DSI-X2

4Ch - 8Ch Digital Signal Interface and Processor

OWNER'S MANUAL

SPECIFICATIONS

MODEL	DSI-X2
Input Channels	4
Output Channels	8
SPK Input Sensitivity Max	8 Vrms
RCA Input Sensitivity Max	4 Vrms
Operating Voltage	9-17 Vdc
High-Level Input Impedance	20 KΩ
RCA Input Impedance	25 KΩ
RCA Output Impedance	220 Ω
RCA Output Voltage	8 Vrms
High-Level Input S/N	>100 dB
RCA Input S/N	>100 dB
High-Level Input THD	<0.01%
RCA Input THD	<0.01%
REM OUT Output Current	100mA
Parametric / Graphic EQ	15 Bands
Sampling Frequency	48KHz
Bit Depth	24bit
Idle Current	<500 mA
Dimensions in (LxWxH)	4.9 x 3.5 x 1.5
Dimensions mm (LxWxH)	125 x 90 x 37

PRECAUTIONS

General installation instructions for DSI-X2 components.

To prevent damage to the unit and possible injury, read this manual carefully and follow all installation instructions. This product has been checked for proper function prior to shipping and is guaranteed against manufacturing defects.

Before starting your installation, disconnect the battery's negative terminal to prevent damage to the unit, fire and / or risk of injury.

Install your **DSI-X2** in a dry location with sufficient air circulation for proper cooling of the equipment. The signal processor should be secured to a solid mounting surface using proper mounting hardware. Before mounting, carefully examine the area around and behind the proposed installation location to ensure that there are no electrical cables or components, hydraulic brake lines or any part of the fuel tank located behind the mounting surface. Failure to do so may result in unpredictable damage to these components and possible costly repairs to the vehicle.

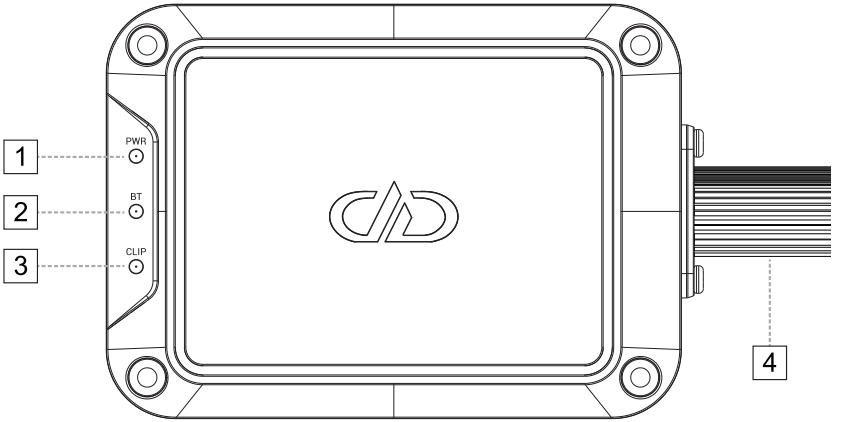
General instruction for connecting the DSI-X2 signal processor.

The **DSI-X2** signal processor may only be installed in vehicles which have a 12 Volt negative terminal connected to the chassis ground. Any other system could cause damage to the signal processor and the electrical system of the vehicle.
The positive cable from the battery for the entire sound system should be provided with a main fuse at a distance of max. 30 cm from the battery. The value of the fuse is calculated from the maximum total current draw of the car audio system.

Use only the provided connectors for connection of the DSI-X2. The use of other connectors or cables can result in damage of the signal processor, the head unit / radio or the connected amplifiers / loudspeakers!

Prior to installation, plan the wire routing to avoid any possible damage to the wire harness. All cabling should be protected against possible crushing or pinching hazards. Also avoid routing cables close to potential noise sources such as electric motors, high power accessories and other vehicle harnesses.

PANEL CONTROLS



1. POWER LED INDICATOR
The Power LED lights up green when the DXI-X2 is turned on and turns off when the DXI-X2 is switched off.

2. BLUETOOTH LED INDICATOR
Turns solid blue when connected to the app.

3. CLIPPING LED INDICATOR
The yellow clipping LED on the DSP warns of signal distortion caused by excessive input levels. If left unchecked, clipping can degrade sound quality and damage the amplifier or speakers.

