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MUSICIAN STM32F446 Leo Digital Interface User Manual

Contents

musician

MUSICIAN STM32F446 Leo Digital Interface

Information

The LEO is a musician-focused product that supports PCM and DSD audio formats. It has a frequency range of 44.1K and supports 2X,4X, 8X, and 16X speed. The LEO can be connected to devices via USB, AES, OPT, and COAX interfaces. It features an FPGA DSP, FIFO, and STM32F446 AMR MCU. It is compatible with Windows, Mac, and Linux operating systems.

- **Specifications**
  - **Frequency Range:** 44.1K
  - **Speeds:** 2X, 4X, 8X, 16X
  - **Interfaces:** USB, AES, OPT, COAX
  - **Compatibility:** Windows, Mac, Linux

Product Usage Instructions

- **Connection**

  To connect the LEO to your device, use the appropriate interface:
  - **USB:** Connect the LEO to your device using a USB cable.
  - **AES:** Connect the LEO to your device using an AES cable.
  - **OPT:** Connect the LEO to your device using an optical cable.
  - **COAX:** Connect the LEO to your device using a coaxial cable.
- **Setup**

  To set up the LEO, follow these steps:
  - Connect the LEO to your device using the appropriate interface.
  - Turn on the LEO by pressing the SETUP button.
  - Use the OK button to confirm the setup.
- **LED Indicator**

  The LED indicator on the LEO provides visual feedback:
  - **LED on:** Indicates that the LEO is powered on.
  - **LED off:** Indicates that the LEO is powered off.
- **FAQ**
  - **What audio formats does the LEO support?**
  - The LEO supports PCM and DSD audio formats.
  - **What is the frequency range of the LEO?**
  - The LEO has a frequency range of 44.1K.
  - **What interfaces can I use to connect the LEO to my device?**
  - The LEO can be connected to devices via USB, AES, OPT, and COAX interfaces.
  - **What operating systems are compatible with the LEO?**
  - The LEO is compatible with Windows, Mac, and Linux operating systems.

INTRODUCTION

Thank you for choosing MUSICIAN products!

- Guangzhou LEZHIJIA Technology Co.,Ltd.(MUSICIAN Audio) was formally establishedin 2020.
- The R & D team is formed by a group of enthusiasts with more than 20 years of audio research and development experience.
- **It is committed to the following product:** R2R discrete balanced decoders, balanced headphone amplifiers, balanced amplifiers, balanced pre-amplifiers, headphones, passive speakers,and other audio products.

TIPS

- Do not cover newspapers, tablecloths, curtains, etc. on the machine, as this may prevent heat dissipation. If the temperature inside the machine is too high, it may cause a fire, damage the machine, or cause personal injury.When using switches, knobs or cables, do not use excessive force.
- Only use the voltage specified by this machine. Using a voltage higher than the specified value is dangerous and may cause fire, damage to the unit, or personal injury.
- Do not attempt to modify or repair this unit by yourself. If you need any service, please contact the MUSICIAN after-sales team through the official website.
- If you plan not to use the machine for a long time, disconnect the power cord from the AC wall outlet.
- To strengthen the protection of this product, unplug the power cord from the wall outlet during lightning, or when no one is managing it, and when not using it for a long time. This will prevent the product from being damaged during lightning and power grid surges.

Product information

Technical Highlights LEO

- Proprietary FPGA DSP Processing Architecture
- FIFO Buffer and Reclock with Internal Crystal
- AT-Cut constant temperature crystal oscillator
- O-type single crystal copper transformer
- Optical Isolated All Digital Input Interfaces
- Proprietary USB Audio Solution via STM32F446 Advanced

AMR Based MCU

- Licensed Thesycon USB Driver For Windows Platform
- Driverless On Mac & Linux
- Dual AES/EBU Output Supported
- External Clocks Input Supported (45.1548MHz, 49.152Mhz)

DSD

- DSD64(DoP) on Coax/AES/Opt Input & Output
- Up to DSD512 On USB Input & IS Output

PCM

- 24bits / 44.1, 48, 88.2, 96, 176.4, 192KHz On All Input & Output
- Up to 768KHz On USB Input & Up to 384KHz on I'S Output

Digital Input

- Coaxial, Optical, AES/EBU, USB, External Clock Input (45.1548MHz, 49.152Mhz)

External Clock Input

- 45.1548MHz, 49.152Mhz

Digital Output

- AES/EBU ×2 output, IS HDMI LVDS/IS RJ45 lvcmos,
- Optical , Coaxial

Please note that the RJ45/HDMI ports of LEO are not typical network /multimedia RJ45/HDMI ports. They are purpose-built IS ports. Please do not connect it to the typical multimedia HDMI port (i.e. Bluray player/TV etc) / Ethernet network.

