ST7 Microcontrollers

Soar Beyond the Competition

Digital Consumer

Home Appliances

USB and PC Accessories

Connectivity & Security

Automotive

Industrial Control

THE PEOPLE WHO PUT YOU IN CONTROL OF YOUR SYSTEM

Contents

ST7 Integrated Microcontroller Solutions

Flexible enhanced 8-bit architecture

The ST7 core is based on an industry standard 8-bit architecture, extended by STMicroelectronics to improve support for high level language programming and to provide additional interrupt handling features. The accumulator-based core has six internal registers including a 16-bit program counter. The instruction set has 63 instructions with 17 addressing modes offering 8x8-bit unsigned multiply, true bit manipulation, various bit/byte transfer modes and powerful branching logic. Peripheral resources are handled via dedicated interrupts and registers.

- Fast multiplication: 11 cycles or 1.37 µsecs for 8 x 8 bits (16-bit result)
- Rich choice of addressing modes for efficient handling of data in RAM (fast manipulation of tables)
- Direct memory addressing (no page handling overhead)
- Up to 16 interrupt vectors for flexible interrupt management
- Fast interrupt response: 1.5µs typical (with 5-byte context save)
- Powerful bit manipulation instructions

Flash memory makes code changes easy and lets your application evolve

Using remote In-Situ Programming (ISP), ST7 devices with Flash program memory can be programmed using a low-cost connector on the application board. Instead of having to extract the ST7 from the application board and plug it into a socket on the programmer, an interface cable from the programmer to the application board allows you to switch the ST7 to programming mode and program it "in-situ". This speeds up the development phase and improves the flexibility of the application, simplifying firmware updating and lowering inventory and rework costs.

Built-in EMC features for high noise immunity

ST7 microcontroller products are designed to be used in domestic, automotive and office applications, in conformance with international EMC regulations. To become a leader in these markets, STMicroelectronics has applied a long-term, coherent EMC approach that has become part of the microcontroller design process. EMC performance is measured during product qualification, using five tests that have been developed jointly with customers in accordance with official norms.

Advanced on-chip peripherals to power your applications

- **8-bit or 16-bit TIMERS**
- **A/D CONVERSION**
- **I²C bus, SPI, SCI and USB COMMUNICATIONS**

Integrated features that cut your hardware costs

- **Low Voltage Detector (LVD)**
- **Read-Out Protection**
- **Low Power Modes**

An ST7 for Every Application

Automotive

Body	ST72254, ST72334, ST72511, ST72521
Radio	ST72311
Fuel/water pumps	ST72141, ST72334
Instrumentation	ST72389, ST72589
Safety watchdog	ST72314, ST72215
Cooling fan	ST72314, ST72141
Sensors	ST7255, ST72254, ST72334
EMC slave µC	ST72254
Throttle control	ST72334

Consumer

Digital players	ST72T311, ST72254, ST72314, ST72F65
Keyboard expander	ST72254
Data flow PABX	ST72254
Set-top box front panel	ST72254
Phone accessories (battery charger, handsfree..)	ST72215, ST72311J

Industrial

Appliances	ST72314, ST72334, ST72311R,
(white goods, small appliances…)	ST72254, ST72389, ST72215
Brushless motor control	ST72141
Universal single phase motor	ST72334, ST72311R, ST72254, ST72215
Metering	ST72C171
Home connectivity	ST72311R
Telemetering	ST72321R
Industrial control	ST72141
Smoke detectors	ST72334, ST72254
Thermo regulation	ST72334, ST72311R, ST7215, ST72216, ST72104
Temperature control	ST72334, ST72311R, ST72254

Smartcard

Reader	ST72411, ST7262

Computer

Battery management (PC,GSM…)	ST72215, ST72311J
USB peripherals	ST7261/62/63
Gaming	ST7263, ST7262
Mass-storage	ST72F65
Uninterruptable Power Supply (UPS)	ST7263, ST72215, ST72311J

Multipurpose Devices

The ST72254 and **ST72334** families have the flexibility of **Flash programming**, a de-facto standard core architecture, and a complete range of products and development tools to suit your budget. They are easy-to-use and will get your ideas to market and into volume production fast. A wide selection of **pin-compatible** devices allows you to develop a scalable product line using a single platform.

The ST72311R is ideal for applications that require a large amount of program code with its 32K to 60K bytes of ROM, OTP, EPROM or FASTROM memory. The additional I/O pins and on-chip peripherals put this microcontroller on the high-end range in terms of functionality.

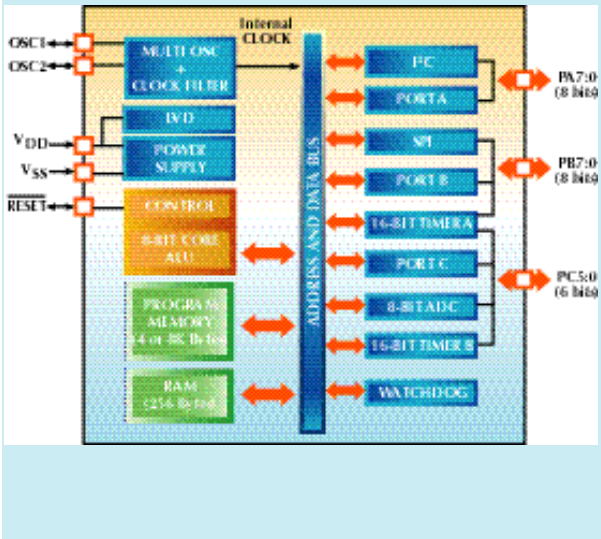
Key Benefits

- Flash program memory for easy programmability, including in-situ programming (ISP)
- Robust design for ensuring operation in EMC-critical environments
- Low power consumption (2mA/MIPS typ.)
- Clock Security System with internal backup oscillator
- Memory read-out protection to prevent unauthorized product copying
- Reduced system component cost due to support for many different oscillator types
- All Flash devices have ROM versions
- Nested interrupt controller (ST72311R only)
- ST72254 and ST72334 families are pin-to-pin compatible with ST72251 and ST72311J families

Applications

- Smart appliances
- Automotive body
- Home connectivity
- Consumer
- Phone accessories
- Battery management

ST72254 Block Diagram



Device Summary

Features	ST72254	ST72334	ST72311R
Program memory - bytes	4K - 8K Flash, ROM, FASTROM	8K - 16K Flash, ROM, FASTROM	32K - 48K - 60K ROM, EPROM, OTP, FASTROM
RAM (stack) - bytes	256 (128)	384 (256) - 512 (256)	1K (256) - 1.5K (256) - 2K (256)
EEPROM - bytes	–	256	–
Peripherals	Watchdog timer, two 16-bit timers, SPI, I²C, ADC	Watchdog timer, two 16-bit Timers, SPI, SCI, ADC	Watchdog timer, two 16-bit timers, 8-bit PWM auto-reload timer, SPI,SCI, ADC
Operating Supply	3.2V to 5.5V	3.2V to 5.5V	3.0V to 5.5V
CPU Frequency	Up to 8 MHz (with crystal up to 16MHz)		
Temperature Range	0°C to 70°C/ -40°C to +85 °C/ -40°C to +105°C/ -40°C to +125°C		
Packages	SO28, SDIP32	TQFP44, SDIP42/TQFP64, SDIP56	TQFP64

USB Products

Today, ST has complete market proven solutions for implementing both full-speed and low-speed peripherals. Indeed, market leaders rely on ST's microcontrollers to power their USB products. With a wide range of products in 20-pin to 64-pin packages, featuring 4K to 32K bytes of program memory, and several innovative products to come, ST has everything you need to fit your requirements.

The ST7261, **ST7262** and **ST7263** are **low-speed** devices used in applications such as gamepads, joysticks, mice and touch screens that need to exchange only short messages with the host computer.

The ST7265 is a **full-speed** device for transferring large files via the USB (digital photographs, audio, or any other type of data). Examples of full-speed applications are Flash card writers, MP3 players and full-speed protocol translators.

