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# OPPO Digital's New 3-D Blu-ray Disc Player Raises the Bar

BDP-105 Universal Audiophile 3-D Blu-ray Disc Player

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Mountain View, CA 94043  
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Price: \$1,199

OPPO Digital recently upgraded its line of universal digital players. The affordable BDP-93 (*audioXpress*, June 2011) was replaced by the BDP-103, which costs \$499. The BDP-105, which is the subject of this month's review, replaces OPPO's top-of-the-line BDP-95 (reviewed in *audioXpress*, January, 2012).

With the BDP-95, OPPO moved beyond its previous "great for the money" players, offering a universal player with true high-end audio performance. But, the company has not rested on its laurels. Although priced \$200 higher than the BDP-95, the added features and improvements in audio performance make the BDP-105 worth the cost increase.

The BDP-105 is not a modification or simple upgrade of the BDP-95. Although it shares much in common with its predecessor, the BDP-105 is an entirely new design (see **Photo 1**).

The dedicated two-channel stereo audio section, in particular, has been completely revamped and is now housed on its own PC board. The BDP-105 is truly universal and supports all standard 4.75" optical media, video, and audio. These include DVD-video, Blu-ray, CD, HDCD, DVD-Audio, SACD, and all standard recordable CD, DVD, and Blu-ray formats. All popular file formats are also supported, including WAV, FLAC, AICC, and MP3, which can be played from discs, or external storage devices plugged into one of the player's USB inputs. A recent firmware upgrade also

enables playback of stereo and multi-channel direct-stream digital (DSD) files from external devices or discs.

My player had no problems with DSD64 files at the standard 2.8224-Mb/s data rate, but I found that the DSD128 files at a 5.6448-Mb/s data rate played at half speed, even with my television turned off (to ensure native-mode DSD playback rather than conversion to 88.2-kHz/24-bit PCM). I downloaded these files on the 2L website's free sample page. Hopefully a future upgrade will support DSD128 files.

Perhaps the most important functional improvement in the new player—at least for audiophiles—is its ability to operate as a DAC with external digital sources. The BDP-105's five digital inputs are routed to the player's excellent DACs and analog circuitry. These include USB (2.0-compatible), S/PDIF coaxial, Toslink optical, and two HDMI inputs (one

on the front panel and one on the rear). The coaxial and optical inputs will accept PCM datastreams up to 96 kHz/24 bit. The USB and HDMI inputs will accept PCM up to 192 kHz/24 bit. The HDMI inputs will also accept up to 7.1-channels in all the standard A/V audio formats (e.g., Dolby Digital, Dolby Digital Plus, DTS, and AAC).

The flexible array of digital inputs enables the BDP-105 to function as a digital music server, conventional DAC, and stand-alone player. Windows 8, 7, Vista, and XP users will need to download a driver to use the BDP-105 as an asynchronous USB DAC with their computers. The driver and installation instructions can be downloaded from the OPPO website. Just click on "Customer Service" and "Knowledge Base." No driver is needed for Mac OS X, but configuration instructions are provided



Photo 1: The BDP-105 is the latest flagship universal player from OPPO Digital. Compared to its predecessor, the BDP-95, the new player offers many new video and audio features, along with improved audio performance (a). The BDP-105's rear panel features dedicated two-channel audio outputs plus digital audio inputs, enabling other digital audio sources to take advantage of the player's excellent D/A conversion and analog circuitry. A generous assortment of HDMI and USB 2.0 inputs enables the player to process various A/V sources (b).

## MANUFACTURER SPECIFICATIONS

### Analog Audio Characteristics\*\*

- Frequency Response: (RCA) 20 Hz–20 kHz:  $\pm 0.2$  dB, 20 Hz–96 kHz:  $-1.5$  dB; (XLR) 20 Hz–20 kHz:  $\pm 0.3$  dB, 20 Hz–96 kHz:  $-1.5$  dB
- SNR:  $>130$  dB (A-weighted, auto-mute),  $>115$  dB (A-weighted, no auto-mute)
- THD+N:  $<0.0003\%$  or  $-110$  dB (1 kHz at 48k/24b, 0 dBFS, 20 kHz LPF);  $<0.0017\%$  or  $-96$  dB (1 kHz at 44.1 k/16 b, 0 dBFS, 20 kHz LPF)
- Output Level:  $2.1 V_{RMS}$  (RCA) or  $4.2 V_{RMS}$  (XLR) at 0 dBFS
- Dynamic Range:  $>110$  dB
- Channel Separation:  $>110$  dB

