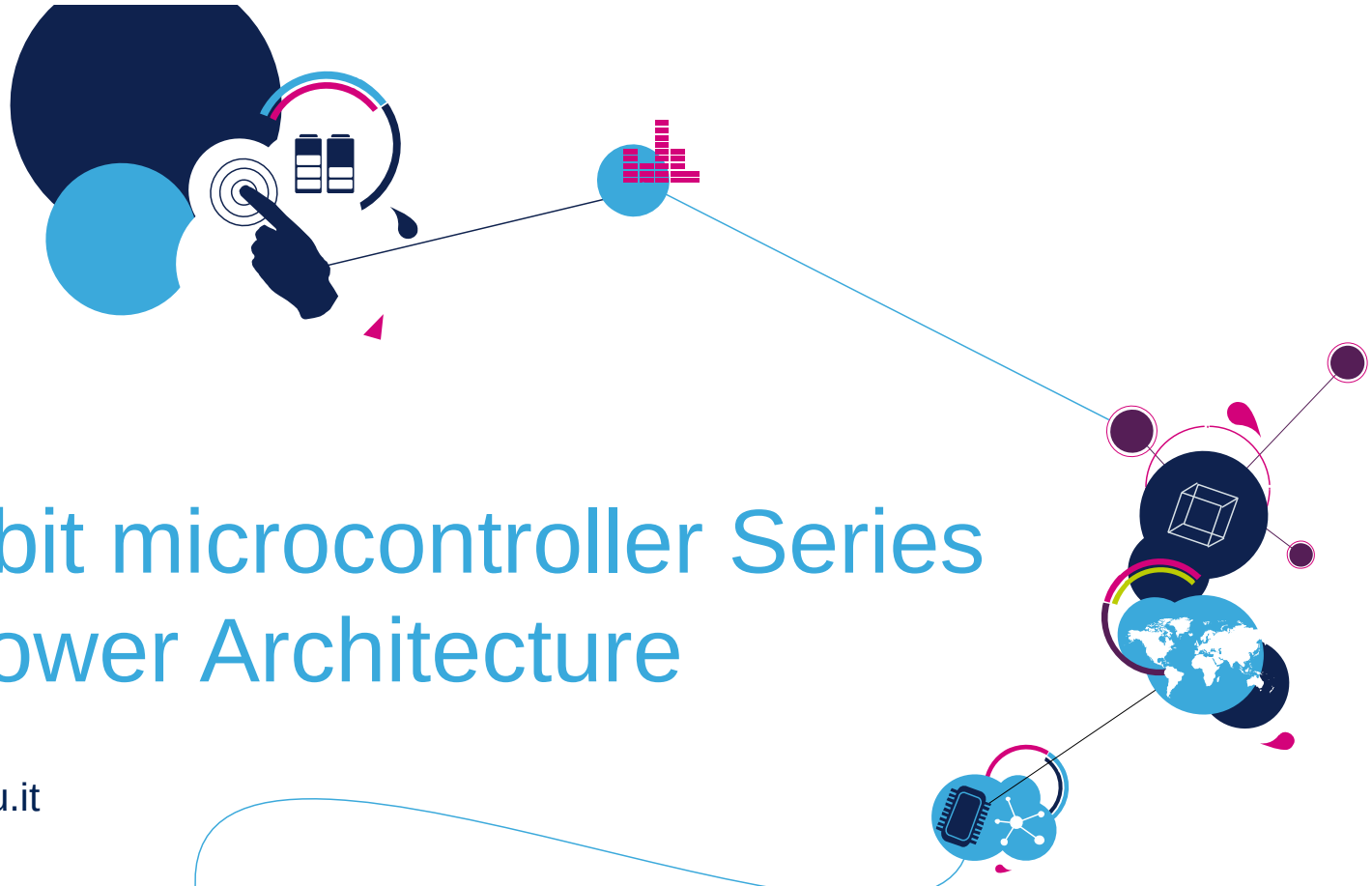

SPC56 32-bit microcontroller Series featuring Power Architecture

March 2013 --- www.emcu.it

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http://www.st.com/SPC56

SPC56 32-Bit MCU's

Our History:
30 Years in Automotive and Harsh Environments

Excellence:
Flash Technology and System Solutions Leadership

Service:
Customized supply, tools, Partners Ecosystem

Stability:
Automotive mindset & Dual Source Supply

Quality: Zero Incidence Mentality

A complete family of high performance & entry level microcontrollers with Automotive Quality using e200z Power Architecture® cores

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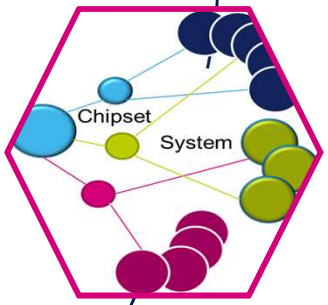
SPC56 32-bit Power Architecture MCU's with Automotive Quality

More than 90 Part number Available

SPC56 Body

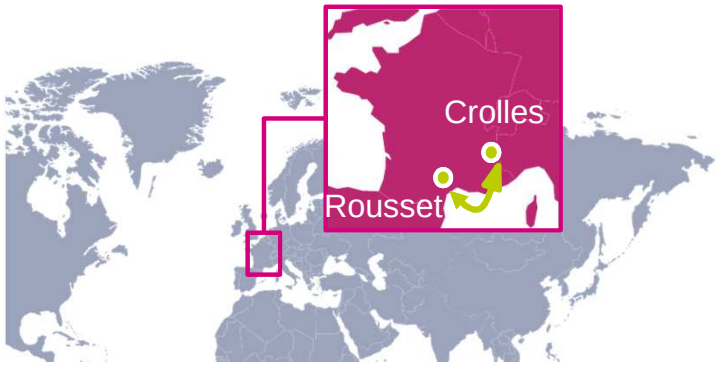
SPC56 Powertrain

SPC56 Chassis & Safety



ST Tools
3rd parties Network
On line Community
Myst.com

SPC5 Studio



Internal Dual Source Manufacturing
for Supply Assurance

Suitable for markets where safety, severe use conditions, reliability & long term supply are key factors for customer success

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SPC56 Family Highlights

Born to fulfill tough automotive requirements valuable in all market segments

The "Automotive" Advantage

- Up to 125°C full performance
- Product longevity
- Outstanding Product Quality
- High-low temperature performance guaranteed

Performance Scalability

- Single - Multicore
- Power Architecture®
  e200z0 to z4 cores with SPE
- 32-150Mhz core speed
- 128K-4MB Flash

Market Standard Power Architecture

- High performance peripherals
- up to 12Bit ADC
- True 3.3-5V Inputs/Outputs
- CAN, LIN, FlexRay, Ethernet
- CSE: Cripto Engine

