

Pulser/Receiver

Model 6006PR PLUS

User Manual

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Regulation Summary

Certifications

CE	Broadsound Corporation is ISO 9001 and ISO 13485 certified. Pulser/Receiver 6006PR PLUS complies with the applicable European Union requirements according to Directives 2014/35/EU (LVD) for product safety and 2014/30/EU for electromagnetic compatibility (EMC).
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Declaration of Conformity

EC Declaration of Conformity	Pulser/Receiver 6006PR PLUS complies with the applicable European Union requirements according to Directives 2014/35/EU (LVD) for product safety and 2014/30/EU for electromagnetic compatibility (EMC). This declaration is based upon compliance of Pulser/Receiver 6006PR PLUS to the following standards: EN 61010-1:2010 Safety requirements for electrical equipment for measurement, control, and laboratory use - Part 1: General requirements EN 61326-1:2013 Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 1: General requirements EN 55011:2009+A1:2010 Industrial, scientific and medical equipment - Radio-frequency disturbance characteristics - Limits and methods of measurement (Group 1 Class B) EN 61000-3-2:2014 Electromagnetic compatibility (EMC) - Part 3-2: Limits - Limits for harmonic current emissions EN 61000-3-3:2013 Electromagnetic compatibility (EMC) - Part 3-3: Limits - Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems EN 61000-6-1:2007 Electromagnetic compatibility (EMC) - Part 6-1: Generic standards - Immunity for residential, commercial and light-industrial environments IEC 61000-4-2:2008 Electromagnetic compatibility (EMC) - Part 4-2: Testing and measurement techniques - Electrostatic discharge immunity test IEC 61000-4-3:2006+A1:2007+A2:2010
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	<p>Electromagnetic compatibility (EMC) - Part 4-3: Testing and measurement techniques</p> <ul style="list-style-type: none"> - Radiated, radio-frequency, electromagnetic field immunity test IEC 61000-4-4:2012 <p>Electromagnetic compatibility (EMC) - Part 4-4: Testing and measurement techniques</p> <ul style="list-style-type: none"> - Electrical fast transient/burst immunity test IEC 61000-4-5:2014 <p>Electromagnetic compatibility (EMC) - Part 4-5: Testing and measurement techniques</p> <ul style="list-style-type: none"> - Surge immunity test IEC 61000-4-6:2013 <p>Electromagnetic compatibility (EMC) - Part 4-6: Testing and measurement techniques</p> <ul style="list-style-type: none"> - Immunity to conducted disturbances, induced by radio-frequency fields IEC 61000-4-8:2009 <p>Electromagnetic compatibility (EMC) - Part 4-8: Testing and measurement techniques</p> <ul style="list-style-type: none"> - Power frequency magnetic field immunity test IEC 61000-4-11:2004 <p>Electromagnetic compatibility (EMC) - Part 4-11: Testing and measurement techniques</p> <ul style="list-style-type: none"> - Voltage dips, short interruptions and voltage variations immunity tests
FCC Part 18	Pulser/Receiver 6006PR PLUS is a non-consumer ISM equipment and complies with the applicable United States regulation according to 47 CFR Part 18 (ANSI C63.4:2014).
RoHS	Pulser/Receiver 6006PR PLUS conforms to the regulations of the European Union Restriction on use of certain hazardous substances in electrical and electronic equipment (RoHS) Directive 2011/05/EU.

Read this first

Please keep this user's manual close to the product as a reference when using the system.

Upgrades may be announced that consist of hardware or software improvement.
Updated manuals will accompany those system upgrades.

Table of Contents

1	Precaution	5
1.1	Symbols & Labels	5
1.2	Electrical Hazard	7
1.3	Mechanical Hazard	8
2	Introduction.....	9
2.1	Introduction to Pulser-Receiver 6006PR PLUS.....	9
2.2	Overall View & Functional Block Diagram	10
2.3	Specification	12
2.4	Arrangement.....	20
3	Installation.....	22
3.1	Environmental Conditions	22
3.2	Computer Requirement.....	22
3.3	Software Installation.....	23
3.4	Installation of Driver	26
3.5	Software Uninstallation	29
4	Operation	31
5	Maintenance.....	34
6	Disposal Instruction	35

1 Precaution

1.1 Symbols & Labels

Warning Signs

Symbol	Description
	WARNING: Indicates that a specific hazard is known to exist which through inappropriate conditions or actions may cause personal injury or property damage.
	CAUTION: Indicates that a potential hazard may exist which through inappropriate conditions or actions will or can cause property damage.

Symbols

Symbol	Description
	This symbol is used where caution is required. Refer to the accompanying information or documents in order to protect against personal injury or damage to the instrument.
	Recycling symbol means that the end of the life of the product you must dispose of it separately at an appropriate collection point and not place it in the normal domestic unsorted waste stream.
	The CE mark. The Pulser/Receiver 6006PR PLUS complies with the applicable European Union requirements.
	United State regulation according to 47 CFR Part 18
	Manufacturer: Broadsound Corporation
	Date of Manufacture
	Power Switch (Supplies/ cuts the power for product)

Labels

To protect the system, you would see the “WARNING” sign marked on the surface of Pulser/Receiver 6006PR PLUS.



Figure 1. Labels on the Top/Rear view of Pulser/Receiver 6006PR PLUS.

 **WARNING**

TO AVOID ELECTRIC SHOCK, THE POWER CORD PROTECTIVE GROUNDING CONDUCTOR MUST BE CONNECTED TO GROUND. NO OPERATOR SERVICEABLE COMPONENTS INSIDE. DO NOT REMOVE COVERS. REFER SERVICING TO QUALIFIED PERSONNEL. DISCONNECT POWER CORD BEFORE REPLACING FUSE.

Figure 2. Detailed WARNING content.

1.2 Electrical Hazard

Electrical Hazard Notes:

- To avoid electric shock, the power cord protective grounding conductor must be connected to ground.
- No operation serviceable components inside.
- Do not disassembly the system.
- Disconnect power cord before replacing fuse.

1.3 Mechanical Hazard

Mechanical Hazard Notes:

- Never attempt to modify the system in any way. The manufacturer limited warranty would be void if the purchaser or other party do any modification or alteration of the product.
- Place the system on a solid surface.
- Handle the system with care; Do not drop or subject the system to any type of mechanical shock. Impact may compromise Pulser/Receiver 6006PR PLUS.
- Avoid any maintenance of the system under voltage.
- Do not operate the system in presence of flammable gases or fumes. Operation of any electrical instrument in such an environment constitutes a definite safety hazard.
- Do not let liquid drip into the Pulser/Receiver 6006PR PLUS. It could damage the Pulser/Receiver 6006PR PLUS.
- The USB port connected to Pulser/Receiver 6006PR PLUS is special designed. Do not pull cable like the label attached on the USB cable.



2 Introduction

2.1 Introduction to Pulser-Receiver 6006PR PLUS

Broadsound Pulser/Receiver 6006PR PLUS is a computer controlled ultrasonic pulser/receiver, which can be used in a variety of applications, such as the research and development of ultrasonic non-destructive testing and field applications. The Windows-based control panel application and an application programming interface (API) are provided to enable development of custom software. Furthermore, the Pulser/Receiver 6006PR PLUS can acquire the received signal in real time without the need for an additional oscilloscope. The features of Pulser/Receiver 6006PR PLUS include:

- 1) The pulser with 14 sets of unipolar pulses are available for use.
- 2) Low noise receiver.
- 3) 50-ohm for both the source impedance of pulser and the input impedance of receiver in ECHO mode & THRU mode.
- 4) Supporting acoustic transducers with center frequency ranging from 0.5 MHz to 35 MHz.
- 6) Pulse echo mode or thru-transmission mode.
- 7) 8-bit analog to digital converter with 48 MHz, 80 MHz, or 240 MHz sampling frequency to acquire the received signal.
- 8) The received signal can be displayed in real-time.
- 9) The Windows-based application programming interface (API) is provided to enable development of custom software.

2.2 Overall View & Functional Block Diagram



Figure 3. Front, side, and top / rear views of the Pulser/Receiver 6006PR PLUS.

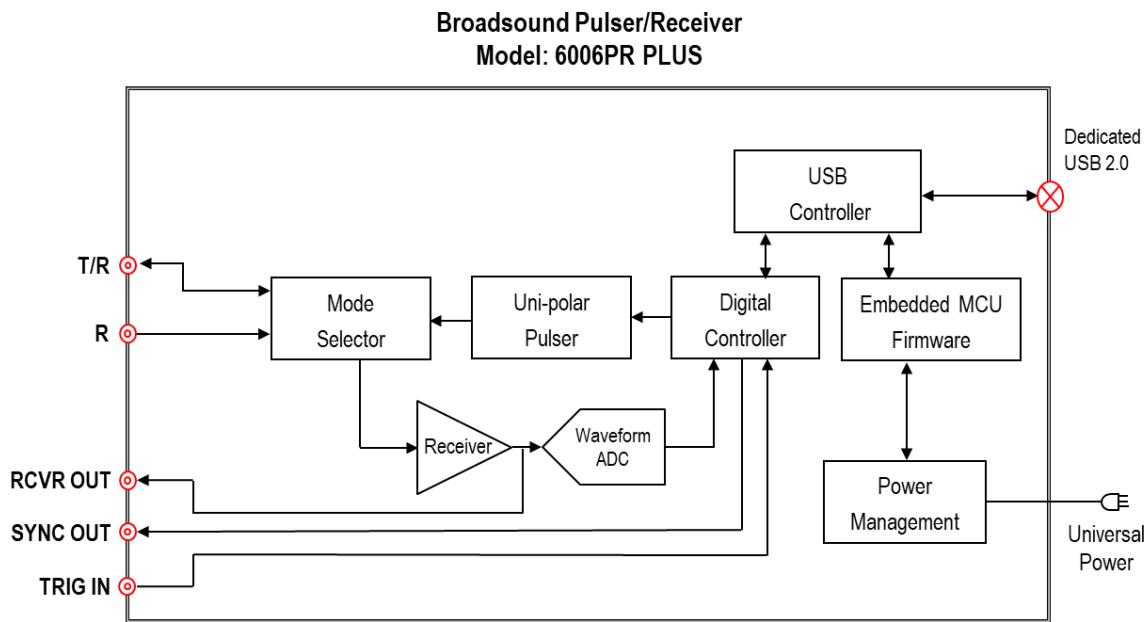


Figure 4. Functional block diagram of Pulser/Receiver 6006PR PLUS.

