TEXAS INSTRUMENTS

TMS320F2803x Microcontrollers

1 Device Overview

1.1 Features

- High-efficiency 32-bit CPU (TMS320C28x)
  - 60 MHz (16.67-ns cycle time)
  - 16 × 16 and 32 × 32 MAC operations
  - 16 × 16 dual MAC
  - Harvard bus architecture
  - Atomic operations
  - Fast interrupt response and processing
  - Unified memory programming model
  - Code-efficient (in C/C++ and Assembly)
- Programmable Control Law Accelerator (CLA)
  - 32-bit floating-point math accelerator
  - Executes code independently of the main CPU
- Endianness: Little endian
- JTAG boundary scan support
  - IEEE Standard 1149.1-1990 Standard Test Access Port and Boundary Scan Architecture
- Low cost for both device and system:
  - Single 3.3-V supply
  - No power sequencing requirement
  - Integrated power-on reset and brown-out reset
  - Low power
  - No analog support pins
- Clocking:
  - Two internal zero-pin oscillators
  - On-chip crystal oscillator and external clock input
  - Watchdog timer module
  - Missing clock detection circuitry
- Up to 45 individually programmable, multiplexed GPIO pins with input filtering
- Peripheral Interrupt Expansion (PIE) block that supports all peripheral interrupts
- Three 32-bit CPU timers
- Independent 16-bit timer in each Enhanced Pulse Width Modulator (ePWM)
- On-chip memory
  - Flash, SARAM, OTP, Boot ROM available

- Code-security module
- 128-bit security key and lock
  - Protects secure memory blocks
  - Prevents firmware reverse engineering
- Serial port peripherals
  - One Serial Communications Interface (SCI) Universal Asynchronous Receiver/Transmitter (UART) module
  - Two Serial Peripheral Interface (SPI) modules
  - One Inter-Integrated-Circuit (I2C) module
  - One Local Interconnect Network (LIN) module
  - One Enhanced Controller Area Network (eCAN) module
- Enhanced control peripherals
  - ePWM
  - High-Resolution PWM (HRPWM)
  - Enhanced Capture (eCAP) module
  - High-Resolution Input Capture (HRCAP) module
  - Enhanced Quadrature Encoder Pulse (eQEP) module
  - Analog-to-Digital Converter (ADC)
  - On-chip temperature sensor
  - Comparator
- Advanced emulation features
  - Analysis and breakpoint functions
  - Real-time debug through hardware
- Package options
  - 56-Pin RSH Very Thin Quad Flatpack (No lead) (VQFN)
  - 64-Pin PAG Thin Quad Flatpack (TQFP)
  - 80-Pin PN Low-Profile Quad Flatpack (LQFP)
- Temperature options
  - T: –40°C to 105°C
  - S: –40°C to 125°C
  - Q: –40°C to 125°C (AEC Q100 qualification for automotive applications)

An IMPORTANT NOTICE at the end of this data sheet addresses availability, warranty, changes, use in safety-critical applications, intellectual property matters and other important disclaimers. PRODUCTION DATA.

1.2 Applications

- Air conditioner outdoor unit
- Door operator drive control
- DC/DC converter
- Inverter & motor control
- On-board (OBC) & wireless charger
- Automated sorting equipment
- Textile machine
- Welding machine
- AC charging (pile) station
- DC charging (pile) station
- EV charging station power module
- Wireless vehicle charging module
- Energy storage power conversion system (PCS)

- Micro inverter
- Solar power optimizer
- String inverter
- AC drive control module
- Linear motor segment controller
- Servo drive power stage module
- AC-input BLDC motor drive
- DC-input BLDC motor drive
- Industrial AC-DC
- Three phase UPS
- Merchant network & server PSU
- Merchant telecom rectifiers

1.3 Description

C2000™ 32-bit microcontrollers are optimized for processing, sensing, and actuation to improve closed-loop performance in real-time control applications such as industrial motor drives; solar inverters and digital power; electrical vehicles and transportation; motor control; and sensing and signal processing. The C2000 line includes the Premium performance MCUs and the Entry performance MCUs.

The F2803x family of microcontrollers provides the power of the C28x core and Control Law Accelerator (CLA) coupled with highly integrated control peripherals in low pin-count devices. This family is code-compatible with previous C28x-based code, and also provides a high level of analog integration.

An internal voltage regulator allows for single-rail operation. Enhancements have been made to the HRPWM to allow for dual-edge control (frequency modulation). Analog comparators with internal 10-bit references have been added and can be routed directly to control the PWM outputs. The ADC converts from 0 to 3.3-V fixed full-scale range and supports ratio-metric V_{REFHI}/V_{REFLO} references. The ADC interface has been optimized for low overhead and latency.

To learn more about the C2000 MCUs, visit the C2000 Overview at www.ti.com/c2000.

Device Information[1]

PART NUMBER	PACKAGE	BODY SIZE
TMS320F28035PN	LQFP (80)	12.0 mm × 12.0 mm
TMS320F28034PN	LQFP (80)	12.0 mm × 12.0 mm
TMS320F28033PN	LQFP (80)	12.0 mm × 12.0 mm
TMS320F28032PN	LQFP (80)	12.0 mm × 12.0 mm
TMS320F28031PN	LQFP (80)	12.0 mm × 12.0 mm
TMS320F28030PN	LQFP (80)	12.0 mm × 12.0 mm
TMS320F28035PAG	TQFP (64)	10.0 mm × 10.0 mm
TMS320F28034PAG	TQFP (64)	10.0 mm × 10.0 mm
TMS320F28033PAG	TQFP (64)	10.0 mm × 10.0 mm
TMS320F28032PAG	TQFP (64)	10.0 mm × 10.0 mm
TMS320F28031PAG	TQFP (64)	10.0 mm × 10.0 mm
TMS320F28030PAG	TQFP (64)	10.0 mm × 10.0 mm
TMS320F28035RSH	VQFN (56)	7.0 mm × 7.0 mm
TMS320F28034RSH	VQFN (56)	7.0 mm × 7.0 mm

(1) For more information on these devices, see Mechanical, Packaging, and Orderable Information.