1. INTRODUCTION

Thank you for choosing DENAFRIPS products! You have made the right choice to purchase the 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 Adaptive Buffer Technology to ensure the DAC clock is less dependent to the input source.

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 All New USB Audio Solution

The Terminator is equipped with the proprietary USB Audio Solution via STM32F446 Advanced AMR Based MCU, with DENAFRIPS redesigned and optimized circuitry, allow the DAC to be used as high-end DAC with computers / streamers. It supports 24bit/1536kHz PCM data stream, and native decoding of DSD up to DSD1024. It comes with licensed Thesycon USB Driver for Windows Platform.

NOTE: The USB Module is designed to trigger on only when USB Input is selected. This is intended design to reduce inputs cross interference for best sound reproduction.

2.4 Proprietary SPDIF DIGITAL AUDIO RECEIVER

The SPDIF Coaxial, TOSLink, AES/EBU input support up to 24bit/192kHz digital audio format. The Terminator abandon the use of Digital Audio Receiver chip. The digital data is decoded by the on-board FPGA (Field Programmable Gate Array), shorten the signal path and eliminated the undesired coloration.

2.5 NOS/OS

Fancy of NOS/OS selection to change the sound signature of the DAC? The Terminator allow the 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 analogue 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 analogue 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 the PCM and DSD formats.

2.7 DAC ARCHITECTURE

This is the simplified architecture diagram. All digital input data are fed and buffered through the on-board FPGA DSP board FIFO high speed RAM buffer.

These data stored in the internal high-speed FIFO, are retrieved via the local CRYSTEK CCHD-957 FEMTO, processed, and reconstructed, for the final stage Discrete R-2R 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!

DENAFRIPS

DAC ARCHITECTURE
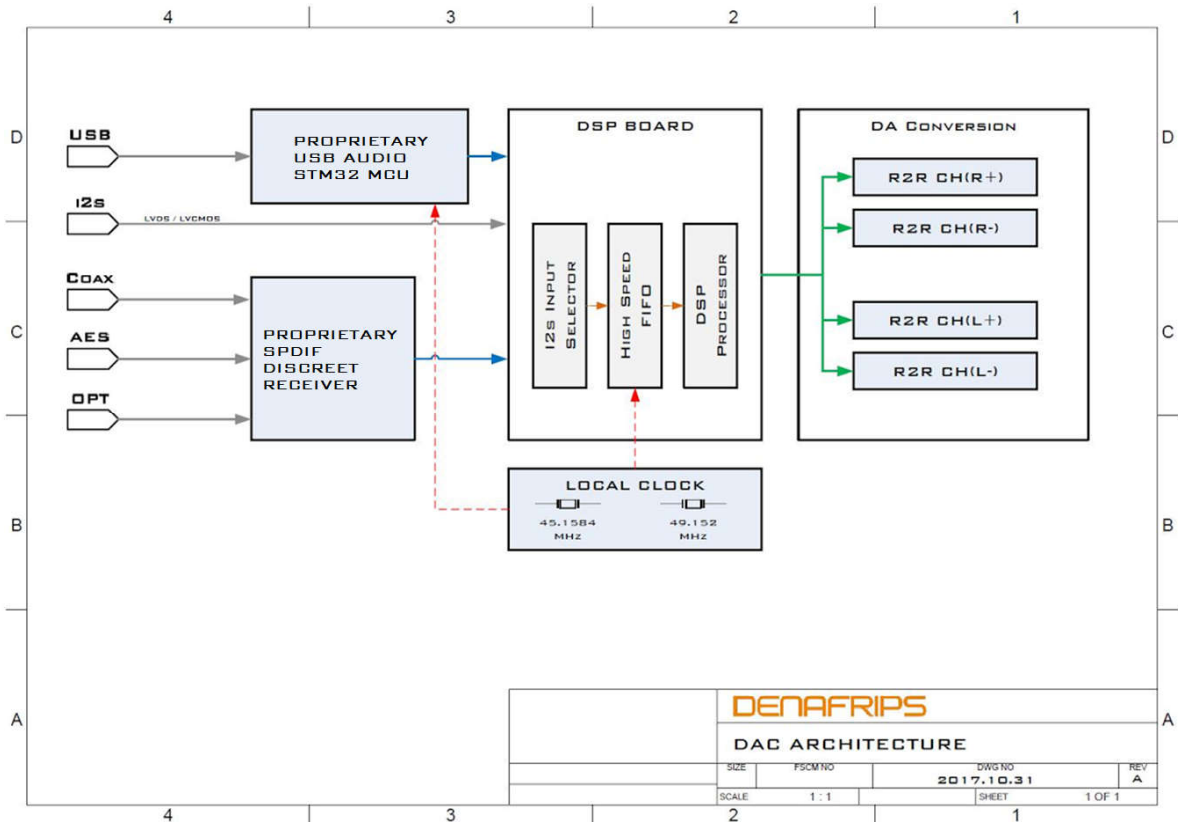
3. INSTALLATION AND SETUP

