KHADAS

Tone2 Maker Kit

Technical Instructions

Preface

Thank you for purchasing a Khadas Tone2 Maker Kit. The Tone2 Maker Kit provides Audiophiles, DIYers & OEM (Original Equipment Manufacturer) customers with a range of expansion and connectivity options.

The goal of this document is to provide the user with a comprehensive explanation of Tone2 Maker Kit's various power and data input interfaces, and thus highlight possible applications for this kit.

Note: The Tone2 Maker Kit is not covered by the Khadas warranty in the event that the product has become unrecoverable, damaged or malfunctions due to inadvertent operation during the DIY process.

1. Power Supply Input

Tone2 has 5 interfaces through which power can be supplied. You are free to choose the appropriate interface for your situation. The priority of each interface is mentioned in the User Manual:

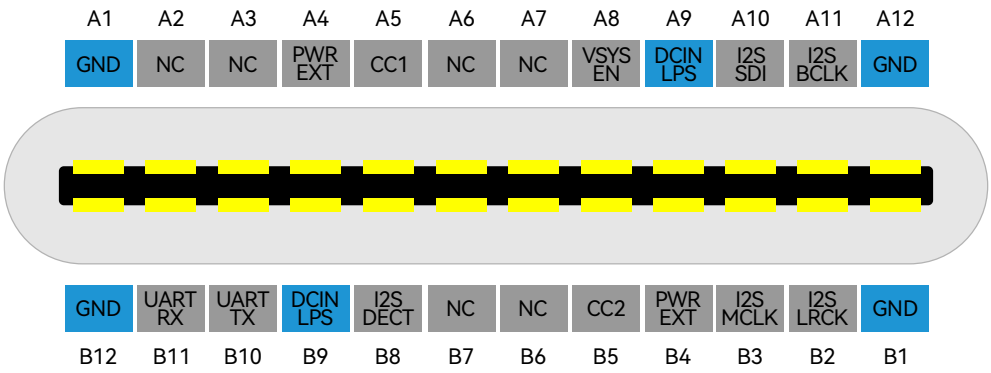
http://dl.khadas.com/products/tone2/manual/tone2_maker kit_user manual_en.pdf

1.1 USB-C (USB) Interface

The USB-C (USB) port is a universal interface that can be connected with any regular USB-C data cable.

1.2 USB-C (I2S)

The USB-C (I2S) port is a non-standard USB-C interface designed by Khadas. The specific power pin connections are highlighted in blue as the figure below.



USB-C (I2S, DC 5V)

