ST7232x family

Cost-effective 8-bit microcontrollers for easy and robust development

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www.st.com/mcu

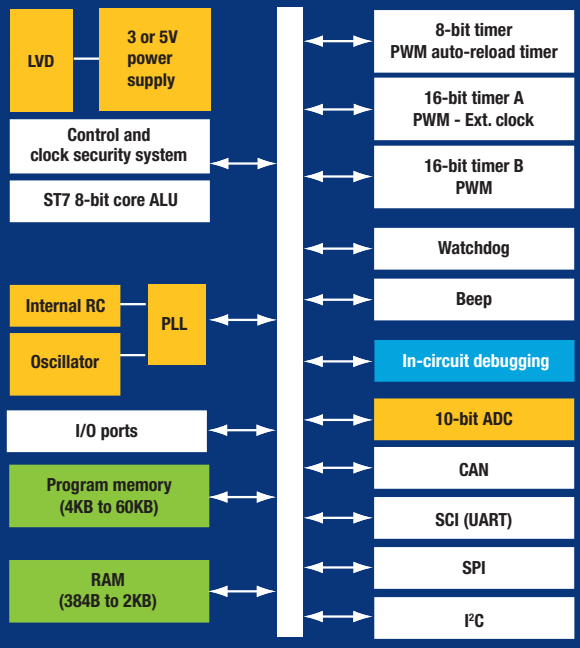
ST7232x series multi-segment microcontrollers are ideal for applications requiring medium to large memory capacities with various pin-count packages in Flash and ROM versions.

They offer a wide range of benefits including:

- Robustness: products meet the most stringent automotive and industrial standards
- Portability: pin-out and peripheral compatibility within the entire family
- Ease: large selection of development tools and technical material for easy development

Application areas

- Industrial:
  - Home appliances
  - Air conditioning systems
  - Industrial connectivity and control
  - Security devices
- Automotive:
  - Power train electronics
  - Engine management
- Computer:
  - Front panels
  - UPS
  - Game pads
  - Printers and faxes
  - Keyboards and mice



Robustness and compatibility

- Solutions which meet the highest standards for automotive and industrial applications
- Robust design which makes the ST7232x family suitable for EMC-critical environments
- Portable and low-power applications benefiting from 3V reduced power consumption
- Full pin-to-pin and peripherals compatibility, allowing fast and easy re-use across a wide range of applications from 4KB-32 pins up to 60KB-80 pins

Libraries and technical documentation

More than 100 relevant application notes and reference designs covering:

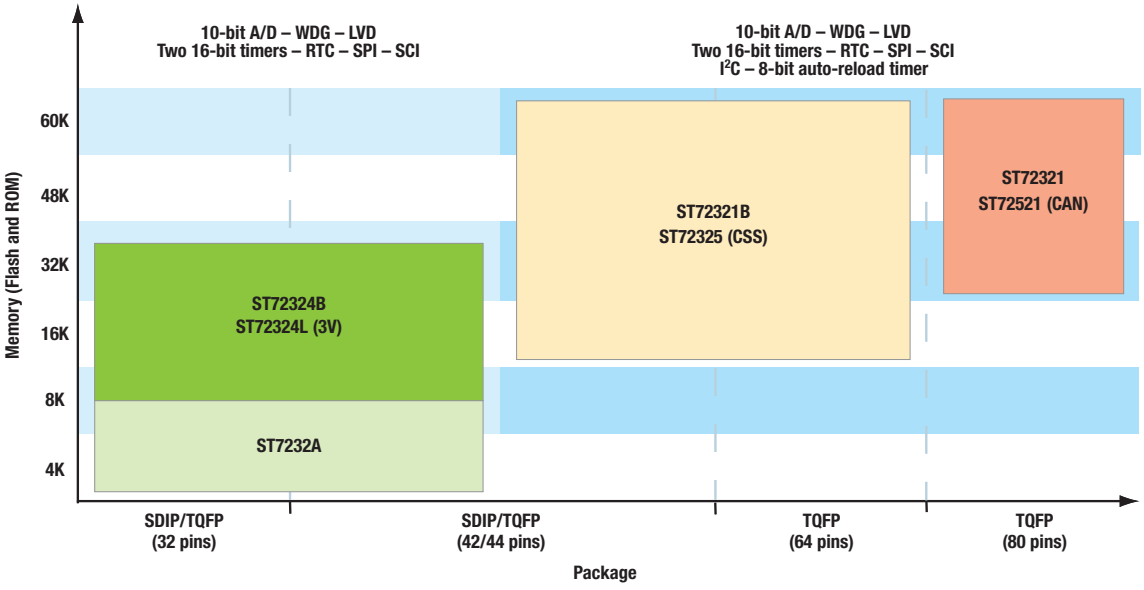
- Peripheral usage and optimization
  - LCD driver with ST72F321 (AN1048)
  - Analog keyboard driver with ST7 ADC (AN979)
  - SMBus slave driver with I²C (AN1713)
  - SCI, LIN, SPI, I²C and timer drivers (AN1042, AN1278, AN1047, AN974, AN972 etc.)
- Software drivers
  - ST7 math utility routines (AN1039)
  - In-application programming drivers (AN1575 and AN1576)
- Application optimization
  - EMC design guidelines (AN1709 and AN1015)
  - Minimizing ADC conversion errors (AN1711 and AN1636)
  - Minimizing power consumption (AN1014)
  - Testing ST7 applications via ICC (AN1754)
- Support for development
  - A full ST7 software library of C routines which can significantly reduce coding time and development costs
  - Assistance for migration across the whole family (AN2197)

ST7232x multi-application family

Features and benefits

Features	Benefits
Built-in EMC hardware protection	Suitable for EMC-critical environments such as appliances and automotive
High-density Flash program memory Best in class for Flash data retention ROM program memory	Fast programming Robust data retention up to 10 years @ 125°C or 40 years @ 85°C Cost-effectiveness and fast ramp-up for high volume
Integrated reset circuit with user-settable low-voltage detector	External components saved for robust applications
Various serial interfaces: SPI, SCI (UART), CAN and I²C	Low-cost hardware interface for multiple serial communication lines
Two 16-bit timers with PWM and multiple inputs/outputs Main 8-bit clock controller with beep function Configurable watchdog timer 8-bit PWM auto-reload timer	Multiple cost effective timers to ease application development
10-bit ADC with 8 to 16 inputs, 7.5µs conversion time	Fast and accurate conversions
Broad range of packages (32-pin 7x7 up to 80-pin 14x14)	Scalable and portable solutions for various applications
Four power saving modes	Suitable for 5 and 3V power-critical applications
In-circuit debugger with two hardware breakpoints	Low-cost and In-application real time debugging

Product guide



Device summary (industrial and automotive)

