# Setting Up Audiofrog USB-Duo and UMI-1 for Making Impulse Response Measurements with Room EQ Wizard







### About Audiofrog USB-Duo

USB-Duo has been designed to provide a compact, high quality and high-performance interface for recording sounds and measuring the acoustic performance of audio systems using Audiofrog's UMI-1 microphone kit or any microphone that includes a pre-polarized condenser microphone (electret).

Unlike many other compact USB soundcards, USB-Duo has nearly flat frequency response on its input and its output. Typical frequency response is 20Hz-20kHz, +0, -0.5dB. While this is certainly sufficient for recording and measuring even without calibration, we will include the method for calibrating the card in this guide.



USB-Duo includes two separate microphone inputs on a pair of 3.5mm TRS jacks and one stereo output on a single 3.5mm TRS jack. Connection to the PC can be made using the USB-C plug or with the USB-C to USB-A adapter.



# Connecting USB-Duo to the UMI-1 Microphone

1. Plug the USB-Duo into any USB or USB-C port on your PC.

2. Plug one male end of the Y adapter into the 1(L) microphone input connector.

3. Plug the other male end of the Y adapter into the headphone output connector. This is your "loopback" connection and will provide a path for the reference signal REW will use as a basline.

4. Plug the UMI-1 microphone into the UMI-1 micstand and plug the micstand into the 2(R) microphone input connector. This will be your measurement signal.

5. Finally, plug the female end of the Y adapter into the Auxiliary input of your head unit using a 3.5mm stereo cable. Alternately, use the 3.5mm to RCA adapter included with UMI-1 and an RCA patch cable to plug USB-Duo's stereo output into your DSP.

# To PC/Tablet/Phone

To Audio System

### Notes:

The measurement signal will be present on both the left and the right outputs of the Y adapter and the RCA adapter.

REW will use the left input as the reference signal and the right input as the measurement signal. When used this way, REW will compare the reference input to the measurement input to determine the difference between them. The reference input will contain the stimulus signal only. The measurement signal will contain the stimulus signal plus any modifications in time or frequency attributable to the audio system and the acoustic space into which it is installed. The difference between them will be displayed as the frequency, impulse and phase response of the system.

The reference signal gives the analyzer its "zero" in time and in level.



### Windows Audio Settings

Once you have plugged in USB-Duo, in the windows search bar (at the bottom left or the bottom center of your screen) type "Control Panel".

When the prompt opens, choose the "Control Panel" app and click to open it.



Next, click on "Sound" to open the Sound controls. Sound will open to the "Playback" tab. Look in the list of audio devices for Audiofrog USB-Duo (Headphones). If it is not highlighted initially, click on it to highlight it. Then, double-click on it to open the Properties panel.

Sound	×	🖌 Headphones Properties	×
Playback Recording Sounds Communications		General Levels Enhancements Advanced Spatial sound	
Headphones 2- Audiofrog USB-Duo Default Device Intel(R) Display Audio Ready Speakers Realtek(R) Audio Reaty		Change Icon Controller Information 2- Audiofrog USB-Duo (Generic USB Audio)	
Realtek HD Audio 2nd output Realtek (R) Audio Not plugged in Headphones		Jack Information No Jack Information Available	
Configure         Set Default         Print	✓	Device usage: Use this device (enable) V	,
OK Cancel	Apply	OK Cancel Apply	

In Properties, be sure that "Use this device (enable) is selected.

Then, click on "Levels" at the top.

Readphones Properties	<
General Levels Enhancements Advanced Spatial sound	
Headphones Change Icon	
Controller Information	
2- Audiofrog USB-Duo Properties	
(Generic USB Audio)	
Jack Information	
No Jack Information Available	
Device usage: Use this device (enable) ~	
OK Cancel Apply	

Move the slider to set the input level to 30.

Make sure the output is activated. There should be no red circle next to the speaker icon.





Not like this

Like this



Next, Click on "Enhancements"

In the Enhancements window, click to check the box marked "Disable all enhancements"

Then, click on "Advanced"

the second se				
leadphones I	Properties	Saved to thi	s PC	×
General Levels	Enhancements	Advanced	Spatial sou	ind
Select the enha configuration. C playback.	ncements to app Changes may not	oly for your c t take effect	urrent speal until the nex	ker kt time you start
☑ Disable all er	nhancements			
Bass Boost Headphone Loudness B	t e Virtualization Equalization			
- Enhancement P	Properties			
boschpa				
Provid	er:			
Stat	us:			Settings
Restore Defau	llts		[	► Preview 🖛
		OK	Cancel	Apply

In the Advanced window, select 2channel, 24 bit, 48000 (Studio Quality) in the drop-down menu.

Check both boxes under "Exclusive Mode"

leadphones Properties	×							
General Levels Enhancements Advanced Spatial sound								
Default Format Select the sample rate and bit depth to be used when running in shared mode. 2 channel, 24 bit, 48000 Hz (Studio Quality) V Test								
Exclusive Mode Allow applications to take exclusive control of this device Give exclusive mode applications priority								
Restore Defaults								
OK Cancel Apply	1							

Then, click on "Spatial Sound"

In Spatial Sound, select "Off" in the drop-down menu.

Click "Apply." And then click "OK." The window will close and the previous menu will reappear.