### BD Profile

- BD-ROM Version 2.5 Profile 5 (also compatible with Profile 1 Version 1.0 and 1.1)

### Disc Types\*

- BD-Video, Blu-ray 3-D, DVD-Video, DVD-Audio, AVCHD, SACD, CD, HDCD, Kodak Picture CD, CD-R/RW, DVD $\pm$ R/RW, DVD $\pm$ R DL, BD-R/RE

### General Specifications

- Power Supply:  $\sim 115$  V/230 V, 50/60 Hz AC
- Power Consumption: 55 W (Standby: 0.5 W in Energy Efficient mode)
- Dimensions: 16.8"  $\times$  12.2"  $\times$  4.8" (430  $\times$  311  $\times$  123 mm)
- Mass: 17.3 lb (7.9 kg)
- Operating Temperature: 41°F–95°F (5°C–35°C)
- Operating Humidity: 15%–75%; no condensation
- Parts and Labor Warranty: 2 Years

### Headphone Audio Characteristics\*\*

- Frequency Response: 20 Hz–20 kHz:  $\pm 0.3$  dB into 300  $\Omega$
- Signal-to-Noise Ratio:  $>98$  dB into 300  $\Omega$  (A-weighted, no auto-mute)
- THD+N:  $<0.001\%$  or  $-100$  dB into 300  $\Omega$  (1 kHz at 48 k/24 b, 0 dBFS, 20 kHz LPF)
- Output Power (per channel): 17 mW into 600  $\Omega$ , 34 mW into 300  $\Omega$ , 63 mW into 150  $\Omega$ , 77 mW into 120  $\Omega$ , 120 mW into 60  $\Omega$ , 187 mW into 32  $\Omega$  (1 kHz at 0 dBFS)
- Dynamic Range:  $>110$  dB
- Channel Separation:  $>90$  dB

### Internal Storage

- 1 GB (Actual space available for persistent storage varies due to system usage)

### Inputs

- HDMI Audio: Dolby Digital, Dolby Digital Plus, DTS, AAC, up to 5.1 channel/192-kHz or 7.1 channel/96-kHz PCM
- HDMI Video: 480i/480p/576i/576p/720p/1080i/1080p/1080p24/1080p25/1080p30, 3-D frame-packing 720p/1080p24
- MHL Audio: Dolby Digital, Dolby Digital Plus, DTS, up to 5.1 channel/192-kHz PCM
- MHL Video: 480i/480p/576i/576p/720p/1080i/1080p24/1080p25/1080p30, 3-D frame-packing 720p/1080p24
- USB Audio: up to two channel/192-kHz PCM
- Coaxial/Optical Audio: Dolby Digital, DTS, AAC, up to two channel/96-kHz PCM

### Outputs

- Analog Audio: 7.1 channel, 5.1 channel, stereo
- Dedicated Stereo Analog Audio: XLR balanced, RCA single-ended
- Coaxial/Optical Audio: Dolby Digital, DTS, up to two-channel/192-kHz PCM
- HDMI Audio: Dolby Digital, Dolby Digital Plus, Dolby TrueHD, DTS, DTS-HD high-resolution, DTS-HD Master Audio, up to 7.1 channel/192-kHz PCM, up to 5.1 channel DSD
- HDMI Video: 480i/480 p/576i/576p/720p/1080i/1080p/1080p24/4K  $\times$  2K, 3-D frame-packing 720p/1080p24

\*Compatibility with user-encoded contents or user-created discs is on a best-effort basis with no guarantee due to the variation of media, software, and techniques used.

\*\*Nominal specification

on the same webpage. Currently, Linux computers are not supported.

OPPO added a headphone jack to the BDP-105. The headphone output takes advantage of the 32-bit digital volume control built into the ES-9018 DAC chip, but the headphone volume control operates independently from the main analog outputs. By default, the headphone volume is set to 50% at turn-on, but this can be changed in the set-up menu. When you plug

in headphones, the analog line outputs are automatically muted and the headphones smoothly fade up to normal volume from silent. When the headphones are unplugged, the main analog outputs fade back to their normal levels. This thoughtful feature is easy on your ears and your equipment.

