

## 1983

### **V30 16-bit microprocessor (NEC)**

#### **~ Integrated Circuit ~**

V30 is the name of NEC's 16-bit microprocessor (strict classification is microprocessor without ROM/RAM, input/output function: MPU) commercialized in 1983.

It realized high performance and low power consumption while having upward compatibility with i8086 from Intel which was de facto standard as a 16-bit microprocessor at the time, in the architecture such as register set/instruction set and terminal function/arrangement. Its performance was 1.5 times with the same clock frequency and power consumption was 1/3 compared to i8086. Using 2 $\mu$ m CMOS technology, 63,000 transistors were integrated in a 6.4 mm  $\times$  7.3 mm chip.

This product was widely adopted in various equipment such as personal computer PC9801 series from NEC, OA (Office Automation) equipment like word processors, fax machines, printers, exchanges and industrial control equipment.

NEC's microprocessor business reached the world's largest shipment quantity since 1982. At the same time, in order to continue to be the top of the world after that, from the standpoint that confidence and original nature were required even in the high-end microprocessor field such as 16bit and 32bit, original microprocessor "V-Series" was developed, thoroughly adopting CMOS technology, taking the lead in the industry. In order to avoid the problem of heat generation accompanying the progress of integration degree of NMOS technology, high performance CMOS technology was adopted and compatibility to conventional microprocessors was aimed. V30 is the first 16-bit microprocessor of the V series.

Furthermore, V20 which was an 8-bit external bus version of V30, V40/V50 equipped with input/output function, etc. were commercialized one after another. V series was widely accepted in the global market due to its high functionality, high performance and low power.

However, the rumor spread in the US that "Intel will file a law suit against NEC in that 16bit V-series infringes the copy right of microcode of i8088/8086." NEC then filed a lawsuit in the Federal Court of California State against Intel for the declaratory judgment that the microcode of V30 / V40 / V50 did not infringed Intel's copyright at the end of 1984.

Although it was a dispute under the disadvantageous circumstances such as being a trial in the US, and being in the midst of high fever of US/Japan semiconductor friction at that time, NEC developed the thorough legal activity for the first time for over four years. In 1988, the Federal Court ruled in favor of the NEC's assertion. At the same time, it became a judicial precedent that allowed the copyright of the microcode embedded in LSI, creating a stir in handling of copyright in the entire semiconductor industry.

In 1990, NEC developed the HL Family (V20HL / V30HL / V40HL / V50HL) which adopted the latest process technology, aiming at performance improvement by further high-speed operation and lower power. In the 16bit V series, the core products and development of peripheral functions, and single chip

microcontrollers (MCU) were developed, and 24 kinds of products were developed including V25/V35 (MCU developed in 1986) with the industry standard architecture.

Beginning with V60, which was commercialized as the first domestic 32-bit microprocessor in 1986, the development of the 32-bit V series was also advanced. After that, the V series microprocessor became a technology driver for the NEC microprocessors. Since 1994, including V850, which is a 32-bit MCU adopting RISC architecture, the product development is still continuing.

Microprocessors keeping the same nickname for more than a quarter of a century is now only “V series”. It can be said that it is a result of improving function and performance ahead of the times. By the way, V10 is a nickname assigned to the CMOS version of Z80, which had been a de facto standard 8-bit microprocessor since the late 1970s.

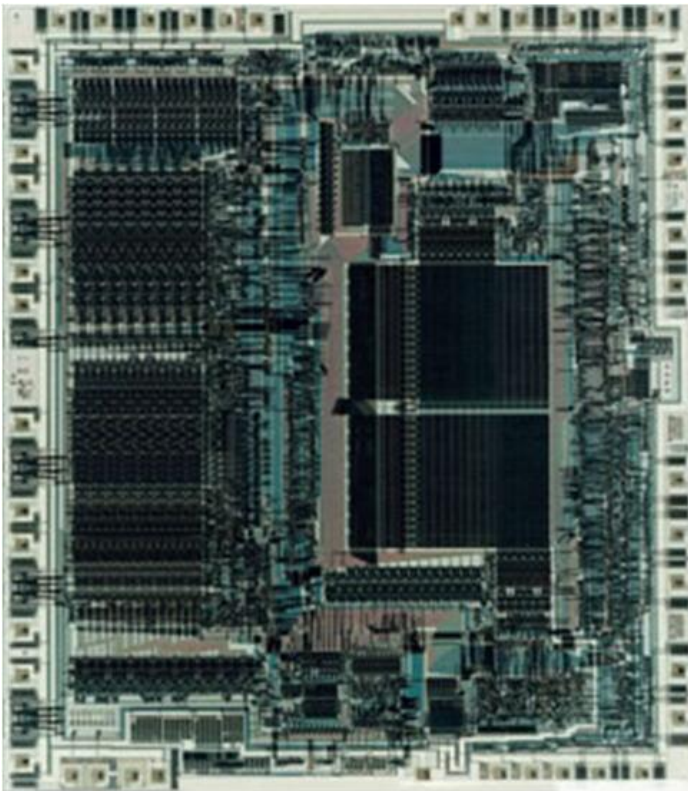


Fig.1: Die Photo of V30  
(By courtesy of Renesas Electronics)

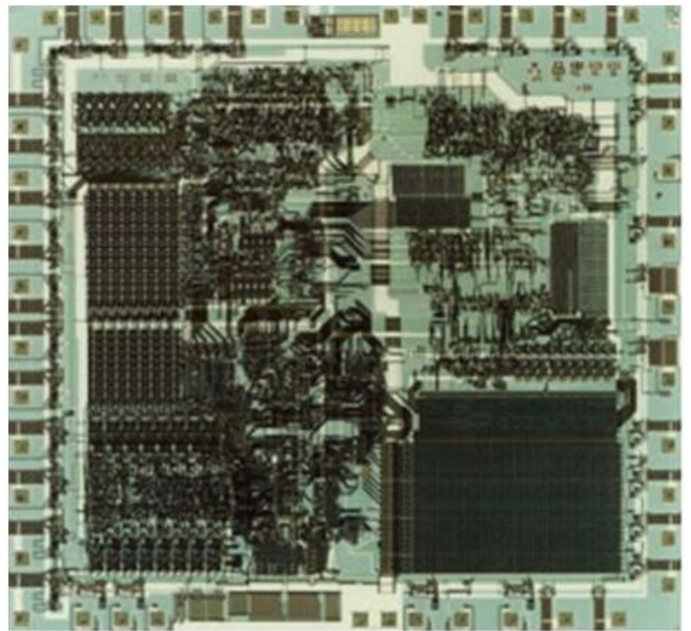


Fig.2: Die photo of  $\mu$ PD8086 from NEC  
(By courtesy of Renesas Electronics)

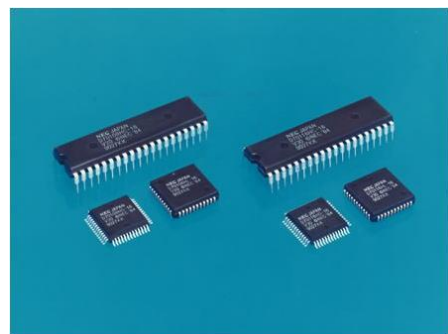


Fig.3: Package photo of V20/V30  
(By courtesy of Renesas Electronics)