EMI Testing Receiver

EM5080L (9kHz~30MHz)

EM5080M (9kHz~500MHz)

EM5080B (9kHz~1GHz)

Shenzhen Zhiyong Electronics Co., Ltd.

1. Summary

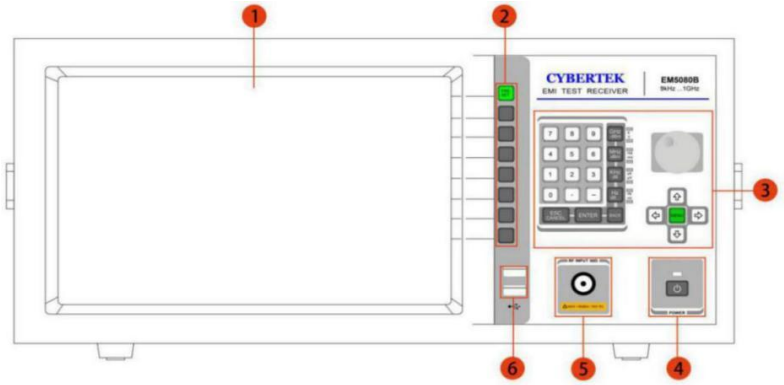
EM5080 series are full-digitalized pre-certified time domain receivers in complete accordance with the CISPR16-1-1 standard. EM5080 series apply a real-time analysis technology platform, using the computing ability of PC platform to realize real time high speed FFT analysis and calculation with real time bandwidth of 10MHz to testing electromagnetic disturbance. EM5080 series' time domain scanning is 500 times faster than the step scanning of the other receiver, the disturbance testing now need only a few seconds and save large amount of time and cost during the product development and certification period. EM5080 series contain real time spectrum analyzing function and display with 10.4-inch HD screen to perform its clear menu and easy to use. Windows 10 operating system make it easy to maintain and upgrade.Digital time domain receiver brings our customers faster scanning, better precision, and higher stability.

2. Characteristics

- Full-digitalized pre-certified time domain receiver
- Contain EMI test receiver and real-time spectrum analyzer
- FFT time domain scanning can test electronic disturbance at high speed
- Real time spectrum analysis with bandwidth up to 10MHz
- Satisfy CISPR 16-1-1 requirement with all resolution ratio bandwidth
- Pre-selector with 20dB pre-amplifier
- Clear 10.4-inch large LCD and structural menu make it easy to operate

3. Panels

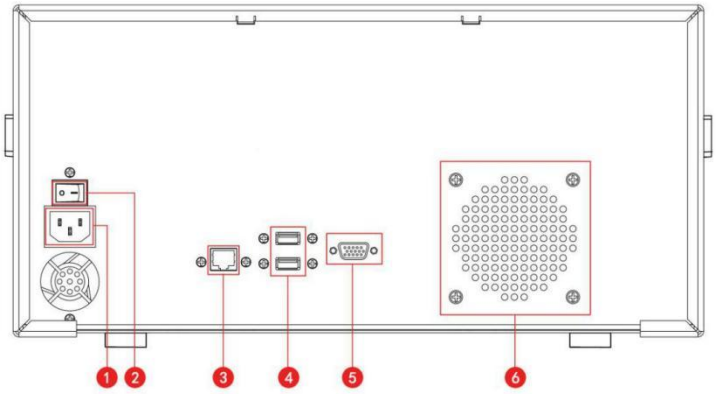
Front Panel



Mark Num.	Name	Description
1	LCD screen	Display testing curve, set up status and related data. Please refer to sheet 4 for further detail
2	Soft buttons 1-8	Cooperating with LCD screen. PRESET button is for recover to default setting or return to the previous menu
3	Navigation and main menu setting	Can use rotary knob, numbers, direction and menu key to make different setting. Please refer to "navigation and main menu setting" for further detail
4	Power switch	Turn on/off the machine
5	Signal input port	50Ω impedance, max input 30dBm/50V DC (RF attenuation≥20dB)
6	USB port	USB port used to connect devices such as keyboard, mouse, flash disk

Sheet 1 Front Panel

◆ Rear Panel



Mark Num.	Name
1	AC power supply input port. 180V-240V 50-60Hz 3.0A
2	Power Switch
3	LAN port
4	USB port
5	VGA port, external display device accessible
6	Thermal Via, please do not cover it during operation

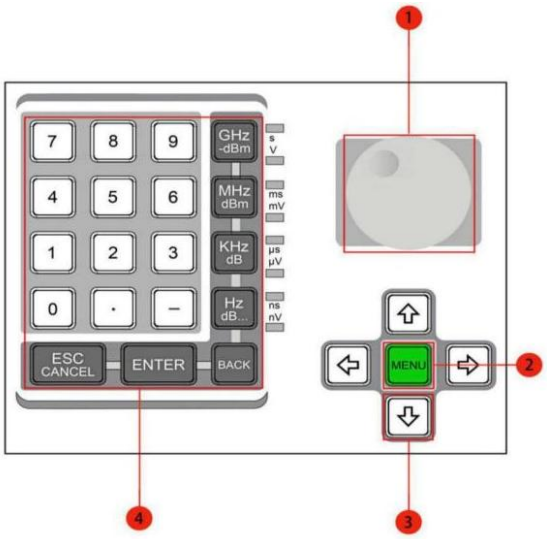
Sheet 2 Rear Panel

4. Technical Specification

Frequency range	EM5080L	9kHz to 30MHz
	EM5080M	9kHz to 500MHz
	EM5080B	9kHz to 1GHz
Level		
Maximum RF level (CW)	RF attenuation≥20dB RF pre-Amplifier off	30dBm(=1W)
Maximum pulse voltage	RF attenuation≥20dB	150V
Resolution ratio bandwidth		
	Analyzer mode	1/2 /3/5/10 step from 10Hz to 1MHz (- 3dB)
	Receiver mode	Standard: 200Hz, 9kHz, 120kHz （–6dB) Newly added 10kHz and 100kHz (-6dB) extra optional
Preselector	Could be turned off in analyzer Mode	15 tunnel fixed filter
Preset amplifier	Can be turn on/off	9kHz to 1GHz, 20dB gain, uniformed
Test time	Receiver mode	1ms to 1.5s
Detector	Receiver mode	Peak, quasi-peak, average value
Displayed average noise level	Receiver mode, uniformed, Average detector, RF attenuation 0dB	
	Preset Amplifier off.	
	9kHz<f<150kHz, bandwidth 200Hz	< 0dBμV
	150kHz<f<30MHz,bandwidth 9kHz	< 10dBμV

