



life.augmented

# ST's solutions for automotive seating systems





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## PERFORMANCE AUTOMOTIVE SYSTEMS

Car electrification and semiconductor pervasiveness are key elements for innovation in traditional Automotive Body components. Among others, this trend impacts car seat features, where together with innovative and fashioned textures and leathers, car manufacturers are investing in advanced technologies to enhance driving comfort. Moving from high-end to middle/low-end cars, features like electric seat adjustment and seat cooling and/or heating are becoming new de-facto standards.

With over 35 years commitment in the Automotive market, ST is riding the waves of technology innovation required to support these new advanced features. ST's rich portfolio includes all components required for modern automotive seat solutions.



### High-side switches

- An unrivalled family of high-side switches, the M0-7 HSDs Series, based on proprietary VIPower® family featuring on-state resistance of few mΩ ideal to drive high-current seat heater loads or mid-high on-state resistance for a wide range of different loads (like the seat cooling). The family integrates a full set of innovative protections and diagnostic features required in the automotive applications



### Motor drivers

- The latest generation of state-of-the-art H-Bridges in VIPower™ M0-7 technology represents a comprehensive, fully integrated and protected solution for low- and medium-power DC motor applications. Offering MultiSense diagnostics, tiny power packages and ultra-low power consumption, these AEC-Q100 qualified drivers enhance system simplicity and flexibility. Together with our motor drivers in BCD technology, our VIPower™ H-Bridges offer an ideal solution to drive seat positioning motors for seat movement, seat height, seat length, seat width, seat angle, back angle, headrest position, headrest angle, lumbar support, and massage



### Power management

- L49 and L5 series of voltage regulators designed for automotive applications
- Linear voltage regulators portfolio offers a wide range of products able to support microprocessor operation, such as watchdog, reset, early warning and a low quiescent current
- SBC versatile products, characterized by a broad selection of features and performances, allow simple use in body modules to supply and drive loads and microcontrollers as well as establishing a reliable interface through dedicated communication protocols



### Microcontrollers

- SPC5 family of 32-bit Power Architecture® MCUs for automotive body applications with a rich peripheral set and memory options



### Sensors

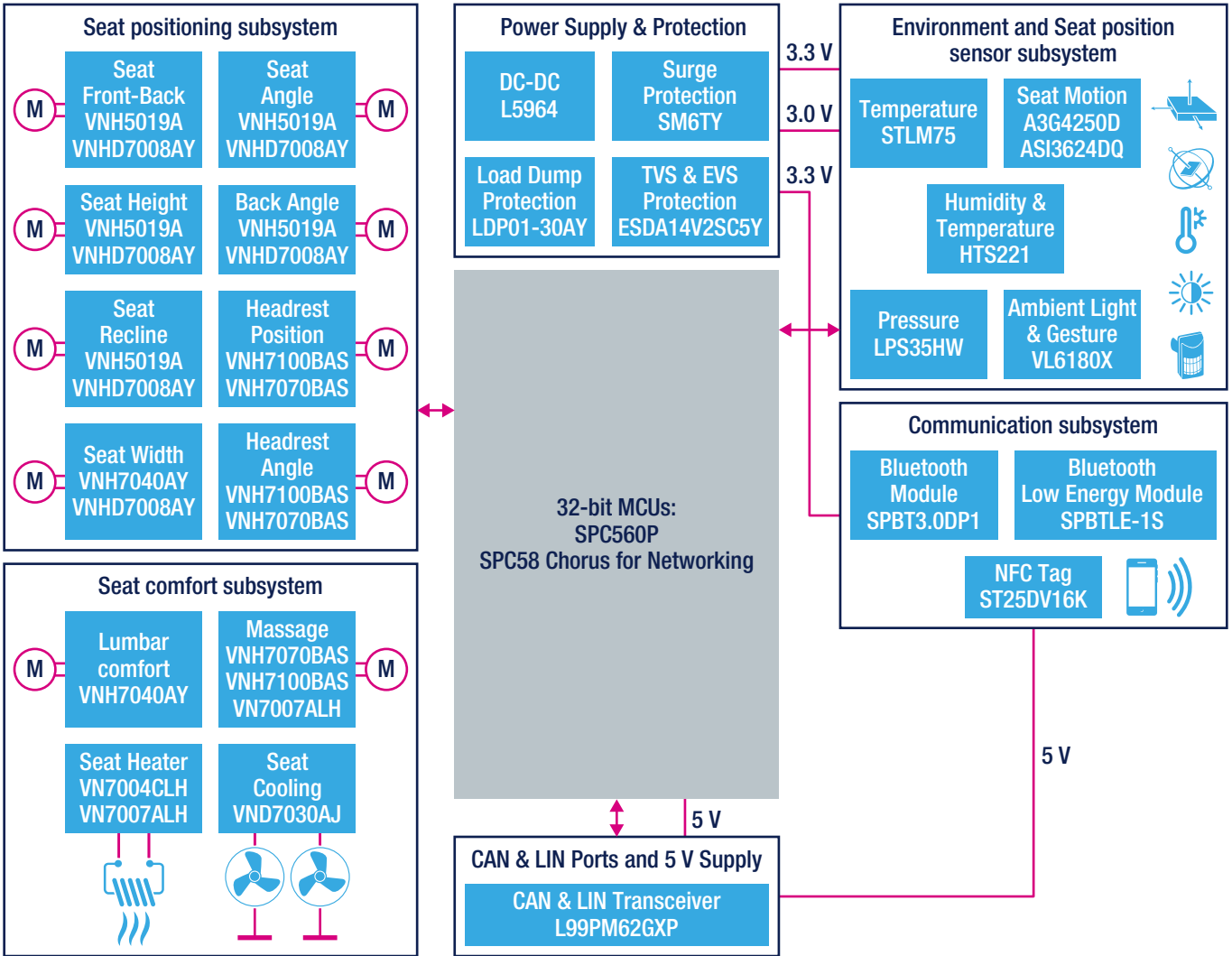
- 3-axis automotive-grade MEMS digital accelerometer and gyroscopes able to provide precise information on seat orientation and position
- A rich set of environmental sensors to acquire information about humidity, barometric pressure, temperature and ambient light to auto-regulate seat heater and / or cooling fans and pumps



