

Picture / Sound quality of DMP-BDT500/320/220

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1 Introduction

Panasonic has been improving picture/sound quality and invented many unique technologies for BD players. In addition to inherit all of them from previous players, we have developed new technologies to improve picture/sound quality for Y2012. This paper explains advantages in our Y2012 models DMP-BDT500/320/220

2 Picture Quality Enhancements

2-1 Panasonic Chroma Technology

As we have frequently reported, the chroma up conversion is the key for high performance picture quality. We developed the high order and high bit precision chroma up-conversion technology called "PHL reference Chroma Processor Plus" and "High Precision 4:4:4". And in Y2010, we invented a new signal processing system named "Motion Adaptive Chroma Up-sample" that brought us the further level of picture quality.

These technologies are already reported in other white papers, please refer to them for details.

2-2 Y2012 model's improvement

Y2012 models inherit all of the past chroma processing, and we also redesigned chroma up-sample filter for 3D contents to improve picture quality. 3D picture quality of Y2012 models is slightly improved from Y2011 models.

2-3 Net contents 24p

Another improvement in Y2012 models is for "Net Picture Quality". Recently "Net contents" had become key function for BD players. People are enjoying net streaming like "You-tube", "Netflix", etc on BD-players.

One of our unique features for Panasonic BD player is DVD 24p output. Even the input is 60i, UniPhier detects the 2-3 cadence and inverse pull-down is applied to generate original 24 frames. This function is highly evaluated by cinema fans because it regenerates original film-like motion with conventional DVD disc.

We applied this technology to net contents.

With this, net movie contents are displayed at 24fps. Judder is removed like 24Hz recorded BD-ROM.

2-4 2D to 3D conversion

Panasonic had developed 2D-3D conversion for Y2011 models. Both L and R view originate same 2D picture but applied different process respectively to give 3D images.

The technology is only applied to BD and DVD contents in past models. But for Y2012 models, it is applied also to net contents.

3 Sound Quality Improvements

3-1 Jitter Purifier

Jitter Purifier which improves sound quality on HDMI interface is also one of the unique technologies developed for Panasonic players. And 2012 models also inherit it. Please see other papers for details.

3-2 Low Noise system (For BDT500)

One of the new technologies in BDT500 sound quality is "High Clarity Sound Plus".

UniPhier is 1chip "System On Chip" (SOC) for BD player and has variety of circuit blocks in it. Video/Audio decoder, signal processor, CPU, memory controller, interface circuit, etc. By concentrating many functions into 1 chip, we could reduce the connective signal lines between chips on PCB (circuit board), through them high speed signals are exchanged and that may generate harmful noises. By making system in 1 chip LSI, we succeeded in reducing noise on PCB and results good picture/sound quality. That is another advantage of UniPhier.

But recently, we found that interference from other circuit block in UniPhier still give small level of noise to audio signals and spoil sound quality a little. Therefore we developed new UniPhier power management technology to get higher level of sound. By this technology UniPhier is partially shut down according to needs of play back mode to minimize the noise

generated by unnecessary block operation.

For example, if the Analog Video output is unnecessary, analog video processing and video DA converters can be shut off, as shown in Fig. 1.

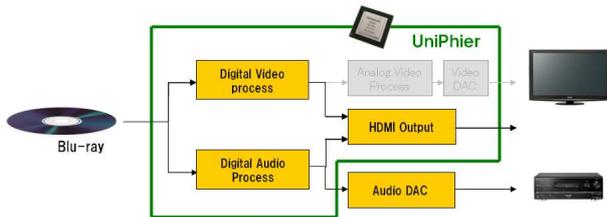


Fig. 1

Or if the CD is playing back and no need for video output, all the video processing blocks can be shut off as shown in Fig. 2.

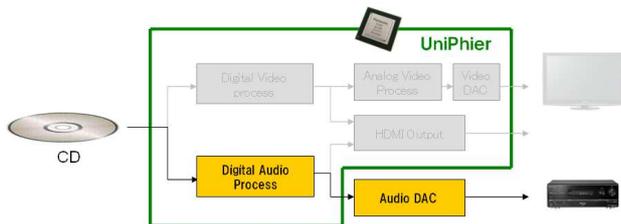


Fig. 2

On this condition, UniPhier works like CD player processor and minimized the noise generation. This mode is also available with USB or DLNA audio sources.

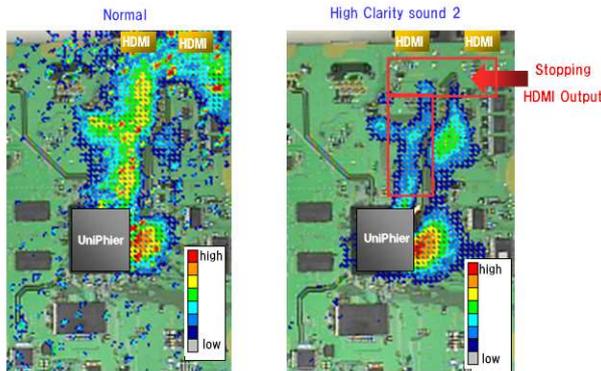


Fig. 3

Fig. 3 shows the circuit board radiation in normal mode and this mode. Obviously the radiation from signal lines between UniPhier and HDMI connector is reduced. This results excellent sound quality

For realize this, complicated block shut down procedure for UniPhier is developed and it also effective for “Eco”.

3-3 Quad 32bit DAC with separated power supply system

For BDT500, Analog Audio circuit is also designed very carefully to meet the high

requirement of audiophiles.

First, we adopt Quad Burr-Brown 192kHz/32bit DA converter for analog 7.1ch output. These DA converter chips are arrayed orderly on PCB. And twin power regulators supply analog and digital power separately to them. (Fig4)



Fig. 4

CD is recorded in 16bit while DVD/BD 24, some may think that 32bit DA converter is excessive quality. But UniPhier has 32bit data width and when some extra process like “Re-master” or “Tube Sound” applied, the sound output comes 32bit. 32bit DA converter can reproduce precise sound quality without any compromise even in such cases.



Fig. 5

We also use audiophile grade chemical and film capacitors for better sound quality. (Fig. 5)

By adopting these techniques and parts that stresses sound quality, BDT500's sound quality is improved to industry top level.

4 Conclusions

Relied on the powerful processor Uniphier, as well as quality oriented design, picture and sound quality is improved again in Y2012 models. We are very pleased to have these improvements, and expect all our customers to enjoy them.