Fujitsu Microelectronics Limited

Fujitsu Launches Industry's First Embedded FRAM-LSI that Counteracts Electromagnetic Interference

-Can meticulously handle arbitrary clock frequencies of up to 134 MHz-

Tokyo, May 22, 2008 - Fujitsu Microelectronics Limited (FML) today announced the launch of the MB88R157, an addition to its existing product line of spread-spectrum clock generators (SSCG(1)), which provide countermeasures against electromagnetic interference (EMI(2)) on high-frequency clock signals. The new LSI also includes embedded FRAM(3), an industry first, which features fast rewriting speed and can vary its frequency output over a range of 1 MHz to 134 MHz while mounted on a circuit board. In addition, Fujitsu Microelectronics' circuit design technology reduces the product power consumption in continuous operation by up to 40% in comparison to similar products from other companies. As it is easy to rewrite parameters in this new LSI, it is appropriate for a wide range of applications including multi-functional printers, PCs, and mobile phones, as well as for televisions, DVD players, and game consoles.
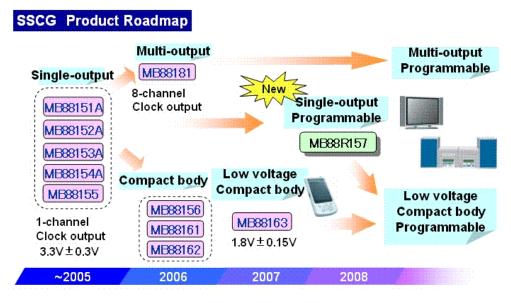

Figure 1: SSCG Product Roadmap

In order to avoid the adverse effects of EMI on high-frequency clock signals, which can cause malfunctions of the chip or the entire system, this LSI minutely varies its clock signal.

Fujitsu has offered SSCGs since 2003, and each SSCG has a unique clock frequency depending on the application in which it would be used.

As digital-media devices have become more high-performance and multi-functional, since the number of types of clock signals driving their internal circuits has increased,

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there is a need for SSCGs that can not only generate unique clock signals, but also vary those signals. In order to meet these needs, Fujitsu Microelectronics developed the MB88R157 with embedded FRAM.

This new product encompasses patent-pending digital frequency modulation control technology and modulation cycle combination technology from Fujitsu VLSI Limited, as well as Fujitsu Microelectronics' own FRAM technology. Fujitsu Microelectronics will continue to provide high value-added SSCG products in future.

Sample Price and Availability

Product Name	Sample Price	Sample Shipment
MB88R157	JPY 300	From May 22, 2008

Sales Target
1.6 million units/month

Product Features

1. **Built-in FRAM for precise clock-frequency settings**
   This product allows the customer to vary the clock rate, adjust the modulation rate, decide whether to use modulation at all, and set stable oscillation capacitance values for stable frequency output. These parameters can be stored in the built-in FRAM. Having these parameters stored in the onboard FRAM means that the customer can change the parameters while the chip remains mounted on its circuit board. Compared to the E2PROM embedded on many products on the market, FRAM's high rewrite speed with lower power consumptions helps customers improve their own production line efficiency.

2. **Reduction of parts count enabled through embedding of peripheral accessories**
   The new LSI features an embedded stable oscillator capacitor required for stable frequency output. It also includes patent-pending digital frequency modulation control technology and modulation cycle combination technology, both technologies from Fujitsu VLSI Limited, to achieve the world's highest levels of EMI mitigation, thereby enabling the elimination of the capacitors[4], choke coils[5], or ferrite beads[6] that are typically needed for noise reduction, and thus further reducing a finished product's parts count.

3. **Low power consumption operation**
   Compared to similar products from other companies, this product reduces power consumption by up to 40% in continuous operation.

Glossary

1 **Spread-spectrum clock generator (SSCG):**

   A type of clock circuit that can minutely vary (modulate) its clock frequency, thereby reducing the spectrum power of that frequency. This is a technique adopted in recent years as a countermeasure against electromagnetic interference (EMI) in devices such as PCs and printers.

2

2 **Electromagnetic interference (EMI) :**

Electromagnetic noise emitted by electronic devices. As strong EMI can adversely affect nearby devices, causing them to malfunction, various nations have set upper limits for acceptable EMI levels.

3 **FRAM:**

Ferroelectric random access memory. A type of non-volatile memory that uses a ferroelectric film as a data-storage capacitor. Combines the benefits of ROM and RAM with fast data writes, low power consumption operation, support for numerous rewrites, and data retention without power consumption. Also known as FeRAM.

4 **Capacitors:**

An electronic device consisting of two electrified plates separated by a dielectric. Typically used in systems to stabilize signal variations.

5 **Choke coils:**

A component for noise countermeasure. Consists of wire wound around a magnet. Used to prevent currents with frequency components above a certain level used in systems.

6 **Ferrite beads :**

A component for noise countermeasure. Uses ferrite's material properties to convert noise to heat.

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Fujitsu - Spread Spectrum Clock Generator: SSCG

About Fujitsu Microelectronics (FML)
Fujitsu Microelectronics Limited designs and manufactures semiconductors, providing highly reliable, optimal solutions and support to meet the varying needs of its customers. Products and services include ASICs/COT, ASSPs, power management ICs, and flash microcontrollers, with wide-ranging expertise focusing on imaging, wireless, automotive and security applications. Fujitsu Microelectronics also drives power efficiency and environmental initiatives. Headquartered in Tokyo, Fujitsu Microelectronics Limited was established as a subsidiary of Fujitsu Limited on March 21, 2008. Through its global sales and development network, with sites in Japan and throughout Asia, Europe, and the Americas, Fujitsu Microelectronics offers semiconductor solutions to the global marketplace. For more information: http://jp.fujitsu.com/group/fml/en/

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MB88R157 Key Specifications

Input clock frequency	10 MHz to 50 MHz
Output clock frequency	1 MHz to 134 MHz (also accommodates fractional frequencies)
Modulation rate	No modulation $\pm0.25\%$ to $\pm1.75\%$, varied in $\pm0.25\%$ steps
Other functions	Output-enabled function (**1)
Power-supply voltage	3.0 V to 3.6 V
Operating temperature	-20°C to +85°C
Packaging	SOP (**2) 8-pin, 1.27 mm pitch, 3.9 x 5.05 mm package

**1: Output enabled: Changes clock-output pin level during system standby
**2: SOP: small-outline L-lead package; a type of compact chip packaging