True Dual Source

- Designed in partnership
- Fully equivalent to competitors Power Architecture® devices
- In-House Manufacturing

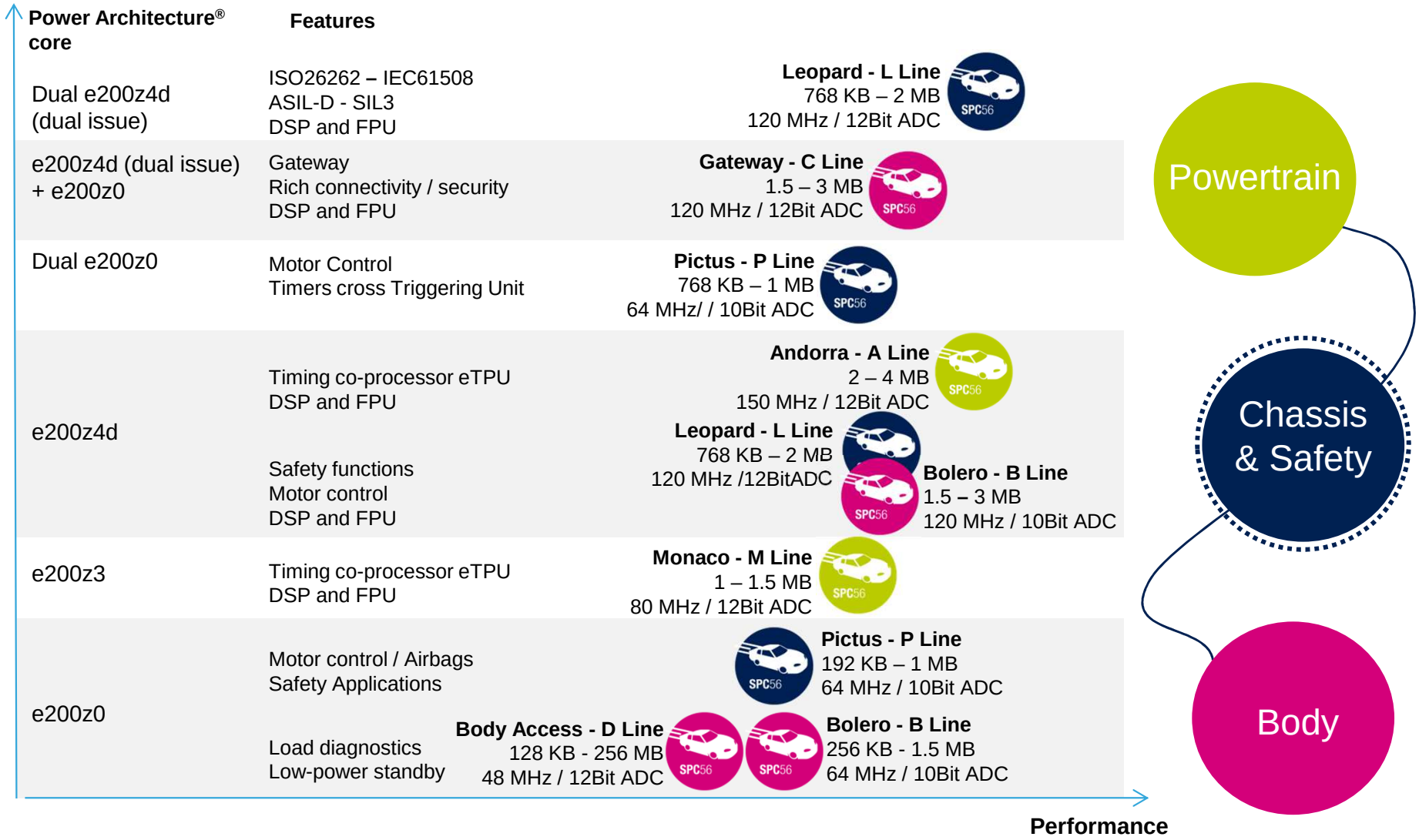
Designed for safe application

- Memory with ECC
- ISO 26262 for ASIL-D safety
- Dual Core with both Lock Step (LSM) and Decoupled Parallel (DPM) modes

Low Cost of Ownership

- Emulation/debugging using IEEE standard
- Same tools, drivers, application code across the whole family

SPC56 Family



Covering a wide range of Applications based on the renowned Power Architecure®

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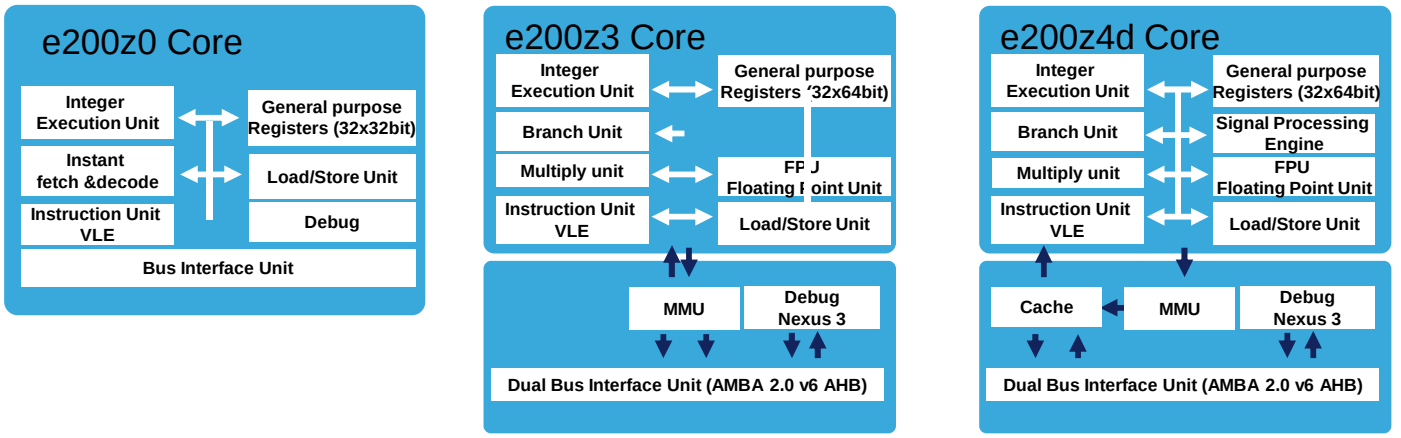
Power Architecture® cores

Core	e200z0	e200z3	e200z4d
Pipeline	4	4	5
Issue (instructions/cycle)	Single	Single	Dual
MMU	-	8 pages	16 pages
CPU cache	-	-	Instructions + Data
CPU MHz range	80 to 100 MHz	80 to 100 MHz	Over 150 MHz

