life.augmented

ST's solutions for mobile devices

Content

Introduction

STMicroelectronics is a leading semiconductor supplier in the mobile industry and provides solutions to both mobile platform suppliers and mobile device manufacturers (OEM/ODM). ST has proven products for the cellular handset and mobile device markets and ships billions of products to the mobile industry every year.

These products include the world's most deployed MEMS accelerometers, gyroscopes, magnetometers, pressure sensors, compasses and inertial modules, state-of-the-art analog and digital MEMS microphones, high-quality audio headphone and speaker amplifiers, touch-sensor controllers with multi-touch capabilities, Near Field Communication Secure MCUs for SIM, M2M SIM and Secure Elements, a wide RF product offer based on Integrated passive device technology, ESD protection and EMI filtering products (IPAD™), interface devices, level translators, I/O expanders, antenna tuner, analog switches, supervisors and smart resets, imaging solutions with photonic sensors like proximity and gesture sensors, ranging sensors, ambient light sensors, high-efficiency power management devices and innovative lighting management solutions. ST is an active player in all major standardization initiatives.

- High-volume manufacturing capacity
- Multiple production sites
- Integrated HW and SW solutions
- High-quality products, already tested in different application fields
- Strong commitment to Sustainable Technology

INTERFACE AND INTERCONNECTED DEVICES
Level translators, I/O expanders, camera interfaces, analog switches, supervisors and smart resets

SIGNAL CONDITIONING
Op amps, comparators

IMAGING SOLUTIONS
Proximity and gesture sensors, ranging sensors, and ambient light sensors

MICROCONTROLLERS
32-bit STM32 ARM® Cortex® -based MCUs and 8-bit STM8 MCUs offer a wide choice of solutions

MEMORY
Serial EEPROM
(2 Kbits up to 2 Mbits) in a miniature packages

NFC, SIM AND SECURE ELEMENTS
NFC controllers and transceivers, and secure MCUs

SENSORS AND USER INTERFACES
Accelerometers, gyroscopes, pressure sensors, iNEMO-Inertial modules, digital compasses, proximity sensors, touchscreen controllers, optical finger navigation sensors, and temperature sensors

AUDIO SOLUTIONS
MEMS digital and analog microphones, headphone and speaker amplifiers

POWER MANAGEMENT
LDO and DC-DC converters, battery management, Flash LED and backlight drivers, and OLED display power supplies, battery monitoring

RADIO FREQUENCY
Couplers, diplexers, baluns, and band-pass filters

PROTECTION AND EMI FILTERING
ESD and EOS protections, EMI filtering

SMART ANTENNA TUNING
Tunable RF capacitors, and dynamic impedance matching controllers

MEMS and Sensors

The most diversified and complete MEMS and sensors supplier

ST has shipped more than 14 billion micro-electromechanical sensors and has one of the industry's most extensive sensor portfolio including proximity sensors and accelerometers, gyroscopes, digital compasses, inertial modules, microphones, and environmental sensors such as pressure, temperature and humidity sensors.

- A unique sensor portfolio, from discrete to fully-integrated solutions, to meet all design needs
- High-volume manufacturing capacity to provide cost competitive solutions, fast time-to-market and security of supply
- High-performance sensor fusion to improve the accuracy of multi-axis sensor systems in order to enable emerging and highly-demanding applications, such as indoor navigation and location-based services
- High-quality products, already tested in different application fields, including mobile, portable, gaming, consumer, automotive and health care segments
- Multiple sites dedicated to MEMS, with full in-house dual-sourcing, guaranteeing 100% security of supply

COMPLETE SOLUTION

- Large sensor portfolio
- Integrated hardware and software solutions
- 100% security of supply
- Scalability of solutions
- Quality is a must for ST
- ST is MEMS market leader

ACCELEROMETERS

ST's state-of-the-art MEMS accelerometers include analog and digital sensors featuring up to ±400g acceleration full scale and from 1.71 to 3.6 V supply voltage. Accelerometers have advanced power-saving features that make them suitable for ultra-low-power applications. These features include low-power mode, auto wake-up function and a FIFO buffer that can be used to store data, thus reducing the host processor loading and system power consumption. The small size and embedded features of ST's accelerometers make them an ideal choice for applications where long battery life is required.

KEY FEATURES

- Low power consumption and smart ultra-low-power operating modes including Always-on
- High resolution: accuracy and stability
- Selectable full-scale up to 16g
- Smart embedded features for less power hungry systems
- Ultra compact devices in packages smaller than 4 mm^3
- Advanced digital features
- Pin to pin compatible product family

Part number	Package size (mm)	Full-scale typ (g)	Typical Noise density (µg/√Hz)	Key features
LIS2DW12	2 x 2 x 0.7	±2; ±4; ±8; ±16	90	High-performance ultra-low-power 3-axis «femto» accelerometer
LIS2DS12	2 x 2 x 0.86	±2; ±4; ±8; ±16	100	14-bit, embedded smart functionalities
LIS2DH12	2 x 2 x 1	±2; ±4; ±8; ±16	220	12-bit,embedded FIFO, board compatible with compasses, ultra-low-power
LIS3DSH	3 x 3 x 1	±2; ±4; ±8; ±16	150	Ultra-low-power , high performance, 3-axis «nano» accelerometer with embedded programmable state machine
LIS2DE12	2 x 2 x 1	±2; ±4; ±8; ±16	220	8-bit ultra-low-power, high-performance 3-axis accelerometer
H3LIS331DL	3 x 3 x 1	±100; ±200; ±400	15000	16-bit data output, shock detection, impact recognition and logging, concussion detection

DIGITAL COMPASSES

ST's digital compasses include combo solutions, with an accelerometer and magnetic sensor integrated in a single LGA package and standalone magnetometer, to give the possibility of designing a solution locating the magnetic sensor in the best position on the board in order to minimize magnetic interference.

KEY FEATURES

- Superior sensing precision combined with low power consumption
- Wide magnetic range with high sensitivity magnetic-scale range
- Ultra low magnetic offset and low noise
- Compact package footprint, pinout compatible with 2x2 accelerometer

Part number	Package size (mm)	Description	Magnetic Range (Gauss) typ	Idd (mA)	Key parameters
LIS3MDL	2 x 2 x 1	Ultra-low-power,high performance, 3-axis digital output magnetometer	±4; ±8; ±12,±16	0.04 LP 0.27 HP	±4; ±8; ±12,±16 gauss selectable magnetic full scales, self test capability
LIS2MDL	2 x 2 x 0.7	Ultra-low-power,high performance, 3-axis digital output magnetometer	±50	0.05 LP combo mode 0.2 HP combo mode	±50 gauss magnetic dynamic range, 3 magnetic field channels, Noise 3mGauss(RMS), ultra-low-power
LSM303AH	2 x 2 x 1	Ultra-compact high-performance eCompass module: ultra-low-power 3D accelerometer and 3D magnetometer	±50	0.05 LP 0.2 HP	±50 gauss magnetic dynamic range, ±2; ±4; ±8,±16 g selectable acceleration full scale

iNEMO® INERTIAL MODULES

iNEMO System-in-packages (SiP) combine accelerometer and gyroscope in a monolithic 6-axis. The integration of multiple sensor outputs bring motion sensing systems to the level of accuracy required for the most demanding applications, such as enhanced gesture recognition, gaming, augmented reality, indoor navigation and localization-based services. With the last generation of iNEMO particularly suitable for mobile, ST have been introduced the Machine Learning Core (MLC) concept. This is an accurate low-power edge processing that enables together with FSM (Finite State Machine) a precise analysis and reconstruction of users Activities and Gesture.

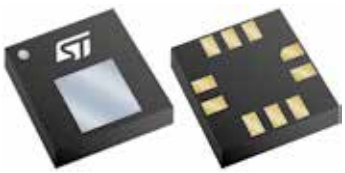
KEY FEATURES

- Always-on 3D accelerometer and 3D gyroscope
- Machine Learning Core (MLC) for advanced Activity Recognition (in LSM6DSOX)
- Dedicated OIS core controlled via Aux Interface I3C interface
- Data acquisition from up to 4 external sensors
- Finite State Machine (FSM) for up to 16 custom gestures recognition in low power mode
- Android compliant
- Pedometer,step detector and step counter
- Rate noise density mdps/√Hz (High Perf. Mode)
- Embedded Self Test and Temperature sensor
- Full supports EIS and OIS applications as the module includes a dedicated configurable signal processing path for OIS and auxiliary SPI, configurable for both the gyroscope and accelerometer

Parameter	LSM6DSOX	LSM6DSO
Current consumption in High-performance mode (mA)	0.55	0.55
Current consumption in normal mode (mA)	0.43	0.43
Noise density in High-performance mode @ 2g Accelerometer (µg/√Hz)	70	70
Typical gyro noise density in High-performance mode (mdps/√Hz)	3.8	3.8
ODR (Hz)	Accel: 1.6 to 6664	1.6 to 6664
	Gyro: 12.5 to 6664	Gyro: 12.5 to 6664
FIFO depth	Up to 9 Kbytes	Up to 9 Kbytes
Sensor data collection	Yes	Yes
Pedometer	Yes v2.0	Yes v2.0
Sensor sync	Yes	Yes

PRESSURE SENSORS

ST's absolute digital output barometer integrates ST's consolidated pressure sensor with the new fully molded package to further improve robustness, reliability and moisture resistance while reducing package thickness.



BENEFITS

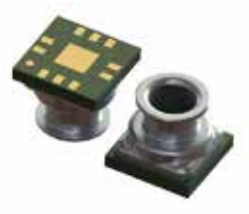
- Ultra-small footprint
- Low-power consumption
- Fully-molded package ensure stability and robustness in any condition and water resistance

Part number	Package (mm)	Pressure range (hpa)	Relative accuracy (hpa)	Absolute accuracy (hpa)	Noise	ODR (Hz)	Current consumption	Highshock survivability (g)	Advanced digital features
LPS22HH	HLGA-10L, 2 x 2 x 0.73 Full-molded	260 to 1260	±0.025	±0.5	0.65Pa RMS (with embedded filter) 1.7Pa RMS (without embedded filter	1, 10, 25, 50, 75,100, 200	12 µA @ 1 Hz (high resolution mode) 4 µA @ 1 Hz (low power mode)	22.000	128 samples FIFO/Embedded compensation/ Interrupt/ I2C/I3C/SPI
LPS22HB	HLGA-10L, 2 x 2 x 0.76 Full-molded	260 to 1260	±0.1	±1	2Pa RMS (with embedded filter) 0.75Pa RMS (without embedded filter	1, 10, 25, 50, 75	12 µA @ 1 Hz (high resolution mode) 3 µA @ 1 Hz (low power mode)	22.000	32 samples FIFO/Embedded compensation/ Interrupt/I2C/SPI

Note: a complete list of part numbers is available at www.st.com/pressure

WATER-PROOF PRESSURE SENSOR

Waterproof pressure sensors are also availble in STs pressure sensors portfolio. The LPS33HW is a waterproof pressure sensor, resistant to chemicals like chlorine, bromine, salt water and also resistant to soaps or detergents. Due to the sensor's high-performance built-in processor and the advanced formula of its water-resistant gel filling gives performance advantages and fast recovery between factory and store-shelf.
The LPS33HW can withstand being submerged up to 90 meters.



Part number	Package (mm)	Pressure accuracy (hpa)	Relative accuracy (hpa)	Absolute range (hpa)	Noise hPa (RMS)	ODR (Hz)	Current consumption	Overpressure	Advanced digital features
LPS33HW	CCLGA10L (3.3 x 3.3 x 2.9)	260 to 1260	±0.1	±1 after OPC ±2.5 before OPC	0.8Pa RMS (with embedded filter) 2Pa RMS(without embedded filter)	1, 10, 25,50, 75	15 µA @ 1 Hz (high resolution mode) 3 µA @ 1 Hz (low power mode)	10ATM	FIFO for Pressure Sensor data Programmable Interrupt/Data ready

HUMIDITY AND TEMPERATURE SENSORS

The HTS221 is an ultra-compact sensor that measures relative humidity and temperature. Housed in a tiny but robust HLGA package (2 x 2 x 0.9 mm), the HTS221 is suitable for wearable and portable devices and all applications where comfort, health and safety might be negatively impacted by humidity and temperature variations.

BENEFITS

- Ultra-small footprint
- Low-power consumption to address wearable devices
- Allows customized calibration for best design flexibility

Part number	General description	Package	Supply voltage min-max (V)	Humidity (RH) min-max (% RH)	Interfaces
HTS221	Capacitive digital sensor for relative humidity and temperature	HLGA-6L 2 x 2 x 0.9 mm	1.7-3.6	0-100	SPI, I²C

TEMPERATURE SENSORS

STMicroelectronics' temperature sensors include both analog and digital temperature sensor ICs.

DIGITAL TEMPERATURE SENSORS BENEFITS

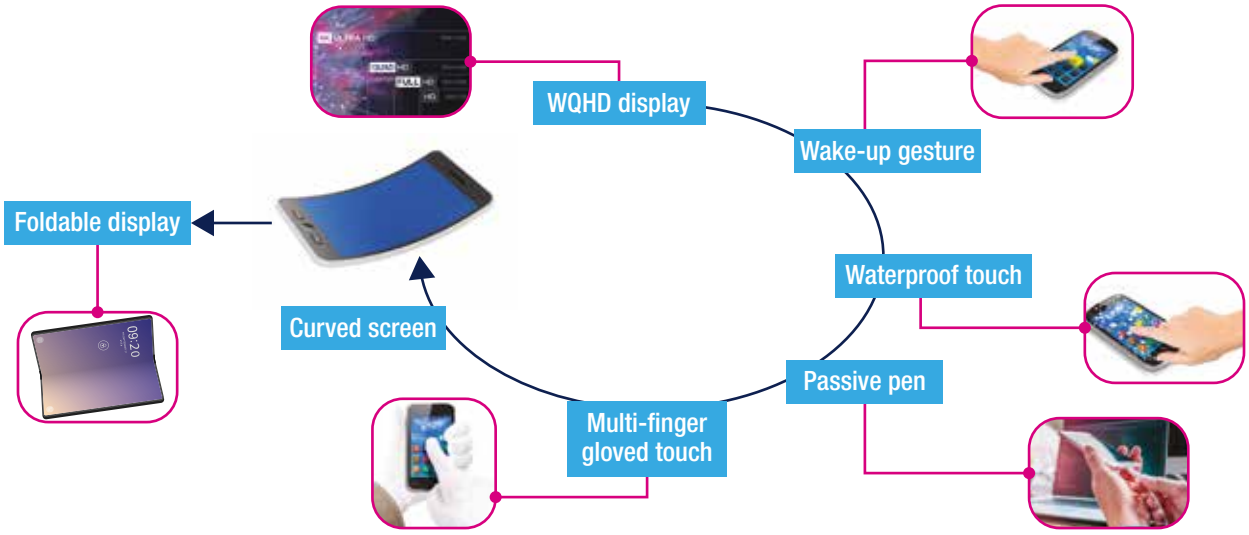
- One-shot mode for power saving
- Dual alarm
- Tiny package
- Programmable resolution
- Low supply current

ANALOG TEMPERATURE SENSORS BENEFITS

- Ultra small package: UDFN-4L (1 x 1.3 mm)
- Ultra-Low supply current: 4.8 µA typ.
- Oper. temperature: -55°C to 130°C

Part number	Package	General description	I/O Interface	Operating voltage min-max (V)	Standby current (µA typ)	Operating current (µA typ)
STTS751	UDFN-6L (2 x 2 mm)	2.25 V low-voltage local digital temperature sensor	SMBus/I²C compatible	2.25-3.6	3	15
STLM20	UDFN-4L (1 x 1.30 mm)	Ultra-low current 2.4 V precision analog temperature sensor	-	2.4-5.5	-	4.8

Touch sensing



ULTRA-LOW POWER CAPACITIVE MULTI-TOUCH SCREEN CONTROLLER FOR 5” TO 13” SCREENS

FingerTip capacitive touchscreen controller

FingerTip provides an optimal mix of low power, small size, low external part count and versatile features with unmatched true multi-touch performance in a single-chip touchscreen controller.
The touchscreen controller can detect, classify, and track 10 finger touches with fast a report rate and response times.
The touch acquisition analog front-end has a wide dynamic range capable of coping with touchscreens of different sizes and configurations.