Always On: Indicates continuous clipping due to an overly high signal level. Lower the volume or gain to prevent damage.

Flashing: Brief flashes are normal, but frequent or constant flashing suggests the signal is too strong. Adjust the gain or volume to maintain clean output.

4. WIRING HARNESS.

THE DSI-X2 GUI PROGRAM

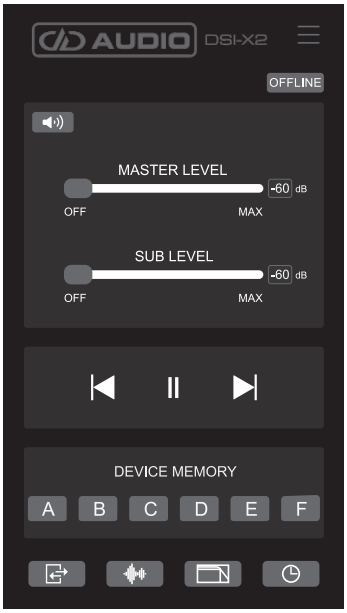
It is possible to freely configure the DSI-X2 with our DSP APP-Tool software.
The user interface is designed for easy handling of all functions and allows an individual adjustment of each of the eight DSP channels. Prior to connecting the signal processor to your mobile phone, visit our website and download the **latest version of the DSP APP-Tool software**. Check from time to time for software updates.

Important: Before beginning the setup be sure all signal sources are turned fully down so there is no volume until after the crossovers are set.

1. Download the latest version of the DSP APP-Tool software (available on our website **DDAUDIO.COM**) and install it on your mobile phone.
2. First turn on the signal processor, connect to the unit in the bluetooth menu of the phone, and then open the app.
3. Now you are able to configure your DSI-X2 with our intuitive DSP APP-Tool software.

Caution: We highly recommend to set the volume of your car radio to minimum position during first start-up. Additionally no devices should be connected to the signal processor until general settings in the DSP PC-Tool software have been made, especially if the DSI-X2 will be used in fully active applications. A wrong setup can destroy your speakers right away.

HOMEPAGE



MASTER LEVEL: Master output level adjustment. Adjusts overall system volume without altering individual channel balance.

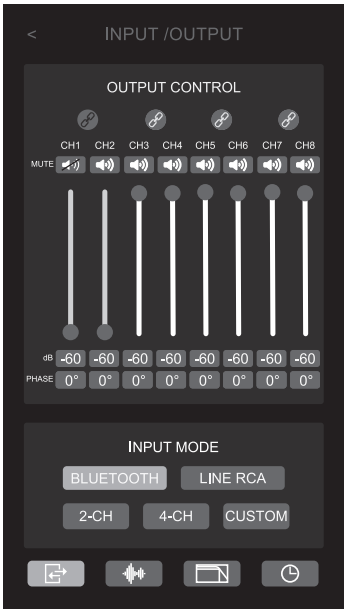
SUB LEVEL: CH7&8 output level adjustment, typically dedicated to the subwoofer. Fine-tunes bass intensity without affecting other speakers.

ONLINE/OFFLINE: Displays if the app is connected or disconnected from the DSP hardware.

MUTE: Use this button to mute.

DEVICE MEMORY: You can save up to 6 presets and additionally save the data on your mobile phone. "A" records the current operation here.

CHANNEL SETUP



Next is Channel Setup, which is where you will tell the program what inputs and outputs you are using.

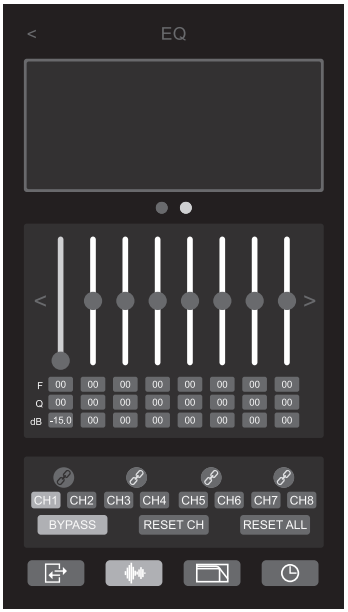
To begin you need to define your system. Fixed 2-Ch inputs will apply left channel information to all odd number output channels and right channel information to all even numbered output channels. These can be 2-Ch or 4-Ch RCA inputs. There are also 4-Ch of speaker level inputs for OEM Integration. The Custom lets you determine your configuration. After you have chosen your input you can move on using the GUI.

