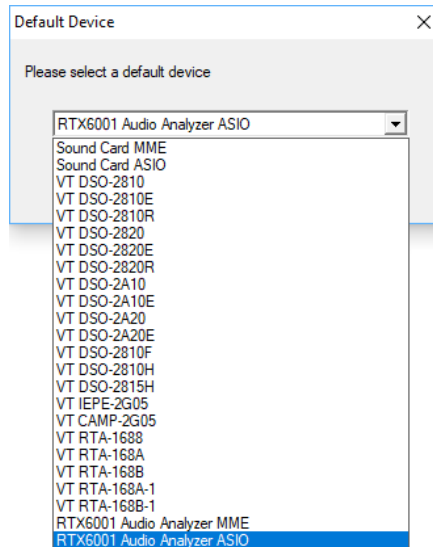# RTX-6001 and Multi-Instrument Bundle Quick Start Guide

1. Selection of RTX6001 as the ADC and DAC devices in Multi-Instrument

If the software is started for the very first time after installation, it will prompt the user to select a default device.


Select "RTX6001 Audio Analyzer MME" or "RTX6001 Audio Analyzer ASIO" depending on whether you want to use Sound Card MME driver or Sound Card ASIO driver for RTX6001.

The default device can also be changed later via [Setting]>[ADC Device], [Setting]>[DAC Device], and [Setting]>[Configure Hot Panel Setting Toolbar], or simply [Setting]>[Restore to Factory Default] to change the former three in one go.

2. Multi-Instrument Software Manual and RTX6001 Hardware Manual

Multi-Instrument software manual can always be accessed via [Setting]>[Help]>[Software Manual] for PDF manual, or [Setting]>[Help]>[Help Topics] for HTML manual, or simply press F1.

With "RTX-6001 MME" or "RTX-6001 ASIO" selected as the ADC Device, its manual can be accessed via [Help]>[Hardware Manual].
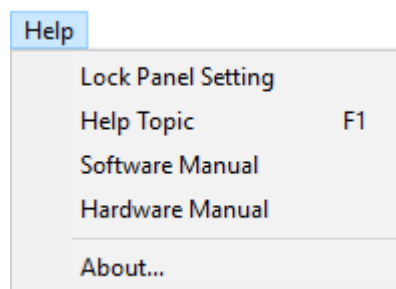
3. PC Control Mode and Local Panel Control Mode

By default, the software will run under PC control mode. The REMOTE LED on RTX6001 hardware panel will be lit up under this mode and all the hardware knobs and switches will be disabled. All controls including input AC/DC selection, input range selection, output range selection will be under Multi-Instrument. The LEDs on RTX6001 will indicate the selections made by Multi-Instrument rather than the knobs and switches on the hardware panel.

To switch to Local Panel Control Mode, go to [Setting]>[Display]>"Delegate Control to Local Panel" (see figure below). Under this mode, Multi-Instrument is still be able to sense the settings on the hardware panel and scale the input and output data correctly. However, the controls from PC will all be disabled.
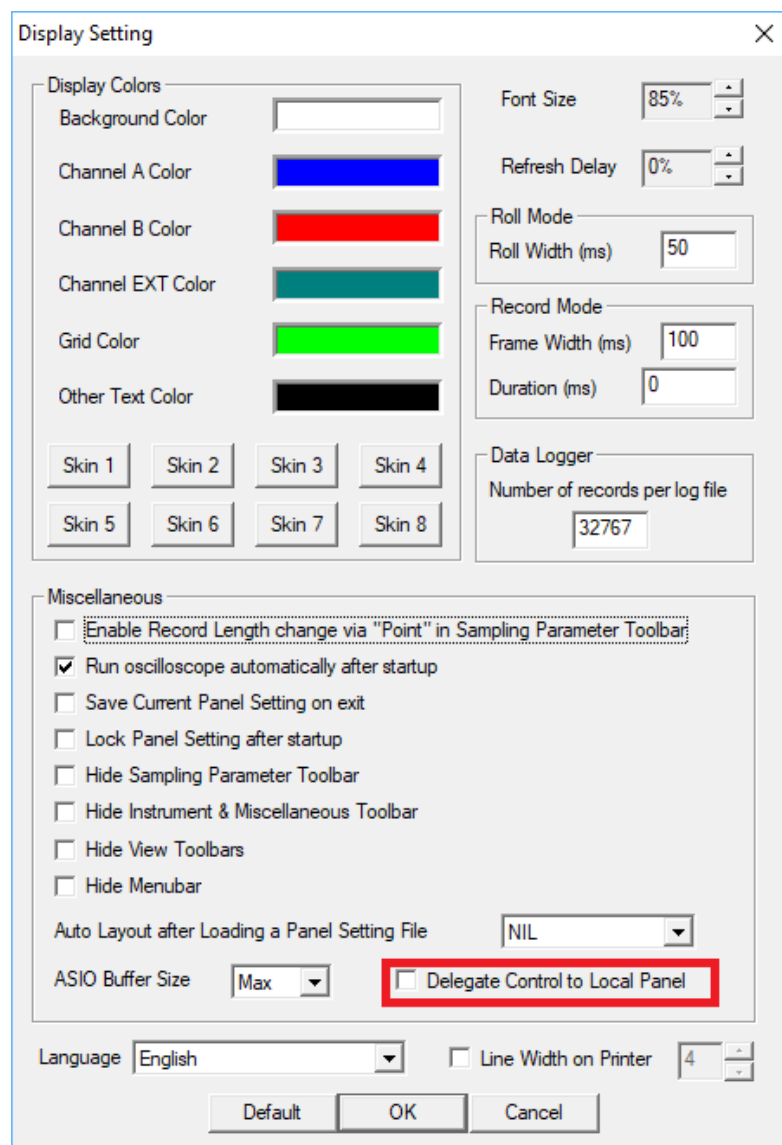
4. Input Coupling and Range Selection, Output Amplitude and Range Selection and Single-End and Differential Selection


The input coupling and range selection can be made manually from the respective controls in the second toolbar from the top. If there is a need to do input sampling parameter auto setting, press the Auto button at the upper right corner of the screen. It will perform the following two actions:

(1) Set the sampling rate and number of samples automatically such that 5~10 cycles of signal are captured in the oscilloscope.
(2) Set the input range automatically based on the input peak level (i.e. autoranging).

