

Piccolo™ MCUs: TMS320F2806x

15+ new C2000™ Piccolo MCUs offering floating-point precision and increased math capabilities



3 key new attributes for F2806x

- Floating-point ease of use and performance in a Piccolo package
- New features like USB, VCU (Viterbi Complex Math Unit), High-Res Capture
- 256KB Flash, 100KB RAM **starting at under U.S. \$5**

What do these Piccolo devices bring?

These new devices add more memory and peripherals to the Piccolo family. But most importantly, they bring in new technologies and floating-point processing to the Piccolo MCU family.

What is Piccolo again?

First introduced in 4Q 2008, Piccolo represents a real-time control solution for cost-sensitive applications. Piccolo is named for its:

- Small size – starting at 7×7 mm
- Low cost – starting at less than U.S. \$2
- High analog integration – oscillators, comparators, BOR/POR, voltage regulator, ADC

So what are these new technologies you speak of?

These F2806x devices bring a few new peripherals to the game:

- **New technology: VCU** for complex math processing, such as FFTs, Viterbi decoding and CRC
- **New technology: High-Resolution Capture (HRCAP)**
- **USB 2.0 host:** for the first time on C2000 MCUs
- **DMA, McBSP, FPU:** for the first time on Piccolo

What tools are there?

There will be a new, low-cost controlSTICK for instant plug-and-play with your computer. The F28069 controlSTICK includes on-board emulation, so it's a complete development kit, along with TI's Code Composer Studio™ v4 IDE and graphical programming for a phenomenal \$39. There will also be an Experimenter's Kit with the F28069 controlCARD. The controlCARD will also be sold individually and can be plugged into all existing evaluation and application kits.

What software is available?

Piccolo F2806x will be the first C2000 device to be released into controlSUITE™ software. It means that right at launch, engineers will have access to all available resources for F2806x and C2000 MCUs – including the Device Support Package, math and application libraries, tools software and examples, training and much more. See more about controlSUITE software and download for free at

www.ti.com/controlsuite

Can you tell me more about the VCU?

The Viterbi Complex Math Unit (VCU) significantly reduces processing time (up to

7.5×) of common complex math operations via new instructions optimized for Viterbi, complex math and CRC. The VCU can be used in many applications, but it is particularly useful for protocols in power line communication (PLC), where noisy environments require robust encoding and filtering.

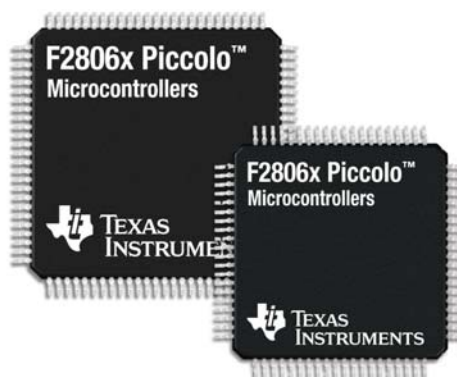
What applications does it go in?

F2806x is a great fit for control-heavy applications or applications looking to add communication via PLC or USB

- **Industrial:** AC servos, inverters, CNC, drives and motor control, lighting, process and valve controls
- **Power conversion:** HEV/EV, solar / renewable energy, line monitoring, protection
- **Power line communication integration:** Solar + PLC, Lighting + PLC, HEV + PLC
- **Precision control and sensing applications**

When can customers get silicon and tools?

Both samples and tools will be available immediately upon launch on January 11, 2011.



Sample Part Numbers	Pin Count
TMX320F28069PNA	80 pin
TMX320F28069PZA	100 pin
Development Tools	Price (U.S. \$)
Piccolo F2806x controlSTICK (TMDX28069USB)	\$39
Piccolo F2806x eXperimenter's Kit (TMDXDOCK28069)	\$59
Piccolo F2806x controlCARD (TMDXCNC28069)	\$99

Piccolo™ F2806x MCUs: Low-cost floating point meets real-time control

High-Performance C28x™ CPU

- Up to 80-MHz performance
- Single-cycle 32-bit MAC
- Fast interrupt response and minimal latency
- Floating point on F2806x

VCU

- Complex Math Unit: 3× faster FFT Butterfly
- Viterbi Unit: Up to 7.5× faster Viterbi operations
- CRC Unit: 2× faster than software implementation

Control Law Accelerator

- 32-bit floating-point math accelerator
- Operates independent of C28x CPU
- Up to 5× performance boost

C28x 32-bit CPU

- 80 MHz
- 32×32-Bit Multiplier
- RMW Atomic ALU
- FPU
- VCU

Memory

- 128–256 KB Flash
- 52–100 KB RAM
- Boot ROM

Power & Clocking

- Dual-OSC 10 MHz
- On-chip OSC
- Dynamic PLL ratio changes
- POR
- BOR

Enhanced Architecture

- High-accuracy on-chip oscillators (10 MHz)
- Single 3.3-V supply with BOR/POR supervision
- 6-ch Direct Memory Access

