Introduction: Special Issue on SPA (Silicon Platform Architecture)

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We introduce this issue as a special edition on SPA (Silicon Platform Architecture) which Oki Electric has been proposing. Today, not a day goes by without hearing about IT (Information Technology), the Internet, or mobile communication. To realize these capabilities, every day various information devices are introduced, and they continue to change our lives, making them more comfortable. As everyone knows, these devices include, for example, Internet telephones, portable digital audio/video units, next generation game machines, ETC (Electronic Toll Collection), etc. The core of these information devices is becoming concentrated in silicon LSI technology and software. We have to understand that “system LSI’s” consist of silicon LSI technology and software and, as a semiconductor vendor, have conducted development suited to this era of the system LSI.

SPA’s are the Solution to Realizing System LSI’s

Now then, what is the difference between a system LSI and the conventional LSI? Naturally, in regard to the scale and type of the circuits to be integrated, the higher operating speed, the smaller device manufacturing using DSM (Deep Sub Micron), a much higher level of technology is needed for system LSI’s. At the same time, the achievement of targets, which would be unattainable through simple extrapolation of conventional LSI technology, is required. These targets include reduction in power consumption, shortened development TAT (Turn Around Time), production with small lot size per product, and high quality. For each of these subjects, we are trying to find solutions through improved development tools, process technology, and manufacturing technology, but we recognized that through those alone, there is no way we could provide adequate solutions to our customers. In that context, in 1998 we introduced the SPA concept and since then have been conducting development aimed at realizing it. The SPA approach consists of (i) common platforms built through integration of processes, circuits, and software used in common across a specific application area and (ii) a development environment for developing system LSI’s using those platforms. In addition, in those application areas, with SPA we also provide services of a type not requested of semiconductor vendors previously, such as application know how, consulting service related to LSI development, system solution proposals, etc.

System LSI’s - the Results of our Efforts to Date

When customers develop system LSI’s, if they use the SPA for that application area, it becomes possible for them to fully minimize the development at each process step, from architecture design to system verification. In other words, total cost reduction becomes possible, including shortened delivery times, higher quality, and reduced investment in development.

Based on this kind of SPA concept, we developed platforms and thus far have applied it for IC development in the areas of communication LSI’s, LSI’s for wireless, automobile LSI’s (for ITS), and speech recognition LSI’s. Also, as will be introduced in these papers, we were the first in the world to develop actual system LSI chip set products based on realization of SPA and deliver them to the markets. These include data communications processor LSI’s for portable devices; LSI chip sets for Bluetooth which is gaining attention as a new wireless technology; LSI’s for the car electronics system, ETC (Electronic Toll Collection); LSI’s for recording and playback of audio built with embedded DRAM; microcontrollers for digital audio; etc. Thus we have been able to realize system LSI’s aimed at information devices which, as mentioned above, is an area that is rapidly growing. Also, concerning process technology and manufacturing technology, we have particularly developed techniques, which are needed for system LSI’s. These include low voltage analog circuit technology, SOI for achieving lower power operation, technology for fine wiring, M CP (multi-chip package), and technologies for smaller packages, such as BGA.

Our Development Strategy for the Future

Our development of SPA’s is still in progress. We feel that it must be accelerated even more. Specifically we will put our efforts into the following three areas. (1) Markets: we will focus even more on mobile / personal, and Internet related markets. (2)Process technology: In particular, we want to be able to use SOI in even broader areas as a LSI technology for low power. (3)Design methodology: Build
an even more powerful high level design and development environment including applicability to DSM and software development.

**Features of this Special Edition**

In this special edition, we introduce recent results related to SPA. In the second article, we explain the technology and issues related to system LSI’s. Then, in the third to sixth, “Products for SPA Application,” we introduce some remarkable system LSI’s based on SPA.

In the seventh to ninth articles, “Design Infrastructure Technology,” we introduce a new design environment, hardware and software platforms and memory type IP’s. In the tenth to twelfth articles, “Individual Technologies which Support SPA,” we describe analog techniques, process technology, and mounting technology.

Through the various papers in this special edition, you will understand the approach Oki Electric is making efforts in regard to semiconductors to contribute to the new millennium. We hope you will be able to put our work to good use in a variety of fields.