HF2IS
Impedance Spectroscope

Zurich Instruments

2 Input Channel, Multi-frequency 50 MHz Impedance Spectroscope

Product Specification
Release date: August 2014

Key Features

- 210 MSa/s, 0.7 µHz - 50 MHz operation
- 2 independent measurement units
- 2 signal generators
- Up to 8 frequencies simultaneously
- 2/3/4-terminal measurements
- Frequency response analyzer, FFT spectrum analyzer and oscilloscope
- Graphical user interface and programming interfaces included

Summary

The Zurich Instruments HF2IS (high-frequency, 2 inputs) is an impedance spectroscope for the frequency range from 0.7 µHz to 50 MHz. With up to 8 demodulators the HF2IS allows simultaneous measurements at 8 frequencies and with 2 physical input channels accommodates readily for 2/3/4-terminal configurations. With these unprecedented capabilities, the HF2IS provides great features for dynamic multi-frequency impedance monitoring and is also suited for static impedance measurements in applications where precision and speed matter.

Applications that were previously tied to analog instrumentation, now profit from the benefits of digital processing such as high-performance filtering and fast readouts with microsecond latency.

Hardware

The HF2IS combines very high-end analog front-end circuits for signal sampling and high-performance digital signal processors.

High-Precision Inputs

The 2 input paths of the HF2IS are optimized for very-low noise operation. The sampling rate of 210 MSa/s is 4-times the analog bandwidth to ensure full capture of the signal and to avoid aliasing.

Signal Outputs

The HF2IS generates 2 high-frequency outputs as a linear combination of up to 8 sinusoids in the range from DC to 50 MHz. The amplitude and the frequency can independently be set for each component.

Demodulators and Filters

The HF2IS provides one dual-phase demodulator for each of the up to 8 signal generators. Configurable filter properties include time constant from 1 µs to 500 s (corresponding to bandwidths from 80 µHz to 200 kHz) and filter order from 1st to 8th. The filters are implemented in advanced 128-bit digital architecture. The advantages over common analog instruments are higher dynamic reserve, zero drift, and accurate phase shifts.

Integrated Toolset

An integrated oscilloscope with memory for 2048 samples provides direct signal-vs-time and spectral views of the input signal. Users obtain an overview of the incoming and generated signals at any time to quickly find the right settings. A frequency response analyzer provides precise signal-vs-frequency plots. The FFT spectrum analyzer delivers a high-resolution spectral view of the signals demodulated by the lock-in amplifier.

Specifications

General

dimensions	45 x 35 x 10 cm (19” rack)
weight	6.2 kg
power supply	110-120 V, 220-240 V 50/60 Hz

HF signal inputs

frequency range	0.7 µHz - 50 MHz
input impedance	50 Ω or 1 MΩ || 20 pF
input noise voltage	5 nV/√Hz (> 10 kHz)
impedance range	100 mΩ - 10 GΩ
input range	±3.3 V
input AC range	±1.5 V (DC coupling)
A/D conversion	14 bit, 210 MSa/s

HF signal outputs

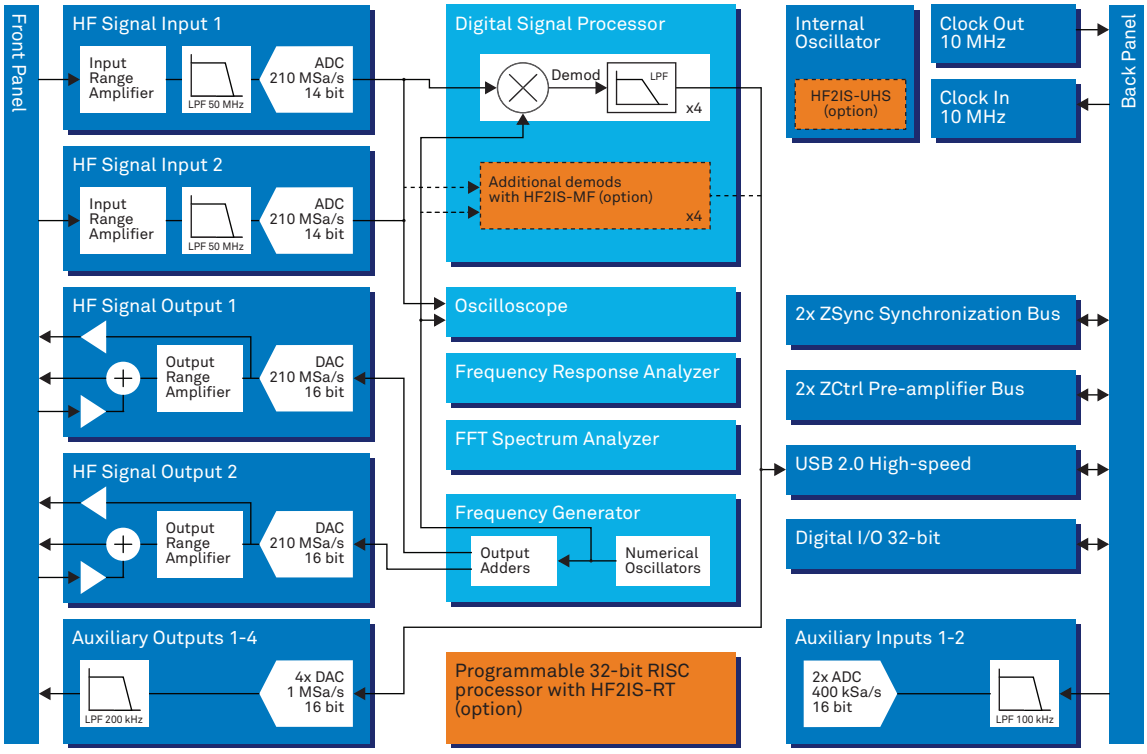
frequency range	DC - 50 MHz
output ranges	±10 mV, ±100 mV, ±1 V, ±10 V
signal adder	±10 V, DC to 50 MHz
output current	100 mA (max)

Demodulators and reference

number of demodulators	4 dual-phase 8 with multi-frequency
output sample rate	USB: up to 460 kSa/s Aux outputs: 1 MSa/s
time constant	1 µs to 500 s
measurement bandwidth	80 µHz to 200 kHz
filter slope (dB/Oct)	6, 12, 18, 24, 30, 36, 42, 48
X, Y, R, Θ samples	64-bit full range
reference frequency res.	0.7 µHz
reference phase res.	1.0 µ°

Auxiliary and others

high-speed outputs	4 channels, ±10V, amplitude, phase, frequency, X/Y, value
D/A converter	16 bit, 1 MSa/s
D/A analog bandwidth	200 kHz
high-speed inputs	2 channels, ±10 V
A/D converter	16 bit, 400 kSa/s
A/D analog bandwidth	100 kHz
digital I/O	16 bit in, 16 bit I/O, 50 MHz
other interfaces	clock input, USB 2.0, 2x ZCtrl, 2x ZSync



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About Zurich Instruments
Zurich Instruments makes lock-in amplifiers, phase-locked loops, and impedance spectroscopes that have revolutionized instrumentation in the high-frequency (HF) and ultra-high-frequency (UHF) ranges by combining frequency-domain tools and time-domain tools within each product. This reduces the complexity of laboratory setups, removes sources of problems and provides new measurement approaches that support the progress of research.