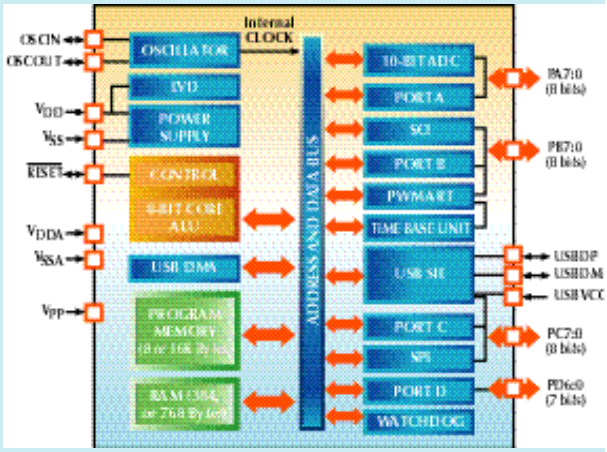
Key Benefits

- Low-speed USB: 3 endpoints, including 2 with interrupt IN and OUT capability
- Full-speed USB: 5 endpoints including 3 with interrupt IN and OUT and bulk capability
- Powerful chip architecture supporting data throughput near to USB bandwidth max.
- Flash re-programming capability through the USB
- Plug-tested firmware and host software solutions
- Easy implementation with USB Development kits and starter kits

Applications

- USB and PC accessories
- Mass storage
- MP3
- Gaming
- Uninterruptable Power Supply (UPS)

ST7262X Block Diagram

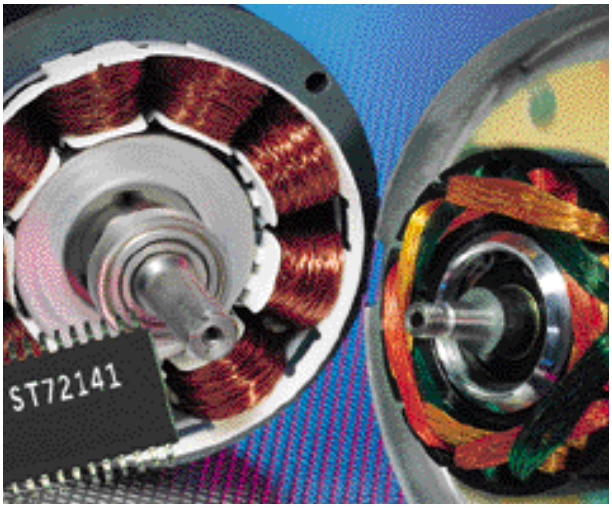


Device Summary

Features	ST7261X	ST7262X	ST7263X	ST7265X
Program memory bytes	4K ROM, FASTROM, Flash	8K - 16K ROM, EPROM, OTP, FASTROM, Flash	4K - 8K - 16K ROM, EPROM, OTP, FASTROM, Flash	16K - 32K ROM, FASTROM, Flash
RAM (stack) - bytes	384 (128)	384 (128) - 768 (128)	256 (64) - 384 (128) - 512 (64)	1K (256) - 5K (256)
Peripherals	3 USB low-speed endpoints, Watchdog, LVD, 8-bit timer	3 USB low-speed endpoints, 10-bit ADC, two 8-bit timers, SPI, SCI (UART), Watchdog, LVD	3 USB low-speed endpoints, 8-bit ADC, 16-bit timer, SCI (UART), I^2C, Watchdog, LVD	5 USB full-speed endpoints, Data Transfer Co-processor, 8-bit ADC, 16-bit timer, I^2C, Regulator, PWM, Watchdog
Operating Supply	3.0V to 5.5V	3.0V to 5.5V	4.0V to 5.5V	Dual 2.7V to 5.5V or 4.0V to 5.5V for USB
CPU frequency	1, 2, 4 or 8MHz	1, 2, 4 or 8MHz	4 or 8MHz	3, 6 or 8MHz
Temperature Range	0°C to 70°C			
Packages	PDIP20/SO20	PDIP20/SO20, SO34/ SDIP32, SDIP42/TQFP44	SO34/SDIP32	TQFP64 (10x10 or 14x14)

Motor Control

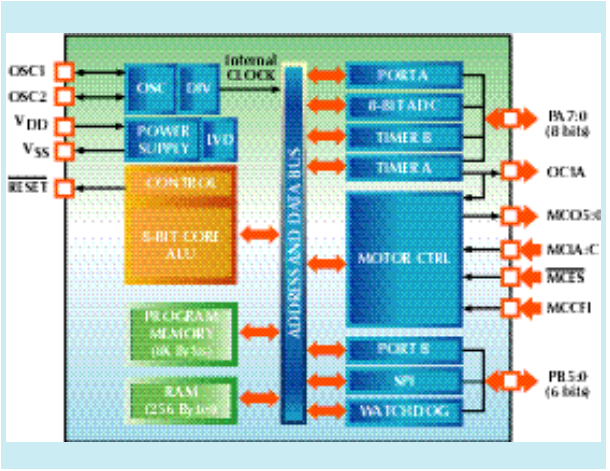
The ST72141 is designed to control **Brushless DC** motors. It embeds a motor control state machine and coprocessor cell which offloads the CPU from motor control tasks. It uses a sensorless STMicroelectronics-patented back-EMF monitoring method to determine rotor position.



Applications

- Domestic appliances
- Automotive
- HVAC
- Health
- Factory automation

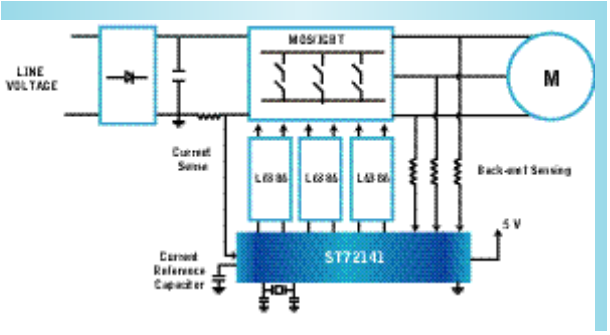
ST72141 Block Diagram



Key Benefits

- Brushless DC Motor (BLDC) peripheral
  - 6 PWM outputs
  - b-EMF detection
  - end of demagnetization detection
  - auto-commutation with hardware delay computation
- Versatile MCU, numerous configurations possible:
  - voltage or current mode
  - sensor or sensorless mode
  - open or closed loop
  - star and delta wound motors
  - 12V to 300V DC motors
- Low cost: minimum external components
  - only 3 standard resistors between motor and MCU for b-EMF detection
  - direct current sensing for on-chip current regulation or limitation with on-chip comparator

ST72141 Application Typical Block Diagram



Device Summary

Features	ST72141K2
Program memory - bytes	8K ROM, EPROM, OTP
RAM (stack) - bytes	256 (64)
Peripherals	BLDC Motor control, watchdog timer, two 16-bit timers, SPI, ADC
Operating Supply	4V to 5.5V
CPU Frequency	4 or 8 MHz (with 8 or 16 MHz oscillator)
Operating Temperature	-40°C to +85°C
Packages	SO34, SDIP32

CAN Network

CAN networks are now found in widely varying types of automotive and industrial systems. The CAN network standard is designed to cover speeds up to 1Mbps in noisy environments. Its robustness stems from powerful error management, multimaster architecture and the specification of its physical layer. It is now used extensively in European automotive and industrial markets, and is currently growing in the U.S. automotive market.

The ST72521 microcontroller with CAN 2.0B passive capability offers, in addition, three other communication interfaces, five timers and a 10-bit A/D converter with 16 inputs. Enhanced clock, reset and supply management features, plus a nested interrupt controller with 14 maskable interrupt vectors add flexibility and reduce the need for external components.

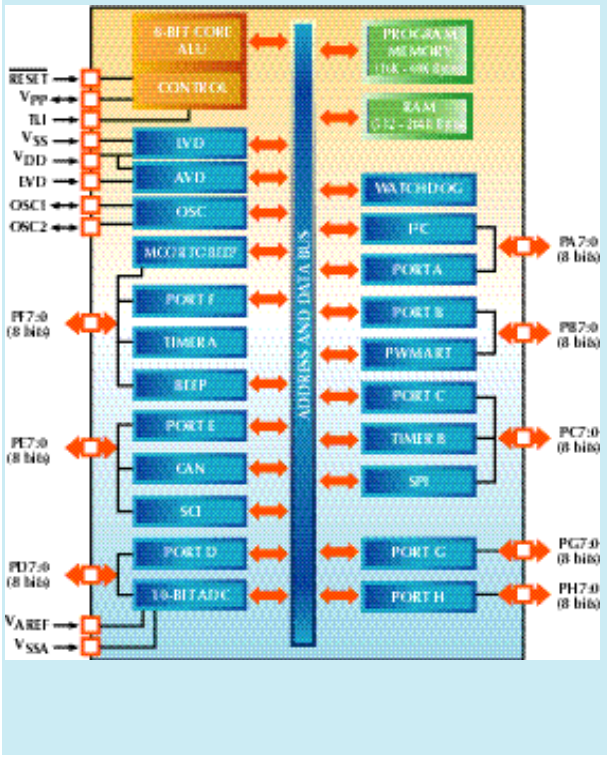
Key Benefits

- Low cost Flash, up to 60K Bytes
- Numerous hardware resources
- Full I²C Multi-Master/Slave interface with standard or fast mode
- Flash re-programming capabilities through the CAN
- Robust design for ensuring operation in EMC-critical environments

