

**IQ processing program - IQ_Process.
Quick Guide.**

Table of contents

Purpose of the program.3

The functionality of the program.3

Restrictions:.....3

The program's interface.3

 Page source data3

 Page processing raw data.....5

 Page analysis of the RF envelope7

Purpose of the program.

IQ_Process program is designed to:

1. Display of recorded data IQ (IQ itself, amplitude signal, the signal phase).
2. Display signals in the spectrum recorded IQ data (specified length, starting at the point specified by the user with the cursor).
3. Digital shift of source data IQ (digital shift) at a predetermined frequency.
4. Filtering source IQ data using pre-defined or user-defined filters (calculated in the program).
5. Decimates original IQ data to a predetermined sampling frequency.
6. Saving processed IQ data.

The functionality of the program.

1. Analyze source IQ data in time and spectral domain.
2. Select and save a separate IQ signal recorded together with other signals using wide band of IQ.

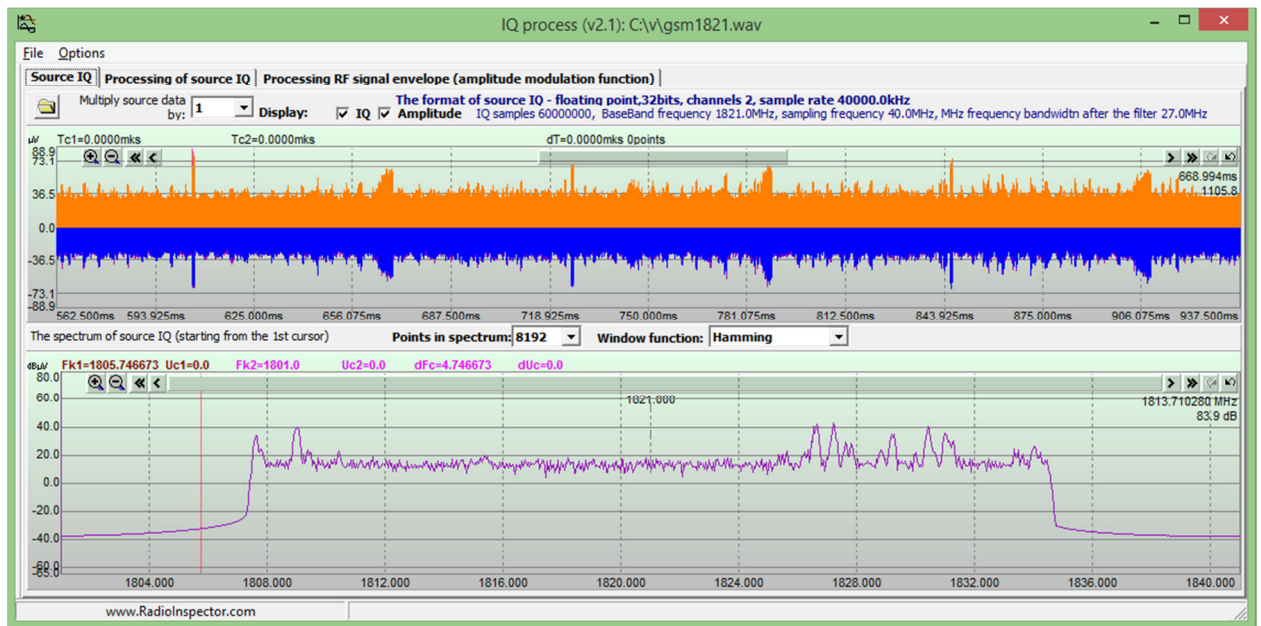
Restrictions:


1. Source IQ - wav file format.
2. Source IQ data may be recorded in 16-bit format Integer or 32 bits Float.
3. The maximum amount of data - 100.000.000 IQ pairs. If the file contains a greater number of pairs of IQ, then only the first IQ pairs 100,000,000 are used to work.
4. The data is not calibrated for the amplitude axis.

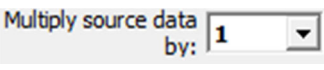
The program's interface.

The interface of the program consist of 3 pages, which displays the source IQ data, the data after the digital shift, filtering and decimation (the processed data), and page analysis of the envelope of the processed signal (for the analysis of AM modulated signals and digital packets analyzing).