### Connectivity

- Bluetooth, Bluetooth Low Energy and NFC communication modules to enable adjustment through smartphones

Recommended ST components for automotive heating systems



Please note:  
VNHD7008AY will be in full prod end of 2017. VNH7008AY is suggested to be used with external low-side MOSFET STL76DN4LF7AG, STL15DN4F5.



## HIGH-SIDE SWITCHES

M0-7 VIPower High Side drivers Series can safely drive resistive, inductive and capacitive loads in compliance with the harsh automotive environment. All devices are qualified according to AECQ100 norm, offering innovative and precise protection, control and diagnostic functions. The products represents an ideal solution for a wide range of automotive applications. They are designed to drive 12 V automotive grounded loads through a 3 V and 5 V CMOS-compatible interface, providing protection and diagnostics.

All the Series components integrates advanced protective functions such as load current limitation, overload active management by power limitation and overtemperature shutdown with configurable latch-off. A dedicated multifunction multiplexed analog output pin delivers sophisticated diagnostic functions including high precision proportional load current sense, supply voltage feedback and chip temperature sense, in addition to the detection of overload and short circuit to ground, short to VCC and OFF-state open-load.

The products can address a wide range of application such as the seat heating and cooling inside the seat positioning system solution.

[www.st.com/vipower](http://www.st.com/vipower)

		Single channel	Dual channel	Quad channel
Vip Zero	3 mΩ	VN7003ALH ●●●● VN7003AH ●●		
	4 mΩ	VN7004CLH ●●●● VN7004CH ●●	VND7004AY	
	7 mΩ	VN7007ALH ●●●● VN7007AH ●●		
	8 mΩ	VN7008AJ ●●●●		
	10 mΩ	VN7010AJ ●●●●	VND7012AY	
	16 mΩ	VN7016AJ ●●●●		
	20 mΩ	VN7020AJ ●●●●	VND7020AJ ●●●●	
	30 mΩ		VND7030AJ ●●●●	
	40 mΩ	VN7040AJ ●●●● VN7040AS ●●●●	VND7040AJ ●●●●	VNQ7040AY
	50 mΩ	VN7050AJ ●●●● VN7050AS ●●●●	VND7050AJ12 ●●●● VND7050AJ ●●●●	VNQ7050AJ ●●●●
	140 mΩ	VN7140AJ ●●●● VN7140AS ●●●●	VND7140AJ12 ●●●● VND7140AJ ●●●● VN7140AS12 ●●●●	VNQ7140AJ ●●●●

● Programmable Protection ● Extended Current Sensing ● Very Low-Voltage Operation ● PowerSSO-16



## MOTOR DRIVER ICs

The ST product portfolio offers a wide range of motor control ICs, well-suited for the most demanding automotive environments, covering the requirements of brushed DC motors, stepper motors and brushless DC motors, over an extensive range of voltage and current ratings. Our motor drivers'

efficiency and accuracy is guaranteed by a unique combination of low-loss PowerMOS output stages and advanced control circuitry; while robustness and reliability are provided by the integration of a comprehensive set of protection and diagnostic features. The availability of products with different control

interfaces, including PWM (Pulse Width Modulation) and serial interfaces, gives customers the opportunity to find the right solution both in centralized or distributed control applications.

Motor Type	Part number	General description	Max Out Current (A)	Supply Vmin - Vmax
Brushed DC	VNH5180A-E	H-bridge motor driver	8	5.5-18
Brushed DC	VNH5200AS-E	H-bridge motor driver	8	5.5-18
Brushed DC	VNH7100BAS	H-bridge motor driver	12	4-28
Brushed DC	VNH7070BAS	H-bridge motor driver	15	4-28
Brushed DC	VNH5019A-E	H-bridge motor driver	30	5.5-24
Brushed DC	VNH7040AY	H-bridge motor driver	35	4-28
Brushed DC	VNH9013Y	Power Stage with Thermal Sensor	40	4-36
Brushed DC	VNHD7008AY	H-bridge motor driver*	51	4-28
Brushed DC	L9960	H-bridge motor driver	-	4-28
Brushed DC	L9960T	Dual H-bridge motor driver	-	4-28
Brushed DC	L9805E	H-bridge motor driver with MCU	-	6.4-18
Brushed DC	L9958	SPI controlled H-bridge motor driver	-	4-28
Brushed DC	L9959	Single/Dual PMOS High-side H-bridge	-	4-28
Brushed DC	L9997ND	Dual Half Bridge Driver	-	7-16.5
Brushed DC	L9903	Motor bridge Pre-driver	-	8-20
Brushed DC	L9904	Motor bridge Pre-driver	-	8-28
Brushed DC	L99H01	Motor bridge Pre-driver	-	6-28
Brushless DC	L9907	3-phase gate pre-driver	0.6	6-54
Brushless DC	L99ASC03G	3-phase gate pre-driver with SPI	0.7	6-28
Stepper Motor	L9930	Dual full bridge driver	-	8-18
Stepper Motor	L9935	Two-Phase stepper motor driver	-	8-24
Stepper Motor	L99MD01	Motor driver	0.7	6-28
Stepper Motor	L99MD02	Motor driver	0.7	6-28
Stepper Motor	L9942	Microstepping stepper motor driver	1.3	7-20