In case (1) is not desirable, go to [Setting]>[ADC Device] and tick "Auto Button for Autoranging only" (see figure below). This is the default setting for RTX6001. Besides this on-demand autoranging, it is also possible to activate continuous autoranging by ticking the "AutoRanging" checkbox. For both on-demand and continuous autoranging, it is possible to specify a dBFS value on which the autoranging is based. It is set to 0 dBFS by default. Unlike the autoranging function, which adjusts the gain of the hardware, autoscaling adjusts the scale of the graphs. Ticking the "AutoScaling" checkbox in the following figure will activate continuous autoscaling while an on-demand autoscaling command is also available in the context menus of oscilloscope, spectrum analyzer and spectrum 3D plot.
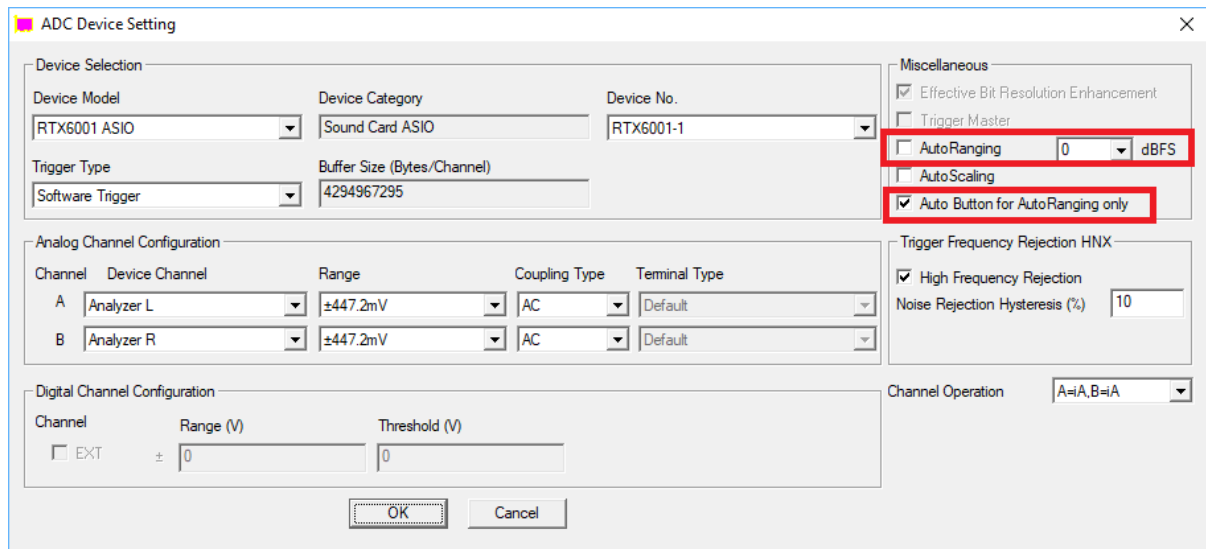
The output amplitudes can be selected or entered manually from the signal generator panel of the software. By default, the output range will be automatically selected by the software based on the output amplitude specified. In case this autoranging feature is not needed, go to [Setting]>[DAC Device] and untick "AutoRanging" (see figure below). It is possible to specify a dBFS value on which the autoranging is based on. 0 dBFS is set by default. The "Differential" options are selected by default. In case you want to change the configuration to "Single Ended", untick the "Differential" checkboxes. Then the output range here as well as the output amplitude in the signal generator panel will change accordingly.
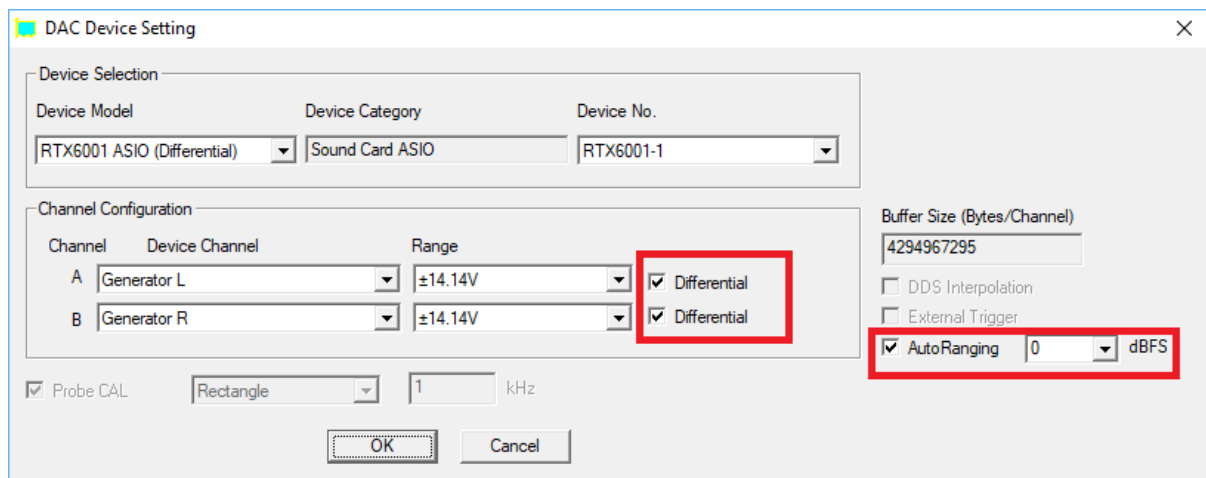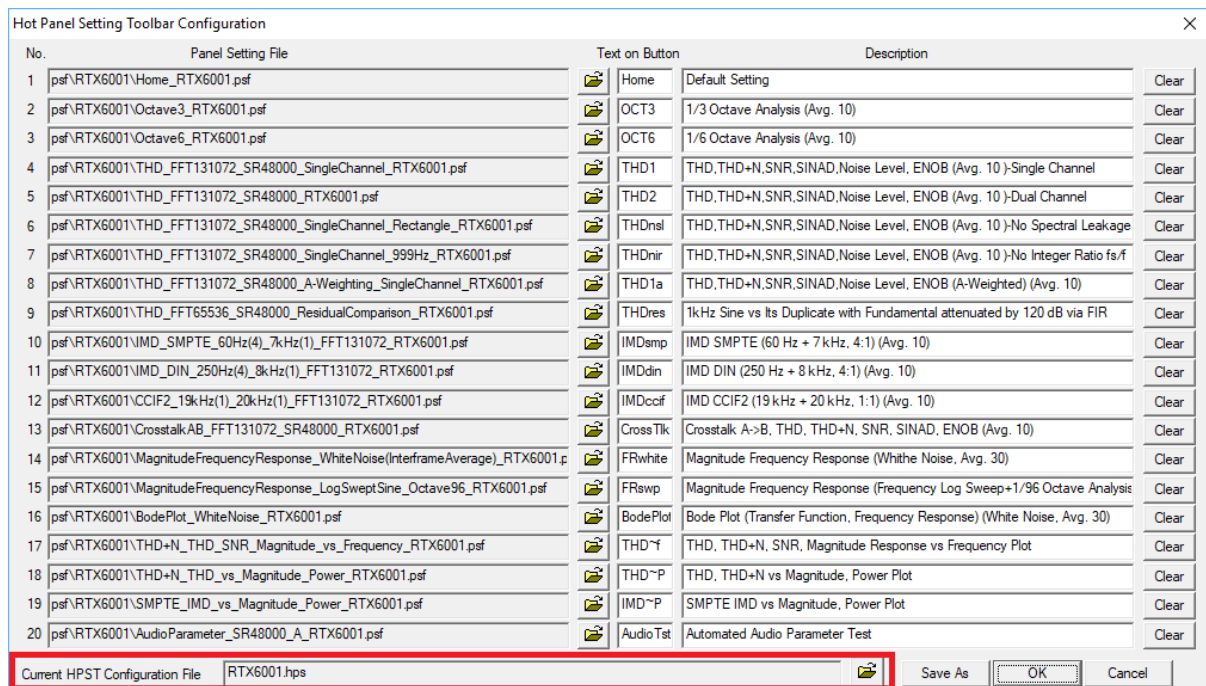

