

# C2000 F280015x Real-Time Microcontrollers



## Key Features and Benefits

- Real-Time Control Performance
  - 32-bit 120-MHz Lockstep C28x CPU core with FPU
  - 256 KB flash with 128 KB option and 36 KB SRAM
  - 4th generation ePWM enables advanced switching techniques for increased efficiency and power density
- Scalability and compatibility
  - Wide range of package sizes, memory footprints, and temperature options (grade 0, grade 1)
  - Highly compatible portfolio through common packages with other C2000™ MCU families, including F28002x, F28003x
  - Starting \$1 1ku prices
- Functional safety-compliant and secure MCUs
  - Support up to ASIL B functional safety requirements
  - Lockstep enables smooth path to ASIL B application without software overhead
  - Support several on-chip safety enablers, including Memory Power On Self Test (MPOST)
  - Real-time JTAG lock and Secure boot
- Variety of digital peripheral options
  - Wide range of communication interface, including CAN-FD, CAN, LIN, I2C, SPI, and UART
  - PMBUS for digital management of power supplies with power control and management components
- Integrated analog peripherals
  - Two 12-bit ADCs, 3 MSPS with post-processing and threshold actions
  - Four Windowed Comparator Sub-system (three 8 bit, one 12 bit)

The TMS320F280015x MCU family are low-cost automotive MCUs targeting a broad range of real-time and general-purpose applications. This family adds to the scalable portfolio of C2000 automotive real-time MCUs. The feature set and cost structure combination make this family technically fit for HVAC, small motor, body, lighting, and low-end powertrain applications.

F280015x		Grade 0/1	Temp(Tj) -40c to 155c
<b>Sensing</b>	<b>Processing</b>	<b>Actuation</b>	
2xADC 12-bit, 3 MSPS, 16ch	C28x™ CPU + FPU + TMU +VCUCRC 120 MHz	7x ePWM (14CH - 4HR)	
CompSS w/ integrated 8b DAC (3)		Fault Trip Zones	
CompSS w/ integrated 12b DAC (1)	<b>Memory</b>	<b>Connectivity</b>	
Temp. Sensor	Up to 256 kB Flash +ECC	2xI2C, 1xSPI, 3xSCI, 1x CAN	
3x eCAP, 2x eQEP	Up to 36 kB SRAM + Parity	1 PMBUS, 1xLIN, 1xCANFD	
<b>System Modules</b>	2x 128-bit Security Zones	<b>Power &amp; Clocking</b>	
3x 32-bit CPU Timers	Secure Boot + JTAG Lock	2x 10 MHz OSC + APLL + DCC	
NMI Watchdog Timer	<b>Debug</b>	4-20 MHz Ext OSC Input	
96 Interrupt PIE	Real-time JTAG	1.2V VREG	
GPIO(26+4Optional)-64QFP		POR/BOR Protection	

## Key Applications

- Automotive
  - PTC/Heater
  - HVAC compressor module
  - DC/AC Inverter
  - Engine fan, pumps
  - On-board charger
  - DC/DC converter
- Industrial
  - Appliance, HVAC, AD Drives
  - Solar DC optimizer, UPS

## Resources

- [TMS320F2800157 Product Folder](#)
- [TMDSCNCD2800157 Product Folder](#)
- [C2000Ware](#)
- [Motor Control-SDK](#)
- [Digital Power-SDK](#)
- [Automotive eCompressor Reference Design - TIDM-02012](#)

## Continuing Investment in C2000 Generation 3 MCU Portfolio

Figure 1 illustrates how the new F280015x is expanding the family of entry-performance Generation 3 MCUs. All families within the Generation 3 portfolio are software and peripheral compatible, enable a smooth platform approach for automotive designers.