Best in class code size ⟷ **Best in class efficiency per MHz**



Same instruction set, same memory map, same interrupt map → Software compatibility

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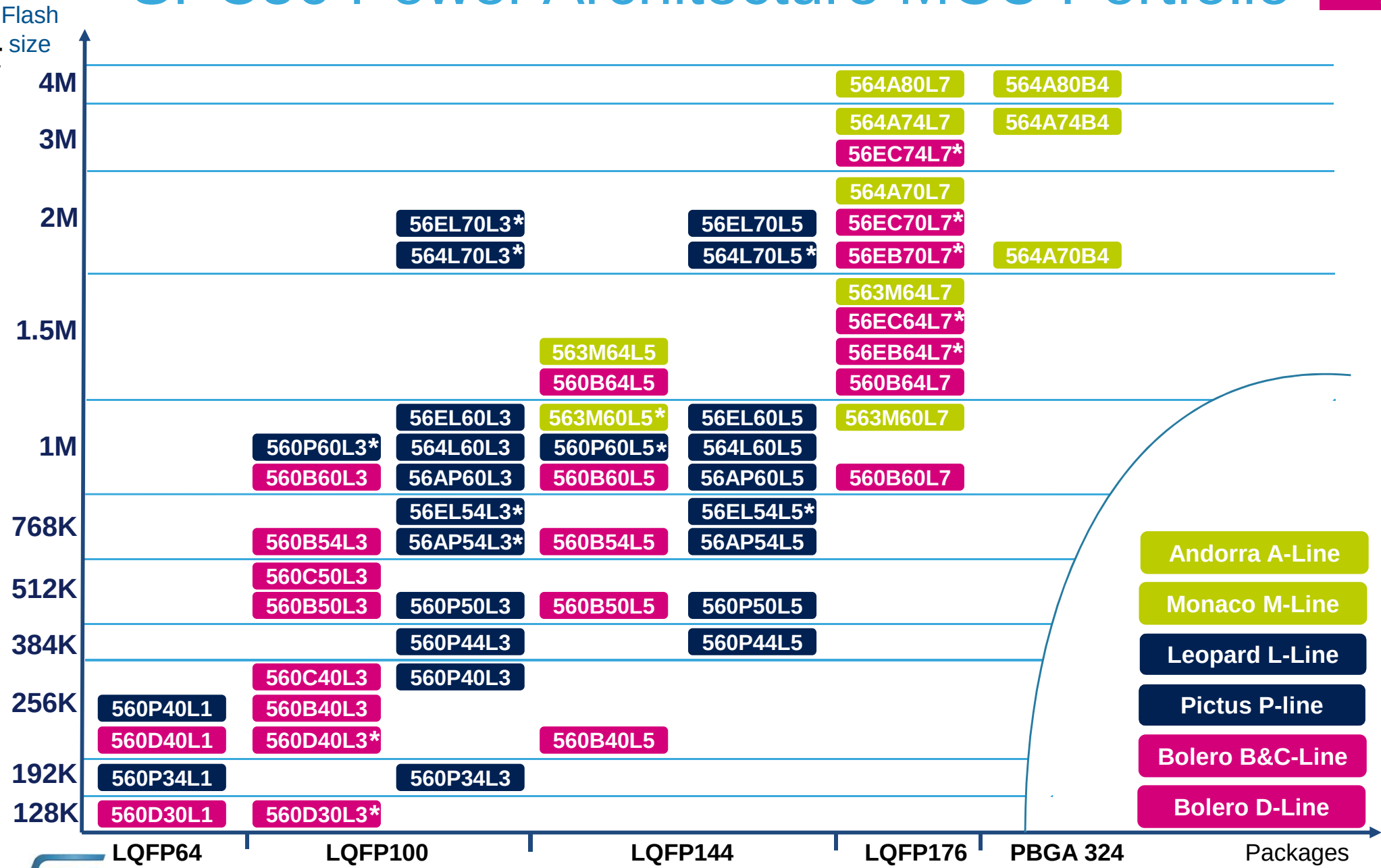
SPC56 Power Architecture MCU Portfolio



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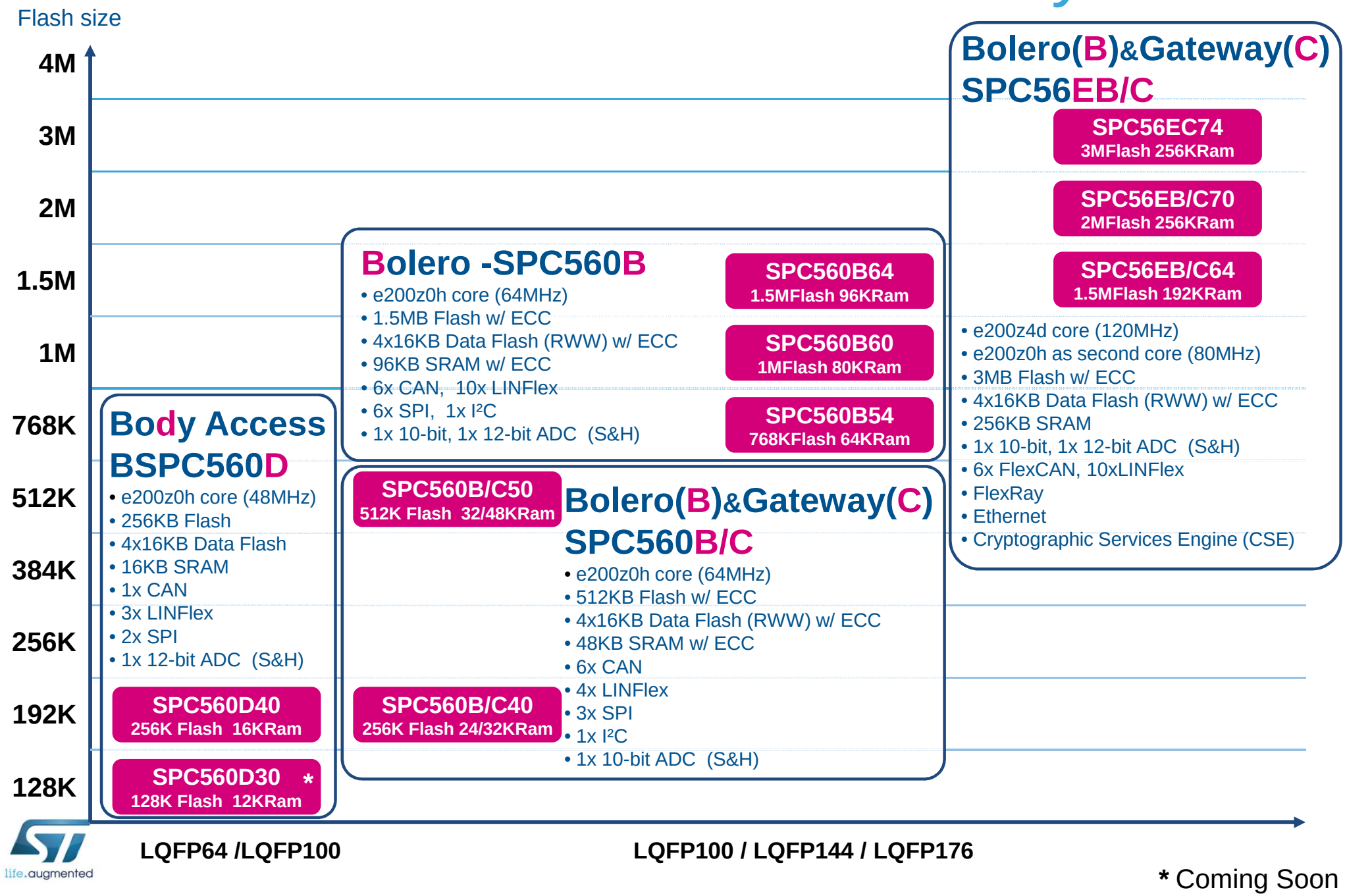
* Coming Soon = available for Production between Q1'13-Q2'13