This offers the flexibility to use FingerTip with multiple touchscreens using different ITO designs and overlay materials. One- or two-layer ITO sensors are supported using glass or PET substrates. FingerTip provides support for curved displays through proprietary node compensation hardware.

FingerTip’s low-noise capacitive analog front-end provides enhanced noise suppression capabilities for various noise sources such as display, 3-phase noise and severe common mode noise introduced by battery chargers.
The device utilizes ST proprietary hardware and firmware techniques to significantly reduce power in low-power active and low-power idle modes, and incorporates multiple TX driving methods that can further boost the SNR and report rate.

Advanced features

- Multi-mode sensing technology: Detects water on the top of the screen without false touch or line breaking
- Multi-finger glove operation
- Thick glove support

All types of SYNC mode (HSYNC and VSYNC) support, which enables touch sampling to be synchronized with the display SYNC signal to work even with quad high definition displays.

The main processor implements a powerful 32-bit ARM Cortex-M3 core with Flash memory that is capable of providing a high level of overall touch performance in terms of noise rejection, response time, and power consumption.
The device supports an I²C serial interface, I²C master interface, HID over I²C interface, and SPI interface for greater flexibility.

KEY FEATURES

- Touch screen size with round or square form factor
- Support all types of Touch ITO
- I²C, I³C, SPI, HID over I²C interfaces
- Ultra-low power modes for longer battery life
- Small BGA packages of 0.47 mm max thickness
- Scan rate > 150 Hz
- High SNR
- Noise immunity to all sources
- GPIO for button support
- Support for multi-finger, thick glove, wet fingers

You can find further information at address: https://www.st.com/en/touch-and-display-controllers.html

Imaging solutions

STMicroelectronics offers a family of high-accuracy and target-independent ranging sensors, leveraging ST's own patented technology called FlightSense™ using the Time-of-Flight (ToF) principle.
ST's FlightSense™ products combine high performance, a small package footprint and low power consumption to make them ideally suited for wireless applications and handheld devices.
ST pioneered high-volume production of fully integrated miniature Time-of-Flight products. These Imaging solutions are creating new innovative use-cases and enhanced user-experiences across a wide range of end products and markets.
ST's internal manufacturing and supply chain guarantees supply demanded by high-volume applications such as mobile phones or tablets.

FlightSense™ ranging sensors can be used in a host of application area:

- Proximity sensing
- Camera autofocus assist
- Vacuum cleaners, service robots and toys for wall tracking, cliff detection, collision avoidance
- Hover/landing assistance for drones
- Home appliances: Ambient light sensing, gesture recognition for light management, automatic door control
- Special power-saving presence detection mode enabling innovative auto-sleep/wake-on-approach use cases for PCs, notebooks and IoT devices
- Further applications include washroom automation in toilets, faucets or soap dispensers, and package counting to aid inventory management in vending machines or smart-shelf systems

KEY FEATURES

- Accurate and high-speed distance measurement
- Low power consumption
- Competitive system cost
- Easy integration with flexible mechanical design
- Development tools and technical support
- Driver and API available
- Full set of documentation on https://www.st.com/content/st_com/en/products/mems-and-sensors/proximity-sensors.html
- Proximity sensor NUCLEO expansion board compatible with STM32 NUCLEO family

SYSTEM ARCHITECTURE

The FlightSense™ proximity and ranging sensor contains an array of SPAD (Single Photon Avalanche Diode) detectors. The SPAD array forms part of an advanced system architecture that can detect the arrival of individual photons and hence calculate the time taken for the photon to leave the module, hit the target and then return back to the module. Actual distance measurement combined with signal amplitude allows simple, but robust, gesture recognition to enable multiple use cases.
Furthermore, the FlightSense™ proximity and ranging sensors ultra-low-power system architecture is perfectly suited to the demanding requirements of wireless and consumer products.

MODULE DESIGN

All components needed to support the proximity sensor and ambient light sensor are embedded in the simple optical module. No mechanical gaskets or additional lens systems are required to complete the industrial design.
The module can be mounted on the host PCB using a standard reflow profile or flex attached.
Its unique time-of-flight properties allow the module to be hidden behind a wide variety of cover-glass materials. This enables very innovative product design with the possibility of removing the optical hole that normally forms part of the industrial design.

Part number	General description	Key features
VL53L0X	The smallest time-of-flight (ToF) ranging sensor on the market today, enabling accurate measurement up to 2 meters	• Accurate range measurement up to 2 meters, independent of target reflectance • Small form factor, easy integration • Low Power for battery operated devices
VL6180X	A proximity sensor, ambient light sensor (ALS) and IR light source in a single integrated module	• Proximity sensor, indicating actual distance from 0 to 40 cm typical • Ambient Light Sensor: 0 to 100 k Lux • Low power: Standby <1 µA, Low Power ranging 60 µA • Module including Laser class1 IR emitter
VL53L1X	New generation of Time-of-Flight ranging sensor, able to measure long distance up to 4 meters and enabling new use cases thanks to its integrated lens and programmable Field-of-view	• Long distance ranging up to 4 meters • Very fast (up to 100 Hz) • Programmable Field-of-view (15 degrees up to 27 degrees) • Small form factor, easy integration

Audio solutions

MEMS microphones and audio subsystems

High-quality audio is the differentiating factor for multimedia-rich mobile platforms. ST manufactures state-of-the art analog and digital microphones with MEMS technology enabling crystal-clear sound and conversations. Our audio amplifier portfolio ranges from class G headphone drivers to class AB and class D speaker drivers that deliver high-quality sound extremely efficiently.

MEMS MICROPHONES

MEMS microphones target all audio applications where small size, high sound quality, reliability, and affordability are key. Our microphones meet price points set by the traditional electret condenser microphones (ECM), while featuring superior reliability and robustness. ST's MEMS microphones perfectly pair with our latest generation of Sound Terminal® audio processing devices, that feature a dedicated built-in interface for direct connection of a MEMS microphone, saving part count and cost.

HEADPHONE AMPLIFIERS

Very high audio quality and low power consumption with capacitor-less class G architectures in tiny flip-chip packages.

SPEAKER AMPLIFIERS

Wide range of filterless class AB and class D audio amplifiers for mono and stereo applications with gain control, in tiny flip-chip packages.

KEY FEATURES

- Microphones: Excellent SNR (>64 dB) with full frequency response (20 Hz to 20 kHz) in small package "Best in class AOP"
- Headphone and speaker amplifiers: High audio quality (PSRR, SNR, THD+N) for headsets in high-efficiency class G topologies; high power in low battery voltages with Class D technology

FEATURED PRODUCTS
HIGH-PERFORMANCE, LOW-POWER DIGITAL MEMS MICROPHONE WITH 64 DB SNR

MP34DT05-A/MP34DT06J

The MP34DT05-A and MP34DT06J are ultra-compact, low-power, omnidirectional, digital MEMS microphones built with a capacitive sensing element and an IC interface. The sensing element that detects the acoustic waves is manufactured using a special silicon micromachining process dedicated to producing audio sensors. The IC interface is manufactured using a CMOS process so that a dedicated circuit may be designed to provide a digital signal externally in PDM format. The MP34DT05-A and MP34DT06J have an acoustic overload point of 122.5 dBSPL with a 64 dB signal-to-noise ratio and -26 dBFS sensitivity. The MP34DT06J is offered with +/-1 dB of sensitivity.
The device utilizes ST proprietary hardware and firmware techniques to significantly reduce power in low-power active and low-power idle modes, and incorporates multiple TX driving methods that can further boost the SNR and report rate.

KEY FEATURES

- Single supply voltage
- Low power consumption
- 122.5 dBSPL acoustic overload point
- 64 dB signal-to-noise ratio
- Omnidirectional sensitivity:
  - –26 dBFS sensitivity
- PDM output
- HCLGA package
- Top port design
- SMD compliant
- EMI shielded

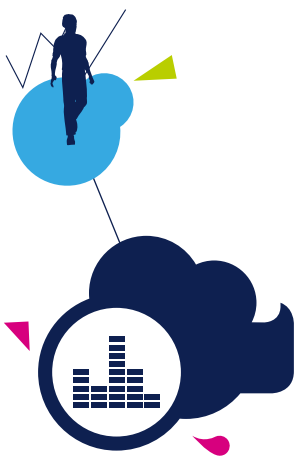
MEMS MICROPHONES

Voice control is a wide spreading trend across many portable applications, making the interaction easier, faster and smoother. It enables fashionable designs by reducing the number of buttons.

KEY FEATURES

- Tiny packages
- Low power consumption
- High performance

Part number	Top/bottom port	Package size (mm)	Supply voltage (V)	SNR (dB)	Sensitivity (dBV)	AOP (dB SPL)	Current consumption (µA)
MP34DT05-A	Top	3 x 4 x 1	1.6 to 3.6	64	-26±3	122.5	650
MP34DT06J	Top	3 x 4 x 1	1.6 to 3.6	64	-26±3	122.5	650



HEADPHONE AND LOW POWER AMPLIFIERS

ST's headphone and low-power amplifier portfolio offers the design and feature flexibility needed to fit your application perfectly:

- Class AB, class G and filterless class D architectures for optimal audio performance and power efficiency
- Integrated features to reduce bill of materials, such as capless and filterless amplification

Part number	Description	Class	Output power (W)	Efficiency typ (%)	Supply voltage (V)	SNR typ (dB)	THD+N Typ (%)	Package
TS4962M	3 W mono filter-free differential power amplifier with variable gain	D	2.3 (into 4 Ohm) 1.4 (into 8 Ohm)	88	2.4 to 5.5	85	<= 1	9- bump flip chip, 500um pitch, 1.6 x 1.6 x 0.6
TS2007FC	3 W mono filter-free differential power amplifier with fixed 6 or 12 dB gain	D	2.3 (into 4 Ohm) 1.4 (into 8 Ohm)	88	2.4 to 5.5	85	<= 1	9- bump flip chip, 500um pitch, 1.6 x 1.6 x 0.6
TS2012EI	2.5 W stereo differential power amplifier	D	1.85 (into 4 Ohm) 1.15 (into 8 Ohm)	88	2.5 to 5.5	99	<= 1	16- bump flip chip, 500um pitch, 2 x 2 x 0.6
TS4990	1.2 W power amplifier with standby active low	AB	1.2 (into 8 Ohm)	-	2.2 to 5.5	> 100	0.1	9- bump flip chip, 500um pitch, 1.6 x 1.6 x 0.6
TS4994FC/ TS4995	1.2 W differential power amplifier with selectable standby and variable gain/fixed 6 dB gain	AB	1.2 (into 8 Ohm)	-	2.5 to 5.5	100	0.5	9- bump flip chip, 500um pitch, 1.6 x 1.6 x 0.6
TS4621E/ TS4621ML	High performance stereo headphone power amplifier with I²C and variable gain/without I²C and with fixed 0 or 6 dB gain	G	0.025 (into 32 Ohm)	-	2.3 to 4.8	100	<0.01	16- bump flip chip, 400um pitch, 1.65 x 1.65 x 0.6

KEY FEATURES

- Low power
- Flip-chip package with low ball count and reduced external components need
- Up to 3 W for class D amplifiers
- Up to 100 db SNR for class AB and class G amplifiers
- Low THD+N

BENEFITS

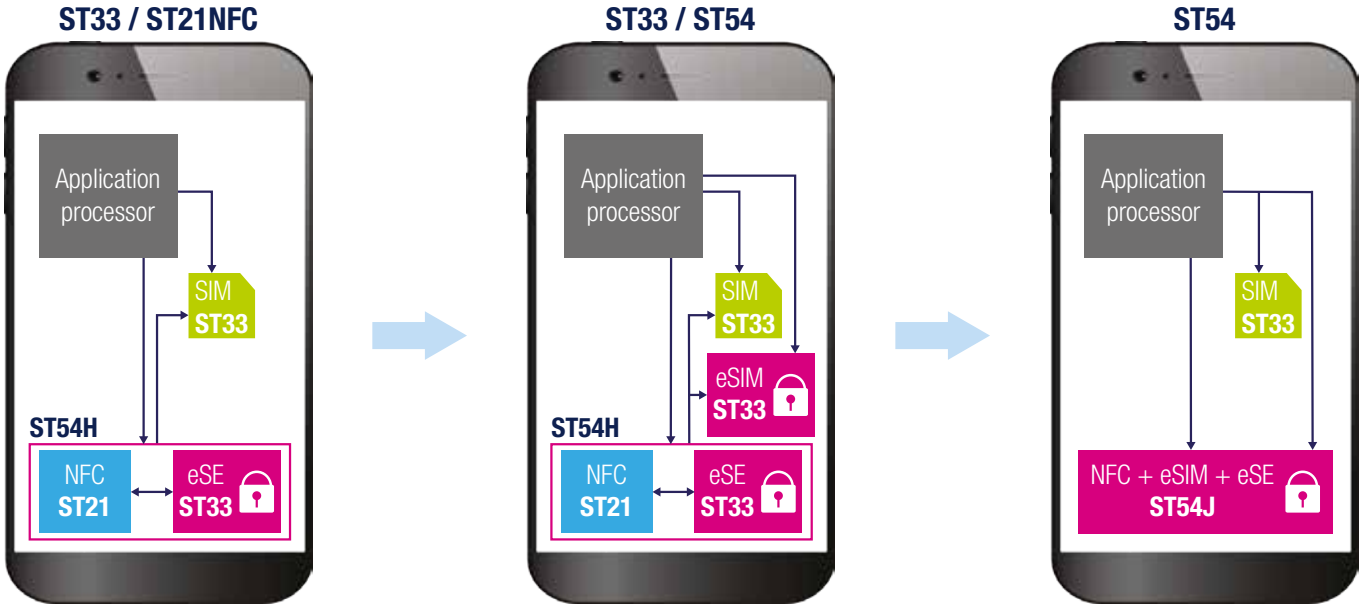
- Longer battery life for a given output power
- High signal quality
- Small application footprint and reduced bill of material

Mobile Security Consumer

Mobile security is expanding from the largely deployed SIM technology in mobile phones to the growing NFC, embedded Secure Element (eSE) and embedded SIM (eSIM) technologies in smartphones, tablets, wearables, and laptop devices.

ST'S SOLUTIONS TO BUILD THE MOST EFFECTIVE AND SECURE MOBILE APPLICATIONS

ST provides an exhaustive offer of NFC and eSE / eSIM products and solutions to address secure mobile transaction applications, from the state-of-the art ST21NFC NFC Controller to the ST54 integrating the widely deployed ST33 Secure Element.
ST solution has enabled the integration of NFC controller and eSE into ST54 SiP solution and is now opening a new step of convergence by merging NFC, eSE and eSIM into ST54J, a single die solution in small WLCSP package.



Stand-alone chips
SIM + NFC + eSE

eSIM emergence
[NFC + eSE] SiP

eSIM / NFC Convergence
[eSIM + NFC + eSE] single die

STANDALONE SOLUTIONS

ST33 for eSIM and eSE applications

ST33 secure microcontrollers meet the advanced security and performance requirements for secure applications including embedded SIM, NFC-SIM, and embedded NFC secure elements with a large user Flash memory capability.
Already integrated by major OEMs in tablets, wearables and notebooks, the eSIM continues to be largely deployed in smartphones.
An eSIM is a surface-mounted device soldered directly on the PCB; enabling OEMs to design smaller and thinner mobile devices and end users to subscribe to the Mobile Network Operator of their choice.
Remote provisioning of the SIM application inside the eSIM device is ensured by subscription management systems compliant with the GSMA Remote SIM provisioning specification.
ST's eSIM is available in multiple form factors such as WLCSP (Wafer Level Chip Scale Package), the smallest and thinnest package of its kind. It is fully compliant with the GSMA Remote SIM Provisioning specification and is fully interoperable with the major subscription management providers.

GSMA SAS-UP CERTIFICATION

In 2018, ST became the first chip maker accredited by the GSMA to personalize eSIMs for Mobiles and connected IoT devices delivering ready to use solution with no further programming required.

The eSIMs, customized with connection credentials, enable smaller form factors, greater security, and increased flexibility.

