



RF Engines Ltd,
Innovation Centre
St Cross Business Park
Newport
Isle of Wight
PO30 5WB
Tel +44 (0)1983 550330
Fax +44 (0)1983 550340
E-Mail Info@rfel.com

RF Engines launches SpectraChip™

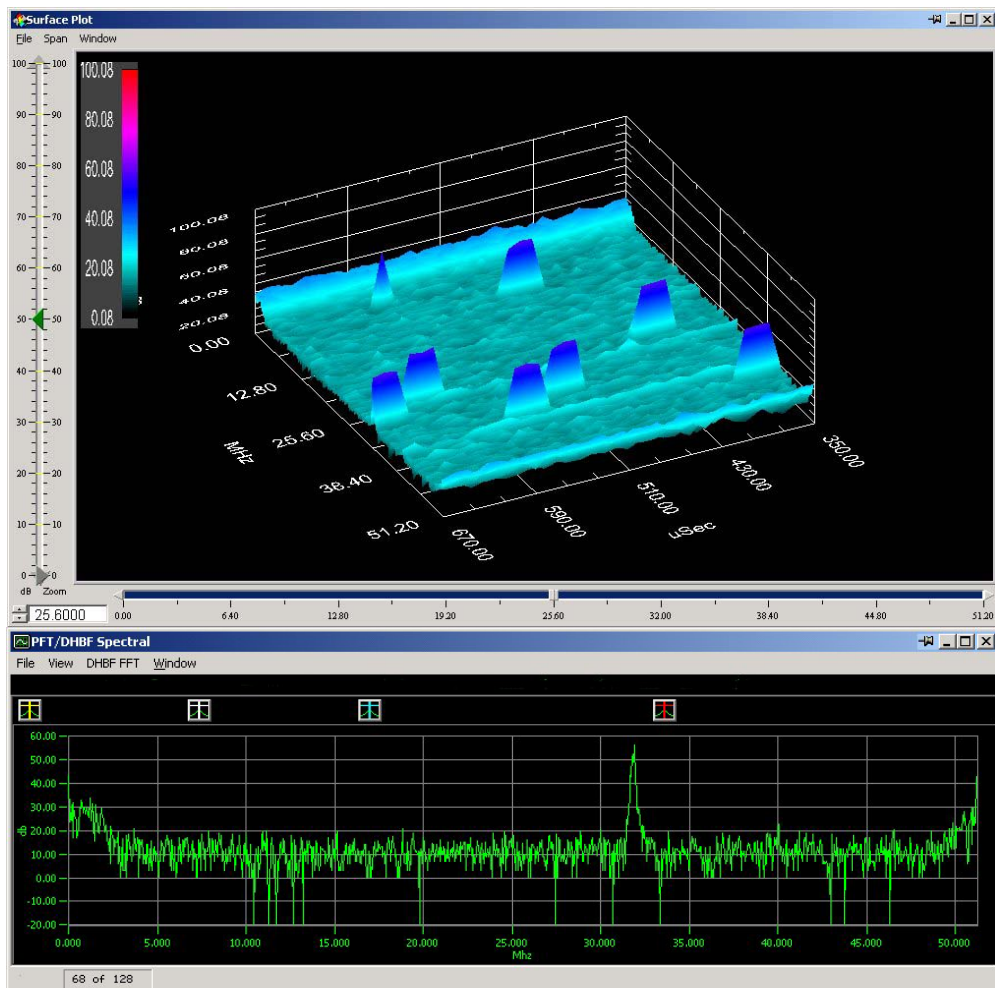
Replaces analogue circuits in spectrum analyser designs with more reliable digital ones, so reducing manufacturing costs

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RF Engines Ltd, the signal processing on FPGA experts, have announced the release of their latest product for test instrument manufacturers. **SpectraChip™ IF** is a digital replacement for analogue intermediate frequency (IF) filtering used in current spectrum analysers and is supplied as an IP core for embedding on low cost FPGA devices. SpectraChip™ IF provides a digital implementation of all the standard features, such as resolution bandwidth filtering, video bandwidth filtering and conversion to log power.