## NEW VIDEO FEATURES

Several new video features have also been added to the BDP-105, including

the ability to upscale all video sources to a 4k (3840  $\times$  2160) output resolution, which is four times faster than full HD 1080p. To take advantage of this feature, you'll need a television capable of 4k resolution, of course. If you own a 3-D television, standard DVD, Blu-ray and other 2-D video content can be converted to 3-D by simply pressing the remote's 3-D button. The depth and eye convergence levels can be adjusted to personal taste.

The BDP-105's two previously mentioned HDMI inputs can also be used to connect external video sources, including set-top boxes and network streaming devices. This enables other HD video sources to take full advantage of the OPPO's advanced video and audio processing capabilities. The front-panel HDMI input doubles as a Mobile High-Definition Link (MHL), enabling connection of mobile devices including smartphones and tablets.

OPPO has also added a third USB 2.0 input to the BDP-105—there's one on the front panel and two on the rear. The three USB inputs are in addition to the previously described dedicated USB DAC input. OPPO has dispensed with the eSATA port included on the BDP-95's rear panel. Because USB 2.0 is now the industry standard for external storage device connection, eSATA support has become unnecessary.

OPPO has also eliminated the NTSC composite and component video outputs, but it has included a composite diagnostics video output for troubleshooting, which only works with the set-up menu. If you are unable to get a picture via HDMI, this "lowest common denominator" connection enables you to go through the video set-up procedure to find your television's correct HDMI settings.

Digital media player (DMP) and digital media renderer (DMR) capabilities enable wired or wireless access of audio, picture, and video files stored on DLNA-compatible media servers, including computer and network storage devices. The BDP-105 is also equipped with an experimental feature that can access video, audio, and picture files shared by computers on a local network via the server message block

(SMB) or common Internet file system (CIFS) protocols.

OPPO has added to the BDP-95's array of media support. The BDP-105 supports CinemaNow streaming and Rhapsody Online Music, along with everything previously supported by the BDP-95. The player can also connect to Gracenote Music ID and VideoIDTM, displaying cover art, title, artist, genre, and other media information for CDs, DVDs, Blu-ray discs, and a range of digital media files.

Free remote control applications are available from the App Store for Apple iOS devices and the Google Play Store for Android devices (see the Resources section at the end of this article). The BDP-105 uses the Marvell Kyoto-G2H video processor—the new “H” version incorporates the latest generation Qdeo technology.

## REMOTE

The BDP-105's remote control is compatible with the BDP-95. Nearly all the buttons are in locations familiar to previous OPPO users. To accommodate the digital audio inputs, the old Source button has been replaced with an Input button, which activates the input selection mode. The Up and Down arrow keys, along with the Enter button, can be used to select the desired digital input. Dedicated buttons to access Netflix and Vudu are also included on the new remote, but a couple of others have been removed to make room for them. The discrete On and Off buttons have been eliminated, but they were never really necessary since the single red Power button toggles those two functions, anyway. The video output mode—PAL, NTSC, or Multi—must now be accessed in the Setup menu. A couple of other functions, including Angle, have been incorporated into a single Option button.

## AUDIO DESIGN

The BDP-105 has two analog PC boards. One is dedicated to the two-channel stereo audio circuitry, including the headphone amplifier, and also houses a pair of rectifier bridges, raw supply filtering, and power supply regulation for the two-channel circuitry (see **Photo 2**). The multichannel audio

circuitry is housed on its own PC board (see **Photo 3**).

Like its predecessor, the BDP-105 uses two eight-channel ES9018 DAC chips, which is ESS's flagship Sabre32 DAC chip that incorporates its patented Hyperstream architecture. One ES9018 is used for the multichannel board and another for the two-channel board. But, OPPO has made some significant changes in the way the ES9018 DAC and analog circuitry are configured for the dedicated two-channel outputs.