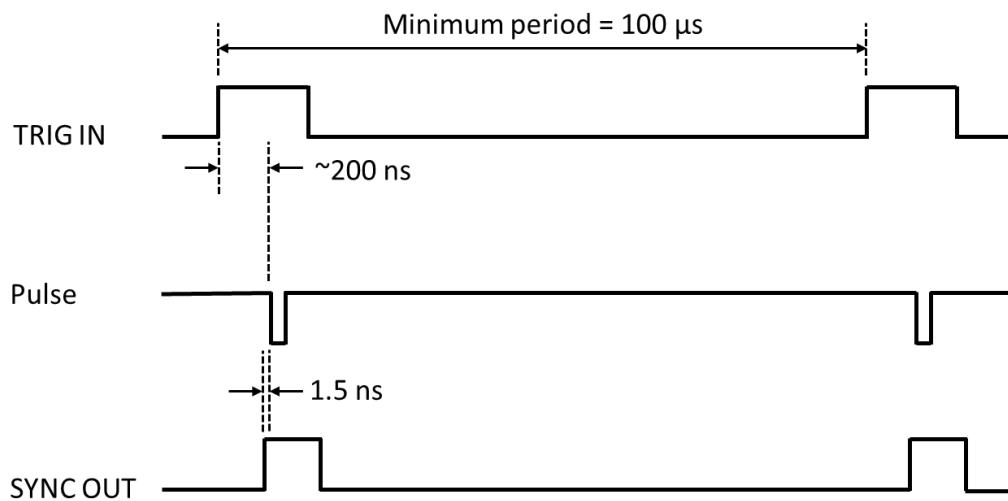


Figure 5. Timing relationships of pulser

2.3 Specification

1) Unipolar Pulser

Negative-Going Unipolar Pulse									
Nominal Settings @ a 50 Ω load		Amplitude	Energy	Bandwidth, -3 dB	Pulse Width @ 50% Amplitude				
1	-25 V, 0.1 μJ, DC–20 MHz (Figure 6)	-25 V	0.1 μJ	DC – 20 MHz	~ 12.5 ns				
2	-45 V, 0.4 μJ, DC–30 MHz (Figure 7)	-45 V	0.4 μJ	DC – 30 MHz	~ 11.5 ns				
3	-75 V, 1.0 μJ, DC–35 MHz (Figure 8)	-75 V	1.0 μJ	DC – 35 MHz	~ 10.5 ns				
4	-120 V, 2.4 μJ, DC–45 MHz (Figure 9)	-120 V	2.4 μJ	DC – 45 MHz	~ 9.0 ns				
5	-190 V, 5.0 μJ, DC–50 MHz (Figure 10)	-190 V	5.0 μJ	DC – 50 MHz	~ 8.0 ns				
6	-190 V, 11 μJ, DC–25 MHz (Figure 11)	-190 V	11 μJ	DC – 25 MHz	~15.5 ns				
7	-190 V, 15 μJ, DC–20 MHz (Figure 12)	-190 V	15 μJ	DC – 20 MHz	~22.5 ns				
8	-190 V, 20 μJ, DC–15 MHz (Figure 13)	-190 V	20 μJ	DC – 15 MHz	~29.0 ns				
9	-190 V, 25 μJ, DC–12 MHz (Figure 14)	-190 V	25 μJ	DC – 12 MHz	~36.0 ns				
10	-190 V, 30 μJ, DC–10 MHz (Figure 15)	-190 V	30 μJ	DC – 10 MHz	~43.0 ns				
11	-190 V, 35 μJ, DC–9 MHz (Figure 16)	-190 V	35 μJ	DC – 9 MHz	~50.0 ns				
12	-190 V, 40 μJ, DC–8 MHz (Figure 17)	-190 V	40 μJ	DC – 8 MHz	~57.0 ns				
13	-190 V, 45 μJ, DC–7 MHz (Figure 18)	-190 V	45 μJ	DC – 7 MHz	~63.5 ns				
14	-190 V, 50 μJ, DC–6 MHz (Figure 19)	-190 V	50 μJ	DC – 6 MHz	~70.5 ns				
Trigger Source		Internal trigger, or external trigger							
Pulse Repetition Frequency (internal)	100 Hz								
	200 Hz (default)								
	500 Hz								
	1 kHz								
	2 kHz								
	5 kHz								
	10 kHz (available for pulse energy < 40 uJ)								
Pulse Repetition Frequency (external TTL)	0 kHz ~ 10 kHz								
Output Impedance	50 Ω								

1. -25 V, 0.1 μ J, DC–20 MHz Negative-Going Unipolar Pulse

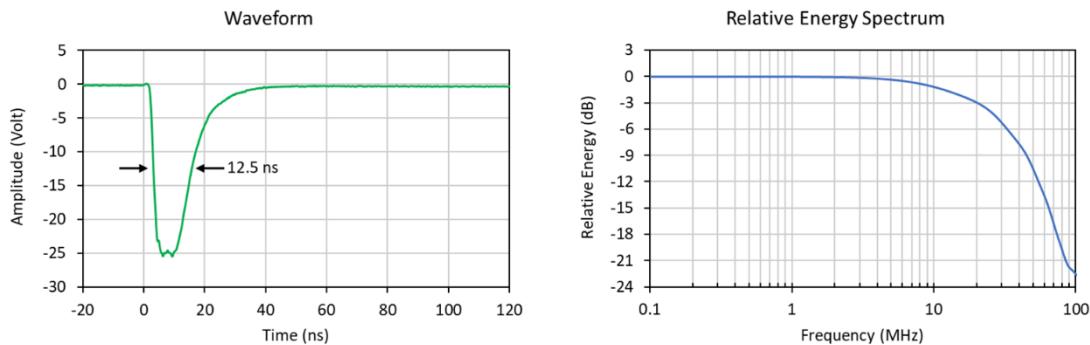


Figure 6. The waveform and relative energy spectrum of the setting: [-25 V, 0.1 μ J, DC–20 MHz] which is a negative going pulse at a 50Ω load generated by the unipolar pulser of the Pulser/Receiver 6006PR PLUS.

2. -45 V, 0.4 μ J, DC–30 MHz Negative-Going Unipolar Pulse

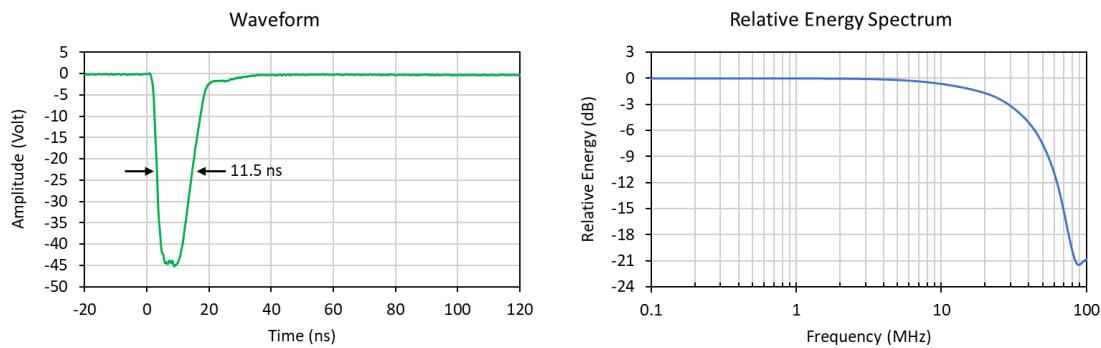


Figure 7. The waveform and relative energy spectrum of the setting: [-45 V, 0.4 μ J, DC–30 MHz] which is a negative going pulse at a 50Ω load generated by the unipolar pulser of the Pulser/Receiver 6006PR PLUS.