CLA

- DMA 6 Ch

Debug

- Real-Time JTAG

Peripherals

- 3× Comparator
- Missing Clock Detection Circuitry
- 128-Bit Security Key/Lock

Timer Modules

- 8× PWM Modules: 16× PWM outputs (8× 150-ps high-res)
- 3× 32-Bit eCAP
- 4× HRCAP
- 2× 32-Bit eQEP
- Watchdog Timer
- 3× 32-Bit CPU Timers

ADC

- 16 Ch, 2 SH, 12-Bit, 5-MSPS ADC

Serial Interfaces

- USB 2.0 FS
- 2× SPI, 1× McBSP
- 2× SCI
- 1× I²C
- 1× CAN

Intelligent Peripherals

- 150-ps resolution on PWM frequency and duty cycle
- 12-bit radio-metric ADC with individual channel triggers
- Up to 3× analog comparators with 10-bit reference
- New high-resolution capture
- Enhanced CAN bus unit, USB 2.0 with Host

Piccolo F2806x floating-point MCU configuration chart

Device (TMS320x)	Processor				Memory			Control Interfaces						Communication Ports												
	Speed (MHz)	VCU	DMA	CLA	RAM (KB)	Flash (KB)	ROM (KB)	PWM Ch	HiRes PWM	Quadrature Encoder	Event Captures	Timers*	12-Bit ADC Channels/Conversion Time (ns)	Comparators	USB (Host)	McBSP	I ² C	UART/SCI	SPI	Lin	CAN	External Memory Bus	Core Supply (Volts)	GPIO Pins	On-Chip OSC/Regulator	Pin/Package
F28069PN / PFP	80	Yes	Yes	Yes	100	256	Boot	15	6	1	3	12	12/325	3	0-1	1	1	1	2	-	1	-	3.3	40	Yes/Yes	80 LQFP, 80 HTQFP
F28069PZ / PZP	80	Yes	Yes	Yes	100	256	Boot	19	8	2	7	16	16/325	3	0-1	1	1	2	2	-	1	-	3.3	54	Yes/Yes	100 LQFP, 100 HTQFP
F28068PN / PFP	80	Yes	Yes	-	100	256	Boot	15	6	1	3	12	12/325	3	0-1	1	1	1	2	-	1	-	3.3	40	Yes/Yes	80 LQFP, 80 HTQFP
F28068PZ / PZP	80	Yes	Yes	-	100	256	Boot	19	8	2	7	16	16/325	3	0-1	1	1	2	2	-	1	-	3.3	54	Yes/Yes	100 LQFP, 100 HTQFP
F28067PN / PFP	80	-	Yes	-	100	256	Boot	15	6	1	3	12	12/325	3	0-1	1	1	1	2	-	1	-	3.3	40	Yes/Yes	80 LQFP, 80 HTQFP
F28067PZ / PZP	80	-	Yes	-	100	256	Boot	19	8	2	7	16	16/325	3	0-1	1	1	2	2	-	1	-	3.3	54	Yes/Yes	100 LQFP, 100 HTQFP
F28066PN / PFP	80	-	Yes	-	68	256	Boot	15	6	1	3	12	12/325	3	0-1	1	1	1	2	-	1	-	3.3	40	Yes/Yes	80 LQFP, 80 HTQFP
F28066PZ / PZP	80	-	Yes	-	68	256	Boot	19	8	2	7	16	16/325	3	0-1	1	1	2	2	-	1	-	3.3	54	Yes/Yes	100 LQFP, 100 HTQFP
F28065PN / PFP	80	Yes	Yes	Yes	100	128	Boot	15	6	1	3	12	12/325	3	0-1	1	1	1	2	-	1	-	3.3	40	Yes/Yes	80 LQFP, 80 HTQFP
F28065PZ / PZP	80	Yes	Yes	Yes	100	128	Boot	19	8	2	7	16	16/325	3	0-1	1	1	2	2	-	1	-	3.3	54	Yes/Yes	100 LQFP, 100 HTQFP
F28064PN / PFP	80	Yes	Yes	-	100	128	Boot	15	6	1	3	12	12/325	3	0-1	1	1	1	2	-	1	-	3.3	40	Yes/Yes	80 LQFP, 80 HTQFP
F28064PZ / PZP	80	Yes	Yes	-	100	128	Boot	19	8	2	7	16	16/325	3	0-1	1	1	2	2	-	1	-	3.3	54	Yes/Yes	100 LQFP, 100 HTQFP
F28063PN / PFP	80	-	Yes	-	68	128	Boot	15	6	1	3	12	12/325	3	0-1	1	1	1	2	-	1	-	3.3	40	Yes/Yes	80 LQFP, 80 HTQFP
F28063PZ / PZP	80	-	Yes	-	68	128	Boot	19	8	2	7	16	16/325	3	0-1	1	1	2	2	-	1	-	3.3	54	Yes/Yes	100 LQFP, 100 HTQFP
F28062PN / PFP	80	-	Yes	-	52	128	Boot	15	6	1	3	12	12/325	3	0-1	1	1	1	2	-	1	-	3.3	40	Yes/Yes	80 LQFP, 80 HTQFP
F28062PZ / PZP	80	-	Yes	-	52	128	Boot	19	8	2	7	16	16/325	3	0-1	1	1	2	2	-	1	-	3.3	54	Yes/Yes	100 LQFP, 100 HTQFP

All devices available with AEC-Q100 (125°C) maximum temperature range.
 *Timers include CPU timers, PWM timers, eCAP timers and Watchdog timers.