GSMA Security Accreditation Scheme — Accredited Supplier

Product	Type	Interface	Key features	Packages
ST33G1M2	eSIM/eSE 1.2 Mbytes Flash	ISO/IEC 7816 SPI, SWP	32-bit ARM® SecurCore® SC300 CPU for payment, transport, access control MIFARE® Classic & DESFire® EMVCo, EAL5+, GSMA SAS-UP for personalization	WLCSP DFN Wafers
ST33J2M0	eSIM/eSE 2 Mbytes Flash	ISO/IEC 7816 SPI, I²C, SWP	32-bit ARM® SecurCore® SC300 CPU MIFARE® Classic & DESFire® EMVCo, EAL5+, MTPS, GSMA SAS-UP for personalization	WLCSP QFN20 Wafers

ST21NFC for NFC Controller

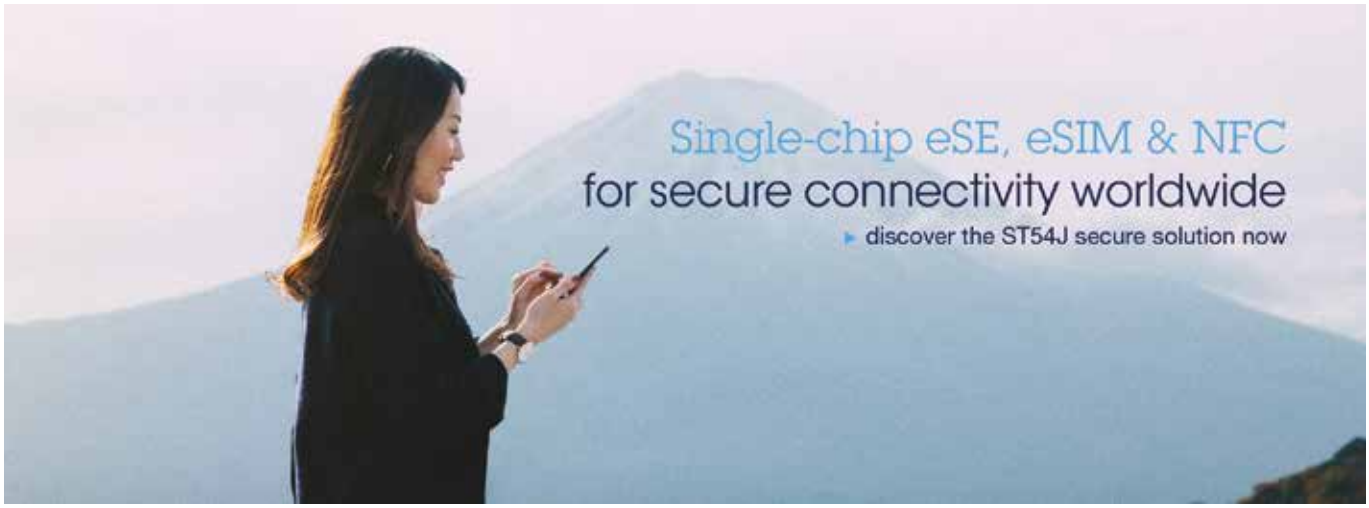
The growth of contactless mobile transactions is driving the adoption of NFC and embedded Secure Element (eSE) solutions in consumer mobile devices such as smartphones and wearables.
Tablets, gaming consoles, laptops and ultrabooks are also integrating NFC technology so they can read tags to interact with smart IoT objects or accept payment cards.
ST21NFCD is ST's 4th generation NFC controller integrating a high-performance RF booster to provide the best user experience and ensure a high level of interoperability to ease integration and certification efforts for OEMs.

Product	Type	NFC mode	Interface	Key features	Packages
ST21NFCD	NFC controller	Card emulation/ Reader & P2P	ISO/IEC14443A/B ISO/IEC 18092, 15693 SWP, I²C	Active Load modulation Optimized power consumption modes NCI 2.0 compliant Secure Firmware Update mechanism	WFBGA (4x4x0.8)

MOBILE SECURITY eSIM/NFC CONVERGENCE INTEGRATED SOLUTIONS TOWARDS A FULLY INTEGRATED NFC + ESE + ESIM SOLUTION

ST54 for Integrated Solution

In order to manage the future of secure mobile transactions, ST provides a large range of ST54 integrated solutions merging our ST21NFC NFC Controller and the proven ST33 secure element. The first generation is a System-in-Package (ST54F/ST54H) delivered in a BGA package while the new ST54J System-on-Chip (SoC), optimized to address convergence, is available as a single-die in a thin WLCSP package.
The ST54J delivers performance-boosting integration for mobile and IoT devices with the added benefit of ST's software-partner ecosystem for smoother user experiences in mobile payments and e-ticketing transactions, as well as more convenient, remote, mobile provisioning to support multiple operator subscriptions.
In addition, as the first chip maker accredited by the GSMA to personalize eSIMs for mobiles and connected IoT devices onto WLCSP packages, ST can boost the supply chain and accelerate delivery to manufacturers.



Product	Type	NFC mode	Interface	Key features	Packages
ST54F/H	Integrated SiP ST33G1M2/ST33J2M0 + ST21NFCD	Card emulation/ Reader & P2P	ISO/IEC14443A/B ISO/IEC 18092, 15693 SWP, SPI,I²C, UART	Secure OS JC 3.0.5, GP 2.3 for eSE HCI, NCI 2.0 for NFC	WFBGA (4x4x0.8)
ST54J	Single die ST33 2MB + NFC controller	Card emulation / Reader & P2P	ISO/IEC14443A/B/F ISO/IEC 18092, 15693 SWP, SPI, I²C, HS-UART	32-bit ARM® SecurCore® SC300 at 100 MHz Secure OS JC 3.0.5, GP 2.3 for eSE/eSIM NFC: Active Load Modulation Optimized power consumption modes NCI 2.0 compliant	WLCSP

NFC & RFID

NFC & RFID

ST25 NFC/RFID Tags & Readers

ST offers a comprehensive portfolio of NFC/RFID products, which operate at 13.56 MHz frequency and are based on NFC and ISO standards:

- NFC/RFID Tags, ideal for wireless pairing (Bluetooth or Wi-Fi) consumer engagement and product identification, feature counters, data protection (password) and able to wake-up the Host chip thanks to a General Purpose Output
- Dynamic NFC tag, featuring a reliable EEPROM memory with data protection (password), an I²C interface to connect to a MCU and a RFID/NFC tag interface, enabling multiple use cases for Consumer, Industrial and IoT
- NFC/RFID Readers, which support multiple NFC protocols in Reader, Write, Peer-to-Peer, and Card Emulation modes, accessed by SPI interface and able to cope with the most challenging environment thanks to High RF performances and advanced features

ST also offers a large range of discovery kits, Nucleo shields, reference softwares and documentations in order to ease the design process.

KEY FEATURES

- Best-in-class RF performances
- HF 13.56 MHz frequency
- High reliable EEPROM with data protection
- I²C/SPI serial interface
- Energy harvesting capabilities
- Tamper detection feature
- Automatic Antenna Tuning
- High and Dynamic Power Output
- Active Wave shaping & Noise suppression Receiver
- ISO14443, ISO15693, and FeliCa Standards
- NFC Forum Type 4 and Type5 standards

Software development kit for ST25

The ST25SDK is software library to be used in Java applications. It can be run by any platform supporting JVM (Windows, Android, and Linux) and some components can be re-used for iOS.

It allows to support several readers with the same application and it offers an easy-to-use model of RF tags, including ST's specific features.
http://www.st.com/st25sdk

Smartphone Apps and SDKs for ST25

Several Apps are available to evaluate quickly ST Solutions, multi-platform Software Development Kit for Android and iOS. Easy development thanks to the source code availability and application examples available for quick startup.

Part number	Mode	Protocol	Serial interface	Key features	Package
ST25R3911B **ST25R3912** **ST25R3913**	Reader/Writer P2P	ISO14443A/B ISO15693 FeliCa	SPI	Automatic Antenna Tuning Dynamic Power Output (up to 1.4 W) Very High Baud Rate 6.8 Mbps Capacitive & Inductive wake-up	QFN32 (5x5 mm)
ST25R3916	Reader/Writer Card Emulation P2P	ISO14443A/B ISO15693 FeliCa	SPI I^2C	Automatic Antenna Tuning Dynamic Power Output (up to 1.6 W) Noise Suppressor Receiver Active Wave Shaping Capacitive & Inductive wake-up	QFN32 (5x5 mm)
ST25R95	Reader/Writer Card Emulation	ISO14443A/B ISO15693 FeliCa	SPI	Power Output (up to 0.23 W) Inductive wake-up	QFN32 (5x5 mm) WLCSP
ST25DV-I2C	Dynamic Tag	ISO15693	I^2C	EEPROM 4 kb, 16 kb & 64 kb Fast Transfer Mode (256 B buffer) 64-bit password Energy Harvesting GPO MCU wake-up	SO8 TSSOP8 FPN8 FPN12 WLCSP
M24SR	Dynamic Tag	ISO14443A	I^2C	EEPROM 4 kb, 16 kb & 64 kb 128-bit password GPO MCU wake-up	SO8 TSSOP8 FPN8 Die
ST25TA	Tag	ISO14443A	NA	EEPROM 512 b, 2 kb, 16 kb & 64 kb 128-bit password 20-bit Counter GPO MCU wake-up	Die FPN5
ST25TV	Tag	ISO15693	NA	EEPROM 512 b, 2 kb,16 kb and 64 kb 64-bit password Tamper Detect loop 20-bit Counter GPO MCU wake-up	Die FPN5

NFC Controller, NFC booster and Secure Element

Near field communication (NFC) technology is at the heart of an expanding spectrum of easy-to-use, intuitive, contactless applications. Integration of NFC is more and more common into wearables to enable contactless payment, transport and access control features.

STMicroelectronics provides a global offer of products and solutions for security and NFC enablement. This includes state-of-the-art NFC controllers, Boosted NFC solutions, and a set of secure 32-bit Flash-based microcontrollers to address embedded Secure Element (eSE). Solutions are delivered as discrete ICs, or system-in-package for optimized integration.

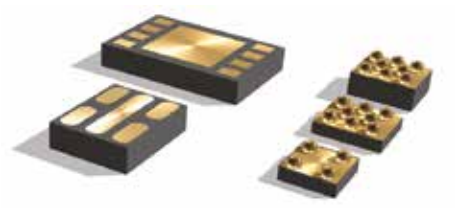
Refer to the **Security Paragraph** for more information

Serial EEPROM

STMicroelectronics is Nb 1 Serial EEPROM supplier since more than 10 years thanks to a complete range of densities and packages which brings flexibility in design and enable reliable parameter management. The latest Serial EEPROMs designed with advanced technology offer the required features for comfortable and high performance wearables.

FLEXIBILITY AND HIGH ENDURANCE

- Byte granularity — Flexible data management for accurate modules
- Best NVM for low power operation — Use EEPROM for Longer battery life time
- Low voltage operation 1.6 V min — Operates with weak battery
- 4 Million cycles per byte at 25 °C — Enables datalog for precise data collection



		2 Kb	4 Kb	8 Kb	16 Kb	32 Kb	64 Kb	128 K	256 K	512 K	1 Mb	2 Mb
I²C	DFN8 2 x 3 mm	•	•	•	•	•	•	•	•	•		
	DFN5 1.5 x 1.7 mm	•	•	•	•	•	•	•				
	WLCSP 8 balls						•	•	•	•	•	•
	WLCSP Ultrathin 4 balls			•	•	•	•	•				
SPI	DFN8		•	•	•	•	•	•	•	•		
	WLCSP 8 balls						•	•	•	•	•	•

Read more at www.st.com/standardeeprom

WLCSP THE SMALLEST FOOTPRINT

- Low pin count for I²C bus — Only 4 wires routing
- Smallest size at 0.5 mm² — Almost invisible PCB footprint
- Ultra Thin < 0.3mm — Fits the thinest modules
- Light weight < 1mg — For comfortable wearables

SELECT YOUR PRODUCT WITH ST EEPROM FINDER APP

ANDROID APP ON Google play

Available on the App Store

Signal conditioning

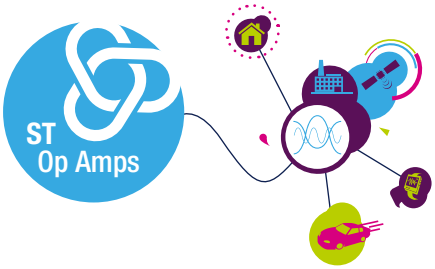
Operational amplifiers and comparators for handheld devices

ST's product portfolio contains a large range of op amps, comparators and current-sense amplifiers.

In addition to our broad portfolio of mainstream devices, ST offers a range of high-performance products specifically designed to meet the tight requirements of the wearable market.

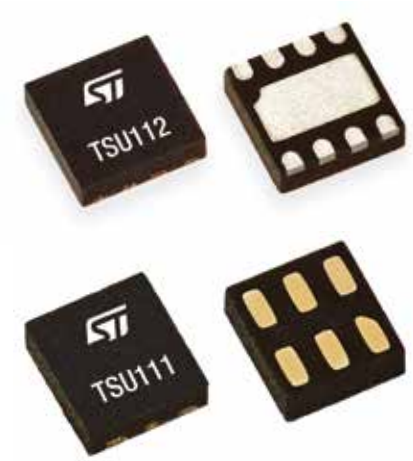
The main features of our growing portfolio are:

- Low power
- High precision
- Tiny packages



OPERATIONAL AMPLIFIERS

Analog sensors need signal transducers to deliver the information for digital processing. ST offers a dedicated set of operational amplifiers suitable for wearable devices with excellent features.



HIGH PERFORMANCE AND SEEMLESS INTEGRATION

- Very accurate signal conditioning Vio<5 µV (TSZ121)
- Space-saving packages DFN6 1.2 x 1.3 x 0.4 (TSU111)
- Extremely-low power consumption Icc<900 nA (TSU111)

Part number	Number of Channels	Input Offset Voltage (µV) max	Input Bias Current (pA) max	Supply Current per Channel (µA) Typ	Supply voltage (V) @ 25 °C	Gain Bandwidth Product (kHz) typ	Package (mm)
TSU101 TSU102 TSU104	1, 2, 4	3000	5	0.58	1.5 to 5.5	8	SC70-5, DFN8 2x2, QFN16 3x3
TSU111 TSU112	1, 2	150	5	0.9	1.5 to 5.5	11.5	DFN6 1.2x1.3, SC70-5, DFN8 2x2
TSV711 TSV712 TSV714	1, 2, 4	200	10	10	1.5 to 5.5	120	SC70-5, DFN8 2x2, QFN16 3x3
TSV731 TSV732 TSV734	1, 2, 4	200	10	60	1.5 to 5.5	900	SC70-5, DFN8 2x2, QFN16 3x3
TSZ121 TSZ122 TSZ124	1, 2, 4	5	200	31	1.8 to 5.5	400	SC70-5, DFN8 2x2, QFN16 3x3
TSZ181 TSZ182	1, 2	25	200	800	2.2 to 5.5	3000	DFN6 1.2x1.3, DFN8 2x2

HOW TO MAKE YOUR SELECTION?

The ST Op Amps App is a free all-in-one design toolkit and smart selector for smartphones and tablets, You can select the best product from among our operational amplifier, comparator, current-sensing, power and high-speed amplifier portfolios.

You can also access to interactive schematics with smart component value calculator, access to 3D package data or access to datasheets while away from the desk.

The ST op Amps App is currently available on GooglePlay and AppStore.

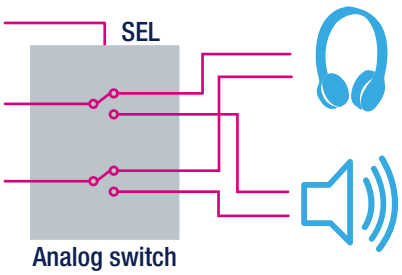
www.st.com/oppamps-app

ANDROID APP ON Google play

Available on the App Store

ANALOG SWITCHES

In portable devices, switches are used to route a great variety of signals such as audio to speakers/headphones or other signals to and from sensors. ST's analog switch line-up is meant to cover all the possible signal typologies from audio to USB.