1.1.1 Linear power supply

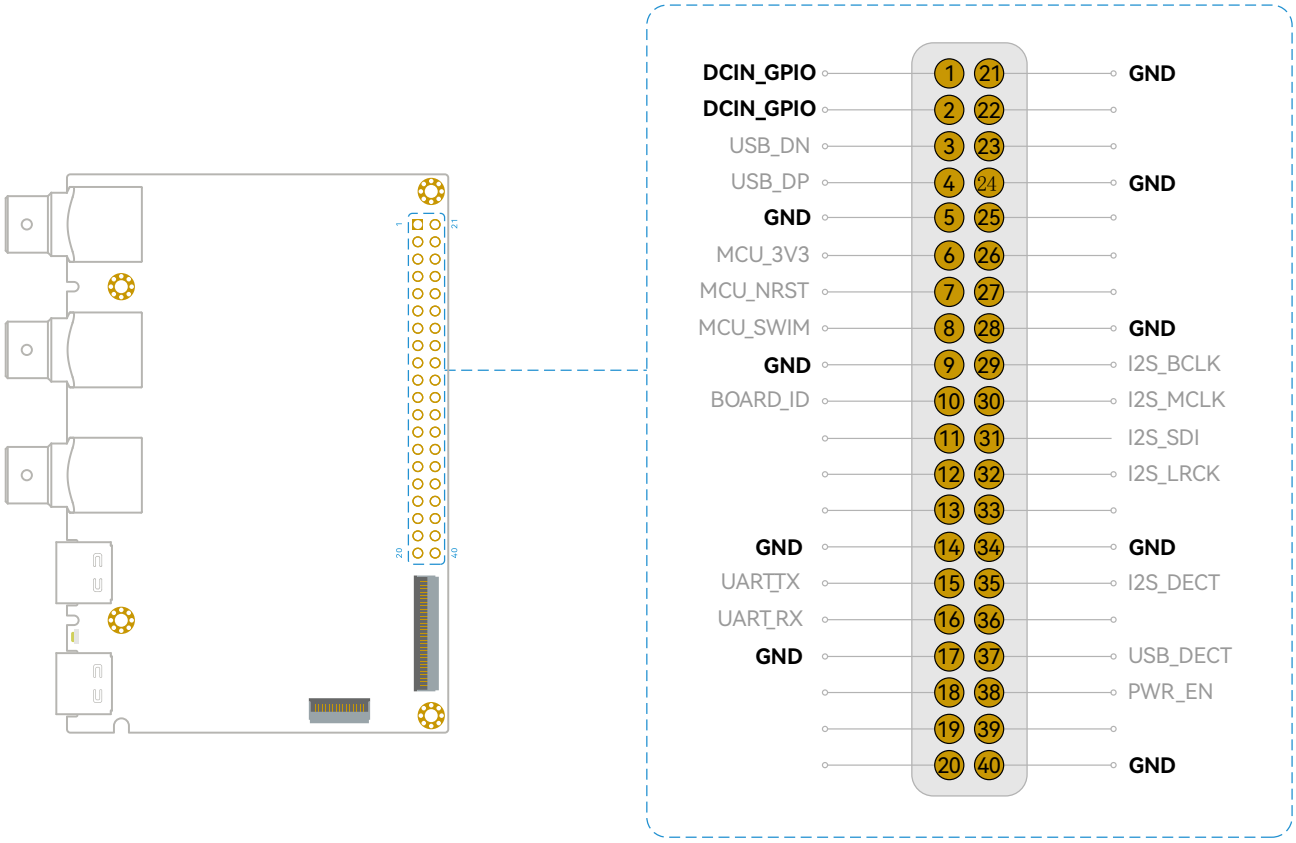
- Connect to DC 5V: A9/B9 (DCIN_LPS)
- Connect to GND: A1/B1/A12/B12
- Rated voltage: DC 5V
- Rated current: ⩾0.5A
- The design is different from a conventional USB-C power supply interface. Power pins A4, B4 and A9, B9 of the USB-C (I2S) interface are separated into two networks. If you connect a standard USB-C cable to this interface, it will affect Tone2's power supply, causing the power indicator to behave abnormally. This inadvertent action will not damage Tone2 nor the attached power adapter, however using a standard USB-C data cable with the USB-C (I2S) interface is not recommended.

1.2.2 Notes:

- The USB cable (USB-A to C) for linear power is purchased separately.
- A4/B4 (PWR EXT) can output DC 5V to an attached BT Magic Bluetooth receiver audio module, please refer to Section 2.1 for more details.

1.3 40-pin 2.54mm Header

The 40-pin 2.54mm header in the Tone2 Maker Kit is compatible with the identical 40-pin 2.54mm header present in Khadas SBCs. Users can also connect other devices to this header by DIY. The specific power pin connections are highlighted in bold as the figure below:



1.3.2 Power supply

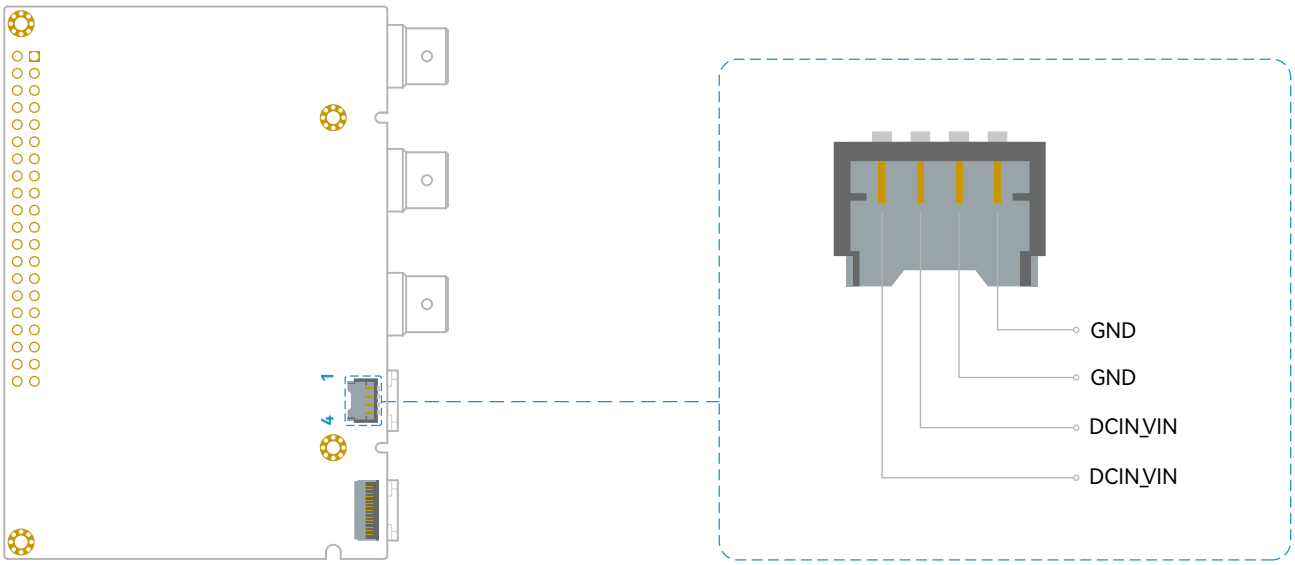
- Connect to Pin1 (DCIN_GPIO) and Pin21 (GND)
- Rated Voltage: DC 5V
- Rated Current: ⩾0.5A

1.3.3 Attaching Tone2 Maker Kit to Khadas SBCs:

- Soldering a third-party 40-pin plug to the Tone2 Maker Kit allows plug-and-play mounting with either a VIM3, VIM3L, VIM4 or VIM1S.
- When the Tone2 Maker Kit is attached to a Khadas VIM4 via the 40-pin 2.54mm header, you need to remove pin7 (MCU_NRST) and pin8 (MCU_SWIM).
- Soldering any third-party component (including a 40-pin plug) onto Tone2 Maker Kit will void the Khadas warranty.

1.4 4-pin 1.2mm VIN

1.4.1 Connector diagram:



1.4.2 Connector model:

Molex 78171-0004

1.4.3 Input voltage range:

DC 4.8V~14V (a 'BUCK' chip that supports high input voltage and a 'BOOST' chip that supports high current are used within the circuit of the VIN interface, This circuit design greatly widens the input voltage range of the VIN input).

1.4.4

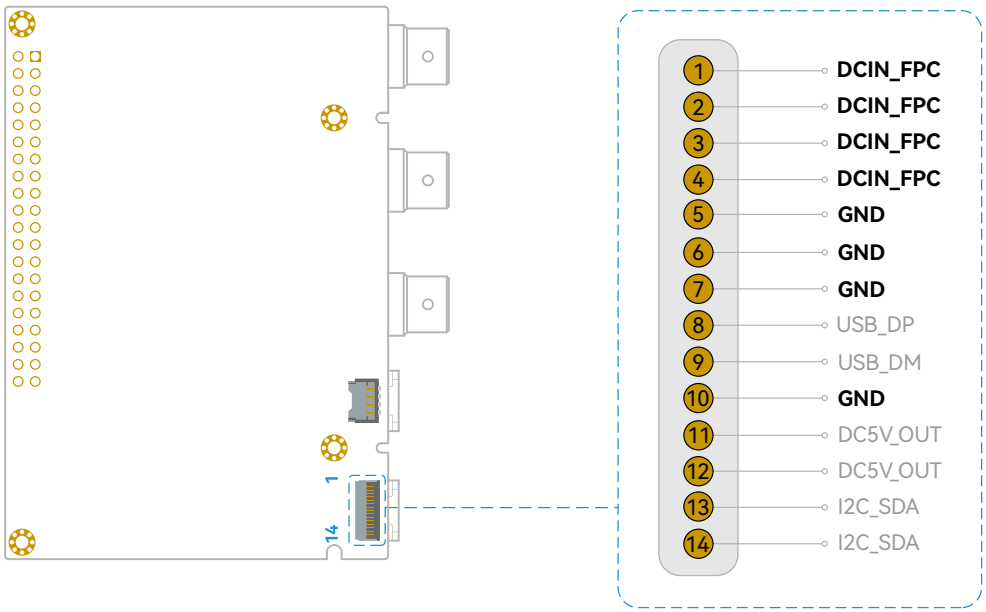
Connector specifications:
dl.khadas.com/products/tone2/specs/molex_781721000_specs.pdf

