CRY2716

NOISE & VIBRATION ANALYSIS SYSTEM

USER MANUAL v1.3

CATALOG

1. Introduction

CRY2716 Multi-Channel Noise and Vibration Analysis System, is the new test instrument of CRYSOUND for noise and vibration analysis.

CRY2716 Multi-Channel Noise and Vibration Analysis System consists of hardware (CRY2716) and software two parts.

Hardware part, CRY 2716 uses the USB3.0 transmission protocol to accomplish the communication with the host computer to support up to 16-channel noise signal, vibration signal synchronization input.

Software part, CRY2716 based on win7, win10 operating system, to cooperate with CRY5069 （the standrad software） for data analysis (time domain waveform, sound pressure level, vibration level, octave, FFT), comparison (threshold validating, multiple test data comparison), and display (free to add test items through multi-screen for simultaneous observation), and a variety of forms (graphics, lists, reports) data export.

2. Hardware part

2.1 Applicable range

-Built-in 24V/4mA constant current circuit, capable of directly acquiring the output of IEPE-type acceleration sensors and microphones.
-Optional built-in charge amplifier for connecting piezoelectric sensors, enabling accurate measurement of dynamic pressure and vibration acceleration.
-Optional strain amplifier for testing and analyzing stress and strain of full bridge, half bridge, and 1/4 bridge.
-Voltage input, compatible with thermocouples, eddy current sensors, magneto-electric velocity sensors, and various transmitters, for testing and analyzing multiple physical quantities.
-Various temperature sensors (such as platinum resistance, copper resistance, etc.) and corresponding conditioners for temperature testing and analysis.

2.2 Features

-Complete hardware and software environment, compatible with the acquisition and analysis of various electrical quantity sensor output signals.

-24-bit A/D multi-channel parallel synchronous sampling with a maximum sampling rate of 256kHz per channel, low noise, and high accuracy.

-Highly integrated with options for 8, 16-channel chassis based on the required number of test points.

-Communication between the computer and the instrument via Gigabit Ethernet interface, accompanied by user-friendly and feature-rich acquisition and analysis software. It enables setting parameters such as input types, range, sensor sensitivity, and sampling rate of the dynamic signal analyzer. Real-time transmission, display, analysis, and processing of data can be performed, and multi-channel signals can be recorded continuously and in real-time on the computer's hard drive.

-Flexible sampling modes and multiple triggering options.

-Expansion capability using Gigabit Ethernet switches, allowing parallel synchronous acquisition and analysis of multiple devices using a single computer. Widely used in various structural fatigue testing, performance testing, and feature analysis in industries such as education, aerospace, automotive, and rail transportation.

3. Specification

Technical Specifications

-Number of input channels: 16

-AD resolution: 24 bits

-Sampling method: Parallel synchronous sampling

-Sampling rate: Up to 256kHz per channel, multiple ranges adjustable

-Data transfer interface: Gigabit Ethernet

-Signal-to-noise ratio: ≥100 dB

-System accuracy:

●Voltage/IEPE input: Better than 0.5%

●Charge input: Better than 1%

-Linearity: Within 0.1% of full scale

-Input types: Voltage/IEPE/Charge input, software configurable

-Voltage input range: ±10VP

●IEPE excitation power: (4mA±1mA) /(20-24VDC)

●Charge input range: ±10000Pc

-Signal input bandwidth:

●Voltage input: DC-100kHz (-3dB)

●IEPE input: 0.3Hz-100kHz (-3dB)

●Charge input: 0.3Hz-100kHz (-3dB)

-Hardware amplification factor: 1, 10, 100

●Filters: Independent analog filters and digital anti-aliasing filters per channel

●Cutoff frequency: 1/2.56 times the sampling rate, synchronized with the sampling rate setting

-Stopband attenuation: Approximately 100dB/oct

-Dimensions: W269mm × H68mm × D234mm

-Power supply: 220V 50Hz/110V 60Hz

-Operating temperature: 0~40℃

-Weight: Approximately 2.3kg

4. CRY2716 Software and Environment Setup

CRY2716 software does not need installation, double-click CRYVoicePrint.exe to run. But before running it is mandatory to install the software operating environment.

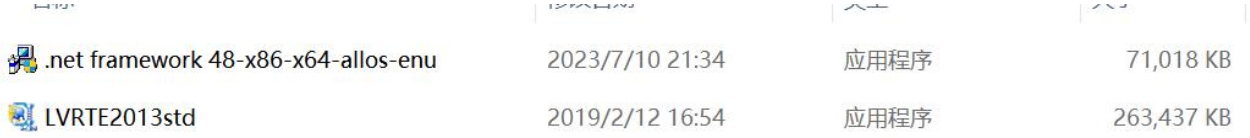


Figure 1. CRY2716 Software and Environment Setup

As shown in Figure 1, CRY2716 software runtime environment contains the LabVIEW runtime, .net driver, VC runtime, USB sound card driver. When USB sound card driver installation is complete, you need to open the program settings, the USB Streaming Mode in Buffer Settings is set to Standard, ASIO Buffer Size is set to 512 samples.

In addition, CRY2716 software data export and import supports only Office 2010 version, you need to install Office 2010 version of Word, Excel and Access.

5. Device Connection

CRY2716 Noise and Vibration Analysis System's hardware connection is very simple and convenient:

- Connect the CRY2716 hardware to the power supply;
- Simply connecting CRY2716 by USB cable to the computer;
- Connect the noise sensors and acceleration sensors through the BNC interface to the CRY2716. See Figure 2.

Figure 2. CRY2716 hardware connection

6. CRY2716 Software Introduction

6.1 Start

Connect the CRY2716 to a computer and open the software. On the start page as shown below:

- Select New Project to create a new project;
- Select Open Project to open the previously saved project, the project expanded-name is .cryx;
- Select User Guide to read user handbook;
- Select Exit to exit CRY2716 software. If the device is not connected, the CRY5069 will enter demo mode. Demo mode can not execute tests.

Figure 3. CRY5069 Start Page

6.2 Main Interface

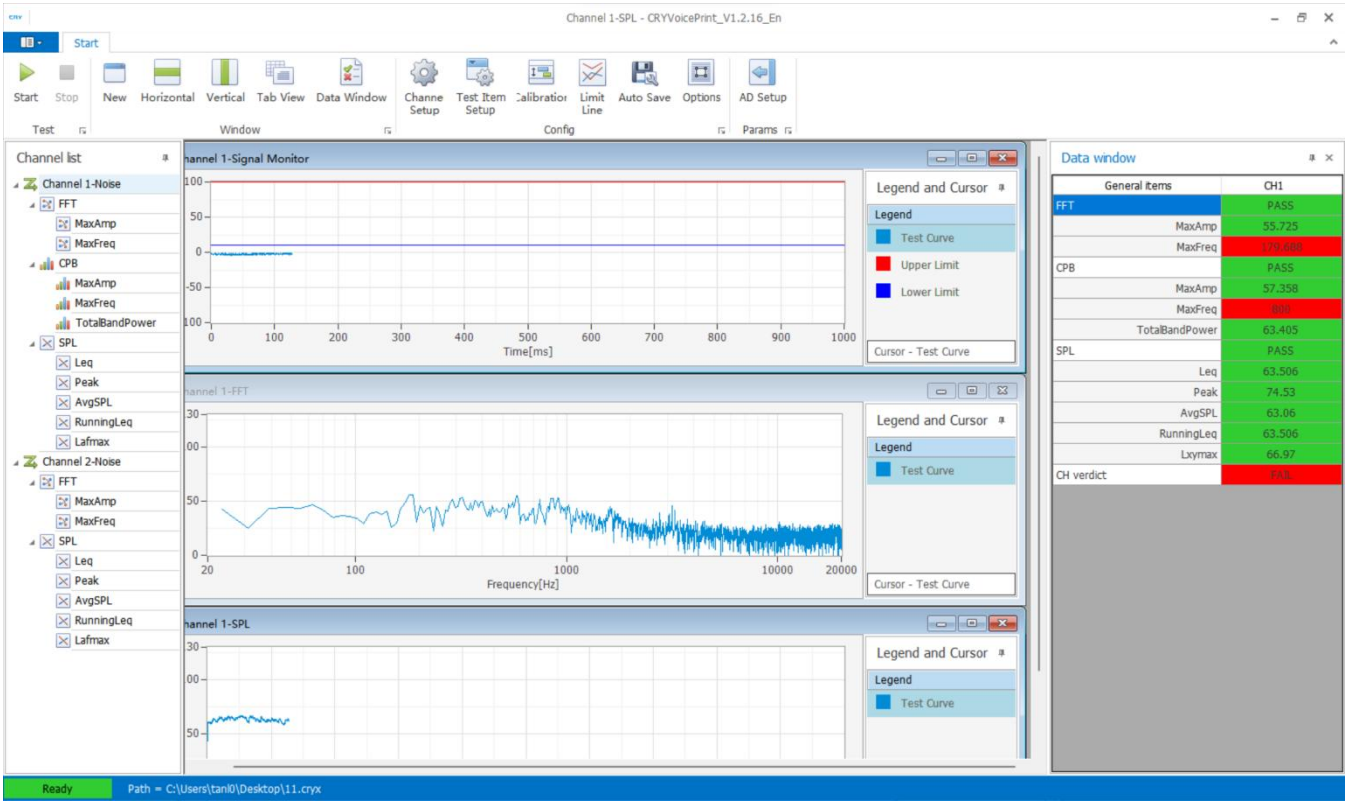


Figure 4. CRY5069 Main Interface

6.3 *Menu Bar*

As shown in Figure 4, at the top of the CRY2716 main interface is menu bar. The menu bar is divided into test bar, window bar and setting bar.

- **Test Bar**: single test, continuous test and stop test;
- **Windows Bar**: **New Window** is used to add the waveform window of the test item;

  Horizontal Distribution, **Vertical Distribution**, **Label View** can be one key adjustment for waveform window position in order to facilitate observation and operation in subsequent test;
- **Channel Setup** can set multi-channel configuration window;
- **Calibration** for internal calibration of the instrument and sensor sensitivity calibration;
- **Limit Line** is used to verdict the threshold setting;
- **Auto Save** allows you to choose different file formats for saving data;
- **Options** for serial ports settings;
- **AD Setup** allows you to configure some basic parameters.

