Since launching the world’s first integrated AVN system onto the market in 1997, our company has been steadily cultivating the market via continuous and innovative evolution of AVN.

Over recent years however, the high market profile of AVN has led rivals to enter the field one after another, resulting in drastic falls in prices and a loss of distinctiveness.

To break out of this situation we developed a new model AVN system that further evolves the audio functions that are our company’s strongpoint, incorporating quad-speed audio-recording Music Juke, FMde'TITLE, and virtual 5.1 channel surround supported by CS II. This paper presents the technology involved.


Introduction

Overview of the product

Common items

Display section

AV section

<Features>
Navigation section
- Display the map
- Route guidance
- Lane guidance
- Crossroad guidance
- Traffic sign guidance
- Real-time traffic condition
- Navigation function

Audio quality section
- CD/Radio
- Disc player
- Digital audio signal
- Sound quality enhancement
- Automatic volume adjustment
- Equalizer settings

System upgrade equipment
- Additional memory
- Enhanced software
- New features
- Improved compatibility
- Future proofing

(+) Additional features: Bluetooth connectivity, voice recognition, multi-language support.
System configuration

Overview of system

MJ's quad-speed audio recording

Development aims
Development items

(1) Quad-speed playback capable deck (DV-03)

(2) ATRAC3 Encoder/Decoder LSI (LC82360)

(3) ASIC for MJ (135926-00900880)

Development of ASIC for MJ

Circuit configuration

- DVD interface section
- DMAC (DMA controller) section
- ATA (AT attachment) arbitration control section

Description of circuit blocks

(1) DVD interface section

(3) ASIC for MJ (135926-00900880)
(2) DMAC (DMA controller) section

The DMAC section is responsible for data transfer between the CPU and memory or peripheral devices. It provides a high-speed, direct memory access mechanism that allows the CPU to transfer data without involving the processor in the process. The DMAC can operate independently and efficiently, reducing the processing load on the CPU.

The DMAC section includes several components, such as the DMA control logic, address and data counters, and status registers. These components work together to manage the transfer of data blocks between memory and I/O devices.

The DMAC uses a burst mode to transfer data in a single write or read operation, which significantly reduces the time required for data transfer. This feature is particularly useful in applications requiring high-speed data transfer rates.

The DMAC also supports priority handling, allowing the system to prioritize different DMA requests based on the importance of the data transfer. This ensures that critical data is transferred in a timely manner, even in environments with multiple DMA requests.

In summary, the DMAC section is a crucial component in modern microprocessors, providing efficient and reliable data transfer capabilities that enhance system performance.

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Physical specifications for ASIC

<table>
<thead>
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<td>Description</td>
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<td>Feature 1</td>
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<td>Feature 2</td>
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</table>
System configuration and control software

(1) Convenience

(2) Symbiosis with FM VICS
Profiles of Writers

Tadayoshi Une
Entered the company in 1998. Since then, has been involved in the planning of AVN products. Currently in the Products Planning Department, Engineering Division 2, Business Division Group.

Taku Yokawa
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Entered the company in 2001. Since then, has been involved in the development of AVN hardware. Currently in the LSI Research & Development Department, Research & Development Group.

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Osamu Okada
Entered the company in 1986. Since then, has been involved in the development of AVN systems through the development of software and AVC devices. Currently in the Engineering Department, Engineering Division 2, Business Division Group.

Tadashi Kidena
Entered the company in 1986. Since then, has been involved in the development of AVN through the design of audio circuitry and the development of LSI. Currently the General Manager of the Engineering Department of Engineering Division 2, Business Division Group.

Conclusion

Today, the AVN market is highly competitive, with a variety of products available in the market. As such, companies are constantly striving to improve their products in order to stay competitive. In this paper, we have discussed the development of the 2004 Model HDD AVN, which was designed to meet the needs of the market.

The development of this product involved a team of engineers working together to create a product that was both functional and aesthetically pleasing. The Design Phase was crucial in determining the overall design of the product, and involved a lot of brainstorming and discussion among the team.

The team had to consider many factors, such as the size and weight of the product, the compatibility with existing systems, and the ease of use for the customer. Once the design was finalized, the Development Phase began, and involved testing and fine-tuning the product to ensure that it met the requirements set out in the Design Phase.

Finally, the Testing Phase was carried out to ensure that the product was functioning correctly and was ready for market launch. This involved a lot of testing and debugging to ensure that all issues were resolved.

In conclusion, the development of the 2004 Model HDD AVN was a complex process that involved a lot of collaboration and hard work. However, the end result was a product that was well-received by the market and was able to compete successfully in the highly competitive AVN market.