SPC56 Body lines



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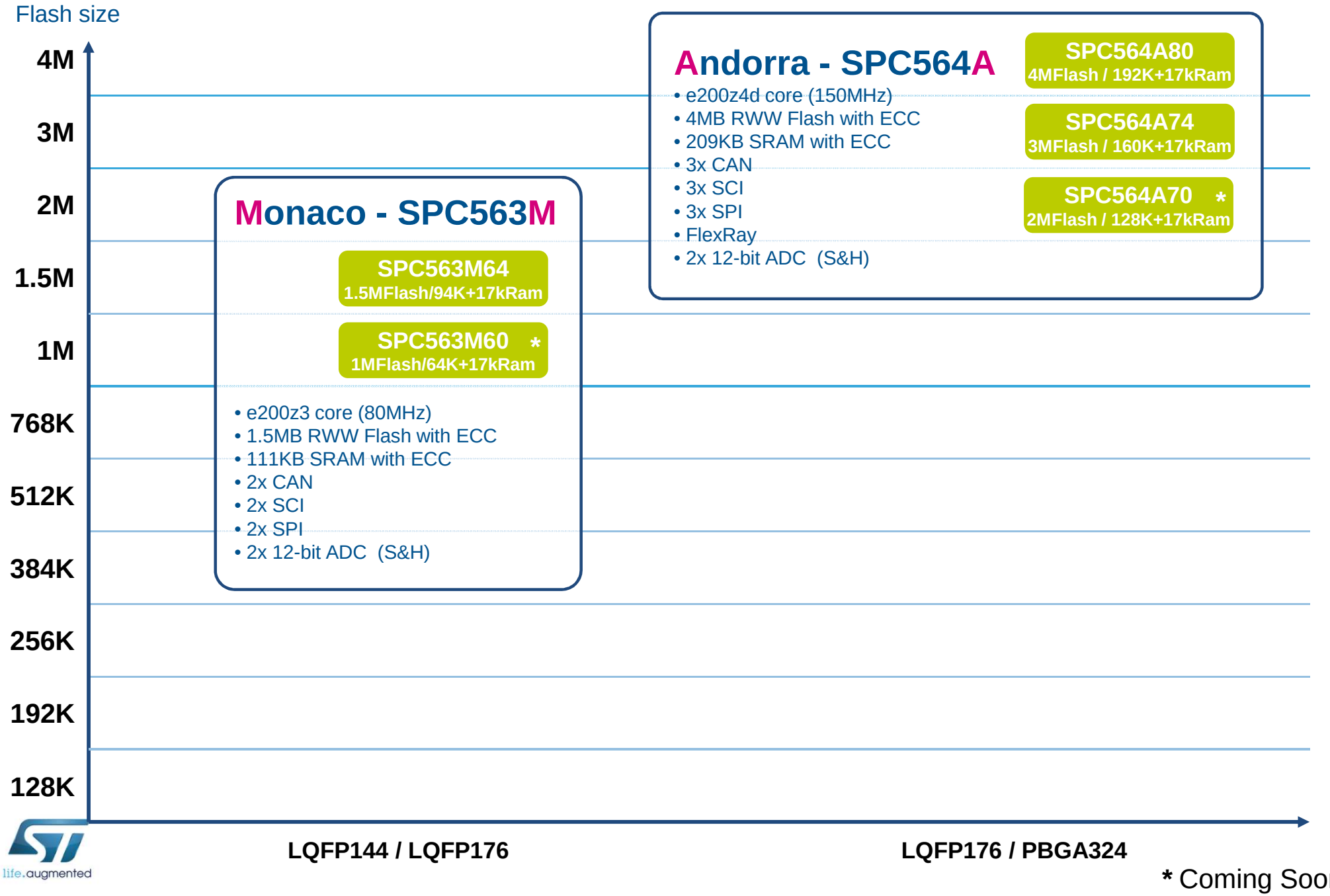
* Coming Soon