Connector 2D drawing:
dl.khadas.com/products/tone2/dxf/molex_78171-0004_2d.pdf

Connector 3D CAD:
dl.khadas.com/products/tone2/cad/molex_78171-0004_3d.stp

1.5 14-pin 0.5mm FPC

The 14-pin 0.5mm FPC is an interface designed by Khadas. Using a T2V Extension Board, you can attach the FPC interface of a Tone2 Maker Kit to a VIM3/VIM3L/VIM4's M.2 connector. The specific power pin connections are highlighted in bold as the figure below:



1.5.1 Power supply

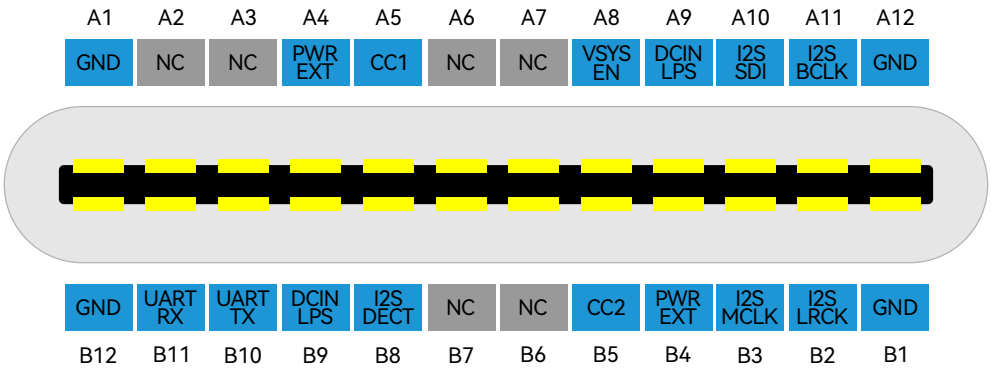
- Connect to Pin1/2/3/4 (DCIN_FPC) and Pin5/6/7/10 (GND)
- Rated Voltage: DC 3.3V
- Rated Current: ⩾1.0A

1.5.2 Attaching Tone2 Maker Kit to Khadas SBCs via the T2V Extension Board, please refer to Section 4.2 (T2V Extension Board Installation Guide).

2. USB-C (I2S) I2S Signal Input

In addition to the linear power input function mentioned above, USB-C (I2S) also has functions such as I2S data input, UART communication, and power output. Currently, it is primarily used for the BT Magic Bluetooth audio receiver module.