5. Panel Setting Files and Hot Panel Setting Toolbar

In Multi-Instrument, a panel setting file contains all the settings for sampling, processing and analysis. It can be saved via [Setting]>[Save Current Panel Setting] and loaded via [Setting]>[Load Panel Setting]. If you want make a default Panel Setting File, use [Setting]>[Save Current Panel Setting as Default]. If you want to save the current panel setting on exit, go to [Setting]>[Display] and tick "Save Current Panel Setting on Exit".

There are many preconfigured Panel Setting Files for various purposes. It is possible to configure 20 most frequently used Panel Setting Files in the Hot Panel Setting Toolbar (the

third toolbar from the top), via [Setting]>[Configure Hot Panel Setting Toolbar], so that they are all available in just one mouse click. It is possible to configure multiple such toolbars for various purposes and load one of them as shown below.

No.	Panel Setting File		Text on Button	Description	
1	psf\RTX6001\Home_RTX6001.psf	📁	Home	Default Setting	Clear
2	psf\RTX6001\Octave3_RTX6001.psf	📁	OCT3	1/3 Octave Analysis (Avg. 10)	Clear
3	psf\RTX6001\Octave6_RTX6001.psf	📁	OCT6	1/6 Octave Analysis (Avg. 10)	Clear
4	psf\RTX6001\THD_FFT131072_SR48000_SingleChannel_RTX6001.psf	📁	THD1	THD,THD+N,SNR,SINAD,Noise Level, ENOB (Avg. 10)-Single Channel	Clear
5	psf\RTX6001\THD_FFT131072_SR48000_RTX6001.psf	📁	THD2	THD,THD+N,SNR,SINAD,Noise Level, ENOB (Avg. 10)-Dual Channel	Clear
6	psf\RTX6001\THD_FFT131072_SR48000_SingleChannel_Rectangle_RTX6001.psf	📁	THDnsl	THD,THD+N,SNR,SINAD,Noise Level, ENOB (Avg. 10)-No Spectral Leakage	Clear
7	psf\RTX6001\THD_FFT131072_SR48000_SingleChannel_999Hz_RTX6001.psf	📁	THDnir	THD,THD+N,SNR,SINAD,Noise Level, ENOB (Avg. 10)-No Integer Ratio fs/f	Clear
8	psf\RTX6001\THD_FFT131072_SR48000_A-Weighting_SingleChannel_RTX6001.psf	📁	THD1a	THD,THD+N,SNR,SINAD,Noise Level, ENOB (A-Weighted) (Avg. 10)	Clear
9	psf\RTX6001\THD_FFT65536_SR48000_ResidualComparison_RTX6001.psf	📁	THDres	1kHz Sine vs Its Duplicate with Fundamental attenuated by 120 dB via FIR	Clear
10	psf\RTX6001\IMD_SMPTE_60Hz(4)_7kHz(1)_FFT131072_RTX6001.psf	📁	IMDsmp	IMD SMPTE (60 Hz + 7 kHz, 4:1) (Avg. 10)	Clear
11	psf\RTX6001\IMD_DIN_250Hz(4)_8kHz(1)_FFT131072_RTX6001.psf	📁	IMDdin	IMD DIN (250 Hz + 8 kHz, 4:1) (Avg. 10)	Clear
12	psf\RTX6001\CCIF2_19kHz(1)_20kHz(1)_FFT131072_RTX6001.psf	📁	IMDccif	IMD CCIF2 (19 kHz + 20 kHz, 1:1) (Avg. 10)	Clear
13	psf\RTX6001\CrosstalkAB_FFT131072_SR48000_RTX6001.psf	📁	CrossTlk	Crosstalk A->B, THD, THD+N, SNR, SINAD, ENOB (Avg. 10)	Clear
14	psf\RTX6001\MagnitudeFrequencyResponse_WhiteNoise(InterframeAverage)_RTX6001.p	📁	FRwhite	Magnitude Frequency Response (Whithe Noise, Avg. 30)	Clear
15	psf\RTX6001\MagnitudeFrequencyResponse_LogSweptSine_Octave96_RTX6001.psf	📁	FRswp	Magnitude Frequency Response (Frequency Log Sweep+1/96 Octave Analysis	Clear
16	psf\RTX6001\BodePlot_WhiteNoise_RTX6001.psf	📁	BodePlot	Bode Plot (Transfer Function, Frequency Response) (White Noise, Avg. 30)	Clear
17	psf\RTX6001\THD+N_THD_SNR_Magnitude_vs_Frequency_RTX6001.psf	📁	THD~f	THD, THD+N, SNR, Magnitude Response vs Frequency Plot	Clear
18	psf\RTX6001\THD+N_THD_vs_Magnitude_Power_RTX6001.psf	📁	THD~P	THD, THD+N vs Magnitude, Power Plot	Clear
19	psf\RTX6001\SMPTE_IMD_vs_Magnitude_Power_RTX6001.psf	📁	IMD~P	SMPTE IMD vs Magnitude, Power Plot	Clear
20	psf\RTX6001\AudioParameter_SR48000_A_RTX6001.psf	📁	AudioTst	Automated Audio Parameter Test	Clear