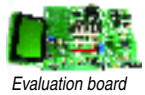
Part number	Prog. memory			Prog. (bytes)	RAM (bytes)	A/D inputs	Timer functions			Serial interface	LVD levels	I/Os (high current[2])	Packages	Supply voltage	Special features
	Flash	Fast ROM[1]	ROM				16-bit (IC/OC/ PWM)	8-bit (IC/OC/ PWM)	Others						
ST7232AK1	•	•	•	4K	384	8x10-bit	2x16-bit (3/3/1)		WDG, RTC	SPI, SCI		24(10)	SDIP32/TQFP32	3.8 to 5.5V	ICP, IAP, nested interrupts, TLI, ROP, beep[3]
ST7232AJ1	•	•	•	4K	384	12x10-bit	2x16-bit (3/3/1)					32(12)	SDIP42/TQFP44	3.8 to 5.5V	
ST72324BK2	•	•	•	8K	384	8x10-bit	2x16-bit (3/3/1)				3	24(10)	SDIP32/TQFP32	3.8 to 5.5V	
ST72324LK2	•	•	•	8K	384	8x10-bit	2x16-bit (3/3/1)					24(10)	SDIP32/TQFP32	2.85 to 3.6V	
ST7232AK2	•	•	•	8K	384	8x10-bit	2x16-bit (3/3/1)					24(10)	SDIP32/TQFP32	3.8 to 5.5V	
ST72324BJ2	•	•	•	8K	384	12x10-bit	2x16-bit (3/3/1)				3	32(12)	SDIP42/TQFP44	3.8 to 5.5V	
ST72324LJ2	•	•	•	8K	384	12x10-bit	2x16-bit (3/3/1)					32(12)	TQFP44	2.85 to 3.6V	
ST7232AJ2	•	•	•	8K	384	8x10-bit	2x16-bit (3/3/1)					24(10)	SDIP42/TQFP44	3.8 to 5.5V	
ST72324BK4	•	•	•	16K	512	8x10-bit	2x16-bit (3/3/1)				3	24(10)	SDIP32/TQFP32	3.8 to 5.5V	
ST72324LK4	•	•	•	16K	512	8x10-bit	2x16-bit (3/3/1)					24(10)	SDIP32/TQFP32	2.85 to 3.6V	
ST72325K4	•	•	•	16K	512	8x10-bit	2x16-bit (3/3/1)	1 (0/3/3)	CSS, WDG, RTC	SPI, SCI, I²C	3	24(10)	SDIP32/TQFP32	3.8 to 5.5V	
ST72324BJ4	•	•	•	16K	512	12x10-bit	2x16-bit (3/3/1)		WDG, RTC	SPI, SCI	3	32(12)	SDIP42/TQFP44	3.8 to 5.5V	
ST72324LJ4	•	•	•	16K	512	12x10-bit	2x16-bit (3/3/1)					32(12)	TQFP44	2.85 to 3.6V	
ST72325C4	•	•	•	16K	512	12x10-bit	2x16-bit (3/3/2)	1 (0/4/4)	CSS, WDG, RTC	SPI, SCI, I²C	3	32(12)	TQFP48	3.8 to 5.5V	
ST72325J4	•	•	•	16K	512	12x10-bit	2x16-bit (3/3/2)	1 (0/4/4)			3	32(12)	TQFP44	3.8 to 5.5V	
ST72324BK6	•	•	•	32K	1K	8x10-bit	2x16-bit (3/3/1)		WDG, RTC	SPI, SCI	3	24(10)	SDIP32/TQFP32	3.8 to 5.5V	
ST72324LK6	•	•	•	32K	1K	8x10-bit	2x16-bit (3/3/1)					24(10)	SDIP32/TQFP32	2.85 to 3.6V	
ST72325K6	•	•	•	32K	1K	8x10-bit	2x16-bit (3/3/1)	1 (0/3/3)	CSS, WDG, RTC	SPI, SCI, I²C	3	24(10)	SDIP32/TQFP32	3.8 to 5.5V	
ST72324BJ6	•	•	•	32K	1K	12x10-bit	2x16-bit (3/3/1)		WDG, RTC	SPI, SCI	3	32(12)	SDIP42/TQFP44	3.8 to 5.5V	
ST72324LJ6	•	•	•	32K	1K	12x10-bit	2x16-bit (3/3/1)					32(12)	TQFP44	2.85 to 3.6V	
ST72325C6	•	•	•	32K	1K	12x10-bit	2x16-bit (3/3/2)	1 (0/4/4)	CSS, WDG, RTC	SPI, SCI, I²C	3	32(12)	TQFP48	3.8 to 5.5V	
ST72325J6	•	•	•	32K	1K	12x10-bit	2x16-bit (3/3/2)	1 (0/4/4)			3	32(12)	SDIP42/TQFP44/48	3.8 to 5.5V	
ST72321BAR6	•	•	•	32K	1K	16x10-bit	2x16-bit (4/4/2)	1 (2/4/4)	WDG, RTC		3	48(16)	TQFP64 (10x10)	3.8 to 5.5V	
ST72321BR6	•	•	•	32K	1K	16x10-bit	2x16-bit (4/4/2)	1 (0/4/4)			3	48(16)	TQFP64 (14x14)	3.8 to 5.5V	
ST72321BJ7	•	•	•	48K	1.5K	12x10-bit	2x16-bit (3/3/2)	1 (2/4/4)			3	32(12)	TQFP44	3.8 to 5.5V	
ST72321BAR7	•	•	•	48K	1.5K	16x10-bit	2x16-bit (4/4/2)	1 (0/4/4)			3	48(16)	TQFP64 (10x10)	3.8 to 5.5V	
ST72321BR7	•	•	•	48K	1.5K	16x10-bit	2x16-bit (4/4/2)	1 (2/4/4)			3	48(16)	TQFP64 (14x14)	3.8 to 5.5V	
ST72321BJ9	•	•	•	60K	2K	12x10-bit	2x16-bit (3/3/2)	1 (0/4/4)			3	32(12)	TQFP44	3.8 to 5.5V	
ST72321BAR9	•	•	•	60K	2K	16x10-bit	2x16-bit (4/4/2)	1 (2/4/4)			3	48(16)	TQFP64 (10x10)	3.8 to 5.5V	
ST72321BR9	•	•	•	60K	2K	16x10-bit	2x16-bit (4/4/2)	1 (2/4/4)			3	48(16)	TQFP64 (14x14)	3.8 to 5.5V	
ST72521M9	•	•	•	60K	2K	16x10-bit	2x16-bit (4/4/2)	1 (2/4/4)		SPI, SCI, I²C, CAN	3	64(16)	TQFP80	3.8 to 5.5V	