3. -75 V, 1.0 μ J, DC–35 MHz Negative-Going Unipolar Pulse

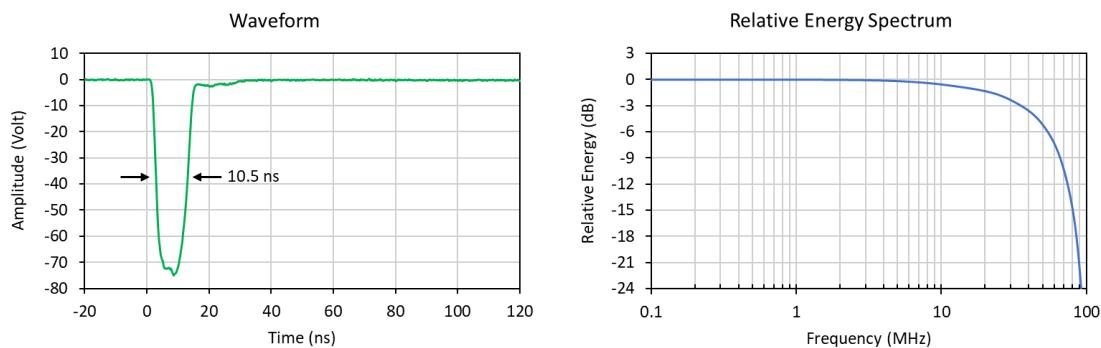


Figure 8. The waveform and relative energy spectrum of the setting: [-75 V, 1.0 μ J, DC–35 MHz] which is a negative going pulse at a 50Ω load generated by the unipolar pulser of the Pulser/Receiver 6006PR PLUS.

4. -120 V, 2.4 μ J, DC–45 MHz Negative-Going Unipolar Pulse

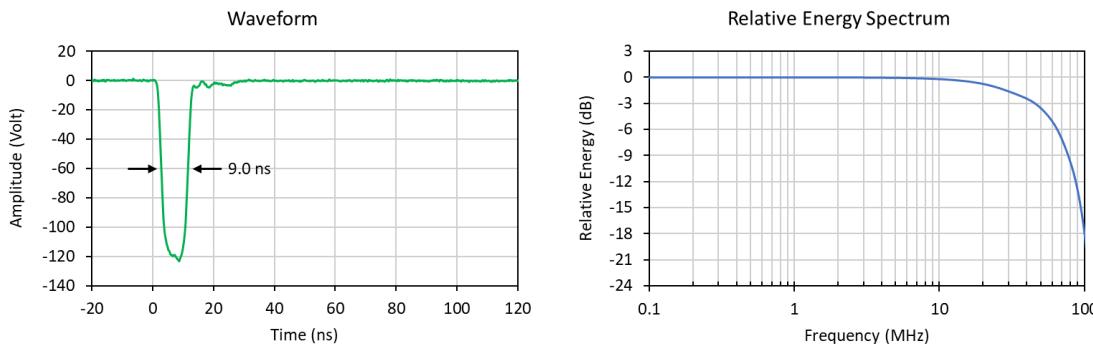


Figure 9. The waveform and relative energy spectrum of the setting: [-120 V, 2.4 μ J, DC–45 MHz] which is a negative going pulse at a 50 Ω load generated by the unipolar pulser of the Pulser/Receiver 6006PR PLUS.

5. -190 V, 5.0 μ J, DC–50 MHz Negative-Going Unipolar Pulse

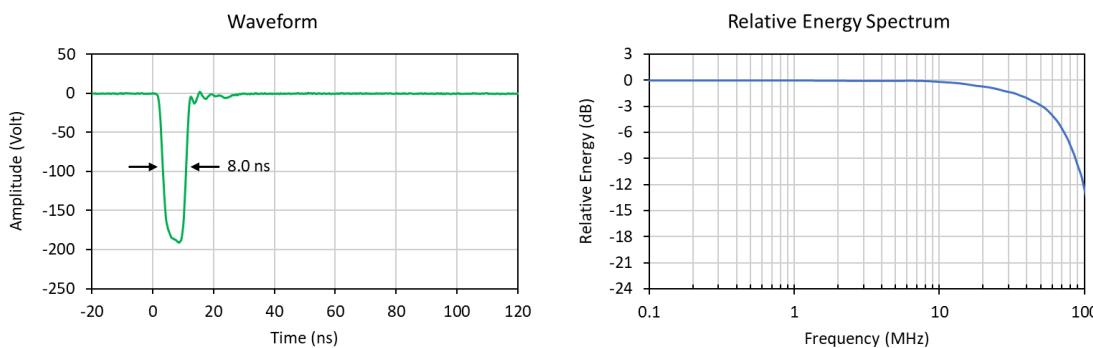


Figure 10. The waveform and relative energy spectrum of the setting: [-190 V, 5.0 μ J, DC–50 MHz] which is a negative going pulse at a 50 Ω load generated by the unipolar pulser of the Pulser/Receiver 6006PR PLUS.

6. -190 V, 11 μ J, DC–25 MHz Negative-Going Unipolar Pulse

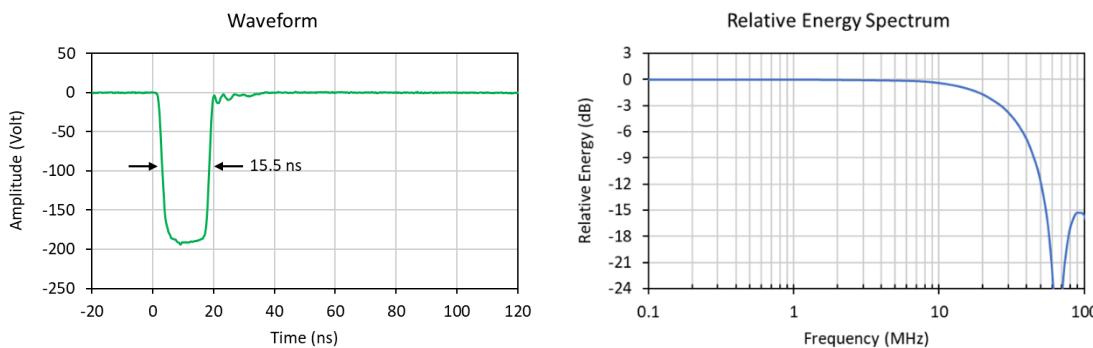


Figure 11. The waveform and relative energy spectrum of the setting: [-190 V, 11 μ J, DC–25 MHz] which is a positive going pulse at a 50 Ω load generated by the unipolar pulser of the Pulser/Receiver 6006PR PLUS.

7. -190 V, 15 μ J, DC–20 MHz Negative-Going Unipolar Pulse

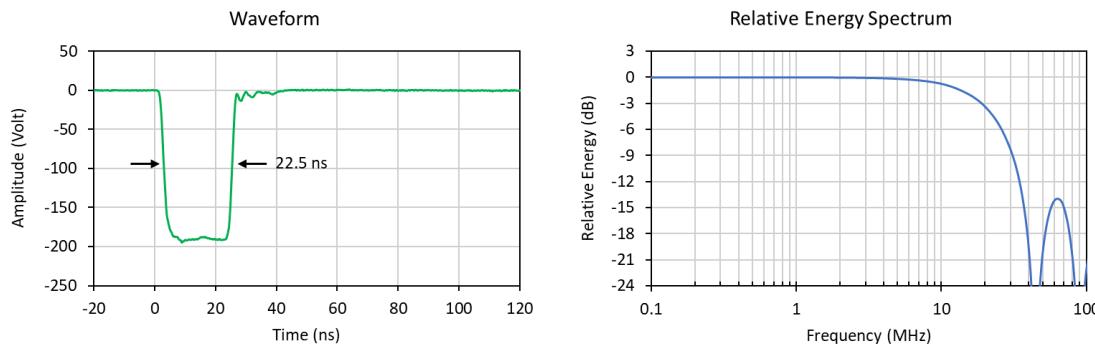


Figure 12. The waveform and relative energy spectrum of the setting: [-190 V, 15 μ J, DC–20 MHz] which is a positive going pulse at a 50 Ω load generated by the unipolar pulser of the Pulser/Receiver 6006PR PLUS.

8. -190 V, 20 μ J, DC–15 MHz Negative-Going Unipolar Pulse

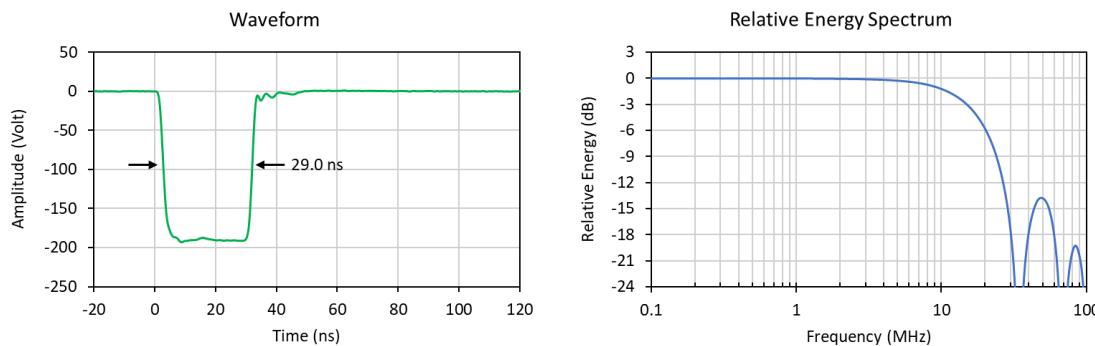


Figure 13. The waveform and relative energy spectrum of the setting: [-190 V, 20 μ J, DC–15 MHz] which is a positive going pulse at a 50 Ω load generated by the unipolar pulser of the Pulser/Receiver 6006PR PLUS.