Current HPST Configuration File RTX6001.hps 📁   Save As   OK   Cancel

6. Record Length vs FFT Size

In Multi-Instrument, Record Length is the number of samples in the oscilloscope. The data sampling length is based on the Record Length not FFT size. FFT size is a parameter for analysis only. To change the Record Length, click anywhere within the oscilloscope window and select the T range at the lower left corner of the screen. In case you want to change the Record Length on per point basis, then go to [Setting]>[Display] and tick "Enable Record Length change via "Point" in Sampling Parameter Toolbar". After that, you will be able to change Record Length directly via "Point" at the upper right corner of the screen. This is very much for advanced users only. To change the FFT size, click anywhere within the spectrum analyzer window and select the FFT size in the toolbar at the bottom of the screen. When the oscilloscope is closed, changing FFT size will update the Record Length as well and make them equal.

There is an indication at the lower left corner of the spectrum analyzer window called number of FFT segments, which is equal to [Record Length] / [FFT size]. You can change your data processing and analysis strategy by varying this ratio:

(1) When [FFT size]>[Record Length], FFT segments <1, thus zero padding will be used in the analysis.
(2) When [FFT size]=[Record Length], FFT segments =1,
(3) When [FFT size]<[Record Length], FFT segments >1, intra-frame average will be used in the analysis.

All the above three are useful for some applications.

7. Alarms for Overflow, High Voltage Detected and Analog Power Off

The "OVF" LED on RTX6001 hardware panel will be lit up under either of the following situations:

(1) The input signal is at or higher than the clipping level, i.e. overflowed.
(2) A high input voltage is detected and RTX6001 enters into protection mode which will attenuate the input signal additionally by about 30 dB. This will make the scaling invalid.

In Multi-Instrument, the above (1) is indicated by the Input Peak Level Indicator at the upper right corner of the screen. The above (2) is indicated as "High Voltage Detected!" text alarm in the middle of the oscilloscope and spectrum analyzer windows. The Analog Power Off alarm will also be indicated in this way. When (2) occurs, the software will automatically change the input range of RTX6001 to the highest. This is in addition to RTX6001's fast hardware based protection action.
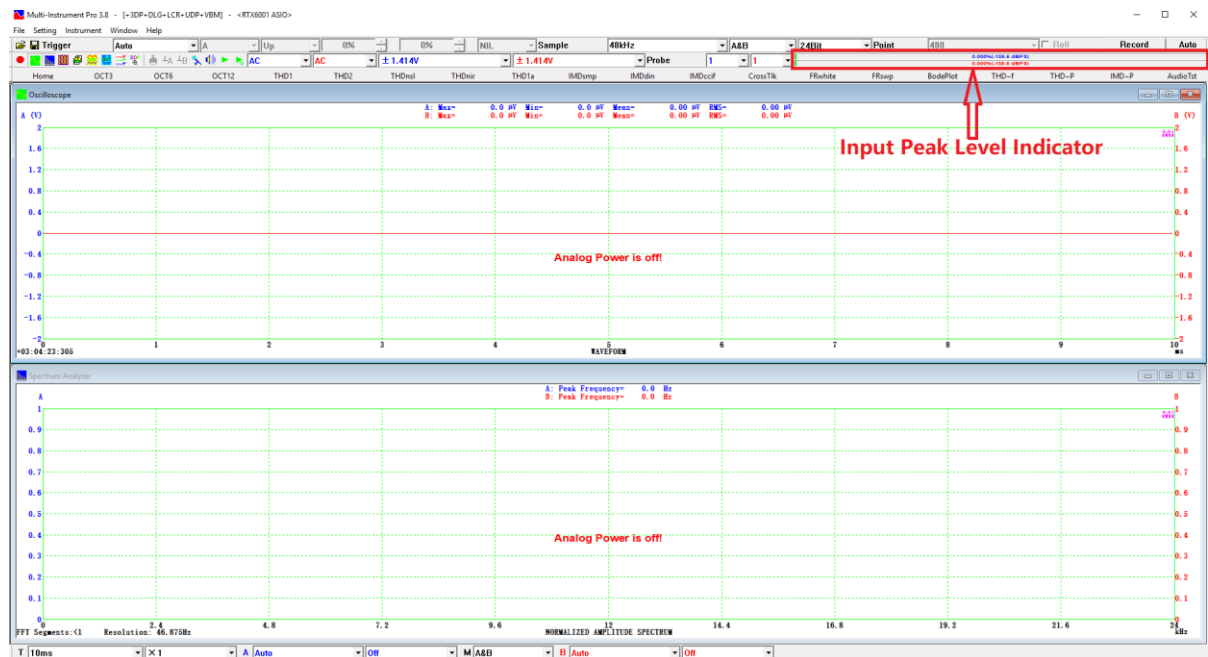
8. Some Screenshots Based on the Currently Configured Hot Panel Setting Toolbar