Note: \* Two external Power Mosfet (LSDs) needed

[http://www.st.com/content/st\\_com/en/products/automotive-analog-and-power/motor-driver-ics.html](http://www.st.com/content/st_com/en/products/automotive-analog-and-power/motor-driver-ics.html)

## LINEAR VOLTAGE REGULATORS

ST offers a wide range of voltage regulators intended for automotive applications. The L49 series in BCD4 technology features a set of LDO voltage regulators with 5 V and up to 500 mA load-current capability. A PMOS-transistor pass element guarantees a very low dropout voltage of 400/500 mV and low

quiescent current. The L49 series embeds additional features such as reset, watchdog and enable pins, together with short-circuit and thermal protection. The L5 series in BCD5 technology has been developed to meet stricter line disturbance and noise rejection requirements. These products are

suitable for all the automotive applications like power supplies in body modules, junction boxes, cluster instrumentation, sun roof, door modules, seat positioning, electric park brake, windows lift, LED light control and keyless entry.

## LOW DROP VOLTAGE REGULATOR

Part Number	Package	Output Current (I <sub>out</sub> , mA)	Quiescent current at low load typ. (µA)	Features
L4938Ex	S0-20 PowerSO-20	OUT1:100 OUT2:400	65	R, EN, EW
L4949Ex	S0-8 S0-20	100	200	R, EW
L4979x	S0-8 S0-20	150	100/6*	R, EN, WD
L4988x	S0-8 S0-20	200	130	R, WD, WD, EN
L4989x	S0-8 S0-20	150	110	R, WD, WD, EN
L4993x	S0-8 S0-20	150	100	R, WD, WD, EN
L4995x	PowerSSO -12 PowerSSO-24	500	90/3*	R, EN
L5150x	SOT-223 PowerSSO-12 S0-8	150	50 55/5*	R(AT), EW
L5300x	HPAK PowerSSO-12 PPAK	300	55/5*	EN, R

Note: \* Regulator disabled

EN = Enable

R = Reset output

R(AT) = Reset (adjustable threshold)

WD = Watchdog timer

WD EN = Watchdog enable

## POWER MANAGEMENT AND SYSTEM BASIS ICS

Part Number	Package	Specific Features
L9952GXP	PowerSSO-36	Wake-up, OP-AMPS, PWM Interrupt, Contact monitoring and Temperature warning
L99PM62GXP	PowerSSO-36	HS-CAN Transceiver, Wake up, OP-AMPS, PWM Interrupt, Contact monitoring, Temperature warning, Time-out interrupt
L99PM60J	PowerSSO-16	Timers, Temperature warning
L99PM72GXP	PowerSSO-36	HS-CAN Transceiver supporting Partial networking functionality, Wake up, OP-AMPS, PWM Interrupt, Contact monitoring, Temperature warning, Selective Wake up

All devices include:

- LIN Transceiver
- High and Low side Driver
- Programmable reset and configurable watchdog
- Ultra low quiescent current
- Thermal shutdown, Fail safe output
- Short circuit protection, UnderVoltage and OverVoltage protection

[http://www.st.com/content/st\\_com/en/products/automotive-analog-and-power/linear-voltage-regulators.html](http://www.st.com/content/st_com/en/products/automotive-analog-and-power/linear-voltage-regulators.html)

## MICROCONTROLLERS - SPC560P AND SPC58 LINE MCUs



	SPC56 P Line	SPC58 B Line		SPC58 C Line	SPC58 G Line
<b>Core</b>	E200z0h @ 64 MHz	e200z2h @ 80 MHz	e200z4d @ 120 MHz	single or dual e200z4d @ 180 MHz	single dual or triple e200z4d @ 180 MHz
<b>eFlash Code</b>	192 kB to 1 MB Code 64 kB data	512 kB to 1 MB	1 MB to 2 MB	2 to 4 MB	4 to 6 MB
<b>ADC</b>	Up to 2x10 bit	1x12 bit	2x12 bit	4x12 bit, 1x10 bit	5x10 bit, 1x10 bit
<b>Networking</b>	Up to 2x LINFlex, 3x FlexCAN, 1x FlexRay	7x ISO CAN FD	8x ISO CAN FD ETH	8x ISO CAN FD ETH	8x ISO CAN FD 2x ETH
<b>Security/Safety</b>	ASIL-B		HSM	HSM	HSM/ASIL - D