6.3.1 Channel Setup

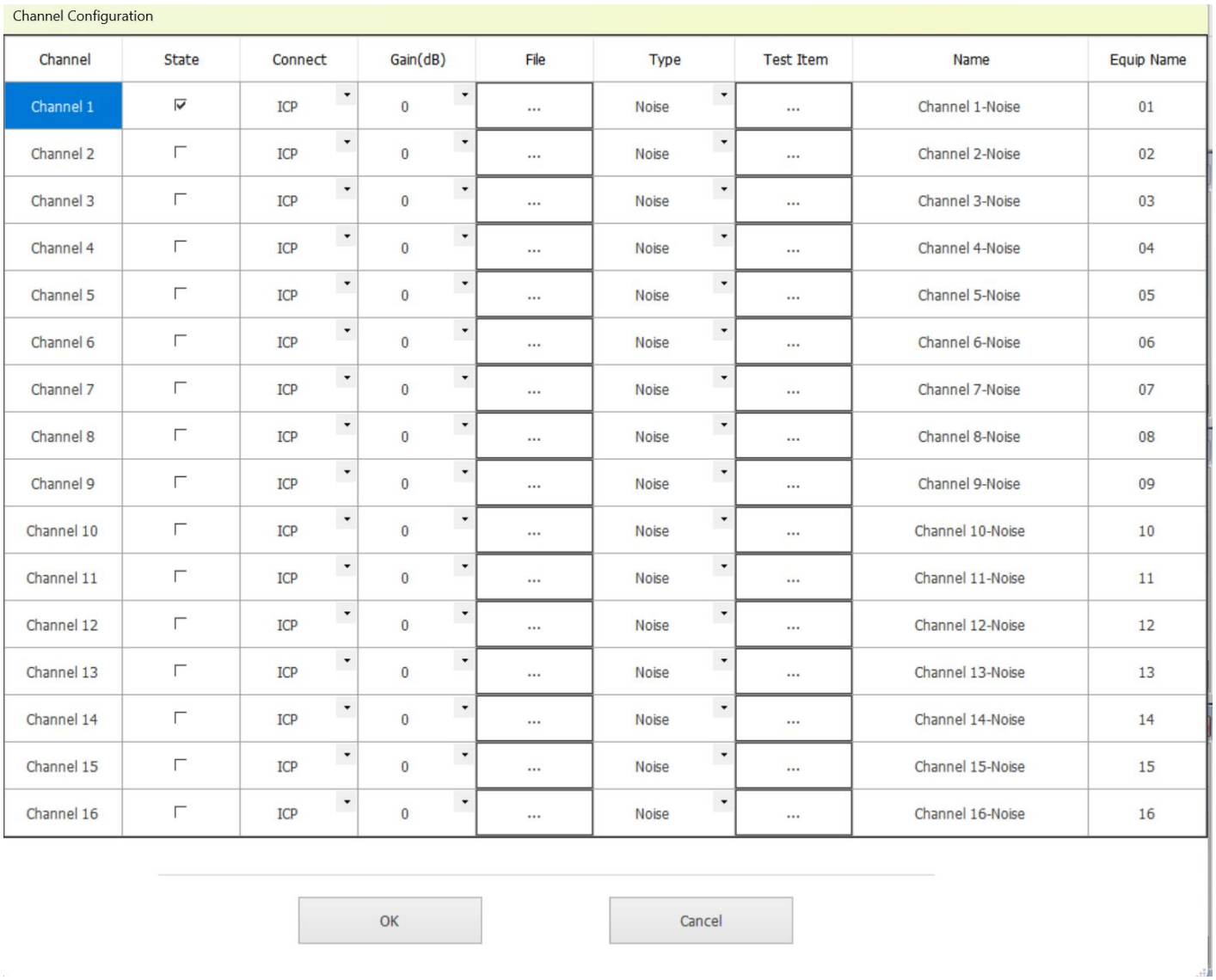


Figure 5. Channel Setup

Click **Channel Setup** on the menu bar, and channel management interface can make a multi-channel setup and test item configuration.

- **State**: after check this channel is added in the test;
- **Connect**: defining interfaces ICP/IEPE power supply or external interface, or by the data from file (offline analysis).
- **Gain**: can be set -96 dB to 30dB. 0dB default.
- **Item**:test items can be quickly added to each channel.
- **Name:** defaults to CHX - test type.

6.4 New Window

- Click the **New Window** to add waveform window of test items, shown in Figure 6. Optional parameters are channel selection, test items, and customized window names.
- It should be noted that, the corresponding channel, and the corresponding test items must be added in the channel configuration window, before chosen in the new window interface. There are 5 optional windows for noise test: time-domain waveform, sound pressure level, FFT ,spectrogram and octave; vibration test has 5 optional windows: time-domain waveform, acceleration level, FFT ,spectrogram and octave.

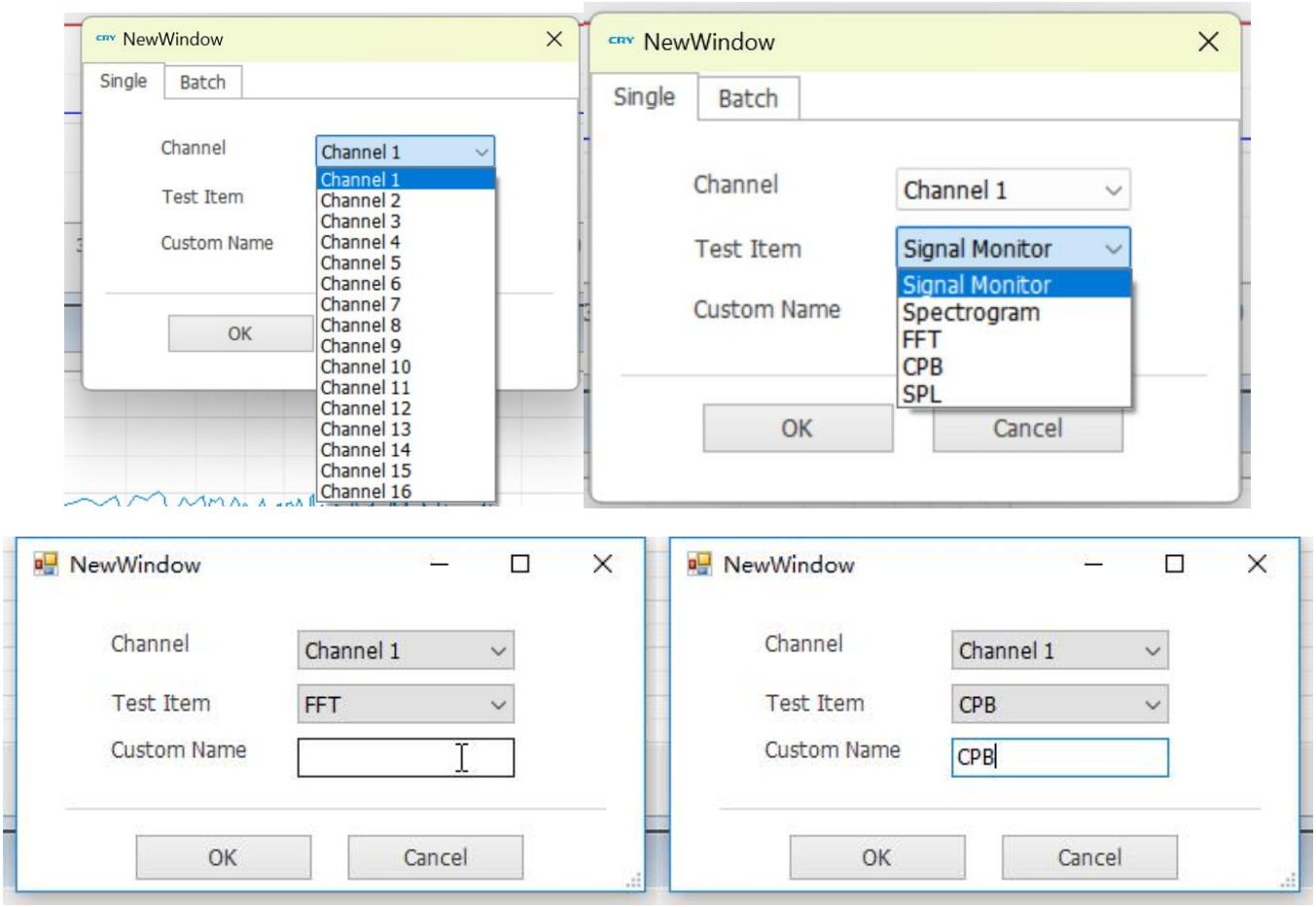


Figure 6. New Window Interface

6.5 Calibration Window

System calibration as shown in Figure 7.

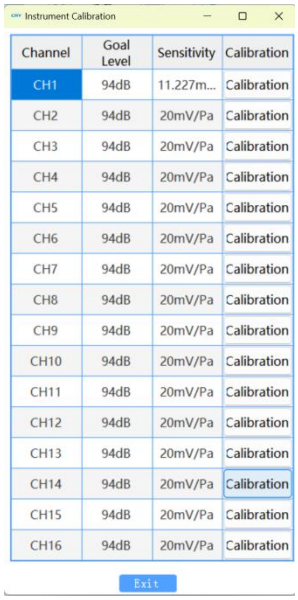


Figure 7. Calibration Interface

Internal calibration of the instrument: as its name implies, is the hardware path calibrated of the CRY2716. It should be calibration when the environment change.

In the corresponding channel, set the reference sound level of calibrator, click the calibration button to get the current sensitivity.

If the sensitivity is known, you can also manually set it.

After completing the calibration, click **exit**.

6.6 Analysis Window

Below the menu bar is the software window. It is divided into three parts: channel configuration window, waveform window, decision window.

6.6.1 Channel Test Configuration Window:

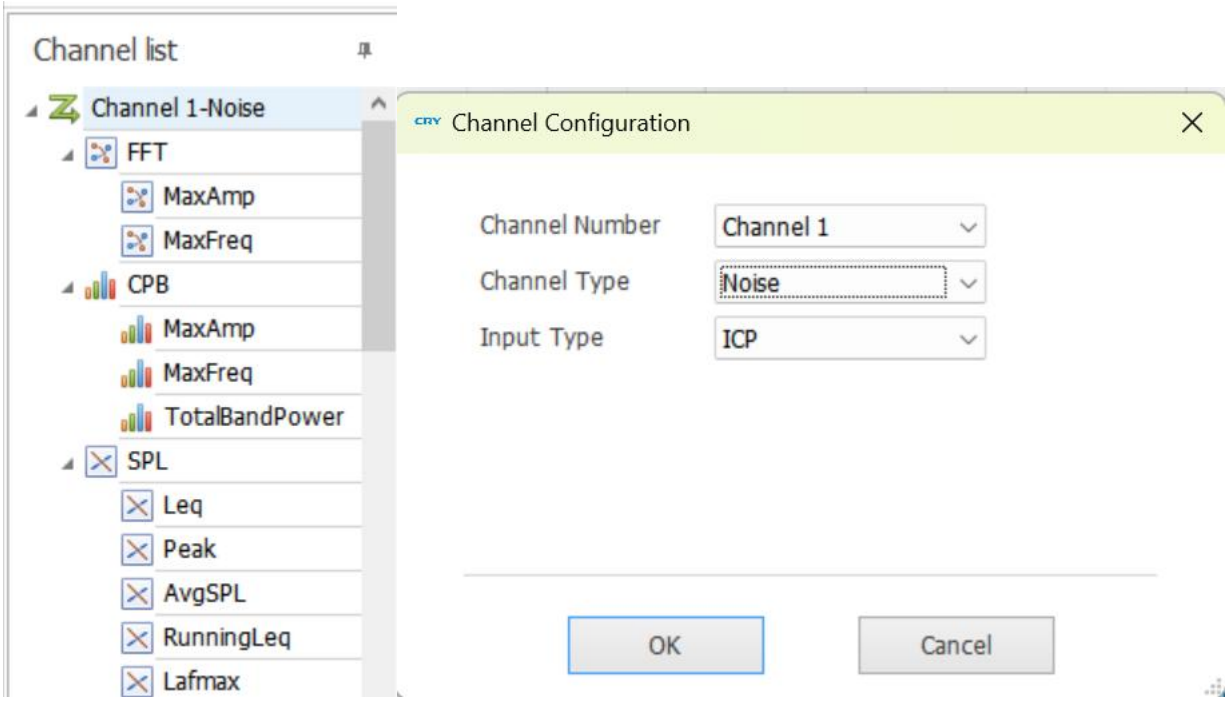


Figure 8. Channel Configuration Window

As shown in Figure 8, right-click on channel 1 to pop up the menu bar for:

- Selecting channels to add or delete;
- Modify channel configuration parameters;
- Add test items (sound pressure level, octave, FFT selectable);
- Export channel configuration file (Designed for automated control design, saved in the Mask folder).