Readphones Properties	×
General Levels Enhancements Advanced Spatial sound	
Spatial sound format Select the Spatial sound format you want to apply.	
Off	~
Restore Defaults	
OK Cancel	Apply

Next, click on the "Recording" tab at the top.

Sound						×
Playback	Recording	Sounds	Communication	IS		
Select a p	layback de	evice belo	w to modify its	settings:		
	Headp 2- Aud Defaul	hones iofrog US t Device	Saved to this P	C		^
	<b>LG ULT</b> Intel(R Ready	RAGEAR ) Display /	Audio			
	<b>Speake</b> Realtel Ready	ers k(R) Audio	D			
	Realtel Realtel Not pl	k HD Aud k(R) Audio ugged in	io 2nd output			
	Headp ThinkP Not plu	hones <sup>a</sup> d Thun ugged in	derbolt 3 Dock	USB Audio		<b>~</b>
Config	ure		Set D	efault	Properti	es
			OK	Cancel	Арр	oly

Find the Microphone tab for Audiofrog USB-Duo and click to highlight it.

Then, double click to open it.



The "General" tab will open. There is nothing to set here. Then, click on "Listen"

Microphone Properties	Х
General Listen Levels Advanced	
Change Icon	]
Controller Information	
2- Audiofrog USB-Duo Properties	
(Generic USB Audio)	
Jack Information	
No Jack Information Available	
Device usage: Use this device (enable)	~
OK Cancel Apply	/

In the "Listen" tab, uncheck the box next to "Listen to this device".

Click to select "Continue running when on battery power"

Hicrophone Properties	$\times$
General Listen Levels Advanced	
You can listen to a portable music player or other device through this Microphone jack. If you connect a microphone, you may hear feedback.	
y ⇒ &	
Listen to this device	
Playback through this device:	
Default Playback Device $\checkmark$	
Power Management	
Continue running when on battery power	
O Disable automatically to save power	
OK Cancel Apply	

Then, click on "Levels" at the top.

Move the slider to set the microphone level to 50.

Just as before, make sure there is no red circle next to the speaker icon. The red circle indicates that the microphone input is not muted. General Listen Levels Advanced

Microphone Properties

 $\times$ 

Then, click on "Advanced"

Choose 2 channel, 16 bit, 48000 HZ (DVD Quality) in the drop-down menu.

Then, click "OK".

ł	Microphone Properties	×
G	eneral Listen Levels Advanced	
	Default Format	
	Select the sample rate and bit depth to be used when running in shared mode.	
	2 channel, 16 bit, 48000 Hz (DVD Quality) $\qquad \qquad \lor$	
	Evolusive Mode	
	Allow applications to take exclusive control of this device	
	Give exclusive mode applications priority	
	Restore Defaults	
	OK Cancel Apply	

The previous menu will appear. Click "OK."

This will save your settings for USB-Duo.

### Note:

If you update your computer, use a different sound card or change these settings for Audiofrog USB-Duo, you may need to perform this procedure again. If you experience trouble in the future, check these settings first!



### Installing Room EQ Wizard

If you haven't already, go to <u>www.roomEQWizard.com</u>. Download and install the program following the prompts. Open the program. Please note that your version may be a more recent one than the one used below in the examples. For the purposes of setup, this shouldn't matter.

Please note that REW is a free program not associated with Audiofrog, Inc. For specific questions about versions and operation of the program not included here, please use the Help file included with the program. It's GREAT!

Once you have installed and opened the program and clicked through all of the initial prompts, you should arrive at a screen that looks like the one below.

💰 REW V5.20.13		- 🗆 X
File Tools Preferences Graph Help Donate Pro Upgrades		ß.
		SALS.
Measure Open Save All Remove All Info	IR Windows SPL Meter Generator Scope Levels Overlays RTA EQ Room Sim	Preferences
169/214MB 48 kHz 16-bit in, 24-bit out 2000 2000 2000 2000 0000 0000 0000 00	16-bit data Peak input before clipping 120 dB SPL (uncalibrated)	

### **Navigating in REW**

"Preferences" will bring up a screen in which you will choose various settings to use in making measurements, where you can check levels and choose and configure your audio device—in this case, your Audiofrog USB-Duo.

The "Measure" window below the menu is where you will make these measurements. If you have heretofore been using only the RTA function, this will be a change in process.

The "Overlays" option to the right is where you will be able to look at several measurements simultaneously.

Click on "Preferences" and you should see this screen. If you see a different screen, click on the "Soundcard" tab at the top.:

Preferences							- 🗆	Х
Soundcard Cal Files	Comms House Curve	Analysis Equaliser	View					
Drivers	Output Device	Buffer	Input Device	Buffer	Out	In	Ref In	
Java	Default Device	▼ 16k -	Default Device	▼ 32k -				
Sample Rate	Output		Input		-10 -=	-10	-10	
48 KHZ	Default Output				-20	-20	-20	
Stereo only	Timing Reference O	utput R 💌	Loopback in	put R 💌	-30	-30	-30	
Input Options	Control output volum	e	Control input volume		.40	-40	-40	
Invert	Output Volume: 0.9	0 📥 📃 Mute	Input Volume: 0.01	A V	-50	-50	-50	
High Pass	Sweep Level: -20	0 🔹 dBFS			Ē			
Treat 32-bit data at Soundcard calibratio Default Device Default None Levels	s 24-bit n Output at 48 kHz	Brow	Calibrate se) Clear Cal) Mak	e soundcard) e cal file	-70 -80 -90 -90 -90 -90 -90 -90 -90 -90 -90 -9	-70 -80 -90 -100 dBFS	-70	
Use main speaker test	signal to check/set levels	Check Le	evels Generate Deb	ug File	-95.99			L
Use pink periodic n	oise for level checks throug	hout REW						
Choose the Outpu can be chosen. Th and inputs are stee inputs or outputs, Make sure that the selected in the An loopback connect	It Device and Input Device the channels used for out reo so you have the choi if that is the case the chai input channel is the one alysis Preferences the o ion on the reference chai	e you wish to use for put and input are sel ce of using the left or innel selectors will b e connected to your S her channel will be u innel.	measurements. After the c ected from the drop downs right channel, or (for outpu e disabled. IPL meter (or mic preamp o ised a reference to remove	levices have bee to the right of the t only) both chan butput). If Use loo time delays with	n selected the pa e output and input nels. Some interf pback as timing in the computer a	rticular Output selections, m faces only prov reference has and interface, th Next >	and input ost outputs ide mono been nis requires a	•

About "Preferences":

The "Soundcard" tab is where you will set up your audio hardware and measurement signal levels.

The "Cal Files" tab is where you will select calibration files for the soundcard (if you choose to calibrate it) and for your microphone.

It's unlikely you'll need the "Coms" tab since car audio equalizers don't include MIDI functionality. You can ignore this one.

The "House Curve" tab is where you might enter a target curve for use with REW's auto EQ.

The "Analysis " tab is where you can choose parameters for analysis, including the resolution of the measurements.

The "Equalizer" tab is where you can enter parameters for REW's auto EQ.

The "View" tab is where you can enter parameters for the display of graphs and the operation of the program.

REW and most PC based analyzers offer a calibration routine that will remove any frequency response nonlinearities inherent in your soundcard from your measurements. The frequency response of USB-Duo is flat enough that this isn't absolutely necessary. The process does provide a good functionality check, so we are going to include it here.

If the Soundcard tab isn't already open, click to open it.

Use the screenshot below to set up your preferences as they are indicated below.

For input and output devices, use the down arrow next to the selection to open the list of available devices and choose "Headphone (2-Audiofrog USB-Duo)" for the output device, Choose Microphone (2-Audiofrog USB-Duo) for the input device.

Set up the rest of the Preferences panel as indicated below.

Confirm that the loopback connector is plugged into the headphone output and the 1(L) input of USB-Duo

Soundcard Ca	Files Comms House Curve	Analysis	Equaliser	View					
Drivers	Output Device	Buf	fer	Input D	evice	Buffer	Out	In	Ref In
Java 🔻	Headphones (2- Audio	🔻 🛛 16	šk 💂	Micro	ohone (2- Audiof 🔻	32k 🛓	0 <u> </u>	0	
Sample Rate	Output			Input			-10	-10	-10
48 kHz 💌	HEADPHONE	▼ L	-	MICRO	PHONE (Master 💌	L 🔻	Ē		=
Stereo only				🗌 Vi	rtual balanced input		-20 -=	-20	-20
	Timing Reference	Output R	•		Loopback input	R 🔻	-30 -	-30	-30
Input Options	Control output volu	me		V Co	ontrol input volume		-40	-40	-40
Invert	Output Volume: 0	.50 🌲 📃 M	ute	Input \	/olume: 0.60 🛓		-50	-50	-50
📃 High Pass	Sweep Level: -2	0.0 🔺 dBFS	;						
🖌 Treat 22 hit	data ao 24 hit						-60 -	-60	-60
Treat 52-bit							-70	-70	-70
Soundcard cali	bration								
Headphones (2	- Audiofrog USB-Duo) HEADPHO	NE at 48 kHz			Calibrate so	oundcard			
None			Brows	e)	ear Cal Make ca	al file	-90 -=	-90	-90
							-100	-100	-100
Levels							dBFS	dBFS	dBFS
Use main speaker test signal to check/set levels Check Levels Generate Debug File									
✓ Use pink periodic noise for level checks throughout REW									

Next, click on the Analysis tab and set all the parameters there as in the screenshot below:

Soundcard	Cal Files	Comms	House Curv	e Analysis	Equaliser	View		
Impulse Re	esponse V	Vindow De	faults					
Left Side			R	ght Side			IR Decay/Waterfall Left	IR Decay/Waterfall Right
Tukey 0.25			r 1	ukey 0.25		•	Hann 🔻	Tukey 0.25
Set win	dow width	s automatic	ally				Waterfall (audio data)	Spectrogram
Default Wid	Ith (ms)	6.5		efault Width (r	ns)	150 🔺	Gaussian 💌	Gaussian 💌
Add fre	quency dep	pendent wi	ndow	Width in cyc	des 15 aves 1/21			
mpulse Re	esponse C	alculation	I				Frequency Response Calculation	I
Truncate IR	after 1.7 s		▼ .	Decimate IR			Allow 96 PPO log spacing	1/48 smoothing 💌
For imports	set t=0 at f	ïrst sample	-	Adjust clock	with acous	tic ref	Show response below window	limit
IR oversam	pler: Windo	owed sinc	-	Adjust clock	with loopba	ack	🗹 Use right window width for min	valid frequency
Loopba	ck delay ref	ference is I	R peak	🖉 Align IR pea	k		🗹 Limit cal data boost to 20 dB	Apply cal files to distortion
				Align t=0 to	a sampling ir	nstant		
Vala								
eih								

Next, click to open the View tab and set those parameters as in the screenshot below.