9. -190 V, 25 μ J, DC–12 MHz Negative-Going Unipolar Pulse

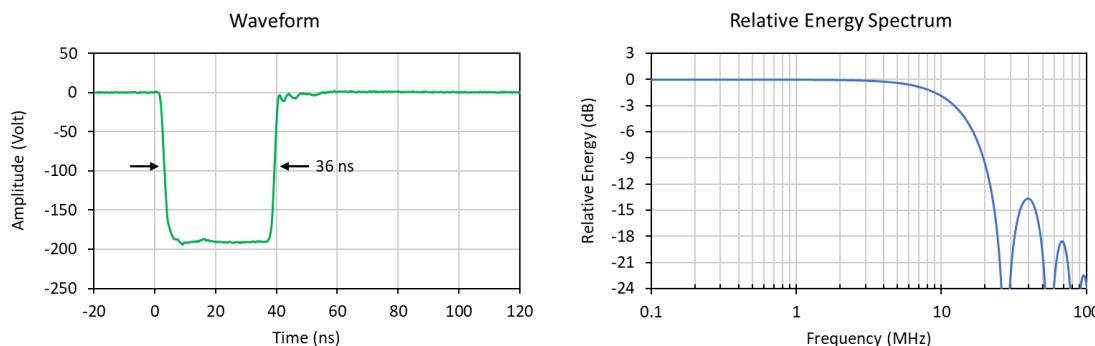


Figure 14. The waveform and relative energy spectrum of the setting: [-190 V, 25 μ J, DC–12 MHz] which is a positive going pulse at a 50 Ω load generated by the unipolar pulser of the Pulser/Receiver 6006PR PLUS.

10. -190 V, 30 μ J, DC–10 MHz Negative-Going Unipolar Pulse

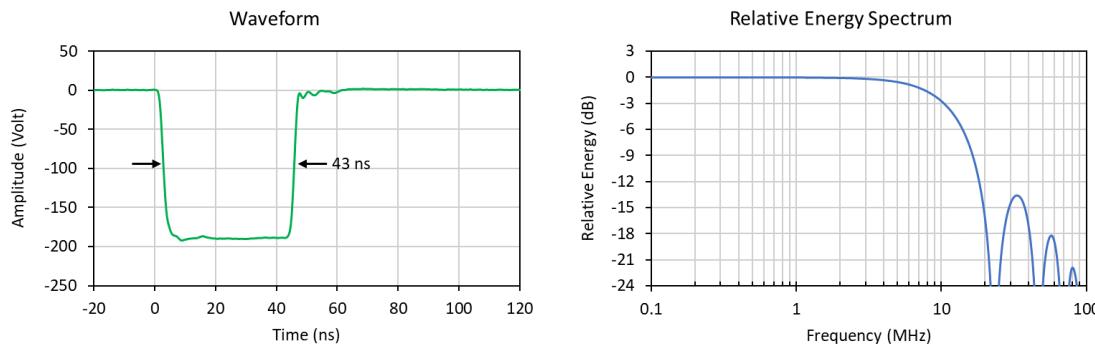


Figure 15. The waveform and relative energy spectrum of the setting: [-190 V, 30 μ J, DC–10 MHz] which is a positive going pulse at a 50 Ω load generated by the unipolar pulser of the Pulser/Receiver 6006PR PLUS.

11. -190 V, 35 μ J, DC–9 MHz Negative-Going Unipolar Pulse

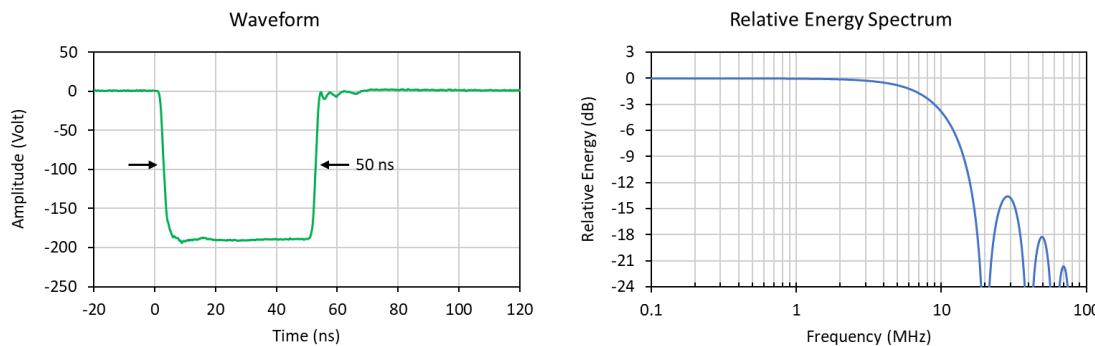


Figure 16. The waveform and relative energy spectrum of the setting: [-190 V, 35 μ J, DC–9 MHz] which is a positive going pulse at a 50 Ω load generated by the unipolar pulser of the Pulser/Receiver 6006PR PLUS.

12. -190 V, 40 μ J, DC–8 MHz Negative-Going Unipolar Pulse

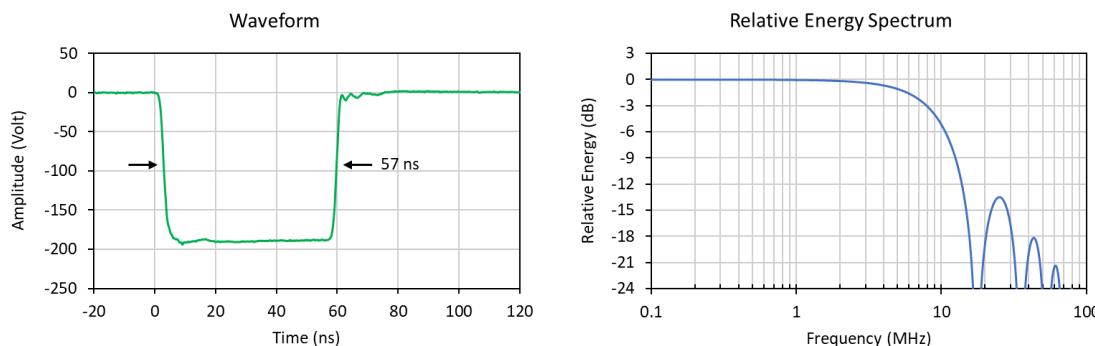


Figure 17. The waveform and relative energy spectrum of the setting: [-190 V, 40 μ J, DC–8 MHz] which is a positive going pulse at a 50 Ω load generated by the unipolar pulser of the Pulser/Receiver 6006PR PLUS.

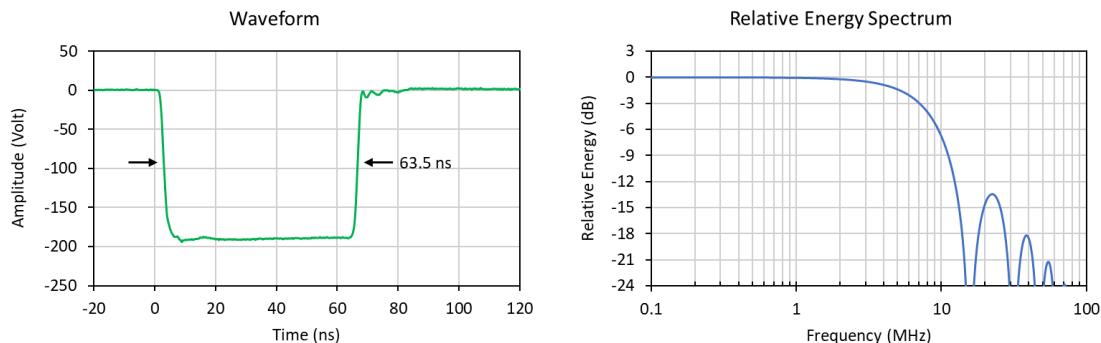
13. -190 V, 45 μJ, DC–7 MHz Negative-Going Unipolar Pulse


Figure 18. The waveform and relative energy spectrum of the setting: [-190 V, 45 μ J, DC–7 MHz] which is a positive going pulse at a 50Ω load generated by the unipolar pulser of the Pulser/Receiver 6006PR PLUS.

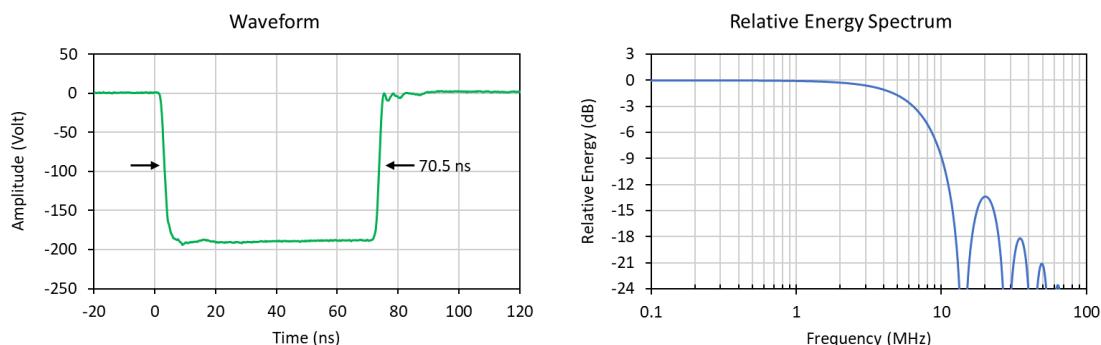
14. -190 V, 50 μJ, DC–6 MHz Negative-Going Unipolar Pulse


Figure 19. The waveform and relative energy spectrum of the setting: [-190 V, 50 μ J, DC–6 MHz] which is a positive going pulse at a 50Ω load generated by the unipolar pulser of the Pulser/Receiver 6006PR PLUS.