The channel configuration window on the right configures:

- **Channel Type** (noise, vibration,noise detection,vibration detection);
- **Input Type**(ICP,Line in,Recorder data);

6.6.2 FFT Test Configuration Window

Right-click on the FFT bar in the Channel Configure， the menu list as below :

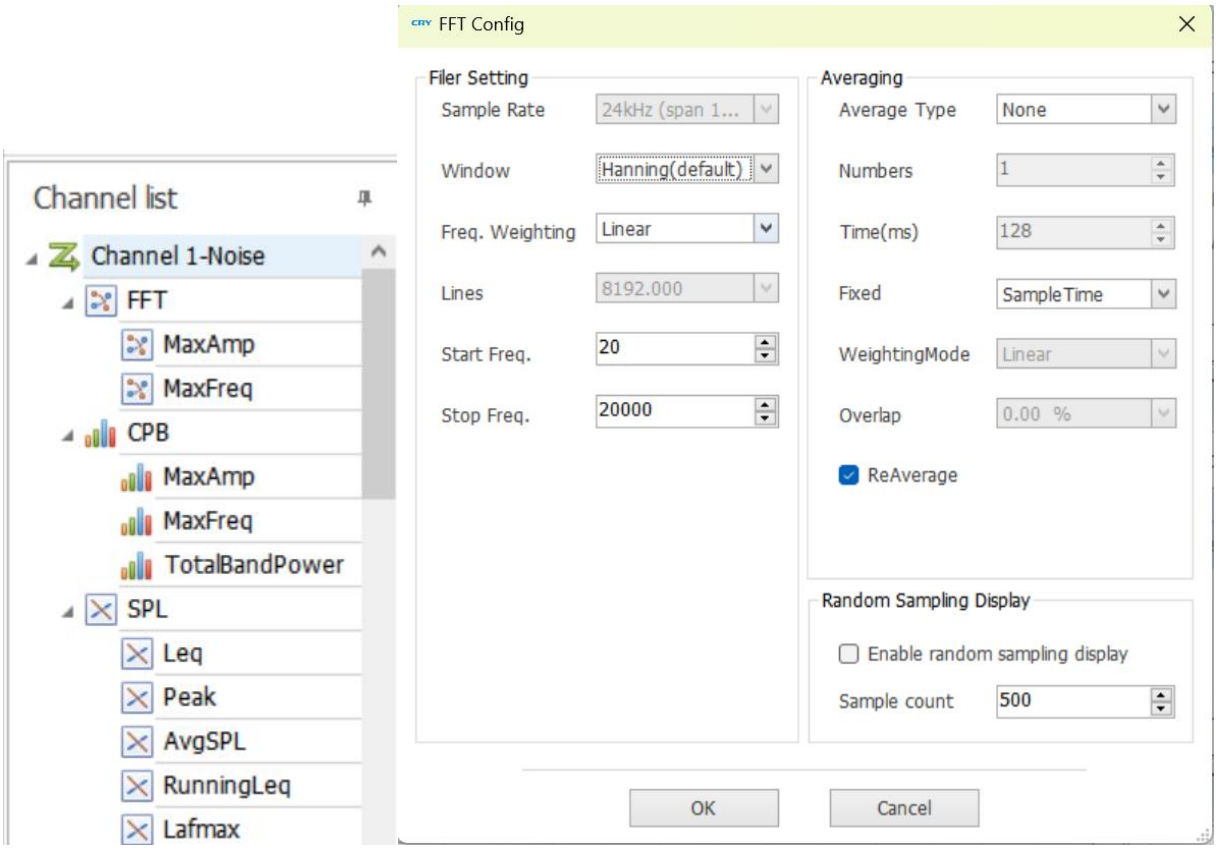


Figure 9. FFT Configuration Interface

- **Configure** FFT parameters;
- Set **Thresholds**;
- **Export waveform data** (saved as cvs format, open in Excel);
- **Delete** test item, as shown in Figure 9;

FFT parameter configuration mainly includes:

- **Window** function (for alleviating spectrum aliasing, optional without window, Hanning window which is in default and Hamming window);
- **Frequency weighting** (A, B, Cweighting,Linear);
- **FFT Line** (The default value is 48000);
- Starting and ending **Frequency** (default 20Hz ~ 20kHz);
- **Average mode** (average of the RMS in default);
- **Time weighting** (linear or exponential);
- **Data Overlap rate;**
- Customized test item name;
- In addition, you can set thresholds for amplitude and frequency for the peak of the spectrum to facilitate subsequent testing;

6.6.3 Threshold Verdict Configuration Window

There are three modes for setting the test threshold: no threshold, straight line and curve. By default, no threshold is set. After selecting the line type, you can add the upper and lower lines of the threshold. Select the curve type to draw the upper and lower lines of the threshold. See Figure 11, Figure 12.

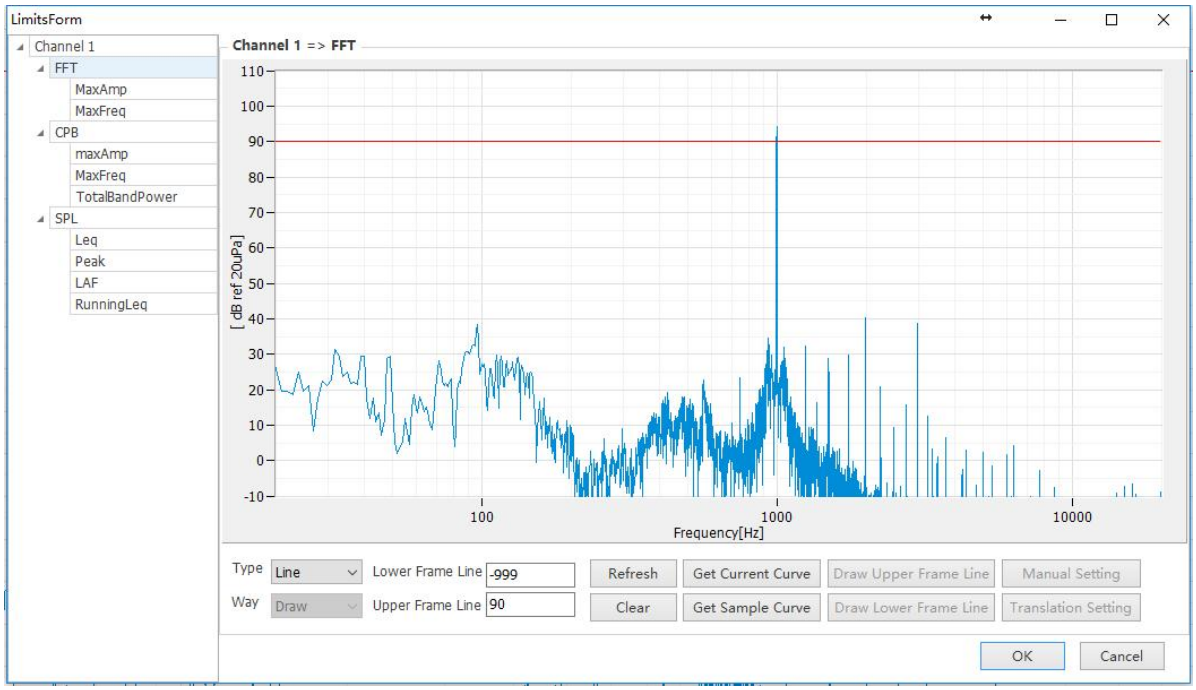


Figure 11. Line Threshold

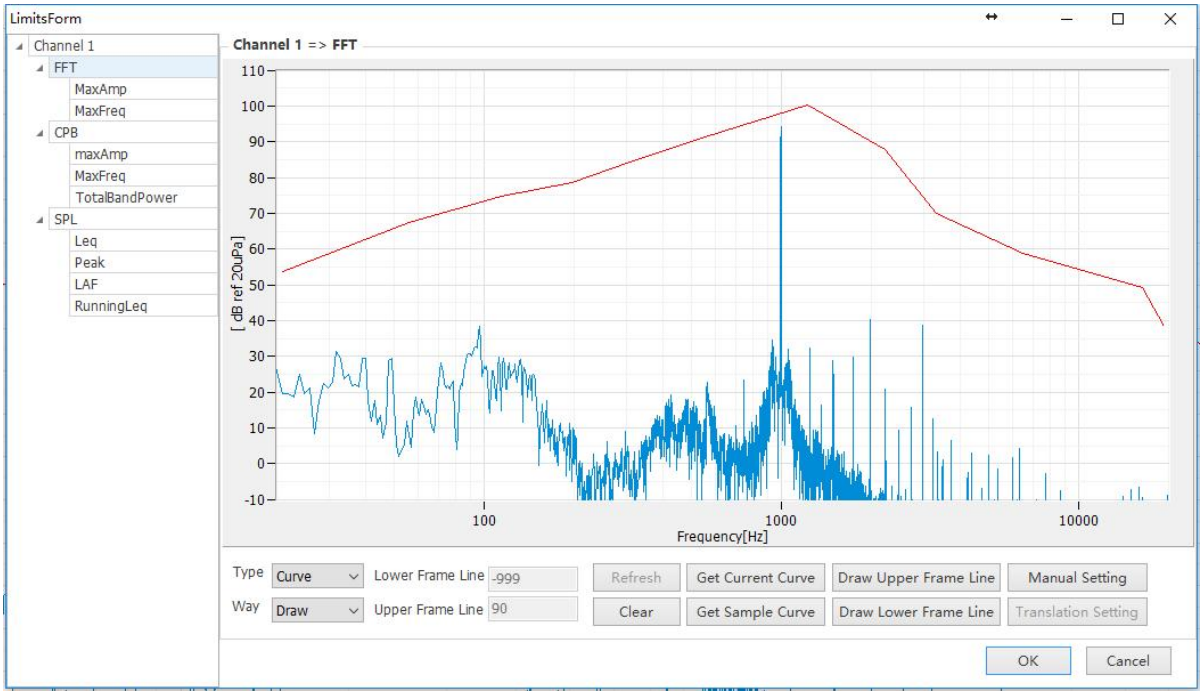


Figure 12. Curve Threshold

6.6.4 CPB Test Configuration Window

Right-click on the CPB bar in the Channel Configure，the menu list as below :