Part Number	Core	Package (mm)	FLASH (kB)	RAM (kB)	A/D Ch.	Serial Interface
SPC560P34L1	e200z0	LQFP 64 10x10x1.4	192 (Prog) 64 (Data)	12	12	1x FlexCAN, 2x DSPI, 2x LINFlex
SPC560P40L1	e200z0	LQFP 64 10x10x1.4	256 (Prog) 64 (Data)	20	12	2x DSPI, 2x FlexCAN, 2x LINFlex
SPC560P40L3	e200z0	LQFP 100 14x14x1.4	256 (Prog) 64 (Data)	20	16	2x FlexCAN, 2x LINFlex, 3x DSPI
SPC560P44L3	e200z0	LQFP 100 14x14x1.4	384 (Prog) 64 (Data)	36	16	1x FlexRay, 2x FlexCAN, 2x LINFlex, 4x DSPI
SPC560P44L5	e200z0	LQFP 144 20x20x1.4	384 (Prog) 64 (Data)	36	26	1x FlexRay, 2x FlexCAN, 2x LINFlex, 4x DSPI
SPC560P50L3	e200z0	LQFP 100 14x14x1.4	512(Prog) 64 (Data)	40	16	1x FlexRay, 2x FlexCAN, 2x LINFlex, 4x DSPI
SPC560P50L5	e200z0	LQFP 144 20x20x1.4	512(Prog) 64 (Data)	40	26	1x FlexRay, 2x FlexCAN, 2x LINFlex, 4x DSPI
SPC560P54L3	e200z0	LQFP 100 14x14x1.4	768(Prog) 64 (Data)	64	16	1x FlexRay, 2x LINFlex, 3x FlexCAN, 5x DSPI
SPC560P54L5	e200z0	LQFP 144 20x20x1.4	768(Prog) 64 (Data)	64	26	1x FlexRay, 2x LINFlex, 3x FlexCAN, 5x DSPI
SPC560P60L3	e200z0	LQFP 100 14x14x1.4	1024(Prog) 64 (Data)	80	16	1x FlexRay, 2x LINFlex, 3x FlexCAN, 5x DSPI
SPC560P60L5	e200z0	LQFP 144 20x20x1.4	1024(Prog) 64 (Data)	80	26	1x FlexRay, 2x LINFlex, 3x FlexCAN, 5x DSPI

www.st.com/spc5



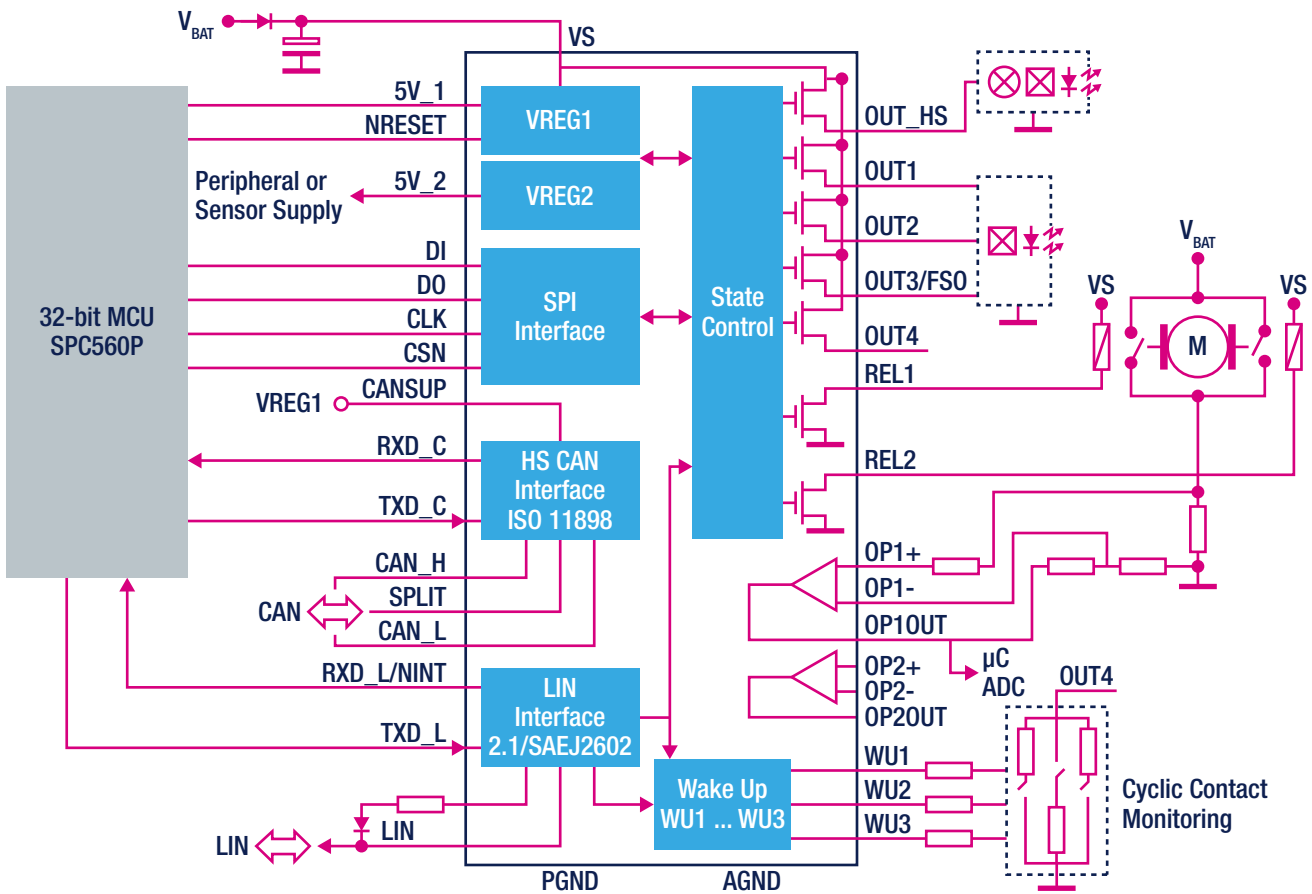
## POWER MANAGEMENT ICs

ST provides a large selection of Power Management ICs specifically conceived to fit into automotive infotainment systems, clusters, USB hubs, electronic control units (ECU), window lift, seat module, trunk module, trailer module, sunroof module, climate control (HVAC) and gateways as well as car body and door zone modules. They combine several power management building blocks, like linear regulators, switching voltage regulators and high-side switches, with an extensive set of diagnostic and protection features, including short-circuit and overvoltage, with a dedicated