Soundcard Cal Files Comms House Curve	Analysis Equaliser View	
Graph		
Use thick traces	Enable mousewheel zoom	Show watermark text on graphs
Use antialiasing for traces	☑ Limit mousewheel zoom rate	Enter watermark text
✓ Use thicker traces for averages	Save trace colour with measurement	Choose default trace colours
✓ Use thicker traces for highlighting	Show aspect ratio dB/decade	
Freq axis start (Hz) 20.0 💌		
Freq axis preset 1 L	Freq axis preset 2 L 20	Preset 1 aspect ratio: As plotted 💌
Freq axis preset 1 R 200	Freq axis preset 2 R 20000	Preset 2 aspect ratio: As plotted 💌
Interface		
Show toolbar text labels	✓ Show grid on thumbnails	✓ *Scale fonts for display DPI
Show graph button text labels	Show toolbar	*Maximum measurements: 60 🔺
Suppress soundcard errors	Use dark background	*General font size: 11
☑ Full scale sine rms is 0 dBFS	🗹 Show [FDW] in name if used	*Graph font size:
🗹 Keep SPL Meter on top	$\checkmark$ Don't show the welcome message	*Max RTA inputs (Pro): 16
🗹 Keep Level Meters on top	Show measurement notes in tooltip	*Max level meters inputs (Pro):
🗹 Keep signal generator on top	☑ Show phase wrap lines	Settings marked * are applied after restart
Keep filters panel on top	☑ Show minor grid lines	Speed of sound (ff/s): 1125
Show measurement level on thumbnails	☑ Animate measurements list	Distance units: feet
Confirm unsaved measurement removal	Disable tooltips	

Help

Now, click on the Soundcard tab again to open it.

Cal Files		View			
carries	Commis House Curve Amaysis Equaliser	View			
Java  Sample Rate 48 kHz  Stereo only	Output Device Buffer Headphones (2- Audio ) 16k (m) Output HEADPHONE ) L ) Timing Reference Output R )	Input Device Buffer Microphone (2- Audiof ♥ 32k ♥ Input MICROPHONE (Master ♥ L ♥ Virtual balanced input Loopback input R ♥	Out <sup>0</sup> пация -10 при	0 -10 -20	Ref In 0 -10 -20 -30
nput Options Invert High Pass ✔ Treat 32-bit data as	✓ Control output volume       Output Volume:     0.50 m/m       Sweep Levet:     -20.0 m/m       dBFS	Control input volume	-40 -50 -60 -70 -70	-40 -50 -60 -70	-40 -50 -60 -70
oundcard calibration Headphones (2- Audio None	n frog USB-Duo) HEADPHONE at 48 kHz	Calibrate soundcard) se) Clear Cal Make cal file	-80 -90 -90 -90 -90 -90 -90 -90 -90 -90 -9	-80 -90 -100 dBFS	-80 -90 -100 dBFS
Use main speaker test Use pink periodic n telp	signal to check/set levels V Check L oise for level checks throughout REW	evels) Generate Debug File	-95.99		
Choose the Outpu can be chosen. Th and inputs are ste inputs or outputs, i Make sure that the selected in the An loopback connect	It Device and Input Device you wish to use for the channels used for output and input are sel reo so you have the choice of using the left of if that is the case the channel selectors will be input channel is the one connected to your S alysis Preferences the other channel will be to on on the reference channel.	r measurements. After the devices have be lected from the drop downs to the right of th r right channel, or (for output only) both cha le disabled. SPL meter (or mic preamp output). If Use Io used a reference to remove time delays wit	en selected the pa e output and inpu nnels. Some inter opback as timing hin the computer	articular Output a It selections, mo rfaces only provio reference has b and interface, thi	and Input st outputs de mono een is requires a
				Next >	Cancel

## Then, click on Calibrate Soundcard

Soundcard Cal File		r Viaw			
Soundcard Carrie	Commis House Curve Analysis Equalise				
Drivers	Output Device Buffer	Input Device Buffer	0.4		
Java 🔻	Headphones (2- Audio 💌 16k 💻	Microphone (2- Audiof 💌 32k 📥			
Sample Rate	Output	Input			10
48 kHz 💌	HEADPHONE 🔽 L 👻	MICROPHONE (Master 🔽 📘		.10	
Stereo only		Virtual balanced input	-20 -=	-20	-20
	Timing Reference Output R	Loopback input R 💌	.30	-30	-30
			Ē		
Input Options	Control output volume	Control input volume	·40 =	-40	-40
Invert	Output Volume: 0.50 🗼 🗌 Mute	Input Volume: 0.60	-50	-50	-50
High Pass	Sweep Level: -20.0 🔹 dBFS			80	-
Treat 32-bit date	a as 24-bit		-00-	.00	
			.70	-70	-70
Soundcard calibra	tion		-80	-80	-80
Headphones (2- Au	idiofrog USB-Duo) HEADPHONE at 48 kHz	Calibrate soundcard	Ē		
None	Brov	wse) Clear Cal Make cal file	-90	-90	-90
			-100	-100	-100
Levels				dBFS	dBF S
Use main speaker to	est signal to check/set levels	Levels Generate Debug File	-95.99		
✓ Use pink periodi	ic noise for level checks throughout REW				
Help					
The sudia (start				d anuad an a collec	ation file
This response i	is subtracted when subsequent measurement	ts are made, eliminating the interface's own	response. The lo	o saved as a calibl oopback connectio	alion life. 1 goes from
the output chan	nel that will be used for measurement (usually	the Right channel of the Line output) to the	input channel tha	it will be used (usu	ally the Right
channer of the h	ine inputy.				
Please connect	t the loopback now and press <b>Next</b> when it has	been connected or Cancel to quit.			
				Next >	Cancel

Then, click on Next in the bottom right.

