dac2541 Users Manual

Discrete R-2R DAC / HeadAmp

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Introduction

The Soekris dac2541 is a fully balanced Audiophile discrete R-2R DAC, with USB and SPDIF inputs and outputs to either the built in headphones amplifier on a front mounted XLR or 6.3mm Jack, or to line level outputs on rear mounted XLR and RCA Phono connectors. The dac2541 is not just any regular DAC, the sound quality is the absolute best available, thanks to the ultra high end design with a discrete R-2R sign magnitude DAC using a total of over 200 small and very precise resistors, powerful hybrid headphones amplifiers, delivering high power to almost any headphones, all powered by high reliability switch mode power supplies with post LC filtering and two discrete linear low noise and low impedance power regulators and three low noise regulators for the digital parts.

The dac2541 R-2R DAC circuit is fully isolated from the noisy computer USB interface and the SPDIF inputs are also all transformer isolated. It supports input signals on the USB interface up to 24 bit / 384 Khz PCM audio, and up to DoP-128 (x2) and DSD-256 (x4) audio, or up to 24 bit / 192 Khz PCM audio on the various SPDIF interfaces. It has a fully digital volume control and four sets of digital reconstruction filters to fit any taste, and have a flexible crossfeed circuit for the headphones. The dac2541 is designed and built in Denmark, using advanced surface mount technology and parts from only the highest quality suppliers, with a full aluminum casing.

Quick Start

Plug in the supplied USB Cable to the dac2541 and connect it to your computer, plug in your headphones, set the rear left switch to “PHONES”, set the rear right switch to “USB1”, select “soekris dac1xxx” as output in your computer settings and start playing music. The default power up settings for volume, anti-aliasing filters and xfeed are stored in flash memory and can be changed, see front view description for details.

Specifications

THD @ -1 dB	<0.004%
THD @ -60 dB	<0.02%
Clock Jitter RMS	0.3 pS typical
Discrete Resistor Network	28 bit, 0.01% - 0.05% Resistors
S/N 20 Khz Bandwidth	>126 dB unweighted
Frequency Range @ 44.1 Khz	20hz - 20Khz +0.1 -1.0 dB
Frequency Range @ 384 Khz	20hz - 80Khz +0.1 -1.0 dB
USB Input	Type B, Isolated, High Speed
USB Input Mode Selectable	Audio Class 2.0
USB Input PCM	Up to 24 Bit / 384 Ksps
USB Input DSD	Up to DoP-128 and DSD-256
SPDIF Inputs	RCA / BNC / AES / Toslink
SPDIF Inputs PCM	Up to 24 bit / 192 Khz
Digital volume control	-90 dB to +10 dB
Output Line	RCA, 2.0V RMS, Zout 50 ohm
Output Line Balanced	3 pins XLR, 4.0V RMS, Zout 100 ohm
Output Headphones	6.3 mm Jack, 6.5V RMS, Zout 1.2 ohm
Output Headphones Balanced	4 pins XLR, 13V RMS., Zout 2.4 ohm
Power Consumption	90-264V AC, max 40W, typ 5W
Size	250 x 205 x 40 mm
Weight	1.5 Kg
Warranty	3 Years

dac2541 front view

"POWER" button: Main power switch.

The LED's on the front indicates input sample rate, input source, crossfeed setting, reconstruction filters selected, selected output and a clip indicator.

When input is Linear PCM audio		When input is DSD or DoP audio	
PCM 44 Khz	"44" LED on	DoP/DSD-64	"DSD" on
PCM 48 Khz	"48" LED on	DoP/DSD-128	"DSD" and "X2" on
PCM 88/96 Khz	"X2" LED on	DoP/DSD-256	"DSD" and "X4" on
PCM 176/192 Khz	"X4" LED on		
PCM 352/384 Khz	"X8" LED on		

"CLIP" indicator: Will blink when the DAC output signal is clipping. You should not turn the volume knob higher than to where the red "CLIP" LED will not blink.

"INPUT" button: Select between the possible input source and an automatic mode, which is the default at power up.

"XFEED" button: Select the Crossfeed mode for Headphones, it's only active when using the Headphones. The Crossfeed function is used to make the stereo image smaller, to make it sound more like the stereo image from speakers.

"XFEED" LED color shows the current crossfeed mode selected for the headphones	
Off	Crossfeed circuit disabled
Green	Small Crossfeed, -12 dB sent to other channel
Orange	Medium Crossfeed, -8 dB sent to other channel
Red	Large Crossfeed, -5 dB sent to other channel

"FILTER" button: Select between the different reconstruction filters. Hold for minimum 4 seconds to store the current volume level, crossfeed setting and reconstruction filter selection, one setting for Line Out and one setting for Headphones Out, the filter setting is common for both.