MUTE: You can use this button to mute each channel individually or in pairs (stereo).
This function is useful if you want to check the performance of each channel individually .

PHASE/LEVEL: Used for adjusting levels and checking Polarity to be sure all speakers are in phase with each other.

There are a number of systems for checking System Phase. If the systems speakers are not all in phase there will be issues you cannot fix by tuning. You can see the section on System Phasing to see one method of Phase checking.

EQ CONFIGURATION

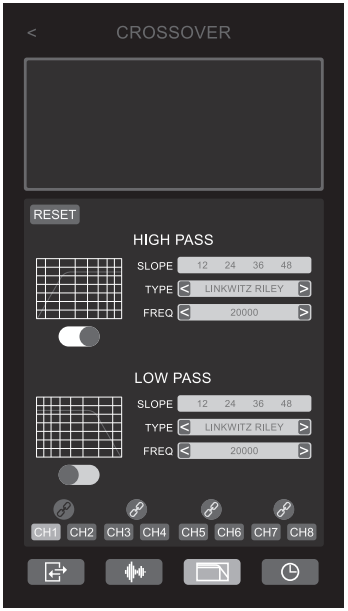


15-band Parametric Equalizer
(25Hz~16kHz, -12 dB~+12 dB, Q Factor 0.2~10)

Here are 15 bands of parametric equalization for each output channel and you can vary Frequency, Gain, and Q (the shape of the adjustment) for each band in several ways.

To aid the tuning process you can temporarily bypass a channel's equalization. You can also use the reset function to reset one channel or to reset all channels to default positions with no equalization.

CHANNEL SELECTION AND CROSSOVER



HP / LP , 20hz-20kHz, Slope : 12dB /24dB / 36dB / 48dB, Bessel/Butterworth / Linkwitz-Riley

You can select a channel to tune by clicking on the desired speaker in the car diagram/Delay section or by clicking on its box in the DSP Channel column. You can pick channels one at a time or you can pick them by pair. Double clicking the dot between a pair of channels links that pair. Similarly, if one channel is already chosen and active, then clicking on the dot will pair them.

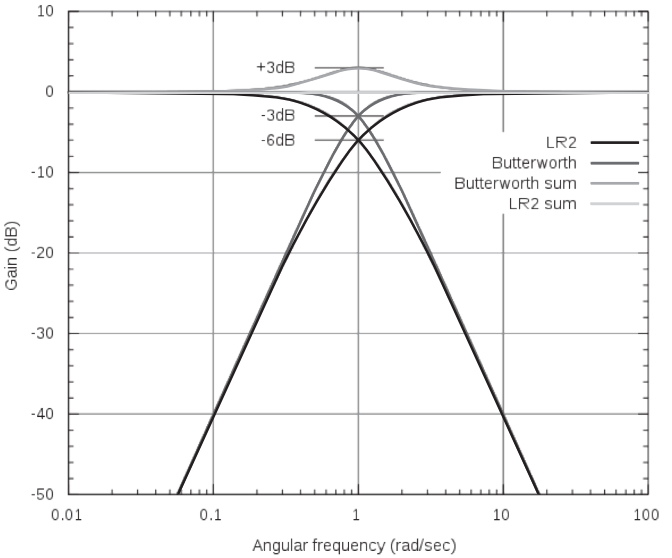
Most applications will have the same crossovers on the left and right channels, so channels should be linked to prevent mistakes and make tuning faster.

Each channel has a High Pass and a Low Pass filter. You can control the frequencies of the filters by highlighting the FREQ box and typing in a value or by using the keyboard up/down arrows.

You can choose the Shape of the crossover from Butterworth, Linkwitz-Riley, or Bessel and the Slope using the drop-down menus. The default crossovers are all 24dB/Octave Linkwitz-Riley.

The best source for information on the proper crossovers for your own speakers are the speaker's manufacturer. They can tell you what crossover to use and also how much power the speakers can handle at different slopes and frequencies.