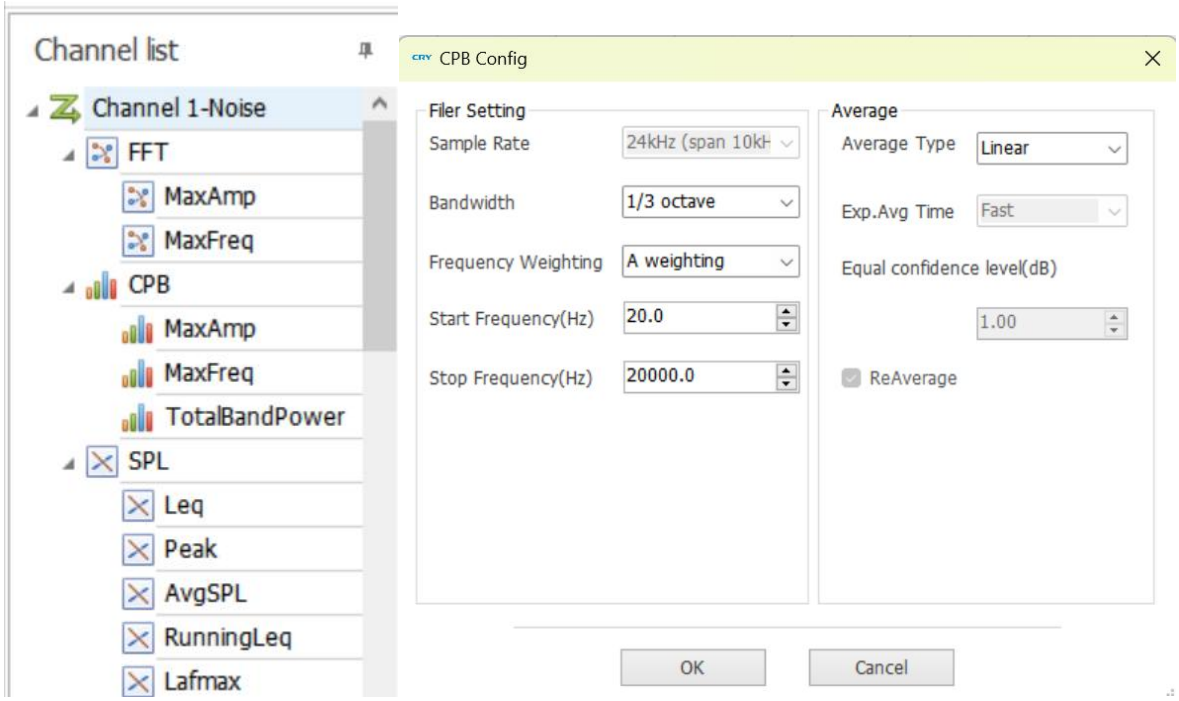


Figure 12. CPB Configuration Interface

- **Configure** the CPB parameters;
- Set the **Threshold**;
- **Export** the waveform data (saved in cvs format and open in Excel);
- **Delete** the test item.

As shown in Figure 12. The CPB configurable parameters include:

- **Octave** selection (1/1, 1/3, 1/6, 1/12, 1/24 optional);
- **Frequency weighting** (A, B, C weighting,Linear);
- Start and stop **Frequency** (default 20Hz ~ 20kHz);
- **Averaging method** (default linear average);
- Customized test item name.

The CPB threshold setting is the same as FFT. In addition, the amplitude and frequency at the CPB peaks and the TotalBandPower threshold can be set to facilitate subsequent testing.

6.6.5 SPL Test Configuration Window

Right-click on the SPL bar in the Channel Configure，the menu list as below :

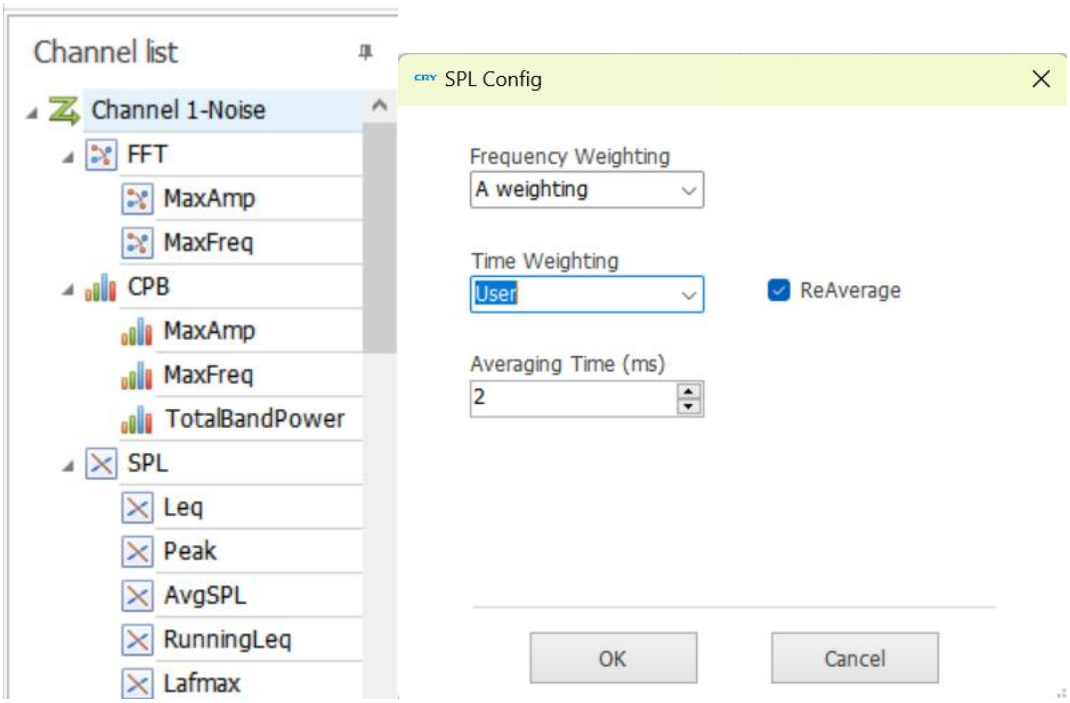


Figure 13. SPL Configuration Interface

- Configuring the SPL parameters;
- Setting the decision threshold;
- Exporting the waveform data (saved in cvs format and open in Excel);
- Deleting the test items;

As shown in Figure 13. The configuration parameters of the SPL mainly include:

- Time weighting (Fast,Slow ,Impluse,User);
- Time length (default 2s);
- Frequency weighting (A, B, Cweighting and Linear optional);
- Re-average (recalculation from time 0 beginning each time);

The threshold of sound pressure level is set to the same frequency spectrum. In addition, the threshold for time average sound level (L_{eq}), peak sound pressure level (L_{peak}), sound pressure level (SPL) can be set to facilitate subsequent testing.

6.6.6 Acceleration Level Test Configuration Window

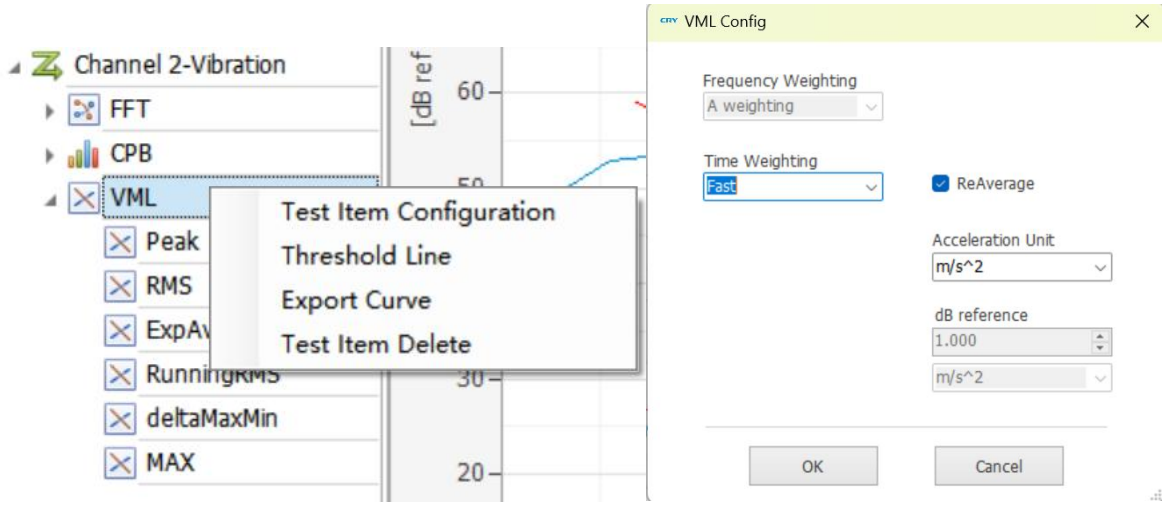


Figure 14. Acceleration Level Configuration Interface

- **Configure** the Vibration Acceleration Level;
- Set the **Threshold**;
- **Export** the waveform data (saved in cvs format and open in Excel);
- **Delete** the test item.

As shown in Figure 14. The acceleration level configuration parameters mainly include:

- **Time Weighting** (F, S, I weighting optional and User);
- **Re-average** (recalculation from time 0 beginning each time);
- The **Unit** of acceleration (m/s^2, g, dB);

In addition, you can set the threshold for the maximum acceleration, root mean square, exponential average, real-time RMS, and peak-to-peak acceleration levels to facilitate subsequent tests.

6.7 Trace Window

In figure15, it shows four parameters of channel 1 (sound pressure level, time domain waveform, frequency spectrum and octave) in the waveform window.

In the test process, you can add any parameters to the parameter window through the new window, and the software supports multi-channel multi-window display.

Right-click window menu function, can choose to add the response functions such as:

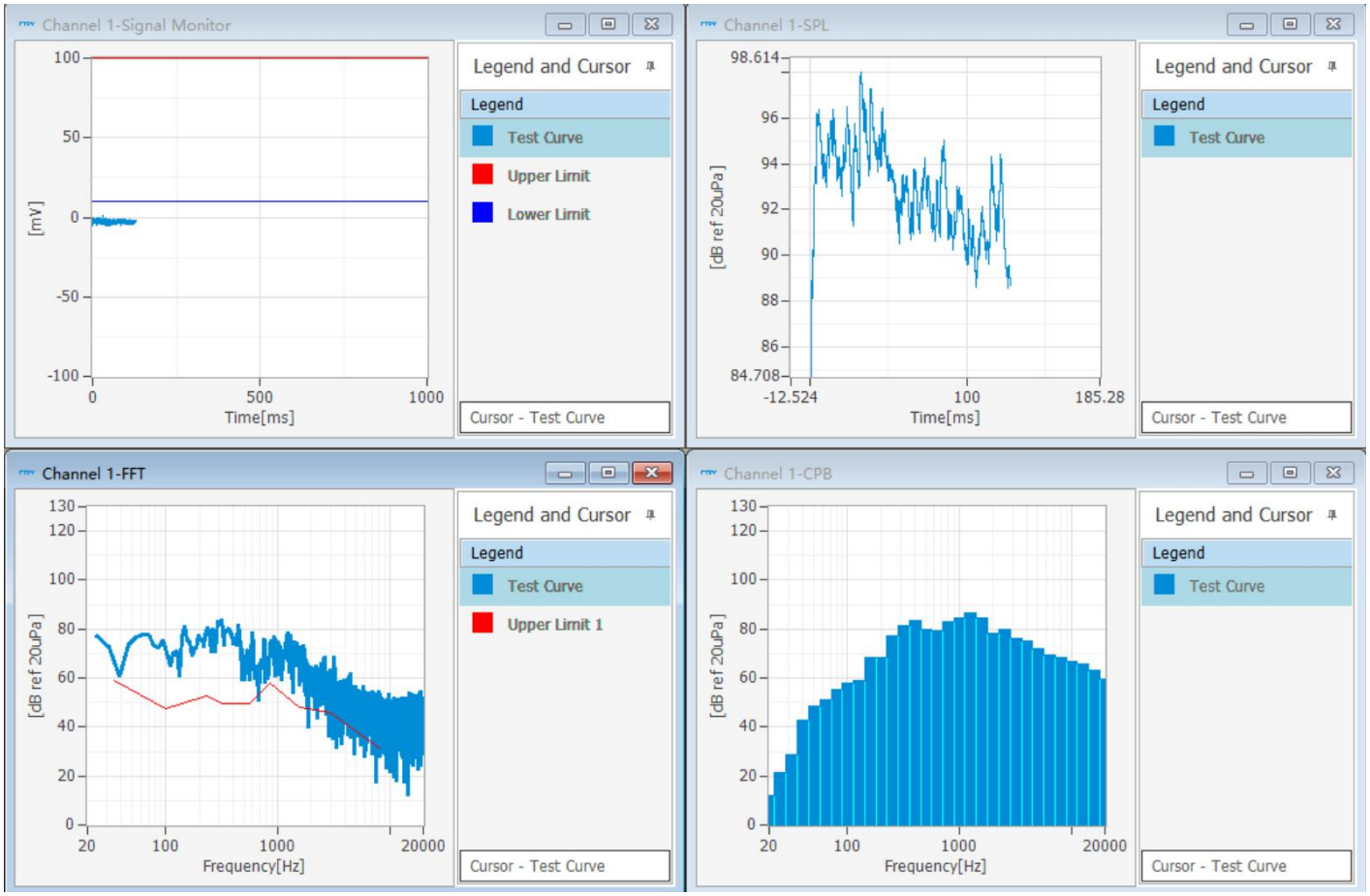


Figure 15. waveform Window

- Display the **Cursor**
- **Zoom** waveform
- **Mobile** waveform
- **Reset** wave
- **Threshold** Settings
- **Limit Line**
- **Import Curve**
- **Export Curve**
- **Export JPG**
- **Calibration**
- **Properties**: Axis setting.

6.7.1 Cursor Function

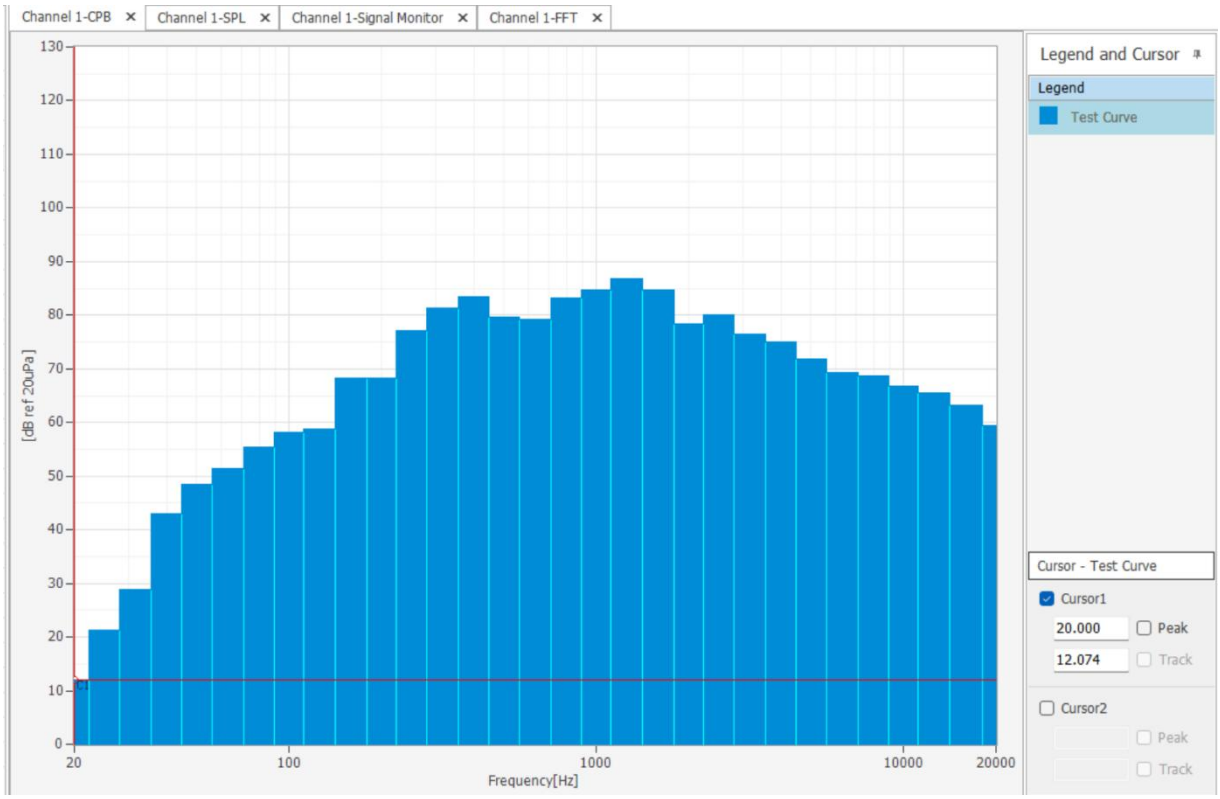


Figure 16. Cursor Function

- After checking the cursor, a column of cursor options will be added to the right of the waveform window;
- After selecting Cursor 1 or Cursor 2, the corresponding cursors C1 and C2 will appear in the waveform window, at the same time show the corresponding value of the cursor in figure 16;
- You can drag the cursor to any data point in the waveform window or move the cursor by entering the horizontal coordinates;
- After the peak is checked, the cursor lock waveform peak;
- After the track is checked, the cursor will track the peak of the locking waveform in a continuous test.

6.7.2 Zoom Function

- After checking the Zoom function, you can enlarge the waveform by selecting the corresponding area;
- Reset the waveform to the initial state by Recovering Waveform;

6.7.3 Move Function

- After checking the move function, the waveform can be dragged in the waveform window;
- If don’t need use this function, please uncheck the move function;

6.7.4 The Curve Import Function

- The Import Waveform File function allows you to import a saved waveform file on your computer into a window for comparison with the current test waveform, as shown in Figure 17;
- Test Curve is the current test waveform and 01-20240104172558.csv is the imported waveform;
- Import can only with the current test item of the same set of curves

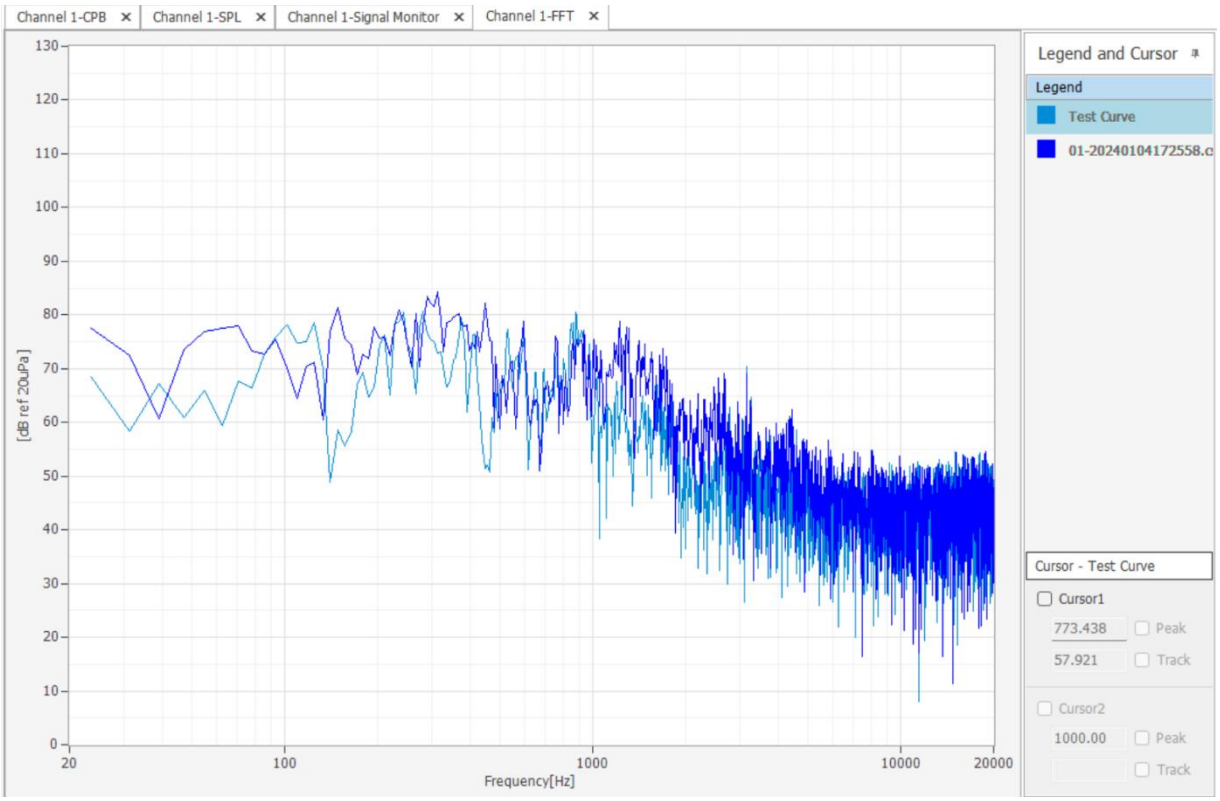


Figure 17. Import Waveform File for Comparison

6.7.5 The Chart Properties

- Chart Properties can adjust the range of axes, as well as the background grid size, as shown in Figure 18. The Threshold Settings and Calibration Functions are the same as above, except that a new entry has been added for easy operation.

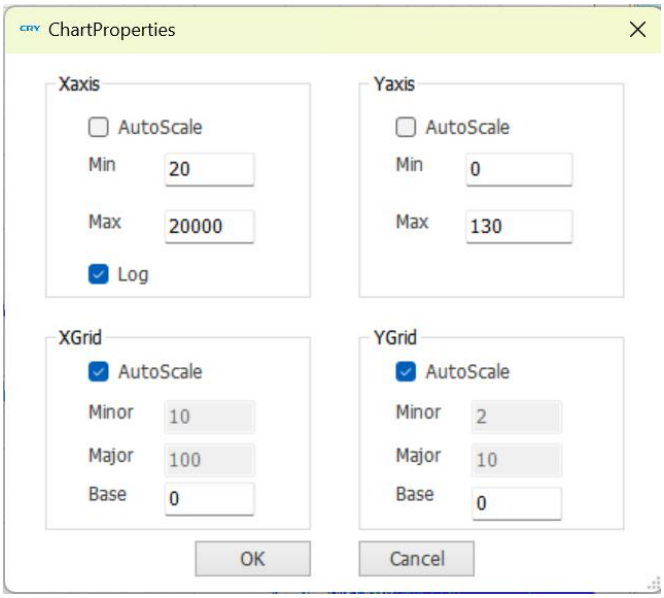


Figure 18. Window Parameter Settings

6.8 Verdict Window

As shown in figure 19, Verdict window can obtain the values of each test, make a test decision by ticking the items you need, and spectrum, octave, sound pressure level bar said waveform curve of window threshold to Vedict whether qualified, other item threshold set in the threshold Settings window. When all items are passed, the display is qualified.

