

## 1. INTRODUCTION

Thank you for choosing DENAFRIPS products! You have made the right choice to purchase our company's FLAGSHIP DAC! Congratulation!

The Terminator is DENAFRIPS' flagship DAC. Being a flagship, the Terminator is filled with our years of R&D achievement in it. State of the art fourth generation discrete resistor 26Bit R-2R for PCM decoding, 6Bit DSD hardware decoding with 32 steps FIR filters, a total breakthrough of the traditional integrated chip constraints.

Dedicated encapsulated power supply section within the same chassis is equipped with Dual Type-O Transformers, Ultra-Low ESR Reservoir Capacitors, and WALT Jung Super Regulators and multi-stages super linear power supply to power up the DAC.

The DAC core conversion module R-2R is constructed with 0.005% high precision, 10ppm low thermal effect precision resistors. Each channel uses more than 500pcs of these precision resistors, or 1000pcs for two channels, it's 4 times more than the other typical R-2R DAC. These achieve a truly astonishing low distortion, full balanced design. Crystek FEMTO clocks are used with FIFO technology to ensure the DAC clock is independent to the input signal.

It will be the Reference Master Class DAC of DENAFRIPS for the next 10 years.

## 2. DESIGN HIGHLIGHT

### 2.1 ADAPTIVE FIFO MEMORY CACHE ARCHITECTURE

Adaptive FIFO technology is used to transfer the audio data input to the high-speed RAM buffer, and, by using the high stability active crystal clock signals generated from within, extract the audio data from the high-speed RAM and converts these data to I2S protocol, then, transmit the I2S data to the R2R DAC for DA conversion.

This FIFO is literally jitter free. It eliminates the possible jitter caused by the upstream source, cable, or the digital receiver chip in the DAC. Let's put it this way, the number of jitter in Terminator DAC can only be caused by the quality of FIFO active crystal. Terminator crystals are high end Crystek FEMTO 9 series clock, and powered by LDO regulator, the jitter is so small that it can be neglected.

### 2.2 I2S INPUT

Terminator i2s DAC works slave mode, the source i2s shall provide the necessary MCLK to work with the DAC. The i2s is not an industrial standard, DENAFRIPS cannot guarantee the compatibility with other i2s devices.

### 2.3 AMANERO USB MODULE & CRYSTEK FEMTO CLOCK

The Terminator is equipped with the famous Amanero USB Module & Crystek Femto Clock, with DENAFRIPS redesigned and optimized circuitry, allow the Terminator to be used as high-end DAC with computers / streamers. It supports 24bit/384kHz PCM data stream, and DSD64, DSD128, DSD256 decoding via asynchronous USB input.

*NOTE:* The USB Module is designed to switch on only when USB Input is selected. This is specially designed to reduce inputs interference for best sound reproduction.

### 2.4 LOW JITTER AKM AK4118 DIGITAL AUDIO RECEIVER

It is known that the jitter contributes greatly to the sound quality. The use of a low-jitter digital audio receiver chip is indeed necessary. The AKM AK4118 is currently the lowest clock jitter digital receiver audio chip available in the market.

### 2.5 NOS/OS

Fancy of NOS/OS selection to change the sound signature of the DAC? The Terminator allow user to change the sampling mode on the fly. NOS, as the name suggested, does not do Over Sampling of the digital input stream. The sampling rate of the digital input signal remain untouched, and it is converted to analog output signal right away.

## 2.6 PROPRIETARY R-2R AND DSD DECODING ARCHITECTURE

The Terminator is equipped with 26Bit R-2R DAC to decode PCM data stream and 32 steps FIR analog filters hardware decoder to decode DSD data stream. These designs guaranteed the PCM format can be perfectly decoded, at the same time, the DSD format can be perfectly decoded as well. It is rare in the currently market that a R-2R DAC can hardware decode both PCM and DSD formats.