Panel information
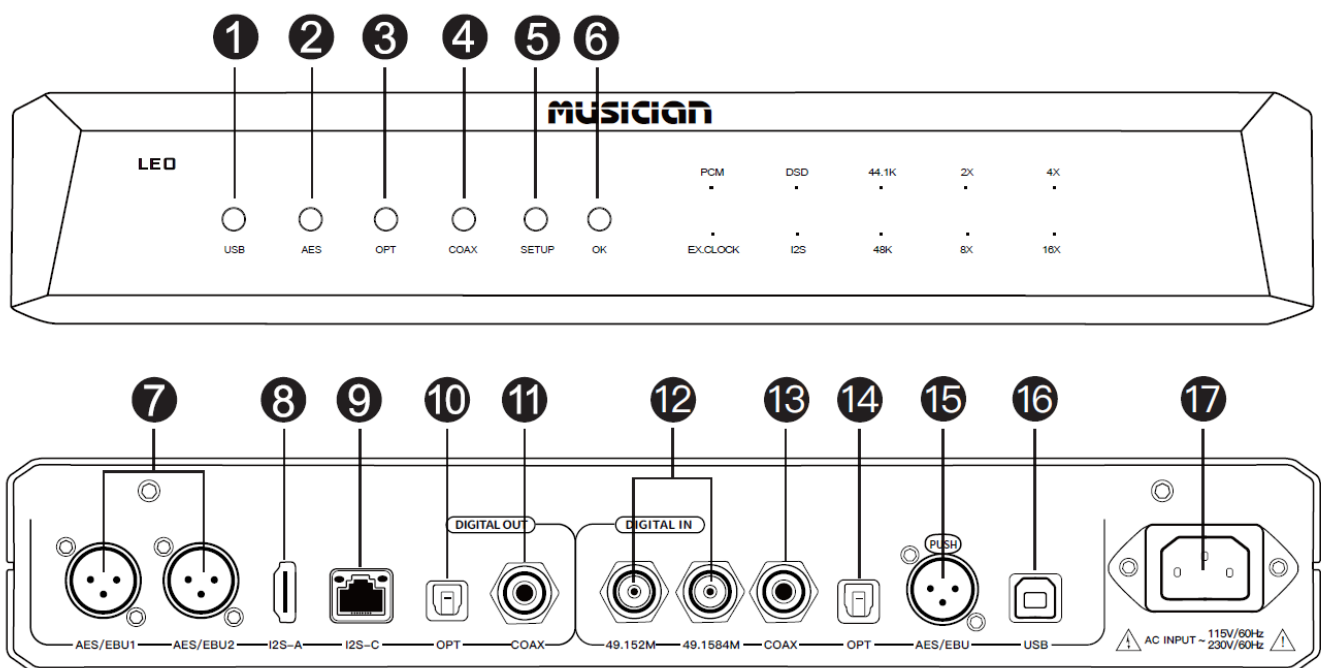
1. USB input button
2. AES input button
3. OPT input button
4. COAX input button
5. SETUP button
6. OK button
7. AES/EBU output
8. IS HDMI LVDS Standard
9. 1S RJ45 LVCMOS Standard
10. Optical output
11. Coaxial output
12. Clock input
13. Coaxial input
14. Optical input

15. AES/EBU input
16. USB input
17. Power input

Driver

- LEO is equipped with a proprietary USB audio solution driven by
  STM32F446, which supports 24bit/768khz PCM data stream and
  DSD to DSD512 processed at this level.

Licensed Thesycon USB Driver For Windows Platform
Download and install Thesycon USB Driver for Windows.

1. Connect the standard USB cable from PC USB port to the USB input
2. Select USB input. The USB input LED should illuminate
3. Check the PC audio device panel to see if it is connected to the machine

Driverless On Mac & Linux

- No need to install the driver, it can be used by connecting
- After connection, check whether it is connected to the machine in the sound setting.