Applications

- Automotive: body electronics and car radio
- Industrial control

ST72521 Block Diagram

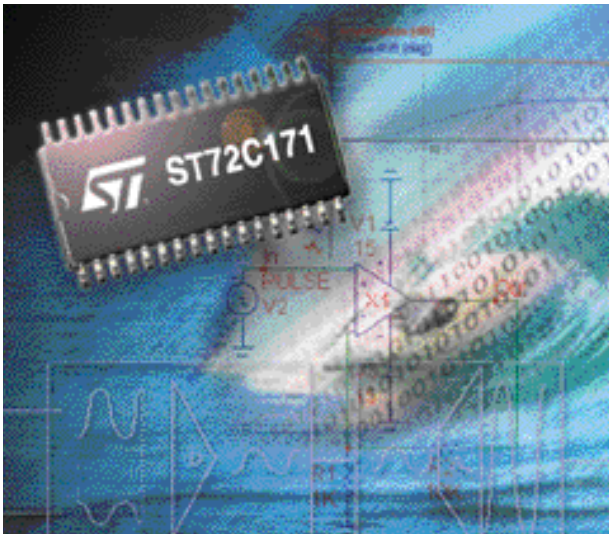


Device Summary

Features	ST72521R9	ST72521R7	ST72521R6
Program memory - bytes	60K Flash & ROM	48K Flash & ROM	32K Flash & ROM
RAM (stack) - bytes	2048 (256)	1536 (256)	1024 (256)
Peripherals	Watchdog timer, 16-bit Timers, SPI, SCI, 10-bit ADC, CAN		
	8-bit PWM ART, I²C		8-bit PWM ART
Operating supply vs. Frequency	FLASH: 2.7 to 5.5V with f_{CPU}≤4MHz or 3.85V to 5.5V with f_{CPU}≤8MHz ROM: 2.7 to 5.5V with f_{CPU}≤8MHz		
Temperature Range	0°C to 70°C / -40°C to +85 °C / -40°C to +105°C / -40°C to +125°C		
Packages	TQFP64 14x14		

Embedded Operational Amplifiers

The ST72171 is ST's first MCU with integrated Software Programmable Gain Amplifiers (SPGAs). It is ideal for a wide range of applications where signal amplification and analog signal processing are needed. It may be used to perform a variety of functions such as: differential voltage amplifier; comparator/threshold detector; ADC zooming; peak voltage detector; general purpose operational amplifier.



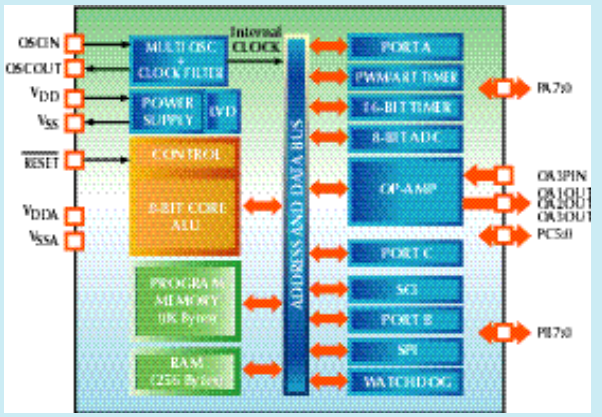
Applications

- Measurement and control systems for energy, power, temperature, humidity, pressure and voice
- Interfacing transducers for electric heaters, weight measurement, freezers, cooling systems

Key Benefits

- Two rail-to-rail amplifiers with software programmable gain and one stand-alone operational amplifier with:
  - Internal reference voltage (Band gap)
  - Internal programmable reference voltage
  - Sample and hold function
- No external hardware resources (no I/O needed to configure the gain, built-in resistors)
- Self calibration mode for operational amplifier offset measurement
- ADC zooming capability for very high resolution voltage measurement (preconversion zooming)
- Selectable amplifier power-down

ST72171 Block Diagram



Device Summary

Features	ST72C171K2M	ST72C171K2B
Flash - bytes	8K Single Voltage	
RAM (stack) - bytes	256 (128)	
Peripherals	2 SPGAs, 1 Op-Amp, Watchdog, 3 Timers, SPI, SCI, ADC (11 chan.)	2 SPGAs, Watchdog, 3 Timers, SPI, SCI, ADC (11 chan.)
Operating Supply	3.2 V to 5.5 V	
CPU Frequency	Up to 8 MHz (with up to 16 MHz oscillator)	
Temperature Range	- 40°C to + 85°C	
Packages	SO34	PSDIP32

e-Support: http://mcu.st.com & MCU on CD

The STMicroelectronics microcontroller site provides specific and up-to-date information concerning the advantages of the entire range of MCUs and their applications.
Our web site is designed to make your work easier and smarter with access to relevant business and technical information.

RAPIDITY
Easy-to-use search engines for all ST MCU databases

INFORMATION
Latest Company news and technological breakthroughs

EDUCATION
Quick access to the UK USB seminar. Information and breaking news about upcoming events.

COMMUNITY
Important industry dates to remember.

QUICK LINKS
Quick links to in-depth and comprehensive information concerning technologies, products, applications, training and marketing.
Documentation: datasheets, application notes, programming manuals, user guides, tool documentation, technical training slides, tutorials.
Download: download the latest STMicroelectronics software, drivers and utilities for the ST6, ST7 and ST9 microcontroller families.
Contact & Support: complete list of sales offices for OEM direct accounts, manufacturing sites & design centers, ST sales representatives and distributors.
MCU Design Consultants: A list of authorized micro application design house & consultants
Gold Standard: ST62 OTP microcontrollers featuring easy designs-in, quick time to market and a complete range of 8-bit devices.

Useful links

ST7-forum.com
chipcenter.com
microcontroller.com
chipdata.com

CD ROM

The "MCU ON CD" features a snapshot of our website and also includes installation files for all software tools and demos for ST7 microcontrollers. It includes the ST7 toolchain, the free Raisonance package and the Visual Micro Lab demo.

Product Selector

This brochure gives a selected list of the latest devices. For a full listing of all available ST7 devices, including ST72101, 121, 212, 213, 251, 311J and 311N, refer to http://mcu.st.com.

	Part Number	Program Memory Type: Flash	OTP	FAST ROM [1]	ROM	EPROM version	Prog. (Bytes)	RAM (Bytes)	Data E²PROM (Bytes)	A/D Inputs	Timer functions: 16-Bit (IC/OC/PWM)	8-Bit (IC/OC/PWM)	Others	Serial Interface	LVD levels	I/Os (High Current [3])	Packages	Special Features
28 - 32 Pins	ST72104G1	●		●	●		4K	256			1 (2/2/1)		WDG	SPI	3	22 (8)	SDIP32/SO28 (Pin to pin compatible)	RC oscillator, clock security system, in-situ programming, ROP, direct LED/Triac driving
	ST72104G2	●		●	●		8K	256			1 (2/2/1)		WDG	SPI	3	22 (8)		
	ST72216G1	●		●	●		4K	256		6x8-Bit	1 (2/2/1)		WDG	SPI	3	22 (8)		
	ST72215G2	●		●	●		8K	256		6x8-Bit	2 (4/4/2)		WDG	SPI	3	22 (8)		
	ST72254G1	●		●	●		4K	256		6x8-Bit	2 (4/4/2)		WDG	SPI / I²C	3	22 (8)		
	ST72254G2	●		●	●		8K	256		6x8-Bit	2 (4/4/2)		WDG	SPI / I²C	3	22 (8)		
42 - 44 Pins	ST72124J2	●		●	●		8K	384			2 (3/3/2)		WDG, RTC	SPI / SCI	3	32 (4)	SDIP42/TQFP44 (Pin to pin compatible)	RC oscillator, clock security system, in-situ programming, ROP, 4 low power modes with Active-HALT, direct LED/Triac driving, beep [2]
	ST72314J2	●		●	●		8K	384		6x8-Bit	2 (3/3/2)		WDG, RTC	SPI / SCI	3	32 (4)		
	ST72314J4	●		●	●		16K	512		6x8-Bit	2 (3/3/2)		WDG, RTC	SPI / SCI	3	32 (4)		
	ST72334J2	●		●	●		8K	384	256	6x8-Bit	2 (3/3/2)		WDG, RTC	SPI / SCI	3	32 (4)		
	ST72334J4	●		●	●		16K	512	256	6x8-Bit	2 (3/3/2)		WDG, RTC	SPI / SCI	3	32 (4)		
56 - 64 Pins	ST72314N2	●		●	●		8K	384		6x8-Bit	2 (3/3/2)		WDG, RTC	SPI / SCI	3	32 (4)	SDIP56/TQFP64 (Pin to pin compatible)	RC oscillator, clock security system, in-situ programming, ROP, 4 low power modes with Active-HALT, direct LED/Triac driving, beep [2] (upgrade of ST72311N & ST72331N)
	ST72314N4	●		●	●		16K	512		8x8-Bit	2 (3/3/2)		WDG, RTC	SPI / SCI	3	32 (4)		
	ST72334N2	●		●	●		8K	384	256	8x8-Bit	2 (3/3/2)		WDG, RTC	SPI / SCI	3	32 (4)		
	ST72334N4	●		●	●		16K	512	256	8x8-Bit	2 (3/3/2)		WDG, RTC	SPI / SCI	1	32 (4)		
	ST72311R6		●	●	●	●	32K	1K		8x8-Bit	2 (3/3/2)	1 (0/4/4)	WDG, RTC	SPI / SCI	1	44 (8)		Nested interrupts, TLI, clock security system, ROP 4 low power modes with Active-HALT, direct LED/Triac driving, beep [2]
	ST72311R7		●	●	●	●	48K	1.5K		8x8-Bit	2 (3/3/2)	1 (0/4/4)	WDG, RTC	SPI / SCI	1	44 (8)		
	ST72311R9		●	●	●	●	60K	2K		8x8-Bit	2 (3/3/2)	1 (0/4/4)	WDG, RTC	SPI / SCI	1	44 (8)		
CAN	ST72511R6		●	●		●	32K	1K		8x8-Bit	2 (4/4/2)	1 (0/4/4)	WDG, RTC	SPI/SCI/CAN	1	44 (8)	TQFP64 (Pin to pin compatible)	Nested interrupts, TLI, clock security system, ROP, 4 low power modes with Active-HALT, direct LED/Triac driving, beep [2] , CAN peripheral (2.0B passive)
	ST72511R7		●	●		●	48K	1.5K		8x8-Bit	2 (4/4/2)	1 (0/4/4)	WDG, RTC	SPI/SCI/CAN	1	44 (8)		
	ST72511R9		●	●		●	60K	2K		8x8-Bit	2 (4/4/2)	1 (0/4/4)	WDG, RTC	SPI/SCI/CAN	1	44 (8)		
	ST72521R6	❍			❍		32K	1K		8x8-Bit	2 (4/4/2)	1 (0/4/4)	WDG, RTC	SPI/SCI/CAN	1	48 (12)		Nested interrupts, TLI, clock security system, ROP, 4 low power modes with Active-HALT, direct LED/Triac driving, beep [2] , CAN peripheral (2.0B passive)
	ST72521R7	❍			❍		48K	1.5K		16x10-Bit	2 (4/4/2)	1 (0/4/4)	WDG, RTC	SPI/SCI/CAN	1	48 (12)		
	ST72521R9	❍			❍		60K	2K		16x10-Bit	2 (4/4/2)	1 (0/4/4)	WDG, RTC	SPI/SCI/CAN	1	48 (12)		
USB	ST72611F1	❍		❍	❍		4K	384				1 (0/0/0)	WDG	USB	1	11 (8)	SO20/DIP20	ROP, ICP 3, Low Speed USB endpoints
	ST72623F2	❍		❍	❍		8K	384		3x10-Bit		2 (2/2/2)	WDG	USB	1	11 (8)	SO20/DIP20	ROP, ICP, IAP, 3 Low Speed USB endpoints
	ST72622K2	❍		❍	❍		8K	384		8x10-Bit		2 (2/2/2)	WDG	USB / SPI	1	21 (8)	SDIP32	
	ST72622L2	❍		❍	❍		8K	384		8x10-Bit		2 (2/2/2)	WDG	USB / SPI	1	23 (8)	SO34	
	ST72621K4	❍		❍	❍		16K	768		8x10-Bit		2 (2/2/2)	WDG	USB / SPI / SCI	1	21 (8)	SDIP32	
	ST72621L4	❍		❍	❍		16K	768		8x10-Bit		2 (2/2/2)	WDG	USB / SPI / SCI	1	23 (8)	SO34	
	ST72621J2	❍		❍	❍		8K	384		8x10-Bit		2 (2/2/2)	WDG	USB / SPI / SCI	1	31 (8)	TQFP44/SDIP42	
	ST72621J4	❍		❍	❍		16K	768		8x10-Bit		2 (2/2/2)	WDG	USB / SPI / SCI	1	31 (8)		
	ST72633K1	❍	●	●	●	●	4K	256		8x8-Bit	1 (2/2/1)		WDG	USB	1	19 (10)	SDIP32/SO34	3 Low Speed USB endpoints
	ST72632K2	❍	●	●	●	●	8K	256		8x8-Bit	1 (2/2/1)		WDG	USB / SCI	1	19 (10)		
	ST72631K4	❍	●	●	●	●	16K	512		8x8-Bit	1 (2/2/1)		WDG	USB / SCI / I²C	1	19 (10)		
	ST72651R4	❍		❍	❍		16K	6.5K			1 (0/2/0)		WDG	USB / DTC	1	47 (3)	TQFP64	PVR, ROP, 2.7 V — 5 Full Speed USB endpoints, ICP, IAP
	ST72651R6	❍		❍	❍		32K	6.5K		2x8-Bit	1 (0/2/2)		WDG	USB /DTC/ I²C	1	47 (3)		DSC, PVR, ROP, 2.7 V