	30MHz<f<1GHz, bandwidth 120kHz	< 20dBμV
	Preset Amplifier on	
	9kHz<f<150kHz, bandwidth 200Hz	< -5dBμV
	150kHz<f<30MHz, bandwidth 9kHz	< 0dBμV
	30MHz<f<1GHz, bandwidth 120kHz	< 5dBμV
All uncertainty	9kHz≤f<1GHz	1.5dB
Power consumption	<100W	

5. Buttons and Rotary Knob

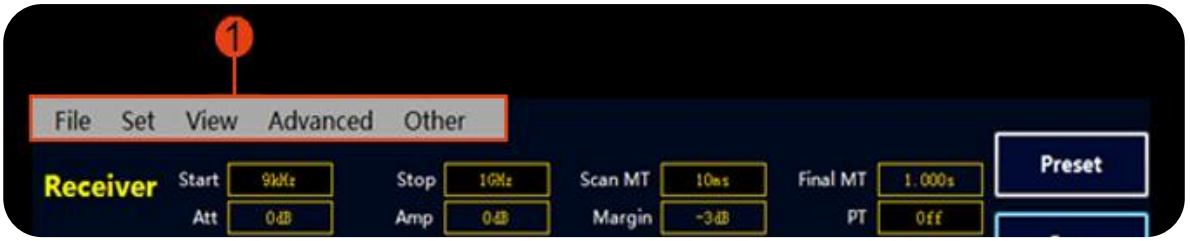


Mark Num.	Name	Description
1	Rotary knob	Rotate the knob to increase or decrease the value, edit the highlighted data or value, or choose list and item by steps
2	Main menu button	Press to display main menu, press again to hide main menu. Please refer to the note description below
3	Direction button	Use the arrow buttons to display or browse the editable item on LCD screen to edit, or choose list and item by steps
4	Number and unit button backspace, confirm, cancel function button	Realize related button defined function

Sheet 3 Buttons and Rotary Knob

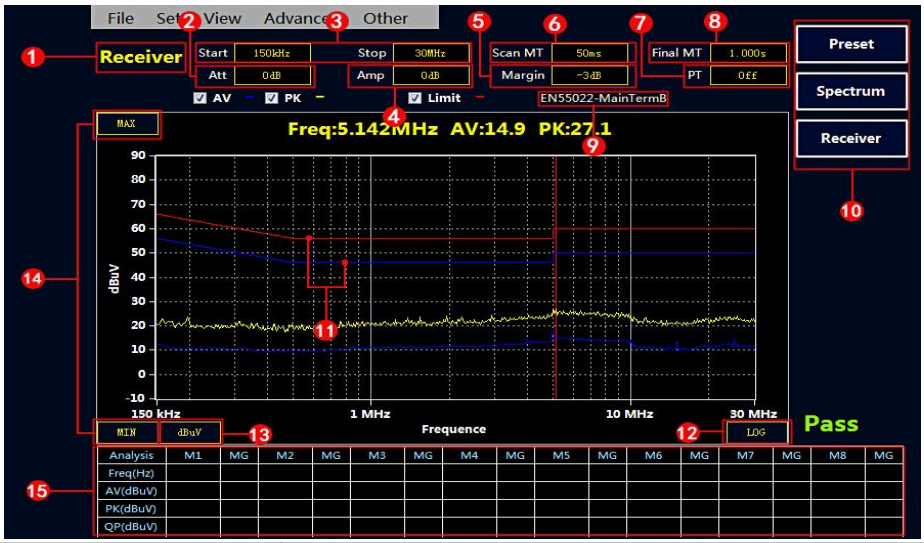
Notes: 

button can display or hide the menu shown below



6. Display Main Menu

The main menu is shown below:

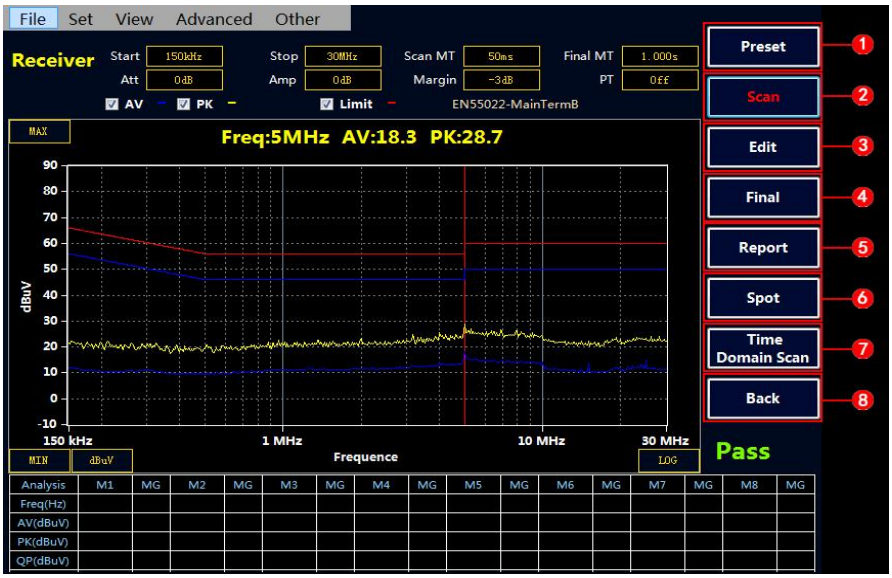


Mark Num.	Name	Description
1	Current mode: receiver mode	Can be switched to frequency spectrum mode by soft button on right side.(Mark number 10)
2	Attenuator setting	Optional from 0 to 30, 10dB each step
3	Current starting frequency and terminating frequency	Set by using mouse or direction button, ENTER button, cooperating with number buttons.
4	Preset amplifier status indication	Set by using mouse or direction button, ENTER button. 0dB and 20dB optional
5	Margin	"-6" means 6dB away from limit line. Users can edit the parameter according to their need. Proceed to set using mouse, direction, ENTER and number buttons.
6	Single point test time under scanning mode	Proceed to set using mouse, direction, ENTER and number buttons. QP curve will be generated when time is set not less than 500ms
7	Afterglow mode status indication	Proceed to set the switch using mouse, direction and ENTER button
8	Single point test time under final test mode	Proceed to set using mouse, direction, ENTER and number buttons.
9	Current curve limit indication	Users can choose or add different limit in main menu. Please refer to "how to add new limit curve" for further detail.
10	Restore, frequency spectrum, receiver mode select button	Switch between receiver mode and spectrum mode with soft button.
11	Limit line	Red line is quasi-peak value limit line, blue line is average limit line.
12	X axis frequency display mode. Can be switched to LINEAR mode	Proceed to switch using mouse, direction, ENTER and number buttons.
13	Amplitude unit: dBuV, dBm, dBuA, dBpW	Proceed to switch using mouse, direction and ENTER button
14	Y axis range setting	Proceed to set using mouse, direction and ENTER button
15	Data sheet	Will automatically show the value of frequency point surpassing margin. The value manually added will also be shown in this data sheet.