Page source data

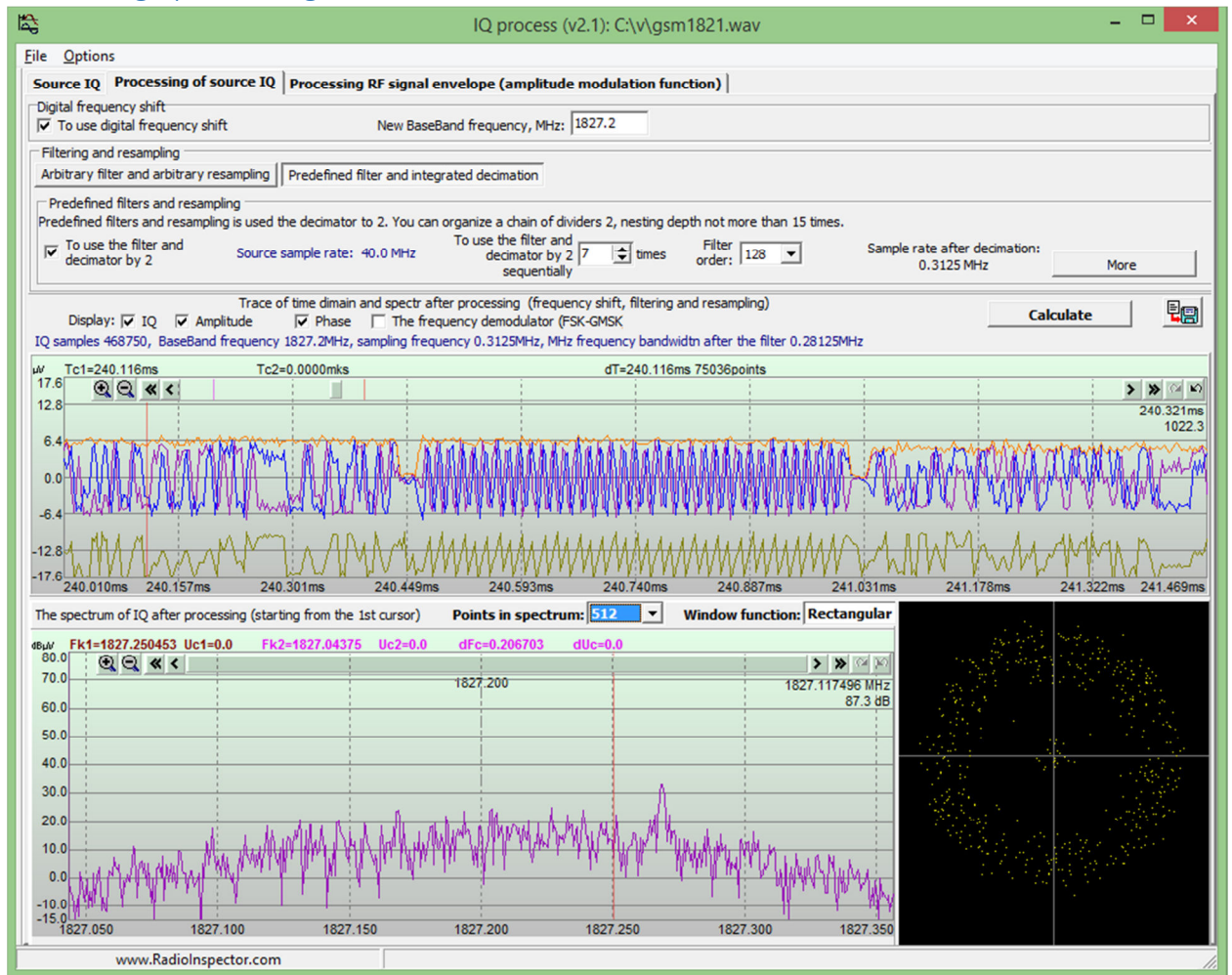


Source data file can be opened by pressing the button  or using the "Open" menu item.

Field  is used to multiply the source data to a predetermined constant if source data has low amplitude.