(Continued)

	Part Number	Program Memory Type: Flash	OTP	FAST ROM [1]	ROM	EPROM version	Prog. (Bytes)	RAM (Bytes)	Data E²PROM (Bytes)	A/D Inputs	Timer functions: 16-Bit (IC/OC/PWM)	8-Bit (IC/OC/PWM)	Others	Serial Interface	LVD levels	I/Os (High Current [3])	Packages	Special Features	
LCD	ST72589B5		●	●	❍	●	24K	1K		5x8-bit	2 (4/4/2)	10-bit (0/0/4)	WDG, RTC	SPI / SCI / I²C CAN		31	PQFP128	60x8 Dot Matrix LCD, CAN peripheral	Nested interrupts, beep [4] TLI
LCD	ST72389B4		●	●	●	●	16K	512		5x8-bit	2 (4/4/2)		WDG, RTC	SPI / SCI		31		60x8 Dot Matrix LCD	
MC	ST72141K2		●		❍	●	8K	256		8x8-Bit	2 (4/4/2)		WDG	SPI	1	26 (3)	SDIP32/SO34	Sensorless brushless permanent magnet DC Motor Controller in 6 step mode, emergency input	
OP	ST72171K2	●					8K	256		8x8-Bit	1 (2/2/1)	1 (1/2/2)	WDG	SPI / SCI	3	22 (5)	SDIP32/SO34	3 Op-Amps, programmable gain	
SC	ST72411R1	●					4K	256				1 (0/0/0)	WDG	Smart Card (5 I/Os)	1	10	TQFP64	Single chip Smartcard reader	

Abbreviations

ADC = Analog to Digital Converter
AR = Auto-Reload
CAN = Controller Area Network
DSC = Dual Supply Control
DTC = Data Transfer Coprocessor
IAP = In Application Programming
IC/OC = Input Capture/Output Compare
ICP = In Circuit Programming
I²C = Inter Integrated Circuit
LCD = Liquid Crystal Display
LVD = Low Voltage Detection
MAC = Multiply Accumulator
MC = Motor Control
MFT = Multifunction Timer
OSG = Oscillator Safeguard
PLL = Phase Locked Loop
PVR = Programmable Voltage Regulator
PWM = Pulse Width Modulation
ROP = Readout Protection
RTC = Real Time Clock Timer
SC = Smartcard
SCI = Serial Communication Interface
SPI = Serial Peripheral Interface
SSC = Single-Cycle Switching Support
SSP = Synchronous Serial Port
TLI = External Top Level Interrupt
TBU = Time Base Unit
USB = Universal Serial Bus
WDG = Watchdog Timer

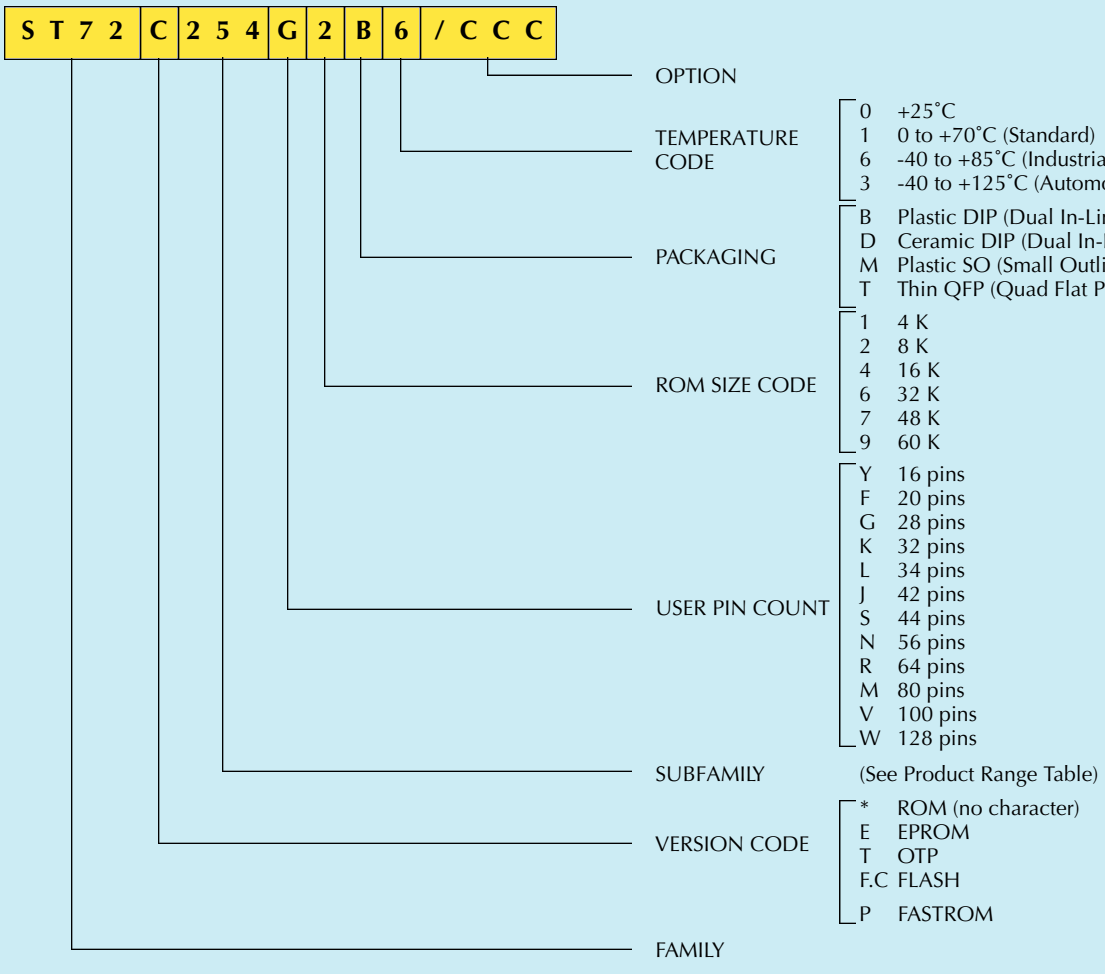
Packages

DIP = Dual In Line
P = Plastic
QFP = Quad Flat Pack
SDIP = Shrink Dual In Line
SO = Small Outline
SSOP = Shrink Small Outline Package
TQFP = Thin Quad Flat Pack

Notes

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

STMicroelectronics Microcontroller Part Number Suffix Typical Designations



Development Tools

STMicroelectronics offers a full range of hardware and software development tools for the ST7 microcontroller family either developed by ST or by third party manufacturers.