Soundcard Cal File	es Comms House Curve Analysis Equali	ser View			
)rivers Java	Output Device Buffer Headphones (2- Audio 💌 16k 💌	Input Device Buffer	Out	0 1	Ref In
ample Rate	Output	Input	-10 📕	-10	-10
48 kHz 🔻	HEADPHONE 🔽 L	MICROPHONE (Master 💌 L	Ē		
Stereo only		Virtual balanced input	-20 -	-20	-20
	Timing Reference Output R	Loopback input R	-30	-30	-30
put Options	Control output volume	Control input volume	-40	-40	-40
Invert	Output Volume: 0.50 🗼 🗌 Mute	Input Volume: 0.60	.50 -	-50	-50
High Pass	Sweep Level: -20.0 📥 dBFS				
7 To a to a to a data			-60 =	-60	-60
✓ Treat 32-bit data	a as 24-bit		-70	-70	-70
oundcard calibra	tion		Ē		
Headphones (2- Au	udiofrog USB-Duo) HEADPHONE at 48 kHz		-80 -=	-80	-80
			-90·	-90	-90
None	В	owse	1 1		
evels			-100 - dBFS	-100 — U dBFS	-100 dBFS
lloo main oncokor te		k Laurala	-95,99		
		Generale Debug File			
Use pink periodi				<u> </u>	
elp					
The Contrate					
Sween Level se	s to use a 1KHZ tone to set the levels of the n atting, it is best to use a fairly high level for inf	reasurement signal and the interface input vi rerface measurement, between -12 and -6 dF	FS Set this level	s generated at tr	veen Level
control above, th	he original level will be restored at the end.				
If the REW volue	me controls are available and enabled the O	utput Volume should be around 0.5 if it affects	s the signal level	If REW volume (	controls are not
available or not	being used set the levels via the controls in	your interface's mixer or your OS audio contro	l panel.	and an	
Press Next whe	en the Sweep Level and Output Volume have	been set or Cancel to quit.			
				Next >	Cancel

Then, click on Next again. The level indicators should appear and the Out and In levels should be similar. If they are not, adjust the value next to "Input Volume" until the input level is withing about 1dB out the output level.

Drivers Output Device Buffer   image image   Sample Rate Output   image image   image image <t< th=""><th><pre>https:// Output/Device// Buffer / Put/Device// Put/Devi</pre></th><th>Soundcard Cal Files</th><th>Comms House Curve Analysis Equalise</th><th>er View</th><th></th><th></th><th></th></t<>	<pre>https:// Output/Device// Buffer / Put/Device// Put/Devi</pre>	Soundcard Cal Files	Comms House Curve Analysis Equalise	er View			
Index       Levels	Index       Dependence	Cal Files Crivers Java   Sample Rate 48 kHz  Stereo only nput Options Invert	Comme House Curve Analysis Equalise Output Device Buffer Headphones (2- Audio * 16k * Output HEADPHONE * L * Timing Reference Output R * Control output volume Output Volume: 0.50 h Hute	r View Input Device Buffer Microphone (2- Audof View) Input MiCROPHONE (Master View) Virtual balanced input Loopback input R Virtual balanced input Control input volume Input	Out <sup>0</sup> particularities for the second seco	s to construct and	Ref In           0         1
.evels     dBFS     dBFS     dBFS     dBFS     dBFS     dBFS     dBFS     dBFS     dBFS     -20.98     -57.52       Use pink periodic noise for level checks throughout REW     Use pink periodic noise for level checks throughout REW     Event     -20.98     -57.52	dBFS	invert High Pass ✓ Treat 32-bit data i Soundcard calibrati Headphones (2- Aud None	Output Volume: 0.50 dBFS Sweep Level: 20.0 dBFS as 24-bit on iofrog USB-Duo) HEADPHONE at 48 kHz Bro	Calbrate soundcard Wse Clear Cat	-50 -60 77 88 90 -60 -00 100 -70 88 -00 -00 -00 -00	-50 - -50 - -60 - -70 - -70 - -70 - -80 - -90 - -90 - -90 - -100 - -100 -	-00 Instantinghantinghantinghantin 100
leip	The 1kHz tone is now playing. Adjust the Input Volume using the REW control (if enabled and available) or your interface's mixer or your OS audio level controls so that the input level is close to the output level, ideally within 6dB, and the peak level (the red line on the bar) is lower than -1dB. If the input level control is at its maximum but the input level is still more than 6dB below the output level try increasing the Output Volume using the REW control (if enabled and available) or your interface's mixer or your OS audio level controls. Press Next when the input volume has been set or Cancel to quit.	Levels Use main speaker tes I Use pink periodic telp	st signal to check/set levels Check noise for level checks throughout REW	Levels) Generate Debug File	dBFS -20.00	dBFS -20.98	-57.52

Once the Out and In level meters read about the same, click Next again.