USB/AES/OPT/COAX

Change according to the sound source key

- **Light off:** the sound source is not selected
- **Light on:** the sound source has been selected, in which the single AES mode light is on, and the dual AES
  mode light flashes
- **Light flashing:** select AES light flashing only when dual AES mode is enabled

SETUP	OK
Light off: home mode **Light flashing:** menu mode	ON when the OK button is pressed OFF when the OK button is released
EX.CLOCK **Light off:** internal clock **Light on:** external clock	**I2S** **Light off:** left and right channels of DSD are L/R **Light on:** right and left channels of DSD are R/L
DLiSghDt off: Not DSD audio **Light on:** Audio for DSD	**PCM** **Light off:** Not PCM audio **Light on:** Audio for PCM
44K1/48K Varies according to the sampling rate of the input signal **Light off:** the input signal is not the sampling rate **Light on:** the input signal is the sampling rate	**2x / 4x / 8x / 16x** Change according to the sampling rate n times the frequency of the input signal **Light off:** the input signal is not n times the frequency of the sampling rate **Light flashing:** the input signal is n times the frequency of the sampling rate

USB button	**In home mode:** Press to select USB sound source and USB light is On
	In menu mode: Press to enter USB upgrade function setting
	In function setting: No response when pressing the button
AES button	**In home mode:** Press to select the AES sound source and the AES light is On
	In menu mode: Press to enter single / dual AES function setting
	In function setting: No response when pressing the button
OPT button	**In home mode:** Press to select the opt sound source and the opt light is On
	In menu mode: Press to enter the external clock function setting **In I2S pin and DSD left and right channel function settings:** Press to switch DSD left and right channels
	In other function settings: No response when pressing the button
COAX button	**In home mode:** Press to select coax sound source and coax light is On
	In menu mode: Press to enter the external clock function setting
	In function setting: No response when pressing the button
SETUP button	Press the button and the setup light flashes to enter the menu mode Press the button and the setup light is off to return to the home mode
OK button	**In home mode:** Press the button without response and the OK light is on. Release the button and the light is off
	In menu mode: Press the button without response and the OK light is On, then release it and it is Off
	In function setting: In function setting: press the button to switch the function setting and the OK light is On, then release the button to turn Off

Function setting description

	Function Settings	Button Operation	LED indicator
USB Upgrade Function settings	Press the setup button to enter the menu mode, and then press the USB button to enter the USB upgrade function setting	First press the Setup button + usb button	Setup light flashes + USB light flashes
	In the USB upgrade function setting, press the OK button to upgrade the USB	Press the OK button again to upgrade	44k1 light off + 48k light off: Upgrade has not started
			44k1 light on +48k light on: Upgrade can be started
Single / Dual AES Function setting	Press the setup button to enter the menu mode, and then press the AES button to enter the Single/Dual AES function setting	First press the Setup button + AES button	Setup light flashes + AES light flashes
	In single / dual AES function setting, press the OK button to switch between Single AES and Dual AES functions	Press the OK button again to switch	44k1 light on: Single AES mode
			48K light on Dual AES mode
External Clock Function setting	Press the setup button to enter the menu mode, and then press the opt button to enter the external clock function setting	First press the Setup button + OPT button	Setup light flashes + EX.clock light flashes
	In the external clock function setting, press the OK button to turn off and turn on the external clock function	Press the OK button again to switch	44k1 light off or 48K light off: Turn off the external clock
			44k1 light on or 48K light on: start the external clock
I2S Pin and DSD left and right channel function settings	Press the setup button to enter the menu mode, and then press the coax button to enter the I2S pin and DSD left and right channel function settings	First press the Setup button + COAX button	Setup light flashes + I2S light flashes
	In the I2S pin and DSD left and right channel function settings, press the OK button to switch the I2S pin	Press the OK button again to switch	44K1(DATA) 2X(BCK) 4X(LRCK) lights are off to be positive 44K1(DATA) 2X(BCK) 4X(LRCK) lights are on, it is negative
	In the I2S pin and DSD left and right channel function settings, press the opt button to switch DSD left and right channels	Press the OPT button again to switch	16X light off L/R
			16X lighr on R/L

I25 PIN

Corresponding LED indicator

I2S PIN⇒ 8 Modes ⇓	2X(DATA)	4X(BCK)	8X(LRCK)
1	Light Off :**DATA+**	Light Off:**BCK+**	Light Off:**LRCK+**
2	Light On:**DATA-**	Light Off:**BCK+**	Light Off:**LRCK+**
3	Light Off:**DATA+**	Light On:**BCK-**	Light Off:**LRCK+**
4	Light On:**DATA-**	Light On:**BCK-**	Light Off:**LRCK+**
5	Light Off:**DATA+**	Light Off:**BCK+**	Light On:**LRCK-**
6	Light On:**DATA-**	Light Off:**BCK+**	Light On:**LRCK-**
7	Light Off:**DATA+**	Light On:**BCK-**	Light On:**LRCK-**
8	Light On:**DATA-**	Light On:**BCK-**	Light On:**LRCK-**

LEO 12S Pin

- There is no industry standard of 12S connection. Different brand/product has different I2S line order.
- If you would like to use the IS connection, the IS pinout matching with the DAC has to be configured correctly. Mismatch of IS pinout may result in static/noise output. The excessive noise output level may damage the loudspeakers/headphone drivers.