KEY FEATURES

- Ultra-low power dissipation
- Low on-resistance
- Wide operating voltage range
- USB (2.0) high-speed (480 Mbit/s) signal switching compliant
- Integrated fail-safe function
- Tiny packages

Part Number	Function	Supply voltage	Vin Range	Ron resistance	Package (mm)
STG3684AUTR	Dual SPDT	1.65 to 4.3 V	0 to Vcc	500 mΩ	QFN10L (1.8 x 1.4 x 0.5)
STMLS05ACQTR	5 channel PMOS Switches	1.8 to 3.6 V	1.05 to 5.5 V	120 mΩ	QFN16L (3 x 3 x 0.5)

Microcontrollers

STM32 AND STM8 WIDE CHOICE OF SOLUTIONS FOR MOBILE DEVICES

By choosing one of ST's microcontrollers & microprocessors for your embedded application, you gain from our leading expertise in scalable computing architecture, silicon technology, embedded real-time and application software, multi-source manufacturing and worldwide support.

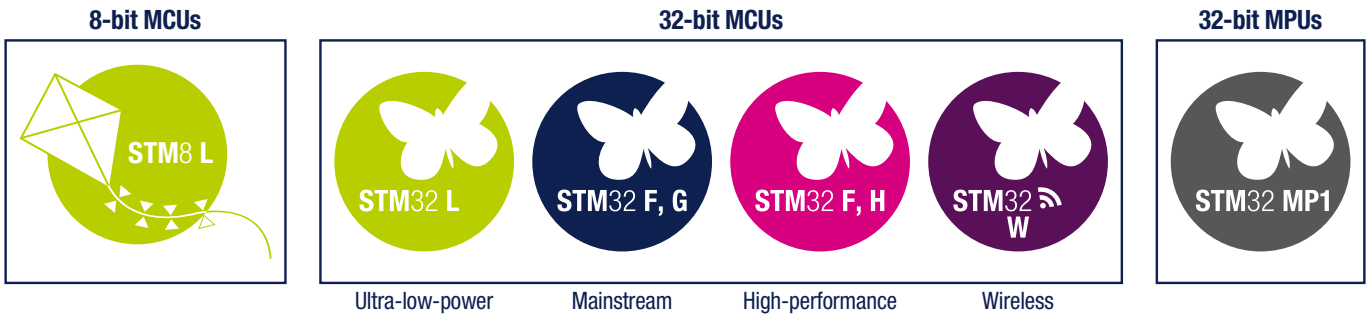
ST's wide-ranging microcontroller product portfolio spans from robust, low-cost 8-bit MCUs up to 32-bit Arm®-based Cortex®-M Flash microcontrollers with a comprehensive choice of peripherals.

With the addition of the STM32 Microprocessor (MPU) and its heterogeneous architecture combining Arm® Cortex®-A and Cortex®-M Cores, embedded system engineers are given new design possibilities and access to open-source Linux and Android platforms. This flexible architecture allows the advanced digital and analog peripherals to be allocated to either core, while achieving the best power efficiency depending on processing and real-time execution requirements. To help engineers reduce application development time, a fully mainlined open-source Linux distribution and a new-generation system toolset from ST and 3rd parties are now available for STM32 MCUs and MPUs.

Leveraging its wide and market-proven portfolio, ST offers a selection of STM32 and STM8 microcontrollers perfectly fitting wearable devices.

KEY FEATURES

- Wide range of processing performance
- Low power and energy efficiency
- Multiple and flexible power modes
- Wide voltage operation range
- Batch Acquisition Mode (BAM)
- LCD drivers
- Serial Audio Interfaces
- RTC with Calendar
- Multiple peripherals
- Advance analog features
- WLCSP packages
- Small and thin UQFN packages



How to make your selection?

The ST MCU Finder is a free app for mobile and desktop application, guiding you through the portfolio of more than 700 STM32 and STM8 MCUs, to select the best fit for your application. The selection results can be shared and technical features and documentation can be instantly accessed. An integrated feed provides up-to-date worldwide and local news around STM32 and STM8 MCUs. Supported languages are English, Chinese and Japanese.
The ST MCU Finder is currently available on GooglePlay and AppStore.
www.st.com/stmcufinder

ANDROID APP ON Google play

Available on the App Store

STM32MP1 MICROPROCESSOR SERIES: SAVING SPACE AND REDUCING TIME TO MARKET FOR HANDHELD DEVICES

To shorten customers time to market, ST has developed the STM32MP1 series based solution including heterogeneous Arm Cortex®-A7 and Cortex®-M architecture, a full set of hardware deliveries and a seamless software implementation while proposing third party companies to help customers into their development.

STMicroelectronics value of the OpenOS strategy. The STM32MP1 series supports Android and Linux Operating Systems. The Highly expert third party Witekio company has pre-ported Android 9.0 while STMicroelectronics has developed the up-streamed OpenSTLinux® Distribution using Yocto project. Both Open OS ports provide business advantages where customers will allocate software resources onto key differentiators. The STM32Cube tools set enables customers to fully reuse the previous environment of STM32MCU developments. Enriched with the DDR tools making complex PCB design easy to make, the STM32Cube tools set definitely helps to reducing the development time.

Handheld applications must optimize PCB space to satisfy greater operating life by allocating bigger battery. Beside the combined integration of the heterogeneous architecture, the STM32MP1 embeds advanced 3D OpenGL ES graphic accelerator, versatile Connectivity's where some of them embed PHY's, analog peripherals with LDO's to remove external passive components. With a 10x10mm package, the STM32MP1 supports the smallest package while providing optimized performance. By adding the dedicated power management integrating buck and LDO', the STPMIC1 helps to remove technical roadblocks and external passive components to reduce ebOM and save PCB space

The above combination allows customers to take full advantage of the STMicroelectronics technology to successfully design handheld applications.

TIME TO MARKET REDUCTION

- Android pre-port
- Off the shelves mainlined OpenSTLinux Distribution
- Ported STM32CubeMP1 package
- Seamless STM32Cube Tools Set
- Complete Hardware deliveries including Evaluation boards, schematics, Gerber files
- Highly knowledgeable Partners on STM32MP1 Series
- Hardware scalability thanks to the pin to pin compatibility between the STM32MP1 Series
- Application notes

PERFORMANCE AND OPTIMIZED SOLUTION

- Dual Cortex-A7 running at 650 MHz
- 32 kB I-Cache and D-Cache
- 256 kByte L2 Cache
- Cortex-M4 running at 209 MHz
- 3D Graphic GPU with 26MTriangles/s
- Rich Connectivity with Giga Ethernet, USB 2.0, CAN…
- Embedded security
- Analog Integration

OpenSTLinux Distribution

LOW eBOM IMPLEMENTATION

- Small footprint and low System Cost
- STM32MP1 Series packages enabling cheap PCB (No HDI Via)
- Smallest MPU package on the market: 10x10 mm^2
- Rich connectivity Integrated features to lower space
- ADC and DAC embedded into the STM32MP1 Series
- Integrating buck into the Power Management IC to save external components

Hardware Tools

ST provides a set of hardware tools for evaluation of the STM32MP1 Series at affordable price ranging from demonstration purposes up to full capabilities of features evaluation.

STM32MP157A-EV1 Evaluation Board

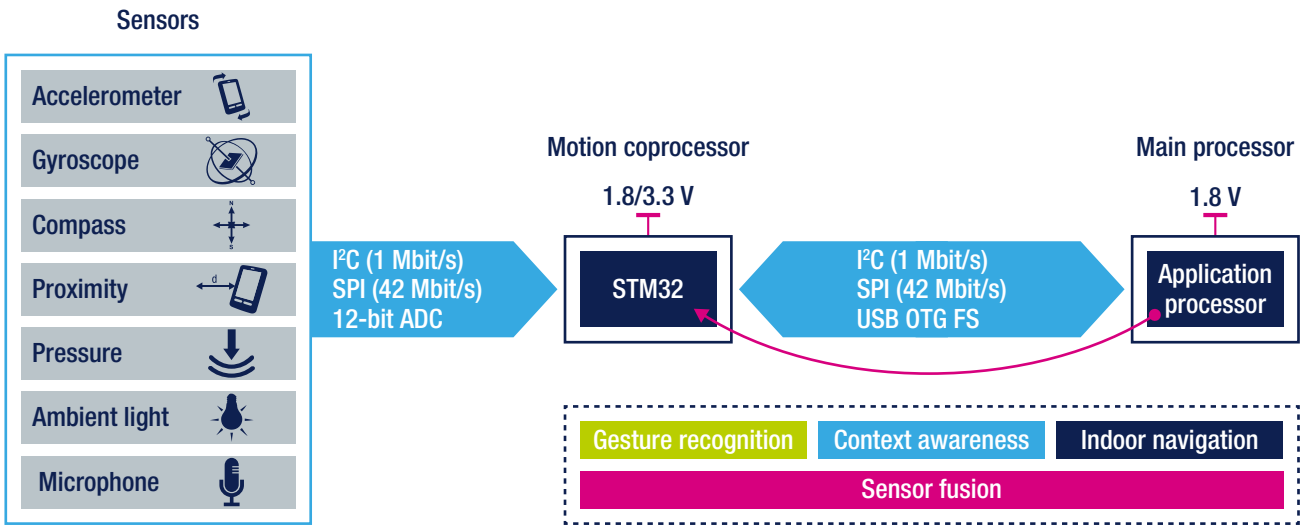
STM32MP57C-DK2 Board

STM32L AND STM8L - ULTRA LOW POWER MCU FAMILIES

A complete microcontroller offer including ultra-low-power STM8L and STM32L to address sensor hub applications in smartphones, tablets and wearable devices. STM32 sensor hub microcontrollers enable low power, low latency sensor fusion and implements an innovative Batch Acquisition Mode (BAM) allowing ultra-low-power sensor data acquisition. The application range is wide and covers from simple activity monitoring bands implementing a single accelerometer up to smartphones with 9-axis accelerometer, gyroscope & magnetometer combined with environmental sensor and audio with MEMS microphones.
STM32 sensor hub microcontrollers are available with 3rd party motion processing libraries including Always-on sensor fusion, gesture recognition, activity & sleep monitoring, context awareness and indoor navigation with map matching on both Android™ and Windows® platforms.

KEY FEATURES

- Cortex®-M0+, M3, M33 and M4
- Up to 120 MHz with FPU
- Up to 165 DMIPS, 427 CoreMark
- Up to 1 Mbyte of Flash memory and 320 Kbytes of RAM
- Batch Acquisition Mode (BAM)
- Current down to 36 µA/MHz in Run mode
- Current down to 300 nA in Stop mode
- I²C, SPI/I²S, USB, USART, SDIO
- ADC, DFSDM (PDM to PCM)
- Down to WLCSP25 to 2x2.2mm



STM32 – THE REFERENCE IN ADVANCED GRAPHIC USER INTERFACES

Enhanced user experience with the Chrom-ART Accelerator™

STM32 portfolio offers a large choice of products combining high-end graphic capabilities with extended battery life. Thanks to the Chrom-ART Accelerator™, the MIPI-DSI® interface support and the round display optimized management, STM32 enables stunning graphic user interface additions to smart watches and wearable applications. The ultra-low-power consumption of STM32 products make it the ideal choice to develop advanced wearables with no compromise on battery life.

GRAPHICS ACCELERATION

- Chrom-ART Accelerator™
  - Offloads the main CPU from repetitive graphical operations
  - Enables high-end user interfaces in parallel with real-time processing
  - Offers an efficient font management capability enabling multi-language support with limited memory size impact
- Hardware JPEG codec
  - Brings additional branding and tutorial video capabilities to your HMI

INTEGRATION AND MEMORY EXTENSIONS

- Up to 2 Mbytes of internal Flash memory, NOR and NAND Flash extentions, and up to 640 Kbyte of internal SRAM
  - Optimum support of up to WQVGA resolutions with no exernal RAM
- Chrom-GRC™ «unsquares» round displays and saves 20% RAM memory resources and offers optimum support of up to 400x400 round displays with no external memory

DISPLAY INTERFACES

- MIPI-DSI® controller
  - For new-generation displays with higher pixel density, lower EMI and lower pin count
- 8080/6800 parallel interface
  - Ideal for small-sized displays
- LCD-TFT controller
  - For mid-sized displays
  - Supports up to XGA resolution

POWER EFFICIENCY

All STM32 MCUs bring low or even ultra-low-power capabilities enabling advanced UIs and longer battery life on consumer, medical, and industrial portable devices.

STM32 GRAPHICS ECOSYSTEM

STM32 graphics-enabled MCUs & MPUs come with a rich hardware and software ecosystem enabling easy and efficient product prototyping and development.

Development kits

Each product line offers a discovery kit and an evaluation board that embed a display panel, external memory extensions as well as a rich set of connectivity features enablingeasy prototyping of your GUI design.

Embedded software

STM32Cube software brings all the hardware abstraction layer drivers, software middleware and implementation examples allowing you to quickly and efficiently benefit from STM32 MCUs and their IPs.

Graphic libraries and tools

A wide choice of leading graphic software libraries and tools taking full advantage of STM32 graphics acceleration, OpenGL ES 2.0 compliancy, display interfaces and smart architecture is also available to help you easily achieve the most advanced GUI design for STM32 Family.

Software examples

Development kits come preloaded with a graphics interface and application examples using different display solutions and demonstrating advanced graphical user interfaces.

STM32 CONNECTIVITY

STM32WB Wireless Series – Bluetooth® 5 & IEEE 802.15.4

The STM32WB series is a dual-core, multi-protocol and ultra-low-power 2.4 GHz MCU system-on-chip. It supports Bluetooth™ 5 as well as IEEE 802.15.4 communication protocols (in Single and Concurrent modes) covering a wide spectrum of IoT application needs.

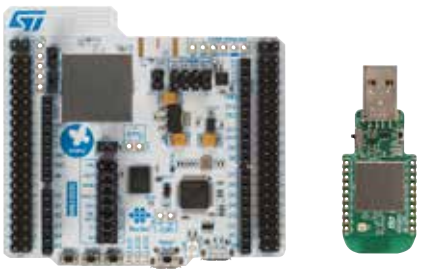
Based on ST's best-in-class, ultra-low-power STM32L4 MCU, the STM32WB series reduces development time and BOM cost, extends application battery life and inspires innova¬tion thanks to its rich and flexible peripheral set.

The STM32WB series is designed to fit industrial, healthcare and consumer applications.

Features	Benefits
Dual-core solution in a single die	Dual-core solution with independent clock trees ensures real-time RF execution and optimized PCB and BOM
TX: 5.2 mA, RX: 4.5 mA BLE: –96 dBm, 802.15.4: –100 dBm	Extended battery life time. Perfect fit for coin cell battery Comfortable and robust operating distance of connection
Integrated balun	Reduces BOM cost and PCB footprint
OTA firmware updates	Easy fleet maintenance
Crystal-less USB 2.0 FS interface	Optimized BOM cost. Battery charging detection
LCD driver, integrated booster	Only a simple low-cost glass display is needed
Quad-SPI XIP	Simple way to upgrade active memory on existing designs.
Customer key storage Secure bootloader	Offers brand protection, IP protection and device integrity

HARDWARE TOOLS

This STM32 Nucleo pack is the most cost-effective way to quickly get started developing STM32WB-based prototypes.



Order code: P-NUCLEO-WB55

SOFTWARE TOOLS

STM32CubeMX enables faster development thanks to its MCU pinout and clock configurator, power consumption calculator and code generation tools. An Eclipse plug-in (STSW-STM32095) is also available. STM32CubeMonRF, a development tool dedicated to wireless connectivity, is also available for radio testing and beaconing to fasten time to market.

STANDARD PROTOCOL

STM32 – THE REFERENCE IN AUDIO AND VOICE

Low-power audio DSP replacement

STM32L4 ultra-low-power and STM32F4 Dynamic Efficiency™ product lines combine advanced processing capabilities, outstanding low power consumption and maximum integration to offer the ideal low-power audio and voice solutions for wearable applications.
Leveraging ST's proprietary ART Accelerator™, the two product lines achieve zero wait state execution from internal Flash memory and deliver the full processing capabilities of the Cortex-M4 core running at up to 80 and 100 MHz. The Cortex-M4 DSP instruction set and the embedded floating point unit boost the performance capabilities, enabling advanced audio processing.
STM32L4 ultra-low-power and STM32F4 Dynamic Efficiency™ access lines achieve an outstanding 36 µA/MHz power consumption in Run mode and offer a Batch Acquisition Mode (BAM) enabling extended battery life by exchanging batches of data through communication peripherals while maintaining the rest of the system, including the CPU, in power-saving modes.