Drivers Output Device Buffer   Java Image: Sample Rate   Output   At Max   At Max   Image: Stereo only   Timing Reference Output R   Image: Stereo only   Image: Stereo only <th>Soundcard Cal File</th> <th>es Comms House Curve Analysis Equalise</th> <th>er View</th> <th></th> <th></th> <th></th>	Soundcard Cal File	es Comms House Curve Analysis Equalise	er View			
Drivers Output Device Buffer   Input Options Control output volume Invert Output Volume: Output Vo						
Java Headphones (2- Audo   Sample Rate Output   Sample Rate Output   Bind Input   Input Input   Stereo only Iming Reference Output R   Invert Output Volume:   Invert Output Volume:   Invert Output Volume:   Invert Output Volume:   Heighbones (2- Audio froi USE-Duo) HEADPHONE at 48 kHz   None   Invert Output Headphones (2- Audio froi USE-Duo) HEADPHONE at 48 kHz   None   Invert Output Headphones (2- Audio froi USE-Duo) HEADPHONE at 48 kHz   None   Invert Output Headphones (2- Audio froi USE-Duo) HEADPHONE at 48 kHz   None   Invert Output Headphones (2- Audio froi USE-Duo) HEADPHONE at 48 kHz   Output Volume: Output Headphones for level checks throughout REW	Drivers	Output Device Buffer	Input Device Buffer	Out	In	Ref In
Sample Rate Output   Input <td>Java 💌</td> <td>Headphones (2- Audio 💌 16k 💌</td> <td>Microphone (2- Audiof 💌 32k 🔺</td> <td>0</td> <td>0 -</td> <td>0</td>	Java 💌	Headphones (2- Audio 💌 16k 💌	Microphone (2- Audiof 💌 32k 🔺	0	0 -	0
HEADPHONE     INCROPHONE (Master)        INCROPHONE (Master)                        <	Sample Rate	Output	Input	-10	-10	-10
Stereo only       Utriusi balanced input         Image of provide the stere of the state of th	48 kHz 🔻	HEADPHONE	MICROPHONE (Master 🔽 L	Ē	Ē	Ē
Timing Reference Output R   nput Options Control output volume   invert Output Volume:   0.50 * Input Volume:   0.60 *   * Treat 32-bit data as 24-bit   Soundcard calibration   Headphones (2- Audiofrog USB-Duo) HEADPHONE at 48 kHz   Central soundcard.   None   Browse   Clear Cali   Make cal file   •00 uput dues to check/set levels   Clear Calibrate soundcard.   •00 uput dues to check/set levels   Clear Calibrate soundcard.   •01 uput dues to check/set levels   •02 uput dues to check/set levels   •03 uput dues to check/set levels   •04 uput dues to check/set levels   •05 uput dues to check to throughout REW	Stereo only		Virtual balanced input	-20 -=	-20 - <u>=</u>	-20 <u>=</u>
nput Options Control output volume Output Ou		Timing Reference Output R	Loopback input R	-30 -	-30 Ē	-30
nput Options Control output volume Output Volume: Os0 + Output Volume: O					Ē	Ē
Invert       Output Volume:       0.50 ★       Mute       Input Volume:       0.60 ★         High Pass       Sweep Level:       -20.0 ★       dBFS         ✓       Treat 32-bit data as 24-bit         Soundcard calibration       -00 ↓       -00 ↓         Headphones (2- Audiofrog USB-Duo) HEADPHONE at 48 kHz       Calibrate soundcard.         None       Browse       Clear Cali         Browse       Clear Cali       Make cal file	nput Options	Control output volume	Control input volume	-40 -	.40	.40 =
High Pass       Sweep Level:       -20.0 → dBFS         ✓       Treat 32-bit data as 24-bit         Soundcard calibration         Headphones (2- Audiofrog USB-Duo) HEADPHONE at 48 kHz         Calibrate soundcard         None         Browse       Clear Calibrate soundcard         .evels         Use main speaker test signal to check/set levels       Check Levels.         Ø Use pink periodic noise for level checks throughout REW	Invert	Output Volume: 0.50 🖨 🔲 Mute	Input Volume: 0.60	-50	·50	-50
Treat 32-bit data as 24-bit       Soundcard calibration       Headphones (2- Audiofrog USB-Duo) HEADPHONE at 48 kHz       Calibrate soundcard       None       Browse       Clear Cali       Make cal file       100       100       dBFs       -56.91	High Pass	Sweep Level: -20.0 dBFS		-60	.60	.60
Soundcard calibration Headphones (2- Audiofrog USB-Duo) HEADPHONE at 48 kHz Calibrate soundcard None Browse Clear Cal Make cal file Use main speaker test signal to check/set levels Check Levels Generate Debug File Use pink periodic noise for level checks throughout REW	✓ Treat 32-bit data	a as 24-bit		Ē		
RoundCard calibration Headphones (2- Audio frog USB-Duo) HEADPHONE at 48 kHz None evels Use main speaker test signal to check/set levels Use paink periodic noise for level checks throughout REW Help				-70 -	.70	.70
Headphones (2- Audiofrog USB-Duo) HEADPHONE at 48 kHz  None  Reveis  Use main speaker test signal to check/set levels  Use paik periodic noise for level checks throughout REW  Reveis  Reveis Reveis  Reveis  Reveis  Reveis  Reveis  Reveis Reveis  Reveis  Reveis  Reveis  Reveis  Reveis  Reveis  Reveis Reveis Reveis  Reveis Reveis Reveis Reveis Reveis Reveis Reveis Reveis Reveis Reveis Reveis Reveis Reveis Reveis Reveis Reveis Re	oundcard calibra	tion		-80	.80	-80
None     Browse     Clear Cal     Make cal file       .evels	Headphones (2- Au	udiofrog USB-Duo) HEADPHONE at 48 kHz	Calibrate soundcard	Ē	Ē	Ē
Levels	None	Bro	wse) Clear Cal Make cal file	-90-	-90-	-90 -
Levels				-100	-100	-100 =
Use pink periodic noise for level checks throughout REW	evels			dBFS	dBFS	dBFS
Use pink periodic noise for level checks throughout REW	Use main speaker to	est signal to check/set levels	Levels Generate Debug File	-95.99	-65.19	-56.91
lelp	🖌 Use pink periodi	ic noise for level checks throughout REW				
	lein					
	ioib.					
					Next >	Cancel