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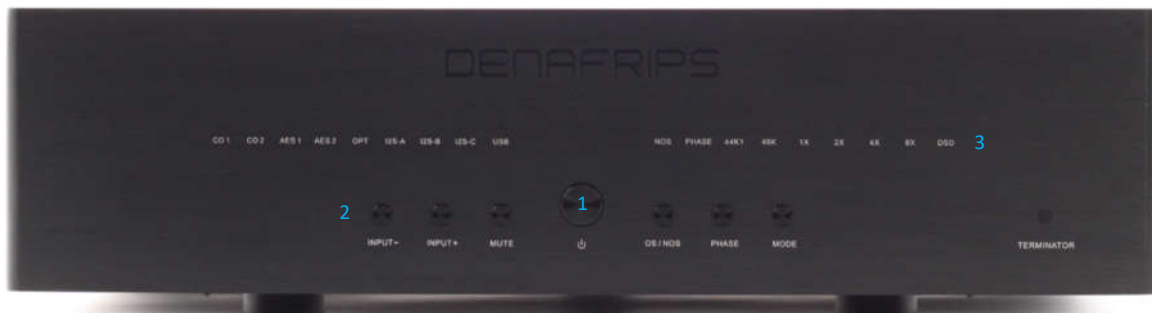

Figure 1.   Terminator Front Panel

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 Input Signal LED will be blinking from Left to Right.

Parameter Settings:

(1) Filter Selection (Effective in OS Only)

1. Press the Mute button once to enter configuration mode
2. Press the Mode momentarily
   - 1X LED On, 8X LED On = Slow Filter
   - 1X LED Off, 8X LED On = Sharp Filter
3. Wait for 10s
4. DAC back in operational mode

(2) Dual AES/EBU Input

1. Press the Mute button once to enter configuration mode
2. Press the INPUT+ momentarily, AES 1, AES 2 LED will turn on/off
   - AES1 On = Dual AES/EBU Input Enabled
   - AES2 Off = Dual AES/EBU Input Disabled
3. Wait for 10s
4. DAC back in operational mode

(3) I²S Pinout Configuration

1. Select I²S-A Input
2. Press the Mute button once to enter configuration mode
3. Press the Phase button momentarily, 1X 2X 4X will turn on/off in a fixed pattern to denote binary 000-111
   - PSAUDIO I²S Standard = 1X On, 2X 4X Off = 100
4. Wait for 10s
5. DAC back in operational mode

(4) I²S DSD Channel Swap Configuration

1. Select I²S-A Input
2. Press the Mute button once to enter configuration mode
3. Press the NOS button momentarily
   - CO1 On = DSD Channel Swap
   - CO2 On = Normal
4. Wait for 10s
5. DAC back in operational mode