Sheet 4 Display Interface

7. Receiver Mode

◆ Receiver mode main interface



Mark Num.	Name	Description
1	Preset button	Set the software to default status
2	Start or stop scanning	Do not change setting during scanning, proceed to set after scanning stopped.
3	Edit scan result	Can edit scanned data, including locate peak value, add or delete frequency point and zoom in/out
4	Final test	Can proceed final test to the frequency point in data sheet
5	Quick report generation	Generate test report fast
6	Spot test function	Enter Spot mode, test for single point
7	Scan mode switch	Switching between time domain and step scanning.
8	Return	Return to previous menu

Sheet 5 Receiver Mode Main Interface

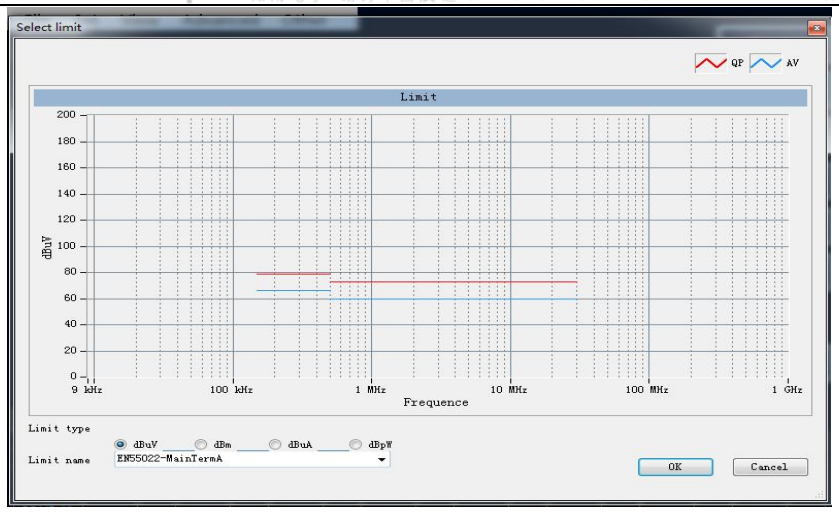
◆ Receiver mode quick operating steps

① Scan mode setting and testing

✧ Press Receiver to enter receiver mode. (Receiver mode is default setting)

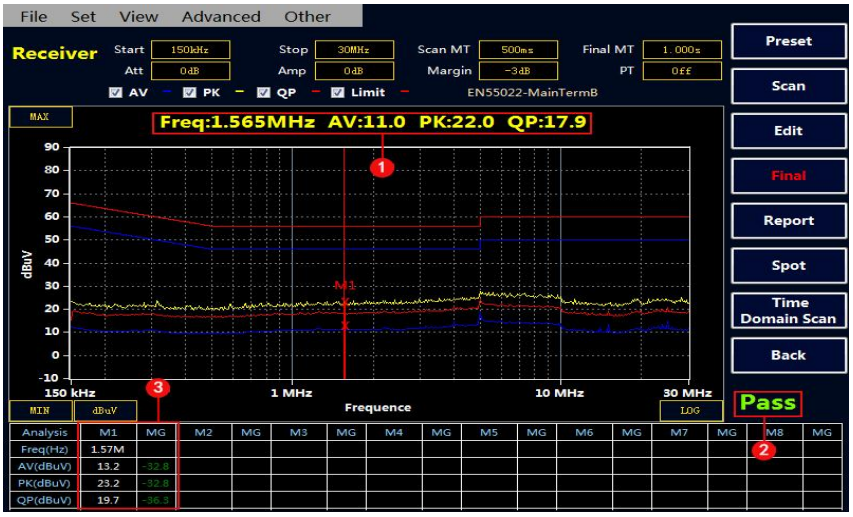
✧ Set “starting frequency”, “stopping frequency”, “single point testing time under scanning mode”, “single point testing time under final test mode” and “Margin”. (Please refer to sheet 4 for setting method)

✧ Select test limit. Press MENU button to display menu. Select “Set”---“limit”---“select limit” to choose limit required and confirm. Please refer to “How to draw limit curve” for further detail about adding new limit.



✧ Select compensation curve. In practical use, the signal under test will need to pass through multiple devices including LISN, antenna, CDN, limiter, attenuator and cables, so loss compensation need to be made and correct by adding compensation curve. Please refer to “How to draw compensation curve” for further detail.

✧ Press **Scan** to initiate scanning and generate curve under test as shown below:



Mark Num.	Description
1	Current Peak value of test curve (auto)
2	Test result. Failed for surpass the limit, Pass for not
3	The detailed AV, PK and QP value of exceed frequency point and value surpasses the limit curve.

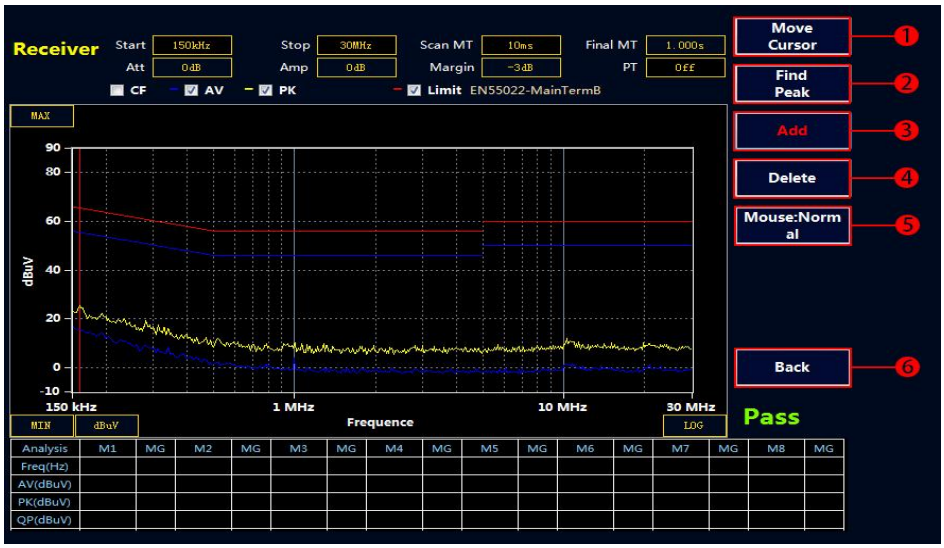
Sheet 6 Scan result description

PS: When Scan Measure Time≥500ms (1.5s Maximum), QP line test will be automatically added, or the system will only scan PK and AV line. The Scan MT = 1 sec in the picture shown above, so the test result includes three curves, AV, QP and PK

