



PAD-2

2 Channel A-D Converter

Mk2

Rev. 4 – Jan. 16, 2019



USER MANUAL

Thank you for purchasing our product.

We strive to provide you with a professional product, a toolbox you will use for several years with satisfaction.

This unit has been carefully handcrafted by Val in Italy, choosing the finest components available, aiming for your complete satisfaction.

It is of extreme importance that the unit be earthed !

You should use it with a FULLY functional earth well.

NEVER disconnect the earth from the receptacle.

Please make sure that your line mains voltage matches with the PAD-2 AC Inlet indication.

FUSE:

You should replace defective fuse with 2AT (slow blow) for 230Vac line, or 4AT for 115Vac line.

Please carefully read this manual throughout before operating the unit.

QES Labs reserves the right to make improvements or changes to it's products at any time, without notice.

Then have fun with your job.

The PAD-2 is a Stereo Analog to Digital Converter featuring a completely passive Analog front end stage, based on a state-of-the-art custom wound transformer pair on high content Nickel core, for extended bandwidth and natural anti-alias filtering action. The filtering characteristics are tailored upon the “*Bessel*” approximation, which ensures maximally flat phase/constant group delay response, improving the transient response.

The controls are kept to a minimum, so the unit is extremely easy to set up and use.

The PAD-2 is designed around a Burr-Brown PCM4222 top-of-the-line A-D conversion IC, which has an internal soft limiting action, and on a pair of Crystek ultra low phase noise Master Clock generators.

INSTALLATION

Make sure your mains voltage supply agrees with the voltage this unit is set for. Make sure that the unit has the proper fuse installed and that the mains switch is OFF.

Connect the input cables to the 3-pin XLR female connectors on the rear panel.

The Input XLRs are transformer coupled balanced wired as follows:

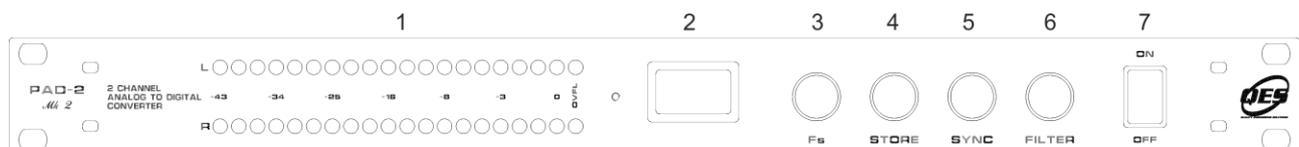
PIN 1 : Ground,

PIN 2 : Hot (positive going phase),

PIN 3 : Cold (negative going phase).



FRONT PANEL



1. 20 segment LED bargraph meter, it reads the input level, peak responding, in dBFS, including *Overload* indication.

2. OLED Display showing Sampling Frequency (F_s) and Filter selections: it shows the operating F_s , and Digital decimation filter type.
3. **Fs**: this button changes the operating F_s through a sequence, that starts by default at 44.1kHz, then increases each time this button is depressed, increasing to 48, then 88.2, 96, 176.4, 192; then, at a further button press, the sequence starts again. If the new “*DSD option*” is installed, after 192, the sequence proceeds to 2.8 and 5.6 MHz, then returns to 44.1 kHz.
4. **Store**: a press of this momentary push-button will save the actual settings of F_s and *Filter* into the microprocessor EEPROM. The unit will default to this settings at the next power-up.
5. **D-Sync** latching pushbutton controls the source for MCLK of the unit, when this button is not engaged, the default condition is that the internal clock generators generate the MCK to advance the ADC IC registers. When the button is depressed, an external Master Clock can be used to put the unit in sync with an external generator. The MCK **must output either 22.5792 or 24.576MHz** for the 44.1 or 48kHz bases, and the “ F_s ” button must be used to set the wanted operating sampling frequency.

Sync: in case you have ordered the standard *Word Clock* (1x F_s) external Sync Input, you will have the choice of 2 internal oscillators. When the *Sync* button is not engaged, the internal TCXO low-jitter oscillators are used in *free running* mode, when you want to use the PAD-2 as a *master* generator of sync clock for external units. When the button is engaged, you are using the PLL-based oscillator, which will sync to an external *Word Clock* generator, connected to the *WCK In* BNC connector on the rear panel, which is *internally* terminated into 75 ohms. When you provide at this input the same WCK frequency of the actual session Sampling Frequency (F_s), the outer ring of the *Sync* button will steadily light up, confirming the “*lock*” condition. If the “*DSD option*” is installed, the *Word Clock* for both DSD2.8 and DSD5.6 sessions, must be 44.1 kHz.