(1) THD2 button (THD, THD+N, SNR, SINAD, Noise Level, ENOB (Avg. 10)-Dual Channel))
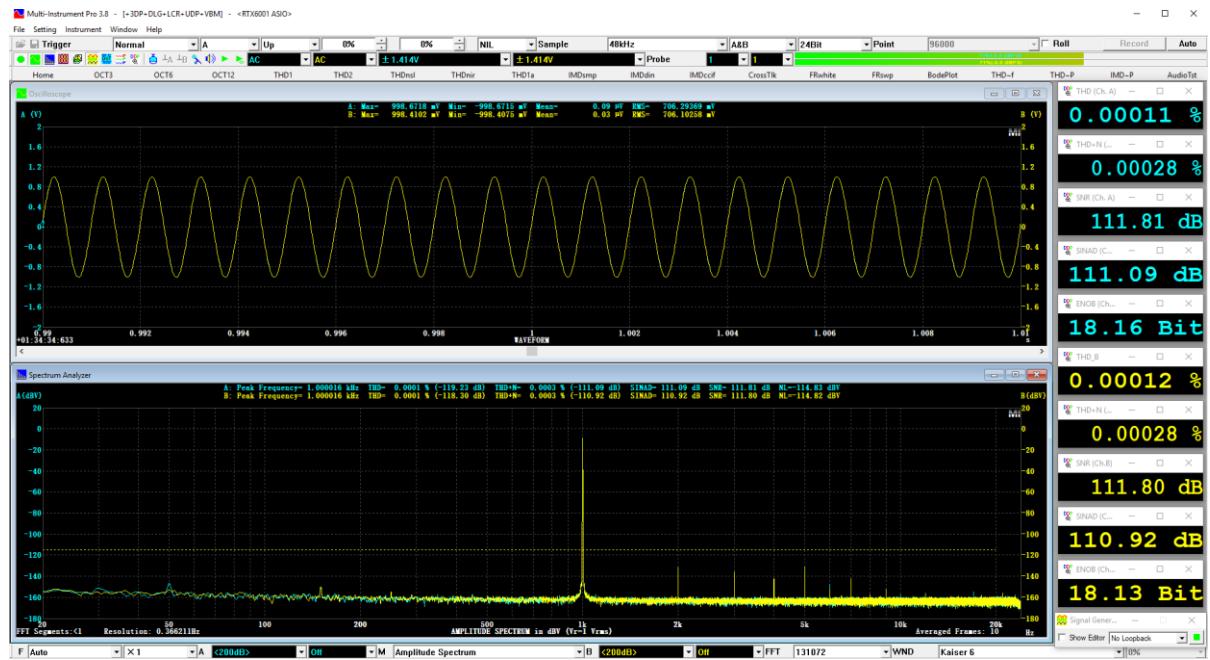
(2) THD1a button (THD, THD+N, SNR, SINAD, Noise Level, ENOB (A-Weighted) (Avg. 10))
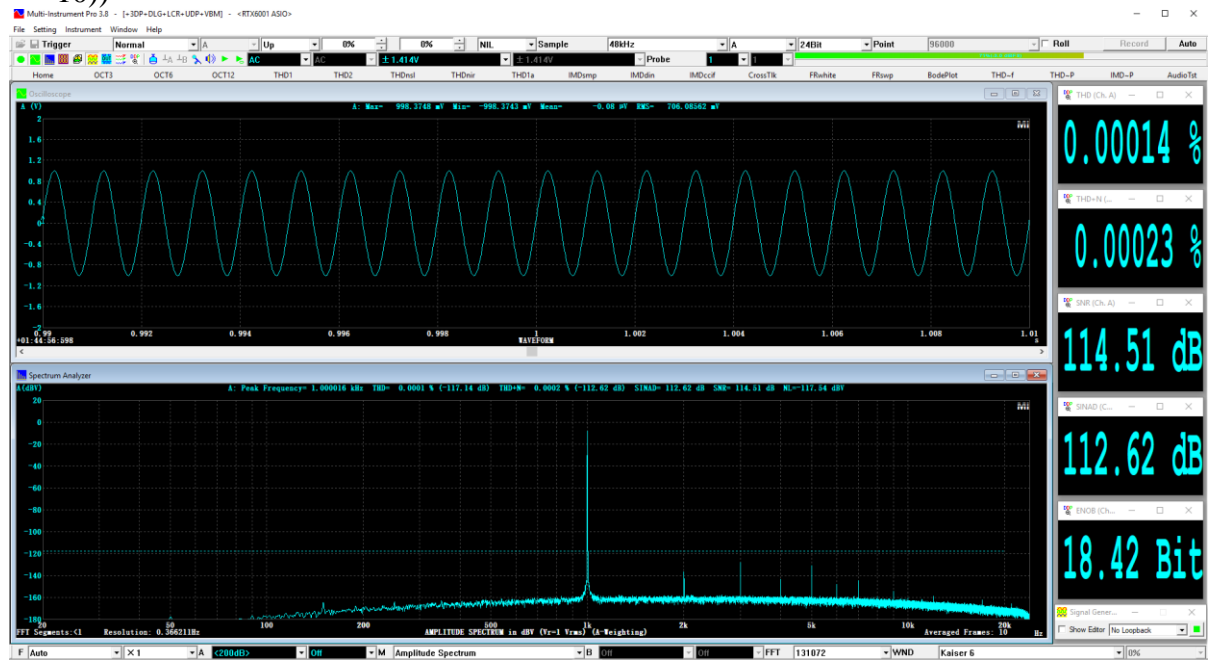
