

Texas Instruments C2000™ F28002x Real-Time Controller Series

Cost-optimized built for power conversion applications



C2000 Portfolio

Real-time control

- Premium MIPS performance from 100MHz DSP core with extended Floating-Point Unit (FPU)
- Advanced Trigonometric Math Unit (TMU) accelerator enhanced with nonlinear PID to minimize compute cycle time
- Flexible and advanced PWMs to control wide range of simple and complex power topologies

Real-time connectivity and distributed control

- Fast Serial Interface (FSI) provides robust high-speed chip-to-chip or board-to-board communication (~200 MBPS) across an isolation barrier, enabling distributed control
- Host Interface Controller (HIC) for high-speed parallel interface to master that enables complimentary functions onto a host processor

System flexibility

- Premium 12-bit A/D converters (3.45 MSPS) + post-processing block
- Fast comparators for protection and peak current mode control
- Configurable Logic Block (CLB) brings FPGA-like customization and absolute encoder support

Real-time control meets system cost optimization and performance scalability with the C2000 F28002x series of real-time control MCUs. Built for server power, single-axis servo, variable frequency AC drives, appliances, smart sensing, solar inverters and automotive on-board charging and DC/DC applications.

F28002x	Temperatures	125C	Q100
Sensing	Processing		
ADC1: 12-bit, 3.45 MSPS, 8ch	C28x™ DSP core		
ADC2: 12-bit, 3.45 MSPS, 8ch	100 MHz		
4x CMPSS : 12-bit DAC	FPU, FastDIV		
8 COMP, 8 Digital Filters	TMU w/NLPID		
Temperature Sensor	6ch DMA		
2x eQEP	CRC & HWBIST		
3x eCAP, 1x HRCAP	Memory		
Configurable Logic Block	128 KB FLASH (1 bank) + ECC		
2 Tiles	24 KB SRAM + ECC		
System Modules	ROM: 64 KB secure + 128 KB boot		
3x 32-bit CPU Timers	128-bit Dual Security Zones		
NMI Watchdog Timer	Host Interface Controller (HIC)		
192 Interrupt PIE	Actuation		
	7x ePWM Modules		
	14x Outputs (8x High-Res)		
	Fault Trip Zones		
	Connectivity		
	1x UART, 2x LIN/UART		
	1x I2C, 1x PMBus		
	2x SPI, 1x FSI		
	1x CAN 2.0B (F28004x class)		
	Power & Clocking		
	2x 10 MHz OSC		
	1.2V VREG		
	POR/BOR Protection		
	Debug		
	cJTAG/Real-time JTAG		
	Real-time Analysis and Diagnostic unit (ERAD)		

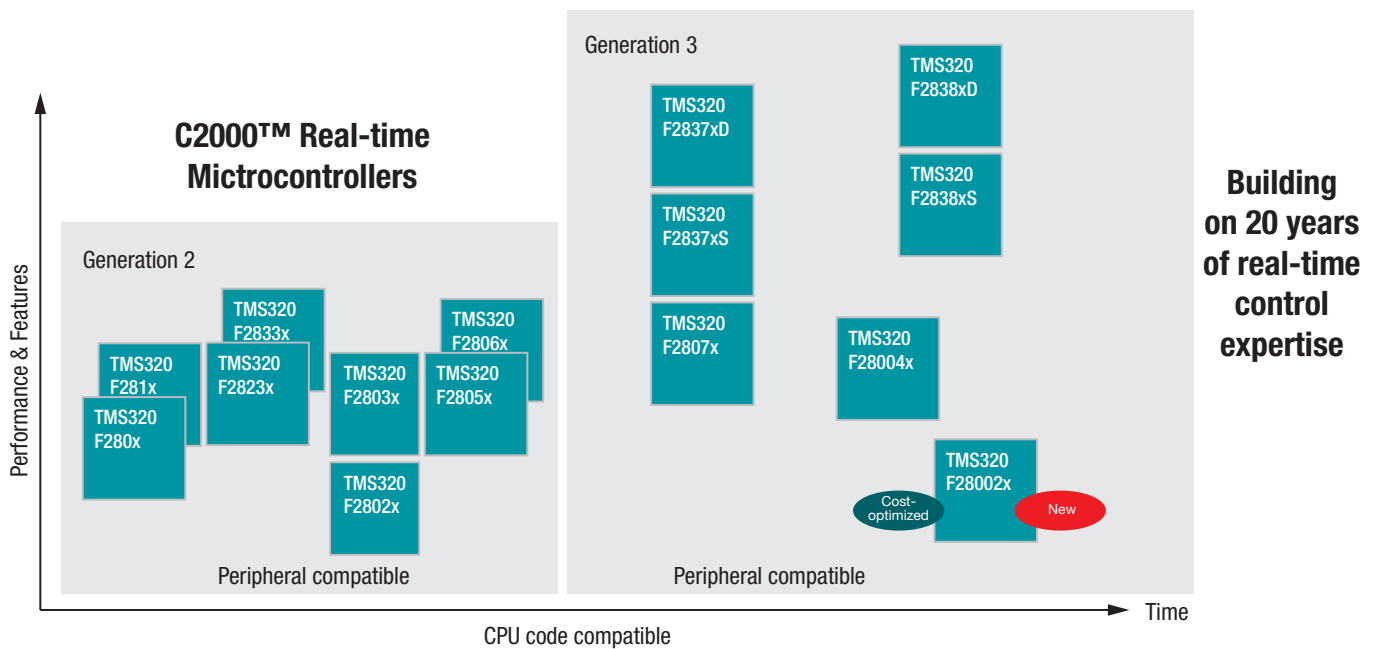
[Learn more about the product](#)

