NAU83G60 NAD Evaluation Platform Quick Start Guide

Firmware Version: ***nad_evb_nau83gxx_G60_VerC_v2025_08_05r26.02.04_8f847b19.bin***

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Platform Description Table

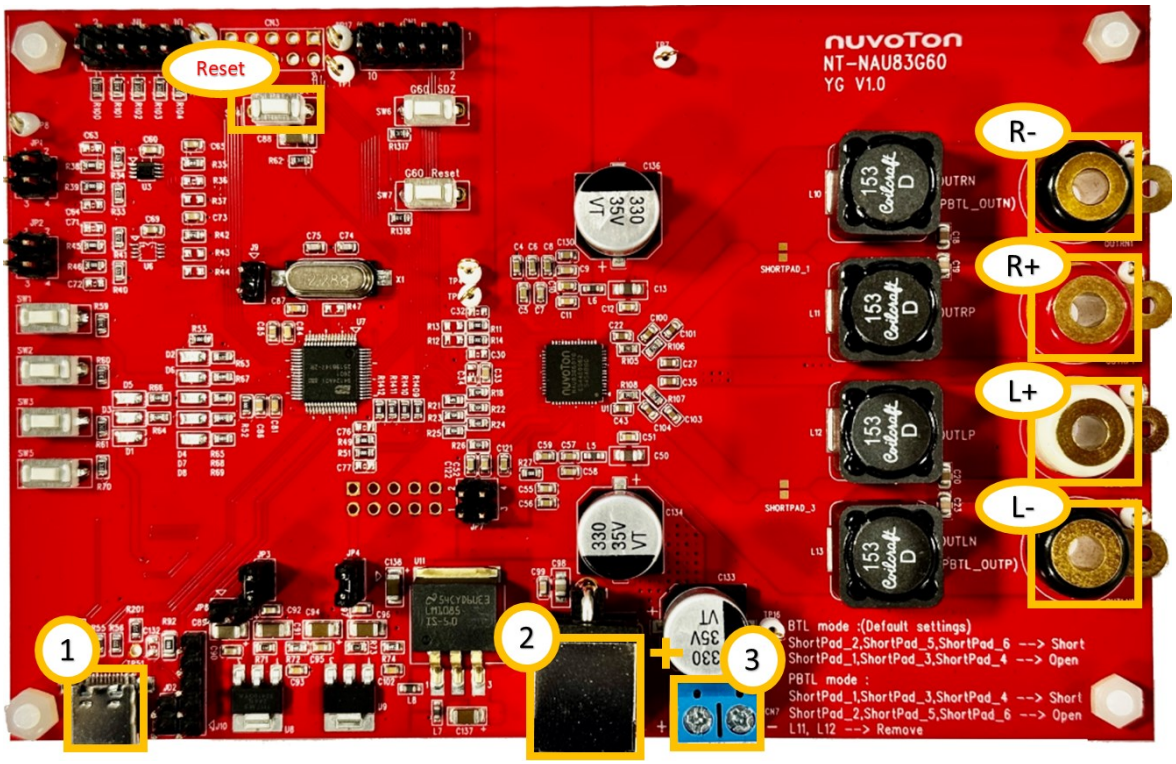

Figure 1. G60 NAD Evaluation Platform

Jumper connection: For normal operation, only connect **JP3** and **JP4**

Table 1. G60 NAD Evaluation Platform Description Table

#	Name	Description
1	USB-C Connection	Supports Virtual COM for dB-Lab/NuvotonGUI for PEQ setting
2	DC Power Terminal	Barrel Connector for power supply(Jack ø5.5, Jack Insertion Depth: 11.1 mm)
3	DC power Supply 2-wire Connector	2-wire power connector for (+) and (-) connections. Shares the connection with DC Power Terminal
L+	Speaker terminals	Left Channel Positive Terminal (0x10 left)
L-		Left Channel Negative Terminal (0x10 left)
R+		Right Channel Positive Terminal (0x10 right)
R-		Right Channel Negative Terminal (0x10 right)

