



**High-performance 32-bit RISC microprocessor is first with NANO FLASH™ ultra-low-power embedded flash memory**

**Processor with 512Kbytes of NANO FLASH addresses performance and power requirements of large-scale systems with single chip**

Toshiba Electronics Europe has announced a high-performance 32-bit RISC microprocessor that integrates the Company's newly developed NANO FLASH ultra-low-power embedded flash memory and a large number of peripherals into a compact 193-pin package.

The TMP19A43 is the first device to feature Toshiba's NANO FLASH technology and provides a single-chip solution for large-scale systems. Potential applications include high-end portable electronic equipment and other designs that require high performance, low power consumption, and minimum component counts.

Developed specifically for use as embedded microprocessor memory, NANO FLASH brings together the benefits of NOR flash and NAND

flash in a single technology. The result is embedded memory that allows both high-speed random access and high-speed programming, while maintaining very low levels of power consumption.

Toshiba's TMP19A43 32-bit RISC processor features 512kbytes of NANO FLASH as well as 24kbytes of built-in RAM. The device is based on the established TX19A CPU core that enables high code efficiency and superior interrupt response and operates with clock speeds up to 40MHz. Internal supply voltages are between 1.35V to 1.65V, while I/O voltages are from 2.7V to 3.6V.

The new processor incorporates a variety of peripherals including a 17-channel 16/32-bit timer, a DMA controller, a 16-channel 10-bit ADC that allows high-speed conversion (1.15µs), two channels of 8-bit DAC, a watchdog timer and a clock timer. Sixteen external interrupt pins and 32-key-on wakeup pins are available for key inputs such as standby release input functions. Six high-speed serial interface channels provide designers with the flexibility to meet the demands of high-end designs.

The TMP19A43 is supplied in a 193-pin FBGA package measuring just 12mm x 12mm x 1.4mm. In addition to the NANO FLASH device, Toshiba will also offer a version with on-chip MASK ROM.

### **About NANO FLASH**

Traditionally, flash-embedded products have been limited in their ability to replace MASK ROM due to power consumption. Toshiba's NANO FLASH overcomes this problem by using improved readout circuitry and timing control to drive down power consumption through lower DC current requirements.

Ideally suited to embedded memory, NANO FLASH can be combined with high-performance CMOS using a logic process rather than a memory process. NANO FLASH combines the best aspects of the circuit technology of NOR flash and the cell implementation of NAND flash memory. The parallel communication architecture of NOR is used to realise the high-speed random access functionality demanded by embedded program memory, while the cell device technology of NAND is used to realise high-speed programming. FN

tunnelling for both program and erase further contributes to high-speed programming at low current.

### **TMP19A43 Technical specifications**

Product name	TMP19A43FDXB
Product type	512-kbyte on-chip flash memory (24-kbyte built-in RAM)
Operating frequency	40 MHz
Supply voltage	Internal: 1.35V to 1.65V, I/O: 2.7V to 3.6V, A/D converter: 2.7V to 3.6V, D/A converter: 2.3V to 2.7V
Peripherals	DMA controller, 16-/32-bit timer, general-purpose serial interface, serial bus interface, A/D converter, D/A converter, Watchdog timer, Key-on wakeup, Clock timer
Package	FBGA193 (0.65mm pitch)
MASK ROM embedded type	TMP19A43CZXB (384-kbyte embedded MASK ROM, 20-kbyte embedded RAM)

### **About Toshiba**

Toshiba Corporation is a leader in information and communications systems, electronic components, consumer products and power systems. The company's integration of these wide-ranging capabilities assures its position as an innovator in advanced components, products and systems. Toshiba has more than 161,000 employees worldwide and annual sales of over US\$53 billion (FY2003).

Toshiba Electronics Europe (TEE) is the European Headquarters for the electronic components business of Toshiba Corporation, which is the world's fourth largest semiconductor vendor according to estimates by Dataquest.

Providing design, manufacturing, marketing and sales, TEE was formed in 1973 in Neuss, Germany. The company now has headquarters in Düsseldorf, Germany and subsidiaries in France, Germany, Italy, Spain, Sweden and the United Kingdom. Company president is Mr Toshio Hamaya and the total number of personnel in Europe is around 400.

Toshiba Electronics Europe offers one of the industry's broadest IC and discrete product lines including high-end memory, microcontrollers, ASICs, ASSPs and display products for automotive, multimedia, consumer, telecoms and networking applications. The company also has a wide range of power semiconductor solutions.

For more company information visit Toshiba's web site at  
[www.toshiba-components.com](http://www.toshiba-components.com)

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**March 2005**

**Ref: 5576/A**