control bus (I<sup>2</sup>C for multichannel ICs and SPI for Power Management ICs (System Basis Chips). The ST standard SPI interface allows developing generic software and take advantage of the advanced high-speed CAN transceiver with local failure and bus failure diagnostics. A LIN 2.1 compliant transceiver is embedded. Multichannel power management ICs satisfy current applications where many functions are concentrated in small places and complex processors as well as surrounding components increase their demand on power rails and current absorption. Here, other features including

rail sequencing, voltage monitors and basic diagnostics are often mandatory. The new product family of multiple voltage regulators easily supports the growing demand for UBS power management devices. The Power Management (System Basis Chip) provides enhanced power supply functions including various standby modes. Multiple high- and low-side drivers ensure accurate driving of motor controls and external loads including LEDs and sensors. A contact monitoring with programmable cyclic sense function increases the user interface capability.

### Typical applications for L99PM62GXP and L99PM72GXP



Part Number	General Description	Package
L4953G	Voltage regulator with backup and reset, ignition comparator and low voltage warning	MW 15L
L4954	Voltage regulator with backup and reset, overvoltage protection and low voltage warning	MW 15L
L5950	Voltage regulator with I <sup>2</sup> C bus, very low stand-by current and low spread output voltage	MW 15L
L5956	Voltage regulator with ignition comparator, reset, overcurrent protection and 3.3 V regulator with independent enable	MW 15L, PowerSO-20
L5957	Voltage regulator with ignition comparator, reset, overcurrent protection, 5 V regulator (CAN) with independent enable	MW 15L, PowerSO-20
L5958	Switchable linear voltage regulators with reset and battery voltage warning	Outline FW 27 SMD
L5959	Voltage regulator with very low stand-by current, reset, hold, backup, under/over voltage detection, overcurrent limitation	MW 15L
L5962	Voltage regulator with dc-dc plus switchable linear regulators controlled by I <sup>2</sup> C bus	PowerSSO-36
L5963	Dual monolithic switching regulator with LDO and HSD	PowerSSO-36, VFQFPN 48
L9758	Multiple supply for engine control	PowerSSO-36
L9952GXP	Power Management IC with LIN transceiver	PowerSSO-36
L99PM60J	Power Management IC with LIN transceiver	PowerSSO-16
L99PM62GXP	Power Management IC with LIN and high speed CAN	PowerSSO-36
L99PM72GXP	Advanced power management system IC with embedded LIN and high speed CAN transceiver supporting CAN Partial Networking	PowerSSO-36
L99PM72PXP	Advanced power management system IC with embedded LIN and high speed CAN transceiver supporting CAN Partial Networking	PowerSSO-36
L5964	Monolithic dual 3.5 A step-down switching regulator with LDO	LQFP, VFQFPN 48
L5965	Multiple power management for automotive vision and radar systems	VFQFPN 48



## AUTOMOTIVE PROTECTION DEVICES

ST's automotive-grade protection device series meets all standard needs for automotive including: ESD protection, load-dump protection and power-rail transient voltage suppressor (TVS) protection.

As such, ST's TVS clamping diodes, or Transil™, are designed to protect sensitive automotive circuits against overvoltage surges defined in ISO 7637-2 and against electrostatic discharges according to IEC 61000-4-2 and ISO 10605. The broad range of devices addresses all the protection sockets in automotive applications, from infotainment, navigation, communication, audio and video to battery charging systems, smart junction boxes, and relay and power-line protection. Standard automotive bus interfaces are supported to meet applications requiring CANbus, LINbus, and FLEXray.

Surges	pulses	
ISO 7637-2	5a 5b	Automotive grade load-dump protection
	3a 2a 1a	Automotive grade power-rail TVS protection
ESD		Automotive grade dataline ESD protection

Type	Part Number	Package	ISO 7637	ISO 10605	Direction	Numb of lines
TVS	SM15TY	SMC	1,2a,2b,3a,3b	true	UNI	1
TVS	SM30TY	SMC	1,2a,2b,3a,3b	true	UNI	1
TVS	SM4TY	SMA	1,2a,2b,3a,3b	true	UNI	1
TVS	SM6T250CAY	SMB	1,2a,2b,3a,3b	true	UNI	1
TVS	SM6TY /A6TY	SMB/SMA	1,2a,2b,3a,3b	true	UNI	1
Load Dump	LDP01-26AY	D <sup>2</sup> PAK	1,2a,2b,3a,3b	true	UNI	1
Load Dump	LDP01-30AY	D <sup>2</sup> PAK	1,2a,2b,3a,3b	true	UNI	1
Load Dump	LDP01-35AY	D <sup>2</sup> PAK	1,2a,2b,3a,3b	true	UNI	1
Load Dump	LDP01-56AY	D <sup>2</sup> PAK	1,2a,2b,3a,3b	true	UNI	1
Load Dump	LDP01-68AY	D <sup>2</sup> PAK	1,2a,2b,3a,3b	true	UNI	1
Load Dump	LDP01-82AY	D <sup>2</sup> PAK	1,2a,2b,3a,3b	true	UNI	1
Load Dump	LDP24A	R6	1,2a,2b,2c,3a,3b	true	UNI	1
Load Dump	RBO40	D <sup>2</sup> PAK	1,2a,2b,2c,3a,3b	true	UNI	1
ESD	DALC208SC6Y	SOT23-6L	3a,3b	true	UNI	4
ESD	EMIF02-020ABRY	QFN-6L WF	1,2a,2b,3a,3b	true	BI	2
ESD	ESDA14V2SC5Y	SOT23-5L	1,2a,2b,3a,3b	true	UNI	4
ESD	ESDA25SC6Y	SOT23-6L	1,2a,2b,3a,3b	true	UNI	4
ESD	ESDA5V3SC6Y	SOT23-6L	3a,3b	true	UNI	4
ESD	ESDA6V1-5SC6Y	SOT23-6L	3a,3b	true	UNI	5
ESD	ESDALC5-1BT2Y	SOD-882T	3a,3b	true	BI	1
ESD	ESDAVLC8-1BT2Y	SOD-882T	3a,3b	true	BI	1
ESD	ESDCAN06-2BWY	SOT323-3L	1,2a,2b,3a,3b	true	BI	2
ESD	ESDCAN24-2BLY	SOT23-3L	3a,3b	true	BI	2
ESD	ESDLIN03-1BWY	SOT323-3L	1,2a,2b,3a,3b	true	BI	1
ESD	ESDLIN1524BJ	SOD-323	3a,3b	true	BI	1
ESD	HDMIULC6-4SC6Y	SOT23-6L	3a,3b	true	UNI	4
ESD	HSP061-4M10Y	uQFN-10L	3a,3b	true	UNI	4