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1 Introduction

The Nuvoton Audio Development (NAD) Evaluation Platform is a device to evaluate Nuvoton Technologies Products hosting the KLIPPEL CONTROLLED SOUND (KCS) nonlinear adaptive loudspeaker control algorithm. With the current firmware ***nad_evb_nau83gxx_G60_RevE_auto_init_v2021_11_17r24.04.26_7965bcfb***, the platform is to evaluate the NAU83G60 devices, in this document briefly referred to as “G60”. The NAD Evaluation Platform comes equipped with I94124, an ARM M4 microprocessor, that has a communication protocol for Klippel’s KCS Monitor GUI operations to communicate directly with the NAU83G60 devices. The communication protocol can be accessed via Virtual COM, which is available as a basic driver for all Windows 10 and newer machines. If using a previous Windows version, please contact Nuvoton support for specialized drivers for this virtual COM port.

Table 2. Required Hardware and Software

Required Hardware and Software:
G60 NAD Evaluation Platform (EVB)
DC Power Supply: up to 24V (recommended 100W)
Klippel dB-Lab >= 212.616. available at: www.klippel.de/go/kcs-eval
NuvotonGUI

For operating KCS, a set of KCS initial parameters describing the desired speaker is required. The KCS initial datasets are conveniently hosted within the KCS Monitor GUI, which is part of KLIPPEL’s software suite dB-Lab. For a step-by-step introduction to KCS Monitor and further information on how to obtain KCS initial parameters, please refer to Section 5.

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2 Buttons and LEDs

Table 3. Button Description

#	Push Type	Function Description
SW1	Hold down while press & release Reset (SW4)	Enable FW update via USB using ISP Tools. See D3
SW2(*)	Long hold down (>5s) while press & release Reset (SW4)	Disable I2S output port on the M4 microprocessor until another reset. This is useful to inject external I2S signals to the NAU83G60 from CN1. See **D8**
SW3 (KCS Toggle)	Short Release (less than 0.5s)	Toggle between **KCS ON** and **KCS OFF + EQ** for both channels. See **D4** and **D5 and note the warning message in 5.1.2, section "Switching Control Modes"**
SW4 (Reset)	On Push	Reset the M4 microprocessor and hard reset the NAU83G60.
SW5(**)	Long hold down (>5s) while press & release Reset (SW4)	Toggle between USB and I2S2 (from CN3) playback input to the M4. See **D7**
SW6	On Push	To control G60 shutdown function. (Active low)
SW7	On Push	To reset G60. (Active low)

Note:
(*) This is intended to help develop customers' FW and test I2C and I2S from customer's board. dB-Lab connectivity is not available in this mode. For external I2S signals with dB-Lab connectivity, please refer to I2S_pinOFF FW versions.

(**) I94 is still in Master Mode so the external I2S signals need to be configured accordingly.

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Table 4. LED Indicator

#	Function Description
D1	TBA (reserved for SD Card Slot)
D2	Heartbeat. • Flashing on and off in 1 second intervals = FW is running • Off = FW is not running
D3	FW Update Mode via ISP Tools indicator. When ON, FW update via ISP Tools is ready.
D4	**GREEN** KCS LED Indicator for NAU83G60 Right Channel • On = Device is present; KCS Algorithm is NOT activated • Off = Device is not present • Blinking = KCS Algorithm is ACTIVE
D5	**RED** KCS LED Indicator for NAU83G60 Left Channel • On = Device is present; KCS Algorithm is NOT activated • Off = Device is not present • Blinking = KCS Algorithm is ACTIVE
D6	TBA
D7	USB/I2S2 playback input • On = I2S2 playback input • Off = USB playback input
D8	I2S Disable LED Indicator. If ON, I2S0 from the M4 to G60 chip is in hi-Z. Customers will need external I2S to drive G60. Intended to help develop customers' FW and test I2S and I2C from their board.