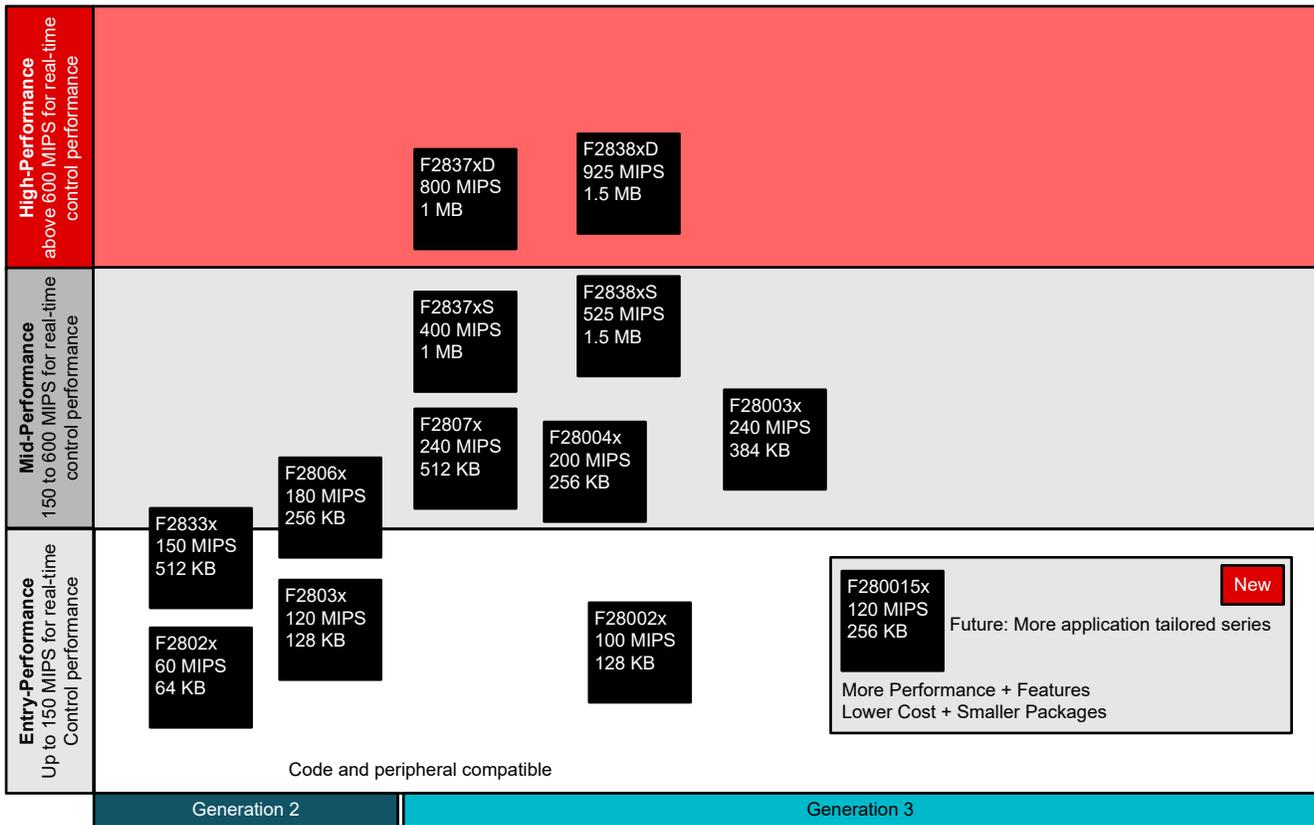


Figure 1. Expanded Family of Entry-Performance Generation 3 MCUs

The TMS320F280015x MCU offers a variety of pin count, memory and packaging options along with integrated communication, functional safety and security features to meet a variety of automotive and industrial needs. A comparison of devices is shown in [Table 1](#).

**Table 1. Pin and Packaging Options and Feature Comparison**

Product	Compute			Memory and Clocking					Analog			Control		Digital							Temp	Packages			
	CPU	Lockstep	TMU - Type 0	Flash	RAM	32-Bit CPU Timers	Watchdog-Timer	NMIWD	ADC - 12 Bit	ADC Channels	CMPSS	Total ePWM	HRPWM	PMBus	CAN	CAN FD	I2C	SCI	LIN	SPI	-40°C - 125°C	32-Pin QFN	48-Pin QFP	64-Pin QFP	80-Pin QFP
<b>120 MHz - 64KB to 256KB</b>																									
F2800157-Q1	C28 (dual core)	Yes	Yes	256KB	36KB	3	1	1	2	Up to 21	5	14	4	1	1	1	2	3	1	1	Yes	√	√ <sup>(1)</sup>	√	√
F2800157	C28 (dual core)	Yes	Yes	256KB	36KB	3	1	1	2	Up to 21	5	14	4	1	1	1	2	3	1	1	Yes		√	√	√
F2800155-Q1	C28 (dual core)	Yes	Yes	128KB	36KB	3	1	1	2	Up to 21	5	14	4	1	1	1	2	3	1	1	Yes	√	√	√	√
F2800155	C28 (dual core)	Yes	Yes	128KB	36KB	3	1	1	2	Up to 21	5	14	4	1	1	1	2	3	1	1	Yes		√	√	√
F2800153-Q1	C28 (dual core)	Yes	Yes	64KB	36KB	3	1	1	2	Up to 21	5	14	4	1	1	1	2	3	1	1	Yes	√	√		
<b>100 MHz - 64KB to 256KB</b>																									
F2800156-Q1	C28 (dual core)	Yes	Yes	256KB	36KB	3	1	1	2	Up to 21	3	14	0	1	1	1	2	3	1	1	Yes	√	√ <sup>(1)</sup>	√	√
F2800154-Q1	C28 (dual core)	Yes	Yes	128KB	36KB	3	1	1	2	Up to 21	3	14	0	1	1	1	2	3	1	1	Yes	√	√	√	√
F2800152-Q1	C28 (dual core)	Yes	Yes	64KB	36KB	3	1	1	2	Up to 21	3	14	0	1	1	1	2	3	1	1	Yes	√	√		

(1) The devices support both Grade 0 and Grade 1 qualification.