SPC56 Powertrain Lines



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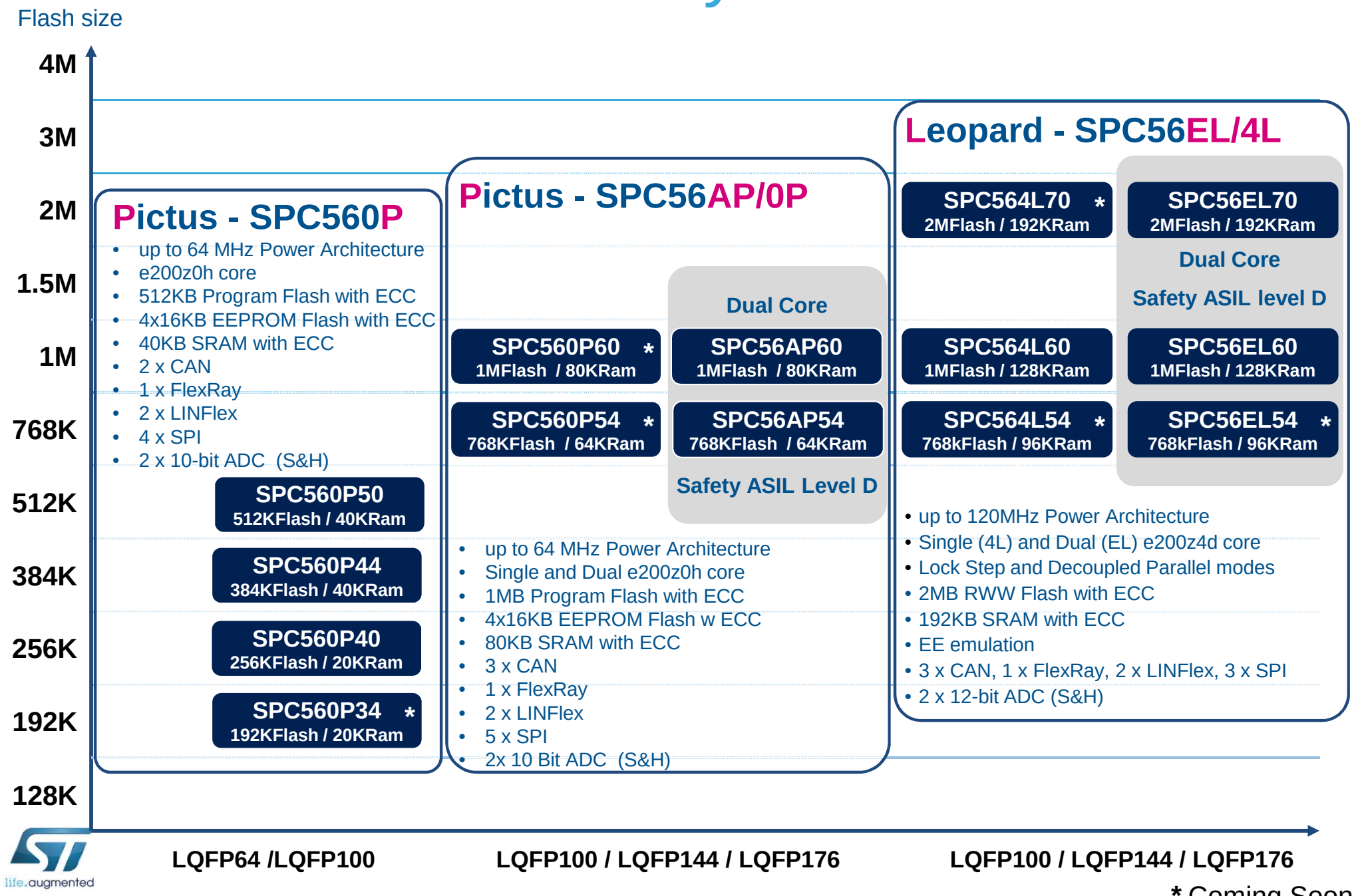
* Coming Soon

SPC56 Safety & Chassis Lines



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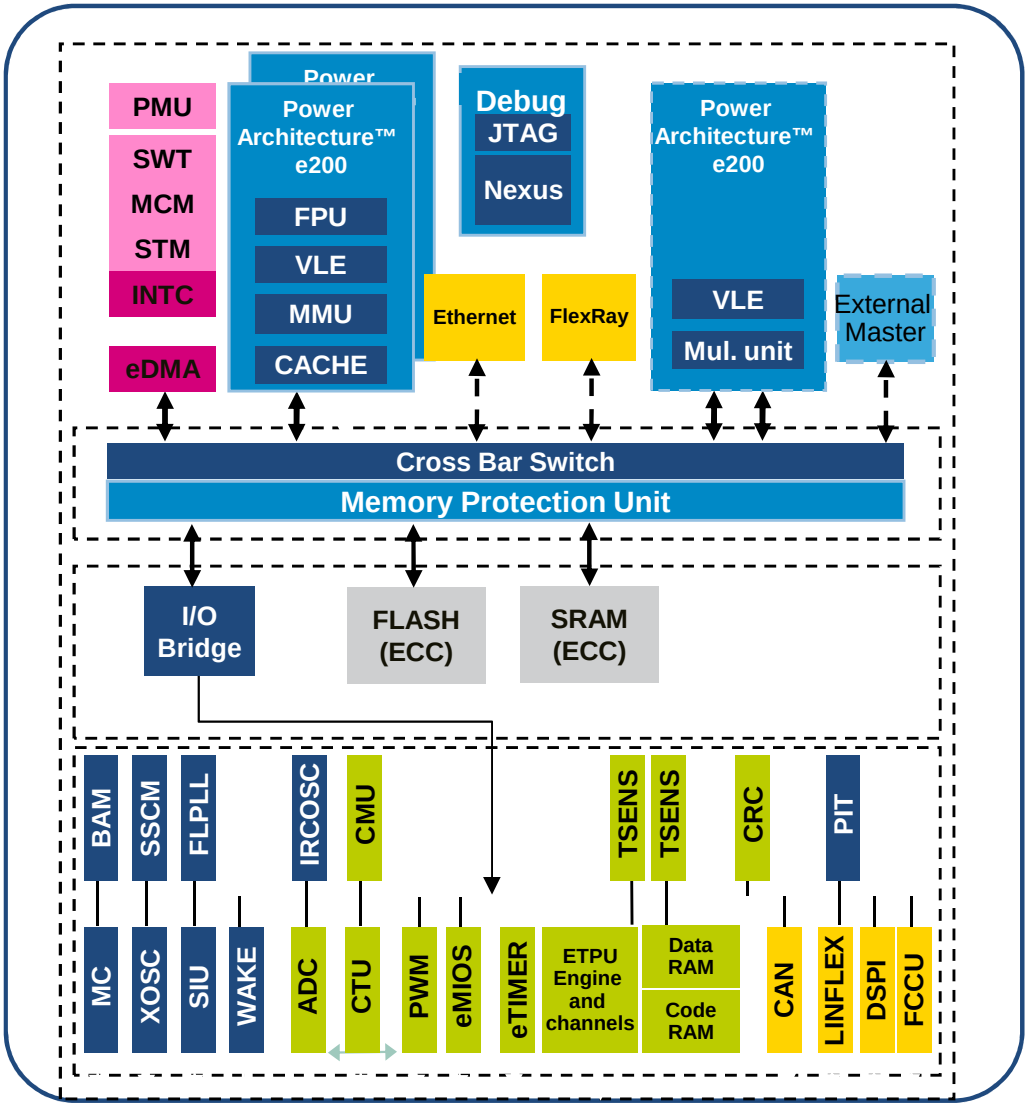
* Coming Soon

SPC56 Platform



✓Single Core to Multi Core

- Performance Core
- Safety / Lockstep Core (IEC 61508 / ISO 26262)
- IO Processor

✓Safety and Security

- CSE and HSM supporting SHE
- Certified ASILD design
- Enhanced HW features supporting fail safe operation
- Enhanced HW features preventing malicious attacks

✓Connectivity

- Ethernet
- Flexray
- CAN, DSPI, LINFLEX...