Hardware Tools

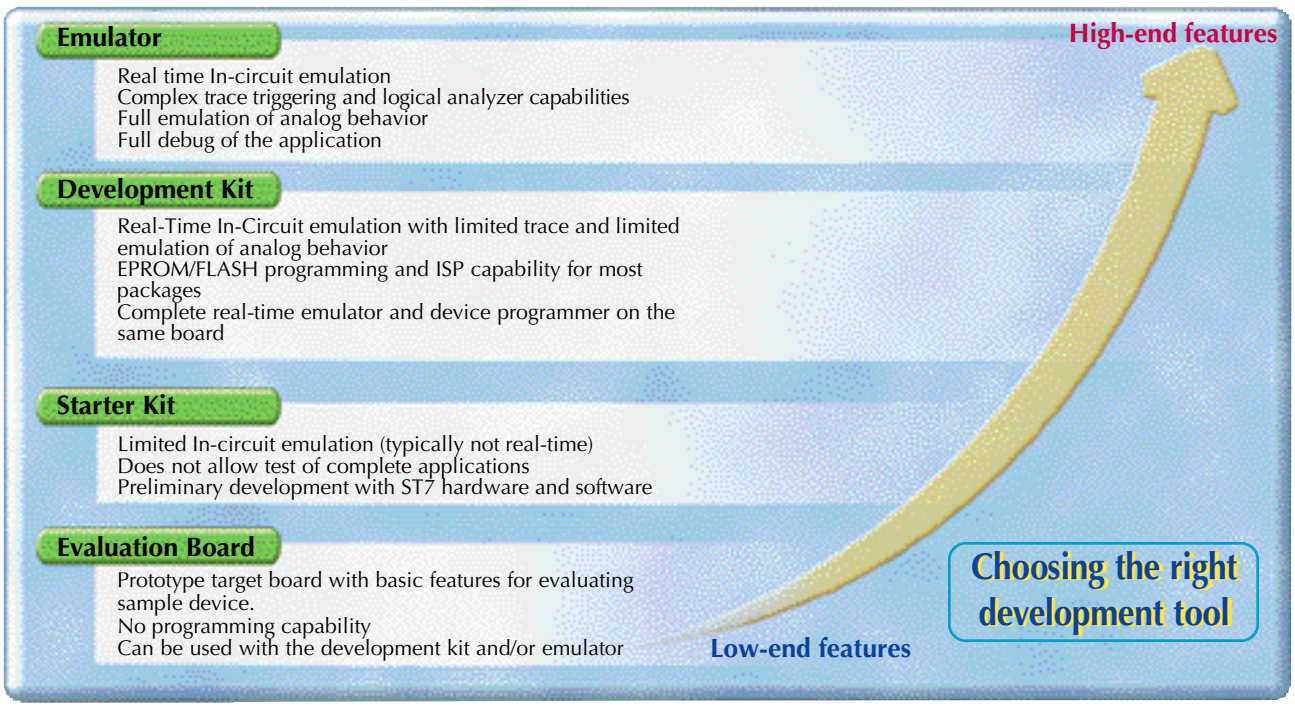
	Device	Emulator	Development Kit	Starter Kit	Single Programmer	Dedication Board/ Probe/Adapter	Gang Programmer
ST	ST72104 ST72216 ST72215 ST72254	ST7MDT1-EMU2B	ST7MDT1-DVP2[2]	ST7KND1-KIT2[2]	ST7MDT1-EPB2[2]	ST7MDT1-DBE2B Dedicated Probe	See Third Party
	ST72124 ST72314 ST72334 ST72311R ST72251X	ST7MDT2-EMU2B	ST7MDT2-DVP2[2]	ST7KND2-KIT2[2]	ST7MDT2-EPB2[2]	ST7MDT2-DBE2B Dedicated Probe & ST7MDT2-DBE-P/ TQ44 Adapter Probe TQFP44 ST7MDT2-DBE Dedicated Probe & ST7MDT2-DBE-P/TQ44 Adapter Probe TQFP44	
	ST72141	ST7MDT5-EMU2B	ST7MTC1 (Kanda)		ST7MDT5-EPB[2]		
	ST72171	ST7MDT6-EMU2B	under development	STK7ND1-KIT2[2]	ST7MDT6-EPB2[2]		
	ST72411	ST7MDT7-EMU2B		under development	ST7MDT7-EPB2[2]		
	ST7261 ST7262X	ST7MDTU2-EMU2B			ST7MTDU2-EPB2[2]		
	ST7263	ST7263-EMU2			ST72E63-EPB/XX[2]		
	ST7265X	ST7MDTU5-EMU2B			ST7MDTU5-EPB2[2]		
Third Party [1]		Hitex, iSystem		Kanda	Kanda (In-situ programming, Keyfob), BP		BP, Leap, Data I/O, Dataman, Softec, Stag, System General

Software Tools

	MCU Family	C Toolchain	Specific Tools	Real Time Kernel	IDE	Debugger
ST	ST7		STREALIZER-II		STVD7	STVD7
Third Party [1]	ST7	Cosmic, Hiware	Actum (graphic programming) RistanCase (CASE Tool) emWare (internet enabling technology)	CMX	Cosmic Hiware iSystem	Cosmic Hiware iSystem Hitex

Note 1. Details on third party products and contact information available from http://mcu.st.com
Note 2. Add /EU, /UK or US suffix to part number for the power supply corresponding to your region

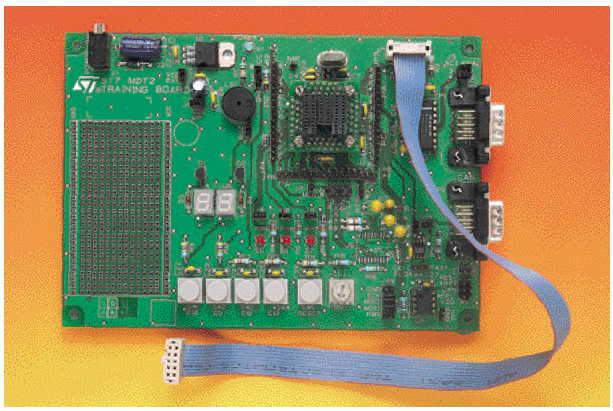
Hardware Tools



Evaluation Boards

ST Evaluation boards

The training and evaluation boards have been designed to help designers to start working with ST7 devices or to perform tests and peripheral evaluation (SPI, I^2C, ADC...). These boards can be used with a device, the emulator or development kit. Exercises and a manual are available on our website mcu.st.com.



Package Contents

- MDT1 or MDT2 training board
- Power Supply
- ISP Connector for Flash devices programming
- Exercise manual (with detailed description of the board)
- CD-ROM

Features

- Support MDT1 and MDT2 families
- LEDs
- Trimmer
- ISP connector for Flash devices programming
- Reset Button
- External Interrupt Management
- Buzzer
- SPI, I^2C, EEPROM
- CAN communication (for MDT2 family)

Ordering Information:

Supported devices	Order code
ST72254, 104, 215, 216 in SDIP32 package	ST7MDT1-TRAIN*
ST72334, 124, 314, 51x, 521, 311R in TQFP64	ST7MDT2-TRAIN*

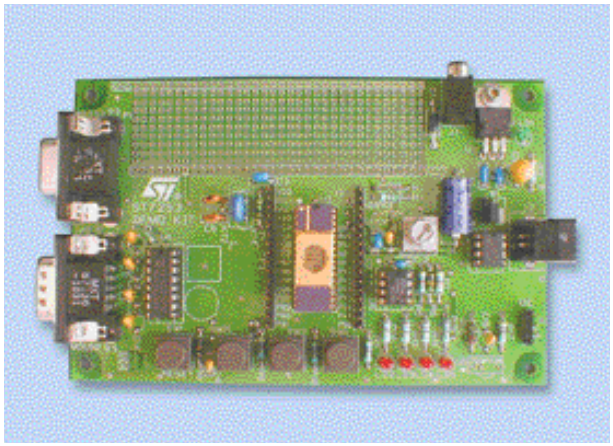
Note *. Add /EU, /UK or /US suffix for power supply

Contact:

Internet: http://mcu.st.com
or contact your local distributor or ST sales office

USB Evaluation Board

This kit can be used to develop USB HID class applications. A Windows™ 98 applet is supplied as well as USB firmware libraries running on the peripheral device.