2) Receiver

Maximum Input		± 1 V
Frequency Response (Figure 20)	-6 dB Limit	0.3 MHz – 60 MHz
	-3 dB Limit	0.6 MHz – 40 MHz
	-1 dB Limit	1.0 MHz – 25 MHz
Noise		25 μ V _{RMS}
Input Impedance		50 Ω
Linear Dynamic Range		96 dB
Overall Voltage Gain Range		-28 dB to +70 dB
Output	Output Impedance	50 Ω
	Output Range @ a 50 Ω Load	± 1 V

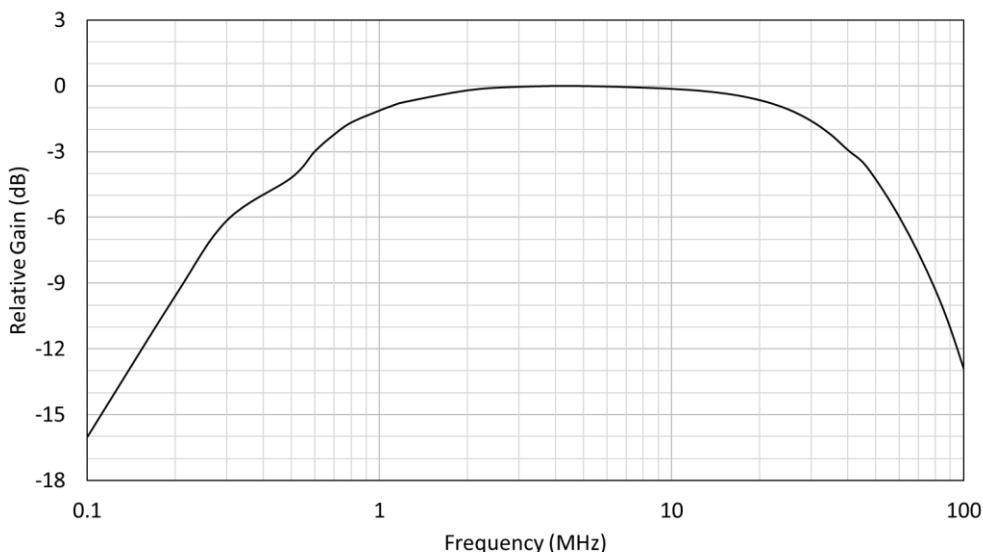


Figure 20. Typical frequency response of the receiver in the Pulser/Receiver 6006PR PLUS.

3) ADC (Analog-to-Digital Converter)

Sampling frequency	48 MHz / 80 MHz / 240 MHz
Resolution	8 bits
Input range	± 1 V
Memory size	260 kB

4) Interface

1	USB (dedicated)	Rugged connector to external PC with dedicated Pulser/Receiver USB cable; High-speed (480 Mb/s); WHQL (Windows Hardware Quality Labs) certification
2	T/R	BNC female connector as 1. Output of Unipolar Pulser in ECHO mode & THRU mode, and 2. Input of Receiver in ECHO mode
3	R	BNC female connector as input of Receiver in THRU mode.
4	RCVR OUT	BNC female connector as Receiver output.
5	SYNC OUT	BNC female connector as Synchronization output of Pulser; 5V TTL, active low, pulse width ~80 ns
6	TRIG IN	BNC female connector as External Trigger input for Pulser; 5V TTL, active high, pulse width > 100 ns

5) Dimension & Weight

Dimension (W x D x H)	395 mm x 306 mm x 115 mm
Weight	5.5 kg

6) Power

Universal Input	100V~240V AC, 50/60 Hz
Consumption	30 W typical, 50 W max
Fuse	0.8A, 250 V, time-lag, 5x20 mm, 1 piece

7) Conditions

Operation	+5°C to +45°C, 10 % to 80 % RH, no condensation
Storage	-20°C to +70°C, 5 % to 85 % RH, no condensation

2.4 Arrangement

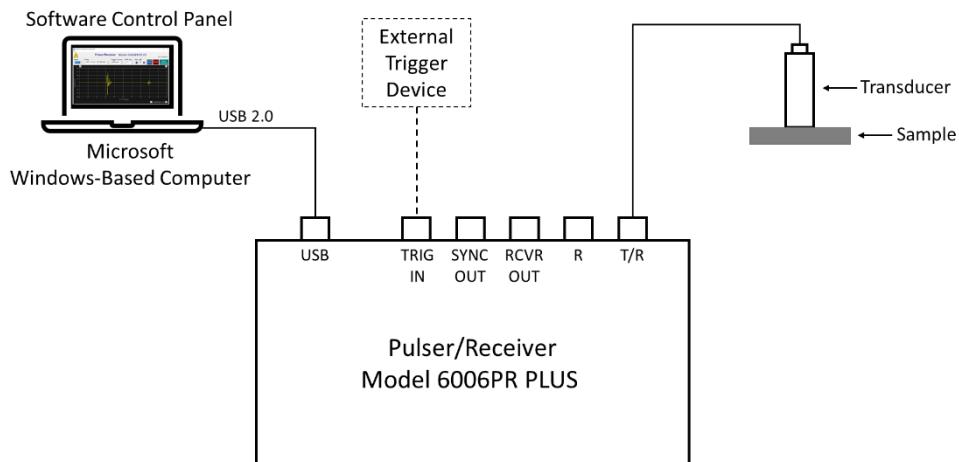


Figure 21. Arrangement of ECHO mode for pulse-echo testing with contact operation.

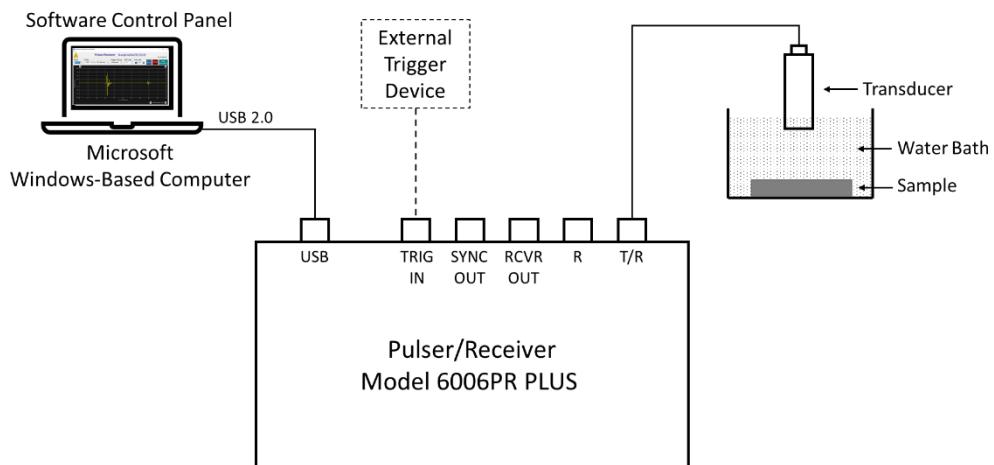


Figure 22. Arrangement of ECHO mode for pulse-echo testing with immersion operation.

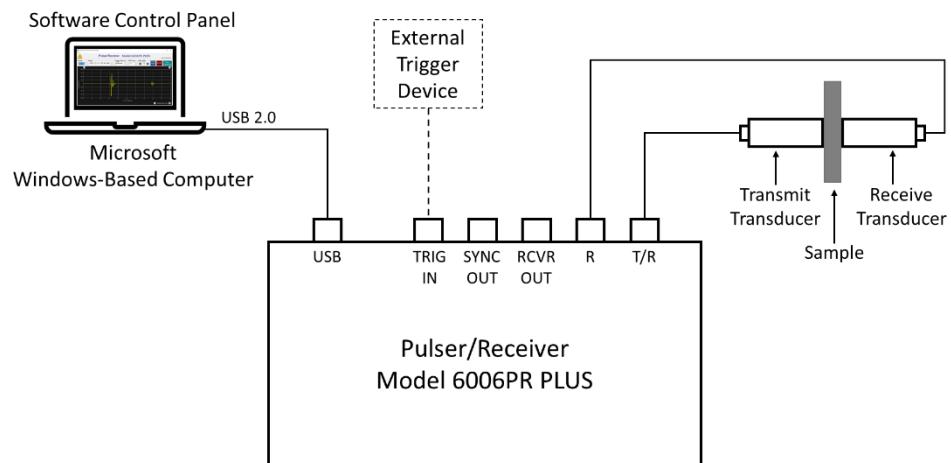


Figure 23. Arrangement of THRU mode for pitch-catch testing with contact operation.