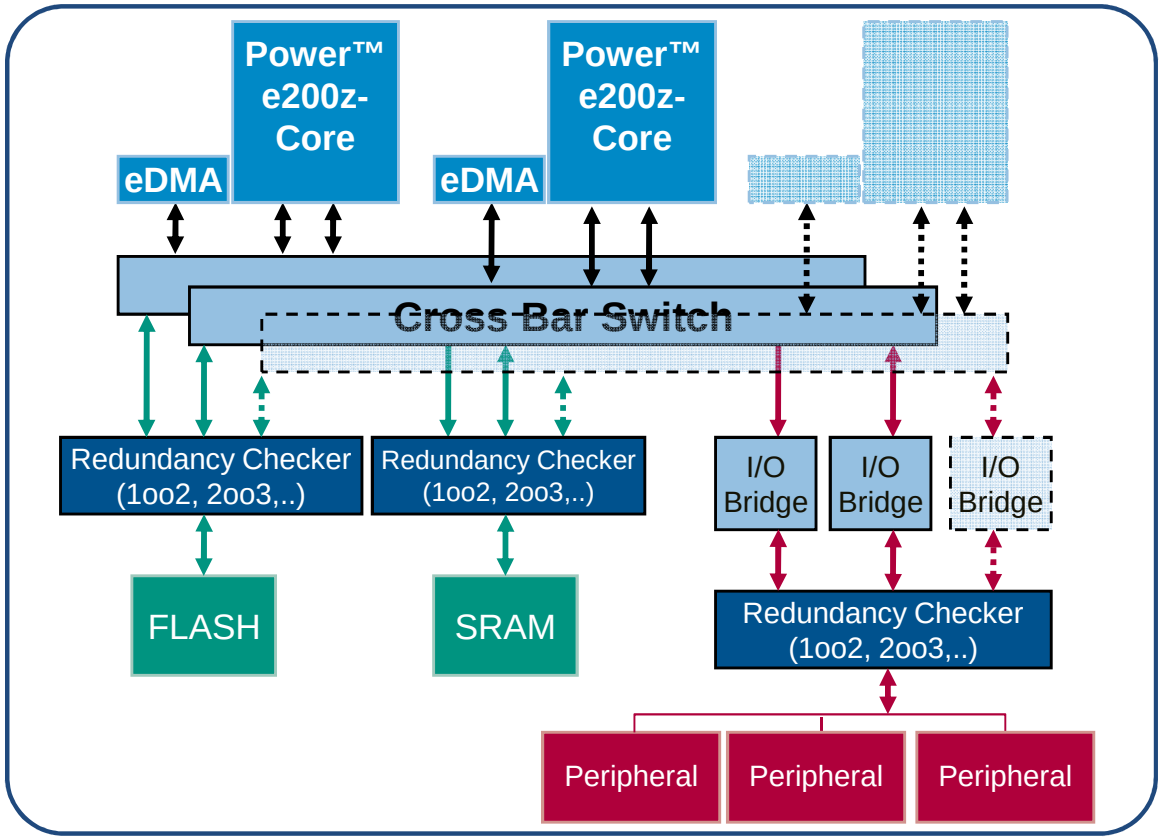
✓Flexibility

- Broad range of scalable memory variations
- Wide range of scalable package options
- Cross family peripheral compatibility

Unique Scalable Multi-Core Fail Safe Safety Architecture

Scalable Safety Architecture

Fail-Safe (**Leopard**) Fail-Operational



- **Reduce Development & Certification Cost**
  - Seamless support of Safety
  - Application develops on a safe platform
- **Reduce Application Cost**
  - Proven safety of MCU allows to drasticaly reduce the need for external devices otherwise needed to reach high safety levels
  - Leopard device allows reaching ASILD/SIL3 with a single MCU implementation
- **Scalable Safety architecture**
  - Fail-safe implementation on Leopard device (Dual-core lock-step).
  - Ready for evolution to Fail-operational

ISO 26262 - ASILx

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SPC56 Series Market Mapping

Body Control Module, Smart Junction Box, Standalone Gateway	Bolero B/C 256K-512KFlash LQFP100/144	Bolero B 768K - 1.5MFlash LQFP100/144/176
Door Module, Seat, HVAC, Comfort Module, Security, Access	Bolero D 128K-256KFlash LQFP64/100	Bolero B 256K-512KFlash LQFP100/144
High end 4 cylinders GDI, Common Rail Diesel , Low end 6 cylinders, Hydraulic Transmission		Andorra 3M - 4MFlash LQFP176/BGA324
Gasoline 4 cylinders, Direct Injection, Robotized transmission	Monaco 1.5MFlash LQFP144/176	Andorra 2MFlash LQFP176/BGA324
Low end 3-4 cylinders, Low end transmission		Monaco 1-1.5MFlash LQFP144/176
1/2 cylinder platform, 2 wheelers, Safety MCU	Pictus 192K - 256KFlash LQFP64/100	Pictus 384K - 512KFlash LQFP100/144

- Complete portfolio mapping automotive market requirements
  - Power Train, Chassis & Safety, Body

Integrated Chassis Management, Specific Driver Assistance, Vehicle Observer, advanced ESP All Safety Critical Application	Leopard 768K - 1MFlash LQFP100/144	Leopard 2MFlash LQFP100/144
Active Front Steering, HEV, Radar, Airbag with Sensor clustering, Domain Controller	Pictus 768K – 1MFlash LQFP100/144	Leopard 768K - 1MFlash LQFP100/144
Advanced Motor Control, Active Suspension, EPS, ABS	Pictus 384K - 512KFlash LQFP100/144	Leopard 768K - 1MFlash Pictus 768K – 1MFlash LQFP100/144
Airbag, EHPS, Single Motor Control, Torque transfer, EPB, low end ABS	Pictus 192K - 256KFlash LQFP64/100	Pictus 384K - 512KFlash LQFP100/144

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Superior Peripherals & Safety level