"FILTER" LED color shows the current reconstruction filter selected	
Red	Linear Phase filter, also called brickwall filter
Orange	Mix between Linear and Minimum Phase filter
Green	Minimum Phase filter, also called butterworth filter
Off	Soft Minimum Phase filter, a soft butterworth filter

Volume Knob: The volume LED display indicates current volume, from -90 dB to +10 dB. The volume knob is using a digital encoder to set the volume level digitally from -90 dB to +10 dB in precise 1 dB steps. If you connect the Line Out to a system with a volume knob you might want to set the dac2541 Line Out volume startup level to a fixed 0 dB, you can do that by selecting Line Out, turning the volume up to -4 or higher, then store the startup setting by pressing and holding the "FILTER" button for 4 seconds. The volume control is then inactive, it can be made active again by holding the "FILTER" button for 4 seconds again.

"OUTPUT" button: Selects where the audio signal will go, when the "LINE" LED is on it will go to the Line Out on the RCA Phone sockets and the balanced XLR sockets, when the "PHONES" LED is on it will go to Headphones Jacks on the front. The output not selected will be muted.

6.3 mm Jack: is for connecting to a set of headphones, almost any type can be used, the loading impedance should be minimum 16 ohm, high impedance types work very well. The dac2541 is able to output minimum 6.5V RMS into 32 ohm or higher, in power that is 1300 mW into 32 ohm, 400 mW into 100 ohm or 140 mW into 300 ohm.

4 pins XLR socket: is for connecting to a set of balanced headphones, almost any type can be used, the loading impedance should be minimum 32 ohm, high impedance types work very well. The dac2541 is able to output minimum 13V RMS into 50 ohm or higher, in power that is 3400 mW into 50 ohm, 1700 mW into 100 ohm, 560 mW into 300 ohm or 280 mW into 600 ohm. The 4 pins XLR socket pinout is the de facto standard as used by Sennheiser and others.

Remote Control: The dac2541 have support for using a remote controller to adjust the volume level and to select input source. The remote need to be an Apple 2nd generation remote or a compatible one. The dac2541 as default will not be locked to a remote, but can be locked to a specific remote using its device code. To lock the dac2541 to a remote, first press the "XFEED" button for 4 seconds until the "CLIP" indicator lights, then press any button on the remote. If you don't press any button on the remote before the "CLIP" indicator goes off then the dac2541 will go back to its default setting of not being locked to a specific remote. You then also need to store the new remote setting by pressing the "FILTER" button for 4 seconds.

Firmware Upgrade: The dac2541 support firmware upgrade via the USB interface, which have a built in Serial Port function. The instructions are at http://soekris.dk/update_dac1xxx.html, but ignore step 1 and step 4 as the dac2541 have the built in Serial Interface. You use the same USB interface and cable you use for Audio.

dac2541 rear view

Analog Out: The dac2541 have balanced line out using 3 pins XLR sockets, marked "R" for the right channel and "L" for the left channel. It also have single ended line out using RCA sockets, the red one marked "R" is for the right channel, the white one marked "L" is for the left channel.

Digital In: The dac2541 have a total of 5 digital inputs.

"TOS": SPDIF Optical Toslink.
"RCA": SPDIF 75 ohms Coax, transformer isolated.
"BNC": SPDIF 75 ohms Coax, transformer isolated.
"AES": SPDIF 110 ohms balanced AES/EBU, transformer isolated.

"USB": USB type B socket: For connection to the USB interface on your computer or other audio source device. You need to use a high quality USB cable, like the USB cable included with the dac2541.The USB interface supports only USB Audio Mode 2, which require drivers for Windows operating systems other than Windows 10.

Windows Drivers: Drivers for using USB Audio Mode 2 on Windows operating systems are available for downloading on http://www.soekris.dk/download.html. Please note that most newer versions of Windows 10, Apple OS X and Linux don't require drivers but will support USB Audio Mode 2 directly, see manual for your operating systems as needed.

Power Socket: The dac2541 support power input voltage from 90V to 264V AC using a IEC8 socket, which should enable it to work worldwide directly. The power Supply is double isolated.

Power Cable: The dac2541 is supplied with a power cable for the US and EU markets, but any power cable designed to fit between an IEC8 socket and the wall power socket in your country can be used, it don't need to be anything fancy.

Conformity Declarations

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that the interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that of the receiver.
- Consult the dealer or an experienced radio/TV technician for help.

In order to maintain compliance with FCC regulations shielded cables must be used with this equipment. Operation with non-approved equipment or unshielded cables is likely to result in interference to radio & television reception.

Application for Council Directives 2011/65/EU, 2014/30/EU
Conformity declared for EN55022 Class B, EN55024

This marking indicates that this product should not be disposed with other household waste throughout the EU. To prevent possible harm to the environment or human health from uncontrolled waste disposal and to conserve material resources, this product should be recycled responsibly. To dispose of your product, please use your local return and collection systems.

Contact Information

Soekris Audio ApS
Stibjergvej 110
DK-4220 Korsør
Denmark

http://www.soekris.dk
info@soekris.dk