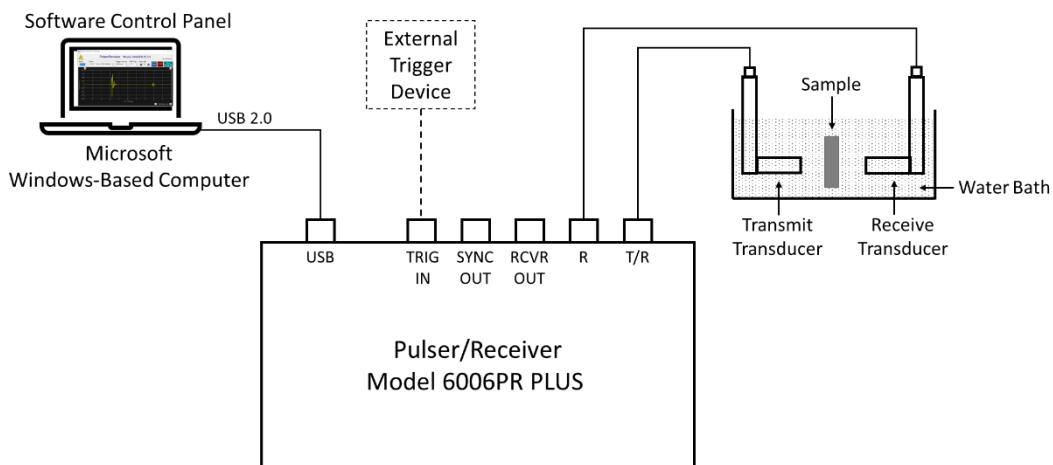


Figure 24. Arrangement of THRU mode for pitch-catch testing with contact operation.

3 Installation

3.1 Environmental Conditions

Pulser/Receiver 6006PR PLUS will work within the specifications of ambient temperatures and relative humidity listed below:

■ Operation Condition

Ambient temperature: + 5°C to + 45°C

Relative humidity: 10 % to 80 %, no condensation

■ Storage Condition

Ambient temperature: - 20°C to + 70°C

Relative humidity: 5 % to 85 %, no condensation

	Caution
	<ol style="list-style-type: none">1. Always use the Pulser/Receiver 6006PR PLUS in dry state. Dew condensation will damage the electronic and cause short-circuiting2. Do not store, transport or use the instrument under condition where temperature fluctuations could cause condensation within the instrument.3. If your instrument was shipped in cold weather, leave it in its box and allow it to warm up slowly to room temperature to avoid condensation.

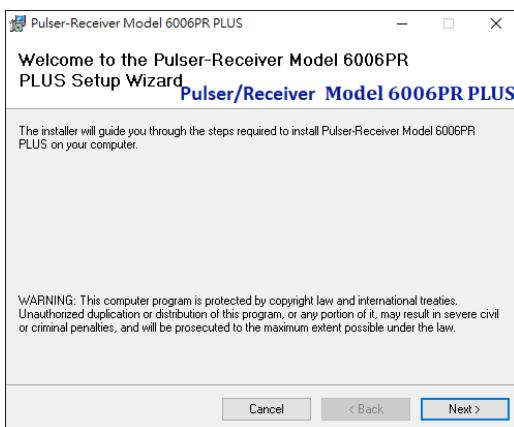
3.2 Computer Requirement

The software control panel of Pulser/Receiver 6006PR PLUS can be installed on desktop computers, industry computers or laptop. The basic requirement of the computer to install the software control panel is shown below:

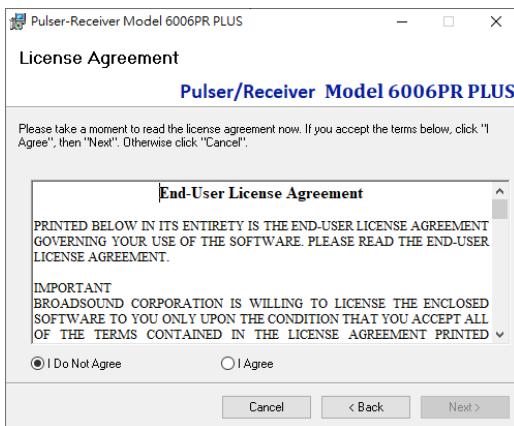
Items	Specification
OS	Microsoft Windows XP/7/8/10
CPU	1.6 GHz or faster
RAM	> 4 GB
Interface	USB 2.0
GPU	Maximum resolution ≥ 1024 x 768 pixels
Display	Monitor with resolution higher than 1280 x 720 pixels (16:9) / 1024 x 768 pixels (4:3)
Storage	> 100 MB free hard disk

3.3 Software Installation

- Step 1. Insert the Pulser/Receiver Software CD into your CD ROM drive; use Windows Explorer to browse through the folders on the media. Find the installer file in folder **Pulser-Receiver 6006PR PLUS** at the root directory.
- Step 2. In the folder of Pulser-Receiver 6006PR PLUS, double-click on the file of **Setup.msi** to launch Pulser-Receiver 6006PR PLUS Setup Wizard, and then click **Next>** to proceed.

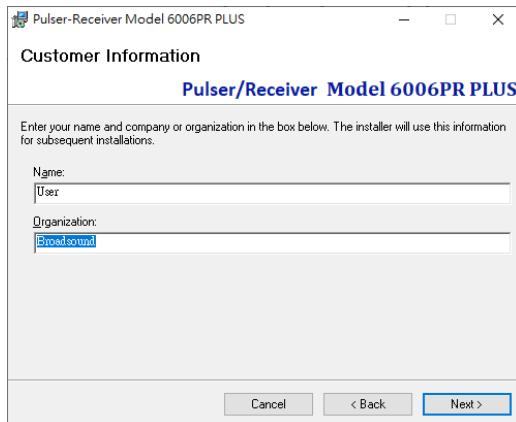


- Step 3. Review carefully the **License Agreement**, check **I Agree** if you accept the terms, and then click **Next>** to continue. Otherwise, press **Cancel** to abort installation.



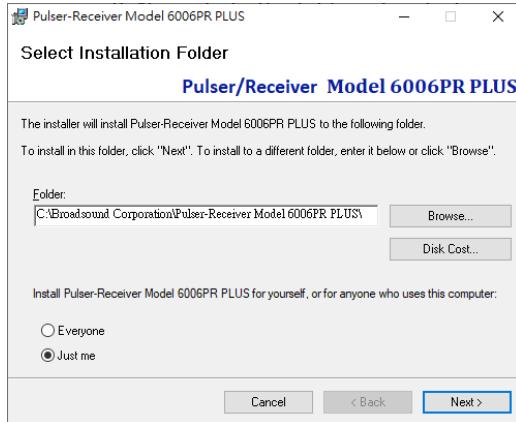
- Step 4. Enter your **Name** and **Organization**, and then click **Next>**.

Pulser/Receiver Model 6006PR PLUS User Manual



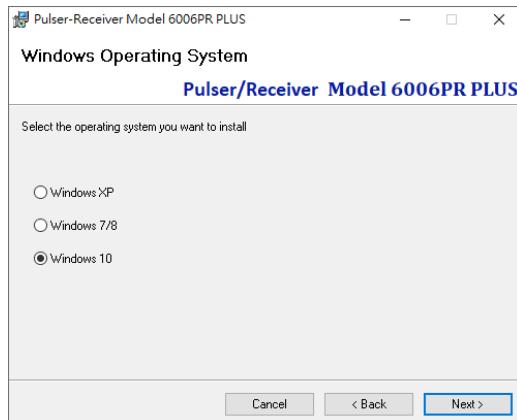
Step 5. Select a folder to install the software. By default, the wizard will place the software in "C:\Broadsound Corporation\Pulser-Receiver 6006PR PLUS" folder. Confirm the installation folder by pressing **Next>** button. If you like to install the software in some other location, do the following:

- Press **Browse...** button in this dialog box.
- Navigate to the folder into which you choose to install the software.
- Select the folder by pressing **OK** button.

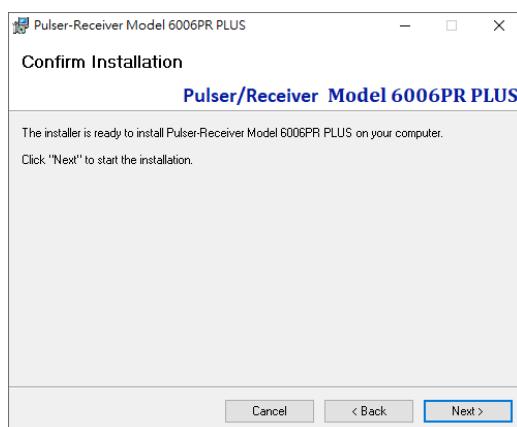


Step 6. In **Windows Operating System** page, check the correct operating system of your computer, and then click **Next>**.

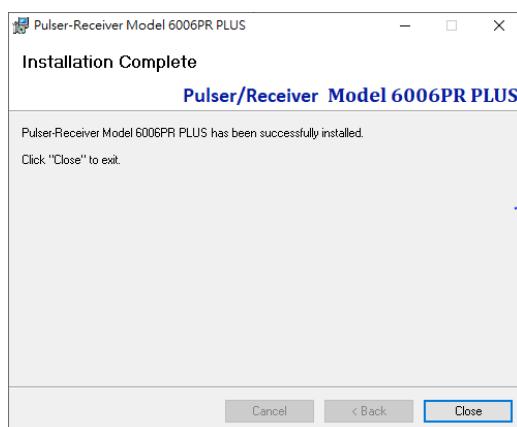
Pulser/Receiver Model 6006PR PLUS User Manual



Step 6. Press **Next>** button to confirm installation.