Difference between Butterworth and Linkwith-Riley characteristics

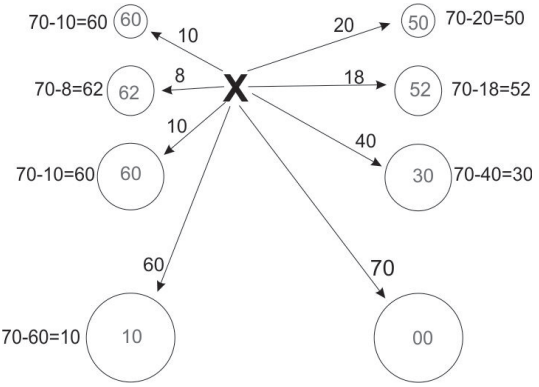


Comparison of the response of summed Butterworth and Linkwitz-Riley crossover filters. The Butterworth crossovers have a +3dB peak at the crossover frequency, whereas the L-R filters have a flat summed output

TIME DELAY CONFIGURATION

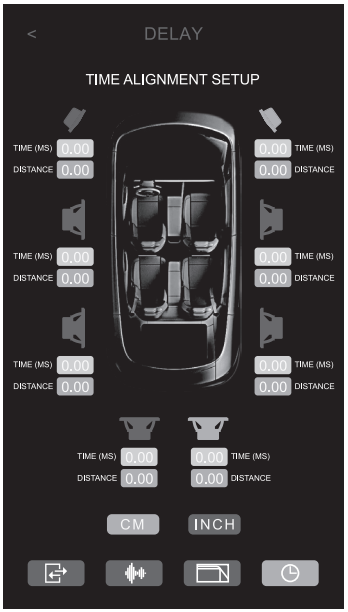
The time delay for each channel is adjustable in 0.01ms steps from 0~108 ms

Delay: Since you can not sit directly in the center of the car, the program can delay the arrival time of near speakers so it will sound as though you are right in the middle of the car. Setting delay is quite straightforward. The purpose is to make every sound arrive at your ears at the same time, simulating being in the center of the vehicle.



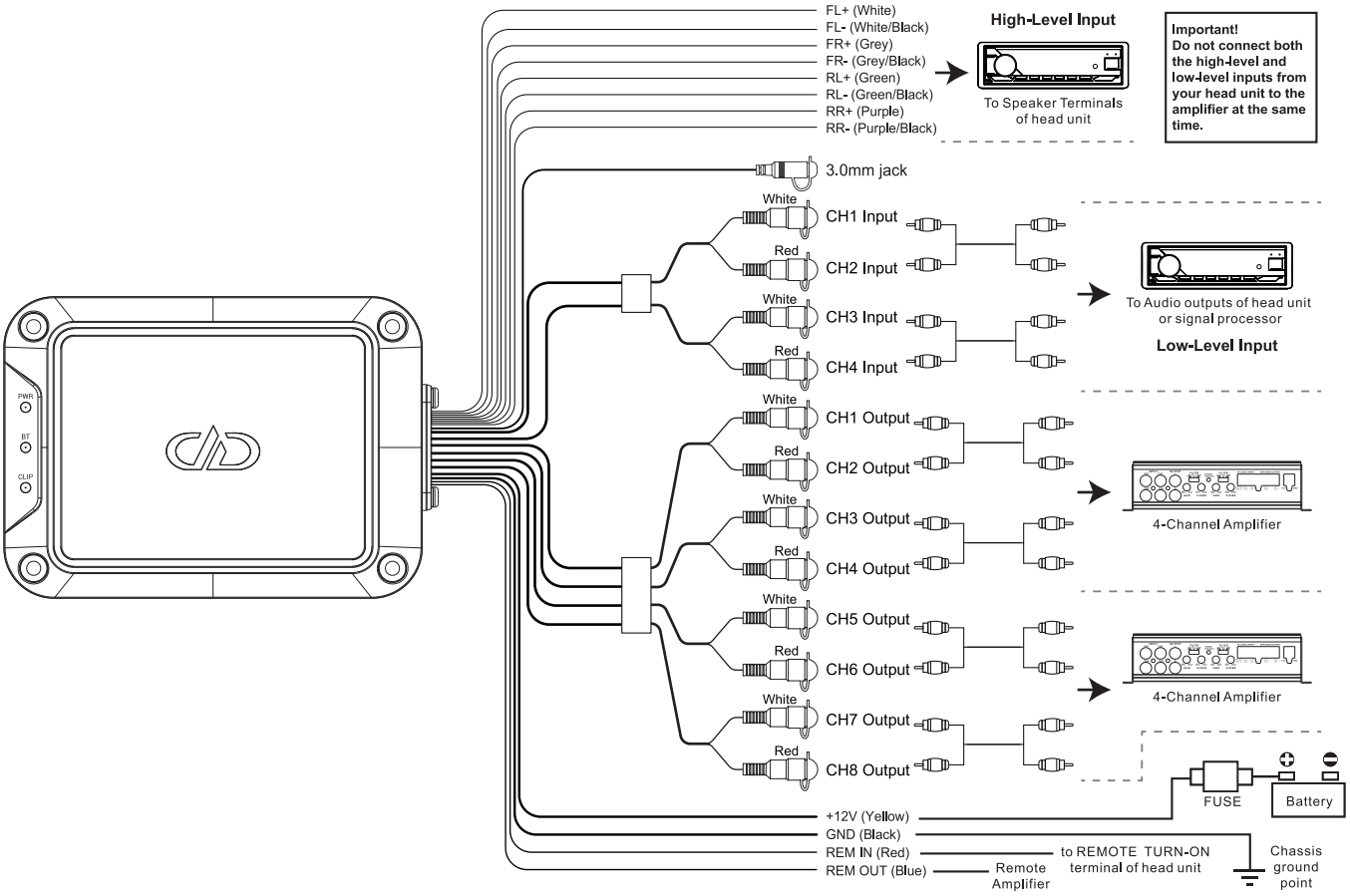
1. Measure the distance between each speaker and where your ears will be in the actual listening position.