New devices are listed in bold red.

Important Notice: The products and services of Texas Instruments Incorporated and its subsidiaries described herein are sold subject to TI's standard terms and conditions of sale. Customers are advised to obtain the most current and complete information about TI products and services before placing orders. TI assumes no liability for applications assistance, customer's applications or product designs, software performance, or infringement of patents. The publication of information regarding any other company's products or services does not constitute TI's approval, warranty or endorsement thereof.

The platform bar, C2000, Code Composer Studio, controlSUITE, Piccolo and TMS320C2000 are trademarks of Texas Instruments.
 All other trademarks are the property of their respective owners.



IMPORTANT NOTICE

Texas Instruments Incorporated and its subsidiaries (TI) reserve the right to make corrections, modifications, enhancements, improvements, and other changes to its products and services at any time and to discontinue any product or service without notice. Customers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. All products are sold subject to TI's terms and conditions of sale supplied at the time of order acknowledgment.

TI warrants performance of its hardware products to the specifications applicable at the time of sale in accordance with TI's standard warranty. Testing and other quality control techniques are used to the extent TI deems necessary to support this warranty. Except where mandated by government requirements, testing of all parameters of each product is not necessarily performed.

TI assumes no liability for applications assistance or customer product design. Customers are responsible for their products and applications using TI components. To minimize the risks associated with customer products and applications, customers should provide adequate design and operating safeguards.

TI does not warrant or represent that any license, either express or implied, is granted under any TI patent right, copyright, mask work right, or other TI intellectual property right relating to any combination, machine, or process in which TI products or services are used. Information published by TI regarding third-party products or services does not constitute a license from TI to use such products or services or a warranty or endorsement thereof. Use of such information may require a license from a third party under the patents or other intellectual property of the third party, or a license from TI under the patents or other intellectual property of TI.

Reproduction of TI information in TI data books or data sheets is permissible only if reproduction is without alteration and is accompanied by all associated warranties, conditions, limitations, and notices. Reproduction of this information with alteration is an unfair and deceptive business practice. TI is not responsible or liable for such altered documentation. Information of third parties may be subject to additional restrictions.

Resale of TI products or services with statements different from or beyond the parameters stated by TI for that product or service voids all express and any implied warranties for the associated TI product or service and is an unfair and deceptive business practice. TI is not responsible or liable for any such statements.

TI products are not authorized for use in safety-critical applications (such as life support) where a failure of the TI product would reasonably be expected to cause severe personal injury or death, unless officers of the parties have executed an agreement specifically governing such use. Buyers represent that they have all necessary expertise in the safety and regulatory ramifications of their applications, and acknowledge and agree that they are solely responsible for all legal, regulatory and safety-related requirements concerning their products and any use of TI products in such safety-critical applications, notwithstanding any applications-related information or support that may be provided by TI. Further, Buyers must fully indemnify TI and its representatives against any damages arising out of the use of TI products in such safety-critical applications.

TI products are neither designed nor intended for use in military/aerospace applications or environments unless the TI products are specifically designated by TI as military-grade or "enhanced plastic." Only products designated by TI as military-grade meet military specifications. Buyers acknowledge and agree that any such use of TI products which TI has not designated as military-grade is solely at the Buyer's risk, and that they are solely responsible for compliance with all legal and regulatory requirements in connection with such use.

TI products are neither designed nor intended for use in automotive applications or environments unless the specific TI products are designated by TI as compliant with ISO/TS 16949 requirements. Buyers acknowledge and agree that, if they use any non-designated products in automotive applications, TI will not be responsible for any failure to meet such requirements.

Following are URLs where you can obtain information on other Texas Instruments products and application solutions:

Products

Audio	www.ti.com/audio
Amplifiers	amplifier.ti.com
Data Converters	dataconverter.ti.com
DLP® Products	www.dlp.com
DSP	dsp.ti.com
Clocks and Timers	www.ti.com/clocks
Interface	interface.ti.com
Logic	logic.ti.com
Power Mgmt	power.ti.com
Microcontrollers	microcontroller.ti.com
RFID	www.ti-rfid.com
RF/IF and ZigBee® Solutions	www.ti.com/lprf

Applications

Communications and Telecom	www.ti.com/communications
Computers and Peripherals	www.ti.com/computers
Consumer Electronics	www.ti.com/consumer-apps
Energy and Lighting	www.ti.com/energy
Industrial	www.ti.com/industrial
Medical	www.ti.com/medical
Security	www.ti.com/security
Space, Avionics and Defense	www.ti.com/space-avionics-defense
Transportation and Automotive	www.ti.com/automotive
Video and Imaging	www.ti.com/video
Wireless	www.ti.com/wireless-apps

TI E2E Community Home Page

e2e.ti.com

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265
Copyright © 2011, Texas Instruments Incorporated