Step 8. When the installation is completed, press **Close** to exit setup wizard.



3.4 Installation of Driver

When you use the Pulser/Receiver 6006PR PLUS with the computer for the first time, you will have to install Pulser/Receiver USB driver, so that the computer may recognize the Pulser/Receiver USB device.

Follow the following steps to install the windows driver for Pulser/Receiver USB interface.

Step 1. Connect the Pulser/Receiver 6006PR PLUS to your computer using the dedicated USB cable and turn it on.

Step 2. In your Taskbar a pop-up Window should appear informing you that Windows has identified a new device.

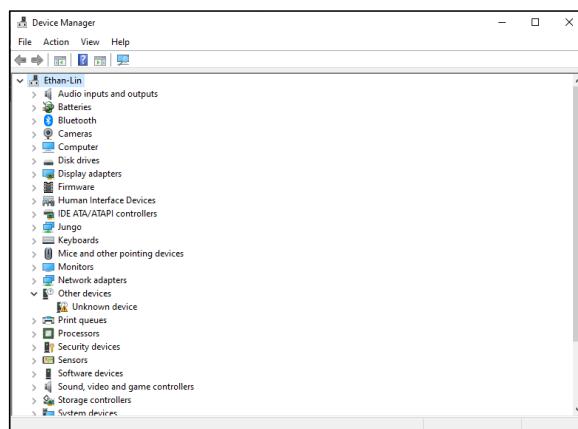
Step 3. Open the Device Manager.

For Windows 10: Right-click on **Start** on the taskbar, and select **Device Manager**;

For Windows 8: On the desktop (or on the Start screen), right-tap the bottom left corner to open the **Quick Access Menu**, and choose **Device Manager** on it.

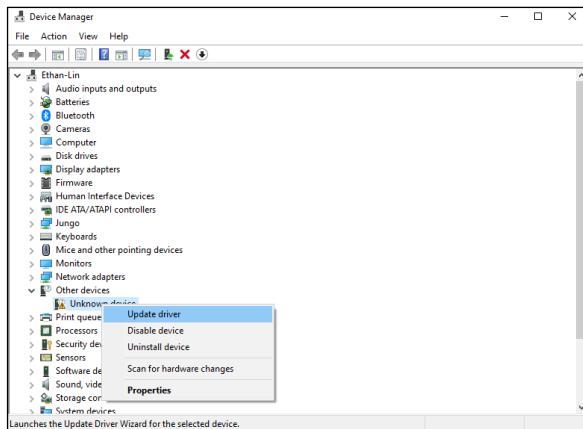
For Windows 7: Right-click **Computer** icon and select **Properties** in the context.
Click on the **Device Manager** at the top left side of the System window.

For Windows XP: Right-click **Computer** icon and select **Properties** in the context.
In the System Properties window, click the **Hardware** tab. On the Hardware tab, click the **Device Manager** button.

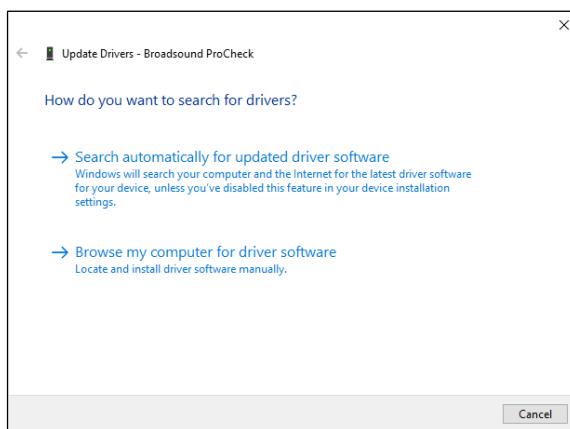


Step 6. In the **Device Manager** window, right click on the **Unknown device** and select the **Update Driver Software** in the context.

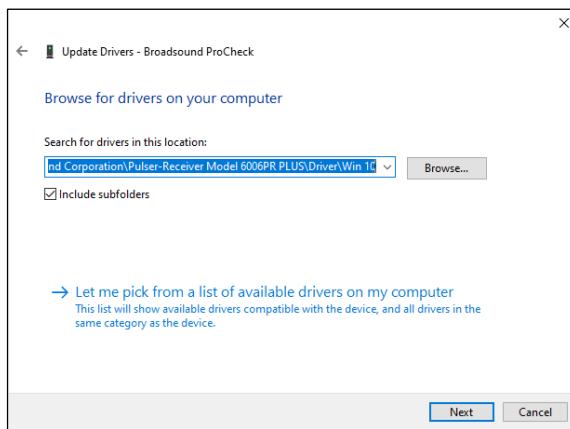
Pulser/Receiver Model 6006PR PLUS User Manual



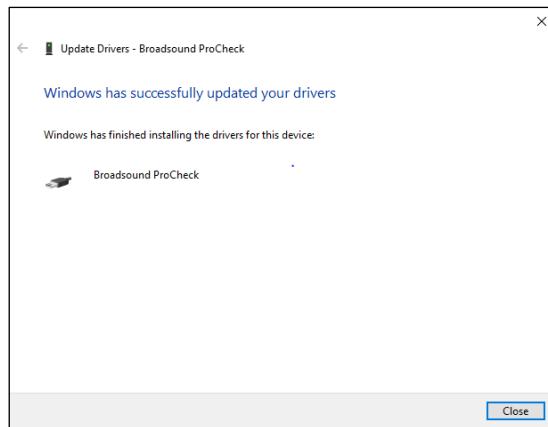
Step 7. Select Browse my computer for driver software item.



Step 8. Click on **Browse...**button, browse and locate the folder where the Pulser/Receiver USB driver is placed. The default folder would be “C: \Broadsound Corporation\Pulser-Receiver Model 6006PR PLUS\Driver”. Then click **Next**.

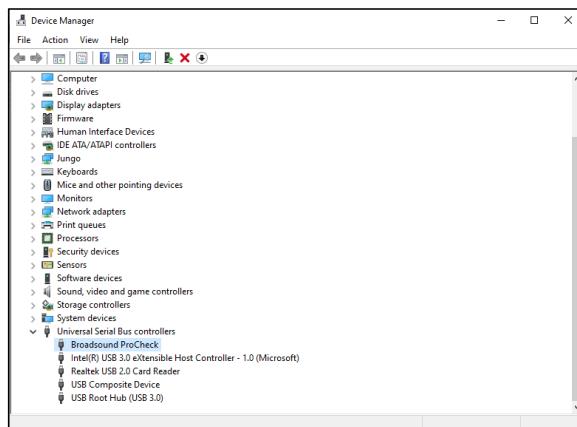


Step 9. When the update is finished, the Pulser/Receiver USB device will be identified as **Broadsound ProCheck**, click **Close** to exit.



Step 10. Check the list of **Universal Serial Bus controllers** in the **Device Manager** again.

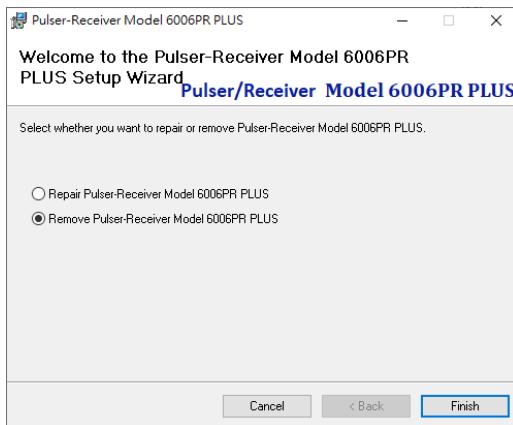
If the label of the device shows **Broadsound ProCheck**, the installation is successfully done.



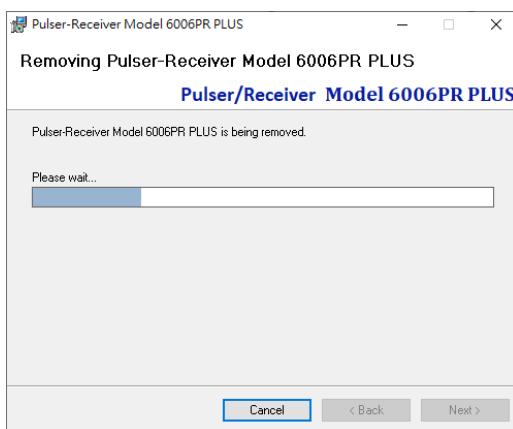
3.5 Software Uninstallation

There are two ways available to uninstall the Pulser/Receiver software. The first way is to use the same **Setup.msi** for Pulser/Receiver 6006PR PLUS.

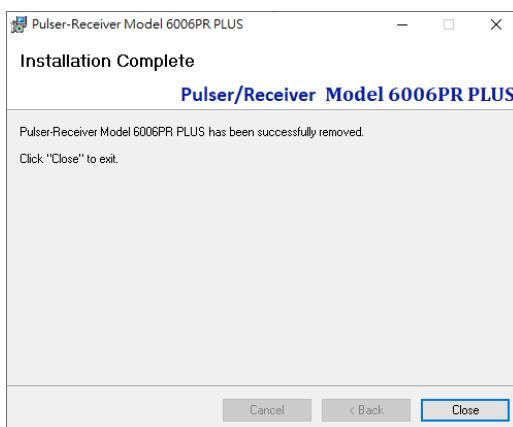
Step 1. Double click on the file **Setup.msi** to launch Pulser/Receiver Setup Wizard, check Remove Pulser/Receiver 6006PR PLUS item, then click the **Finish** to proceed.