The threshold settings can be set by clicking on the Limit Line of the menu bar.

Data window

General items	CH1	CH2
FFT	PASS	PASS
MaxAmp	55.402	46.279
MaxFreq	929.688	367.188
CPB	PASS	PASS
MaxAmp	57.408	47.36
MaxFreq	1000	1000
TotalBandPower	62.945	55.885
SPL	PASS	PASS
Leq	62.865	51.538
Peak	73.605	63.058
AvgSPL	62.295	51.195
RunningLeq	62.865	51.538
Lxymax	67.161	55.003
CH verdict	FAIL	FAIL

Figure 19. Verdict Window

6.9 Report Function

The report module can export the curve window screenshots that have been added with JPG.

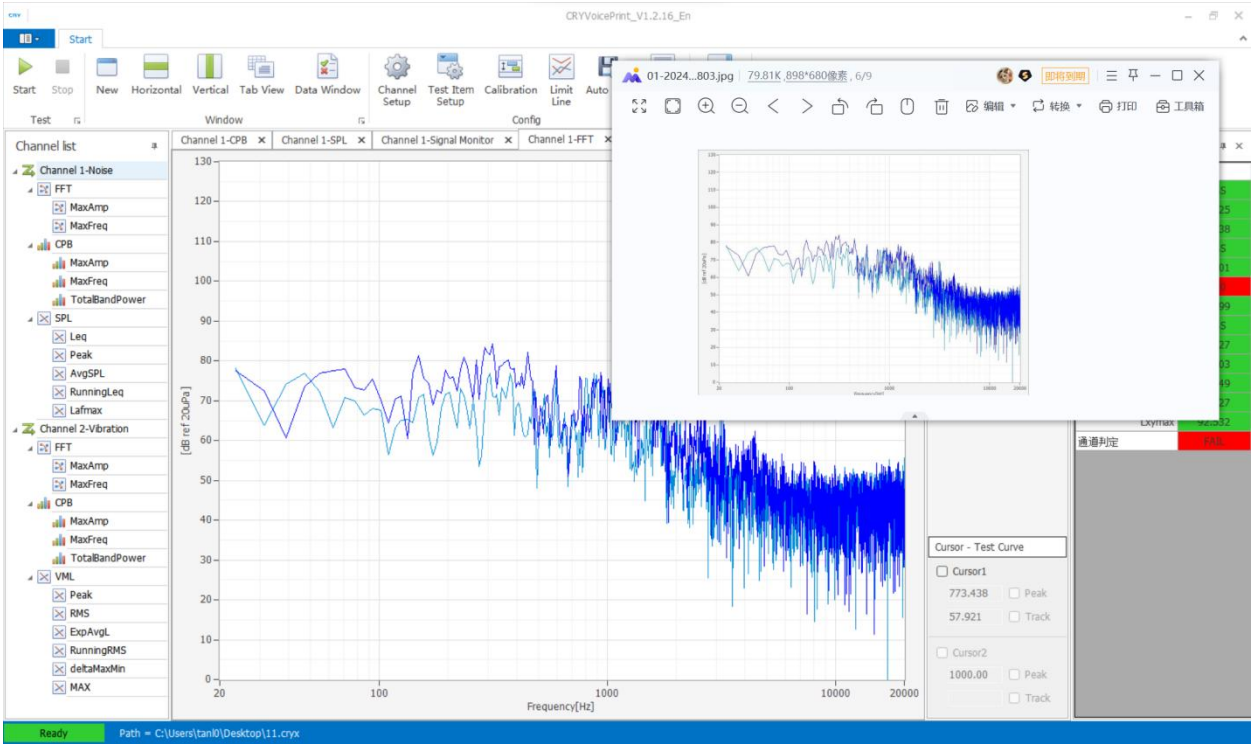


Figure 20. Report

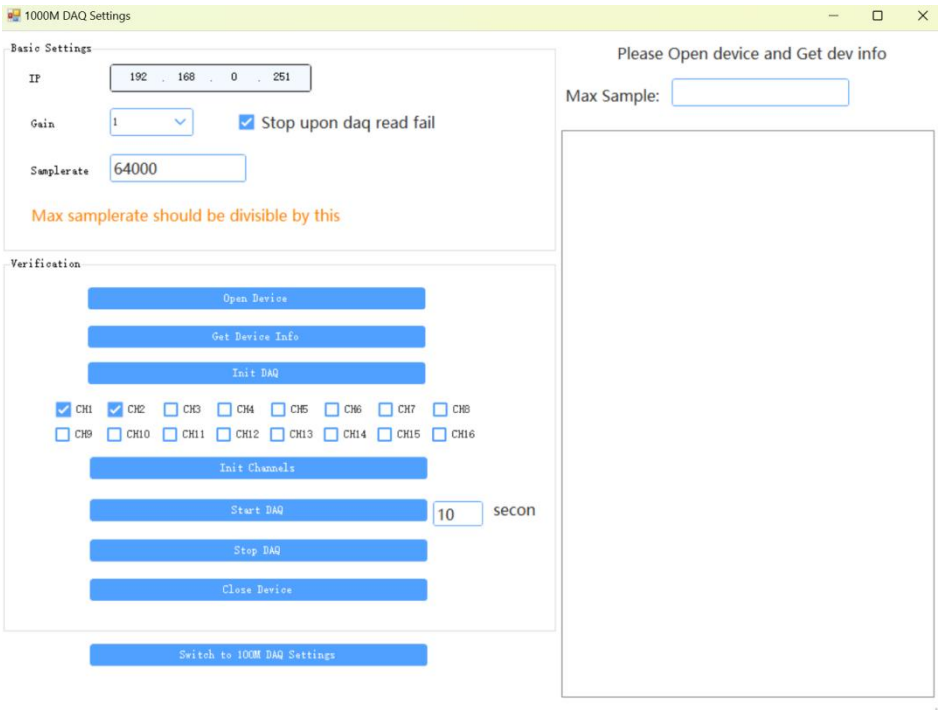
7. Test Sequence

Before using the 5069 software, you need to install and run the required configuration environment for the software.

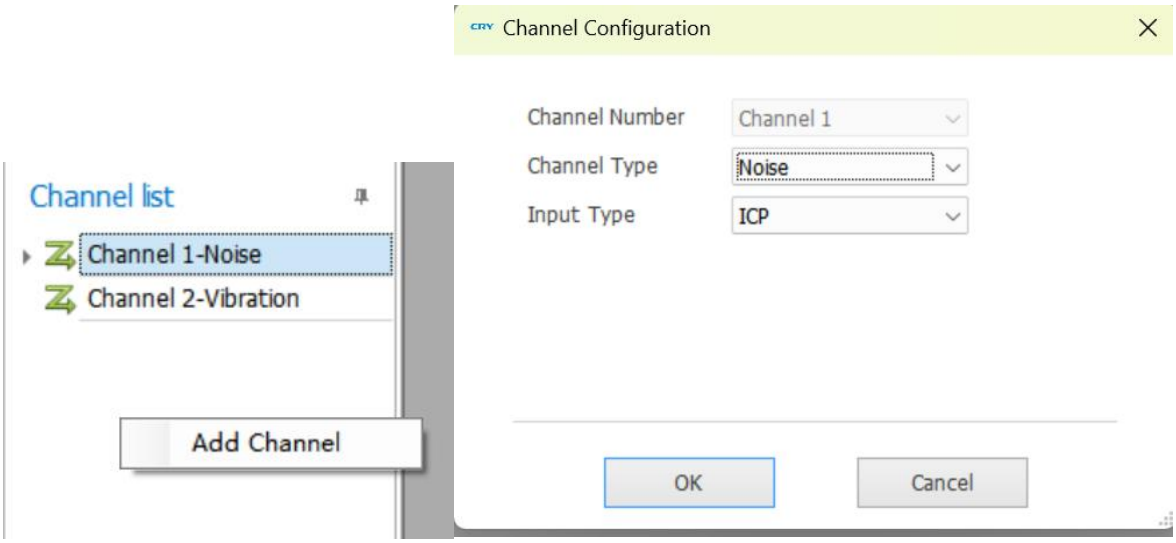
.net framework 48-x86-x64-allos-enu	2023/7/10 21:34	应用程序	71,018 KB
LVRTE2013std	2019/2/12 16:54	应用程序	263,437 KB

1) Create a new test project or open a saved engineering template.

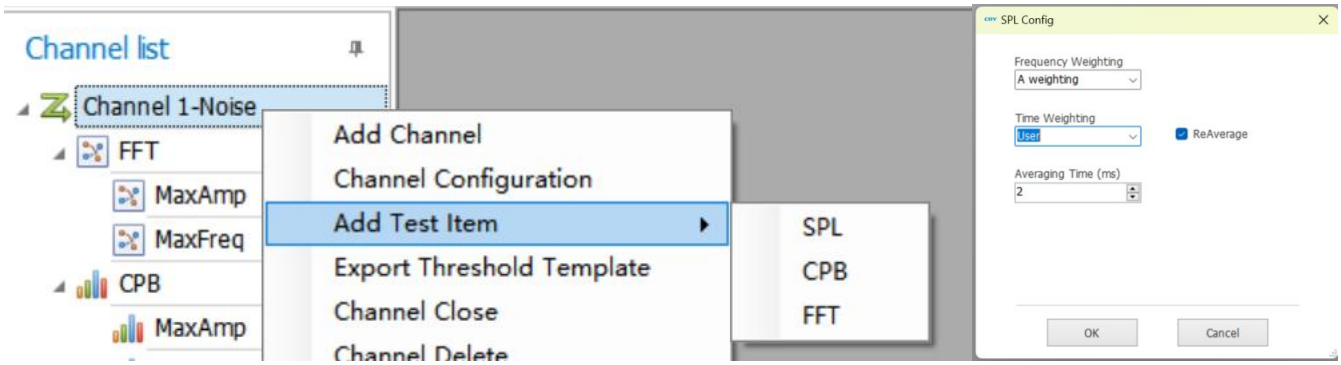
2) Click on "AD SETUP" to configure basic parameters.Click on “Switch to 1000M DAQ Settings”.