In case the illuminated ring is blinking, this means that the external WCK frequency you are providing, is slightly off with respect to the session F_s . If the ring does not light up at all, this means either there is no clock signal present at the rear BNC connector, or the frequency provided by the external generator is far off the actual session F_s (i.e. you set 88.2kHz externally while the session is 44.1).

6. **Filter**: this *momentary* button controls the internal configuration registers to set up the digital decimation low-pass filter of the ADC. When the button is not engaged,

the default condition is set up on “*Low Group Delay*” filter response, is detailed in the next picture, and is available for all sampling modes. By depressing the ‘*filter*’ button once, the new setting is “*Classic*” filter response, which is typical of traditional audio data converters. The ‘classic’ mode is not available for 176.4 and 192kHz sampling rates. Each time the “*filter*” button is changed, the unit is automatically reset by the internal microcontroller for 5 ms, during this lapse the unit is momentarily muted.

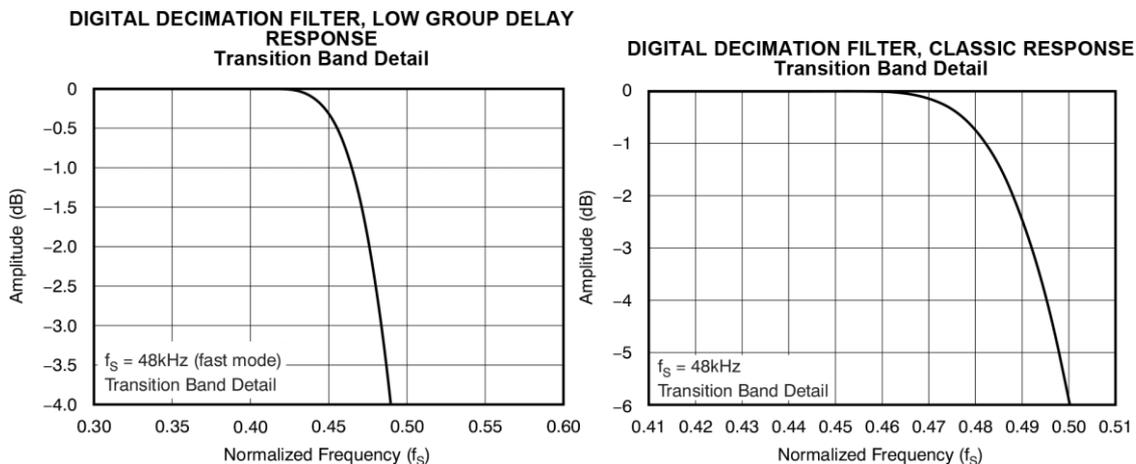
In “*DSD mode*”, since the output is taken before the decimation filter, this button has no effect and should not be used.

7. POWER FUSE REPLACEMENT

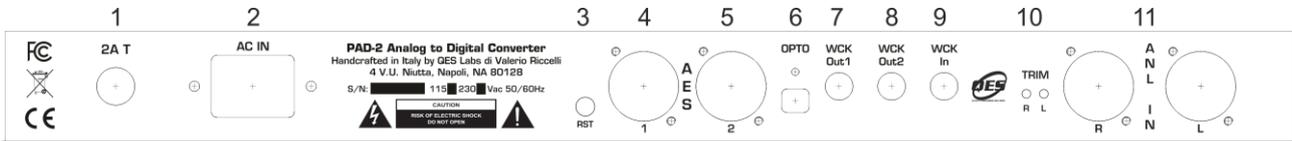
Use a 5x20mm slo-blo type fuse. 4AT for 110-120Vac, or 2AT for 220-240V.