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3 Re-programming FW via ISP Tool

Notice: In some cases, you cannot use the ISP Programming tool to update FW. You will then need to use Nu-Link (Pro) and ICP Programming Tool instead.

3.1 Required Software: ISP Programming Tool

Customers can find the software on the Nuvoton website:
https://www.nuvoton.com/hq/support/tool-and-software/software/programmer/

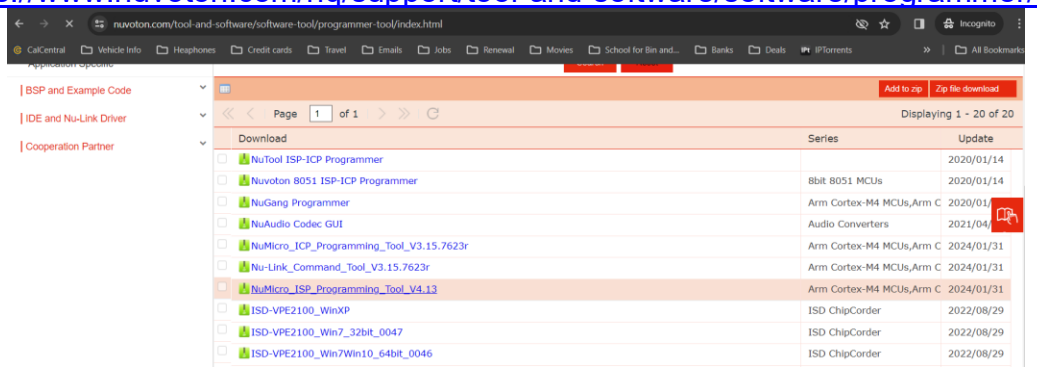

Figure 2. ISP Programming download

3.2 Entering ISP mode

Before you can connect to the hardware via ISP Programming tool, the hardware needs to be set to ISP Mode.

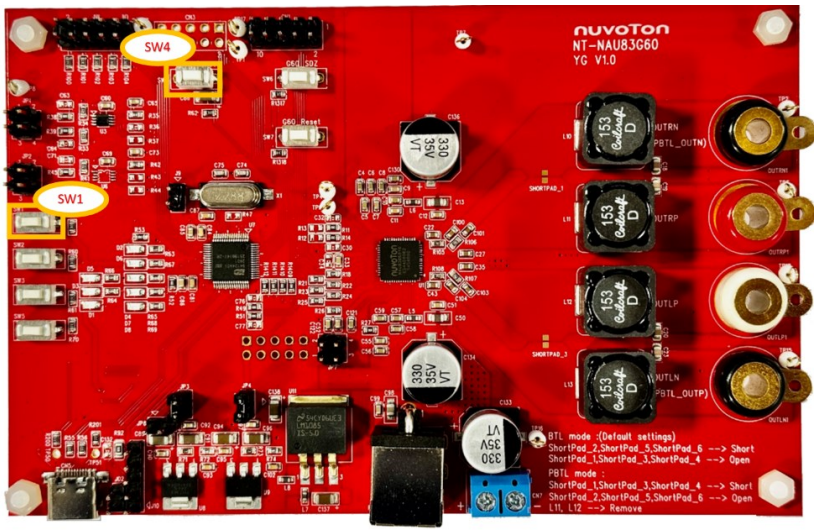

Figure 3. NAU83G60 NAD board ISP Mode Trigger

With G60 NAD board powered up and connected to PC: hold down SW1 and *press & release* SW4 to enter this mode. Once successful, D3 will light up.

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3.3 Updating FW

Figure 4. ISP Programming Tool Selections to load APROM

Open ISP Tool and follow these steps to update FW:

- 1: **Connect** to G60 NAD board
- 2: Click on **APROM** and navigate to the new FW .bin file
- 3: Check **APROM** box in Programming
- 4: Click **Start**

Reset the board (via SW4) and the board is ready with the new FW.

