low power.

When integrating the Synthesizer core into your TSMC 130 nm SoC, our engineers support your design from system-level integration through verification and fabrication. This characterized cell enables your SoC with predictable performance across multiple applications.

The KR-SDS-36-TSMC-130-01 has a maximum output frequency of 3.6 GHz with step sizes of <1 kHz using Kaben's patented 14-bit $\Delta\Sigma$ modulator making it ideal for multi-mode wireless systems.

The synthesizer cell uses a high comparison frequency, up to 16 MHz, to achieve an in-band phase noise of -83 dBc/Hz measured from a 3.6

GHz output frequency. Spurious response of -82 dBc makes this product an ideal selection for applications, such as GSM, where interference from adjacent or alternate channels is key.

High performance is delivered in combination with low power consumption. The cell core operates on 11 mA from a 3 V supply.

Support is provided for all phases of the life cycle of your SoC. For system design, Kaben provides high-level models in Matlab/Simulink. System-level models offer various modes of abstraction for flexibility in simulation speed vs. accuracy. Included is a loop-filter design kit for tailoring the trade-off between VCO noise and synthesizer phase noise. All high-level models are based on measured data.

At the circuit design level Kaben's Release Kit contains GDSII files, Verilog files, and Cadence™ design libraries that include test benches, schematics, symbols, cell layouts and post layout extracted views.

For production test, the cell has a built-in Signature Analysis block, Full Scan, or BIST.

Electrical Characteristics

Parameter	Conditions	Min	Typ	Max	Units
Supply Voltage		2.9	3.0	3.6	V
Total Supply Current	VCC=3 V, Temp=25 °C, F _{REF} = 16 MHz, f _{VCO} =3.6 GHz not including digital (includes XTAL)		11		mA
VCO Current			6		mA
Standby Current			1		µA
RF Operating Frequency		0.6		3.6	GHz
Reference Oscillator Frequency		5	16	16	MHz
Charge Pump Output Current		.125		0.5	mA
Current Step Size			125		µA
Charge Pump Variation Over Temperature				+/- 5	%
RF Input Sensitivity	Peak-to-peak single ended	150		300	mV
Synthesizer contribution to close-in Phase Noise	25 kHz offset at 3.6 GHz synthesizer output using a 16 MHz reference and 500 µA charge pump current.		-83		dBc/Hz
	1 MHz offset		-120		
Spurious Levels	When carrier is within one Loop Bandwidth of an Integer multiple of the reference frequency			-40	dBc
	When carrier is more than 10 Loop Bandwidths away from an Integer multiple of the reference frequency		-82		
Integer Divider Range		100		225	
Frequency Resolution	14 bit $\Delta\Sigma$ Modulator		$F_{REF}/2^{14}$		Hz
Operating Temperature		-40		+85	°C
Die Size			0.64		mm ²