Peripherals	Pictus P-Line	Pictus Dual Core P-Line	Bolero B-Line	Gateway C-Line	Gateway Dual Core C-Line	Body Access D-Line	Leopard L-Line	Monaco M-Line	Andorra A-Line
ADC	27 channels 1x10-bit .65us@3.3-5V	27 channels 1x10-bit .65us@3.3-5V	53 channels 1x10-bit 1us@3.3-5V 1x12-bit 3us@3.3V, 2us@5V	36 channels 1x10-bit 1us@3.3-5V	43 channels 1x10-bit 1us@3.3-5V 1x12-bit 3us@3.3V, 2us@5V	33 channels 1x12-bit 3us@3.3V, 2us@5V	32 channels 2x12-bit 1us@3.3-5V	34 channels 2x12-bit .94us@5V	40 channels 2x12-bit .94us@5V
Timer Processor Unit	eTimer	eTimer	eMIOS	eMIOS	eMIOS	eMIOS	eTimer	eTPU, eMIOS	eTPU, eMIOS
Timer	16 bit / 8 ch	16 bit / 28 ch	16 bit / 64 ch	16 bit / 56 ch	16 bit / 64 ch	16 bit / 28 ch	16 bit / 28 ch	24 bit / 32 ch 16 bit / 16 ch	24bit / 32 ch 16 bit / 24 ch
PWM	8 channels	-	64 channels	56 channels	64 channels	28 channels	28 channels	48 channels	56 channels
SPI	2, 3, 4, 5	5	6	3	8	2	2 (3 dual core only)	2	3
I2C	--		1	1	1	-	-	-	-
Can	2, 3	3	2, 3	5, 6	6	1	2	2	3
FlexRay	0, 1	1	-	-	1	-	1	-	1
LIN-flex / eSCI	2	2	10	4	10	3	2	2	3
Crypto Engine	-	-	-	-	CSE	-		-	-
Thermal sensor	1	-	-	-	-	-	1	1	1
External Bus Interface	-	-	-	-	Ethernet	-	-	-	1
SAFETY	**P-Line**	**P-Line**	**B-Line**	**C-Line**		**D-Line**	**L-Line**	**M-Line**	**A-Line**
Multicore Mode	-	Performance	-	-	Performance	-	Safety, Performance (dual core only)	-	-
Safety features	ECC Flash, ECC RAM, CRC	ECC Flash, ECC RAM, CRC	ECC Flash, ECC RAM, MPU	ECC Flash, ECC RAM, MPU, CRC	ECC Flash, ECC RAM, MCU	ECC Flash, ECC RAM, CRC	ECC Flash, ECC RAM, MPU, CRC	ECC Flash, ECC RAM	ECC Flash, ECC RAM, MPU, CRC
SIL level (eligible)	ASIL-B	ASIL-B	-	-	-	-	ASIL-D	-	ASIL-B

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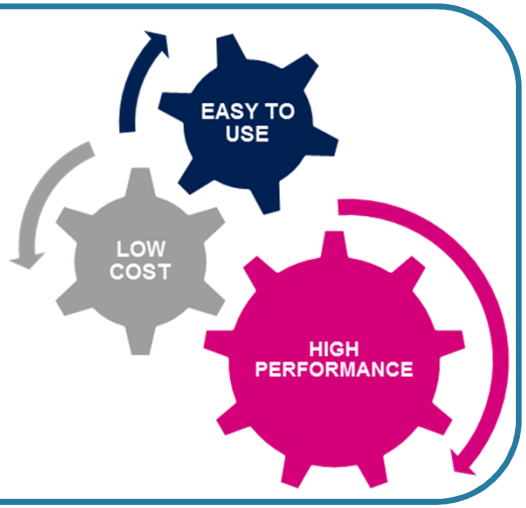
All resources are intended “up to” please refer to selected package option for exact resource count

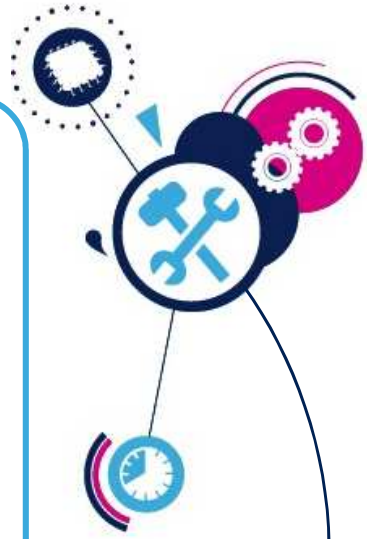
Software & development tools

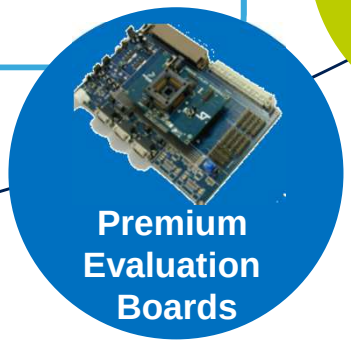
A new Getting Started Package



SPC5 Studio

- Eclipse based development environment with a graphic project, drivers and I/O's configurator.
- HighTec EDV GCC Compiler and PLS Strip Down UDE Debugger(*) distributed by ST.
- Runtime libraries
  - Flash drivers library
  - eTPU Powertrain library
- All for AUTOSAR
  - Low level Drivers for AUTOSAR (MCAL)
  - AUTOSAR Starter Kits





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(*) Coming Soon

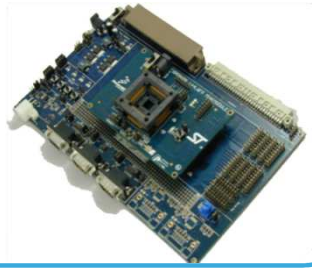
Getting started with SPC56

Discovery Boards

- SPC56 Discovery is simplest solution to evaluation SPC56 MCU's at affordable cost. Discovery system is available in two flavors according to device complexity
- Discovery base: comes with USB-JTAG interface on board and could be used connected to PC USB port
- Discovery+: comes with more connectivity option on board (Can, LIN,..), 12V external power supply to get started in a connected environment (require ext USB+JTAG adapter)
- Discovery Kits are supported by SPC5 Studio to jump start, creating your project, compiling it without size limitations (temporary license)

Premium Evaluation Boards

- The Evaluation Boards provide a solution to fully evaluate SPC56 series functionalities and performances.
- The complete system consists of a motherboard and a mini-module
- Different mini-modules are available for evaluating powertrain, body, chassis and safety applications with different target devices of the family.
- The evaluation system allows full access to the CPU, all of the CPU's I/O signals and motherboard's peripherals such as CAN, SCI, LIN, Flex-Ray and Ethernet.
  Eval board are supported by SPC5 Studio



Enable
real-time in circuit
parameter calibration for

Monaco and Andorra series

Available in vertical and standalone version

Calibration Adapters

http://www.st.com/web/en/catalog/tools/FM116/SC1041

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Order Starter Kit and Evaluation Boards

Evaluation Boards: full Access to MCU's resources

Part number	Description
SPC56XXMB	Motherboard for all SPC56xx products
SPC560B64A100S	Module with socket for B-Line in LQFP100
SPC560BADPT144S	Module with socket for B-line in LQFP144
SPC560BADPT176S	Module with socket for B-Line in LQFP176
SPC560PADPT100S	Module with socket for P-Line in LQFP100
SPC560PADPT144S	Module with socket for P-Line in LQFP144
SPC560PADPT64S	Module with socket for P-Line in LQFP64
SPC56ELADPT100S	Module with socket for L-Line Dual Core in LQFP100
SPC56ELADPT144S	Module with socket for L-Line Dual Core in LQFP144
SPC563MADPT144S	Module with socket for M-Line in LQFP144
SPC563MADPT176S	Module with socket for M-Line and A-Line in LQFP176
SPC564AADPT324S	Module with socket for A-line in BGA324

