1993

Microcontroller with on-chip flash memory (Hitachi)
~ Integrated Circuit ~

As shown in Fig. 1, the microcontroller (MCU) is composed of a processor unit (CPU), a memory unit (RAM and ROM), peripheral circuits, and the like. It is the ROM section that contains the user program, but how to easily rewrite its contents is important. Fig. 1 shows the transition of such a ROM portion.

Hitachi introduced the first flash built-in microcontroller H8-538F to market in 1993. This product is a 16-bit microcontroller targeted at industrial and OA fields, and equipped with 60 KB of flash memory.
In consideration of the importance of this technology, we registered the trademark in 1993 and named it F-ZTAT microprocessor/controller. In ZTAT microcontroller (Zero Turn Around Time, EPROM built-in microcontroller) which had already been in mass-production, it was possible to write on the user side only once, whereas in F-ZTAT it could be rewritten any number of times, so we added F meaning flexible. Because the program could be changed even after the final product was shipped, the F-ZTAT microcontroller became a pioneer of "field programmable microcontroller/processor", which was a great advantage for users. The market greatly welcomed this, and the demand expanded rapidly. In order to meet this market need, Hitachi expanded its product lineup to 8-bit (H8-300, 300L), 16-bit (H8-300, 500), 32-bit (SH microcomputer), and increased to 33 products in total as of 1998. Application fields also expanded not only to industrial and office equipment but also to consumer equipment, information equipment, automobile field and others.

Figure 2 shows the trend of flash microcontroller production in Hitachi. The production volume rose from 100 thousand in 1995 to 4 million in 1996, 48 million in 1998, and 100 million in 2000.
Such a rapid rise curve was almost synchronized with the rise of FPGA (field programmable GA), and it symbolized the arrival of the field programmable era. This momentum expanded further, and in the mid 2000's NEC Electronics started "All-Flash declaration" campaign, and the flash microcontroller completely established the mainstream position.
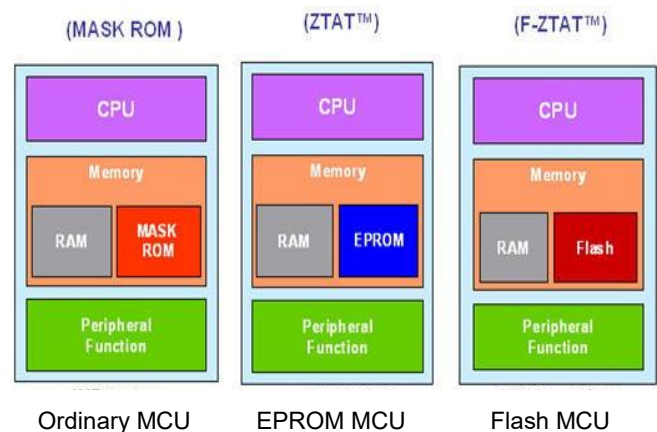

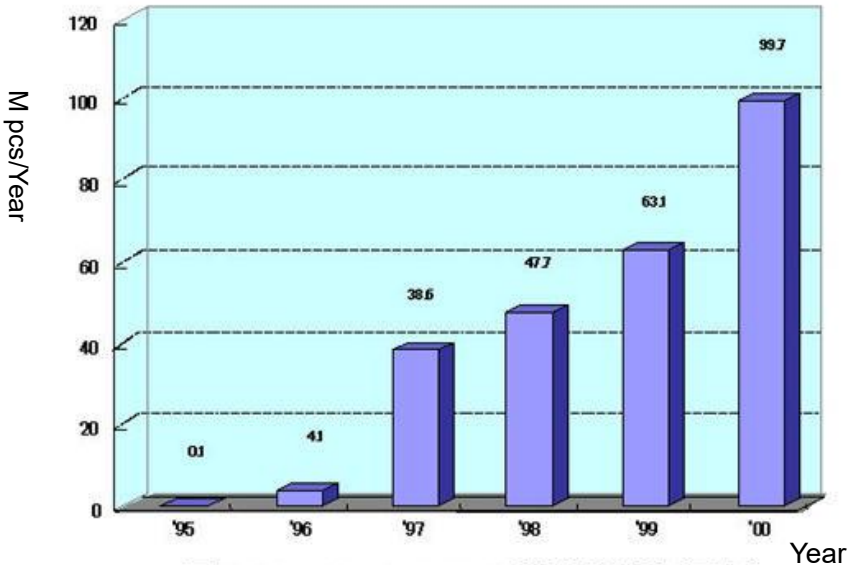
Fig.1 Evolution of Microcontroller
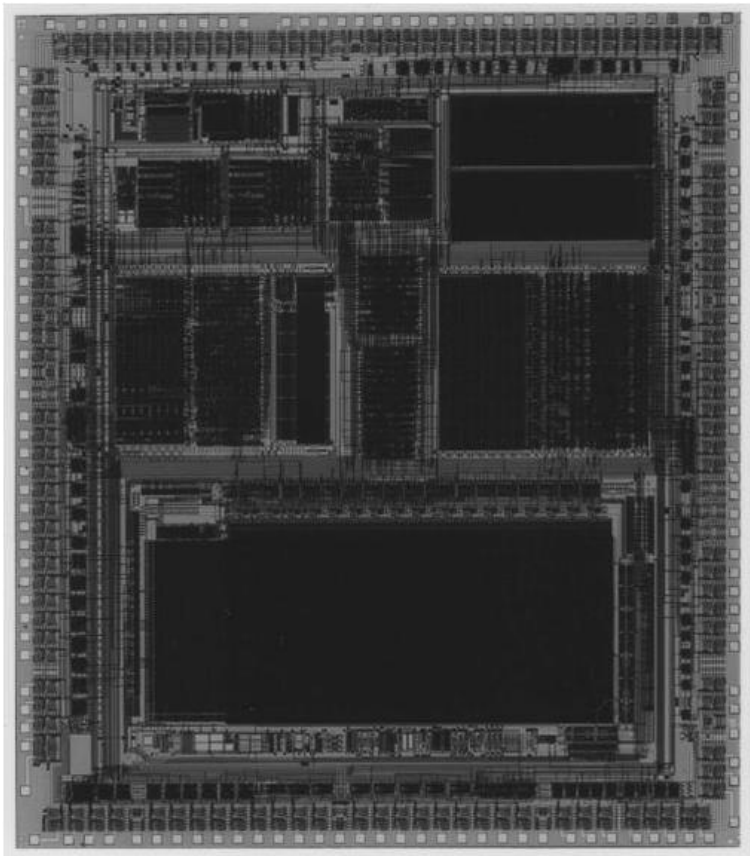
Fig.2: Shipment Trend of Flash MPU (Hitachi)

Fig.3: Die Photo of Flash Microcontroller H8-538F

60 KB of Flash Memory at the bottom

(By courtesy of Renesas Electronics)