## The Scalable Device Platform

The TMS320F280015x MCU family enables a broad range of real-time and general-purpose automotive applications in a low price. Compared to other Generation 3 devices, it offers increased performance over the F28002x, and a lower web price than the F28003x family. [Table 2](#) provides an overview of the different features in each device family to help you choose the right device for your application needs.

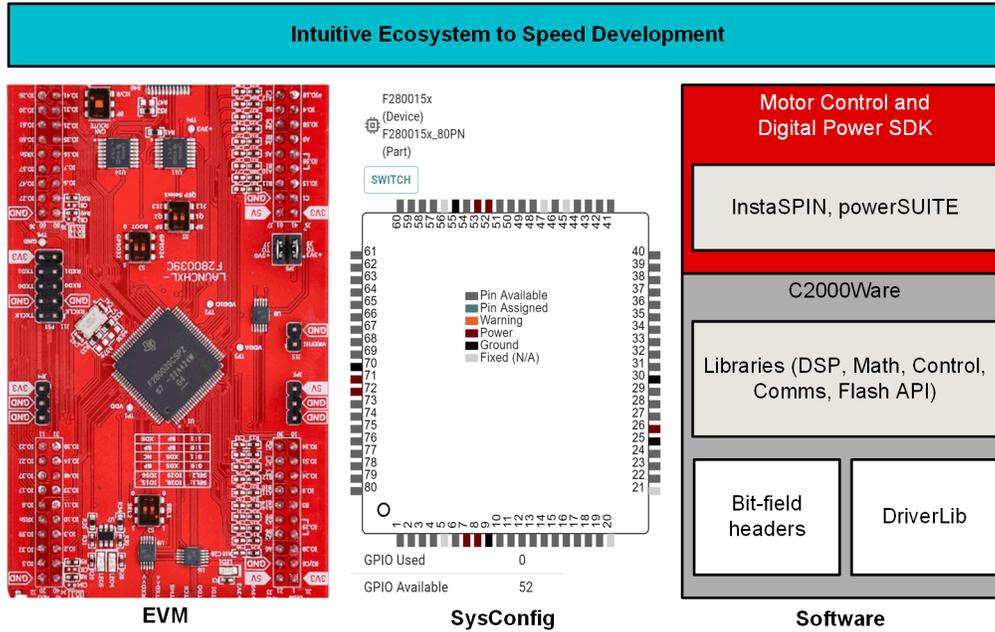
**Table 2. Overview of Different Features**

Feature	F280015x	F28002x	F28003x
MIPS	120	100	240
CPU (MHz)	120	100	120
Lockstep	Yes	No	No
FPU32	Yes (Type 0)	Yes + FastDIV	Yes + FastDIV
TMU32	Type 0	Type 1	Type 1
CLA (Control Law Accelerator)	No	No	Yes
CLB (Configurable Logic Block)	No	Yes	Yes
DMA	No	Yes	Yes
Flash (kB)	256	128	384
RAM (kB)	36	24	69
ADC	2 x 12-bit	2 x 12-bit	3 x 12-bit
ADC channels (Max)	21	16	23
CMPSS	1	4	4
CAN (DCAN) - Type 0	1	1	1
CANFD (MCAN) - Type 2	1	0	1
I2C	2	2	2
LIN	1	2	2
PMBus	1	1	1
SCI	3	1	2
eCAP/HRCAP module	3 - Type 2	3 (1 with HRCAP capability) - Type 2	3 (1 with HRCAP capability) - Type 3
ePWM/HRPWM Type 4	14 (4 with HRPWM)	14 (8 with HRPWM)	16 (8 with HRPWM)
Functional Safety	ASIL B	Quality Managed	ASIL B
Cybersecurity	JTAG Lock, Secure Boot	Dual-zone Security	JTAG Lock, Secure Boot, AES Engine
Starting Price (1ku)	<\$1	<\$2	<\$3

**Table 3. Compatibility Across Cost-Optimized Portfolio**

C2000 Family	32 QFN	48 LQFP	64 LQFP	80 LQFP	100 LQFP
F280015x-Q1	✓	✓	✓	✓	
F28002x-Q1		✓	✓	✓	
F28003x-Q1		✓	✓		✓
F28004x-Q1			✓		✓

## Intuitive Ecosystem to Speed Development



The C2000 MCU SysConfig offers:

- Full peripheral configuration and application-specific calculators
- Integrated tool support: PinMux, Security (DCSM)
- Dependency detection across modules
- **NEW** One-click setup and initialization of C2000 MCU libraries
- **NEW** Memory configuration support
- **NEW** Board component support for easier migration, faster development
- **NEW** ePWM support
- **NEW** FreeRTOS configuration

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