2. Enter the measured distance into the software, and the correct delay will be automatically calculated

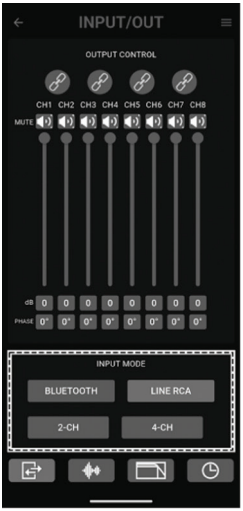


After you have entered the distances in **cm** or **inch** you can see the delay in milliseconds.

WIRING


FL+ (White)
FL- (White/Black)
FR+ (Grey)
FR- (Grey/Black)
RL+ (Green)
RL- (Green/Black)
RR+ (Purple)
RR- (Purple/Black)
High-Level Input
To Speaker Terminals of head unit
Important! Do not connect both the high-level and low-level inputs from your head unit to the amplifier at the same time.
3.0mm jack
White
CH1 Input
Red
CH2 Input
White
CH3 Input
Red
CH4 Input
To Audio outputs of head unit or signal processor
Low-Level Input
White
CH1 Output
Red
CH2 Output
White
CH3 Output
Red
CH4 Output
4-Channel Amplifier
White
CH5 Output
Red
CH6 Output
White
CH7 Output
Red
CH8 Output
4-Channel Amplifier
FUSE
Battery
+12V (Yellow)
GND (Black)
REM IN (Red)
REM OUT (Blue)
Remote Amplifier
to REMOTE TURN-ON terminal of head unit
Chassis ground point
PWR
BT
CLIP

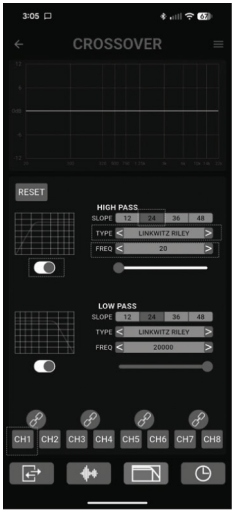
QUICK START GUIDE



Step 1: Setting Inputs.

Go to the INPUT/OUTPUT menu.
Select what inputs you will be using.

Fixed 2-Ch inputs will apply left channel information to all odd number output channels and right channel information to all even numbered output channels. These can be 2-Ch or 4-Ch RCA inputs. There are also 4-Ch of speaker level inputs for OEM Integration. The Custom lets you determine your configuration. After you have chosen your input you can move on in the tuning process.