Discovery KITs: its easy

Part number	Devices
SPC56-L-Discovery	Discovery Kit for L line
SPC56-BD-Discovery	Discovery for B/D -lines
SPC56-P-Discovery	Discovery for B/D -lines

Calibration Adapters

Standalone

Part number	Description
SPC563M64CAL144	Calibration board for M-Line 1M5 LQFP144 targets
SPC563M64CAL176	Calibration board for M-Line 1M5 LQFP176 targets
SPC564A70CAL176	Calibration board for A-Line 2M LQFP176 targets
SPC564A80CAL176	Calibration board for A-Line 4M LQFP176 targets

VertiCal

Part number	Description
SPC563M64AVB144	Vertical base for M-line 1M5 LPQF144 targets
SPC563M64AVB176	Vertical base for M-line 1M5 LPQF144 targets
SPC564A70AVB176	Vertical base for A-line 2M LPQF176 targets
SPC564A70AVB324	Vertical base for A-line 2M BGA324 targets
SPC564A80AVB176	Vertical base for A-line 4M LPQF176 targets
SPC564A80AVB324	Vertical base for A-line 4M BGA324 targets
SPC56XVTOP-A	RAM/Debug top board for A-Line
SPC56XVTOP-M	RAM/Debug top board for M-Line

Accessories

Part number	Description
POLYPOD-TQFP144	Polypod adapter for LQFP144
POLYPOD-TQFP176	Polypod adapter for LQFP176

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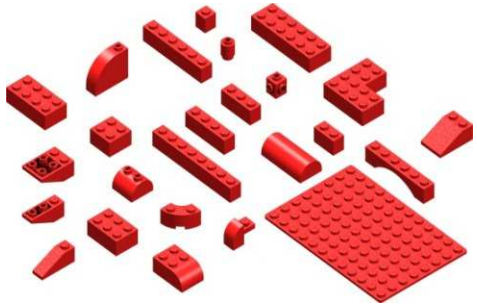
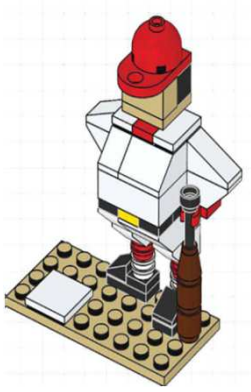
New SPC5Studio Plug&Develop

- Environment
  - Standard framework (Eclipse) for consistent experience
  - Graphic Approach to code generation (Project, Application wizard)
  - Components development kit for community expansion
- Components
  - SPC56 Lines board support packages
  - Low level Drivers collection
  - Open Source RTOS (ChibiRTOS/RT)
  - eTPU Library(*) (for Monaco & Andorra Line)
- Tools
  - HighTec C/C++ GNU Compiler (VLE SPE)
  - PLS JTAG debugger for ST(*)
    - Any other debugger supported through ELF file
  - Visual Pin-out Mapping Wizard(*)
  - Diagnostic Log & Trace Analyzer(*) (by Intecs)

The right Components



The right Tools



Click Here to Download!

Click Here for community!

5 Minutes and Application is Up!

(*) Available Soon

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ST network of third parties and partners

- IDE/Compilers
  - Green Hills MULTI
  - Wind River Compiler and Workbench
  - Cosmic Compiler
  - HighTec
- Debuggers/Emulators
  - Lauterbach PowerDebug and PowerTrace
  - PLS UAD/UDE
  - iSystem ic3000
  - Raisonance Rlink
- Calibration tools
  - VertiCal and proprietary calibration solution
- Operating systems and SW
  - EB
  - ETAS
  - Vector
  - STMicroelectronics and partners
- Trainings
  - MicroConsult for products and toolchain
  - Intecs for getting started with Autosar

SPC56 Family on paper and on line

Product Information & Support Available on the fly

Flyers / Brochures

www.st.com/SPC56

MyST.com

- Newsletter
- Software Download
- On Line Support
- Buy On Line

Community

SPC5Studio

SPC56 Family

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Ordering Information

SPC	56	0	B	50	L3	C	XX XXX	Y
	Family	Core	Line	Memory Size	Package	Temperature	Custom version Line Dependent	Conditioning

Core	**Line Name**	**Memory Size**	**Temp Range**	**Package**	**Conditioning**
0: e200z0 3: e200z3 4: e200z4 A: e200z0 dc E: e200z4 dc	M: Monaco P: Pictus B: Bolero A: Andorra L: Leopard C: Gateway D: Body Access	30……128KByte 34……192KByte 40……256KByte 44……384KByte 50……512KByte 54……768KByte 60……1MByte 64……1.5MByte 70……2MByte 74……3MByte 80……4MByte	B: -40 … 105°C C: -40 … 125°C	L1: LQFP64 L3: LQFP100 L5: LQFP144 L7: LQFP176 B4: PBGA324	Y: Tray R: Tape&Reel X: Tape&Reel 90°

Custom Version

Pictus P-Line: $X_1X_2X_3$			**Body Acc., Bolero, Gateway D,B & C-Lines : $X_1X_2X_3$**			**Andorra A-Line: X_1X_2**		**Monaco M-Line : X_1X_2**		**Leopard L-Line $X_1X_2X_3$**		
X_1:EEPROM	X_2:Subline	X_3:Option	X_1:Freq.	X_2:EEPROM	X_3:Voltage	X_1:Interfaces	X_2:Freq.	X_1:Memory	X_2:Freq.	X_1:Freq.	X_2:Interfaces	X_3:Safety level
E: On Chip data Flash 0: No Data flash	F: Full Featured M: Motor Control (P44/50) A: Airbag G: F+3rd CAN	Version A: 5V, 64MHz B: 3.3V, 64MHz C: 5V, 40MHz D: 3.3V, 40MHz	3: 32MHz 4: 48MHz 6: 64MHz 8: 80MHz 9: 120MHz	E: On Chip data Flash 0: No Data Flash	0: 5V	F: FlexRay O: No FlexRay	A:150Mhz B:120Mhz C:80Mhz	O: Standard P: Sub-memory	A:80Mhz B:64Mhz	B: 120MHz C: 80MHz	F: FlexRay O: No FlexRay	Q: Quality management safety level S: ASILD/SIL3

Notes: 1 - Not all combinations available – Refer to Datasheet

www.st.com/spc56
www.st.com/spc5studio

Join our e2e community on myst.com

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