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4 USB Protocols

The G60 NAD Evaluation Platform has the following protocols integrated.

G60 NAD Evaluation Platform USB Protocols	Utilization
Virtual COM Port	KCS-Monitor

KCS-Monitor utilizes the Virtual COM Port. Section 5.1 covers KCS-Monitor, a Klippel dB-Lab operation.

The USB Audio Output is an asynchronous audio driver based on the USB audio standard. To output any audio for the Nuvoton Audio Development Platform, please use this device as the default playback device as shown in Figure 5 and Figure 6.

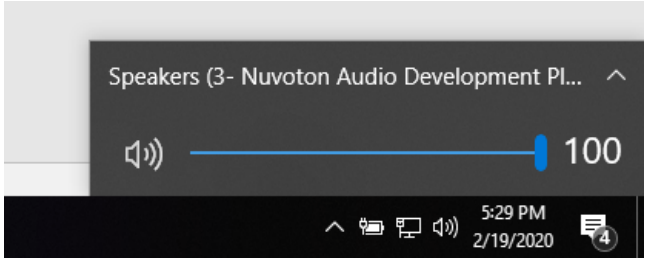

Figure 5. Windows 10 quick select of output device.

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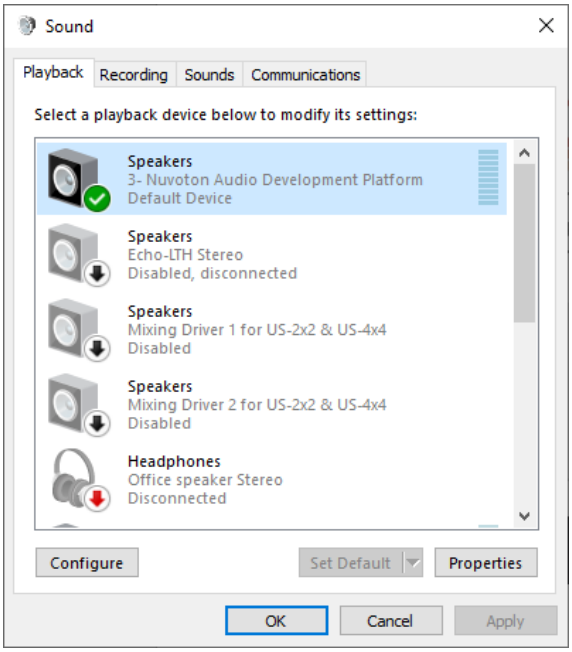

Figure 6. Windows 10 Sound Settings - Default Output Device.

NOTE 1/2: The current version of the audio driver will allow modification of volume through the Windows Volume Control Slider shown in Figure 5. If you already had a Nuvoton NAD Board delivered before **March 12, 2021 connected to this computer**, or have problems with the audio driver, please update the driver as shown below:

1) **With the new G60 NAD Board plugged in**, go to the Windows Sound Control Panel (as shown in Figure 6) by accessing the Windows Control Panel and clicking on “Sound”.

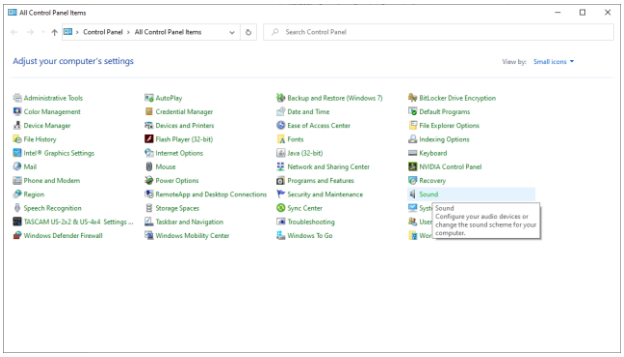

Figure 7. Windows Control Panel

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2) Go to the properties window of the Nuvoton Audio Development Platform by double clicking the device or selecting the device and clicking the “Properties” button.
3) When in the properties window of the Speaker driver for the G60 NAD Board, in the “General” Tab click on the “Properties” button as shown in Figure 8.