2.1 USB-C (I2S) Pinout:



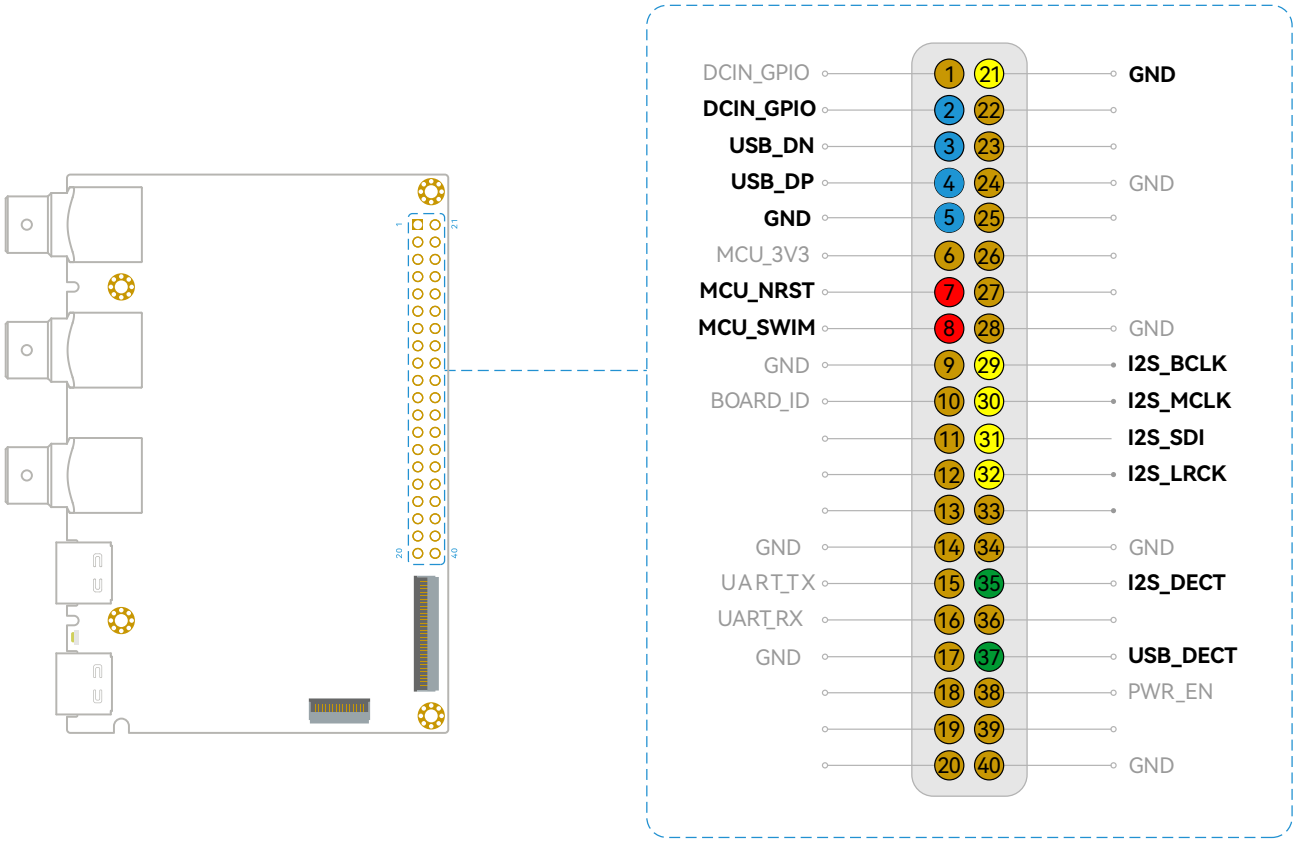
USB-C (I2S, DC 5V)

2.2 BT Magic User Manual:

https://dl.khadas.com/products/add-ons/bt_magic/bt_magic_user_manual.pdf

3. 40-pin 2.54mm Header USB/I2S Signal Input

In addition to USB-C (USB) and USB-C (I2S) ports, Tone2 Maker Kit is able to input USB or I2S signals via the 40-pin 2.54mm header. This process will be explained in more details as below.



USB signal input	
Pins for USB input connection	Pin2 (DCIN_GPIO)
	Pin3 (USB_DN)
	Pin4 (USB_DP)
	Pin5 (GND)
Pins for USB input selection	Pin35 (I2S_DECT) set to low (GND)
	Pin37 (USB_DECT) set to high (3.3V)
Input selection	Operating the encoder to switch the input selection as: USB / Auto

I2S signal input	
Pins for I2S input connection	Pin29 (I2S_BCLK)
	Pin30 (I2S_MCLK)
	Pin31 (I2S_SDI)
	Pin32 (I2S_LRCK)
	Pin21 (GND)
Pins for I2S input selection	Pin35 (I2S_DECT) set to high (3.3V)
	Pin37 (USB_DECT) set to low (GND)
Input selection	Operating the encoder to switch the input selection as: GPIO (I2S) / Auto

Note: When the Tone2 Maker Kit is attached to a Khadas VIM4 via the 40-pin 2.54mm header, you need to remove pin7 (MCU_NRST) and pin8 (MCU_SWIM).

4. Streaming Media Player Setup Guide

There are two ways to combine your Tone2 Maker Kit with a Khadas VIM SBC to turn them both into a Hi-Fi Streaming Media Player. Use either the 40-pin 2.54mm header on the top, or the 14-pin 0.5mm FPC connector on the bottom. The advantages and disadvantages of each method are covered in section 4.1. Section 4.2 covers the installation of the T2V Extension Board.