Updating spectrum analyser designs to replace traditional analogue components with modern digital techniques helps to make the systems easier to manufacture, more reproducible and more reliable. The use of digital technology saves on the manufacturing alignment costs normally associated with analogue circuitry, and the guaranteed repeatability of the digital design reduces both the need for, and the costs of, ongoing calibration.

With the enhanced version of this first release core, new features also become possible. Most existing spectrum analyser designs are based on a swept approach to monitoring a band of the spectrum, which means that the system is only looking at each part of the spectrum for a finite period of time. By switching off the sweep function and using FFTs and other specialist techniques to perform the spectral analysis means that a wide band of interest can be analysed at all times, and that even very short duration pulses can be captured by the instrument. The further addition of complex triggering allows storage of signal data. This can then be presented to the user using 3-dimensional "waterfall" plots or 2-dimensional spectrograms, to show how the signal changes over time.



SpectraChip™ IF can be licensed from RFEL as an off-the-shelf design, and can be easily modified to meet particular interface requirements, as well as achieving different intermediate frequencies and ranges of RBW (Resolution Band Width) and VBW (Video Band Width) that may be required. The standard design will fit comfortably into the Spartan3 1000 FPGA device costing less than \$100, and consumes a mere 0.5W in operation, or significantly less in the power save mode. This high specification design is available “off the shelf” fully characterised, documented and tested in silicon.

The principle behind the new product range is to simplify and de-risk the embedding and incorporation of high performance, digital designs into instrumentation for spectrum analysis, whether this is for general test instruments or equipment for specific applications. In many applications, this approach opens the opportunity for real-time monitoring of quality of service and pre-empting service degradation or total failure.

The designs provide a cost-effective and high performance solution wherever high quality spectral analysis is demanded. The flexible solutions can be upgraded with technological advances and user demands, as part of an ongoing development program. RFEL can also provide its proven design-in support services, with immediate access to its technical experts where design support is required. The comprehensive nature of the solutions available provides manufacturers with a platform upon which to design a whole family of products with different specifications to meet a variety of requirements, along with the ability to develop a clear roadmap of product development. Where appropriate, RFEL will provide bespoke solutions, incorporating specific device choices to meet the user requirement.

John Summers, RFEL's VP of Sales and Business Development, added, "This exciting new range brings together all the expertise that we have developed over many years in the area of signal and electronic intelligence gathering, to provide a complete solution on a chip. As the solutions are proven technology using firmware on an FPGA, it is easy to update and modify as required providing manufacturers with a reduced risk development strategy."

Two of the world's leading instrument manufacturers are already using **SpectraChip™** cores in their products. Solutions based on the **SpectraChip™** designs, cost from \$100 for the IP per product (depending upon product, volumes and excluding the set up costs) and can provide component savings of up to 50% compared to traditional board solutions.

How does it work?

The signal to be analysed must first be digitised by an ADC. The digitised data is then presented to the FPGA containing the **SpectraChip™ IF** solution. The standard design will accept a high-speed digitised data stream with a signal IF centred at +/- 21.4MHz and a signal bandwidth of up to 10MHz. However, options are available that will allow different IF frequencies and signal bandwidths.

The standard solution can then be controlled by an interface to select RBW, VBW, etc. equivalent to pressing the buttons on a standard spectrum analyser front panel. The core then configures itself to the correct settings and produces the filtered signal output, converted to a power reading for analysis by the system or display on a screen. Other input parameters to the **SpectraChip™** solution allow system calibration to be performed.

At most, the only additional components required are a separate ADC and low cost FPGA. The FPGAs required cost less than \$100 yet provide an extremely high specification performance.

Future Developments

In the **SpectraChip™ MHz** and **SpectraChip™ GHz** real-time designs, which are currently at an advanced development stage, large bandwidth signals can be presented to the core and one of RFEL's extensive range of filter-bank cores can be utilised. Using the programmability benefit of the FPGA, a number of different filter banks can be supplied to meet different measurement requirements. Standard Gaussian shape filters can be used to produce a standard spectrum analyser effect, or higher specification, flat top, low transition band filters can be used to achieve power measurement accuracy and good frequency isolation.

