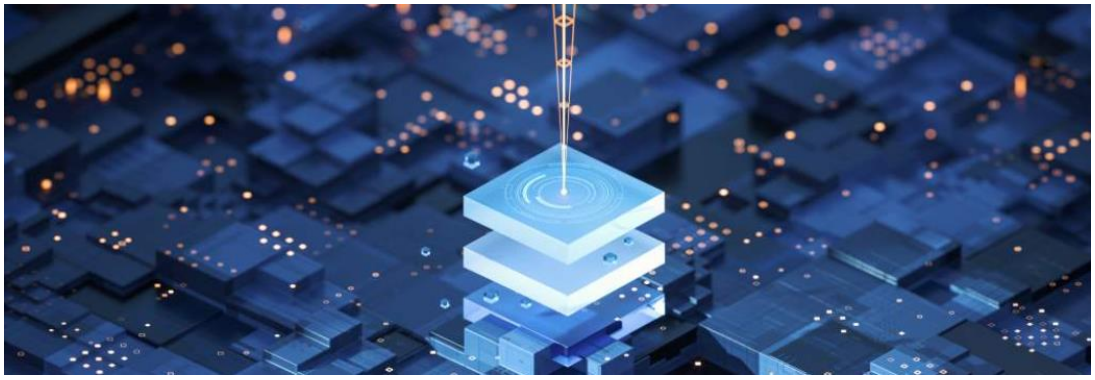
TPS325M0 Series

TPS32 ARM-based General Purpose Industrial Microcontrollers

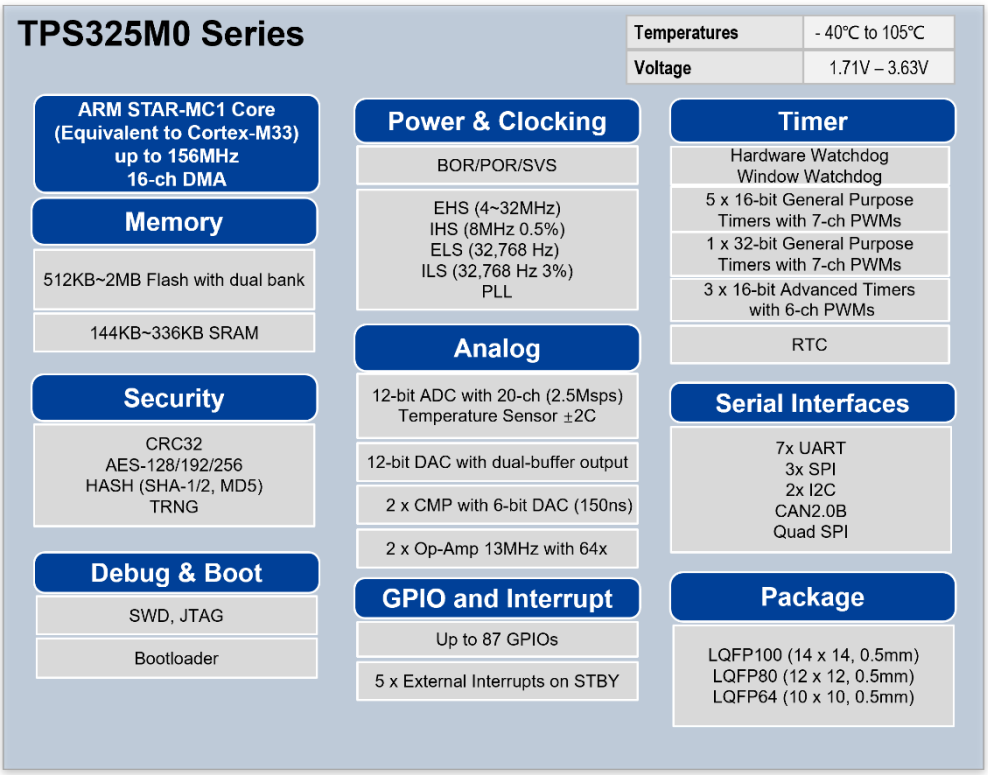


The TPS325M0 Series adopt Arm®v8-M Architecture based STAR-MC1 core compatible with Cortex®-M33 instruction set. The TPS325M0 Series is designed with advanced architecture, 3PEAK powered rich integrated analog and peripherals to provide high performance and flexibility, which meets the diverse needs of various applications, delivering exceptional experiences to customers.