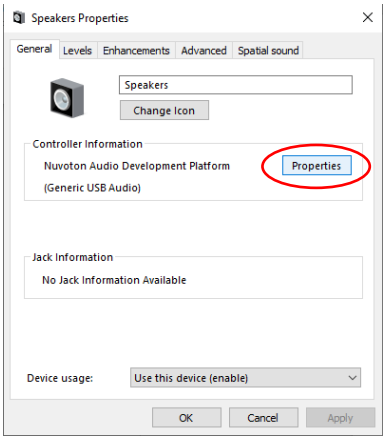

Figure 8. General Tab of Speaker Properties Window

4) In the specific Nuvoton Audio Development Platform properties window that opened due to 3), click on the “Change Settings” button. If a User Account Control (UAC) pop-up activates, then select yes to have the ability to change the driver.

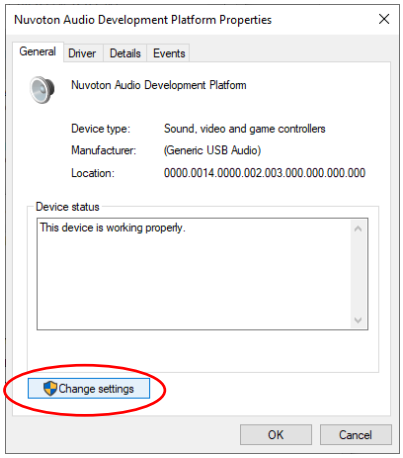

Figure 9. G60 NAD Platform Device Properties

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5) Next, go to the “Driver” and in this tab click on “Uninstall Device”. This will uninstall the current driver and force a re-installation of the new device drivers.

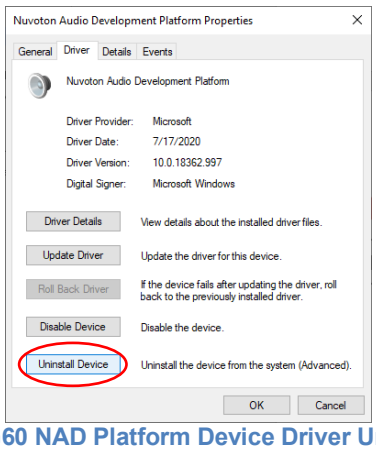

Figure 10. G60 NAD Platform Device Driver Uninstallation

6) Finally, restart your computer for system stability and the G60 NAD Platform Device should be installed automatically. To check this, you can go back to the Speaker Properties in Figure 8 and select the “Levels” tab. Right click the volume control and select “Decibels” from the menu. The decibel values from max to min volume should be **0dB** to **-64dB**. Take note that this volume control is now accurate.

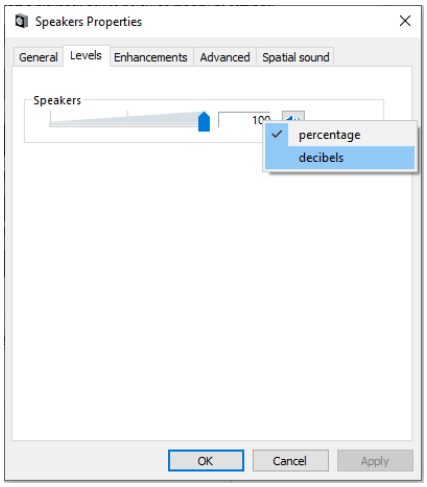

Figure 11. Speaker Properties Verification of New Driver

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Note 2/2: For an effective demo, it is recommended to use an audio source that is original in form. Some media players may normalize the audio output for enjoyable listening but this may affect the quality of the demo. Please be sure to use the original format of music for this demo platform, especially if you have received configuration files from Nuvoton as these are tuned without normalization of the music content.

