KHADAS

Tone2 Maker Kit

Hi-Fi USB DAC Audio Board

Quickstart Guide

Setup
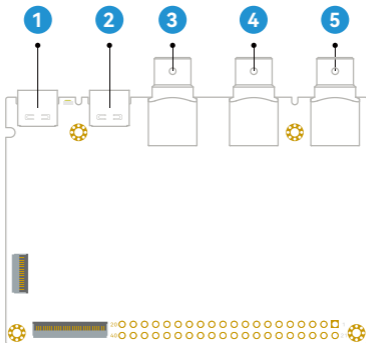
1. Computer / Smartphone / SBC (data-in and power-in)
2. 'Khadas BT Magic' Bluetooth audio receiver module / USB-C 5V linear power supply (power-in)
3. CD player (S/PDIF coax-in)
4. Pre-amp (analog out)-> Amp -> Hi-Fi speaker
5. Pre-amp (analog out)-> Amp -> Hi-Fi speaker

* The 'Khadas BT Magic' Bluetooth audio receiver module needs to be purchased separately.

Interfaces

USB-C
(USB 2.0, DC 5V)

USB-C
(I2S, DC 5V)

Balanced RCA
(Coaxial-input)

Balanced RCA
(Left Line Out)

Balanced RCA
(Right Line Out)

Power LED

RGB LED

Encoder & Button

CPLD
(Intel 5M80ZM68)

14-Pin 0.5mm FPC

XMOS
(XU208)

Shield Cover
(Analog Circuit Area)

KHADAS
Tone2 V12
2207 2230

Khadas Audio

30-Pin 0.5mm FPC

40-Pin 2.54mm Header
(USB 2.0, GPIO I2S, UART, DC 5V)

Interfaces

4-Pin 1.2mm VIN Input
(DC 4.8~14V)

14-Pin 0.5mm FPC
(USB 2.0, DC 3.3V)

Maker Guide

1 **Document Download Instruction**
Schematics: **dl.khadas.com/products/tone2/schematic/**
Specification: **dl.khadas.com/products/tone2/specs/**
2D DXF: **dl.khadas.com/products/tone2/dxf/**
3D CAD: **dl.khadas.com/products/tone2/cad/**
Encoder Specifications: **dl.khadas.com/products/tone2/specs/**
Encoder & Enclosure 3D CAD: **dl.khadas.com/products/tone2/cad/**

2 **Website Introduction**
For the function, usage and Pin definition of each extended interface and more technical information, you can visit **docs.khadas.com/tone2.**
If you encounter technical issues during development, seek help at **forum.khadas.com.**
To purchase additional accessories, please visit **www.khadas.com/shop.**

Driver Installation

1 **Install the Khadas ASIO USB driver**
Download the latest driver from dl.khadas.com/products/tone2/driver

2 **Restart your Windows PC**
The Khadas ASIO USB driver will activate after your PC restarts.

1 Step 1
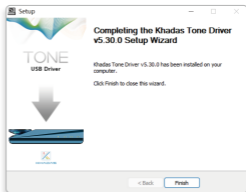
2 Step 2

* Windows' default USB audio driver has high latency, low sampling rates, and does not support ASIO. For a better user experience, please install the Khadas ASIO USB driver.

Firmware Upgrade

1 **Open the Khadas DFU Upgrade Tool**
Download the latest tool from **dl.khadas.com/products/tone2/dfu_tool**

2 **Download the latest Tone2 firmware**
Download the latest firmware from **dl.khadas.com/products/tone2/firmware**

3 **Flash new firmware to Tone2**
Connect your Tone2 via a USB-C cable to your PC, and use the DFU tool to burn the new firmware.

4 **Power off and restart your Tone2**
After the firmware update is completed, Tone2 needs to be powered off and restarted to activate the new firmware.

1 Step 1

2 Step 2

3 Step 3

* For more details, visit **docs.khadas.com/tone2**
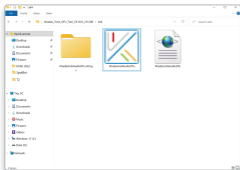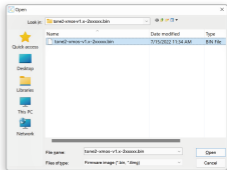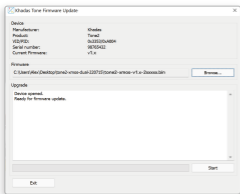
Volume Knob