Digital Decimation Filter transition band details:

Please note that the “*filter*” change has a subtle effect, it substantially affects the transition band response, as can be seen in the following pictures:



REAR PANEL



1. **Fuse:** in case, replace with a 5x20mm Time Lag (slow-blow) fuse.
2. **AC IN:** C-14 compatible, 3-prong mains connector. It is fundamental to have a good and perfectly working earth system.
3. **RST:** momentary action RESET button, it momentarily sets the unit in Reset mode, until the button is released.
4. **AES-3** digital output, S/pdif protocol, it is galvanically isolated by a pulse transformer, it can be used together with the additional AES output and/or the Opto output.
5. **AES Out2 or SPDIF** RCA connector (optional), transformer balanced, it can be used while operating the AES connector, and along with the Opto output. This output comes as a configuration option.
6. **OPTO** optical connector, suggested for Fs up to 96kHz, Toslink format. This output comes as a configuration option, not included in the basic version.
7. **WCK Out:** traditional WCK output, TTL level (5Vpp) compatible, can be used to synchronize an external unit to the PAD-2. In DSD mode output is 44.1
8. **WCK Out2** (optional), this can be added as a configuration option, not present in the basic version.
9. **Ext. Sync In (D-Sync):** accepts either 22.5792 or 24.576MHz master clock from an external clocking system, so that the ext. Clock can directly operate the internal shift registers of both ADC and Spdif TX IC's, with very low jitter, without the use of PLL stages.

WCK In (optional): this *external sync* input comes as a configuration option, allows the unit to be slave-sync'ed to an external 1x Fs *Word Clock* master generator, it uses the internal PLL-based oscillators when the *Sync* button is pressed.

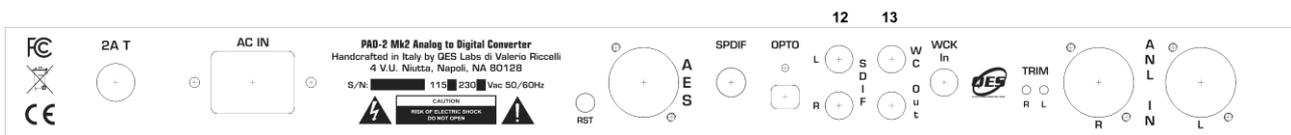
10. Trim: can adjust the default reference level of -18dBFS (at +4dBu on analog input), by ± 1 dB. It is mainly used to center the reference level.

11. Analog Inputs: accept balanced line level audio signals, pin 1 ground/screen, pin 2 hot, pin 3 cold.

The maximum analog level input to reach digital 0dBFS is +22dBu.

The reference 0VU/+4dBu analog level, thus, corresponds to **-18dBFS** digital level.

REAR PANEL, DSD OPTION



12. DSD Outputs: these work when the *DSD option* is installed, outputting the Direct Stream from the *Sigma/Delta* modulators, without passing the digital decimation filter. The available Fs are: 2.8224MHz (DSD64), and 5.6448MHz (DSD128). The outputs are in **SDIF-3** protocol.

13. Word Clock Outputs: The DSD option mounts two WC outputs, TTL level, must be terminated into 75 ohms at the receiving end, not daisy-chained. Can be used at the same time.

CABLE CONNECTIONS, POWERING THE UNIT ON-OFF

With the unit set to OFF, connect all the cables as needed. Before turning on the unit, make sure that you have no record-enabled tracks on your DAW to avoid pops and clicks.

At the end of your recording session, remember to record disable your DAW tracks before turning the PAD-2 off: pops and clips might damage your speakers.

WARRANTY

QES Labs warrants this product to be free of defective parts and workmanship for a period of 1 (one) year from the date of original purchase, except for vacuum tubes (60 days).

This warranty excludes the following conditions: normal wear and tear, misuse, customer negligence, accidental damage, adverse weather and/or natural events, unauthorized repair or modification, cosmetic damage and damage incurred during shipment.

This warranty is provided by the dealer where the unit was purchased, and by QES Labs. In case of a valid warranty claim, buyer's sole and exclusive remedy and QES entire liability under any theory of liability will be, at its option, to repair or replace the product without charge, or, if not possible, to refund the purchase price. The defective product must be returned to QES Labs or authorized service facility in its original condition, only after RMA. Unauthorized returns will not be accepted.

The warranty is not transferable, and applies only to the original purchaser of the product.

This warranty is in lieu of all warranties whether oral or written, expressed or implied, including, but not limited to, any implied warranty of merchantability or fitness for a particular purpose.

The warrantor assumes no liability for lost profits, property damage or any other direct, indirect, special, incremental, incidental or consequential, exemplary damages whatsoever which may result from failure of this product, even if QES Labs is aware of the possibility of such damages.

In no event will QES Labs' liability exceed the purchase price of the product.

Any and all warranties of merchantability and fitness implied by law are limited to the duration of the expressed warranty.