

- ADVANCED PRODUCT BRIEF -

General Description

The KW800 is a high dynamic range IF digitizer that includes a reconfigurable filter with programmable gain and an analog to digital converter. The filter is a sampled IF (SIF) filter that provides anti-aliasing for the internal ADC core. The filter bandwidth and selectivity is programmable to address a variety of wireless and wireline market segments.

An integrated Low Noise Transimpedance Amplifier (LNTA) eliminates the need of an external amplifier.

The KW800 includes a 14-bit Analog to Digital Converter with a maximum of 120 MHz sampling frequency.

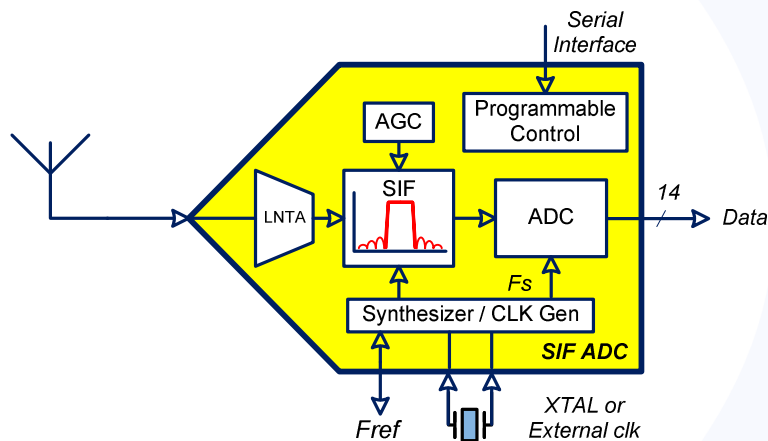
An embedded frequency synthesizer provides the sampling clock to the ADC and the SIF filter.

Applications

- Wideband FM / DAB / DVB Receivers
- Software Defined and Cognitive Radio
- GPS Receivers
- Pico Cell Receivers and Repeaters
- Wireline / Powerline Receivers
- GSM, EDGE, W-CDMA, LTE, CDMA2000, WiMAX, TD-SCDMA
- Handheld Scope Meters
- Portable Medical Imaging Systems
- Ultrasound
- Radar

Features

- 14 bit resolution (ENOB 12.8—13.5)
- Sampling Rates (F_s) from 80 MHz to 120 MHz
- Built-in Anti-aliasing / Image Rejection
- Stopband Attenuation up to 40 dB
- Field Programmable Lowpass/Bandpass filter
- IF Input frequencies can approach 40 % of F_s
- Filter Bandwidth up to 70 % of Nyquist ($F_s/2$)
- Originally targeted for 65 nm CMOS Technology
- Up to 80 dB of SFDR
- 1.8 and 1.2 V supplies
- 180 mA from 1.2 V Supply
- 20 mA from 1.8 V Supply
- Maximum input power 0 dBm
- Power consumption < 250 mW @ 120 MHz F_s
- Synthesizer Clock/Crystal Reference 20-40 MHz
- Field Programmable through serial interface
- Broad-band resistive 50 Ohm input
- No amplifiers or other ADC interfacing required
- IP for integration into client's ASIC or as a standalone IC using Kaben's fulfillment partners



KW800

Description

The KW800 is capable of digitizing signals having a center frequency of a several kHz up to 48 MHz. The embedded filtering can be programmed either as a low pass or bandpass filter.