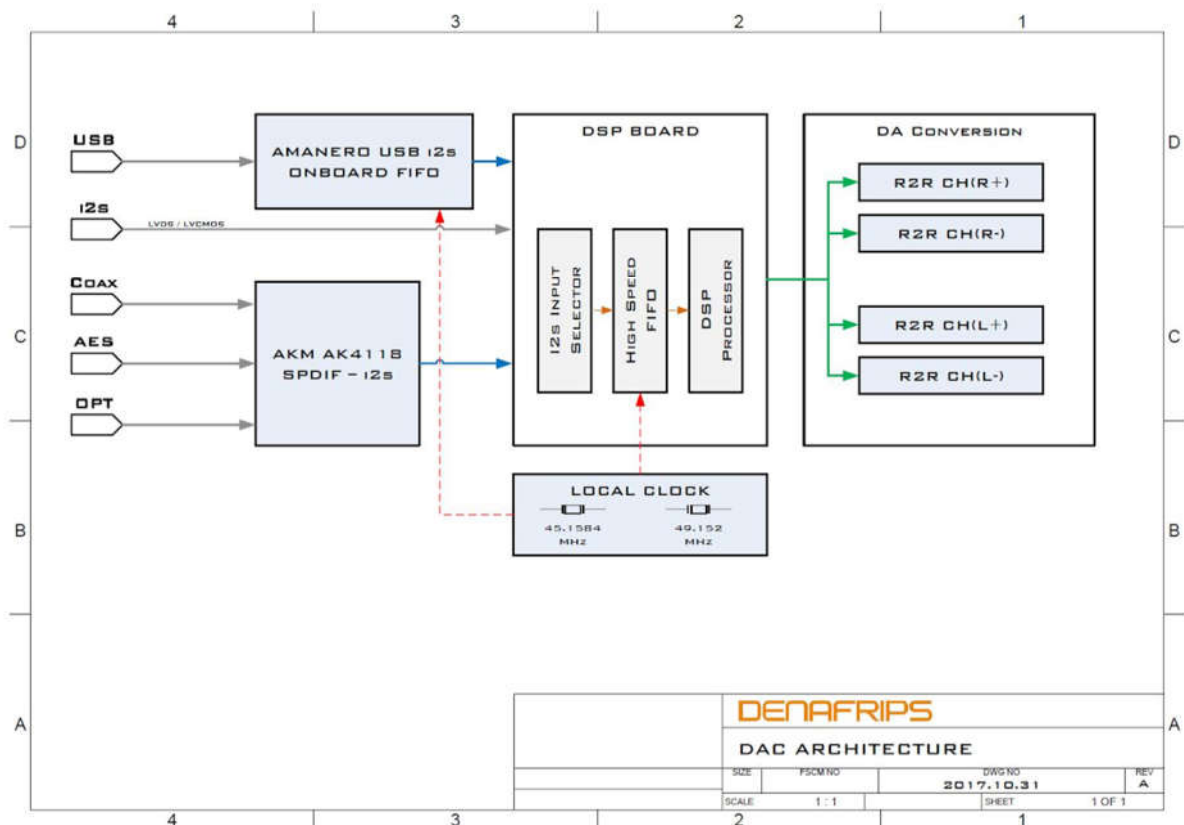
## 2.7 DAC ARCHITECTURE

This is the simplified architecture diagram. All digital input data are fed and buffered through the internal DSP board FIFO high speed RAM buffer except for Amanero USB module. The Amanero module comes with its own on-board FIFO.

These data stored in the internal high speed FIFO and the Amanero FIFO buffer, are retrieved via the local crystals (CCHD-957 FEMTO on Venus & Terminator), processed, and reconstructed, for the final stage Discrete R2R for DA conversion.

The reliance of digital input source clock quality is less critical. This made DENAFRIPS DAC sounds good with literally any source.

As in all audiophile high standard, a good source quality does make a different to the sound quality. But we'd like to stress that, don't lose sleep over the technical aspect of the DAC. Just sit back, and... enjoy the music!



### 3. INSTALLATION AND SETUP

The Terminator is easy to use. Nonetheless, DENAFRIPS advice to read this section to fully understand the functions and features available.

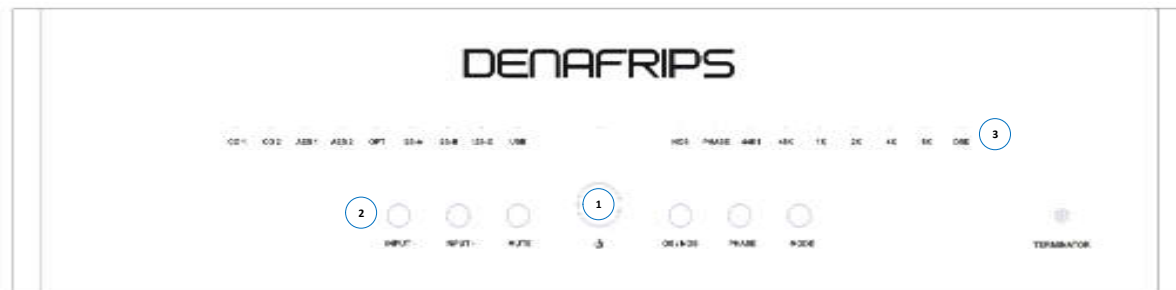


Figure 1. Terminator Front Panel

#### Description:

##### (1) Standby Button

Press the button once to switch on the DAC, vice versa, press once to switch the DAC into standby mode. The Standby LED shall be on when the DAC is in Standby Mode. The LED shall be off when the DAC is in Operating Mode.