TARGET APPLICATIONS

- Industrial Equipment
- Instrumentation and Measurement Equipment
- Human Machine Interface
- Home Appliances
- Motor Control
- Sweeping Robot

TPS325M0 SERIES BLOCK DIAGRAM



KEY FEATURES

Performance

- 32-bit STAR-MC1 core with FPU based on Arm® v8-M architecture
- Compatible with Cortex®-M33 instruction set
- Operation frequency up to 156 MHz
- 8KB Data Cache /Instruction Cache
- 64KB ITCM/ 32KB x 2 DTCM
- Dual DMA with eight channels each

Analog

- One 12-bit ADC with 14-external and 6-internal channels. Resolution up to 12-bit at 2.5 Msps.
- One 12-bit DAC channels, up to 1 Msps, 2 x buffered external channels
- Two fast rail-to-rail analog comparators (CMP) with built-in 6-bit DAC for internal voltage reference
- Two operational amplifiers (OA) that can be used in PGA/buffer/GP mode

Serial Interfaces

- Two I2C fast mode plus (1 Mbit/s) with 20 mA current sink, SMBus/PMBus, wakeup from stop mode
- Seven UARTs(LIN, MODBUS) with DMA support
- Three SPI with DMA support
- Quad SPI Interface
- CAN 2.0B

Supply Voltage, Temperature and Package

- Supply Voltage: 1.71~3.63V
- -40 ~ 85℃ and -40 ~105℃
- LQFP100，LQFP80，LQFP64

Memory

- 512KB to 2MB Dual Bank Flash memory with allows a read-while-write capability
- Readout protection (RDP) and Write protection (WRP) for Flash memory
- 144KB~336KB SRAM memory
- 32K systems memory with integrated bootloader

Timers

- Five 16-bit and one 32-bit general purpose timers, each with 7 x PWM channels
- Three 16-bit advanced timer for motor control with up to 6 x PWM channels per each, dead time regeneration and emergency stop
- IWDG and WWDG
- SysTick Timer
- Real Time Clock with Calendar

Low Power Consumption

- Ultra-low static and dynamic power consumption by fine tune multiple low power modes:
  - Sleep, Stop, Standby and Shutdown modes
  - up to 3.0μA@shutdown mode with RTC
  - up to 2.6μA @ standby mode with RTC and 16KB retention RAM

Security

- 96-bit unique Chip ID
- Cyclic Redundancy Check (CRC32)
- True random number generator (TRNG)
- AES: 128/192/256-bit key encryption hardware accelerator
- HASH: SHA-1/SHA-2, MD5

TPS325M0 PORTFOLIO

There are Two sub series included in TPS325M0 Portfolio. The differentiation list can be found as follows:

TPS325M0 Portfolio	Description	Memory		GPIOs	Analog	Package	Temperature Range(℃)
		Flash(KB)	RAM(KB)				
TPS325M0A	HMI Application Specific Standard Product	512	336	56	ADC,DAC,OPA,CMP	LQFP64	-40-105
TPS325M01	Rich analog functions for both industrial and consumer applications	512-2048	144-336	55-87	ADC,DAC,OPA,CMP	LQFP64;LQFP80; LQFP100	-40-105