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## AUTOMOTIVE SENSORS FOR SAFETY AND NOT SAFETY APPLICATIONS

ST offers a portfolio of MEMS automotive sensors qualified according to AEC-Q100. Our automotive sensor portfolio includes digital accelerometers with low and high g full scale, and digital 3-axis gyroscopes. ST's low g 3-axis accelerometers have advanced power-saving features and an extended temperature range that make them the ideal choice for non-critical automotive applications including telematics, navigation, infotainment and security. Our high g

acceleration sensors feature an extended temperature range and are suitable for airbag applications in vehicle safety restraint systems. Our 3-axis gyroscopes offer superior stability over time and temperature, and guarantee the level of accuracy required by the most advanced navigation systems embedding dead reckoning. ST's 3-axis gyroscopes have a single sensing structure for motion measurement along all three orthogonal axes, while other solutions on

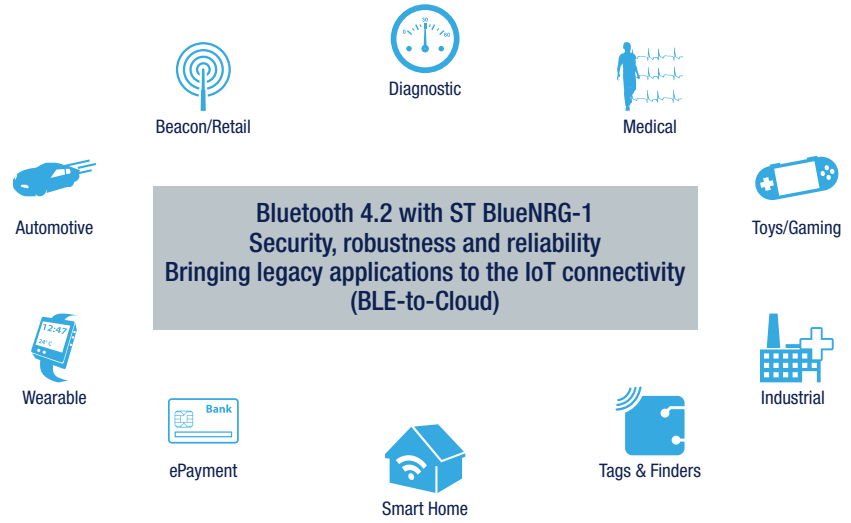
the market rely on two or three independent structures. Our solution eliminates any interference between the axes that inherently degrades the output signal. The result is increased accuracy and reliability of motion-controlled functionalities. ST's MEMS automotive sensors are developed on the same technology platform used for high-volume MEMS at the core of many industrial and consumer applications.

Type	Part Number	General Description	Package
Gyro	A3G4250D	3-axis digital output	LGA 16 4 x 4 x 1.1 mm
Acceler.	AIS1120SX	Single-axis for central airbag applications	SO-8
Acceler.	AIS1200PS	Single-axis with PS15 point-to-point interface	SO16
Acceler.	AIS2120SX	Dual-axis high g for airbags	SO-8
Acceler.	AIS328DQ	High-performance ultra-low-power 3-axis	QFN 24 4 x 4 x 1.8 mm
Acceler.	AIS3624DQ	3-axis non-safety automotive applications	QFN 24 4 x 4 x 1.8 mm
Humidity	HTS221	Capacitive digital sensor	HLGA-6L 2 x 2 x 0.9 mm
Barometer	LPS22HD	260-1260 hPa	2.0 x 2.5 x 0.8 mm
Barometer	LPS22HB	260-1260 hPa	2 x 2 x 0.76 mm
Barometer	LPS25H/B	260-1260 hPa MEMS pressure sensor	2.5 x 2.5 x 0.76 mm
Barometer	LPS35HW	260-1260 hPa with water resistant package	3.5 x 3.5 x 1.85
Temper.	LM334	3-terminal adjustable current source	SO-8
Temper.	LM335	Precision temperature sensor	SO-8, TO-92
Temper.	STCN75	Digital temperature sensor and thermal watchdog	MSOP/TSSOP 8
Temper.	STDS75	Digital temperature sensor and thermal watchdog	MSOP/TSSOP 8
Temper.	STLM75	Digital with thermal watchdog	MSOP/TSSOP 8, SO-8
Temper.	STTS2004	2.2 V memory module temperature sensor with a 4 Kb SPD EEPROM	TDFN8 2 x 3 x 0.75
Temper.	STTS75	Digital temperature sensor and thermal watchdog	MSOP/TSSOP 8, SO-8
Temper.	STTS751	2.25 V low-voltage local digital temperature sensor	DFN6 2 x 2 x 0.5, SOT23-6L
Range	VL53L0X	World smallest Time-of-Flight (ToF) ranging sensor	OPTICAL LGA12 4.4 x 2.4 x 1 mm
Gesture	VL6180X	Proximity sensor, gesture and ambient light sensing (ALS) module	OPTICAL LGA12 4.8 x 2.8 x 1 mm