KEY FEATURES

- 100/125/165 DMIPS
- DSP & FPU
- 36 µA/MHz in Run mode
- Batch Acquisition Mode
- Maximum integration

Ultra-low power always-on acquisition + Floor Sound detector	Low power Signal conditioning + Sound activity detector	Voice trigger detection
ULPSD (HW)	LPSD (SW)	ASR (SW)
< 70 µA	< 200 µA	1.2 mA

Wide range of processing performance, connectivity features and optimized software

ST's scalable STM32 microcontroller portfolio offers a wide range of processing performance and embedded SRAM sizes to meet a large number of audio application requirements. In addition, STM32 microcontrollers embed numerous audio interfaces with I²S, TDM and PDM support as well as audio dedicated PLLs to achieve audio accuracy.
STM32 microcontrollers also offer rich connectivity features with USB, SDMMC, camera, and display interfaces to meet the requirements for the most advanced applications.
Equally important, the STM32 software ecosystem facilitates the development of audio and voice applications by providing optimized internal and third-party audio software as well as hardware kits for prototyping. The software offer includes internal voice and audio codecs with MP3, AAC, WMA, Speex, ADPCM, G711 and G726 support. It also includes synchronization software, as well as audio post-processing solutions with SRC, equalization, bass management, smart volume control and visualization. The STM32 ecosystem also gives access to a wide range of optimized third-party software including voice command solutions.

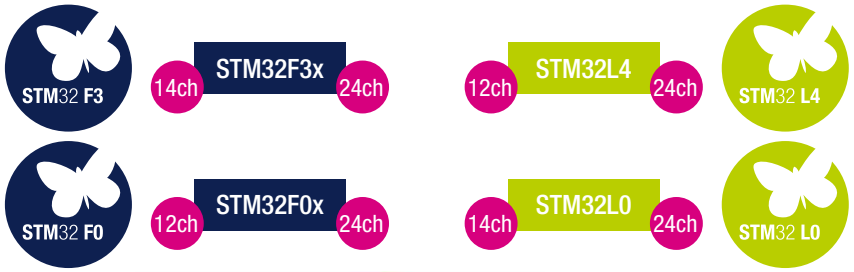
DSP CONCEPTS

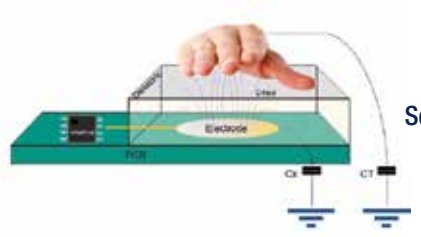
sensory

STM32 AND STM8 – THE REFERENCES IN TOUCH SENSING AND WIRELESS CHARGING

STM32 and STM8L families: Integrated touch-sensing functions

Certain STM32 microcontrollers feature a full hardware touch-sensing acquisition module based on self-capacitance technology. These devices include several I/Os (up to 24 channels) for integrating multiple touch keys and providing developers with a single-device solution.





Self -capacitance

Microcontroller-based I/Os internally coupled to touch sensing controller with up to 24 channels

Touch sensing acquisition < 5% CPU load. Based on charge transfer acquisition

Free-of-charge software libraries (C source code, firmware examples)

Adapted development tools: STM-STUDIO STM32CubeMX and STM8CubeMX

STM8 - STM32 families: Wireless charging system

From basic waveform generation for low-end devices up to complex waveform generation, our MCU mainstream series ensures extreme flexibility for the digital control of the coil.

Timers with flexible PWM generation, dead time management or complemented output.

- Arm Cortex-M4 + FPU at 72 MHz – 90 DMIPS
- From 16 to 512 Kbytes of Flash memory
- Mixed-signals: CCM-SRAM, 16-bit ADC ∑Δ, HR-timer…

- Arm Cortex-M3 at 72 MHz – 61 DMIPS
- From 16 Kbytes to 1 MB byte of Flash memory
- STM32 foundation: USB, Ethernet, CEC…

- Arm Cortex-M0+ at 64 MHz – 59 DMIPS
- From 16 to 512 Kbytes of Flash memory
- Entry-level MCU, compact and robust, for cost-sensitive applications, first 8-pin STM32
- High integration with 2.5 MSPS ADC, 2xfcpu timers, rich connectivity, USB-C Power Delivery and maximum RAM

- Arm Cortex-M0 at 48 MHz – 38 DMIPS
- From 16 to 256 Kbytes of Flash memory
- Entry-level, cost-sensitive: 32-bit MCU at 32 cents, USB, CAN…

- STM8 core at 24 MHz
- From 4 to 128 Kbytes of Flash memory, plus E²Data
- Robust and reliable for basic functions

- STM8 core at 16 MHz
- From 2 to 64 Kbytes of Flash memory
- Low voltage operation and reduced power consumption

STM32 AND STM8 – THE REFERENCES IN POWER MANAGEMENT

STM8L family: 8-bit ultra-low-power MCU family

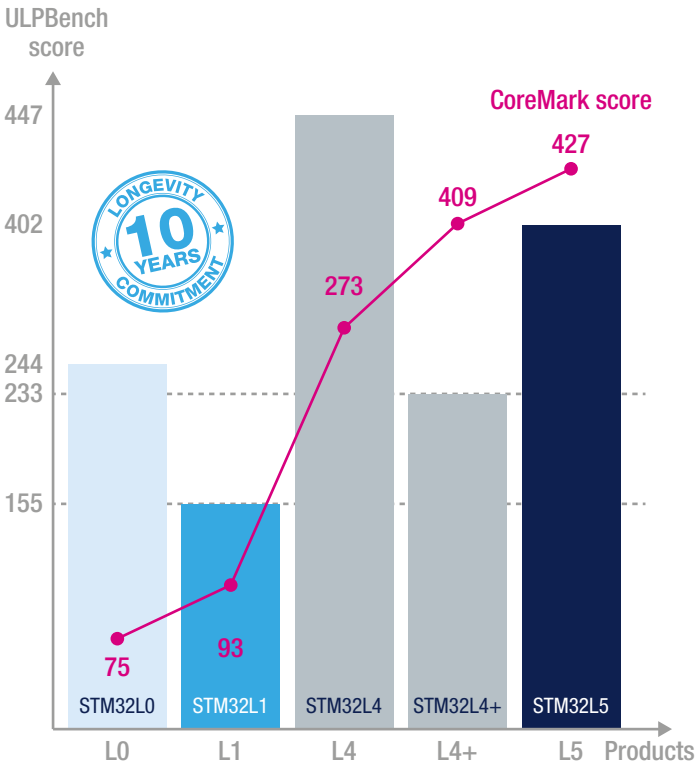
The STM8L, based on the 8-bit STM8 core, benefits from our proprietary ultra-low-leakage process, and features an ultra-low power consumption of 0.30 µA with the lowest power mode. STM8L also share peripherals similarities with STM32 series.

STM32L family: the 32-bit ultra-low power mcu family

ST's ultra-low-power MCU platform is based on a proprietary ultra-low-leakage technology. STM32L0 (Arm® Cortex®-M0+), STM32L1 (Cortex-M3), STM32L4 (Cortex-M4) and the STM8L (8-bit proprietary core) represent a large range of devices addressing devices supplied from batteries or through energy harvesting and grant an optimized cost/performance ratio in all kinds of low-power applications.
This ultra-low-power platform with the industry's lowest current variation between 25 and 125 °C warrants outstandingly low current consumption at elevated temperatures. The MCUs reach the industry's lowest power consumption of 350 nA in Stop mode (with SRAM retention), while maintaining the wakeup time as low as 3.5 µs.
The new STM32L4 is the convergence of the ultra-low-power and high performance providing 100 DMIPS with DSP instructions and floating point unit, more memory (up to 1 Mbyte of Flash) and innovative features.

- Entry-level in ultra-low-power performance
- Targeting cost-sensitive applications

- Ultra-low-power market-proven solutions
- Best in class in ultra–low-power performance



- 32-bit Arm® Cortex®-M33 + FPU at 110 MHz
- From 256 to 215 Kbytes of Flash memory
- Lowest power mode + RAM + RTC: 0.35 µA

- 32-bit Arm® Cortex®-M4 + FPU at 120 MHz
- From 1 to 2 Mbytes of Flash memory
- Lowest power mode + RAM + RTC: 1 µA

- 32-bit Arm® Cortex®-M4 + FPU at 80 MHz
- From 64 Kbytes to 1 Mbyte of Flash memory
- Lowest power mode + RAM + RTC: 0.34 µA

- 32-bit Arm® Cortex®-M3 at 32 MHz
- From 32 to 512 Kbytes of Flash memory
- Lowest power mode + RAM + RTC: 1.2 µA

- 32-bit Arm® Cortex®-M0+ at 32 MHz
- From 8 to 192 Kbytes of Flash memory
- Lowest power mode + RAM + RTC: 0.67 µA

- 8-bit STM8 core at 16 MHz
- From 2 to 64 Kbytes of Flash memory
- Lowest Halt mode: 0.3 µA

STM8CubeMX AND STM32CubeMX POWER CONSUMPTION CALCULATOR WIZARD

With STM8CubeMX and STM32CubeMX configuration and initialization C code generators, select your chip and use its Power Consumption Calculator wizard to select peripherals and power supply, then define a sequence of steps representing your application and analyze its power consumption and battery life results.

Motor Driver ICs

STSPIN2 SERIES: LOW VOLTAGE AND VERY LOW POWER MONOLITHIC MOTOR DRIVERS

STSPIN monolithic motor drivers are now optimized and ready also for mobile applications.

STSPIN2 series is a solution tailored for portable applications, offering a complete set of ICs able to drive brushed DC, stepper or three-phase BLDC motors. Thanks to the extremely compact package (QFN 3x3) and the lowest standby current available on the market (max 80 nA), STSPIN2 series represents the best performance-cost trade-off.

Devices are equipped with control logic and a fully protected power stage.

STSPIN220 embeds advanced microstepping circuitry able to control a stepper motor with a very high resolution of up to 256 µsteps making it a perfect fit for controlling innovative features in latest generation smartphones such as pop-up cameras.

STSPIN230/3 are field oriented control (FOC) compliant drivers for 3phase BLDC motors that allow an easy implementation of highly efficient 2 or 3 shunts control topologies.

These innovations improve both quality and user experience of modern mobile applications such as smartphones and portable gimbals.

KEY FEATURES AND BENEFITS

- Very low operating voltage from 1.8 to 10 V, ideal for battery-operated motors
- Integrated power stages, featuring very-low $R_{DS(ON)}$, allowing very good thermal dissipation
- Energy saving and long battery life with best-in-class standby down to 10 nA
- Extreme positioning accuracy and smoothness with 256 microsteps per full step (STSPIN220)
- High efficient 3phase BLDC motion control thanks to sensorless FOC (STSPIN233)
- High current up to 2.6 ARMS for single brushed DC motors (STSPIN250)
- Maximum reliability thanks to UVLO, over-current and thermal protections
- Ultra-miniaturized 3 x 3 mm QFN package

PRODUCT TABLE

Part number	Description	Typical $R_{DS(ON)}$ (Ω)	Minimum supply voltage (V)	Maximum supply voltage (V)	Maximum output current (A_{RMS})	Maximum peak output current- (A)	Expansion board for STM32 nucleo board
STSPIN220	Monolithic microstepping driver with up to 256 µsteps / step	0.2	1.8	10	1.3	2	X-NUCLEO-IHM06A1
STSPIN230	Monolithic driver for 3-phase brushless DC (BLDC) motors	0.2	1.8	10	1.3	2	X-NUCLEO-IHM11M1
STSPIN233	Monolithic driver for 3-phase brushless DC (BLDC) motors optimized for 3 shunts configuration	0.2	1.8	10	1.3	2	X-NUCLEO-IHM17M1
STSPIN240	Monolithic driver for two DC motors	0.2	1.8	10	1.3	2	X-NUCLEO-IHM12A1
STSPIN250	Monolithic driver for single DC motors	0.1	1.8	10	2.6	4	X-NUCLEO-IHM13A1

Radio frequency

Integrated passive devices for RF front-end antenna tuners

STMicroelectronics provides a wide RF product offer based on its integrated passive device (IPD) technology. IPD solutions based on glass substrate can offer a low parasitic and high-Q solution suitable for RF applications.

BALUNS

Baluns use ST's process to integrate high-quality RF passive components on a single glass substrate. As well as balanced/unbalanced conversion, they can also integrate a matching network in a footprint smaller than 1 mm^2 for the complete function.

DIPLEXERS

Cost- and size-efficient way to combine different complementary radio access paths into a single antenna, combine dual antenna feeds into single feeds or vice versa.

COUPLERS

Wideband couplers use ST's process to integrate high-quality RF passive components on a single glass substrate. They are intended for cellular applications (GSM, WCDMA, LTE). The range includes high-directivity, frequency selector and various coupling factor devices.

BAND-PASS FILTERS

Improves RF system performance through cost-efficient frequency filtering for cellular and ISM bands. RF IPDs provide high-performance RF solutions with low sensitivity to top shielding.

KEY BENEFITS

- Size: up to 80% board saving
- Cost: up to 40% cost saving
- Performance: improved RF immunity
- Low component height compared to low-temperature co-fired ceramic technologies
- Fewer board placement variation effects than discrete due to monolithic implementation
- High predictability from simulation enabling fast production response time

FEATURED PRODUCTS
SMALLEST HIGH-DIRECTIVITY WIDE-BAND COUPLERS WITH INTEGRATED ATTENUATORS

CPL

The CPL are single- antenna couplers used to closely monitor the forward and reverse power between the RF power amplifier and the antenna. By also integrating attenuators on coupled and isolated ports, the antenna couplers simplify circuit design while saving cost and PCB space. This additional integration is achieved using ST's proprietary integrated passive device (IPD) technology. Other types of couplers need separate attenuators.
In addition, insulated glass-substrate fabrication and wafer-level packaging reduce total device height and footprint compared to alternative low-temperature co-fired ceramic (LTCC) technology. ST now offers a range of couplers with various coupling levels and an integrated flattener.

KEY FEATURES

- 50-ohm nominal input/output impedance
- Operating frequency range: 700 to 2700 MHz
- Less than 0.2 dB insertion loss
- 30 to 40 dB typical coupling factor
- 25 dB typical directivity
- Component and PCB area:
  - 1.3 mm^2 for single path (incl. integrated attenuators)

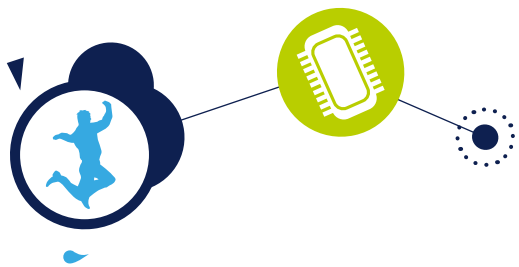
LOW-LOSS FREQUENCY DIPLEXER

DIP1524-01D3

The DIP1524-01D3 is a diplexer to separate GPS/Glonass signals and WLAN, Bluetooth or LTE band VII signals received on the same antenna. The 20 dB of attenuation between bands guarantees a good separation between GPS and the other RF signals. This diplexer uses ST's proprietary integrated passive device (IPD) technology developed to address the needs of passive integration in RF applications.
The DIP1524-01D3 is available in a flip-chip package with a pitch of 0.4 mm and does not require any extra PCB land around the component such as for LTCC packages. ST's solution is extremely small and saves over 50% more PCB space than conventional solutions.