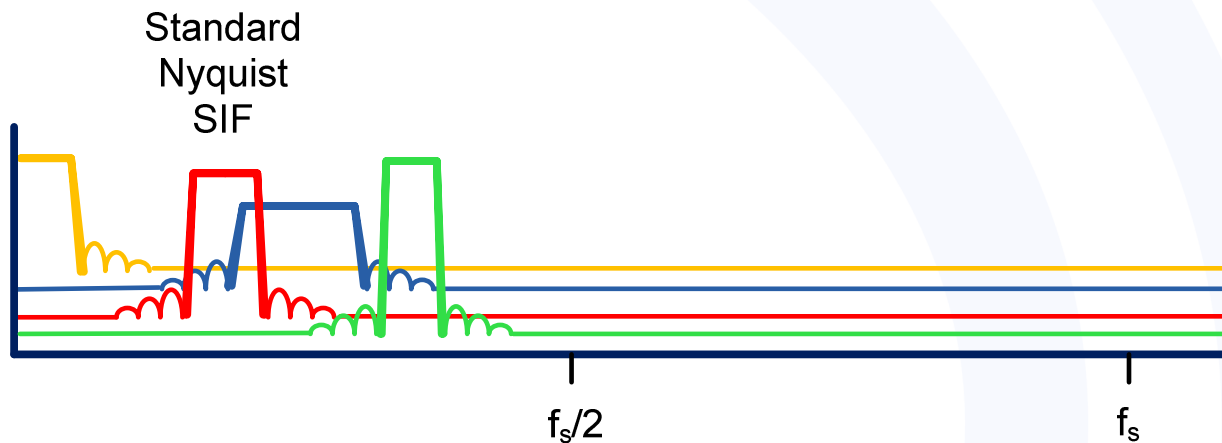
The filter characteristics are controllable by a number of programmable analog FIR filter taps. The filter bandwidth, center frequency and selectivity are programmable thereby enabling software defined radio architectures. The KW800 can be used either as part of IF radio or as part of a Zero IF radio.

The filtering action in front of the ADC inherently offers anti-alias filtering and image rejection filter and provides design flexibility to system engineers using this component as part of their receiver line up.

The embedded filtering prior to the ADC core uses Kaben's proprietary Sampled IF Filters (SIF). Our filters use charge-domain signal processing and interleaving to process and digitize high frequency input signals. The ADC uses Kaben proprietary and patent pending techniques that

leverage similar techniques employed by the SIF filter. Together they have effective full-scale voltages (VFS) that exceed supply voltage limits for vastly improved dynamic range. This on-chip union between the filter and ADC eliminates interfacing challenges such as time-varying VSWR making this highly attractive as an IF strip solution.

Support is provided for all phases of the life cycle of your SoC. For system design, Kaben provides high-level models in Matlab. Kaben's Release Kit contains GDSII files and encrypted netlists and Verilog/VerilogA files.



A lowpass filter and several bandpass filters are illustrated to demonstrate the flexibility of the programmable SIF Filter. The on-chips Taps can be used for selecting the filter bandwidth, center frequency, transition bandwidth, stop band attenuation or ripple.

KW800 Field Programmability

The Filter type, Center Frequency, Transition Band, Passband Ripple and Stopband Attenuation are chosen by programming the tap values using the Kaben Filter Design Software. These Tap values can be downloaded to the SIF-ADC after power up.

The filter type can be either low pass or band pass. The center frequency of a bandpass filter (F_c) may be up to 35 % of F_s . The bandwidth of the filter can be programmed between 10 % and 70 % of the Nyquist band (ie. $F_s/2$).

The sampling frequency F_s is set by a reference XTAL. Alternatively, one of the Reference Clock Source pins for the low-noise, on-chip XTAL oscillator can be over ridden with an external source.

An integrated Fractional-N Synthesizer clocks the analog FIR Filter at a programmable multiple of F_s .

Electrical Specifications

Specification	Conditions	min	nominal	max	Units	Note
Supply Voltages		1.08	1.2	1.32	V	1.8/2.5V optional for IO
Maximum Input Power			0		dBm	50 ohm termination
Temperature Range		-40		+120	C	Junction Temperature
SIF ADC Linearity			+30		dBm	IIP3
Stopband Attenuation				40	dB	
Power Consumption	120 MHz sampling			250	mW	
Current Consumption	1.2 V Supply, 120 MHz sampling		180		mA	
Current Consumption	1.8 V Supply, 120 MHz sampling		20		mA	
Power up Time				10	ms	
Synthesizer Settling Time				100	μ s	
Reference Frequency		20		40	MHz	
Noise Figure	Balanced Input @ 50 ohms		6		dB	
Allowable Center Frequencies	80 MHz Sampling	DC		32	MHz	
SNR			82		dB	40 MHz BW
SFDR			78		dB	40 MHz BW
ADC ENOB			13.5			
Allowable Center Frequencies	120 MHz Sampling	DC		48	MHz	
SNR			80		dB	60 MHz BW
SFDR			76		dB	60 MHz BW
ADC ENOB			12.0			