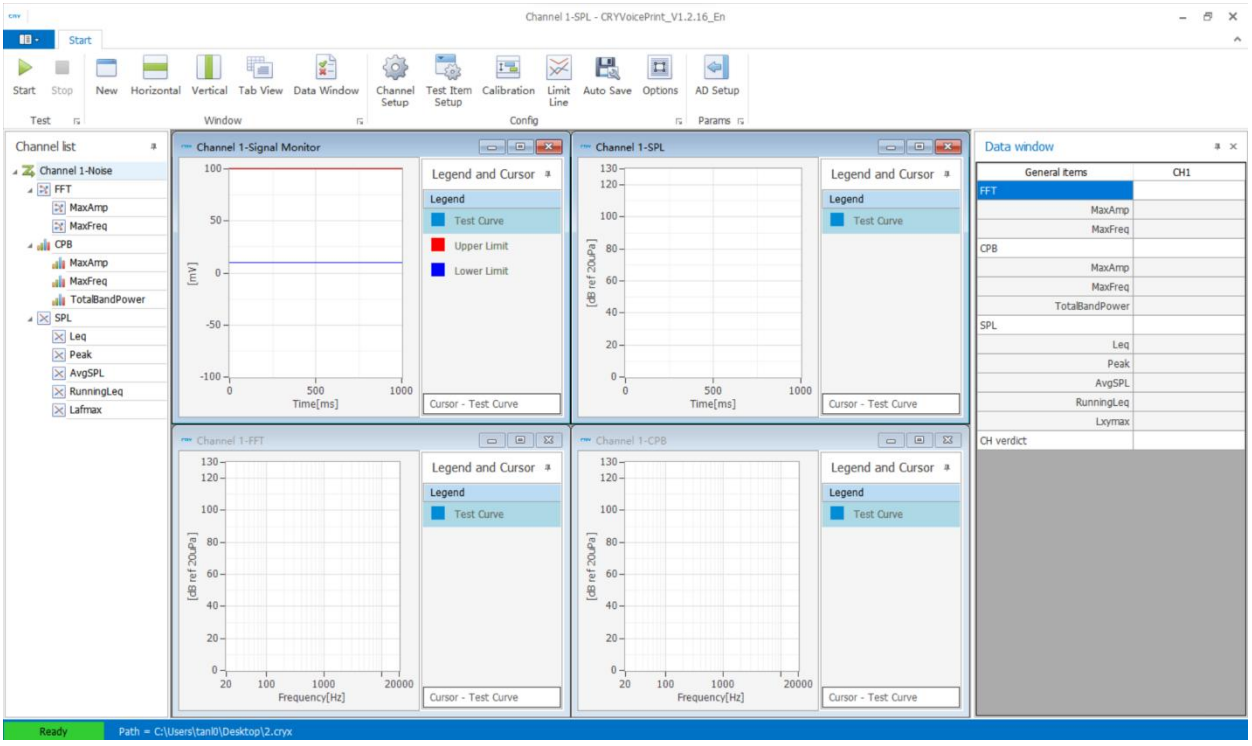
3) Right-click in the channel configuration window, add test channels, and configure channel parameters. Such as channel number, channel type, sampling rate, sampling time, etc., or using default values.



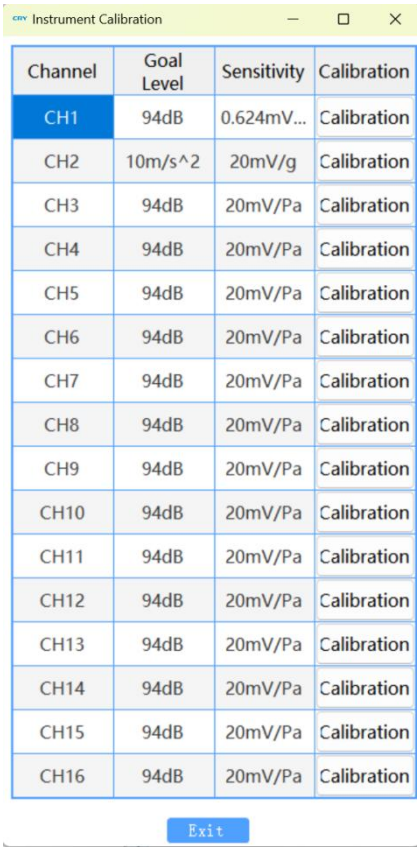
4) Right click on the channel bar, select add test items, and configure test item parameters. Such as the frequency weighting, time weighting, octave etc.



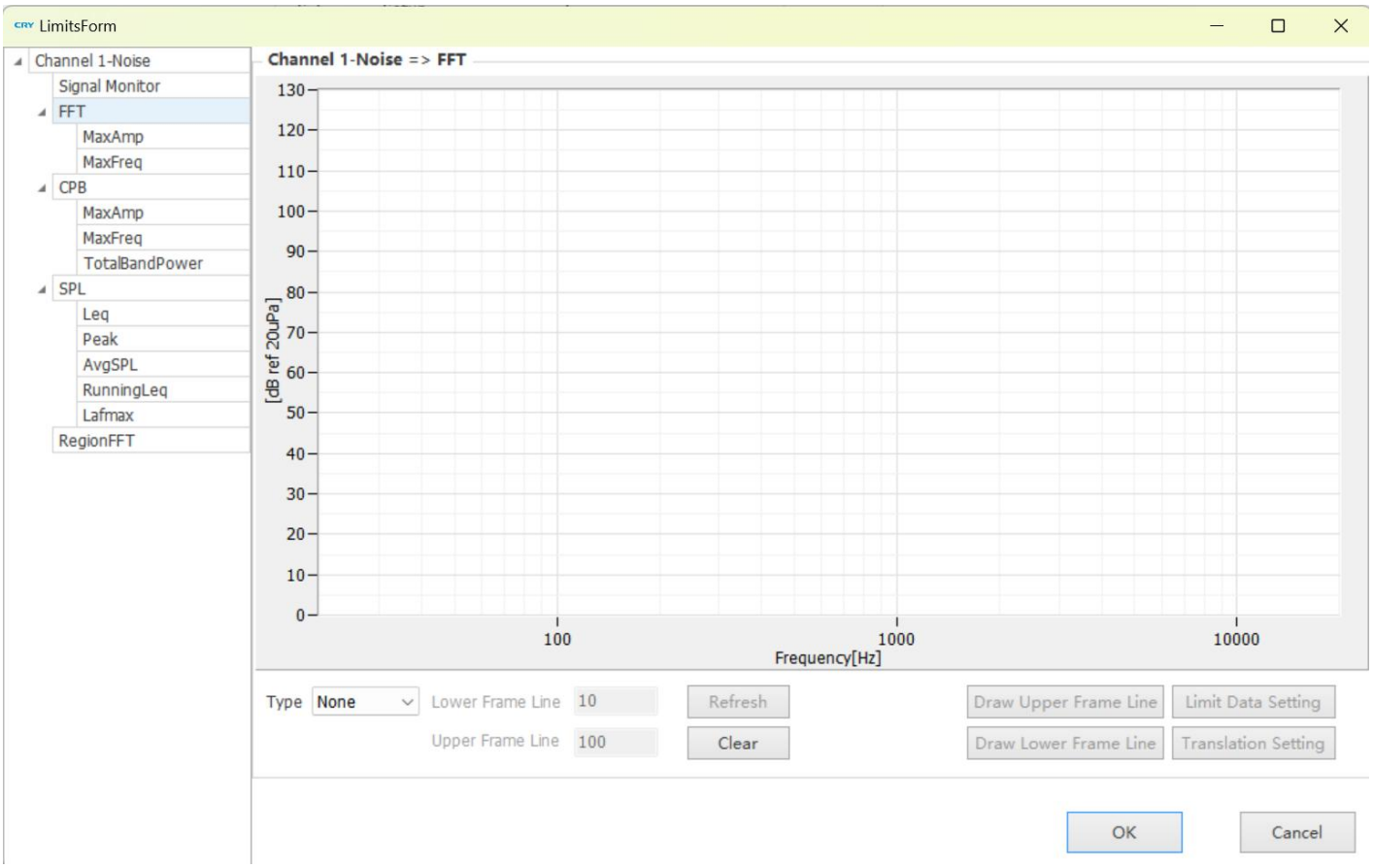
5) New test window and Vedict window, and adjust window distribution.



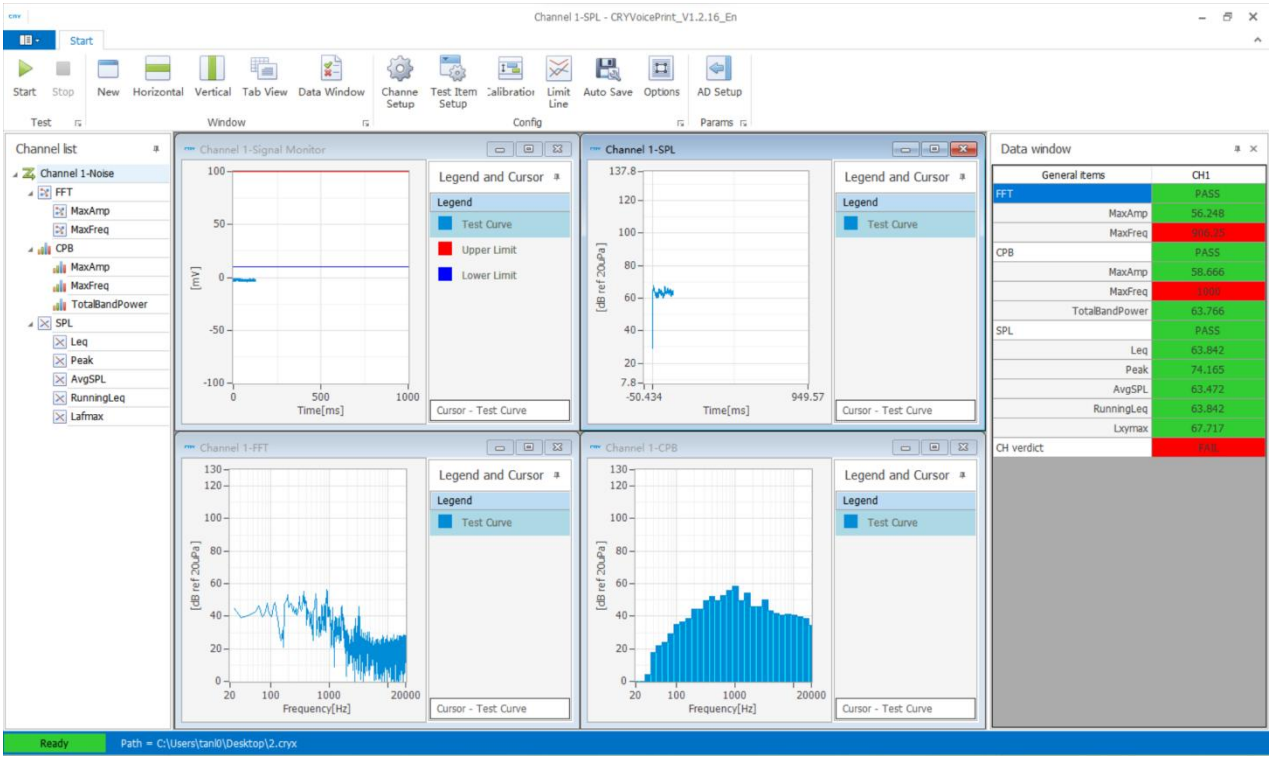
6) Calibration of instrument and calibration of microphone.



7) Set the judgment threshold, and check the required parameters in the Vedict window.



8) Click single or continuous to start the test. Observe the obtained test results.