KEY FEATURES

- Operating frequency range: 1600 MHz and 2400 to 2700 MHz
- 0.65 to 0.85 dB insertion loss
- 20 dB attenuation between bands
- -20 to -10 dB return losses
- Component and PCB area: 1.1 mm^2
- 50% space saving versus LTCC solutions



DEVICE SUMMARY

RF IC supplier	RF IC name	Matched Balun	Frequency (MHz)	Integrated filter	Size	Package
STMicroelectronics	SPIRIT 1	BALF-SPI-01D3	868-915	Yes	1.4 mm x 2.0 mm	CSP
		BALF-SPI-02D3	433	Yes	1.4 mm x 2.0 mm	CSP
	S2-LP	BALF-SPI2-01D3	868-915	Yes	2.1mm x 1.55 mm	CSP
		BALF-SPI2-02D3	433	Yes	2.1mm x 1.55 mm	CSP
	BlueNRG-MS (QFP32 &nd CSP34)	BALF-NRG-01D3	2400	Yes	1.4 mm x 0.85 mm	CSP
	BlueNRG-1 (QFP32 and CSP34)	BALF-NRG-02D3	2400	Yes	1.4 mm x 0.85 mm	CSP and Thin CSP
	BlueNRG-2 (QFN32 and CSP34)	BALF-NRG-02J5 (Height <350 µm)				
Atmel	ATWINC1500A	BAL-WILC10-01D3	2400	No	0.95 mm x 0.95 mm	CSP
	ATSAMR21E8	BALF-ATM-01E3	2400	Yes	2.0 mm x 1.25 mm	Bumpless CSP (LTCC assy-like)
Texas Instrument	CC1101	BAL-CC1101-01D3	868-915	No	2.0 mm x 1.0 mm	CSP
	CC1120/C1125	BALF-112X-01D3	868-915	Yes	1.95 mm x 1.87 mm	CSP
		BALF-112X-02D3	433	Yes	1.95 mm x 1.87 mm	CSP
	CC2540/43/45, CC2530/31/33	BAL-CC25-01D3	2400	Yes	0.9 mm x 0.9 mm	CSP
	CC2541	BALF-CC25-02D3	2400	Yes	0.9 mm x 0.9 mm	CSP
	CC2610/2620/2630/2640/2650	BALF-CC26-05D3	2400	Yes	0.9 mm x 0.9 mm	CSP
Nordic Semi	nRF51822-QFAACx/QFABAx	BAL-NRF01D3	2400	Yes	1.5 mm x 1.0 mm	CSP
	nRF51422-QFAACx					
	nRF51822-CTAx	BALF-NRF01J5 (Height <350 µm)	2400	Yes	1.4 mm x 0.85 mm (height < 350µm)	Thin CSP
	nRF51822-CxAx/nRF51422-CxAx	BAL-NRF02D3	2400	Yes	1.4 mm x 0.9 mm	CSP
	nRF51822-QFAAHx/nRF51822-QFACAx	BALF-NRF01E3	2400	Yes	1.5 mm x 1.0 mm	Bumpless CSP (LTCC assy-like)
	nRF51422-QFAAFx/nRF51422-QFACAx					
	nRF51822-QFAAGx/nRF51822-QFABBx	BALF-NRF01D3	2400	Yes	1.5 mm x 1.0 mm	CSP
	nRF51422-QFAAEx/nRF51422-QFABAx					
RF IC supplier	**RF IC name**	**Matched Low Pass Filter**	**Frequency (MHz)**	**Integrated filter**	**Size**	**Package**
STMicroelectronics	STM32WB55Cx BLE 5.0	MLPF-WB55-01E3*	2400-2500	Yes	1.5 mm x 1.0 mm	Bumpless CSP (LTCC assy-like)
RF IC supplier	**ULTRA WIDE BAND**	**Balun 50/100 Ω**	**Frequency (GHz)**	**Integrated filter**	**Size**	**Package**
Ultra Wide Band	Recommended for DW1000 from DecaWave	BAL-UWB-01E3*	3-8	No	1.8 mm x 1.25 mm	Bumpless CSP (LTCC assy-like)

Note: * Available Q1-2019

Smart antenna tuning

RF front-end antenna tuners

ST's tunable capacitors and associated controllers are designed to tune wireless antennas to specific frequencies. The implementation of tunable capacitors enables significant improvement in terms of radiated performance (TRP & TIS) making them almost insensitive to the external environment. ST's integrated tunable capacitors offer excellent RF performance, low power consumption and high linearity required in adaptive RF tuning applications:

TUNABLE CAPACITORS

The STPTIC series of integrated tunable capacitors offers excellent RF performance, low power consumption, and high linearity required in adaptive RF tuning applications. Standard capacitor values ranging from 1.5 to 8.2 pF with a tuning ratio of 5:1 to 3 GHz. They are available in miniature chip-scale packages.

BST CONTROLLERS

The STHVDAC series are dedicated devices able to control tunable capacitors. They provide a high-voltage digital-to-analog converter (DAC), specifically designed to control and meet the wide tuning bias voltage requirement of BST tunable capacitors. Devices include SPI and MIPI RFFE serial interfaces.

KEY FEATURES

- High tuning range (5:1)
- Excellent RF linearity (IP3 > 65 dB)
- High Q factor (Q > 60 @ 1 GHz)
- Miniature WLCSP package with single footprint all PTIC values
- Battery-powered operation with low-power mode to reduce power consumption
- Compliant with MIPI RFEE 2.0 interface with synchronous Read support
- Dynamic control to optimize capacitor transition time thanks to turbo and glide modes

FEATURED PRODUCTS
NEW RF TUNABLE CAPACITORS BOOST LTE SMARTPHONE PERFORMANCE

STPTIC C4 series

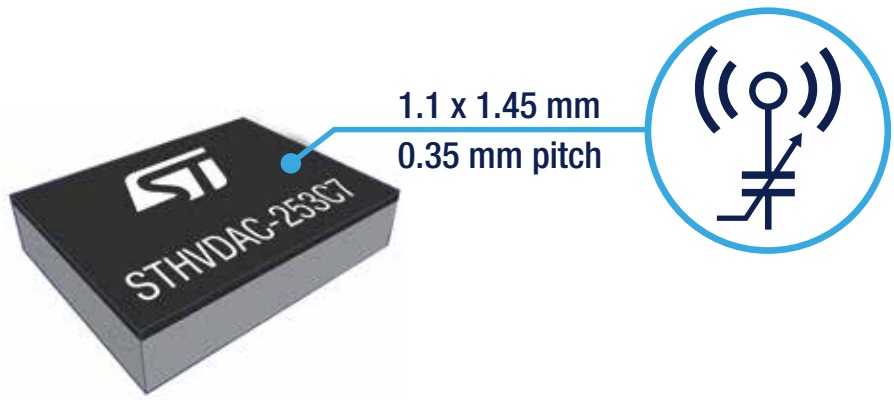
ST's new range of BST (barium strontium titanate) tunable capacitors in a WLCSP package uses solder bars instead of bumps. In addition to increasing the chip's mechanical strength when soldered on thin printed circuit boards, the 3-solder bar package is smaller than a 4-bump device, making this new C4 series of Parascan™ tunable integrated capacitors (STPTIC) even more suited for high-volume manufacturing. There are currently three RF tunable capacitors with solder bars: STPTIC-15C4 and STPTIC-27C4 are high-linearity devices used in frequency-tuning applications and the STPTIC-82C4 with standard linearity is best suited for impedance matching. A common land pattern can be used in order to support passive tunable integrated circuit (PTIC) values ranging from 1.5 to 8.2 pF.

ST	PTIC -	15	L	2	C4
STMicroelectronics	Parascan™ Tunable Integrated Capacitor	Capacitor value	Linearity	2nd GEN	Package
		15 = 1.5 pF 27 = 2.7 pF 33 = 3.3 pF 39 = 3.9 pF 47 = 4.7 pF 56 = 5.6 pF 68 = 6.8 pF 82 = 8.2 pF	G: Standard (x24) L: High (x48)		C5: WLCSP 4 C4: WLCSP 3

NEW BST CAPACITANCE CONTROLLER SIGNIFICANTLY SHRINKS SMART ANTENNA TUNING CONTROLLER

STHVDAC-253C7

Leveraging ST's advanced 0.18 µm BCD8 process and 0.35 mm-pitch flip-chip package, the STHVDAC-253C7 high-voltage BST capacitance controller is 50% smaller than its predecessor and consumes half the operating current. In addition, the new controller requires no external Schottky diode, thereby reducing the overall circuit footprint even further.
Using the STHVDAC-253C7 with STPTIC capacitors for impedance matching and frequency tuning provides stronger signal reception, fewer dropped calls, faster data rates, and longer battery life for handset users.



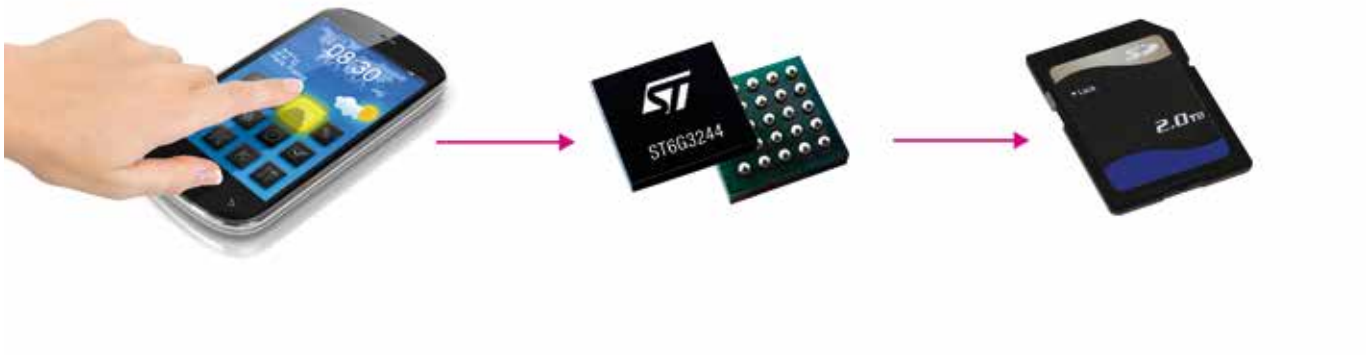
KEY FEATURES

- 12 WLCSP with 0.35 mm pitch
- Battery powered operation with Low Power Mode to reduce Power Consumption
- Integrated boost converter with 3 programmable outputs (from 0 to 24 V)
- Compliant with MIPI RFFE 2.0 interface with synchronous Read support
- Dynamid control to optimize Capacitor transition time thanks to Turbo and Glide Mode
- 3 USID support in order to control 3 antennas with a single device
- GPIO pin to support Antenna swap

SMART ANTENNA TUNING

Tunable Capacitors G2 Series	
STPTIC-15G2C5	1.5 pF Tunable Capacitor, 5:1 tuning ratio WLCSP 0.4 mm
STPTIC-27G2C5	2.7 pF Tunable Capacitor, 5:1 tuning ratio WLCSP 0.4 mm
STPTIC-33G2C5	3.3 pF Tunable Capacitor, 5:1 tuning ratio WLCSP 0.4 mm
STPTIC-39G2C5	3.9 pF Tunable Capacitor, 5:1 tuning ratio WLCSP 0.4 mm
STPTIC-47G2C5	4.7 pF Tunable Capacitor, 5:1 tuning ratio WLCSP 0.4 mm
STPTIC-56G2C5	5.6 pF Tunable Capacitor, 5:1 tuning ratio WLCSP 0.4 mm
STPTIC-68G2C5	6.8 pF Tunable Capacitor, 5:1 tuning ratio WLCSP 0.4 mm
STPTIC-82G2C5	8.2 pF Tunable Capacitor, 5:1 tuning ratio WLCSP 0.4 mm
Tunable Capacitors L2 Series	
STPTIC-27L2C5	2.7 pF Tunable Capacitor, 5:1 tuning ratio WLCSP 0.4 mm, HIGH Linearity
Tunable Capacitors C4 Series	
STPTIC-15L2C4	1.5 pF Tunable Capacitor, 5:1 tuning ratio WLCSP 3 solder bar, HIGH Linearity
STPTIC-27L2C4	2.7 pF Tunable Capacitor, 5:1 tuning ratio WLCSP 3 solder bar, HIGH Linearity
STPTIC-82G2C4	8.2 pF Tunable Capacitor, 5:1 tuning ratio WLCSP 3 solder bar
BST Controllers	
STHVDAC-253C7	3 ouptuts, 25 V, 0.35 mm pitch WLCSP12, MIPI RFFE interface, Turbo & Glide
STHVDAC-256MTGF3	6 ouptuts, 25 V, 0.4 mm pitch WLCSP20, MIPI RFFE interface, Turbo & Glide

Interface



Interface secure digital (SD) cards with ST level translators.
Increase the number of I/O ports and enhance the control capability of existing platforms with ST's Xpander™ technology.
Direct audio and data signals on mobile devices with audio and high-speed switches.
Improve design and user experience with ST's smart reset devices that remove the need for dedicated reset buttons or having to remove the battery when a device freezes.
Prevent over-discharging and system start-up with low battery with supervisor devices.

LEVEL TRANSLATORS

ST's dual-supply level translators are the ideal solution for bidirectional level translation with mixed voltage systems of 1.8 V, 3.3 V and 5 V.

I/O EXPANDERS

I/O expanders with advanced features: keypad scanning, PWM and rotator general I/O expanders with 8-16 I/Os.

CAMERA INTERFACES

Deserializer for SMIA CCP1 and CCP2.
Dual mode deserializer for SMIA/CCP2 and MIPI/CSI-2.

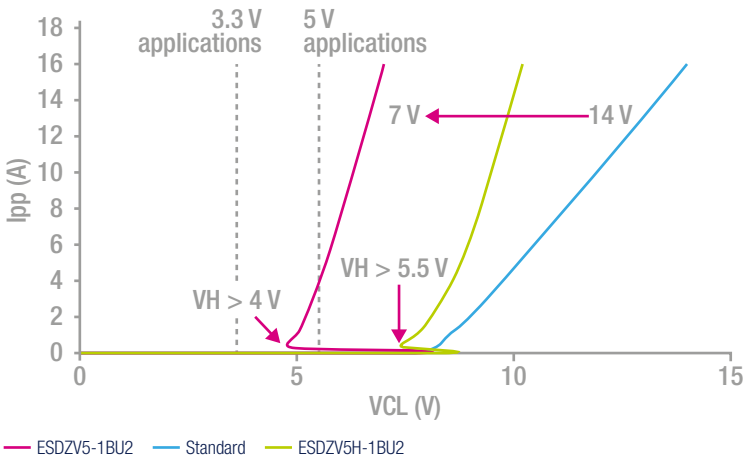
KEY BENEFITS

- Flexibility in system design versus monolithic implementation
- Easier verification of subsystems
- Faster development time by using discrete components
- Deserializer enables use of parallel interface baseband with serial cameras

Protection

Protection devices

ST's complete protection and filtering range with integrated or standalone solutions offers design flexibility while bringing space saving and high system immunity.



TVS crowbar diodes and ICS

TVS clamping diodes and ICS

Automotive-grade TVS clamping diodes and and arrays

TVS clamping arrays

Current-limiting terminations

ESD PROTECTION

Our solutions are not only specified against the highest level of IEC 61000-4-2 for robustness, but also target the lowest clamping voltages, residual currents for the highest protection efficiency. Protection devices for clamping arrays, rail-to-rail topologies, USB ports and high-speed ports are driven by requirements for robustness, efficiency, and transparency.

EOS PROTECTION

ST proposes dataline and powerline high power-density protection, rated against IEC 61000-4-5. These EOS 8/20 µs protection devices are available in a large choice of packages.