② **Edit and analyze the scan result**

Under receiver main menu, click 

button to enter scan curve edit interface as shown below:



Mark Num.	Description
1	Move the cursor: directly type in the frequency point you want to add or check, the cursor will show the corresponding location data according to the input.
2	Look for peak value: Looking for the peak value on curve, click again to realize the auto
3	Add the frequency point where cursor located into the data sheet
4	Delete the frequency point selected in the sheet
5	Mouse: standard status, Functions marked by 1, 2, 3, 4 can be execute for the magnified area Mouse: view status, Curves can be magnified by the mouse.
6	Back to the previous menu

③ **Final Test**

Press 

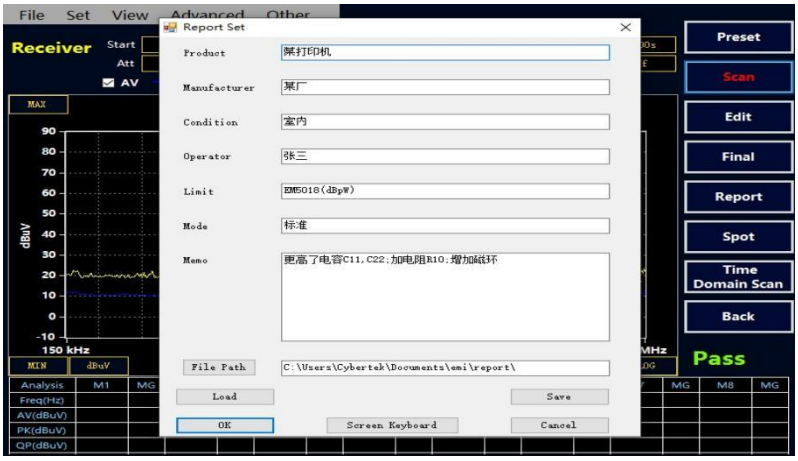
button to proceed to final test to the points in the sheet, testing PK, AV, QP value. Test time can be set in Final MT. Final test will be invalid if there's no exceed point or testing point manually added. ATTENTION: Do not turn off the EUT during Final Test.

④ **Generate Report**

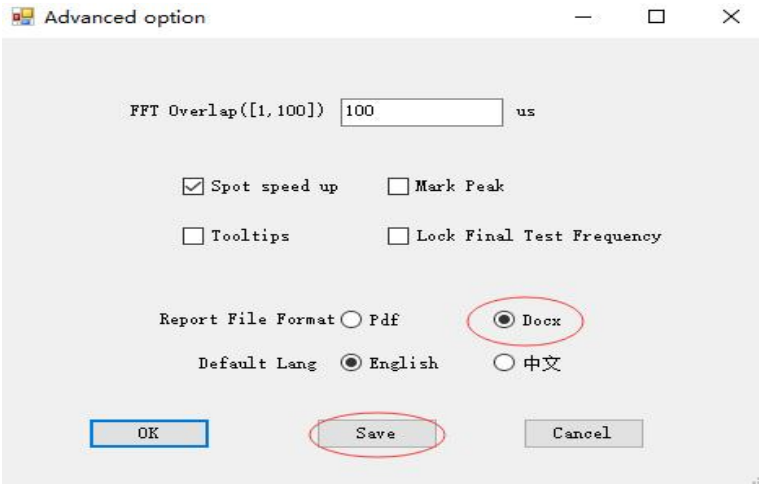
✧ Press 

to display main menu

✧ Move your cursor File---Report---Report Set to set up the related product information as shown below:



✧ Choose Select “Make Report” to automatically generate report in pdf format. You can either save it locally or in your USB flash disk. You can also click the “Report” button in the main menu to directly generate report while the system is in receiver mode. Generating report in word format is also possible (if WPS or word is installed already) by clicking Advanced—Advanced option and select Docx in report file format. Save the setting so that a test report in word form will be automatically generated in the next time you start the system.

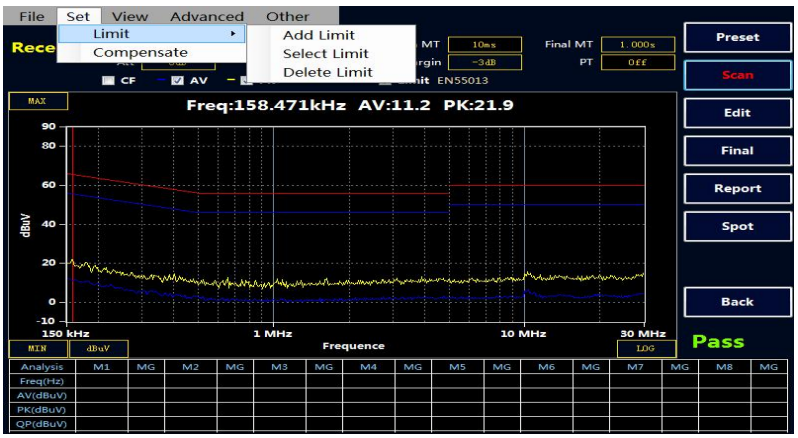


◆ Draw new limit curve

✧ Press 

to enter the main menu

✧ Use the cursor to proceed from Set---Limit---Add Limit, into add/delete limit interface



The example shown below is the radio disturbance limit and testing method (EN55022 standard) of national standard GB 9254-2008/CISPR 22: 2006, adding QP and AV curve separately. The B rank conduct limit value

according to this standard is shown below:

Frequency range/MHz	Limit value/dBuV	
	Quasi-peak value（QP）	Average value（AV）
0.15-0.5	66-56	56-46
0.5-5	56	46
5-30	60	50