TPS325M0A Sub Series Options

TPS325M0A Sub Series Part Number	Max CPU Freqency(MHz)	Memory		HMI	Communication						Timers				Analog				Additional Key Features	Total GPIO	Package				Temperature Range(℃)
		Flash(KB)	RAM(KB)	TPSensor® Capacitive Sensing [Number x Channels]	CAN	QSPI	SPI	I2C	USART	I2S	General Timers	Advance Timers	Watchdog Timers	RTC	ADC[Number x Bits] @ [Conversion Rate]	DAC[Number x Bits]	OPA	CMP			QP5 LQFP64	QP6 LQFP80	FSD QFN88	QP7 LQFP100	
TPS325M0A57	156	512	336	-	1 x CAN 2.0B	1	3	2	6	3	6	3	2	1	1 x 12bit @ 1Msps SAR ADC	1 x 12bit	2	1	TRNG; MD5; SHA; AES-256;	56	✓	-	-	-	-40-105

TPS325M01 Sub Series Options

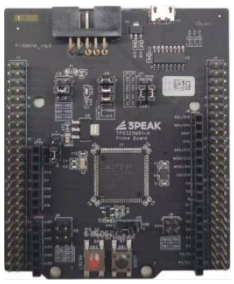
TPS325M01 Sub Series Part Number	Max CPU Freqency(MHz)	Memory		HMI	Communication						Timers				Analog				Additional Key Features	Total GPIO	Package				Temperature Range(℃)
		Flash(KB)	RAM(KB)	TPSensor® Capacitive Sensing [Number x Channels]	CAN	QSPI	SPI	I2C	USART	I2S	General Timers	Advance Timers	Watchdog Timers	RTC	ADC[Number x Bits] @ [Conversion Rate]	DAC[Number x Bits]	OPA	CMP			QP5 LQFP64	QP6 LQFP80	FSD QFN88	QP7 LQFP100	
TPS325M0155	156	512	144	-	1 x CAN 2.0B	1	3	2	6	3	6	3	2	1	1 x 12bit @ 1Msps SAR ADC	1 x 12bit	2	1	TRNG; MD5; SHA; AES-256;	55	✓	-	-	-	-40-105
				-		1	3	2	7	3	6	3	2	1				2		71	-	✓	-	-	
TPS325M0156	156	512	208	-	1 x CAN 2.0B	1	3	2	7	3	6	3	2	1	1 x 12bit @ 1Msps SAR ADC	1 x 12bit	2	2	TRNG; MD5; SHA; AES-256;	87	-	-	-	✓	-40-105
TPS325M0166	156	1024	208	-	1 x CAN 2.0B	1	3	2	6	3	6	3	2	1	1 x 12bit @ 1Msps SAR	1 x 12bit	2	1	TRNG; MD5; SHA; AES-256;	55	✓	-	-	-	-40-105
				-		1	3	2	7	3	6	3	2	1				2		71	-	✓	-	-	
				-		1	3	2	7	3	6	3	2	1				2		87	-	-	-	✓	
TPS325M0177	156	2048	336	-	1 x CAN 2.0B	1	3	2	6	3	6	3	2	1	1 x 12bit @ 1Msps SAR	1 x 12bit	2	1	TRNG; MD5; SHA; AES-256;	55	✓	-	-	-	-40-105
				-		1	3	2	7	3	6	3	2	1				2		71	-	✓	-	-	
				-		1	3	2	7	3	6	3	2	1				2		87	-	-	-	✓	

TPS325M0 SERIES DEVELOPMENT RESOURCES

Evaluation Boards

Prime Boards: TPSP-5M51A-EVM1

Prime Boards are perfect appropriate for fast prototyping with TPS32 microcontrollers' feature sets. These prime boards are easy to use with user guide, design files, development tools, and comprehensive software code examples. Prime Boards can be flexible used as standalone, with expansion boards for more functionalities, and varies additional ARDUINO® compatible shields.



TPS325M0 Prime Board

Expansion Boards: TPSX-SER-EVM1

Expansion Boards allow the possibility for more functionality exploration. These boards can work with multiple prime boards with standard expansion connector. Complimentary documentation and software libraries and code examples are provided accordingly.

Serial Communication Expansion Board

Embedded Software

- TPS32 software development kit (SDK)
- Run-Time OS: FreeRTOS;

Development Tools

- Integrated development environment (IDE): Arm Keil MDK; IAR Embedded Workbench;
- Emulator: Segger J-Link; DAP-Link
- TPS32 Programmer

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