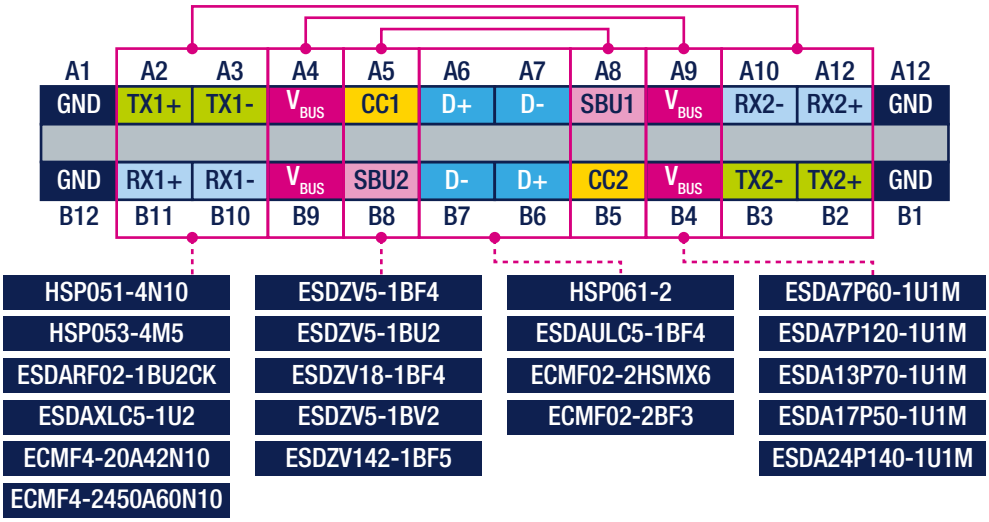
KEY FEATURES

- Exceed IEC61000-4-2 level 4
- Low clamping voltage down to 7V
- Extra low capacitance down to 0.2 pF
- IPP (peak pulse current) of EOS 8/20 (Electrical Over Stress) up to 150 A
- Small packages down to 01005 (0.2 mm x 0.45 mm)

FEATURED PRODUCTS
PROTECTION AND FILTERING SOLUTIONS FOR USB TYPE-C CABLES AND CONNECTORS

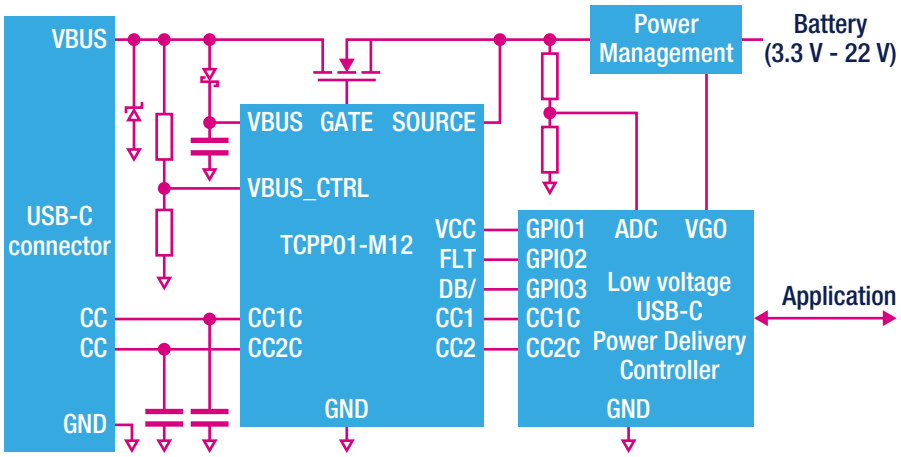
ST offers a complete range of solutions to protect and filter USB Type-C power lines and datalines:

- Solutions to fully protect USB Type-C connections and reduce noise that de-senses Wi-Fi and other RF systems
- Alternate Mode supports many protocols in addition to USB and requires protection and filtering devices to optimize signal integrity and clamping voltages, while ensuring deep rejection over a large spectrum
- USB Power Delivery increases the power capability of Type-C connectors, again pushing the limits of miniaturization of TVS or EOS protection devices



TCPP01-M12

The TCPP01-M12 is a single chip solution for USB Type-C Port Protection that facilitates the migration from USB legacy connectors Type-A or Type-B to USB Type-C connectors. The TCPP01-M12 features 22 V tolerant ESD protection as per IEC61000-4-2 Level 4 on USB Type-C connector Communication Channel (CC) and V_{BUS} lines. To allow fast certification for USB Power Delivery, the TCPP01-M12 provides overvoltage protection on CC1 and CC2 pins when these pins are subjected to short circuit with the V_{BUS} pin that may happen when removing the USB Type-C cable from its receptacle. For sink applications, TCPP01-M12 triggers an externally programmable N-MOSFET overvoltage protection on V_{BUS} pin when a defective power source applies a voltage higher than selected OVP threshold. Also, the TCPP01-M12 integrates a “Dead Battery” management logic that is compliant with the USB Power Delivery specification. The VBUS N-MOSFET load driver can also be used in source applications.



KEY FEATURES

- ESD protection for CC1, CC2 and VBUS
- Compliant with IEC 61000-4-2 Level 4 (± 8 kV contact discharge, ±15 kV air discharge)
- Over Voltage Protection on CC lines against short-to-VBUS overvoltage
- Externally programmable Over Voltage Protection on VBUS line
- Integrated VBUS gate driver for external N-MOSFET
- Over Temperature Protection
- Integrated “Dead Battery” management
- Open-drain fault reporting
- Operating junction temperature from -40 °C to 85 °C
- ECOPACK®2 compliant

EMI filtering

Wearable devices are sensitive to electro-magnetic interference. They are small integrated devices with a high density of components mounted on PCB. The risk of antenna desense and EMI coupling must be mitigated.

ST offers a wide range of EMI and common-mode filters (ECMF™) with the following benefits:

- Drastically reduce radiated noise and antenna de-sense with unique extra large rejection band or extra deep rejection at selected frequencies
- High integration: 1mm^2 for 2 differential lines for ECMF™
- High quality of protection with low clamping voltages

EMI FILTERS

Part number	Target interface	Number of lines	Number of integrated discrete components	Clamping voltage max (V_{CL} @ 30 ns in V)	IEC 61000-4-2 min (contact discharge) in kV)	Package	Package size (mm x mm)
EMIF02-SPK03F2	Speaker	2	10	16.7 V for 30 kV contact surge	30	WLCSP	0.89 x 1.26
EMIF02-MIC03F2	Micro	2				WLCSP	
EMIF04-EAR02M8	Audio jack	4	20	9.2 V for 8 kV contact surge	30	uQFN-8L	1.5 x 1.7
EMIF08-VID1F3	Keypad, camera, LCD	8	40	4.5 V for 8 kV contact surge	20	WLCSP	1.04 x 3.15

COMMON-MODE FILTERS

Part number	Number of lines	Attenuation @ Frequency	Bandwidth (@-3 dB) in mHz	Clamping voltage max (V_{CL} @ 30 ns in V)	IEC 61000-4-2 min (contact discharge) in kV)	Package	Package size (mm x mm)
ECMF02-2HSMX6	2	-20 dB @ 2400 MHz -35 dB at 1.5 GHz -20 dB at 2.4 GHz -18 dB at 2.7 GHz -20 dB at 5 GHz	3200	26.8	8	uQFN-6L	1.35 x 1.60
ECMF02-2BF3	3	-30 dB @ 900 MHz	5000	30	10	WLCSP	1.35 x 0.83
ECMF4-20A42N10	4	-13 dB at 0.7 GHz -15 dB at 1.5 GHz -25 dB at 2.4 GHz -23 dB at 2.7 GHz -13 dB at 5.0 GHz	5000	11	8	uQFN-10L	1.35 x 2.2
ECMF4-2450A60N10	4	-30 dB at 2.4 GHz -15 dB at 5.0 GHz	6000	11	10	uQFN-10L	1.35 x 2.2

ESD protection

Portable devices are by nature vulnerable to ESD. Indeed, they are small integrated devices using ESD-sensitive ICs with thin lithography technologies and in close contact with electrostatic charges that a human can develop in low relative humidity. The risk of ESD damage is then very high.

Benefits of ST's current ESD protection devices:

- High efficiency of protection with low clamping voltages down 7 V with Snapback « Z » series.
- Transparency to high-speed signals with ultra-wide bandwidth up to 20 GHz
- Flexibility and Integration with single- or multi-line products from 01005 package size
- High robustness against surges with capability up to 30 kV
- High Ipp versions to combine EOS and ESD in smallest packages

Part number	Number of lines	Directionality	Breakdown voltage (in volt)	Capacitance line to GND (C_{line} in pF)	Clamping voltage max (V_{CL} @ 30 ns)	IEC 61000-4-2 contact (in kV)	Package & size (mm x mm)
General purpose ESD protection							
ESD051-1BF4	1	Bi-Directional	5.8	45	11	30	ST0201 0.6 x 0.3
ESDZV5-1BF4	1	Bi-Directional	5.8	5	7	18	ST0201 0.6 x 0.3
ESDZV5-1BU2	1	Bi-Directional	5.5	6	9	20	ST0201 0.6 x 0.3
ESDZV5H-1BU2	1	Bi-Directional	5.5	4	10	14	ST0201 0.6 x 0.3
ESDZV18-1BF4	1	Bi-Directional	18	3	21.5	30	ST0201 0.6 x 0.3
ESDZV5-1BV2	1	Bi-Directional	5.8	5	7	16	ST01005 0.2 x 0.45
ESDZV141-1BV2*	1	Bi-Directional	18	1.5	26	20	ST01005 0.2 x 0.45
ESDAVLC5-4BU4	4	Bi-Directional	5,.5	6	15	15	uQFN-4L 0.9 x 0.5
High-speed signals ESD protection							
ESDAXLC5-1U2	1	Uni-Directional	5	0.55	10.4	16	ST0201 0.6 x 0.3
ESDARF02-1BU2CK	1	Bi-Directional	5	0.25	19	8	ST0201 0.6 x 0.3
HSP051-4N10	4	Uni-Directional	4.5	0.4	13	8	uQFN-10L 1.9 x 1.0
HSP053-4M5	4	Uni-Directional	5.8	0.25	15	10	uQFN-10L 1.3 x 0.8
USB Vbus and Vbat ESD & EOS protection							
Part number	**Number of lines**	**Directionality**	**Voltage**	**Peak pulse current (I_{PP} @ 8/20 µs**	**V_{CL} @ I_{PP} (@ 8/20 µs surge)**	**IEC 61000-4-2 min (contact for 8 kv in V)**	**Package & size (mm x mm)**
ESDA7P60-1U1M	1	Uni-Directional	5.5	60	10	30	ST1610 1.6 x 1.0
ESDA7P120-1U1M	1	Uni-Directional	5.5	120	11	30	ST1610 1.6 x 1.0
ESDA7P80-1U1M**	1	Uni-Directional	5	80	8	30	ST1610 1.6 x 1.0
ESDA13P70-1U1M	1	Uni-Directional	12	70	20	30	ST1610 1.6 x 1.0
ESDA15P60-1U1M	1	Uni-Directional	13.2	60	20	30	ST1610 1.6 x 1.0
ESDA17P50-1U1M	1	Uni-Directional	15	50	24	30	ST1610 1.6 x 1.0
ESDA17P100-1U2M	1	Uni-Directional	15	160	28	30	QFN 2.0 x 1.8
ESDALC20-1BF4	1	Bi-Directional	20	2.4	37	20	ST0201 0.6 x 0.3
ESDA22P150-1U3M	1	Uni-Directional	20	150	27	30	QFN 2.0 x 2.0
ESDA25P35-1U1M	1	Uni-Directional	22	35	39	30	ST1610 1.6 x 1.0
ESDA24P140-1U3M	1	Uni-Directional	22	140	33	30	QFN 2.0 x 2.0
USB CC and SBU lines ESD & EOS Protection							
ESDA8P30-1T2	1	Uni-Directional	6.3	30	12	30	SOD882T 1.0 x 0.6
ESDA8P80-1U1M	1	Uni-Directional	6.3	80	13.2	30	ST1610 1.6 x 1.0

Note: * Available Q2-2019 ** Available Q4-2019

Power/Battery management

High integration combined with a broad IP portfolio, complete system competency and state-of-the-art technology.

ST is a leading supplier in power management and mixed-signal ICs for mobile applications, offering a wide range of products from simple power management ICs up to highly-integrated devices that mix power management blocks with advanced analog and digital functionality.

Battery management ICs

- Advanced embedded features (power path, shipping mode, protection circuit module PCM)
- Battery monitoring

Wireless charging

- TX and RX architectures supported
- Compliant with PMA and Qi standards

DC-DC converters

- 500 nA quiescent, 400 mA Buck converter for low power applications
- Buck-Boost converter with Vout up to 5.5 V

LDOs

- Wide product selection
- Unique bump-less technology allows the smallest form factor

Smart reset

- Customizable products providing safe and convenient reset

USB type C and Power Delivery

- USB Type-C connector is reversible
- Able to carry up to 100 W charging power (from 5 V/0.5 A up to 20 V/5.0 A)

BATTERY CHARGER

ST's battery management devices provide high efficiency, power density and low standby power consumption. Our product portfolio includes complete solutions for battery chargers: switching chargers that offer charge currents up to 1.2 A, integrating in the same chip a fuel gauge function; linear chargers with charge currents from 15 mA to 1.1 A and wireless chargers compliant with PMA and Qi standards. By combining wireless power technology with high efficiency and smart charging, ST creates easier, faster, innovative, ways to power up smartphones, tablets and other mobile devices.

Part number	General description	Operating temperature		Charge current (A)	Supply current (bat) typ (µA)	Supply voltage (V_{DD})		Package
		min (°C)	max (°C)			min (V)	max (V)	
L6924D	Single Cell Li Ion battery Charger	-40	85	1	0.25	2.5	12	VFQFPN 16
L6924U	Single Cell Li-Ion Battery Charger IC for USB port and AC Adapter	-40	85	1	0.25	2.5	12	VFQFPN 16
STBCFG01	Switch-mode Single Cell Li+ Battery Charger with OTG Boost, Voltage Mode Fuel Gauge and LDO	-40	85	-	10	3.78	5.95	Flip-Chip25
STNS01	Li-Ion Linear Battery Charger with LDO	-30	85	0.2	6	4.55	5.4	DFPN 12 3 x 3
STWBC-WA	Digital controller for wireless battery charger transmitters for wearable and smart watches applications	-40	105	-	-	3	5.5	VFQFPN 32
STBC02	Li-Ion Linear Battery charger with LDO, Load Switches, Battery Protection and Reset Generator	-40	85	0.45	4	4.55	5.4	Flip-chip30
STBC03	Li-Ion Linear Battery charger with LDO, Load Switches and Battery Protection	-40	85	0.65	4	4.55	5.4	Flip-chip30
STBC15	Ultra-low current consumption linear battery charger for thin film and Li-ion Batteries	-40	85	0.04	0.25	3.2	6.5	QFN 12 Flip-chip12

WIRELESS BATTERY CHARGER

ST's transmitter and receiver solutions for wireless battery charging are designed for ultra-compact battery-operated devices such as wearables, sports gear, smart watches, sensors and medical equipment. The STWBC-WA transmitter can support both full- and half-bridge topologies and provides designers with increased flexibility thanks to a powerful software API which allows modifying the behavior of LED and GPIOs, as well as adding external interfaces via I²C and UART communication ports. Efficient power transfer is enhanced by a smart standby state while waiting for a receiver, which guarantees a power consumption as low as 3 mW while maintaining the foreign object detection (FOD) function active for maximum safety. The STWLC30JRF* receiver is Qi 1.2 compliant and can support solution for portable applications up to 5 W.

ST provide a complete ecosystem to evaluate the offer for Wireless Battery charger:

- The STEVAL-ISB045V1 reference design includes a wireless power transmitter board, turn-key firmware APIs, user-friendly GUI and USB-to-UART dongle. It supports wireless power transfer of 2.5 W over a 20 mm antenna on the transmitter side and can be scaled-down to 1 W by switching to a half-bridge configuration
- The STEVAL-ISB043V1 provides a complete kit compliant to Qi 1.2 up to 2.5W output power, the firmware gives user the flexibility to modify parameters and setting to ensure the fitting in final application

Note: * Available in Q1 2019

BATTERY MONITORING ICs

STC3115/STC3117

ST's battery fuel gauge ICs can be located in the battery pack or in the handheld device and integrate functions to monitor the battery voltage, current and temperature. Using a built-in Coulomb counter, these fuel gauge ICs calculate battery charge and store the data in 16-bit register resolution for retrieval by the system controller. Access is via an industry-standard I²C interface, enabling the controller to create an accurate graphical representation of the remaining battery-operating time. Battery-monitoring fuel gauge ICs combine a small footprint with outstanding measurement accuracy and extremely low power consumption to increase battery runtime and lifespan in mobile phones, multimedia players, digital cameras, and other space-constrained portable devices.