1 Push
2 Rotate
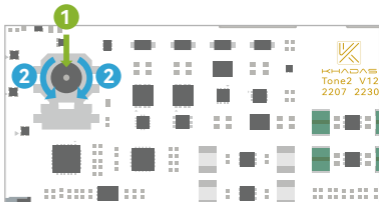
Action		**1** Push				**2** Rotate	
Mode	**Function**	**Single**	**Double**	**Triple**	**Long**	**Clock**	**Anti-C**
General	Play/Stop	*					
	Lock/Unlock			***			
	Off				********		
	On	*					
	Erase BT record				********		
Volume	Increase	** Mode switch				↻	
	Decrease						↺
Track	Next	** Mode switch				↻	
	Previous						↺
Input	Next	** Mode switch				↻	
	Previous						↺
Filter	Next	** Mode switch				↻	
	Previous						↺

* With the external Bluetooth Module plugged-in and Tone2 powered off (USB cable with 5V power still plugged-in), long-press the volume knob for 5s to clear the Bluetooth pairing record.

Power Priority
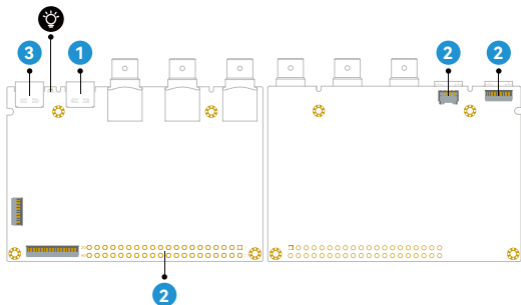
Priority	Power supply	Power LED color
1	**USB-C** (I2S, DC 5V)	White
2	**40-Pin 2.54mm Header** (USB 2.0, GPIO I2S, UART, DC 5V)	Red
2	**4-Pin 1.2mm VIN Input** (DC 4.8~14V)	Red
2	**14-Pin 0.5mm FPC** (USB 2.0, DC 3.3V)	Red
3	**USB-C** (USB 2.0, DC 5V)	Light red

* Refer to **docs.khadas.com/tone2** for the priority of power input to each I/O interface.
* The USB-C (I2S) interface is not standard. Only specific cables (sold separately)
can be used for linear power supplies connected to the USB (I2S) port.

Light Interpretation

🔵 Volume
turquoise

Volume
(mute)

1–20%

21–40%

41–60%

61–80%

81–100%

HID volume adjusting
(Flashes 3 times)

🔴 Track
red

Track

* HID volume adjusting refers
to the 'system volume' of the playback device, e.g. PC, Smartphone, Tablet.

Input selection
yellow, red

USB

S/PDIF

I2S

GPIO (I2S)

AUTO

Filter selection
blue, red

Linear fast

Linear slow

Mini fast

Mini slow

Apodizing

Hybrid fast

Brick wall

* In 'S/PDIF' input mode,
playing, pausing, skipping tracks and adjusting HID volume are not supported.

* GPIO (I2S) input refers
to input I2S signal via GPIO interface, it's only supported in the Tone2 Maker Kit.

DSD format
white

64

128

256

512

PCM format
yellow

44.1 / 48K

88.2 / 96K

176.4 / 192K

352.8 / 384K

705.6 / 768K

* The audio format is only
indicated by the RGB ring light when Tone2 is in 'USB' input mode.

Encoder locked
white

Locked
(Flashes 3 times)

Power off
grey

Power off

FAQ

Which Khadas single board computers can be connected to the Tone2 Maker Kit's 40-pin 2.54mm header?

The VIM1S, VIM3, VIM3L and VIM4 are all supported, however you will need to solder a female 40-pin header to the Tone2 first. Please refer to the instructions in **docs.khadas.com/tone2** for more information.

Please note that the Khadas Warranty Service is no longer valid once you have performed soldering on the Maker Kit.

Which Khadas single board computers can be connected to the 14-pin 0.5mm FPC header on the bottom of the Tone2 Maker Kit?

The VIM3, VIM3L, VIM4 can be connected to the Tone2 Maker Kit in this way via their onboard female M.2 connector. You will need to purchase the Khadas T2V adapter board for this purpose. For specific information, please refer to the instructions in **docs.khadas.com/tone2**.

I have connected DC power to the VIN interface, however the Tone2 Maker Kit does not power on, please help.

Firstly, ensure that the supplied voltage is between 4.8 to 14V. Secondly, please check if there are any discrepancies with the DC power connector's pin layout. Please refer to the instructions in **docs.khadas.com/tone2** for the pin layouts for each I/O interface on the Tone2 Maker Kit.

What is the electrostatic protection level of the Tone2 Maker Kit?

All interfaces have undergone static discharge testing, the protection level is 1000V for contact and 3000V for non-contact. Do not touch the PCBA's circuits when the board is powered on to avoid undesirable effects; such as damage to the board.