##### (2) Control Button (From left to right)

- a. INPUT +/- :  
Press the button to select the input source, namely, CO1, CO2, OPT, AES1, AES2, USB, I2S. Press + to select the next right input. Press – to select the previous left input. The respective input source LED shall be on to indicate that the input source is selected.
- b. PHASE  
Press the button to toggle Phase Output. LED On: Positive Phase, LED Off: Negative Phase
- c. OS/NOS  
Press the button to toggle between OS/NOS model. The LED lit to indicate the DAC is in NOS mode.
- d. MUTE  
Press the button to enable/disable Mute. When mute, the Mute LED will be blinking 1s in interval.

a. MODE – Updated 15<sup>th</sup> Sep 2017

DENAFRIPS HDMI i2s Pin-out is configurable to mate with various non-industrial-standard i2s source devices. In i2s input mode, press 'Mode' button to select different configuration as per following table.

The LEDs 1X, 2X, 4X serve as indications of 2s' binary combination from 000 - 111 ( $2^3 = 8$  configurations). The trick is LED 1X correspond to BCK, 2X - DATA, and 4X - L / RCLK.

LED				DATA		BCK		L/RCLK	
1X	2X	4X		Pin1	Pin3	Pin4	Pin6	Pin7	Pin9
0	0	0		DATA(-)	DATA(+)	BCK(-)	BCK(+)	L/RCLK(-)	L/RCLK(+)
0	0	1		DATA(-)	DATA(+)	BCK(-)	BCK(+)	L/RCLK(+)	L/RCLK(-)
0	1	0		DATA(+)	DATA(-)	BCK(-)	BCK(+)	L/RCLK(-)	L/RCLK(+)
0	1	1		DATA(+)	DATA(-)	BCK(-)	BCK(+)	L/RCLK(+)	L/RCLK(-)
1	0	0		DATA(-)	DATA(+)	BCK(+)	BCK(-)	L/RCLK(-)	L/RCLK(+)
1	0	1		DATA(-)	DATA(+)	BCK(+)	BCK(-)	L/RCLK(+)	L/RCLK(-)
1	1	0		DATA(+)	DATA(-)	BCK(+)	BCK(-)	L/RCLK(-)	L/RCLK(+)
1	1	1		DATA(+)	DATA(-)	BCK(+)	BCK(-)	L/RCLK(+)	L/RCLK(-)

Table 1. I2S PINOUT CONFIGURATION

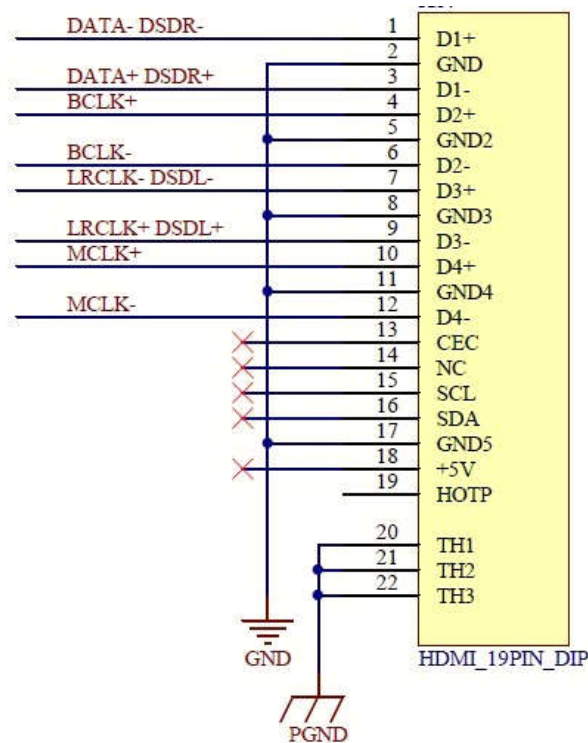


Figure 1. Terminator HDMI i2s Input

**(3) Digital Audio Signal Input Sampling Rate**

The following table illustrate the Input Sampling Rate LED status:

Base Sampling Rate	Multiplier	Input Format
44.1 kHz	1X	44.1 kHz
	2X	88.2 kHz
	4X	176.5 kHz
	8X	352.8 kHz
48 kHz	1X	48 kHz
	2X	96 kHz
	4X	192 kHz
	8X	384 kHz
DSD	1X	DSD 64
	2X	DSD 128
	4X	DSD 256
	8X	N/A