Package Contents

- Two ST72E63 USB microcontroller devices (one pre-programmed controller and one spare device)
- One USB evaluation board printed circuit board
- One diskette including Software and Firmware (C source code)
- Documentation (Getting Started, Datasheet, Application Notes AN1017 and AN1069)

Ordering Information:

Supported devices	Order code
ST7263	ST7263DEMO

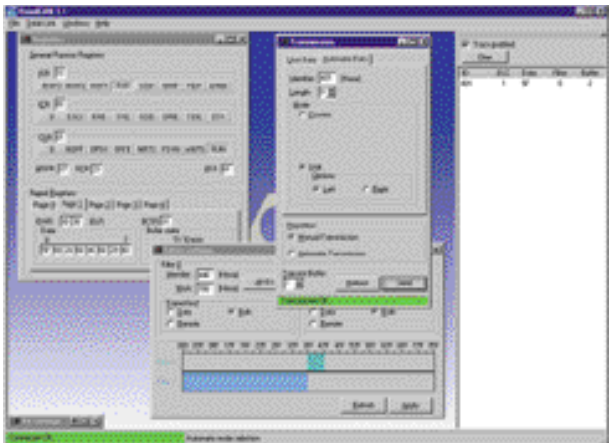
Contact:

Internet: http://mcu.st.com
or contact your local distributor or ST sales office

Evaluation Boards

CAN Evaluation Board

Connected to a PC through the serial link, a graphical interface (VisualCAN) enables CAN communication commands plus access to the microcontroller registers.
In conjunction with the ST7MDT2-DVP2 development kit, it allows you to easily develop your own CAN software driver acting as a node in the network.
The evaluation board includes the VisualCAN software for PC. It offers a user friendly access to the CAN controller integrated in the ST72T511R9.



Features

- CAN cell configuration
- CAN message transmission
- CAN bus monitoring

Package Contents

- ST72T511R9 microcontroller with CAN
- L9615D CAN line interface
- RS232 driver to interface to PC serial port
- Interface cable to serial port
- CAN cable
- “Getting Started” manual
- CD-ROM

Ordering Information:

Supported devices	Order code
ST72511	ST7CAN-DEMO

Contact:

Internet: http://mcu.st.com
or contact your local distributor or ST sales office

Home Automation Evaluation Kit

STMicroelectronics has designed a new evaluation board for ST7233X microcontrollers that are used to interconnect various types of electric and electronic home automation applications.
This Evaluation Kit is an easy-to-use tool for testing/ evaluating both hardware and software used in EHS Power Line Communication devices.

Features

- Four bi-directional communication modes
- EHSLite demo software
- RS232 connection to interface to PC serial port
- Light dimming application integrated
- On-board switched mode power supply

Package Contents

- Home Automation Evaluation Kit board
- One ST72E33x MCU (EPROM version)
- European power supply cable
- Getting started booklet
- Introduction to EHS booklet
- The EHS protocol: Concepts and Products booklet
- CD-ROM
- MCU Product Finder
- A diskette with EHS demo software

Ordering Information:

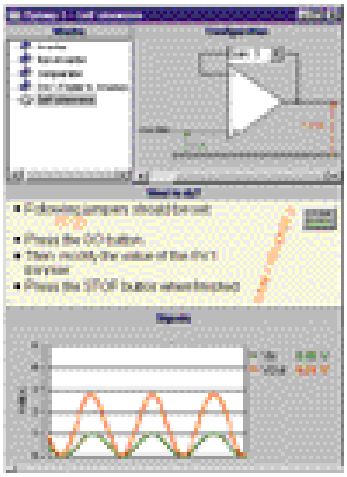
Supported devices
ST7233X families

Contact:

E-mail: ulrich.fiedler@st.com

Operational Amplifier MCU Evaluation Board

This evaluation board is intended for starting with the ST72C171 microcontroller.
The ST72C171 has two on-chip Software Programmable Operational Amplifiers (SPGAs).
The board can be connected to a PC through the serial port and is supported by menu-driven user interface software.



Features

- Evaluate the ST72C171 features, including the various SPGA configurations
- Develop your own application using the SPI and I/O port connectors and the wire-wrap area
- Erase/Program Flash memory of the ST72C171 via the ISP (In-Situ Programming)

Package Contents

- ST72C171 Evaluation board
- Getting Started manual
- PC serial interface cable
- Power Supply
- CD-ROM

Ordering Information:

Supported devices	Order code
ST72C171K2M6	ST7MDT6-EVAL*

Note *. Add /EU, /UK or /US suffix for power supply

Contact:

Internet: http://mcu.st.com
or contact your local distributor or ST sales office

Starter Kit

Kanda Starter Kit

The Starter Kit provides you with everything you need to immediately start designing, developing and evaluating applications at a low price. Each starter kit comes with a pre-programmed device. It demonstrates ST7 features using the on-board hardware resources (push buttons, LEDs, buzzer, etc.). Instructions are performed on the PC, I/Os on the Starter Kit (In-Circuit Simulation).

Features

- Immediate evaluation of ST7 devices with demonstration examples
- Simulation / debugging within the user's real application environment
- In-socket / on-board programming (DIP sockets)

Typical application development

- Write and compile the code using Kanda application builder
- Simulate the code on the PC or on the board. In on-board simulation mode, all accesses to the data space (including peripheral registers) are physically done on the board.
- Program a device directly on the starter kit or with an EPROM Programming Board.

Package Contents

- Starter kit board
- Flash sample devices
- Power Supply (US, EU, UK)
- Parallel port interface cable
- CD-ROM
- User Manual
- Software
- Personality keys (emulation and programming keys)
- Registration card

Ordering Information:

Supported devices	Order code
ST72254, 104, 215, 216, ST72171	ST7KND1-KIT2*
ST72334, 314, 124, 311R	ST7KND2-KIT2*

Note *. Add /EU, /UK or /US suffix for power supply

Contact:

Internet: http://mcu.st.com
or contact your local distributor or ST sales office

Development Kits

ST Development Kit

Features

- Emulation capabilities:
  - Breakpoints on data addressing, with read or write accesses
  - Stack exception
  - 1 Input/Output Trigger
- Device Programming Board
- In-situ Programming Board
- 5V Power Supply Interface Cable for connection to PC parallel port (LPT)
- 256 bytes trace with filter capabilities
- IDE interface (STVD7)

Package Contents

- DVP board + corresponding probe
- Power Supply
- Parallel cable
- Flash sample devices (x2)
- CD-ROM
- User Manual

A low-cost development package including a full real-time evaluation board.

Ordering Information:

Supported devices	Order code
ST72254/104 (G1/G2)/215G2/ 216G1	ST7MDT1-DVP2*
ST72334/314(J2/4,N2/4)/124(J2/4)/ 511(R6/7/9)	ST7MDT2-DVP2*

Note *. Add /EU, /UK or /US suffix for power supply

Contact:

Internet: http://mcu.st.com
or contact your local distributor or ST sales office

Kanda Motor Controller Development Kit

Kanda's new comprehensive motor controller development kit makes controlling motors easy. Just three steps are required to test permanent magnet brushless DC motors up to 300V or more.

Step1. Become an expert by practicing with the supplied default motor.

Step2. Test your own motor, and work out your parameters.

Step3. Program your ST device with selected parameters and monitor the results.

This board can be used with the ST72141 emulator.

Package Contents

- Programming board
- Controller board with pre-programmed OTP chip.
- Power stage (3-phase wired) Low Voltage or High Voltage
- 24V BLDC fan motor with standard load
- 15V Mains adapter
- Parallel port cable
- 26-way ribbon cable with IDC connection
- Blank EPROM chip
- PC communication adapter
- Manual on control theory, motor control and other essential information

Ordering Information:

This kit is available directly from Kanda

Supported devices	Order code
ST72141K4	ST7MTC1

Contact:

Internet: http://www.kanda.com

ST7-HDS2 Emulator

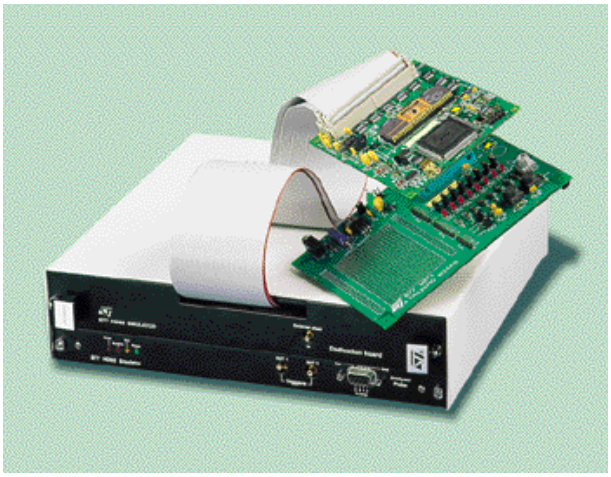
Features

- Real-time emulation
- Software programmable clock frequency
- 1K-trace can be triggered by an external signal
- Complex breakpoints
- Logic analyzer
- LVD emulation
- IDE interface (STVD7) or classic ST7 Debugger (WDGB7)
- Parallel connection to PC
- System of active probe for the EMU2B, DBE for the EMU2

Package Contents

- ST7-HDS2 Emulator
- A set of probes (including DIP adapters)
- Power supply
- Parallel interface cable
- CD-ROM
- User Manual

The ST7MDTx-EMU2B is the new release in the ST7-HDS2 series of high end STMicroelectronics emulators. It supports most of the ST7 devices and features a large number of software configurable options.