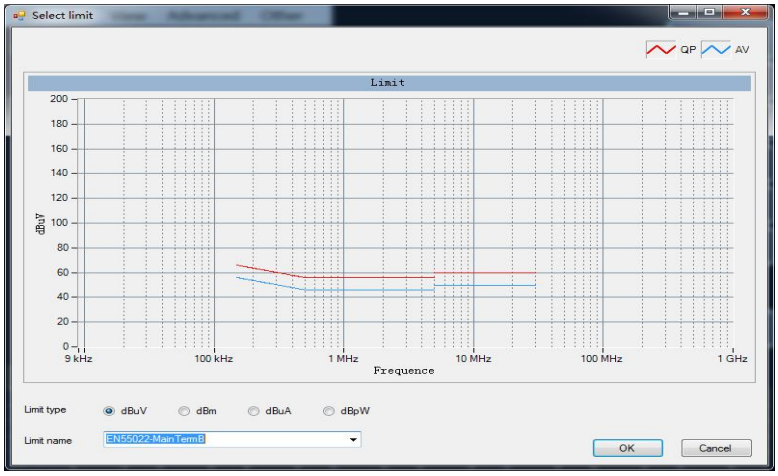
① **Draw QP curve**

- Type in standard name EN55022 in Limit Name and choose dBuV for unit
- Select QP
- Enter corresponding frequency in Freq, limit value in Amplitude and choose Add, Delete or Reset. The sheet above will display the curve drawn at real time.
- Save

② **Draw AV curve**

The method to draw AV curve is nothing different from that of QP curve. Click on Save after AV curve is finished and Exit after the curve limit is finished.

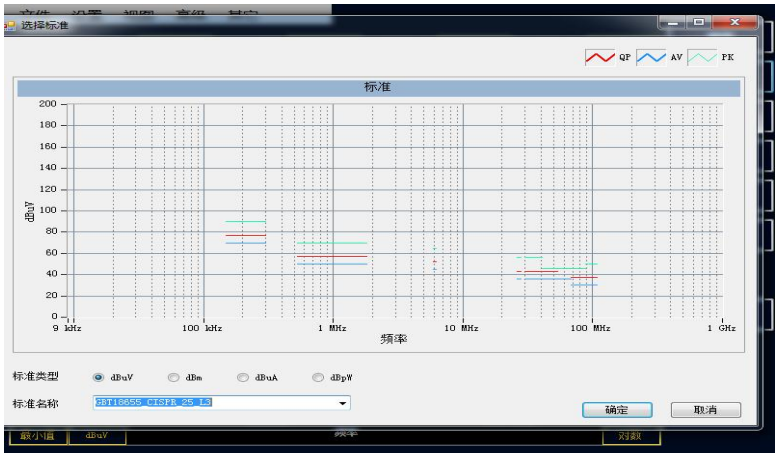
Note: In same limit condition, the limit names of AV and QP curve are the same, and two limit curves will be called.



③Draw PK curve

The method to draw PK curve is nothing different from that of QP curve. Click on Save after AV curve is finished and Exit after the curve limit is finished.

For instance, the GB18655CISPR 25 L3 standard of vehicle electronics required 3 curves including AB, QP and PK curve.



◆ Draw and call the compensation curve

① Draw compensation curve

✧ Press 

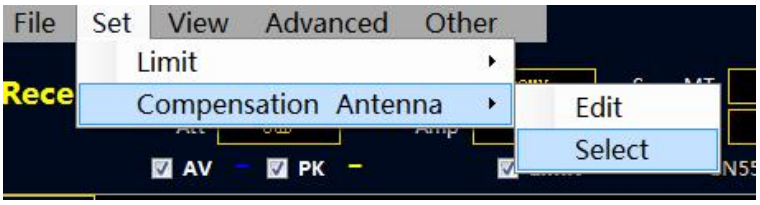
to enter the main menu

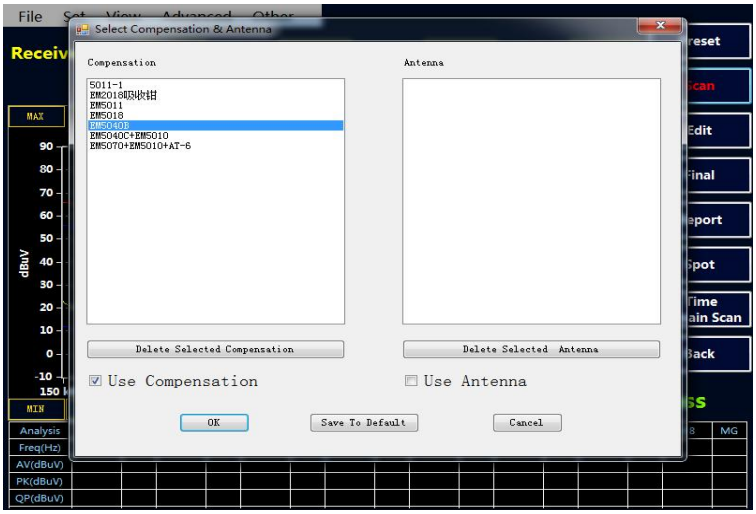
✧ Select Set---Compensate to enter compensation edit interface

✧ Take our LISN EM5040B as example. Due to the inner 10dB attenuator, the actual test result need compensate for 10dB. Type in corresponding frequency in Freq, enter compensation value 10 in Factor and select Add, Delete or Reset according to your need. Name the compensation curve LISN-COMP in the empty space of Filename and click on Save or Save To Default.

② Load Compensation Curve

Click on Set-Compensation Antenna-Select, select the compensation curve needed. Click on Use Compensation, and the program will apply the current compensation curve and display the compensation value on the sheet. Click on OK to confirm.





◆ Save Function

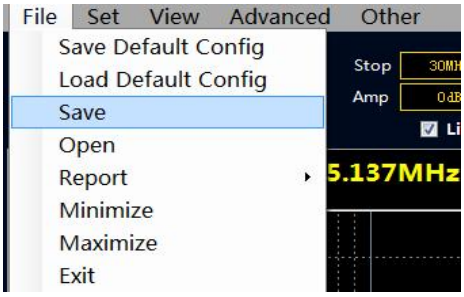
EM5080 has four types of saving:

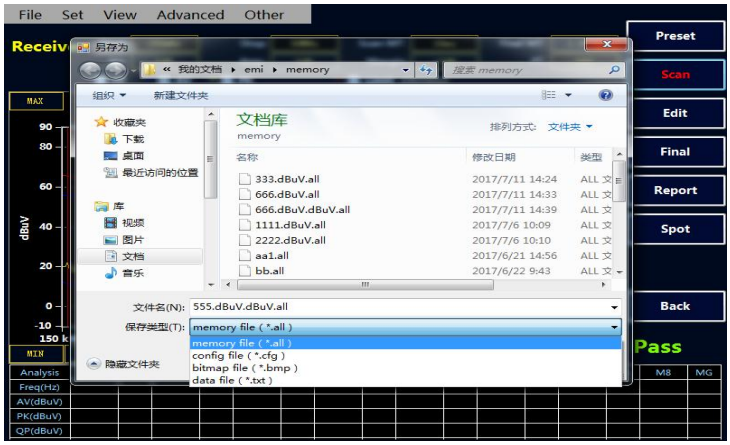
✧ all can save the current scanning data and settings for further comparison between two curves

✧ cfg can save current scanning settings, and users can call previous setting directly.