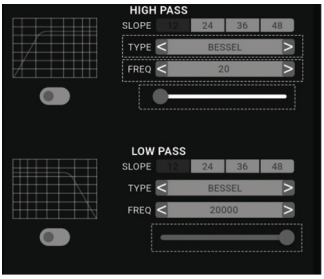
Step 2: Setting Crossovers.

Go to the **CROSSOVER** menu. We will go through the process of tuning channel 1 first. Make sure you have selected **CH1** in the bottom left hand corner of the screen.

Decide what crossovers you need to apply to this channel.

First you need to decide what crossovers you are using, and then you will enter it into the app.

In most systems the **24** dB/octave **Linkwitz Riley** is the best. This is the default setting of the DSI-X2 and does not need to be adjusted in most cases. You also need the frequency (**FREQ**) setting. Midrange speakers and tweeters typically need a high pass that is 2x the Fs or the lowest rated frequency. The low pass filter should be set at the same frequency as the high pass filter of the next smallest speaker. Avoid having the low pass filter less than 4x the frequency of the high pass filter, as that causes cancellations and loses output.



Once you have chosen the crossovers you are using you can enter them into the app.

Turn the low pass and/or the high pass on (toggle switch under graph) before clicking on the **FREQ** and entering the number you will be using. You can also adjust the **SLOPE** and **TYPE** if you are using something other than a 24dB/octave Linkwitz-Riley

Now, repeat the same process for every channel you will be using.

Step 3: Time Alignment.

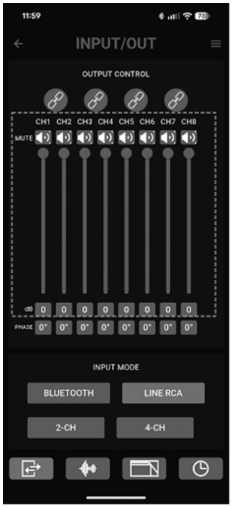
Next, se the alignment by first opening the DELAY menu.

a. Measure the distance between each speaker and where your ears will be in the actual listening position.

b.Enter the measured distance into the software, and the correct delay will be automatically calculated.

Step 4: Listen.

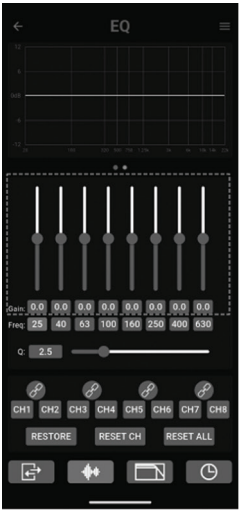
Now, listen to the system. Play several songs that you like and have heard many times. Pay attention to what parts of the music are louder than others, and what speakers those sounds are coming from. Simpler songs, like ones with isolated vocals and instruments are easier to tune with.



Step 5: Level Matching.

Go to the **INPUT/OUT** menu.

If any speakers are playing significantly louder than the rest, use these settings to turn the volume on them down. Each -6 cuts the volume level in half, so setting the channel to -12 would bring the speaker to ¼ of its original loudness. Dial this in until each of the speakers are at similar volume.

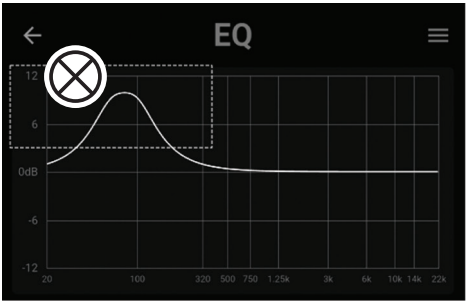


Step 6: EQ.

Lastly, go to the **EQ** menu.

If there are any specific frequencies that are too loud, use the EQ to decrease the volume of them. As with the level matching, -6 dB drops the volume of that frequency by ½. You can boost frequencies as well, but be careful and make sure the graph never exceeds 6 dB.

ATTENTION: <u>DO NOT</u> EXCEED 6dB



End Notes:

This will provide you with a good starting point, but tuning a DSP is an art. You should continue spending more time with the specific tunes and seeing what each setting does. There are plenty of resources available that will help you further understand and dial in every aspect of DSP tuning. But for now, sit back and enjoy your music.