ST7-HDS2 Emulators support all the ST7 families. The system of active probes for the EMU2B generation allows you to emulate different ST7s by changing the active probe: the emulator basis is kept!

Ordering Information:

Supported devices	Order code	
	Complete Emulator	Dedication Board
ST72104/215/216/254	ST7MDT1-EMU2B	ST7MDT1-DBE2B Dedicated Probe
ST72124/51X/314/334/311R	ST7MDT2-EMU2B	ST7MDT2-DBE2B Dedicated Probe & ST7MDT2-DBE-P/TQ44 Adapter Probe TQFP44
ST72141	ST7MDT5-EMU2B	
ST72171	ST7MDT6-EMU2B	
ST72411	ST7MDT7-EMU2B	
ST7261/62	ST7MDTU2-EMU2B	
ST7265	ST7MDTU5-EMU2B	
ST7263	ST7263-EMU2	

Contact:

Internet: http://mcu.st.com
Please contact your local distributor or ST sales office

Hitex Emulators

Hitex develops high-end emulators with high-end features (access on the fly, time stamp, logic analyzer trace, etc.). The active probe system enables you to switch from any MCU to ST7.
Hitex emulators are delivered with a powerful IDE called Hitop (The STVD7 IDE debugger cannot be used).

Features

- Emulation up to device frequency
- 3.3V and 5V operating voltage
- Supports MDT2 family (ST72331 (J2/J4)
- IDE interface (Hitop 98)
- Trace buffer (8K)
- Unlimited number of breakpoints (64K)
- Serial link to PC
- 4 Triggers
- Supports Hiware and Cosmic C Compilers
- Active probe targeted MCU (ST7)

Package Contents

- MX-ST7 emulation system: base unit, microcontroller-specific adaptation board and a symbol preprocessor (for Hiware, Cosmic)
- IDE (Hitop 98)
- Serial Link
- Power supply
- User Manual

Ordering Information:

This package is available directly from Hitex

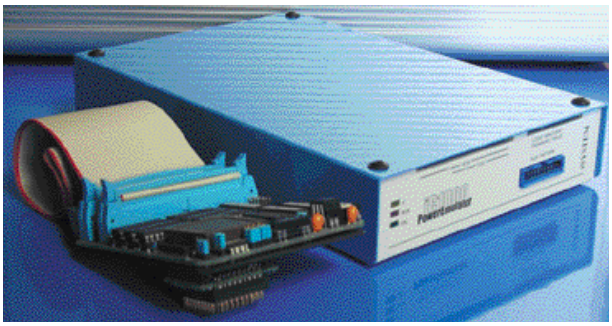
Supported devices	Order code
ST72124/314/334/ 311R/51X	MX-ST7 APST72331 (Adapter)

Contact:

Internet: http//www.hitex.com
E-mail: info@hitex.com

iSystem Emulators

iSystem develops a range of emulators from basic models up to high-end embedded systems. Emulators are based on an active probe system enabling you to switch easily from any MCU to ST7.
iSystem emulators are delivered with a powerful IDE called WINIDEA but can also be used with STVD7 (the IDE offered by ST).



Features

- Variable clock speed
- Real-Time Emulators (PowerPOD technology)
- Multiple voltage support (3V and 5V)
- IDE (WinIdea)
- RS232 or parallel communication with the PC
- Waveform Generator
- Unlimited number of breakpoints
- Real time trace (16K)
- Code coverage
- Timing Analyzer

Package Contents

- 1 Emulator unit
- 1 Emulator POD kit (probes)
- RS232 serial interface cable
- Power supply (power cord not included)
- User Manual
- Software package

Ordering Information:

This package is available directly from iSystem

Supported devices	Order code
ST72254 and subsets	POD ST72C254 (IC81700)
ST72334and subsets, ST725xxR, 311R	POD ST72511 (IC81701)

Contact:

Internet: http//www.isystem.com
E-mail: emulator@isystem.com

Programmers

EPB (EPROM/Flash Programming Board)

Features

- All sockets (except SSOP) available
- Handles both Motorola S19 and Intel Hex formats
- Windows EPROMer software interface
- In-situ programming capability (ISP connector) on all EPBs
- Project Management

Package Contents

- An EPROM Programming Board
- Parallel interface cable
- Power supply
- CD-ROM
- User Manual
- ISP Cable for EPB2

Ordering Information:

Supported devices	Order code
ST72254, 104, 215, 216	ST7MDT1-EPB2*
ST72334, 124, 314, 51x, 311Rx	ST7MDT2-EPB2*
ST72141	ST7MDT5-EPB*
ST72171	ST7MDT6-EPB2*
ST72411	ST7MDT7-EPB2*
ST7261/62	ST7MDTU2-EPB*
ST7265	ST7MDTU5-EPB*
ST7263	ST72E63-EPB*

Note *. Add /EU, /UK or /US suffix for power supply

Contact:

Internet: http://mcu.st.com
or contact your local distributor or nearest sales office

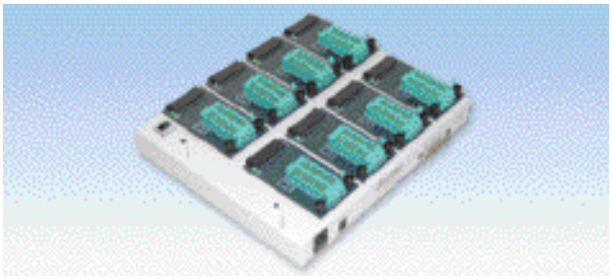
Third Party Programming Products

Single Position Programmers

These tools can be used to program one device at a time. Generally they can be controlled by a PC (running a Windows-based software interface) or they can work in standalone mode. For more details please check our website (http://mcu.st.com) to get direct links to our third party websites.

Gang Programmers

These are used to program several devices simultaneously for production purposes.
They can be controlled by a PC (running a Windows-based software interface) or they can work in standalone mode.
Several sockets are available depending on the device to be programmed. Detailed product information can be found on all third party manufacturer's websites.



Ordering Information:

Third party	Products	Supported devices
Softec Microsystem		
Internet: http://www.softecmicro.com	MP8011a	Check the Softec website for information
BP Microsystems		
Internet: http://www.bpmicro.com	BP1x00, BP2x00, BP3x00, BP4x00,	ST72334, ST72254, ST7263, ST72141
Data I/O		
Internet: http://www.data-io.com	Single, Multisite, ChipWriter and P100	ST72311, 215, 254
Leap		
Internet: http://www.leap.com.tw	SU2000	All except Flash devices
System General Corp.		
Internet: http://www.systemgeneral.com	Multi-apro	ST72251, 311
Stag Programmers Inc.		
Internet: http://www.stagusa.com	MP8011a	Check the Stag website for information

Kanda ISP (In-Situ Programming)

The ISP (in-situ programming) allows users to program ST Flash devices with a simple "dongle" connection directly from the PC (serial or parallel).

Features

- Very fast ISP
- Supports Windows™ 95, 98, NT
- Load/save/edit Intel Hex files and Motorola S19 format
- Sophisticated auto-programming
- Standard read/erase/secure functions

Ordering Information:

Supported devices	Order code
ST72104, 215, 216, 254, 124, 314, 334 and ST72171K2	This package is available directly from Kanda

Contact:

Internet: http://www.kanda.com

Kanda Keyfob

The ST7 Keyfob programmer is a small hand-held, easy-to-use programmer, which anyone can operate. The Keyfob is small and light and, by pressing a button, you can download the same code time and time again, no matter who is pressing the button. It is re-programmable which makes it very versatile. The interface from the Keyfob programmer to the board consists of a 10-way connector. (There is no need for a PC to program!).

Features

- Dimensions 4.5 x 3 x 1.5 cm
- Draws no power from the battery if the target device is powered
- Auto-sensing which enables the Keyfob to turn on and off when required
- Supports Windows™ 95, 98, NT and Motorola S19 format

Ordering Information:

Supported devices	Order code
ST72104, 215, 216, 254, 124, 314, 334 and ST72171K2	This package is available directly from Kanda

Contact:

Internet: http://www.kanda.com

Internet Development Platform

STMicroelectronics has teamed with emWare® to provide the technology and interoperability required for device networking over the Internet. The ST7 WebST@rter kit provides the means to connect any device to any network.

Features

- Interface with your devices using a Web browser, PDA, telephone, spreadsheet, database or other enterprise application

Contact:

Internet: http://www.emware.com

Package Contents

- ST7 WebST@rter SDK board
- EMIT 3.0 device networking software (60-day evaluation)
- Symantec Visual Cafe (30-day evaluation)
- Netscape 4.5, Microsoft Internet Explorer 4.0 software
- Hiware compiler tool kit (limited evaluation)

Software Tools

ST7 C Compilers

Cosmic C Toolchain

Cosmic software provides a C compiler dedicated to ST7 devices. An IDE is supplied with the C Compiler.