✧ bmp saves data in picture file

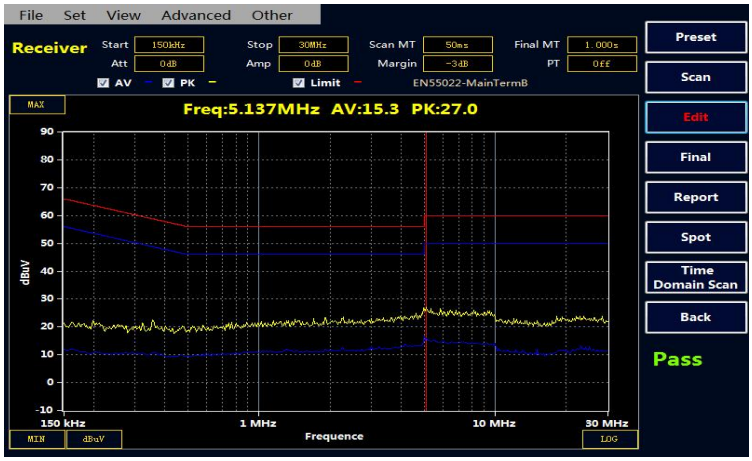
✧ txt save data in notepad

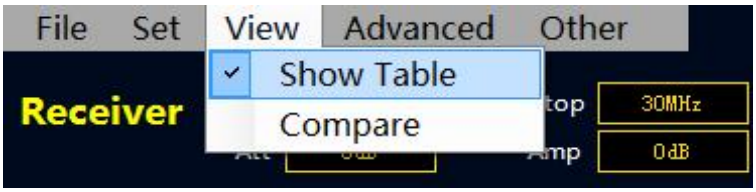




◆ Hide data sheet

Click on the menu View---Show Table to hide and display data sheet. Hide the sheet can show larger graph display interface as shown below

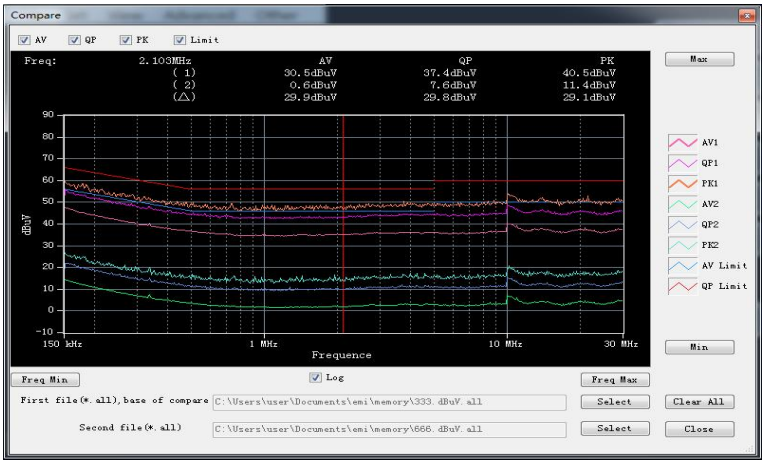




◆ Graph comparison

Click on main menu View---Compare to display the graph comparison interface. Call two .all file to realize the AV, QP PK curve comparison, drag the red line to compare the difference between AV, QP and PK.

Note: the first picture is the current curve scanned by default, and every related setting is based on the first picture file.



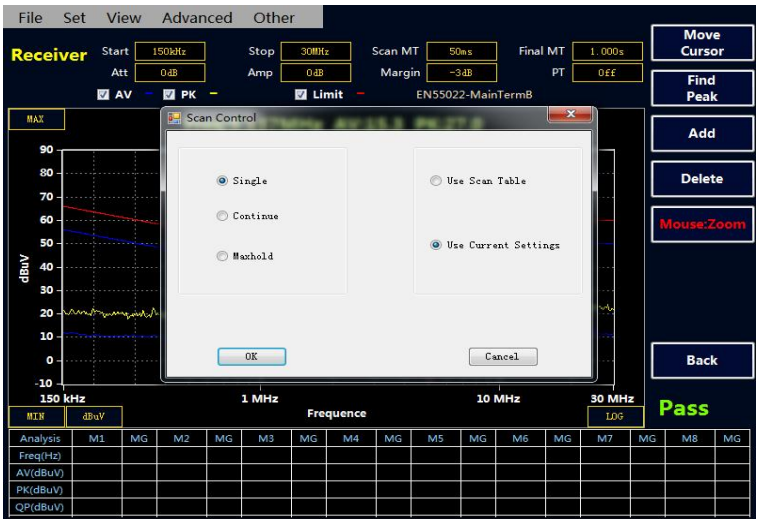
Scan mode setting

Click on menu Advanced---Scan mode to show the dialog box of scan mode

There're three optional modes:

- Single Scan: Only one scan will be executed after clicking Scan. The Stop button can interrupt the scanning at any time.
- Continuous Scan: Continuous scanning will be executed after clicking Scan, and the previous data will be covered. The Stop button can interrupt the scanning at any time.
- Maximum hold scan: Continuous scanning will be executed after clicking Scan, shown as maximum value, and the previous data will be covered. The Stop button can interrupt the scanning at any time.

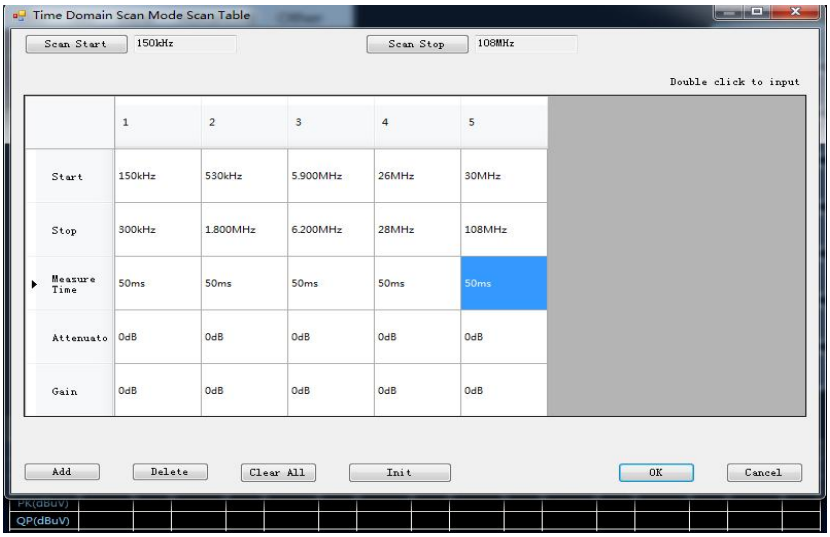
Note: Do not change the related parameter setting during scanning. Change the setting after scanning finished.