## CONNECTIVITY

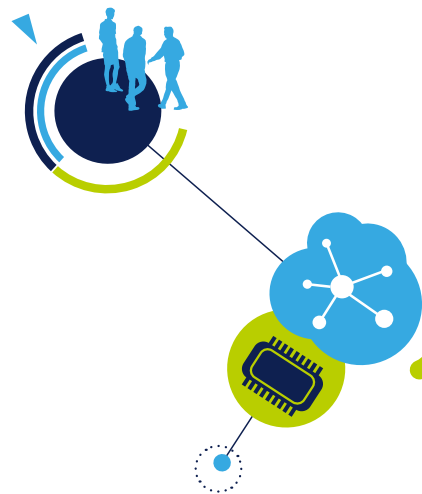
### Bluetooth connectivity

ST's proprietary BlueCore technology – powered by the embedded ST Bluetooth Low Energy master and slave certified stack – features ultra-low power consumption together with an excellent RF link budget for robust and reliable connectivity. The optimized radio front-end and the efficient power management architecture will extend battery life from months to years. The on-chip non-volatile memory enables an easy and quick firmware upgrade, including in-the-field over-the-air (OTA) upgradability. ST modules for Bluetooth Smart and Bluetooth Classic technologies – based on our device portfolio and equipped with on-board antenna, crystal and balun – offer a proven, robust and quick time-to-market solution. They come with the embedded Bluetooth stack to provide a BQE end product qualified solution that is also fully RF, ETSI, IC and FCC certified, thus ensuring rapid integration into the final application and providing an easy-to-use solution.



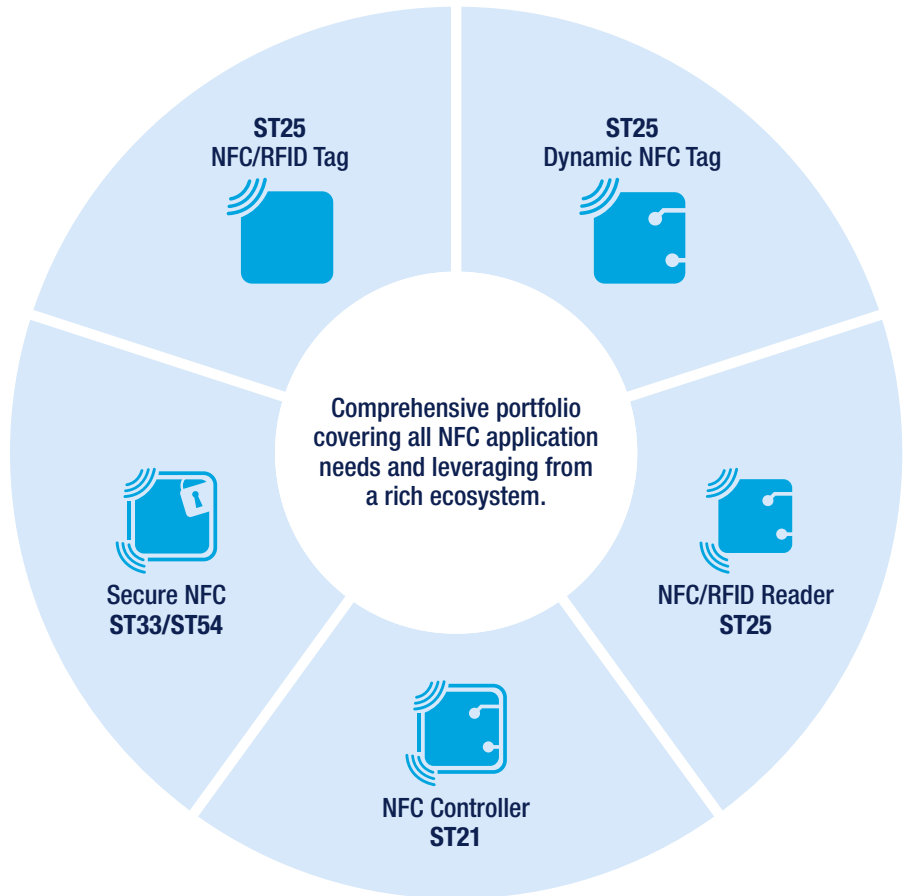
Part Number	General Description	Package
SPBTLE-RF	Very low power module for Bluetooth Smart v4.1	RF MODULE
BlueNRG-1	Bluetooth Low Energy system-on-chip	VFQFPN,WLCSP MSL1
BlueNRG-MS	Bluetooth Low Energy network processor supporting Bluetooth 4.1 core specification	VFQFPN32 ,WLCSP MSL1
SPBT3.ODP1	Bluetooth Technology Class1 - iAP2	RF MODULE
SPBT3.ODP2	Bluetooth Technology Class2 - iAP2	RF MODULE
BALF-NRG-01D3	50 Ω nominal input/conjugate match balun with integrated harmonic filter for BlueNRG transceiver	Chip Scale Package 0.4 mm pitch

[www.st.com/bluetooth](http://www.st.com/bluetooth)



## NFC connectivity

Near Field Communication (NFC) was born as a specialized subset of the 13.56 MHz RFID technology in 2002. Initially used for access control and public transport payment cards, the integration into credit / debit cards and smartphones is driving rapid growth not only for payment but also as an always-on radio link for simple pairing, diagnostic readout, parameter programming and much more. One of the pioneers of RFID and NFC technology, ST offers a comprehensive range, covering all NFC application needs, supported by a rich ecosystem. The devices include NFC / RFID tags, dynamic NFC tags, NFC / RFID readers & NFC controllers including secure element and turnkey solutions.