I'S Suggestions for matching DAC

1. Connect 12S cable (high quality HDMI cable <3ft/1m)
2. Turn down the volume (minimum audible volume)
3. Play music (first PCM, then DSD)
4. 12S setting for running DAC(consult DAC manufacturer for details)
5. When playing PCM and DSD, one of the modes should match the playing source
6. It is recommended to conduct an audio tone test to ensure that the L/R channel is correct in phase/out of phase.
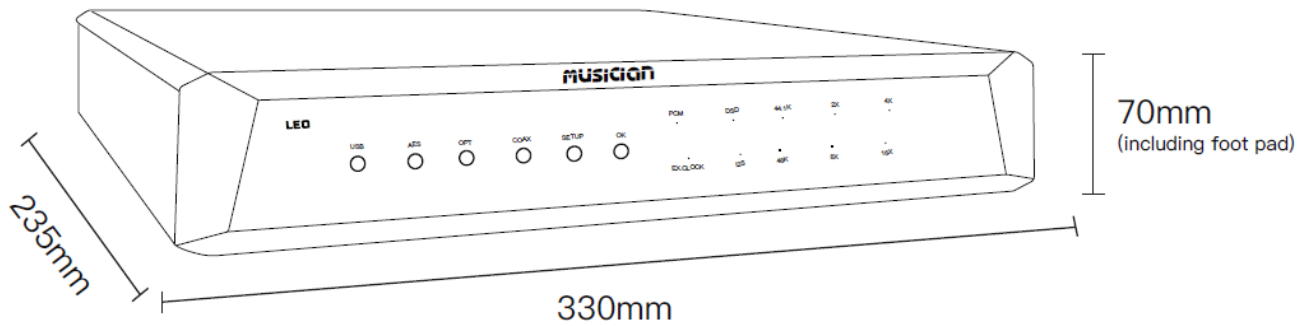
Basic parameters

- **Function keys:** USB, AES, Optical fiber, Coaxial input buttons, Setup, OK Button
- **Input mode:** Coaxial, Optical , AES/EBU, USB2.0 Type B External clock (45.1548mhz / 49.152mhz)
- **Output mode:** AES/EBU ×2 output, IS HDMI LVDS / IS RJ45 lvcmos, Optical, Coaxial
- **Power input:** 100-240V AC, 50/60hz (Global voltage)
- **Machine size:** 330mm*235mm*70mm (Height includes foot pad)
- **Machine weight:** 4.35kg
- **Package weight:** 5.5kg

Warranty

- We take pride in the quality of our products with strict quality control checks.
- To give you more confidence, all of our products are provided with a three-years warranty.
- Within the first 30 days from the date of purchase, most items can be returned for refund or exchange if meet the following conditions.
- Wish you enjoy a wonderful shopping experience!

RETURNABLE ITEMS

Items that can be returned/refunded or exchanged with in 30 days of receipt must comply with the following standards

1. Any returned items must be accompanied by all accessories, hardware, manuals or instructions, and in the same "new" state as when shipped to you.
2. Any returned items will be evaluated after receipt. Of course, we will not refund any defective products caused by improper handling, improper use, tampering or improper use.
3. If there is no complete original packaging (original packing box, foam filing, etc.) at the time of return, 25%6 replenishment fee will be charged.
    - **Tips:** The items should be transported back safely.
    - Before we received, You will take full responsibility.
    - If you choose to replace, we will ship your replacement items free of charge.

RETURN FEE AND ADDRESS

- We aim to provide services that benefit all our loyal customers.
- Global customers can return products to our Chinese warehouse.
- Please always contact us before returning items to relevant addresses.

1. All transportation costs are borne by the customer. This includes shipping costs for returns or exchanges. Shipping costs are non-refundable.
2. Please contact your local post office to confirm the actual return shipping fee before shipping back. We recommend that you use the cheapest postal service if available.
3. **Email: info@musician-audio.com**.
4. **Official website: http://www.musician-audio.com**.

Documents / Resources

MUSICIAN LEO 高性能数字界面 使用说明书 | 客户邮箱 info@musician-audio.com 官网 http://www.musician-audio.com	**MUSICIAN STM32F446 Leo Digital Interface** [pdf] User Manual STM32F446 Leo Digital Interface, STM32F446, Leo Digital Interface, Digital Interface, Interface

References

- **User Manual**