Why does Windows require the Khadas USB driver?

The Khadas USB driver provides ASIO support and removes the latency and sample rate conversion issue experienced with the default Windows USB driver for DACs.

What is Balanced RCA?

A new balanced audio connector standard, designed by Khadas for small form-factor desktop DACs. It is backwards compatible with standard RCA plugs and cables, more details visit **https://khadas.com/balanced-rca**

How do I use my existing XLR-3 equipment with Balanced RCA?
Purchase the Khadas Balanced-RCA to XLR-3 adapter; it is a male Balanced-RCA plug connected to a male XLR-3 plug.

How do I use 'S/PDIF' input?
Attach a standard RCA cable to the orange-coloured RCA jack, and set the input mode to 'S/PDIF'. Alternatively, set the input mode to 'AUTO' and stop music playback from other sources.

How do I connect my smartphone to Tone2 via Bluetooth?
Attach a Khadas bluetooth module to the USB-C (I2S) port, and set input mode to 'I2S'.

Can the USB-C input be used with the USB-C output of Android phone?
Yes, Tone2 can be powered by most Android smartphones via USB-C.

What are the input priorities of the 'Auto' input mode?
When connecting both USB-C (USB) and S/PDIF interface in 'Auto' input mode, "USB" input has the highest priority.
When music playback over USB is stopped (you do not need to remove the USB cable), input will switch to the 'S/PDIF'.
Refer to **docs.khadas.com/tone2** for the priority of audio input to each I/O interface.

Can I connect Tone2 to my iPhone or iPad?
Apple's iPhone does not support the Tone2. You can still connect Tone2 to your iPad using a USB-C to C cable, but the Tone2 device information will not appear on your iPad.

Does the Tone2 support native DSD decoding?
Yes, DSD512 native decoding can be enabled by installing the Khadas USB driver.

What is the voltage level of the Balanced RCA connection?
4.0Vrms for balanced RCA mode, and 2.0Vrms for standard RCA mode (single-ended).

Can I use the Tone2 to receive a signal from the TV via coaxial and send it to the amplifier via RCA?

Yes. Set the input mode as 'S/PDIF' or 'Auto', Tone2 will output to the RCA.

Can I supply power to the USB (I2S) interface using my computer, PC or laptop?

No. Please instead connect a linear power supply or battery bank to the USB (I2S) interface.

How do I adjust the HID (system) volume using the volume knob?

When Tone2 is not at or above maximum volume, turning the volume knob clockwise will increase the device's hardware volume. Once Tone2 is at maximum volume, continuing to turn the knob clockwise will cause the RGB indicator to flash turquoise 3 times. Continuing to turn the knob clockwise after this point will instead increase the HID (system) volume of your PC.

Why can't I adjust the HID volume whilst playing DSD formatted audio?

Tone2 does not support HID volume adjustment whilst playing DSD formatted audio.

Troubleshooting Guide

The Volume Knob is unresponsive and flashing full-white when I turn it.
It has been locked, triple-press it to unlock.

My Android phone can't detect Tone2, the power LED remains off, and USB-C is plugged-in correctly.
Go to 'Settings' and enable the 'USB-OTG' feature, most phones have this off by default.

My Tone2 is connected to my PC and I'm playing a song but there's no sound!
Check your computer's sound-output device, switch from 'Speakers' to the 'Tone2'. Secondly, check that your Tone2's input mode is set to 'USB' or 'Auto'.

Help! I've connected my PC to the Tone2 and the lights are on, but my computer cannot detect it!
Ensure that you've plugged your USB-C cable into the USB-C port labelled 'USB'.

I cannot hear any sound from Tone2 when playing music through the S/PDIF input.
Check to ensure that your music is not DSD formatted. The 'S/PDIF' input does not support playback of DSD music.

HID volume control does not work when playing non-DSD formatted audio and the input source is set to USB input.
Please check if there is more than one audio player running simultaneously on your playback device. In such cases, the HID volume control command will only be sent to one of the audio players. Close additional audio players, only open one audio player when using your Tone2.

Specifications

Balanced RCA Line-Out Performance

• THD+N: 0.000126% (–118dB)

• DNR: 121dB

• Crosstalk, 200KΩ: > 120dB

• Noise level: 3.5uVrms

• Output, 200KΩ: 4.0vrms

Single End RCA Line-out Performance

• THD+N: 0.000158%(–116dB)

• DNR: 118dB

• Crosstalk, 200kΩ: >118dB

• Noise Level: 2.3uVrms

• Output, 100KΩ: 2.0vrms

What's In The Box

Tone2 Maker Kit * 1pcs

Instruction Manual * 1pcs

Warranty Card * 1pcs