ST's dynamic NFC / RFID tags feature up to 64-Kbit of EEPROM memory which can be accessed either through a low-power I<sup>2</sup>C interface or an RF contactless interface operating at 13.56 MHz. Both short-range (ISO 14443-A) and long-range (ISO 15693) standards are supported:

- M24SR series: ISO 14443-A NFC Forum Type 4 dynamic tag designed for consumer electronics, wearables, home appliances and more
- M24LR series: ISO 15693 dynamic tag optimized for industrial, metering, healthcare, medical equipment and more
- ST25DV series: ISO 15693 NFC Forum Type 5 dynamic tag suited for consumer electronics, industrial, metering, electronic shelf labels, IoT objects and more



Dynamic NFC Tags		
M24SR	M24LR	ST25DV
ISO14443-A 106kb/s NFC type 4	ISO15693 up to 53kb/s	ISO15693 up to 53kb/s NFC type 5
EEPROM 2Kbit to 64Kbit 200-year, 1Mcycles	EEPROM 4Kbit to 64Kbit 40-year, 1Mcycles	256Bytes buffer EEPROM 4Kbit to 64Kbit 40-year, 1Mcycles
128bit password RF disable Field detect	32bit password E-harvesting Field detect	Fast Transfer Mode 64bit password E-harvesting Field detect
I <sup>2</sup> C 2.4V - 5.5V 1MHz	I <sup>2</sup> C 1.8V - 5.5V 400kHz	I <sup>2</sup> C 1.8V - 5.5V 1MHz
Consumer Home appliance Wearable	Metering Lightning Healthcare	Metering, Lightning Healthcare Home automation

Part Number	General Description	Contactless RF Interface	Memory Capacity (b)	Package
M24LR04E-R	4-Kbit Dynamic NFC/RFID tag with password protection, energy harvesting and RF status functions	ISO 15693	4096	S08,TSSOP8, UFDFPN 8
M24LR16E-R	16-Kbit Dynamic NFC/RFID tag with password protection, energy harvesting and RF status functions	ISO 15693	16384	S08,TSSOP8, UFDFPN 8
M24LR64E-R	64-Kbit Dynamic NFC/RFID tag with password protection, energy harvesting and RF status functions	ISO 15693	65536	S08,TSSOP8, UFDFPN 8
M24SR02-Y	2-Kbit Dynamic NFC/RFID tag NFC Forum Type 4 with I <sup>2</sup> C interface and password protection	ISO 14443	2048	S08,TSSOP8, UFDFPN 8
M24SR04-G	4-Kbit Dynamic NFC/RFID tag NFC Forum Type 4 with I <sup>2</sup> C interface and password protection	ISO 14443	4096	GOLD BUMPED DICE, UFDFPN 8
M24SR04-Y	4-Kbit Dynamic NFC/RFID tag NFC Forum Type 4 with I <sup>2</sup> C interface and password protection	ISO 14443	4096	S08,TSSOP8, UFDFPN 8
M24SR16-Y	16-Kbit Dynamic NFC/RFID tag NFC Forum Type 4 with I <sup>2</sup> C interface and password protection	ISO 14443	16384	S08,TSSOP8, UFDFPN 8
M24SR64-Y	64-Kbit Dynamic NFC/RFID tag NFC Forum Type 4 with I <sup>2</sup> C interface and password protection	ISO 14443	65536	S08,TSSOP8, UFDFPN 8
ST25DV04K	4-Kbit Dynamic NFC/RFID tag NFC Forum type V with I <sup>2</sup> C interface, fast transfer mode and energy harvesting	ISO 15693	4096	S08,TSSOP8, UFDFPN 12, UFDFPN 8
ST25DV16K	16-Kbit Dynamic NFC/RFID tag NFC Forum type V with I <sup>2</sup> C interface, fast transfer mode and energy harvesting	ISO 15693	16384	S08,TSSOP8, UFDFPN 12
ST25DV64K	64-Kbit Dynamic NFC/RFID tag NFC Forum type V with I <sup>2</sup> C interface, fast transfer mode and energy harvesting	ISO 15693	65536	S08,TSSOP8, UFDFPN 12

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## TRANSCEIVERS

ST offers monolithic ICs containing standard ISO 9141 compatible interface functions and bidirectional transceivers for signal conditioning that operate with a CAN controller and meet ISO/DIS 11898 up to 1 Mbaud.

Part Number	General Description	Package	Data Bit Rate (Bd) typ	Fault tolerant	Load dump protection	Overvoltage protection	Reverse battery protection
L9613	Medium-speed data interface	S0-8	130000	True	False	True	True
L9615	High-speed CAN bus transceiver	S0-8	500000	False	True	False	False
L9616	High-speed CAN bus transceiver	S0-8	1000000	False	False	False	False
L9637	ISO 9141 Interface	S0-8	1000000	True	True	True	True
L9663	PSI5 transceiver	QFN 5X5 mm, TQFP 32	-	-	-	-	-

[http://www.st.com/content/st\\_com/en/products/automotive-analog-and-power/transceivers.html](http://www.st.com/content/st_com/en/products/automotive-analog-and-power/transceivers.html)



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