And then click Next one more time. The measurement window will open and the soundcard will be measured.

Make a me	easurement					×
Туре:	SPL Impedance		Method:	Sweep	Noise	
Name:		Add number	Settings:	Length	Repetitions	5.5 s
	Will appear as: Sep 18	Add date/time     Image: Add date/time     Use as entered	Timing:	No timing reference		
Notes:				Set t=0 at IR peak	-	
	Keep for next measurement		Playback:	From REW	From file	
Range:	Start Freq End Freq	Hz	Sample rate:	48 kHz		
-	RMS	🔾 dBu	Measurements	1	Delay:	seconds
Level:	-20.00 dBFS	dBV     Volts	Output:	HEADPHONE	-	L
Protection	T Abort if basisy input clipping occurs	dBFS		Invert second output		
Trotocilor	Abort above SPL limit	dB				
	Remaining sweeps: 1 time: 5s 38%					
		Headroom dB		Virtual balan and input	Cal files	
Input:	-30	20.9	Input:	MICROPHONE (Master Vo	olume)	L
			Char	k levels	Start	Cancel
			Cilec	A levels	Start	Cancer

After the measurement is complete, the window will close. Go to REW's main screen to view the measurement of the soundcard. It should look something like the screen below.



Go back to the Soundcard panel in Preferences. And click "Make Cal File"

Soundcard Cal Files	Comms House Curve Analysis Equaliser	View					
Drivers	Output Device Buffer	Input Device Buffer	Out	In	Ref In		
Java 🔻	Headphones (2- Audio 💌 16k 🚽	Microphone (2- Audiof 💌 32k 👻					
Sample Rate	Output	Input	-10 -	-10	-10		
48 kHz 💌	HEADPHONE 💌 L 💌	MICROPHONE (Master 💌 L 💌	Ē	=			
Stereo only		Virtual balanced input	-20 -=	-20	-20		
	Timing Reference Output R	Loopback input R	20 <sup>-</sup>		20		
			-30 <u>-</u>	-30	-30		
Inout Options		Control input volume	-40 -	-40	-40		
input options V control output volume V control input volume							
Invert Output Volume: 0.50 - Mute Input Volume: 0.60							
High Pass Sweep Level: 20.0 + dBFS							
Treat 22 bit data a	n 24 hit						
Inear 52-bit data a	5 24-01		-70 -	-70	-70		
Soundcard calibratio	NP.		Ē				
Headphones (2 Aud	afrog USB Dup) HEADPHONE at 48 kHz		-80 -	-80	-80		
rate soundcard							
None Browse Clear Cal Make cal file							
Levels dBFS dBFS dBFS							
Use main speaker tes	t signal to check/set levels 💌 Check Le	evels Generate Debug File	-95.99				
V Use pink periodic	noise for level checks throughout REW				I		
Help							

Enter a description for the calibration file if you wish and then click OK.



Name the calibration file and save it to a convenient folder on your computer.

🕌 C:\Users\a	andyw\Documents\Au	dio Test Rig∖Audiofrog U	JSB-Duo 2		×
Look In:	Audiofrog USB-Duo 2			•	) 🏠 👔 🗐
Name	Size	item type	Date modified		
File <u>N</u> ame:	Audiofrog USB-Duo Ca	libration			
Files of <u>Type</u> :	Calibration Data (.cal, .	csv, .frd, .txt, .omm, .bkw)			•
					Save Cancel

Now the calibration file will be loaded into the Soundcard panel in REW. This will invert the frequency response of the soundcard and apply that correction filter to every measurement you make.