Step 2. Wait for the processing of removing files.



Step 3. Press **Close** button to complete removal and exit.



The other method is to utilize the system management function of Windows.

Step 1. From the **Windows Task Bar**, select **Start > Control Panel > Programs and Features > Uninstall a Program**.

Step 2. This will open the **Uninstall or Change a Program** control panel.

Step 3. Find **Pulser-Receiver Model 6006PR PLUS** in the list.

Step 4. Click on **Pulser-Receiver Model 6006PR PLUS**, and then press **Uninstall** button.

Step 5. Click **Yes** button to confirm the software removal.

4 Operation

The operation of Pulser/Receiver 6006PR PLUS goes closely with the combination of hardware arrangement and software control panel. The software control panel of Pulser/Receiver 6006PR PLUS is used when driving a transducer with a unipolar pulse signal. The software control panel of Pulser/Receiver 6006PR PLUS is shown in Figure 25.

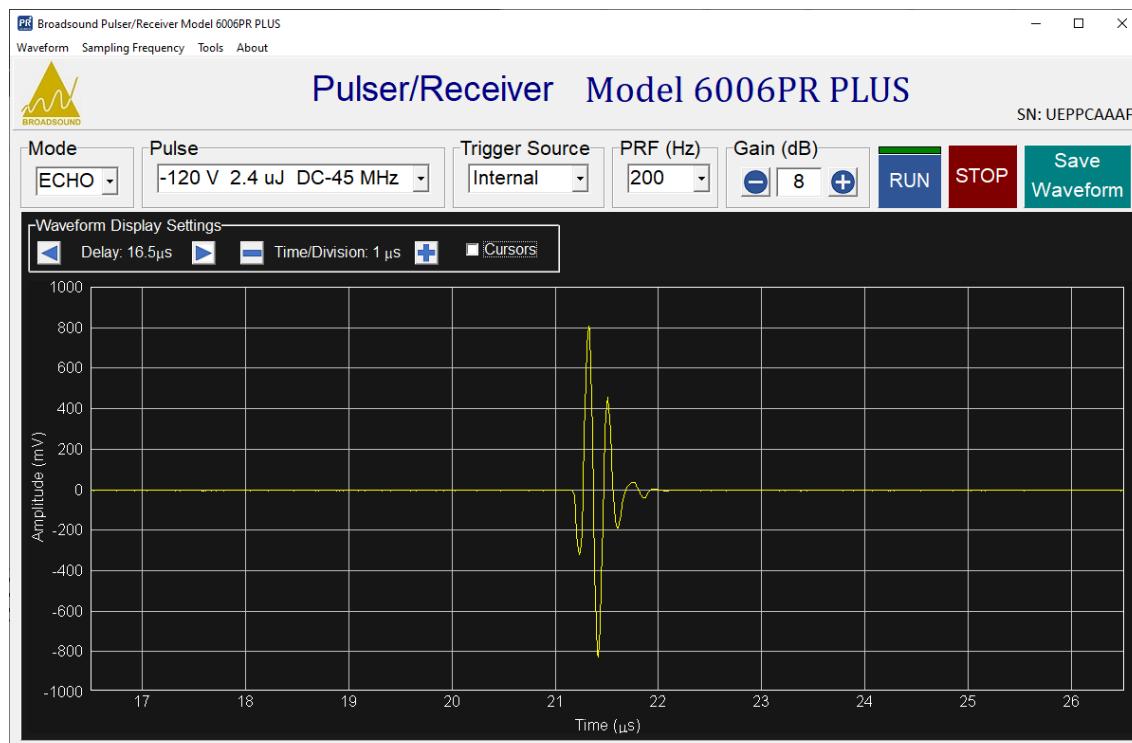


Figure 25. The software control panel of Pulser/Receiver 6006PR PLUS.

The functions of the software control panel are described as follows:

- 1) **Mode:** To select from the available modes, ie., ECHO mode for pulse-echo testing or THRU mode for pitch-catch testing, click the pull-down menu of mode.
- 2) **Pulse:** To select from the available amplitude/energy of the driving pulse, click the pull-down menu of mode.
- 3) **Trigger Source:** To select from the available trigger source, ie., internal or external, click the pull-down menu of trigger source.
- 4) **PRF (Hz):** To select from the available PRF (pulse repetition frequency), click the pull-down menu of PRF.
- 5) **Gain (dB):** To adjust the gain of receiver, click the **-** or **+**, or key in the value of gain.
- 6) **RUN:** To output the pulse according to the settings, click the button of RUN.
- 7) **STOP:** To stop to output the pulse, click the button of STOP.
- 8) **Save Waveform:** To save the acquired signal as CSV file, click the button of Save

Waveform.

9) Waveform Display Settings

- a) **Delay:** To adjust the delay of acquired signal, click the  or .
- b) **Time/Division:** To adjust the time per division to display, click the  or .
- c) **Cursors:** To display the cursors, check the box. Cursors are markers that identify the horizontal and vertical values at points on the x-axis. The horizontal and vertical values are shown on the bottom of control panel, as shown in Figure 26. The cursor can be repositioned by dragging the cursor with the left mouse button.

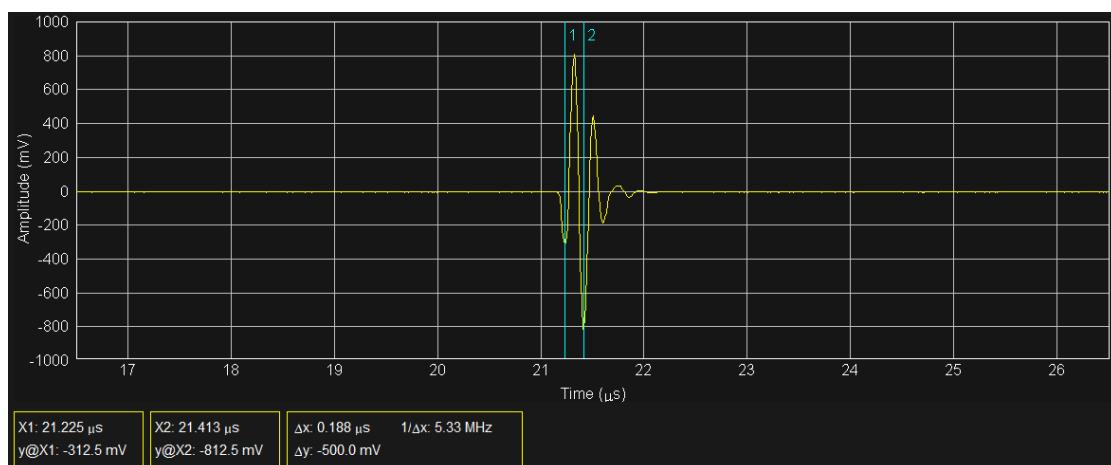


Figure 26. The horizontal and vertical values marked by cursors are shown on the bottom of control panel.

- 10) **Waveform > Enable Waveform Acquisition:** To enable the function of waveform acquisition, check the item of enable waveform acquisition; To disable the function of waveform acquisition, uncheck the item of enable waveform acquisition.
- 11) **Waveform > Output Type > Voltage:** To display the amplitude of waveform in voltage, check the item of voltage.
- 12) **Waveform > Output Type > Percentage:** To display the amplitude of waveform in percentages, check the item of percentage.
- 13) **Waveform > Reset Cursors:** To reset the positions of cursors, click the item of reset cursors.
- 14) **Waveform > Average:** To perform averaging of received signals prior to display, select the sub-menu of number of received signals.
- 15) **Sampling Frequency:** To select from the available sampling frequency, ie., 48 MHz, 80 MHz, or 240 MHz, select the sub-menu of sampling frequency.
- 16) **Tools > Connect pulser/receiver:** Connect the pulser/receiver.
- 17) **Tools > Self-diagnosis:** Perform the self-diagnosis to check the pulser voltage.

- 18) About:** Display the information of the software control panel of Pulser/Receiver 6006PR PLUS.

5 Maintenance

- It is recommended that the power cord be unplugged from the AC outlet if Pulser/Receiver 6006PR PLUS will not to be used for an extended period of time.
- Clean only the exterior of Pulser/Receiver 6006PR PLUS using a damp and soft cloth. Do not use chemicals or abrasive materials.
- To avoid electrical shock, unplug the power cord from the AC outlet before cleaning.
- Under no circumstances allow moisture to penetrate the instrument.

6 Disposal Instruction

If possible, try to keep the package of Pulser/Receiver 6006PR PLUS for usages, such as ship analyzer back to Broadsound for calibration, repair, etc.

When Pulser/Receiver 6006PR PLUS is scrapped at the end of its life, you must dispose of it separately at an appropriate collection point and not place it in the normal domestic unsorted waste stream. Within the EU, when you discard the Pulser/Receiver 6006PR PLUS, you must send it to appropriate facilities for recovery and recycling.

Please consult local government authorities for proper disposal methods.