In the BDP-95, four channels of the ES-9018 are stacked (paralleled) for both the left and right stereo outputs. The same paralleled sections feed the unbalanced RCA and balanced XLR output circuitry. In the BDP-105, the ES9018 DAC dedicated to the stereo outputs is configured as follows: One pair of DAC channels feeds the RCA stereo outputs, a second pair feeds the stereo XLR balanced outputs, and two pairs are stacked for the headphone output.

There's a valid technical reason for stacking two DAC sections for the headphone output. Paralleling DAC sections results in higher output current, which enables OPPO to use a lower-value I/V conversion resistor. The lower-value resistor has less thermal noise. This lowers noise at the headphone output where the improvement will be most beneficial.

I was curious why OPPO abandoned the parallel DAC arrangement used for the stereo outputs in the BDP-95. In

response to my inquiry, OPPO's Lanping Deng and Jason Liao offered the following response: “In the BDP-105, we initially tried to use the same stacked DAC design, but found that the performance became worse. The addition of the USB, coaxial, and optical DAC inputs, and the headphone output, made it impossible to design an optimized PCB layout if we continued to stack the DAC channels. The sub-optimal layout caused degraded performance. After many attempts and revisions, we decided to no longer stack the DAC channels. The new configuration allows us to create a clean layout that minimizes interference and crosstalk. We lose the benefit of the lower thermal noise from using a smaller I/V resistor, but by beefing up the power supply and separating the stereo and multichannel boards, we were able to lower the noise floor and maintain excellent performance. The BDP-105's stereo audio specification is listed to be the same as the BDP-95, and our internal test results actually show that the BDP-105 is slightly better.”

In the detailed description of its CD-1 CD player, Parasound notes that “a single DAC is inherently free of any inter-DAC delays” (it uses a single Analog Devices AD1853 DAC for this player, in the stereo mode). Parasound also states: “The delay between multiple DACs working in parallel can measure up to 10 ns (10,000 ps), introducing minute amounts of delay into the signal chain.”<sup>[1]</sup>

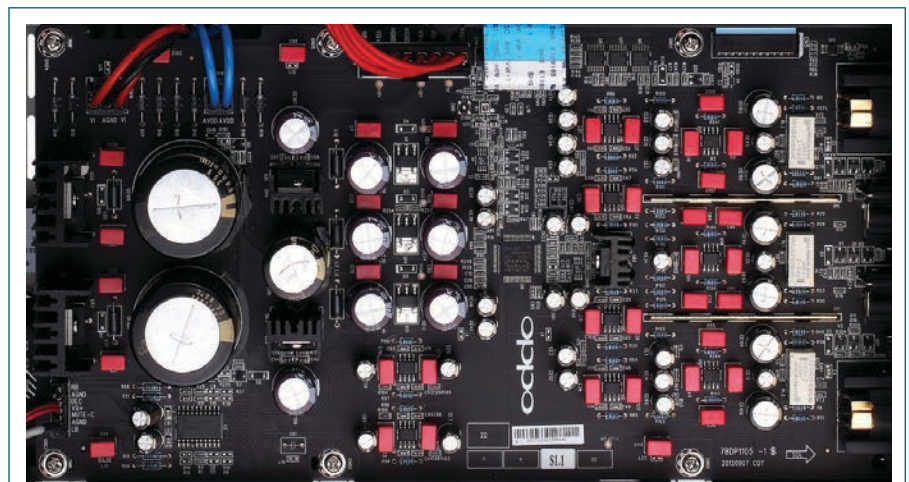


Photo 2: A close-up view of the dedicated two-channel audio board is shown. The board includes an ES9018 DAC chip, a linear supply regulation, a headphone amplifier, and analog circuitry for the balanced and unbalanced stereo outputs.

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rality with a somewhat bright  
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value for money on budget projects.



**Silver Z-Cap**  
Super smooth cap without any  
harsh additions to the sound.  
Absolutely neutral tonal balance.  
A truly outstanding audio part.  
1200 VDC - 800 VDC

In August of 2013 Jantzen Audio Denmark has launched a brand new website.

- New products added
- Better product information
- A new section of DIY speaker kits designed by Danish speaker designer Troels Gravesen

Our product portfolio now includes a market leading selection of coils, capacitors and other components for speaker building.