4.1 Pros & cons of the 40-pin 2.54mm header vs the 14-pin 0.5mm FPC connector

Interface	40-pin 2.54mm Header	14-pin 0.5mm FPC
Prerequisites	Third-party 40-pin Plug	T2V Extension Board
Soldering Required	Yes	No
Khadas SBCs Compatibility	VIM3/VIM3L/VIM4/VIM1S	VIM3/VIM3L/VIM4
Streaming media signal	USB/I2S	USB

4.1.1 The 40-pin 2.54mm header offers two streaming inputs 'USB and I2S', however you'll need to purchase a third-party 40-pin plug, and soldering will be required to attach it to your Tone2 Maker Kit.

Please Note: After soldering a third-party plug, the Khadas warranty will no longer be available.

4.1.2 The 14-pin 0.5mm FPC interface only offers USB streaming input, you can purchase the T2V Extension Board directly from Khadas, then attach to Tone2 Maker Kit and Khadas SBC to make up a Hi-Fi Streaming Media Player.

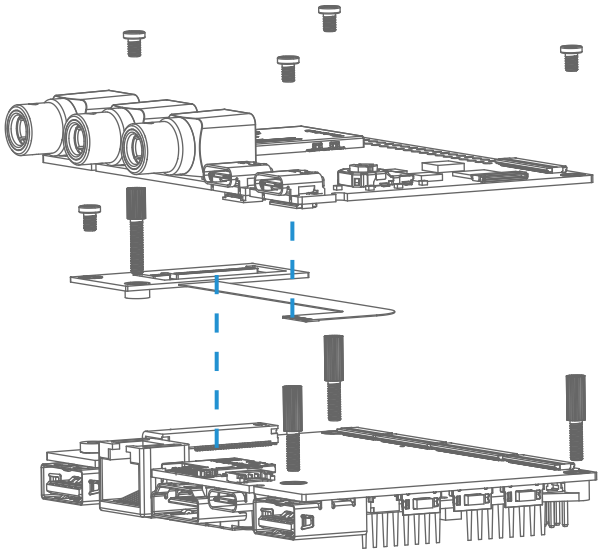
4.2 T2V Extension Board Installation Guide

4.2.1 List of prerequisite devices

- x1 Tone2 Maker Kit
- x1 T2V Extension Board (included: screws and standoffs)
- x1 Khadas SBC: VIM3/VIM3L/VIM4

Purchase these products from: https://www.khadas.com/shop/

4.2.2 Assembly diagram



4.2.3 To learn more about the T2V Extension Board, please visit:

https://www.khadas.com/shop

5. OEM Customization

The Tone2 Maker Kit has a plethora of interfaces and usage modes, making it a versatile companion for OEM (Original Equipment Manufacture) customers and makers of new-age, trendy audio products.

5.1 Customizable Options

5.1.1 Multichannel support (up to 8 channel output)

5.1.2 Volume knob I/O access

5.1.3 MQA OFS support

5.2 Additional notes

5.2.1 To support MQA OFS, the manufacturer needs to verify that their product meets the licensing requirements of MQA, for more details:

https://www.mqa.co.uk/

5.2.2 For more details, please contact Khadas Sales Representative or Khadas Official Email:
hello@khadas.com

6. Product Design Documents

The following links pertain to the design documents for the Khadas Tone2 Maker Kit, please refer to them at your own convenience.

Technical Specifications:

http://dl.khadas.com/products/tone2/specs/khadas_tone2_specs.pdf

PCBA 2D Line Drawing:

http://dl.khadas.com/products/tone2/dxf/tone2_maker_kit_pcba_v12_220919.dxf

PCBA 3D CAD Model:

http://dl.khadas.com/products/tone2/cad/tone2_maker_kit_3d_model_220919.stp

Encoder Specifications: Technical Specifications of the Push/Rotate Encoder

http://dl.khadas.com/products/tone2/specs/tone2_encoder_specs.pdf

3D CAD Model of Encoder:

http://dl.khadas.com/products/tone2/cad/tone2_encoder_3d_220919.stp

Enclosure 3D CAD: 3D CAD Model of Tone2's enclosure and volume knob. A design reference for DIYers & OEM (Original Equipment Manufacturer) customers.

http://dl.khadas.com/products/tone2/cad/tone2_enclosure_3d_220919.stp

User Manual: Electronic version of the User Manual

http://dl.khadas.com/products/tone2/manual/tone2_maker_kit_user_manual_en.pdf

For further Technical Support:

https://forum.khadas.com/