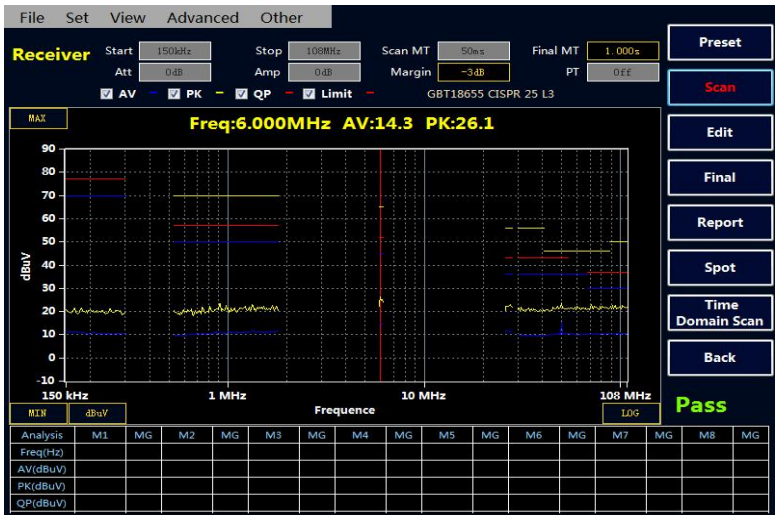
Frequency band setting

Click on menu Advanced---Time Domain Scan Mode Scan Table or Stepped Frequency Scan Mode Scan Table to display frequency band setting dialog box

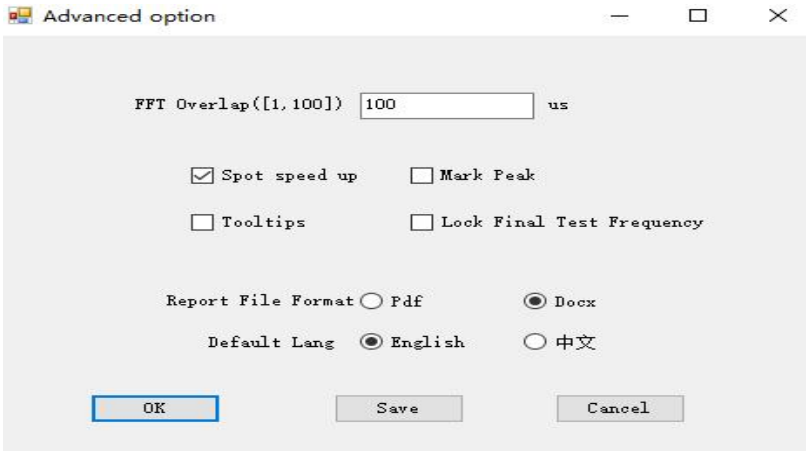
Users can select the scanning frequency band according to their need. For instance, vehicle electronics uses voltage method to test conduct disturbance, and the frequency band used is divided into 6 sections. Users can set the frequency band and scanning time according to the standard as shown below：



After standard is set, proceed scanning to obtain the graph below:

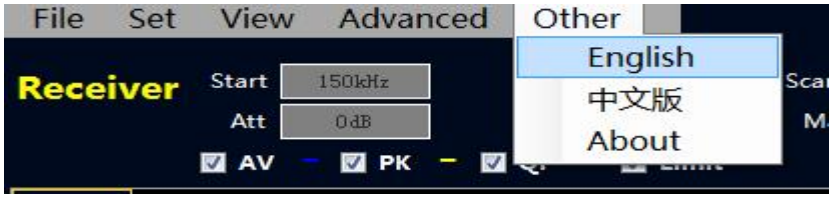


- Setting Introduction of Advanced Option
- Click on Advanced—Advanced option
- FFT Overlap: when testing the transient signal, FFT overlap time need to be reduced to increase the time resolution and grasp the ultra-short time event.
- Spot speed up: Should be turned off when testing transient signal.
- Mark peak: Mark peak.
- Tool tips: Display the mouse position frequency value prompt.
- Lock final test frequency: frequency value locking (detail covered in the introduction of lock final test frequency function).
- Report file format: the default format for generating reports, including PDF and word.
- Default Lang: default language for generating reports.



Chinese/English Switching

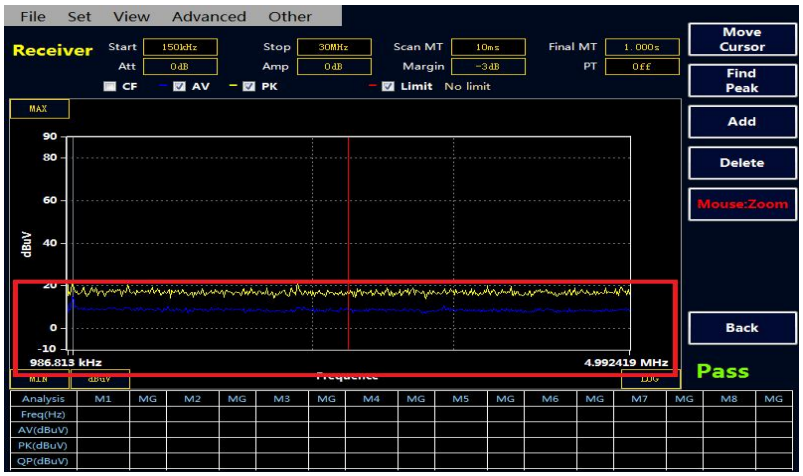
Click on Other to switch language according to need.



Curve Zoom in Function

Click on view and select the range of band you want to zoom in.

Zoom in image is shown below, you can always zoom in again if needed.