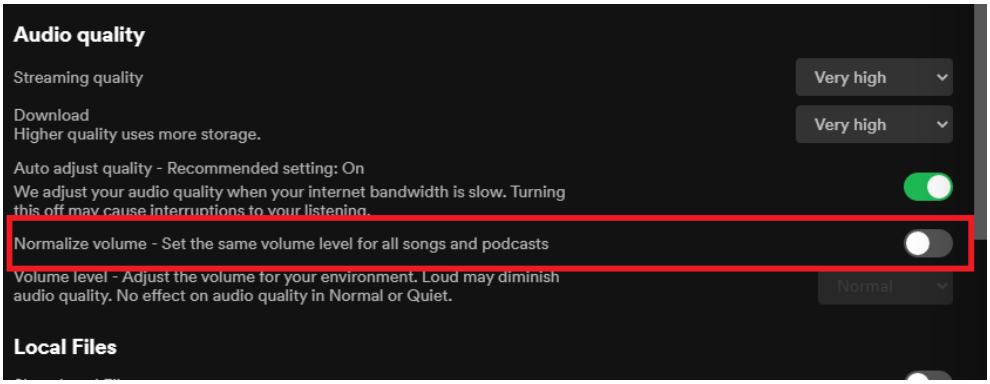

Figure 12. Be sure to turn off volume normalization when using the demo platform.

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5 Step-by-Step Quick Start Guide

This is a quick, step-by-step starting guide on how to get a speaker up and running with the KCS algorithm using the NAU83G60.

Required Hardware, Software, and Files	
G60 NAD Demo board	Hardware
Power Supply (24V, 5A)	Hardware
USB Mini Cable	Hardware
Speaker	Hardware
Computer with **Windows 10** (or newer)	Hardware
Klippel dB-Lab >= 212.616	Software
Nuvoton Audio Enhancement (A6)	Software
KCS initial parameter set for the speaker (*)	KSC Monitor Data File

(*) **Obtaining KCS initial parameters**:
For controlling a speaker with KCS, a set of KCS initial parameters is required. This dataset characterizes the loudspeaker model (a reference version of the transducer mounted in its enclosure/box) and the target amplifier which is the NAU83G60 in this case. The dataset is conveniently stored in the KCS Monitor GUI.
The KCS initial parameters can be obtained in two ways:

1. For speakers that are sold in evaluation kits (reference speakers), KCS initial data will be included.
2. To operate KCS on an individual speaker of your own, the KCS initial dataset needs to be measured first. This is done using the Klippel software module KCS-ID Parameter Identification, which requires the Klippel Analyzer hardware (KA3). The process is described in detail on www.klippel.de/go/kcs-eval. There you can also find guidance on how to proceed, in case you do not have access to the above-mentioned tools.

NOTE: The software communicates through virtual com ports, introduced as a basic driver in Windows 10 or newer. If you do not have Windows 10 or newer, please contact Nuvoton support to acquire to specific driver that the G60 NAD Evaluation Platform requires.

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5.1 KCS Monitor Tutorial

5.1.1 Introduction

KCS Monitor is a software module running in the Klippel dB-Lab framework. It is used for evaluating the Klippel Controlled Sound (KCS) technology. It allows communication with a supported KCS hardware platform and is used to both set up the KCS real-time processing software and to read comprehensive diagnostics information from it.

5.1.2 Starting KCS using Klippel dB-Lab Software

The following is a simplified version intended to get the G60 NAD board operational. Please see *www.klippel.de/go/kcs-eval* for more detailed instructions on how to tune and set up your device.

Requirements

- ***Klippel dB-Lab*** version >= 212.616
- ***KCS Monitor*** operation comprising initial data of the currently connected speaker.

Hardware Setup

Connect the speaker and power supply to the G60 board and establish USB connection to the PC. Make sure that the speaker is of correct polarity (red is +, black is -). Details

Open KCS Monitor data:

Open the provided Klippel dB-Lab database comprising the KCS Monitor operation holding the tuned KCS data belonging to your speaker.