F28002x real-time control MCU	C28x CPU MHz/MIPS	Flash memory	Available package types	Configurable Logic Block	HIC, FSI
TMS320F280021	100	32KB	48QFP, Q100	-	YES
TMS320F280022	100	64KB	64QFP, Q100	-	YES
TMS320F280023	100	64KB	48QFP, 64QFP, 80QFP, Q100	-	YES
TMS320F280023C	100	64KB	48QFP, 64QFP, 80QFP	YES	YES
TMS320F280024	100	128KB	64QFP, Q100	-	YES
TMS320F280024C	100	128KB	64QFP Q100	YES	YES
TMS320F280025	100	128KB	48QFP, 64QFP, 80QFP, Q100	-	YES
TMS320F280025C	100	128KB	48QFP, 64QFP, 80QFP, Q100	YES	YES

F28002x real-time control MCU	Description
Getting Started	Datasheet
	Technical Reference Manual (TRM)
	F28002x controlCARD and experimenter's kit bundle
	C2000Ware software
	Digital Power software development kit
	Motor Control software development kit

Portfolio

The F28002x real-time control MCU series builds on the third generation improvements introduced in the F2838x, F2837x and F28004x series. The F28002x series extends the portfolio within Gen 3 allowing customers to scale from high-end to mid-end to low-end while maintaining feature differentiation and quality performance. The C2000 portfolio provides pin-to-pin and code compatibility across existing device families, alleviating effort for developers working with products that scale with performance. The nature of these device families makes it easy to migrate and build a range of products on similar technology, enabling a sustainable platform solution.



Comparison of F28002x series with Gen 2 and Gen 3 series

	GEN 3		GEN 2	
	F280025	F280049	F28027	F28035
Total MIPS	100	200	60	120
CPU	100	100	60	60
FPU	YES + FastDIV	YES	NO	NO
TMU	YES + NLPID	YES	NO	NO
DMA	YES	YES	NO	NO
CLA	NO	Type-2	NO	Type-1
Flash (KB)	128	256	64	128
RAM (KB)	24	100	20	20
ADC	2x12-bit	3x 12 bit	1X 12-bit	1x 12-bit
Sample & Hold	2	3	2	2
ADC Channels	16	21	16	16
ADC Post Processing	YES	YES	NO	NO
Comparators	4	7	2	3
CMPSS	CMPSS	CMPSS	NO	NO
Sigma-Delta Filter	0	4	0	0
ePWM Technology	Type-4	Type-4	Type-2	Type-2
PWM Channels	14	16	14	14
HRPWM Channels	8	16	7	7
CLB	YES	YES	NO	NO
HIC	YES	NO	NO	NO
QEP	2	2	0	1
CAN	1	2	0	1
UART	3	2	1	1
LIN	2	1	0	0
I2C	2	1	1	1
SPI	2	2	1	2
FSI	1	1	0	0
PMBus	1	1	0	0
GPIOs	14, 24, 26, 39	24, 25, 26, 40	20, 22	26, 33, 45
Packages	48, 64, 80	56,64,100	38,48	56, 64, 80
1ku price	\$1.52 - \$3.30	\$4.85 - \$7.95	\$2.20 - \$4.08	\$3.05 - \$5.80

Generation 3 Key Enhancements

- New process technology allows for more features, accelerators (TMU), on-chip memory, peripherals, and lower power consumption
- Flexible register load capability, dead-band generation, advance trip-zone functionality, more high resolution PWMs, and flexible crossbars for premium advanced control and protection mechanisms
- Improvements to sensing capability through additional ADCs, new Comparator Subsystem (CMPSS) with windowed comparators, and ADC post-processing hardware
- Latest peripherals like high-speed Fast Serial Interface (FSI) at up to 200 Mbps
- New Configurable Logic Block (CLB) provides further system integration and customization
- Memory enhancements with addition of ECC, parity, dual-zone security memory and DMA

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Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265
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