Working with charts in the time and spectral domain is described in the documentation for the program «RadioInspector»

Page processing of source IQ



On this page at the field

Digital frequency shift
☒ To use digital frequency shift
 New BaseBand frequency, MHz: 1827.20879

you can to install a new center frequency (frequency shift is performed digitally). The frequency can be set manually or automatically entered in the field

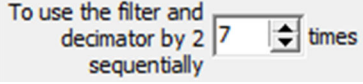
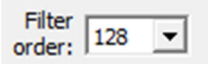
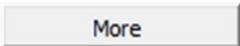
New BaseBand frequency, MHz: 1827.20879 when you change the first cursor position on the chart of spectrum of source IQ (frequency in this field corresponds to the frequency of the first cursor).

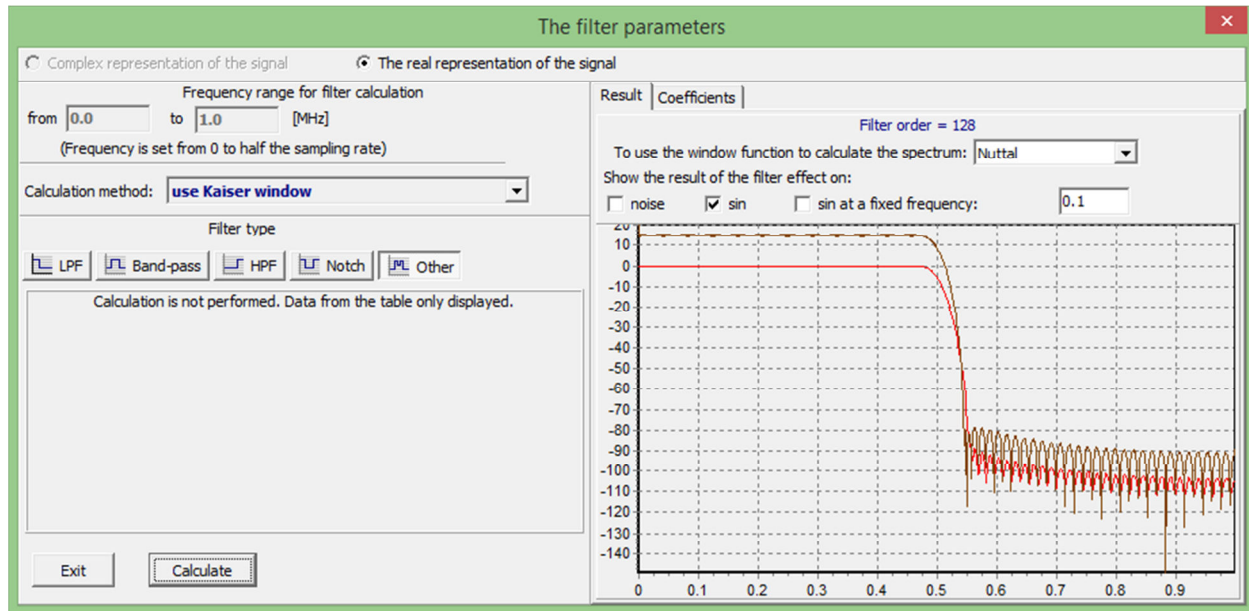
Using the field

Filtering and resampling
 Arbitrary filter and arbitrary resampling | Resampling to predefined coefficients and integrated filtration
 Predefined filters and resampling
 As a pre-defined filters and re-sampling filter is used the decimator to 2. You can organize a chain of dividers 2, nesting depth of not more than 15 times.
☒ To use the filter and decimator by 2
 Source sample rate: 40.0 MHz
 To use the filter and decimator by 2 sequentially 7 times
 Filter order: 128
 Sample rate after decimation: 0.3125 MHz
 More


you can create a digital filter for filtering the source signal and set the source signal decimation conditions.