I asked OPPO if this might explain why the ES9018 actually performs better without stacking sections together. OPPO stated that it has not observed any time delay differences between multiple DAC channels. OPPO's audio design consultant had raised this issue with ESS, but was assured that time delay differences are not a problem with the ES9018. In fact, the ES9012 chip is an internally stacked version of the ES9018. So, it would appear that time delay would not account for the improved performance OPPO has observed with the ES9018's new, non-stacked configuration.

The dedicated stereo outputs' analog circuitry uses the same high-performance ICs as the BDP-95. For each of the unbalanced stereo outputs' channel, a Texas Instruments (TI) LM4562 dual op-amp provides differential I/V conversion. Half of another LM4562 is used as the output amplifier. For each of the balanced stereo outputs, an LM4562 provides differential I/V conversion and a TI LME49724 fully differential op-amp is used as the output amplifier. A TI TPA6120A is used as the headphone amplifier. It has the same excellent current-feedback chip that delivered impressive performance in the Parasond Zdac (reviewed in *audioXpress*, July 2013).

Another pair of LM4562 op-amps provide differential I/V conversion ahead of the headphone amplifier. The multichannel outputs are similar to those in the BDP-95. Each ES9018 DAC channel on the multichannel PC board feeds an LM4562 differential I/V converter. Half of a second LM4562 is used as the output amplifier.

## AC COUPLING

The BDP-95's analog circuitry was DC-coupled, but OPPO has capacitor-coupled the BDP-105's multichannel and stereo outputs. I was curious why OPPO chose AC coupling for the new player, since my measurements on the BDP-95 showed the DC levels on all analog outputs—both the multichannel and stereo—to be less than 2 mV, which is a completely safe value.

OPPO noted that a few BDP-95 players came back with damaged



Photo 3: The BDP-105's multichannel audio board is located in the upper left. The dedicated two-channel audio board is on the right. The video circuitry and its switching power supply are fully shielded and located in the bottom portion of the player. The unit features excellent construction quality and a robust steel chassis.

audio boards. Its investigation led the company to believe the damage was the result of direct current fed back through the output connectors. OPPO also had a few reports of distorted audio that seemed to be related to the DC coupling.

In one case, the company asked the user to try its interconnect cables with coupling capacitors in the signal path. This eliminated the distortion. OPPO said these few isolated cases were probably the result of DC at the input of the users' A/V receivers or amplifiers. (I agree that this is the most likely explanation.) So, OPPO decided the safest solution for the BDP-105 would be AC-coupling of the output.

For output coupling, OPPO chose the ELNA Silmic II capacitors to ensure the best possible audio performance. The Silmic II capacitors are electrolytic types, which may surprise some readers. (I admit that I was taken aback, at first.) But, these capacitors are a new type of electrolytic design, and I urge you to keep an open mind before jumping to conclusions.

ELNA's website has a datasheet and a detailed description of the Silmic II capacitors. Since there are several translation issues with ELNA's English

text, I have taken the liberty of paraphrasing its product description.

The Silmic capacitors were designed specifically for high-performance audio applications and use an entirely new type of electrolytic paper. The new paper's primary ingredient is silk fiber, mixed with Manila hemp fiber to increase strength. Since silk is a relatively supple material, problems associated with mechanical vibration are mitigated. The silk also results in an equivalent series resistance (ESR) that is 20% lower than capacitors made with hemp fiber alone.

ELNA also uses "anode growth foil with more un-etched parts and a 55- $\mu\text{m}$  low-multiplier high-purity cathode foil in order to improve the signal propagation." No permeable metal is used in these capacitors—all leads are oxygen-free copper wire.

ELNA notes that aural evaluations of these capacitors show a significant reduction in high-frequency glare and midrange roughness, with an improvement in low-frequency power and richness. ELNA summarizes by stating that the Silmics yield a "powerful yet mellow sound" that was not previously possible with aluminum electrolytic capacitors.

For a given value and voltage, these capacitors are physically larger than garden-variety electrolytics. OPPO uses 100- $\mu$ F/16-V capacitors that measure 10 mm  $\times$  12.5 mm. But, the large value should ensure excellent low-frequency performance with any load impedance likely to be encountered in A/V receivers, preamps, and amplifiers. OPPO uses these capacitors without any film bypassing, so they may actually perform better on their own.