Features

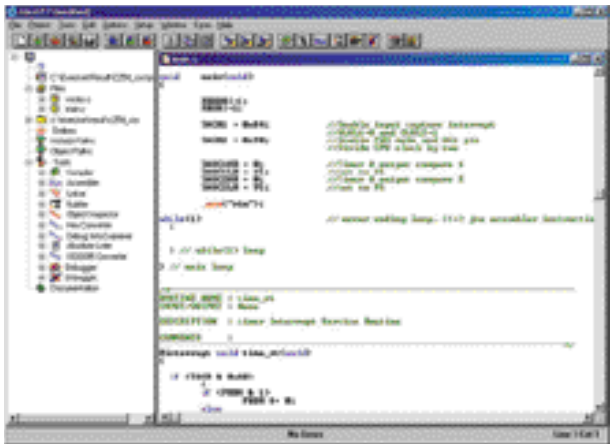
- Powerful C Compiler
- IDE: IDEA for ST7
- Debugger: ZAP
- Evaluation kits downloadable from Cosmic internet site

Ordering Information:

C Compiler, IDEA and ZAP are available directly from Cosmic

Contact:

Internet: http://www.cosmic-software.com
E-mail: sales@cosmic.fr for France
sales@cosmic-us.com for US
sales@cosmic.co.uk for UK
sales@cosmic-software.de for Germany
cosmic@cosmic-software.sc for Scandinavia



Hiware C toolchain

Hiware, provides a C compiler and an IDE for ST7 devices.

Features

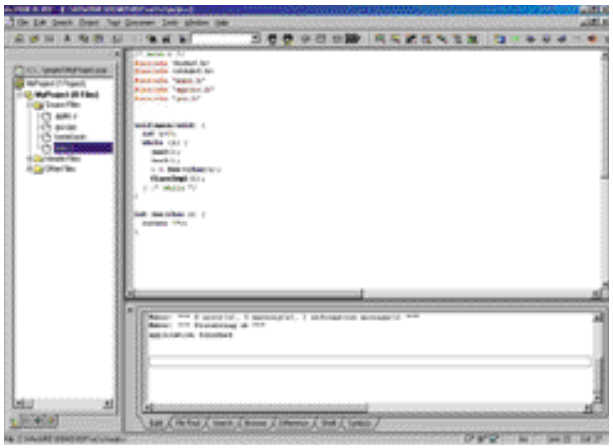
- Powerful C Compiler
- IDE: Panta™
- Debugger: Hi-Wave
- Demo version downloadable from the Hiware internet site

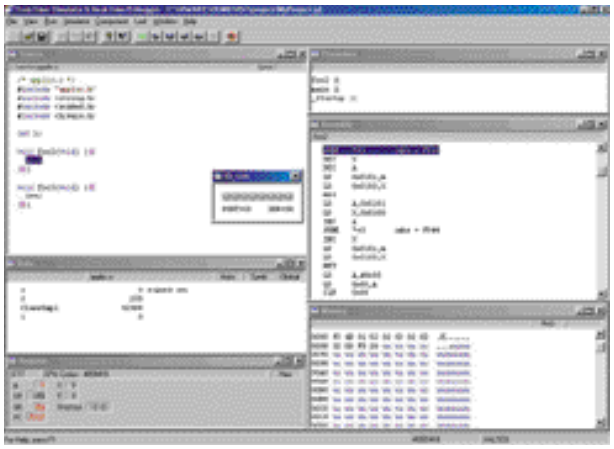
Ordering Information:

C Compiler, Panta and Hiwave are available directly from Hi-Wave

Contact:

Internet: www.hiware.com.
E-mail: info-europe@metrowerks.com





ST-Realizer II

ST-REALIZER is a graphics-oriented tool that allows you to create applications for ST7 (and ST6) MCUs without having to learn or write a single line of assembly code. Simply draw a diagram of the application using a library of symbols that represent functions. The symbols are wired to each other to create the application flowchart, which will then be translated into assembler code by the Realizer. This version of the ACTUM REALIZER is specifically designed for ST. The full version including optimization and support is directly available from ACTUM Solutions.

Features

- Support for interrupts
- Support for low-power modes
- Symbols available for accessing all peripheral control registers
- Execution conditions for sub-schemes
- Pin level simulation

Ordering Information:

This software is available from ST.

Order code: STREALIZER-II

Contact:

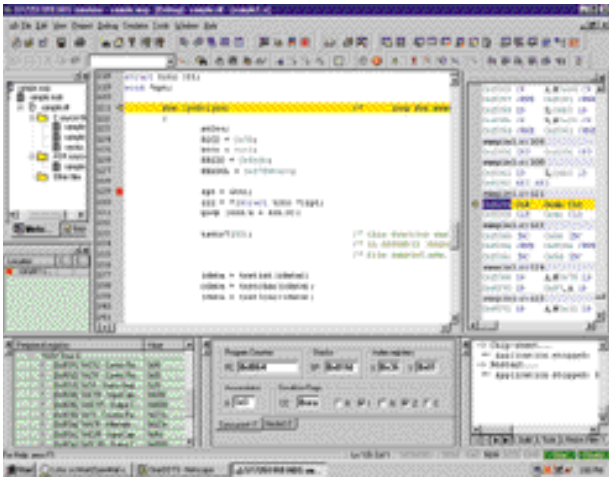
Internet: http://www.actum.com; http://mcu.st.com
or contact your local distributor or nearest sales office

STVD7 IDE: ST7 Visual Debug

STDV7 is the new IDE (Integrated development environment) developed by ST, which enables you to build and debug the application in the same environment. STVD7 can work with the ST Assembly toolchain, Hiware C toolchain or Cosmic C toolchain. STVD7 is completely free of charge, downloadable from the ST Internet site and provided in "MCU ON CD" with all ST tools. The available features are: data breakpoints, trace window, logic analyzer, hardware test function, hardware events with output triggers, a peripheral window, etc. For more information on STVD7, please refer to ST7 Visual Debug User Manual or application note AN978.

Contact:

Internet: http://www.mcu.st.com, free software page.
Or contact your local distributor or ST sales office.



THIS SOFTWARE IS AVAILABLE FROM THE ST INTERNET SITE OR "MCU ON CD" CD-ROM

Application Notes

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AN969	SCI Communication between ST7 and PC
AN970	SPI Communication between ST7 and EEPROM
AN971	I²C Communication between ST7 and M24cxx EEPROM
AN972	ST7 Software SPI Master Communication
AN973	SCI Software Communication with a PC using the ST72251 16-Bit Timer
AN974	Real Time Clock with ST7 Timer Output Compare
AN976	Driving a Buzzer through ST7 Timer PWM Function
AN979	Driving an Analog Keyboard with the ST7 ADC
AN980	ST7 Keypad Decoding Techniques, Implementing Wake-Up on Keystroke
AN1017	Using the ST7 Universal Serial Bus Microcontroller
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AN1042	ST7 Routine for I²C Slave Mode Management
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AN1086	ST7/ST10/U435 CAN-DO Solution for Car Multiplexing
AN1129	PWM Management for BLDC Motor Drives Using the ST72141
AN1130	Brushless DC Motor Drive with ST72141
AN1148	Using the ST7263 for Designing a USB Mouse
AN1149	Handling Suspend Mode on a USB Mouse
AN1180	Using the ST7263 Kit to Implement a USB Game Pad
AN1182	Using the ST7 USB Low-speed Firmware

PRODUCT EVALUATION	
AN990	ST7 Benefits versus Industry Standard
AN1150	Benchmark ST72 Vs PIC16
AN1151	Performance Comparison between ST72254 & PIC16F876

PRODUCT OPTIMIZATION	
AN982	Using ST7 with Ceramic Resonator
AN1014	How to Minimize the ST7 Power Consumption
AN1070	ST7 Checksum Self-Checking Capability
AN1078	ST7 PWM Duty Cycle Switch Implementing True 8% & 100% Duty Cycle
AN1179	Programming ST7 Flash Microcontrollers in Remote ISP Mode (In-situ Programming)

PROGRAMMING AND TOOLS	
AN978	Key Features of the STVD7 ST7 Visual Debug Package
AN983	Key Features of the Cosmic ST7 C-compiler Package
AN985	Executing Code In ST7 RAM
AN986	Using the Indirect Addressing Mode with ST7
AN987	ST7 In-Circuit Programming
AN988	Starting with ST7 Assembly Tool Chain
AN989	Starting with ST7 Hiware C
AN1039	ST7 Maths Utility Routines
AN1064	Writing Optimized Hiware C Language for ST7
AN1106	Translating Assembly Code From HC05 to ST7

GENERAL	
AN683	MCUS - 8/16-BIT Microcontrollers (MCUs) Application Notes Abstracts by Topics
AN886	Selecting between ROM and OTP for a Microcontroller
AN887	Making it easy with Microcontrollers
AN898	EMC general information
AN899	Soldering Recommendations and Packaging Information
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