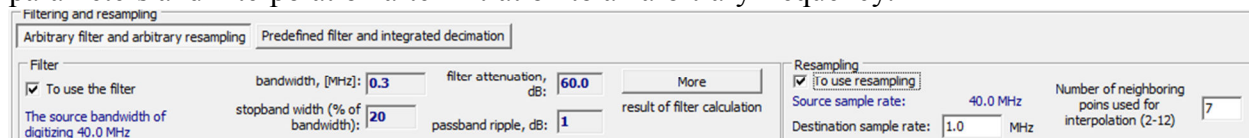
Page **Predefined filter and integrated decimation** It used to work with pre-defined filters and resampling to 2. You can build a filter chain of LPF by 2 (no more than 15 filters) for

more deep filtering (box ). The order of the filters specified in the field . Frequency response of the filter can be viewed by clicking on the button .



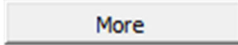
Other fields of predefined filters are clear from their names.

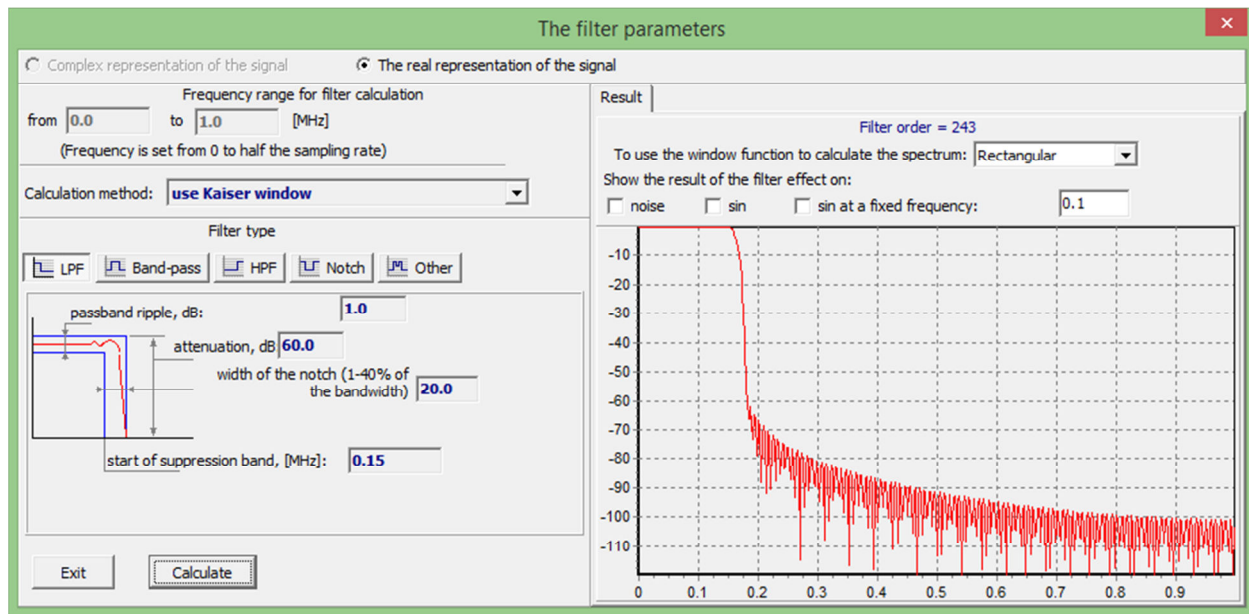
Page  is used to create a filter with the user required parameters and interpolation after filtration to an arbitrary frequency.



The screenshot shows a window titled "Filtering and resampling" with two tabs: "Arbitrary filter and arbitrary resampling" and "Predefined filter and integrated decimation". Under the "Arbitrary filter and arbitrary resampling" tab, there are sections for "Filter" and "Resampling". The "Filter" section has checkboxes for "To use the filter" (checked), "bandwidth, [MHz]: 0.3", "filter attenuation, dB: 60.0", "stopband width (% of bandwidth): 20", and "passband ripple, dB: 1". There is a "More" button and a "result of filter calculation" label. The "Resampling" section has a checkbox for "To use resampling" (checked), "Source sample rate: 40.0 MHz", "Destination sample rate: 1.0 MHz", and "Number of neighboring points used for interpolation (2-12): 7".

Assigning of parameters of page is clear from their names.


For the filter calculation you can used the button . In the new window filter parameters are entered and displayed the result of the filter calculation.