## POWER SUPPLY

OPPO has paid special attention to the BDP-105's power supplies. Like the BDP-95, all audio circuitry—from the DAC chips to the output amplifiers—is powered by a dedicated linear power supply. The power transformer bears OPPO's logo and part number (the BDP-95 transformer has a Rotel label). Raw filtering consists of a pair of ELNA Tonerex 6,800- $\mu$ F/35-V electrolytic capacitors.

An LM 317/337 pair, in TO-220 cases mounted on heatsinks, are the analog circuitry's main regulators. Four additional IC regulators supply the pairs of 1.2- and 3.3-V rails required for the two-channel ES9018 DAC.

Local supply bypassing is generous, to say the least. I counted 30 local bypass capacitors on the two-channel PC board: 220  $\mu$ F/35 V, all in parallel with Wima film capacitors.

The headphone amplifier, also located on the two-channel board, is powered by its own pair of TI fixed, low-dropout, three-terminal regulators, an LM2940CT for the 15-V rail and an LM2990CT pair for the -15-V rail.

The multichannel board's analog circuitry is fed from the LM-317/337 regulators on the two-channel board. The LM4562 op-amps used for the multichannel outputs are bypassed with 24 electrolytic capacitors in parallel with WIMA film types.

The ES9018 DAC chip on the multichannel board is powered by its own set of 1.2- and 3.3-V regulators. The BDP-105's video circuitry and switching power supply are fully shielded to ensure that radiated noise does not degrade the analog circuitry's performance.

## DIGITAL INPUTS

The ES9018 DAC accepts an S/PDIF input directly, so it does not require a separate input receiver. The S/PDIF coaxial input is coupled with a pulse transformer, which is the preferred interfacing method. The asynchronous USB input is built around an XMOS-programmable microcontroller, which appears to be either the same XS1-series, 128-pin chip used by PS Audio in its NuWave DAC (reviewed in *audio Xpress*, August 2013) or a similar device. Asynchronous operation ensures that the jittery clocks found in most computers won't compromise the USB input's performance.

The BDP-105 is larger and heavier than the BDP-95—the new player is 4.8" tall (vs. 4") and weighs 17.3 lb (vs. 16 lb). The player is beautifully constructed on a steel chassis with an aluminum faceplate and a center-mounted mechanism for excellent mechanical stability. Chinese-manufactured products are still highly variable in quality, and many are downright shoddy. But, OPPO products clearly represent some of the highest-quality manufacturing that country has to offer.

Some users apparently complained about noise from the BDP-95's cooling fan. (The fan in mine is especially quiet and I never noticed any noise, at least not in my normal listening position.) OPPO has dispensed with the fan in the BDP-105. The combination of a larger chassis and ventilation slots in the cover ensure cool and quiet operation without a fan.

The BDP-105 is supplied with a robust 14 AWG, International Electrotechnical Commission (IEC)-style power cord. But, a player this refined can benefit from a high-quality shielded cord (e.g., the cost-effective Pangea AC-14SE or the no-holds-barred D.H. Labs Red Wave).

## PERFORMANCE

The BDP-105 is based on the same video architecture as the BDP-95 and BDP-93. The BDP-105 offers the same state-of-the-art performance as its predecessors (along with the added features described earlier). For details, I refer readers to those reviews.

I used the BDP-105 player's dedicated

two-channel unbalanced outputs, feeding the main preamplifier in my system to perform sonic evaluations on the BDP-105. In my BDP-95 review, I provided a thorough overview of that player's sonic virtues, including excellent soundstage reproduction, low-frequency weight, and dynamics. I also noted that "the BDP-95 doesn't force you to choose between the last ounce of detail and the most natural-sounding treble. It delivers the best of both worlds: exceptionally articulate, detailed sound combined with a smooth, silky treble region, and overall tonal neutrality that just makes you want to keep listening."

I concluded that "as an audiophile who is surrounded by live, unamplified music on a daily basis, the OPPO continually impressed me by just how 'right' it sounds." I'm not going to repeat all the details here. I suggest reading the BDP-95 review for the full story.