1. Factory Advanced Service Technique ROM 2. Number of high current pins included in the number of I/O pins 3. Audio square wave generator • Under development

Development tools

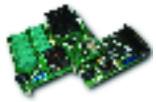
Product	Description	Supplier
	Software	
STVD7	**ST7 Visual Debugger** is a free software toolchain including IDE, ST7 assembler and linker. It fully interfaces with third-party C compilers	ST www.st.com/mcu
STVP7	**ST7 Visual Programmer** is a free programming interface used with ST7 programming hardware and ST emulators. This tool allows users to read, program, verify and check ST7 memory	
ST7LIB	**ST7 library** is a free software package consisting of device drivers for all standard ST7 peripherals. Each device driver has a set of functions covering the functionality of the peripherals. The source code developed in 'C' is fully documented	
C compilers	**ANSI C compilers** for ST7, free 4Kbyte code size limited evaluation version is available	Cosmic www.cosmicsoftware.com
	Evaluating	
ST7232x-EVAL	**ST72F32x evaluation board**, with ICC connector for programming capability. Can be used with ST emulators (DVP and EMU series)	INSEM* www.insem.co.kr
	Debugging	
ST7232x-SK/RAIS	**Low cost in-circuit debugging/programming tool,** USB powered with main evaluation board, RLink interface and USB communication to the PC	Raisonance* www.raisonance.com
STX-RLINK	**Very low cost in-circuit debugging/programming tool** for ST7 microcontroller families, with USB interface to PC	
ST7MDT20-DVP3	**Real-time emulator** from ST7-DVP3 series that offers a flexible, modular debugging and programming solution	ST www.st.com/mcu
ST7MDT20J-EMU3	**High-end emulator** from ST7-EMU3 series that offers a flexible, modular debugging and programming solution, giving users start-to-finish control of the application developments	
	Programming	
ST7-STICK	**ST7 in-circuit** communication kit is a complete, low cost software/hardware package for programming ST7 Flash microcontrollers	ST www.st.com/mcu
ST7SB20J	**Socket board, with ICC connector**, combined with any hardware tool equipped for in-circuit programming (ICP). It offers users flexible and complete programming tool	


STVD7


Evaluation board


DVP3 emulator


EMU3 emulator


Stick with socket board

* Also available at www.st.com/mcu

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