8. Notification

1. The above software function is the basic function of CRY2716. If the user needs to expand and customize the function, you can contact our company for customization.
2. During the use of the signal line, the signal line shall not be short connected with the signal ground line, and the power supply shall not be short-connected with any ground wire to avoid burning the instrument.
3. This instrument is operated by professional technicians to ensure good long-term performance. If you have any questions, please contact us.
4. This instrument is guaranteed for a year.

Appendix A: Glossary Explanation

1. **Measurement microphone**: used for measuring the sound pressure of acoustoelectric conversion device, its sensitivity, known under prescribed conditions and usually has a wide and flat frequency response, good stability, large dynamic range, etc. The CRY331/333 microphone designed and produced by our company is the prepolarization free field measurement microphone for measuring the undistorted real sound pressure before the microphone is put into the sound field. Design and production of CRY332/772 microphone is pre-polarization pressure field measurement microphone, used to measure the microphone diaphragm on the surface of the actual sound pressure (including because of the existence of microphone itself and cause the change of the sound field).

2. **Octave**: the upper limit frequency is twice as high as the lower limit frequency. This method is used to divide each frequency to be called 1 Octave, or Octave, the abbreviation is Oct.

3. **1/3 octave**: in the 1 octave between the upper and lower frequency and then insert two frequency points, a frequency range can be divided into three frequency range, and four of the ratio between frequency points the same, namely the G3 = 2, the abbreviation is 1/3 Oct. The same can be said of 1/6 Oct, 1/12 Oct, 1/24 Oct.

4. **Calibration**: the sound level calibrator should be used for sound calibration before use. The sound level calibrator produces 1kHz, 94dB sound pressure level.

5. **Sound Pressure Level (SPL)**: the logarithm of the base Sound Pressure and the base Sound Pressure ratio is multiplied by 20. The sound pressure level is represented by decibels (dB), and the symbol is Lp.

6. **Frequency Weighting**: For sound level weights, the difference between the indicated signal level on the display unit and the corresponding constant amplitude steady-state sinusoidal input signal level. The difference between the levels is expressed in decibels (dB).

7. **Time Weighting**: A time-index function that specifies the time constant that weights the square of the instantaneous sound pressure.

8. **Time-weighted Sound Level**: The base-10 logarithm of the root-mean-squared pressure to the reference sound pressure multiplied by 20, and the root-mean-squared sound pressure is weighted by the standard frequency weights and standard time weights. The time weighted sound level is expressed in decibels (dB) with the symbols L_{AF}, L_{AS}, L_{CF}.

9. **Peak Sound Level**: The base 10 logarithm of the ratio of peak sound pressure to reference sound pressure times 20, and the peak sound pressure is weighted by the standard frequency. The peak sound level is expressed in decibels (dB) with the symbol L_{peak}.

10. **Time-average Sound Level and Equivalent Continuous Sound Level**: within the prescribed Time interval, the square is the root of the ratio of the benchmark Sound pressure and Sound pressure with logs base 10 x 20, Sound pressure with a standard frequency weighting. The time average sound level or equivalent continuous sound level is expressed in decibels (dB), and the symbol is L_{eqT}

Appendix B: The RS485 Modbus communication protocol is V1.0

Baudrate	9600
Databits	8
Stopbits	1
Parity	NONE

Tips: The bytes used in the following description (Byte) are 8 bits, and the word (word) is 16 bits.

Register type used: hold register (read and write), input register (read-only).

Supported function code:

- **The 0x04 (read input registers), frame format**

Request frame:
Address domain (1Byte) + function code 0x04 (1 Byte) + register start address (2 Byte) + register number (2 Byte) +CRC16 check code (2 Byte)

Response frame:
Address domain (1Byte) + function code 0x04 (1 Byte) + bytes (1 Byte) + register content (2Byte) +register number (2 Byte) +CRC16 check code (2 Byte)

- **0x03（Read hold register），frame format**

Request frame:
Address domain (1Byte) + function code 0x03 (1 Byte) + register start address (2 Byte) + register number (2 Byte) +CRC16 check code (2 Byte)

Response frame:
Address domain (1Byte) + function code 0x03 (1 Byte) + bytes (1 Byte) + register content (register number *2 Byte) +CRC16 check code (2 Byte)

- **0x06（Write a single hold register），frame format：**

Request frame:
Address domain (1Byte) + function code 0x06 (1Byte) + register start address (2 Byte) + register number (2 Byte) +CRC16 check code (2 Byte)

Response frame:
Address domain (1Byte) + function code 0x06 (1Byte) + register address (2Byte) + register content (2Byte) +CRC16 check code (2 Byte)

- **0x10（Write multiple hold registers），frame format：**

Request frame:
Address area (1Byte) + function code 0x10 (1Byte) + register start address (2 Byte) + register number (2 Byte) + byte number (1Byte) + register content (length equal to byte number byte)

+CRC16 check code (2 Byte).

Response frame:

Address domain (1Byte) + function code 0x10 (1Byte) + register start address (2Byte) + register number (2Byte) +CRC16 check code (2 Byte)

- **The address domain range that is supported as below:**

The 0 as the broadcast address.

The 1~247 address range from the available machine.

Register content definition

- **Holding register part Content format:**

The template ID：

The four character (4Byte) represents the template name.

The channel control: 2Byte,

The high 8 bits of data for the 0x00,

The low 8 bits: 0x55 said that at the beginning of the test, 0xAA said stop test.

The custom field:

Unopened.

CRY2716 has 16 channels, each of which takes up 16 register addresses in the hold register, and an additional broadcast channel takes up 16 register addresses.

The register segment occupied by all channels, with the same structure in the segment, as shown in the following figure.

<table>
<tr><td colspan="2">0x0000</td><td colspan="2">0x0001</td><td colspan="2">0x0002</td><td colspan="2">0x0003</td></tr>
<tr><td>Byte1</td><td>Byte2</td><td>Byte3</td><td>Byte4</td><td>Byte5</td><td>Byte6</td><td>Byte7</td><td>Byte8</td></tr>
<tr><td colspan="4">template ID 4 Byte</td><td colspan="2">channel control 2 Byte</td><td colspan="2">custom field</td></tr>
<tr><td colspan="2">0x0004</td><td colspan="2">0x0005</td><td colspan="2">0x0006</td><td colspan="2">0x0007</td></tr>
<tr><td>Byte9</td><td>Byte10</td><td>Byte11</td><td>Byte12</td><td>Byte13</td><td>Byte14</td><td>Byte15</td><td>Byte16</td></tr>
<tr><td colspan="8">custom field 26 Byte</td></tr>
<tr><td colspan="2">0x0008</td><td colspan="2">0x0009</td><td colspan="2">0x000A</td><td colspan="2">0X000B</td></tr>
<tr><td>Byte17</td><td>Byte18</td><td>Byte19</td><td>Byte20</td><td>Byte21</td><td>Byte22</td><td>Byte23</td><td>Byte24</td></tr>
<tr><td colspan="8">custom field 26 Byte</td></tr>
<tr><td colspan="2">0X000C</td><td colspan="2">0X000D</td><td colspan="2">0X000E</td><td colspan="2">0X000F</td></tr>
<tr><td>Byte25</td><td>Byte26</td><td>Byte27</td><td>Byte28</td><td>Byte29</td><td>Byte30</td><td>Byte31</td><td>Byte32</td></tr>
<tr><td colspan="8">26 Byte</td></tr>
</table>

CH1 occupied 0x0000~0x000F address in the range of 16 to keep the register,
CH2 occupied 0x0010~0x001F address in the range of 16 to keep the register,
CH3 occupied 0x0020~0x002F address in the range of 16 to keep the register,
CH4 occupied 0x0030~0x003F address in the range of 16 to maintain a register,
a broadcast channel occupies 16 to keep the register 0x0080~0x008F address range

Register address calculation method:

corresponding channel address segment start address + address within segment

Example:

2 channel control register address =CH2 address segment start address (0x0010) + Segment address (0x0002) = 0x0012

- **Input register Content format：**

The high 8 bits of data retention, 0x00;

The lower 8 bits of data representation of equipment status：

0x00 Indicate that the device is idle;
0XFF Indicate that the device is busy;
0x55 Representing the test results Pass;
0xAA Representing the test results Fail;

0x0000		0x0001		0x0002		0x0003	
Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8
CH1 Channel States		CH2 Channel States		CH3 Channel States		CH4 Channel States	

Appendix C: TCP/IP protocol specification V1.0

1. Agreement

Communication protocol TCP/IP, CRY5069 software terminal for Server (TCP Server), secondary development software end for Client (TCP Client).

The server port is customizable.

To open TCP/IP communication, you need to check whether or not to set up server > in software options/server Settings.

2. Communication instruction

function	send	return	note
State of Query	States?	RStates 0;Ready； States 1; Testing	
Start Testing	Start;	RStart 1;StartTesting； RStart 0; Not Ready	
StopTesting	Stop;	RStop 1; ； RStop 0; Fail to Stop	
Query Results	Result?	RRes: Ch1 1; RRes: Ch2 1; RRes: Ch3 1; RRes: Ch4 0; RRes: Ch5 1; RRes: Ch6 1; RRes: Ch7 1; RRes: Ch8 1;	1: Pass 0: Fail

The communication instruction is continuously increasing. If there is any requirement, please contact our engineer.

Appendix D: IO module and switch output control

1. Summary

The software can support the integrated automation module, which needs to buy IO module hardware separately. TTL I/O can be supported, DC wet switch output.

2. I/O setting interface

You can define the I/O port of the back panel DB25 interface of CRY2716 to control the start and end of the corresponding channel test and the test results and state of the corresponding channel.

Input IO: when the corresponding input IO receives TTL (3.3 v-5v) high level, the current input channel selection action will be performed.

The optional execution of any channel is as follows:

Number	Event
1	Channel 1 Start
2	Channel 1 Stop
3	Channel 2 Start
4	Channel 2 Stop
5	Channel 3 Start
6	Channel 3 Stop
7	Channel 4 Start
8	Channel 4 Stop
9	ALL Start
10	ALL Stop

when the corresponding output IO corresponds to event/action, the current output IO will be set to TTL high level.

Number	Event
0	None
1	Channel 1 State
2	Channel 2 State
3	Channel 3 State
4	Channel 4 State
5	System Heathy State
6	Channel 1 Result
7	Channel 2 Result
8	Channel 3 Result
9	Channel 4 Result
10	System Working State

System Heathy State: indicating device status indication: equipment working normally,
System Working State: indicates whether the device is tested or finished.

3. Interface setting interface of DC wet switch

If necessary, purchase hardware IO module.
12V switch output (with load capacity): mainly used to indicate test status; Each channel is assigned a four-way switch output.
The default is 0; Trigger the following events to be 1;
Definition of four - way switches per set.

- switch 1 indicating equipment idle or state by the end of the test
- switch 2 denote a state of the device is busy
- switch 3 instructions Pass test results
- switch 4 indicator test results Fail

Pin distribution is as follows:

Event	Number
12V switching value CH 1 2 3 4	Instruct Channel 1 State
12V switching value CH 5 6 7 8	Instruct Channel 2 State
12V switching value CH 9 10 11 12	Instruct Channel 3 State
12V switching value CH 13 14 15 16	Instruct Channel 4 State