FEATURES

- OptimGauge™ algorithm for STC3115
- OptimGauge+™ algorithm for STC3117
- Coulomb counter and voltage gas gauge operations
- Programmable low battery alarm
- Internal temperature sensor

BENEFITS

- 3% accuracy of battery state of charge no need for shunt resistor
- Accurate estimation of battery state of charge at power-up
- Reliable battery swap detection
- SoH and impedance tracking with OptimGauge+ algorithm (ST IP)
- Charger enable and system reset control for accurate OCV reading fuel
- Minimum form factor

Part number	Charging sensing voltage range	Charging sensing resistor	Typical supply current (Icc)	Supply voltage (VDD)		Comment	Package
				Min	Max		
STC3115	±40 mV	5 to 50 mΩ	0.045 µA	2.7 V	4.5 V	OptimGauge Algo/Built_in OCV Curves	1.4 x 2.0 mm 10-bump CSP 2.0 x 3.0 mm DFN10
STC3117	±40 mV	5 to 50 mΩ	0.04 µA	2.7 V	4.5 V	OptimGauge+ Algo/ Customizable OCV Curves	1.5 x 1.6 mm 9-bump CSP

USB TYPE C & PD

USB Type-C is now established as a standard for medium to high-end Smartphones, Computers, Notebook, video game consoles introduced in the market. Democratization process is on-going, and the “old fashion” legacy micro-B connector being smoothly replaced by the tiny, powerful and reversible type-C plug in most battery powered portable devices.

To enable this massive migration, STMicroelectronics has introduced a ready-to-use, tiny, safe, certified and easily customizable SINK PD controller. The IC is called STUSB4500 and is the first controller optimized for SINK only applications. Being standalone, the IC does not need any complex software development to handle the USB PD stack, negotiate with the SOURCE, monitor incoming power and protect the application from up to 28 V external voltage. Power profiles can be easily adjusted through Non Volatile Memory or external MCU support, when available. On top of QFN4x4 package, a 2.6x2.6 CSP package integrating also the high voltage protections is available to address the smallest form factors.

Evaluation board (STEVAL-ISC005V1) and minimum form factor reference design (STREF-SCS001V1) are available from st.com or through STUSB4500 product page.

STUSB45
Stand-alone USB PD controller - SINK

FEATURES

- Consumer – UFP
- Auto-run & Dead Battery support
- Up to 3 SINK PDO profiles
- Dual VBUS gate drivers: Low voltage (5 V) and High Voltage (up to 20 V) charging paths
- Short-to-VBUS protections up to 28 V
- Integrated Voltage monitoring
- Integrated VBUS discharge path
- Dual power supply (VBUS and/or VSYS):
  - VBUS = (4.1 V - 22 V) - AMR = 28 V
  - VSYS = (3.0 V; 5.5 V)

BENEFITS

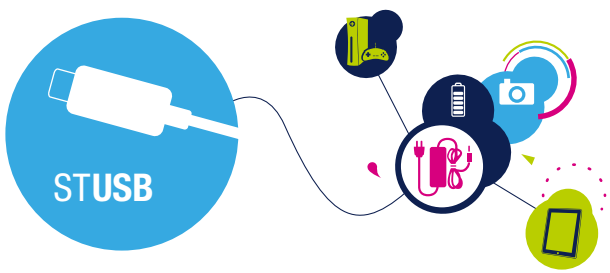
- Plug & Play
- Can run without MCU support
- Robust to high voltage spikes
- Configurable and flexible
- Integrated solution: low BOM cost

PACKAGE

- QFN-24 EP 4 x 4 mm^2
- CSP-25 2.6 x 2.6 mm^2

STUSB4500 QUICK LINKS

DATASHEET	STUSB4500
REF DESIGN (mini dongle)	STREF-SCS001V1
EVAL BOARD	STEVAL-ISC005V1
GUI	STSW-STUSB002
Software library (open source)	STSW-STUSB003
Example of application	USB-C Wireless charging accessory
VIDEO (corporate)	Device migration (≤ 100 W)
USB-C Power Delivery	
FAQ	WHY and HOW to replace any power plug with type-C?
BLOG	charge easily your device with USB-C
STUSB portfolio	Product selector



DC-DC OR POINT OF LOAD

ST's DC-DC synchronous converters are designed for consumer and portable applications. Buck, buck-boost and boost switching regulators must provide low power consumption, high-efficiency power conversion, and be available in very small packages from standard leadless plastic to flip-chip pure bumped silicon. The switching frequency control loop guarantees high dynamic response with very small inductor size. All products are optimized to work with Li-ion batteries, USB sources or the latest battery chemistries.

KEY FEATURES

- Syncronous rectification and high switching frequency
- Automatic PWM and PSM mode
- Low quiescent current
- Programmable output voltage
- Automatic transition between buck and boost mode
- Low output voltage ripple for noise sensitive systems
- By-pass mode

BENEFITS

- PCB Miniaturization with less passive components. Chip coil inductor can be used for ST1S15
- Maximizes efficency over the whole load range
- Extends system battery life
- One/two/three pins allow selecting the required output voltage
- Allows using battery over the entire operating voltage range
- No secondary stage regulation is needed STBB2/STBB3
- Reduced power consumption for long live battery

Part number	General description	Input voltage (Vin)		Regulated output voltage		Output Current-Max (I_{OUT}) (A)	Quiescent current(Iq) typ (µA)	Switching frequency typ (KHz)	Package
		min (V)	max (V)	min (V)	max (V)				
ST1S15	500 mA, 6 MHz synchronous step-down converter	2.3	5.5	1.82	1.82	0.5	45	6000	Flip-Chip 6
STBB2	800 mA 2.5 MHz, high efficiency dual mode buck-boost DC-DC with by-pass mode	2.3	5.5	1.2	4.5	0.8	35	2500	Flip-Chip 20
STBB3J	2 A, 2 MHz, high efficiency dual mode buck-boost DC-DC converter	1.8	5.5	1.2	5.5	2	35	2000	Flip-Chip 20
STBB3JCC	2 A, high efficiency single inductor buck-boost DC-DC converter and High Brightness White LED Driver	1.8	5.5	1.2	5.5	2	35	2000	Flip-Chip 20
ST1PS01	400 mA Nano-Quiescent Synchronous step-down converter with voltage selection and power good	1.8	5.5	0.625	3.3	0.40	0.5	2000	Flip-chip 8
ST1PS02*	400 mA Nano-Quiescent Synchronous step-down converter with voltage selection, power good, Aux Switch	1.8	5.5	0.7	3.3	0.40	0.05	2000	TQFN 12 2.0 x 1.7mm

Note: * Full production in Q2 2019

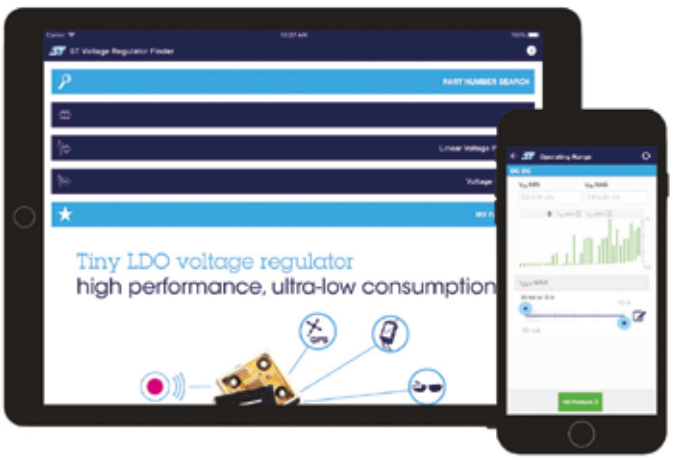
LOW-DROPOUT REGULATOR (LDO)

ST offers a complete portfolio of high-performance LDOs, with state-of-the-art figures on the key merit parameters fitting into the smallest packages available. ST's ultra-small, high-performance LDOs are particularly suitable for the latest generation of portable devices

Part number	General description	Input voltage Range (V)	Output Voltage (V_{OUT}) (V)	Output Current (I_{OUT}) (mA)	Adjustable Regulated Output Voltage	Supply Voltage Rejection Ratio (SVR) (@ 10 kHz) typ (dB)	Dropout Voltage (VD) nom (mV) @ max I_{OUT}	Output Tolerance (%) typ	Quiescent Current (Iq) typ (µA)	Operating Temperature		Package
										min (°C)	max (°C)	
STLQ50	50 mA, 3µA Supply current low drop linear regulator	2.3 to 12	1.8 : 5	50	Yes	20	200	2	3	-40	125	SOT323-5L
LD39115J	150 mA low quiescent current low noise voltage regulator	1.5 to 5.5	0.8 : 4.5	150	No	67	90	2	20	-40	125	Flip-Chip 4
LD59015	150 mA low noise high PSRR linear voltage regulator	2.4 to 5.5	0.8 : 3.3	150	No	76	150	1.8	31	-40	125	SOT323-5L
LD39020	200 mA very low quiescent current Linear regulator IC	1.5 to 5.5	0.8 : 5	200	No	67	200	0.5	20	-40	125	DFN4 1x1
LDBL20	200 mA very low quiescent current Linear regulator IC	1.5 to 5.5	0.8 : 5	200	No	67	200	1.5	20	-40	125	ST STAMP™
LDK120	200 mA low quiescent current very low noise LDO	1.9 to 5.5	0.8 : 3.5	200	Yes	36	150	2	30	-40	125	SOT23-5L; SOT323-5L; DFN6 1.2x1.3
STLQ020	200 mA - ultra low quiescent current linear voltage regulator	2 to 5.5	0.8 : 4.5	200	Yes	50	160	2	0.3	-40	125	Flip-Chip 4; SOT323-5L; DFN6 2x2
LDLN025	250 mA - ultra low noise - high PSRR linear voltage regulator IC	1.5 to 5.5	1 : 5	250	No	70	120	1	12	-40	125	Flip-Chip 4; DFN4 1x1; SOT23-5L"
LD39030SJ	300 mA low quiescent current soft-start, low noise voltage regulator	1.5 to 5.5	0.8 : 4.5	300	No	62	200	2	20	-40	125	Flip-Chip 4
LD39130S	300 mA very low quiescent current Linear regulator IC with automatic Green mode	1.4 to 5.5	0.8 : 4	300	Yes	65	300	1	1	-40	125	Flip-Chip 4; DFN6 1.2x1.3
LD59030	300 mA very low drop Linear regulator IC	1.5 to 5.5	0.8 : 5	300	No	67	135	1	28	-40	125	DFN4 1x1
LDK130	300 mA low quiescent current very low noise LDO	1.9 to 5.5	0.8 : 3.5	300	Yes	35	200	2	30	-40	125	SOT23-5L; SOT323-5L; DFN6 1.2x1.3
LD56050	500 mA ultra low dropout linear regulator with bias supply	0.8 to 5.5	0.8 : 3.6	500	No	70	80	0.5	27	-40	85	DFN4 1.2x1.2
LD56100	1A very low dropout fast transient ultra-low noise linear regulator	1.8 to 5.5	1 : 5	1000	No	68	120	1	100	-40	125	DFN8 1.2x1.6

ST-VREG-FINDER

The ST-VREG-FINDER is a free application for smartphones and tablets that enables a smart selection of products, both bet.



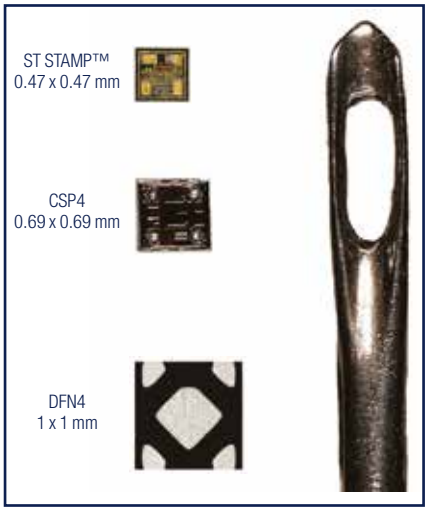
Google play

Available on the App Store

ST STAMP™: A STEP FURTHER IN MINIATURIZATION

ST STAMP™ (ST Small Thickness Advanced Micro Package) is ST's trademark for our new unique and innovative bumpless CSP package.

Compared to the smallest DFN plastic packages and flip-chips, the ST STAMP™ solution provides similar package performance and reliability, reducing the total heigth to 200 µm or less, with a smaller footprint.



SMART RESET

ST's smart reset ICs extend the functional capacity of existing control buttons to give users the possibility of resetting a device, with a single or two simultaneous buttons.

KEY FEATURES

- Choice of a single button or two simultaneous buttons to signal a reset
- Support for applications where the battery cannot be removed
- Tiny packages

Part number	Number of reset button	Number of power button	Reset setup delay typ (sec)	Reset pulse duration (ms). Typ.	Supply voltage (V)	Package
STM6519	1	-	1.5 to 10	Push button controlled and factory programmed time	2 to 5.5	DFN6 1 x 1.45 x 0.55
STM6520	2	-	7.5 to 12.5	Push button controlled and factory programmed time	1.65 to 5.5	DFN8 2 x 2 x 0.75
STM6524	2	-	4 to 10	Push button controlled and factory programmed time	1.65 to 5.5	DFN6 1.3 x 1.6 x 0.55
STM6600	1	1	Selectable via ext. capacitor	360	1.6 to 5.5	DFN12 2 x 3 x 0.75

User interface

LED / OLED

ST provides monolithic OLED power management devices that add value to new designs by simplifying power-supply circuitry and also maximizing battery life for feature-rich portable products. Yet, ST's intelligent LED drivers provide the necessary voltage to power multiple LEDs that can be arranged in different configurations.

AMOLED Power Supply

- World's best product portfolio
- Outstanding electrical performance
  - 90% efficiency in worst case
  - TDMA noise control to minimize display flickering

LCD backlight

- Series and parallel LED configuration powered by linear or switching architectures
- Superior brightness control
  - 1% current matching
  - High resolution PWM dimming
- Full LED diagnostics for service and production

Matrix LED drivers

- High level of integration with embedded power rail
  - Adaptive power rail to maximize efficiency
- Analog and digital PWM dimming for optimum color calibration
- LED failure detection

OLED

Part number	General description	Input voltage (Vcc) min (V)	Output voltage (Vout) (positive)		Output voltage variation (positive) typ (%)	Quiescent current (Iq) typ (mA)	Switching frequency typ (MHz)	Topology	Efficiency max (%)	Package
			min (V)	max (V)						
STOD1317B	170 mA 13 V, high efficiency boost converter + LDO	2.6	6	13	-1.0, +1.0	1	1.2	Boost cascaded with an LDO	85	DFN12
STOD32W	100 mA triple DC-DC converter for powering AMOLED displays	2.9	4.577	4.623	-0.5, +0.5	-	1.55	Boost + Inverting	92	Flip-Chip 12

LED DRIVERS

Part number	General description	Input voltage (Vcc)		Output current-Max (I_{OUT}) nom (mA)	Output current accuracy typ (%)	Number of LEDs max ()	Switching frequency typ (MHz)	LED configuration	Package
		min (V)	max (V)						
STLED524	Intelligent matrix LED display driver	2.7	5.5	480	7.5	5x24	2.4	Matrix	CSP 56 3.4 x 3.0 mm, pitch 0.4 mm
STP4CMP	Low voltage 4-channel constant current LED driver with charge pump	2.7	5.5	120	7	4	-	Parallel	QFPN 20 3.2 x 1.8
LED1202	12-Channels,1.8 V compatible I^2C, 12-bit PWM, 8-bit Analog local dimming, 8 patterns with progammable patterns sequence, Low Iq, Open LED Detection.	2.6	5	20	1	12	-	Parallel	WLCSP 1.71 x 2.16 x 0.5 mm 20 with 0.4 mm pitch and ball 0.25mm. VFQFPN 3 x 3 x 0.6 20L with 0.5 mm pitch

REAL-TIME CLOCK

ST's M41T62LC6F real-time clock is the perfect match for wearable devices when size, weight, and power-efficiency matters. It offers a very low frequency error at 25 °C which equates to about 5 seconds per month, an ultra-low power consumption of 350 nA in stand-by, and comes in an ultra-small 1.5 x 3.2 mm package with an embedded crystal oscillator.

BENEFITS

- Ultra-small package with embedded crystal 1.5 x 3.2 x 0.8mm
- Ultra-low power consumption 350nA
- Timekeeping voltage down to 1 V
- Programmable alarms with wake-up functions
- +/- 2PPM accuracy by digital calibration
- Compatible with Li-Ion battery voltages

Part number	General description	Package	Battery supply current (nA typ.)	Data Bus type	Supply Voltage min-max (V)
M41T62	Ultra low-power serial real-time clock	LCC8 (3.2 x 1.5mm)	350	I^2C	1.3-4.4

life.augmented