Processing IQ of source data is performed after clicking on the button

Calculate

The result of processing the source data is displayed in the time and spectral domain. Diagram of "constellations" does not show the true location of the characters as the sequence of IQ is not synchronized to the symbol rate.

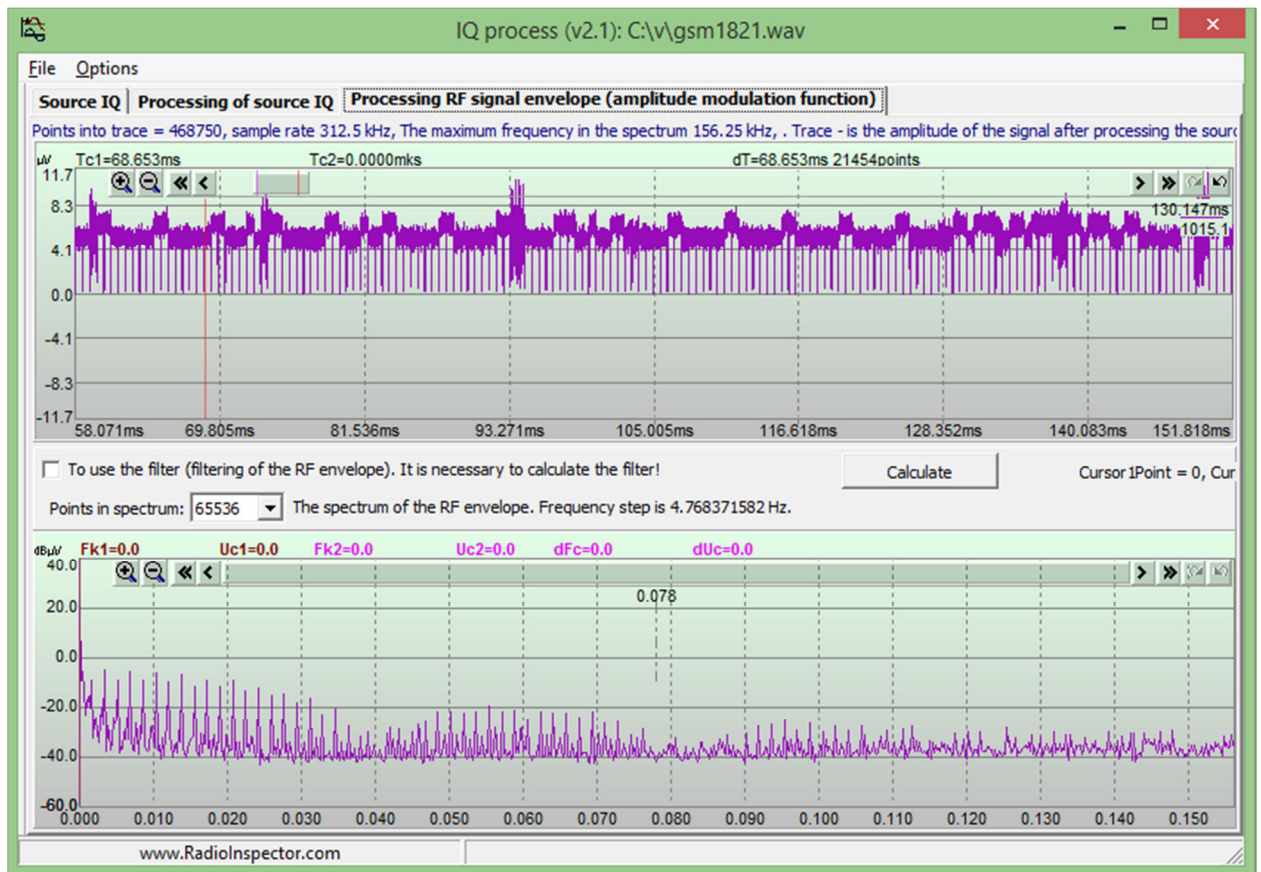
Use the  you can save the results of the processing of source IQ in a wav file.

Page processing RF signal envelope

Page

Processing RF signal envelope (amplitude modulation function)

the main window is for



This page can analyze the time and spectral characteristics of the low-frequency modulation function (envelope of radio signal) in the time and spectral domain, such as the time characteristics of digital data packets.