(3) THDres button (1kHz Sine vs Its Duplicate with Fundamental attenuated by 120 dB via FIR)
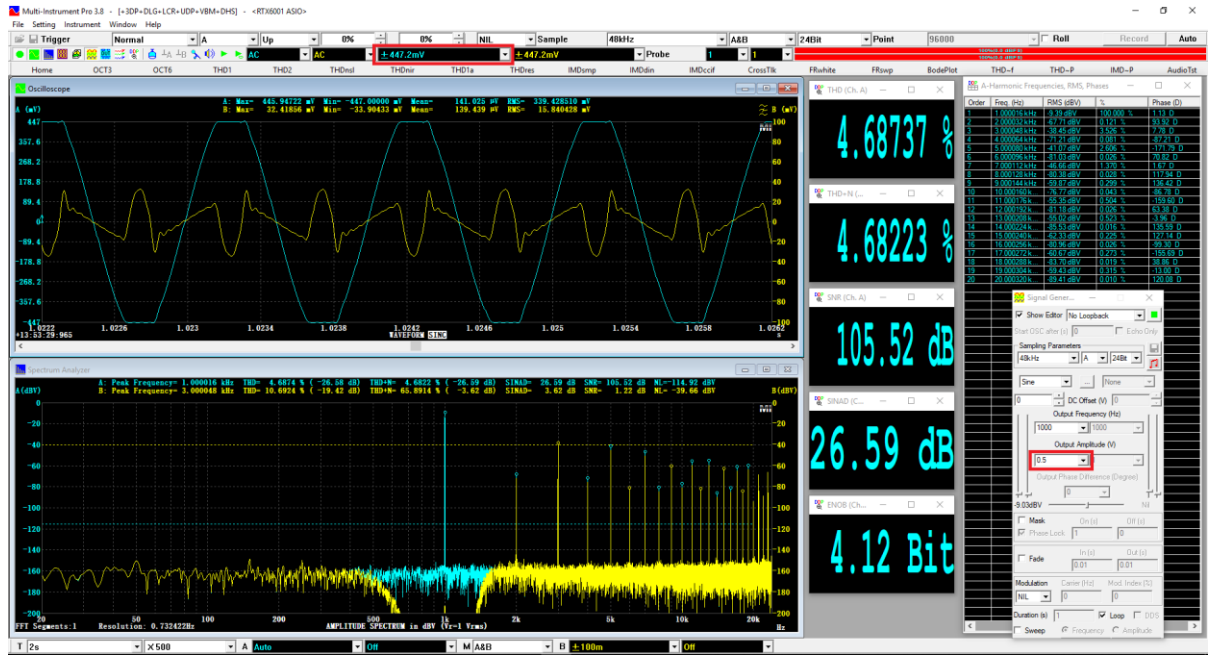
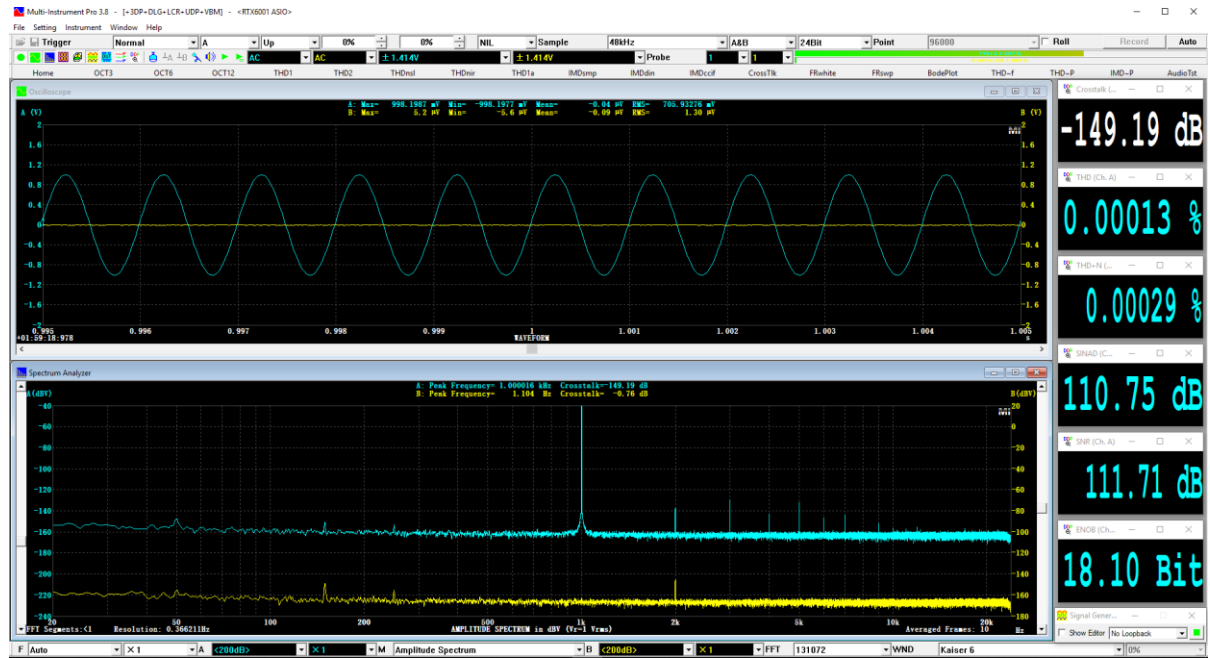(4) IMDsmp button (IMD SMPTE (60 Hz + 7 kHz, 4:1) (Avg. 10))
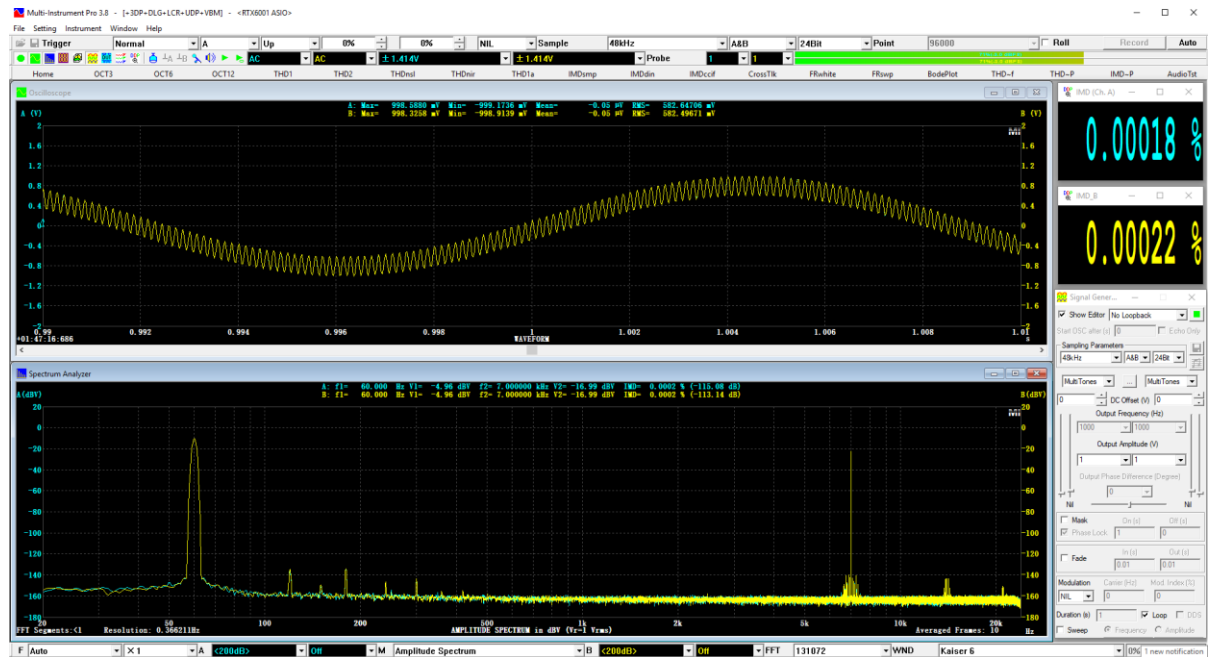