*Table 2. Sampling Rate*

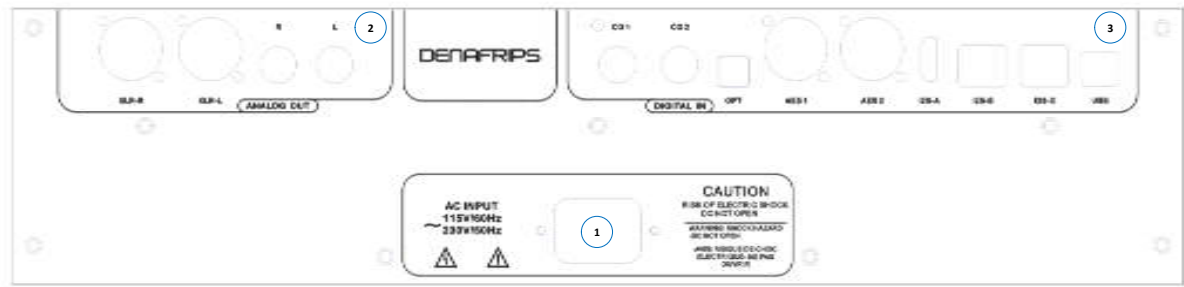


Figure 2. Terminator Rear Panel

**Description:**

**(1) AC Power Supply**

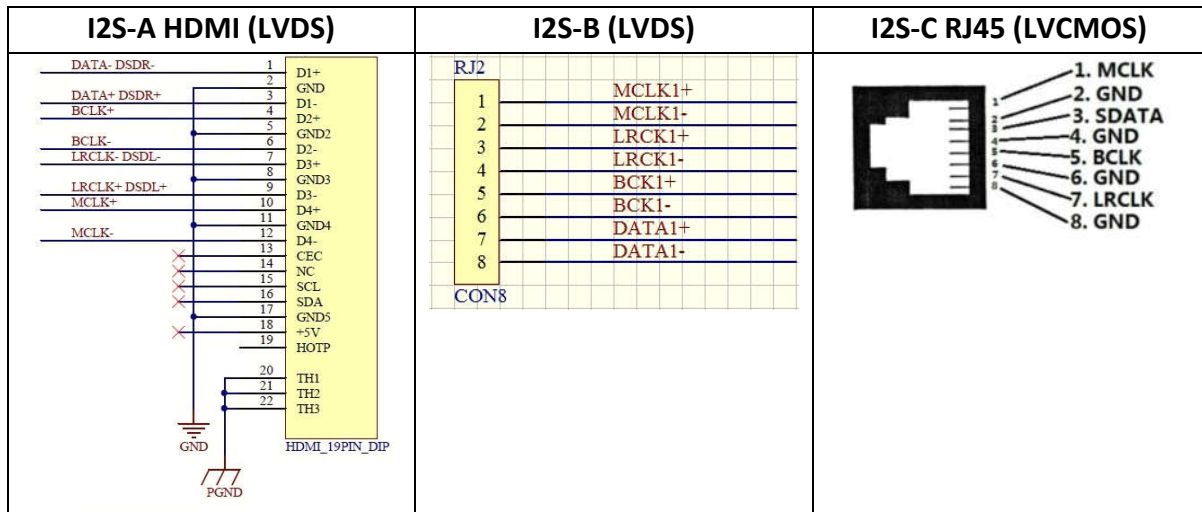
**CAUTION!** Worldwide AC Power Supply voltage supported. The AC input voltage is automatically ranged thanks to the DENAFRIPS smart power management technology.

**(2) Analog Audio Signal Output**

Balanced output via XLR (pin2 hot), singled ended output via RCA. The Terminator is a true balanced DAC, we recommend using balanced output whenever possible.

**(3) Digital Audio Signal Input**

There are 9 inputs, namely, COAX 1, COAX 2, OPT, AES 1, AES 2, I2S A, B, C and USB.



## 4. SPECIFICATION

Description	Parameters
AC Power	Worldwide AC Power Supported 110 - 230V, 50/60Hz In 110VAC supply, the min voltage range from 92V to max 126V In 230VAC supply, the min voltage range from 184V to max 253V
Power Consumption	< 30W
Frequency Response	20-40KHz -0.2dB
THD+N	≤0.0010% (1KHz A Weighted)
Output (RCA)	2.3(+/-10%) V RMS(1KHz)
Output (XLR)	4.6(+/-10%) V RMS(1KHz)
Supported Format (DSD)	2.8224MHz(DSD1X) All Input 5.6448MHz(DSD2X), 11.288MHz(DSD4X) USB & I2S Only
Supported Format (PCM)	26bit/44.1, 48, 88.2, 96, 176.4, 192, 352.8 (USB & I2S), 384(USB & I2S) kHz
S/N Ratio	115dB(RCA), 114dB(XLR)
Dynamic Range	>132dB
Stereo Crosstalk	-110dB
Dimension	430*380*105 mm
Weight	19.0kg

## 5. WARRANTY & SUPPORTS

DENAFRIPS Terminator comes with **36** months of warranty from the date of purchase / delivery (whichever later). Customers shall bear the two-way shipping cost for RMA. In event of tampering found on the unit, the warranty shall be voided.

Visit our website at [www.denafrips.com](http://www.denafrips.com) for more updates

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*Enjoy The Music!*