Soundcard Cal Files	Comms House Curve Analysis Equaliser	View						
Drivers	Output Device Buffer	Input Device Buffer	Out	In In	Ref In			
Java 🔻	Java V Headphones (2- Audio V 16k / Microphone (2- Audiof V 32k / 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0							
Sample Rate	Sample Rate Output Input -10 -10 -10							
48 kHz 💌	HEADPHONE 💌 L 💌	MICROPHONE (Master 💌 L	Ē					
Stereo only		Virtual balanced input	-20 -=	-20 -20				
	Timing Reference Output R	Loopback input R	-30 📕	-30				
			Ē					
Input Options	Control output volume	<ul> <li>Control input volume</li> </ul>	-40 — 	-40 -40				
□ Invert Output Volume: 0.50 + Mute Input Volume: 0.60 + .505								
High Pass	High Pass Sweep Level: -20.0 + dBFS							
Transf 22 hit data and								
Ireat 32-bit data as	V Treat 32-bit data as 24-bit -70 -							
Soundcard calibration			=					
Headphones (2- Audiof	rog USB-Duo) HEADPHONE at 48 kHz	Calibrate soundcard	-80 -	-80				
Audiofrog USB-Duo Calibration.cal								
Use main speaker test s	Use main speaker test signal to check/set levels							
	lise for level checks throughout PEW							
E ose pline periodie no					,			
Help								

### Go back to REW's main screen.



107/256MB 48 kHz 16-bit in, 16-bit out 2000 2000 2000 2000 0000 0000 0000 16-bit data Peak input before clipping 120 dB SPL (uncalibrated)

To confirm that the calibration file works, Click on Measure in the top left



Click on Start at the bottom and in a few seconds, the measurement will be completed.

Make a mea	asurement			×
Туре:	SPL Impedance	]	Method:	Sweep Noise
Name:		Add number	Settings:	Length Repetitions
	Sep 18	Use as entered	Timing:	No timing reference
Notes:				Set t=0 at IR peak
	Keep for next measurement		Playback:	From REW From file
Range:	Start Freq End Freq 10 * 22,000 *	Hz	Sample rate:	48 kHz
Level:	-20.00 dBFS	O dBu O dB∨ O Volts	Measurements: Output:	HEADPHONE
Protection	Abort if heavy input clipping occurs	dB		Invert second output
	Ready to measure 0%			
Input:	-00 -10 -30 -60		Input:	Cal files Virtual balanced input MICROPHONE (Master Volume)
		J	Chec	k levels Start Cancel

When the measurement completes, you should see a second measurement in REW's main screen on the left below the soundcard calibration measurement. The new measurement will fill the display. The new measurement should be flat with the small amount of attenuation at low frequencies and at high frequencies removed.



Next, go back to the Soundcard panel in Preferences and change the input and output channels and the timing reference channels so that the Left channel is the timing reference and the right channel is the input and output channel.

Soundcard Cal Files	Comms House Curve Analysis Equaliser	View				
Drivers Java 💌	Output Device Buffer Headphones (2- Audio 💌 16k 💂	Input Device Buffer	Out	In 0 -=	Ref In	
Sample Rate 48 kHz Stereo only	Output HEADPHONE R Timing Reference Output	Input MICROPHONE (Master V RV Virtual balanced input Loopback input	-10 -10 -20 -30 -30	-10 -20 -30	-10 -20 -30	
Input Options Invert High Pass Treat 32-bit data a	✓ Control output volume       Output Volume:       0.50 ★       Sweep Level:       -20.0 ★       dBFS	-40 -40 -50 -60 -60 -70 -70	-40 -50 -60 -70	-40		
Soundcard calibration Headphones (2- Audiofrog USB-Duo) HEADPHONE at 48 kHz Calibrate soundcard						
Levels	alibration.cal	e ) Clear Cal ) Make cal file	-100 dBFS	-100 dBFS	-100 dBFS	
Use main speaker test	signal to check/set levels Check Levels	/els   Generate Debug File	-90.99			

Now you're ready to make impulse measurements!

Connect the output of the sound card (the female end of the Y adapter) to your head unit or your DSP. Be sure your microphone is plugged into USB-Duo's 2(R) input.

Click Measure in the upper left of REW's main screen. When the measurement window opens, be sure that "Use loopback as timing reference" is selected.

Click "Check Levels" and set the head unit's volume control or the input level of your DSP so the stimulus noise is at a low to moderate level. You don't need to make these measurements loudly and doing so may put your speakers in danger!

Then, click Start.

Make a measurement X								
Type:	SPL	Impedance		Method:	Sweep	Noise		
Name:			Add number	3	Length	Repetitions		
	Will appear as:		Add date/time	Settings:	256k 💌	1 💌	5.5 s	
Sep 18		O Use as entered	Timing:	Use loopback as timing re	eference			
					Timing offset:	0.0000	ms	
Notes:								
	Keep for next m	neasurement		Playback:	From REW	From file		
	Start Freq	End Freq						
Range:	10 🚽	22,000 -	Hz	Sample rate:	48 kHz			
		RMS	🔘 dBu	Measurements	с <u>1</u>	Delay: 1	seconds	
Level:	-20.00	dBFS	dBV     Volts	Output:	HEADPHONE	•	R 💌	
		•	dBFS					
Protection:	✓ Abort if heavy is	nnut clinning occurs			Invert second output			
	Abort above SP	L limit 100		Ref output:	HEADPHONE		L	
	Ready to measure			Ref input:	MICROPHONE (Master Vo	lume)	L	
	0	%						
	0-					Cal files		
	-10				Virtual balanced input	ı		
Input:	-50 -	Manufacture and an a		Input:	MICROPHONE (Master Vo	olume) 💌	R	
	Ξ							
	L-80 -			Che	ck levels	Start	Cancel	

When the measurement completes, you should see another measurement in the list of measurements to the left in REW's main screen and the new measurement should fill the display. You can turn the phase and frequency response graphs on and off using the check box below the display.



Click on Impulse in the horizontal list of options just above the display. The impulse response measurement will appear in the display.