(5) IMDdin button (IMD DIN (250 Hz + 8 kHz, 4:1) (Avg. 10))
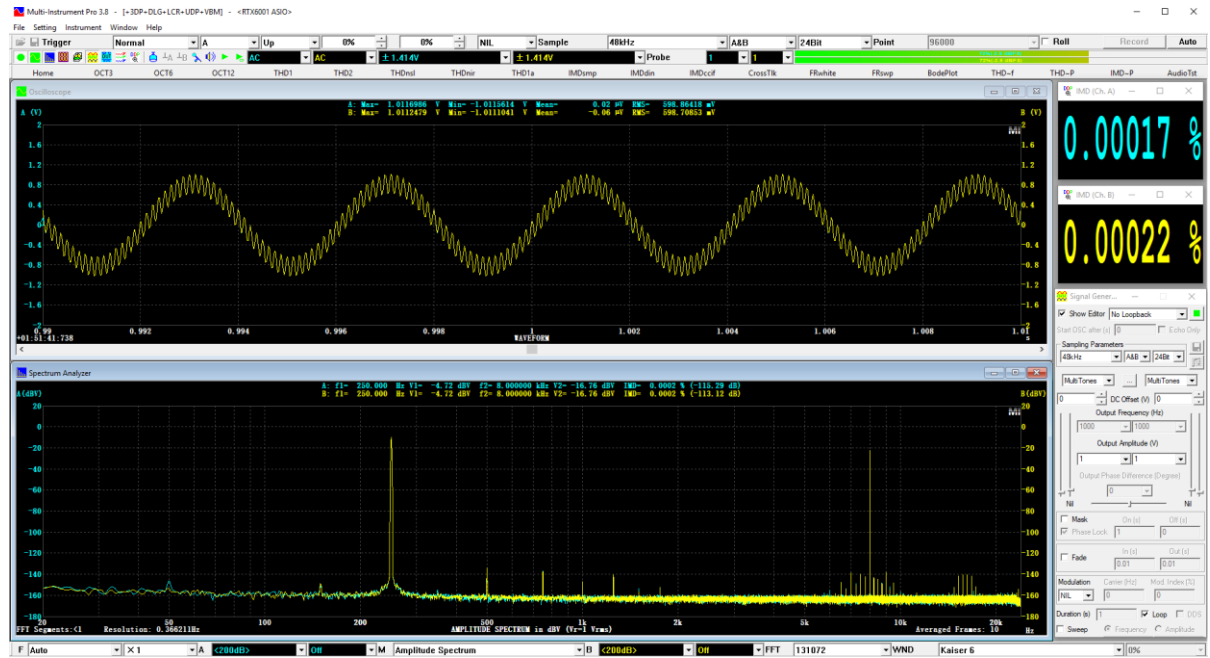
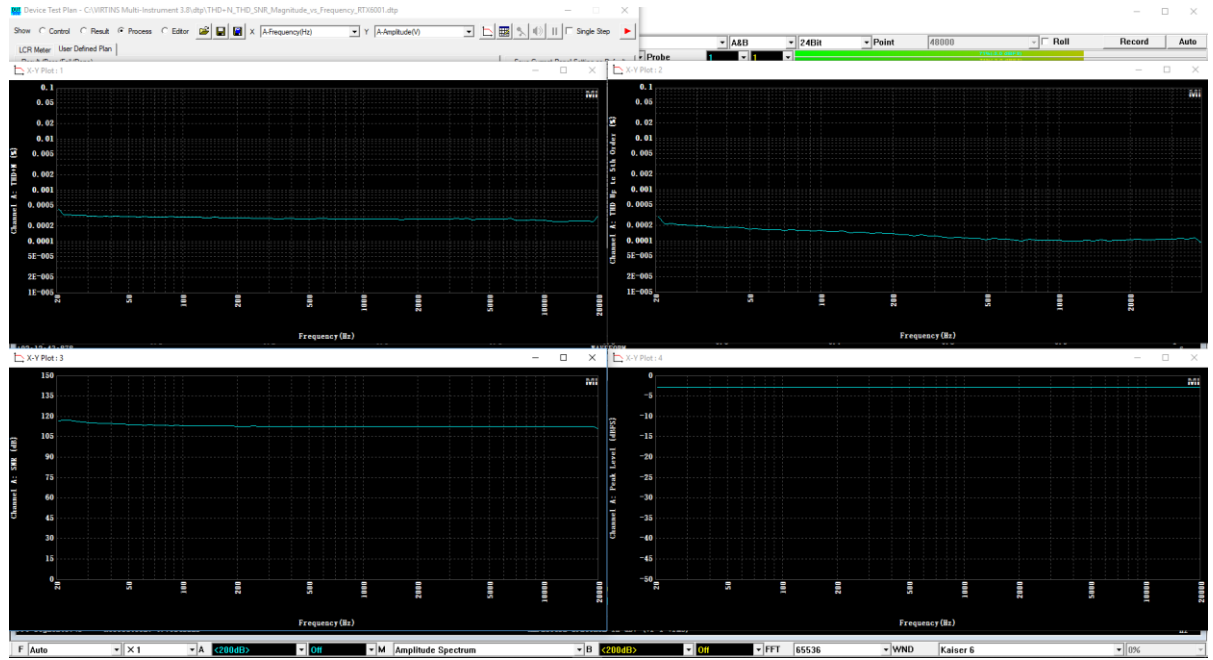(6) IMDccif button (IMD CCIF2 (19 kHz + 20 kHz, 1:1) (Avg. 10))
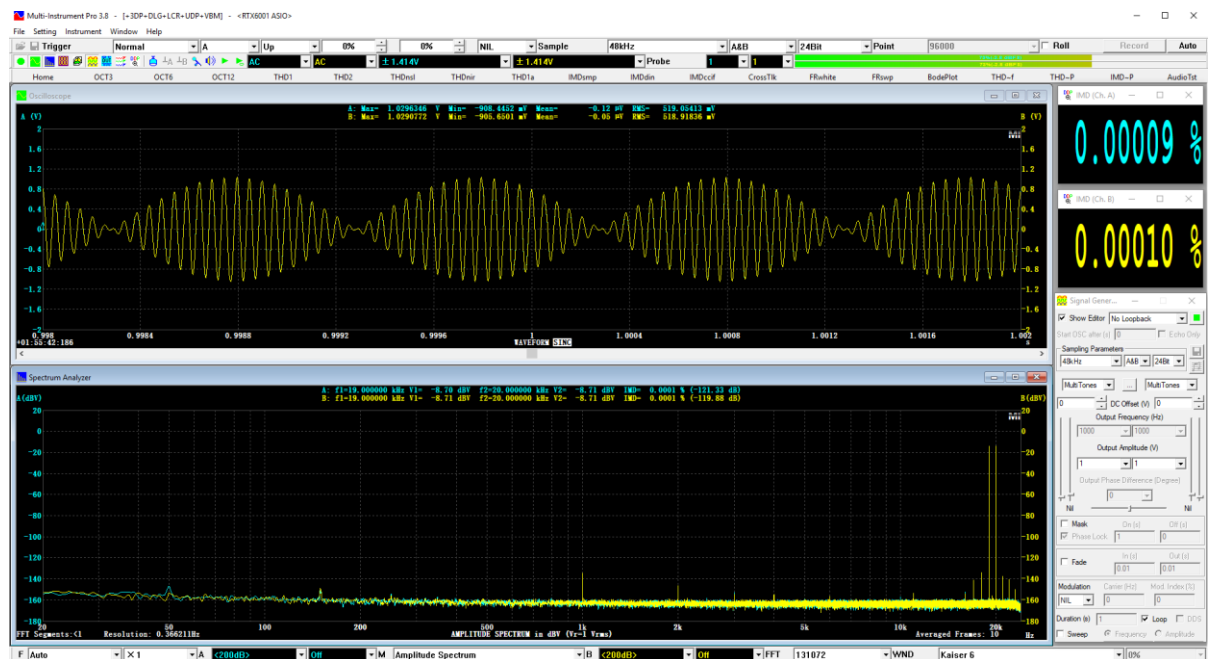
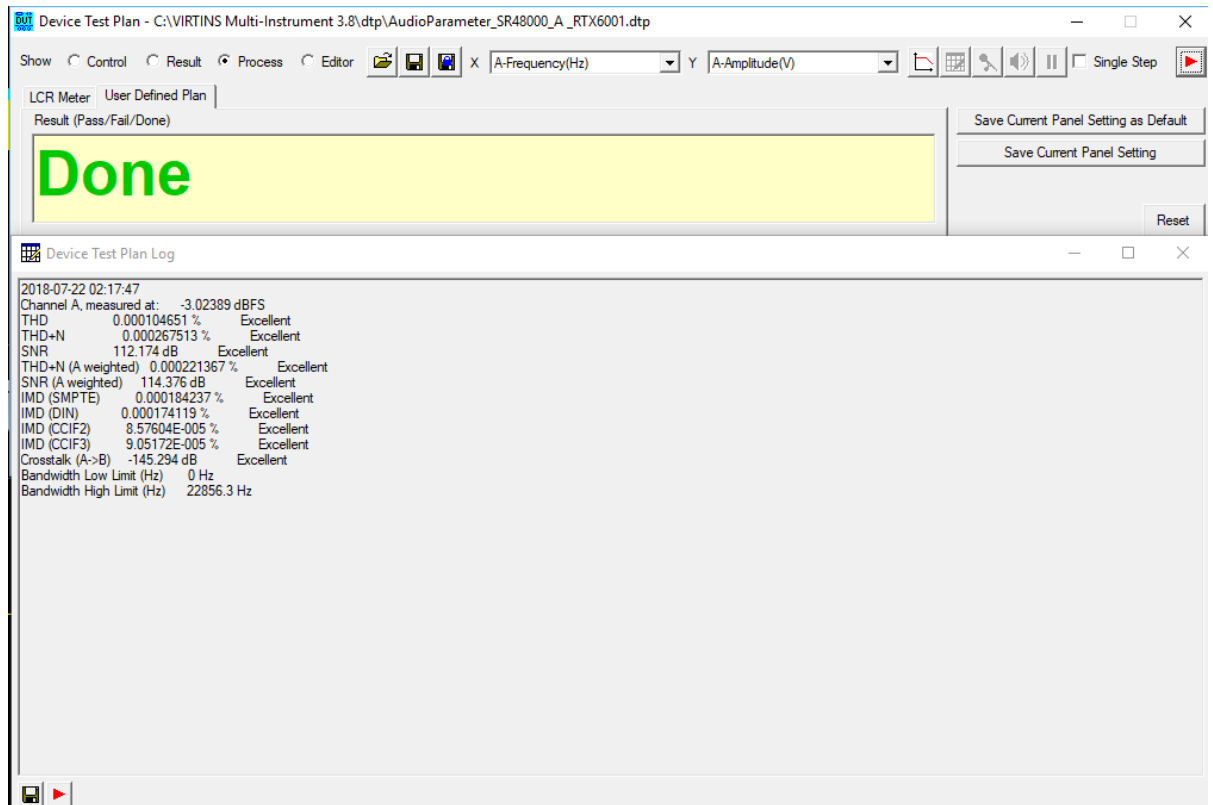(7) Crosstlk button (Crosstalk A->B, THD, THD+N, SNR, SINAD, ENOB (Avg. 10))

(8) FRswp button (Magnitude Frequency Response (Frequency Log Sweep+1/96 Octave Analysis))

(9) THD~f button (THD, THD+N, SNR, Magnitude Response vs Frequency Plot)

(10) AudioTst button (Automated Audio Parameter Test)