In the real-time mode, an optional complex trigger function can be included in the **SpectraChip™** design. This enables fleeting events to be stored and analysed on a time-frequency-power basis or passed via the secondary I&Q outputs to demodulation processes for characterisation.

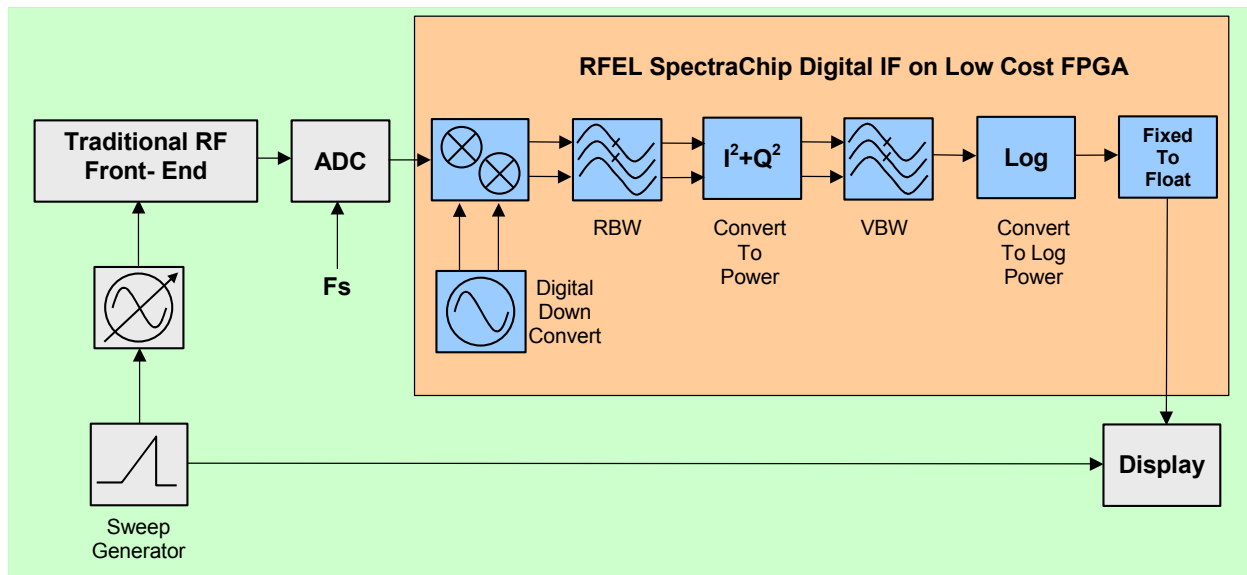


Figure 1 – Spectrum Analyser Architecture using SpectraChip IF

RF Engines Limited

RF Engines Limited (RFEL) is a UK based signal processing specialist, providing high specification signal processing cores, system on chip designs, and FPGA based board solutions for applications in the defence, communications and instrumentation markets. These applications include base stations, wireless and wireline broadband communications systems, satellite communications systems, test and measurement instrumentation, as well as defence, signal intelligence and surveillance systems.

More specifically, RFEL is a solutions provider for projects requiring complex front end, real time, wide and narrow band, flexible channelisation. The company provides a range of standard cores covering multiple FFT, polyphase DFT and proprietary PFT techniques, as well as system design services for more specialist applications.

For further information, please see the website at www.rfel.com or contact RF Engines at Innovation Centre, St Cross Business Park, Newport, Isle of Wight, PO30 5WB, Great Britain. Tel +44 (0) 1983 550330. E-mail info@rfel.com.

Press information and illustrations can be obtained from Nigel Robson, Vortex PR, Island House, Forest Road, Guernsey, GY8 0AB, Great Britain. Tel +44 (0) 1481 233080. E-mail nigel@vortexpr.com.