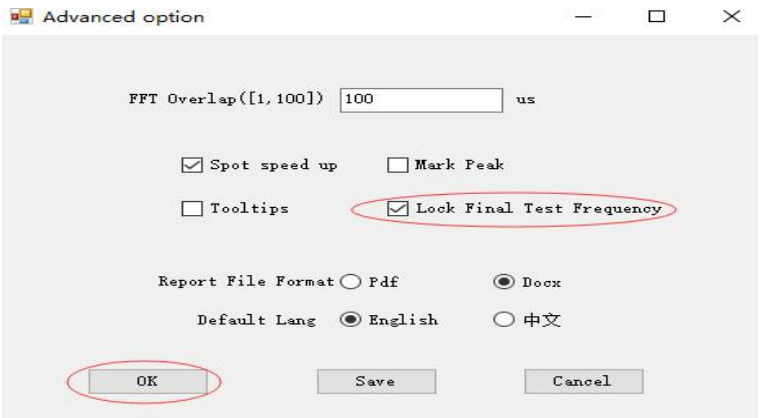


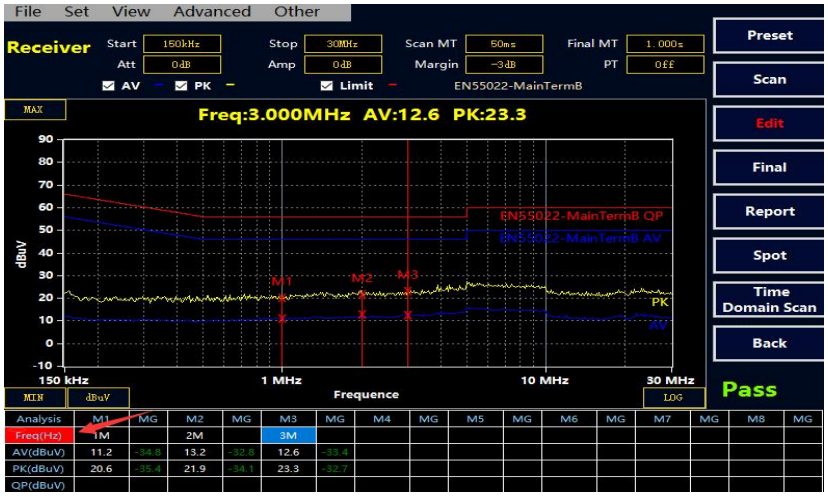
Note: Users can double-click to add the frequency point needed on the lower part of the screen. (Not optional in Amplified Mode)

Lock final test frequency

Click on Advanced—Advanced option and tick the box of “Lock Final Test Frequency.” Click OK, and if the frequency column of the exceed point is displayed in red, the setting is done, you can add the test point according to your need after. (After the received scanned PK and AV value, if you need to keep monitoring the PK, AV and QP value corresponding to the frequency of the peak value point, you can lock this frequency point and scan the point needed by default.)

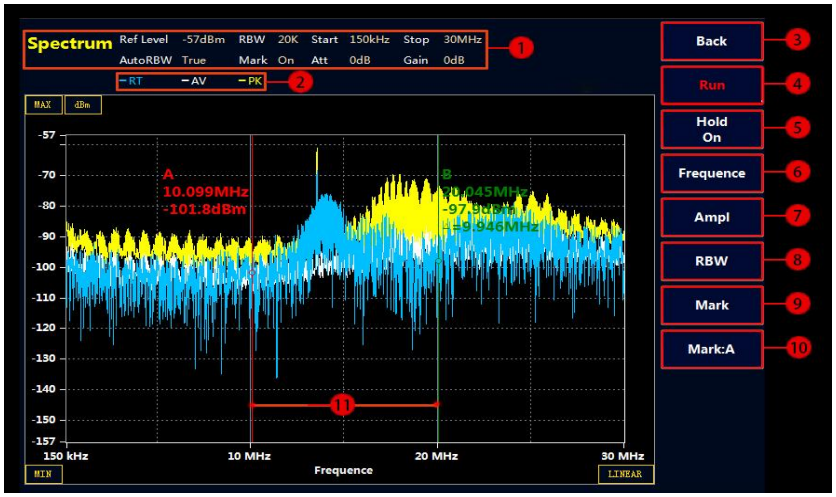
To set the shortcut to this function, double click on the Freq(Hz) on the lower-left corner of the main interface, if it turns red it means setting is done. You can add any frequency test point and scan by then.





8. Frequency Spectrum Mode

Frequency Spectrum mode interface



Mark Num.	Name	Description
1	Status indication	Including parameters including frequency, attenuation and RBW
2	Curve color indication	PK= Peak Value Curve AV= Average Value Curve RT= Real Time Curve
3	Return button	Return to previous menu
4	Execute button	Use mouse or soft button to start or stop scanning
5	Maximum value maintenance mode switch button	Curve refreshing will record the maximum value. Use mouse or soft button to start or stop maximum value maintenance

6	Frequency setting button	**Center** : Central frequency setting **Span** : Frequency scan width setting **Start Frequency** : Starting frequency setting **Stop Frequency** : Terminal frequency setting **xAxes Linear** : X axis display method, can be switched to logarithm mode.
7	Amplitude setting button	**Ref Level** : Reference level setting **Unit dBuv** : dBuV, dBm, dBuA, dBpW unit switching **Auto Level On** : Auto turns on reference level. Receiver can automatically balance the reference level according to the input amplitude. Can be turned off by soft button or mouse. **Attenuator 0dB** : Attenuator setting. 30dB Maximum **Gain 0dB** : Amplifier setting. 20dB maximum **Vertical 10dB/div** : Y axis division setting
8	Resolution ratio bandwidth setting button	**Auto On** : RBW mode is automatically on. Can be turned off using soft button or mouse. **RBW 20K** : Current RBW value, can switch by soft button or mouse. Attention: Invalid when Auto RBW is on. **Ratio 1000** : RBW switch according to BW/Ratio parameter
9	Mark point setting button	**Mark On** : Turn on mark function **Threshold 60dBuv** : Mark threshold point value setting. Mark when it surpasses 60dBuV **To Center** : Set the mark point as central frequency
10	Switching cursor button	Switching between cursor line A and B
11	A, B cursor line	Red cursor line is selected

9. Environmental Characteristics and Mechanical Specification

Temperature	Operating temperature: 0℃--40℃。 Storing temperature: -20℃--50℃。
Humidity	Operating humidity: Max 50%-95%（40℃） Storing humidity: Max 95%（40℃）
Operating altitude	Maximum 3000m
Size (Length* Width* Height)	430*355*210mm
Weight	9.4kg

10. Packing List

Packing List	
Receiver	1
Power cable（CK-318）	1
BNC connection cable（CK-320A）	1
N/BNC adapter（CK-20）	1
Mouse	1
Keyboard	1
Instruction manual	1
Warranty card	1
Test report	1

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