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Upload KCS Data to the Hardware Device

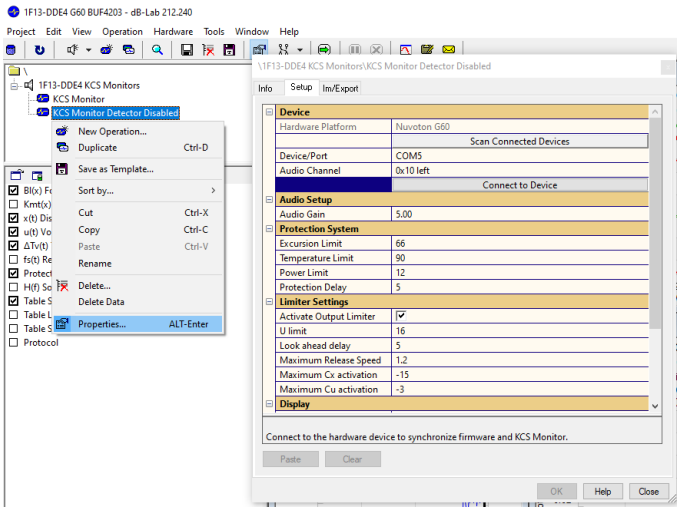

Figure 13. Property page of KCS Monitor

Open the KCS Monitor's property page by right-clicking on the operation → *Properties* or marking the operation and press [Alt]+[Return].
Within the properties window, press *Scan Connected Devices* to update the available COM ports. Then press *'Connect to Device'* to synchronize the KCS setup of software module and hardware.

Starting KCS on-line processing

Start the KCS real-time processing by pressing in the toolbar. This will start the audio output and the collection of diagnostic data.

You can now play music or other audio signals, switch KCS on and off and perform measurements.

Stopping KCS on-line processing

The KCS Monitor operation can be terminated by pressing the green check mark in the toolbar. After finishing, a message box '*Terminate KCS on-line Processing?*' pops up which allows you to either terminante KCS on-line processing completely (choose "Yes" in the message box) or continue to run the KCS processing in standalone mode on the DSP, without a PC connection (choose "No").

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Switching Control Modes

KCS can be switched on and off using the according buttons in the *State* window during runtime. See descriptions below:

KCS ON (Nonlinear Control): Full Nonlinear Control with active protection, distortion compensation, linear and nonlinear inductance compensation, and voice coil stabilization. System alignment is applied.

KCS OFF+EQ (Equalization only): No mechanical protection and no nonlinear distortion compensation. Time-variant parameters and the linear inductance are compensated. System alignment is applied.

KCS OFF (Bypass Control): No alignment, no mechanical protection, and no distortion compensation. Thermal protection is still active.

Attention: The transducer can be destroyed in modes *KCS OFF* and KCS OFF+EQ as the mechanical protection system is switched off! Before switching to these modes from *KCS ON* mode, make sure that playback levels are sufficiently low to avoid damage to the speaker.

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6 Revision History

Version			Description
#	Date	Page/Section	
0.1	July 14, 2022	All	Preliminary Draft.
0.2	March 07, 2023	2	Change to G60 NAD RevB1 picture.
0.3	May 02, 2023	Section 2.	Added section 2. Updated with G60 NAD RevB1 pictures.
0.4	Jan. 16, 2024	All	Draft for official release.
0.5	Feb. 20. 2024	All	Updated based on Klippel's inputs. Swapped Section 2 and 3.
0.6	July 10. 2024	2, 3, 4, 6	Change to G60 NAD RevC picture and firmware version. Change to USB-C Connection on Table 1. Upate the Button Description on table 3.
0.61	June 12. 2025	2	Add the size information of DC power jack on Table 1.
0.7	Apr. 9. 2026	2, 6	Change to G60 NAD picture and firmware version.

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