When OPPO announced the BDP-105, the new features alone would have been enough to justify the modest increase in price. I would have been



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content if the audio performance simply remained on par with the BDP-95. I'm happy to report that not only has OPPO maintained the virtues of the BDP-95, but it's actually improved on that player's performance in a few areas. The most striking enhancement is in the soundstage reproduction, which is wider, deeper, and more precise than before. The new player also improves on the low-frequency weight and impact. The changes in power supply regulation and bypassing have undoubtedly helped in these areas.

Like its predecessor, the BDP-105's tonal balance is neutral. Although the treble region is airy and detailed, it is also smooth and musically satisfying for the long term and doesn't exaggerate the deficiencies of problematic recordings. The over-miked, sizzly strings in William Steinberg's Deutsche Grammophon (DG) recording of Gustav Holst's *The Planets* are less annoying on the BDP-105 than on players and DACs that favor the treble region. Well-recorded strings (e.g.,

Antal Dorati's Mercury CD of Ottorino Respighi's *The Birds*) are palpably realistic and a pleasure on the ears. Low strings maintain that rich, gutsy quality that I praised in the BDP-95, taking on a bit more weight than before.

The BDP-105 is an extremely revealing player. I am struck by how different digital re-masterings of the same recordings are easily characterized.

A case in point is Georg Solti's legendary Decca recording of Wagner's *Der Ring des Nibelungen*. Two audiophile editions of this recording have been released in recent years—a premium-priced super audio CD (SACD) edition re-mastered in Japan in 2009 by Esoteric and the Deluxe Limited Edition released by Decca in the fall of 2012, which, in addition to 17 CDs and a DVD documentary, also includes a single Blu-ray audio disc containing the entire Ring cycle in 48-kHz/24-bit uncompressed pulse-code modulation (PCM).

Both editions are based on the late James Lock's 1997 re-mastering, where he up-converted Decca's original 1984 digital transfer to 96 kHz/24-bit. (In 1997, Lock told me the original analog tapes had deteriorated to the point where they were no longer useable, a sad situation confirmed in the notes to the Deluxe Edition.)

The SACD edition is clearly superior to the Blu-ray version, having greater low-frequency warmth and heft and a better sense of the acoustical properties of the recording venue. The SACD also has less of the high-frequency glare inherent in the original 1984 transfer. The BDP-105 easily resolves these differences, and to a greater degree than the BDP-95.

The BDP-105's balanced outputs do maintain the high-performance level I've noted for the unbalanced outputs. As with the BDP-95, the new player offers stellar performance, driving a balanced-input power amplifier directly, adjusting the internal 32-bit volume control using the remote.

The BDP-95's relatively coarse 5-dB volume increments have been changed to 1 dB on the BDP-105. (A firmware upgrade changes this for the BDP-95, as well.) If you use only digital sources, the BDP-105's input

flexibility may eliminate the need for a preamplifier.

Throughout my BDP-105 evaluation, I can honestly say the ELNA Silmic II coupling capacitors never drew attention to themselves. In fact, I had done a considerable amount of listening—all entirely positive—before I became aware that the outputs were AC coupled. Perhaps if I had two BDP-105s for A-B comparison—one with the capacitors and one without—the difference would be audible. As it stands, I'm not able to point to any sonic signature created by these capacitors.

In my Parasound Zdac review, I noted "the headphone amplifier is dynamic and punchy, and had no difficulty driving my AKG K701 headphones, which have a 62- $\Omega$  impedance rating. As implemented in the Zdac, the TI headphone amplifier chip is clean, detailed, and spacious."

The OPPO BDP-105 takes the TI TPA6120's virtues to the next level. I found the OPPO's performance with headphones to be slightly better than the Parasound in inner detail and soundstage size.

Like the BDP-95, the new player may make an outboard DAC unnecessary, unless you're prepared to spend a lot of money. None of the affordable DACs I've reviewed in recent years beat the BDP-105 as a stand-alone player, though one came within striking distance.

The PS Audio NuWave DAC offers a slight improvement in soundstage size and localization. The low-order THD added by its discrete output circuitry provides a harmonic richness that is musically extremely engaging. In other areas, (e.g., tonal balance, high-frequency smoothness, and detail), I prefer the BDP-105.

