Hitachi Releases H8S/2268F 16-Bit Single-Chip Microcontrollers with On-Chip LCD Controller and DTMF Output Circuit

— 256-Kbyte on-chip flash memory for shorter system development times and suitable for use in such products as electric power meters and wireless equipment —

Tokyo, June 14, 2001— Hitachi, Ltd. (TSE: 6501) today announced, as an addition to the H8S/2200 Series of low-power 16-bit microcontrollers, the H8S/2268F F-ZTAT™*[1] microcontroller featuring an on-chip LCD controller/driver and DTMF output*[2] circuit, plus 256-Kbyte on-chip flash memory. Sample shipments will begin in September 2001 in Japan.

With an on-chip segment-type LCD controller or sine-wave generating DTMF output circuit, the H8S/2268F is suitable for use in such products as electric power meters and wireless equipment. In addition to enabling systems to be made smaller while providing higher functionality through high-performance 16-bit microcontroller control and a variety of peripheral functions, the H8S/2268F also includes on-chip flash memory that allows shorter system development times to be achieved.

By incorporating a variety of functions in one chip, a single-chip microcontroller enables end-products to be made smaller and at lower cost, and for this reason they are used for control of various kinds of devices. However, as such devices become functionally more sophisticated year by year, there is a move away from control by 8-bit microcontrollers to control by 16-bit models to handle this higher functionality. In line with this trend, the functions previously provided in 8-bit microcontrollers have also become necessary in 16-bit models. One such function in demand is LCD display of numerals indicating the power quantity, etc., in devices such as electric power meters, while in the wireless device field, for example, a numeric value may be added in the calling wave to confirm the wireless devices that are supposed to be communicating, and in such cases there is a need for a DTMF output function generating sine waves at two specific frequencies corresponding to numerals.

To meet these market needs, Hitachi is releasing the H8S/2268F, as an addition to the H8S Series of high-performance, low-power-consumption 16-bit microcontrollers, featuring an on-chip LCD controller and DTMF output circuit, together with 256 Kbytes of flash memory.

The features of the H8S/2268F are summarized below.

< Features >

(1) On-chip LCD controller/driver
The provision of an on-chip segment-type LCD controller circuit, LCD driver, and power supply circuitry enables direct drive of an LCD panel, using a maximum of 40 segments × 4 common lines.

In addition, an on-chip 3× step-up circuit allows LCD display at a low voltage, and segment output pins not used for LCD drive can be used as I/O ports in 8-pin units.

(2) On-chip DTMF output circuit
The DTMF output circuit generates sine waves at two specific frequencies corresponding to a single numeral or symbol, using a 400 KHz clock frequency for the reference clock. It is possible to output two sine waves in combination, or only one or other of the two.

(3) Large 256-Kbyte on-chip flash memory
The large 256-Kbyte on-chip flash memory, using single-power-supply programming and erasing, enables control programs and system adjustment data to be rewritten on-board, making it possible to achieve shorter system development times.

(4) Lower radiation noise through provision of on-chip step-down circuit
An on-chip step-down circuit allows internal operation at a low voltage of 3 V on a 5 V external power supply voltage, greatly reducing the radiation noise generated by the LSI. At the same time, a 5 V interface is provided for all I/O pins, enabling the H8S/2268F to be used with a single 5 V power supply, and existing 5V power supply specification design resources to be used without modification.

The H8S/2268F also includes a rich array of peripheral functions. A 2-channel I^2C bus interface and 3-channel asynchronous serial communication interface allow communication with devices that use different serial interface specifications, and the comprehensive peripheral function lineup also features a variety of time functions including a 3-channel 16-bit timer, 4-channel 8-bit timer, 4-channel 8-bit reload timer, a 2-channel watchdog timer that can be used as a real-time clock timer, a 10-bit × 10-channel A/D converter, 8-bit × 2-channel D/A converter, and 32 KHz sub-oscillator.

The existing H8S Series C compiler, assembler, linkage editor, librarian, simulators, debuggers, etc., can be used as a development environment, and a variety of emulators, including the E6000 real-time emulator, are also available as hardware support tools.

The package lineup comprises 100-pin plastic QFP and TQFP types. The use of a TQFP package enables systems to be made significantly smaller and thinner.

The development of a mask ROM version of the H8S/2268F is also planned for the future, as well as models offering higher functionality to meet evolving market needs.

Notes:1. F-ZTAT (Flexible Zero Turn-Around Time) is a trademark of Hitachi, Ltd.

2. DTMF (Dual Tone Multiple Frequency) output: This function generates sine waves of two specific frequencies corresponding to individual buttons, in the row (horizontal) direction and column (vertical) direction of a matrix represented by a panel comprising numerals and symbols (0 to 9, #, and *) on a telephone, for example, and outputs these sine waves in combination.

From these signals, a switching system can identify which numeral or symbol has been pressed.

< Typical Applications >

- Wireless devices
- Electric power meters
- Portable home appliances such as silicon audio devices
- Health equipments

< Prices in Japan > (For Reference)

Product Code		Package	Sample Unit Price (Yen)
H8S/2268F	HD64F2268FA	QFP-100 (FP-100B)	1,600
	HD64F2268TE	TQFP-100 (TFP-100B)	1,700
	HD64F2268TF	TQFP-100 (TFP-100G)	1,700

< Specifications >

Product Code	H8S/2268F		
	HD64F2268FA	**HD64F2268TE**	**HD64F2268TF**
Operating frequency/operating voltage	20 MHz / 4.0 V to 5.5 V 13.5 MHz / 3.0 V to 5.5 V		
ROM	256-Kbyte flash memory		
RAM	16 Kbytes		
8-bit timer	4+4 channels		
16-bit timer	3 channels		
Watchdog timer	2 channels (1 also usable as real-time clock)		
LCD display	40 segments × 4 common lines		
DTMF output*[2]	On-chip		
I^2C bus interface	2 channels		
Serial Communication interface	3 channels		
A/D converter	10 bits × 10 channels		
D/A converter	8 bits × 2 channels		
32 KHz oscillator	On-chip		
Packages	QFP-100 (14 mm × 14 mm, 0.5 mm pin pitch)	TQFP-100 (14 mm × 14 mm, 0.5 mm pin pitch)	TQFP-100 (12 mm × 12 mm, 0.4 mm pin pitch)