I²S Pinout Configuration

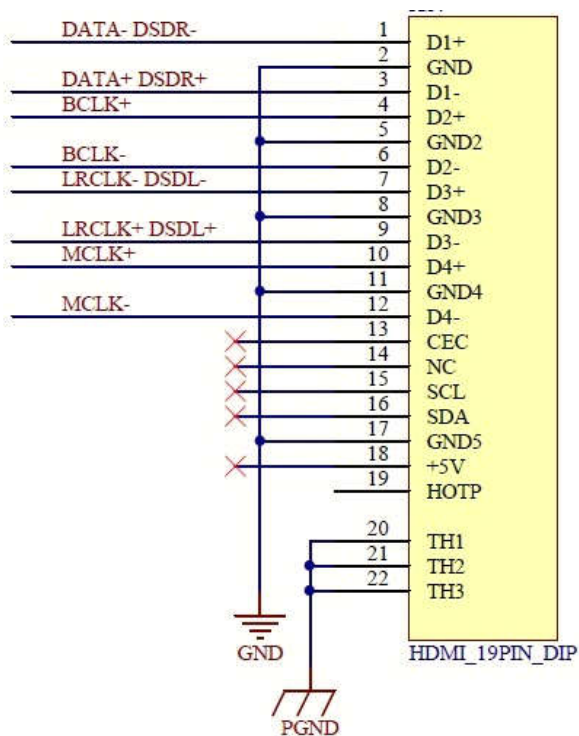| LED				DATA		BCK		L/RCLK	
1X	2X	4X		Pin1	Pin3	Pin4	Pin6	Pin7	Pin9
0	0	0		DATA(-)	DATA(+)	BCK(-)	BCK(+)	L/RCLK(-)	L/RCLK(+)
0	0	1		DATA(-)	DATA(+)	BCK(-)	BCK(+)	L/RCLK(+)	L/RCLK(-)
0	1	0		DATA(+)	DATA(-)	BCK(-)	BCK(+)	L/RCLK(-)	L/RCLK(+)
0	1	1		DATA(+)	DATA(-)	BCK(-)	BCK(+)	L/RCLK(+)	L/RCLK(-)
1	0	0		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
	16X = 2X + 8X	705.6 kHz
	32X = 4X + 8X	1,411.2 kHz
48 kHz	1X	48 kHz
	2X	96 kHz
	4X	192 kHz
	8X	384 kHz
	16X = 2X + 8X	768 kHz
	32X = 4X + 8X	1536 kHz
DSD	1X	DSD 64
	2X	DSD 128
	4X	DSD 256
	8X	DSD 512
	16X = 2X + 8X	DSD 1024

Table 1.   Sampling Rate

Figure 2.   Terminator Rear Panel
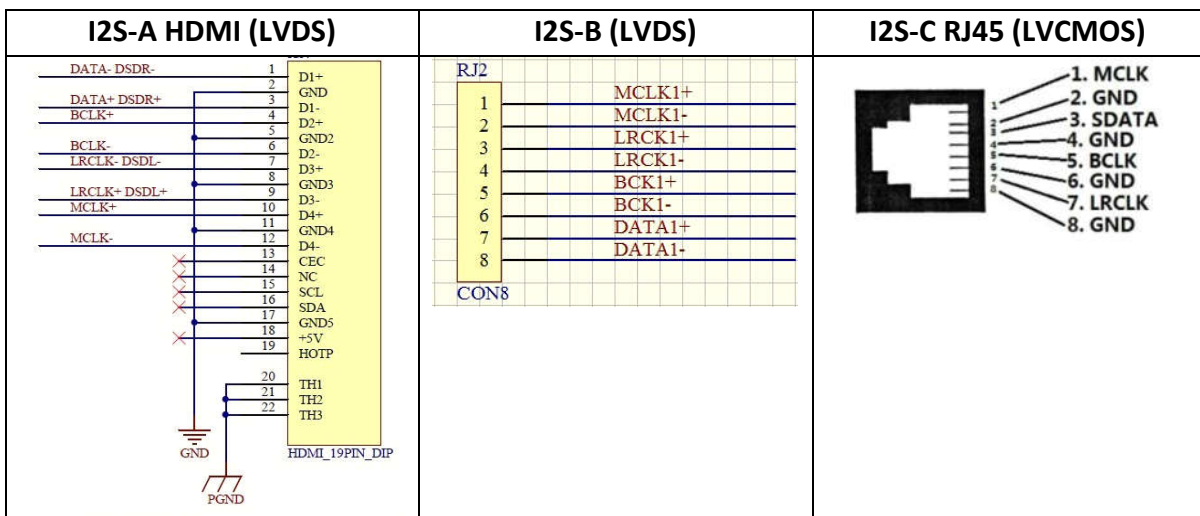
Description:

(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. The RCA and XLR output are shared, please use either of the output at a time. It is not recommended to use both RCA and XLR output simultaneously.

(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.

I2S-A HDMI (LVDS)	I2S-B (LVDS)	I2S-C RJ45 (LVCMOS)

4. SPECIFICATION

Description	Parameters
AC Power	Worldwide AC Power Supported 110 - 230V, 50/60Hz In 110VAC supply, the min voltage ranges from 92V to max 126V In 230VAC supply, the min voltage ranges 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)	DSD64 All Input DSD64 – DSD1024 USB & I²S Only
Supported Format (PCM)	24bit/44.1, 48, 88.2, 96, 176.4, 192 kHz All Input 44.1 – 1536 kHz USB & I²S Only
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 purchased from the Authorized Distributor 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 for more updates

Enjoy the Music!