I've only had one DAC in my system that clearly beat the BDP-105, and that's the Bricasti M-1. Last winter, I had an M-1 for one weekend and experienced the finest PCM digital playback I've ever heard. But, the M-1 sells for \$8,600, so there's no way it was going to become a permanent addition to my listening room.

Realistically, I think you'll have to spend at least \$1,500 or more on

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an outboard DAC to significantly improve on the BDP-105's performance as a stand-alone player with PCM sources. The BDP-105 will output a DSD data stream via its HDMI outputs when playing SACDs. Unfortunately, I have yet to see an outboard DAC with HDMI inputs that can accept DSD data.

## FINAL IMPRESSION

With the BDP-105, OPPO has raised the bar once again. The ability to use the BDP-105 as a DAC with a variety of digital sources makes it more than just a universal player. It's really a complete digital music server.

The refined audio performance alone would make the BDP-105 an easy choice for audiophiles. Add state-of-the-art video capabilities and a list of features that leaves little, if anything, to be desired, and you have another high-quality player from OPPO Digital. The BDP-105 is now the reference digital player in my listening room, and I just purchased one for my studio at work. Need I say more? *aX*

## REFERENCES

[1] Parasound Products, Inc., "The Parasound Halo CD 1 Concept and Technology," [www.parasound.com/pdfs/CD1Whitepaper.pdf](http://www.parasound.com/pdfs/CD1Whitepaper.pdf).

## REFERENCE RECORDINGS

### CDs

G. Holst, *The Planets*, Boston Symphony Orchestra, conducted by William Steinberg, DG Originals 463 627-2.

O. Respighi, *The Birds*, the London Symphony Orchestra, conducted by Antal Dorati, Mercury 432 007-2.

R. Wagner, *Der Ring des Nibelungen*, the Deluxe Limited Edition, soloists, Vienna Philharmonic Orchestra, conducted by Georg Solti, Decca 478 3702-2 (replacing the CD edition, 455 555-2) or the SACD Esoteric, ESSD 90021-34 (out of print).

## RESOURCES

2L, [www.2l.no/hires/index.html](http://www.2l.no/hires/index.html).

App Sote for Apple iOS devices, <https://>

[itunes.apple.com/us/app/oppo-remote/id584701552](https://itunes.apple.com/us/app/oppo-remote/id584701552).

ELNA Co., Ltd., "Features of the Silmic Series," [www.elna.co.jp/en/capacitor/onkyou/silmic.html#anc01](http://www.elna.co.jp/en/capacitor/onkyou/silmic.html#anc01).

\_\_\_ "Miniature Aluminum Electrolytic Capacitors For Audio" datasheet, [www.elna.co.jp/en/capacitor/alumi/catalog/pdf/rfs\\_e.pdf](http://www.elna.co.jp/en/capacitor/alumi/catalog/pdf/rfs_e.pdf).

Google Play Store for Android devices, <https://play.google.com/store/apps/details?id=com.oppo.oremove>. message.

## SOURCES

### AD1853 DAC

Analog Devices | [www.analog.com](http://www.analog.com)

### Pangea Audio AC14SE power cord

Audio Advisor, Inc. | [www.audioadvisor.com](http://www.audioadvisor.com)

### M1 Dual-Mono DAC

Bricasti Design, Ltd. | [www.bricasti.com](http://www.bricasti.com)

### Red Wave power cord

DH Labs | [www.silversonic.com](http://www.silversonic.com)

### Silmic II capacitors and Tonorex electrolytic capacitors

ELNA Co., Ltd. | [www.elna.co.jp](http://www.elna.co.jp)

### ES9012, ES9018, and Sabre32 DACs

ESS Technology, Inc. | [www.esstech.com](http://www.esstech.com)

### Kyoto G2H video processor

Marvell Technology Group, Ltd. | [www.marvell.com](http://www.marvell.com)

### BDP-93, BDP-95, BDP-103, and BDP-105 Blu-ray disc players

OPPO Digital, Inc. | [www.oppodigital.com](http://www.oppodigital.com)

### Zdac DAC

Parasound Products, Inc. | [www.parasound.com](http://www.parasound.com)

### LM4562 and LME49724 op-amps, TPA6120A headphone amplifier, LM2940CT regulator

Texas Instruments, Inc. | [www.ti.com](http://www.ti.com)

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