

STMicroelectronics' product offer for mobile devices



STMicroelectronics

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Microcontrollers and secure MCUs

8/32-bit microcontrollers, NFC controllers, secure elements

Imaging solutions

Imaging processors, CMOS sensors, camera modules

Interface and interconnected devices

High-speed SD card interfaces, I/O expanders, camera interfaces, analog switches

Sensors and human interfaces

Audio microphones, accelerometers, gyroscopes, pressure sensors, modules, capacitive touch key controllers, proximity sensors, touchscreen controllers, optical finger mice

Audio solutions

Speaker amplifiers, headphone amplifiers

Radio frequency

Couplers, diplexers, baluns, clock distribution, real-time clocks

Power management

LDO regulators, Li-ion battery management, DC-DC converters, flash LED drivers, backlight drivers, OLED display power supplies

Protection and EMI filtering

ESD and EOS protection, EMI filtering and common-mode filtering



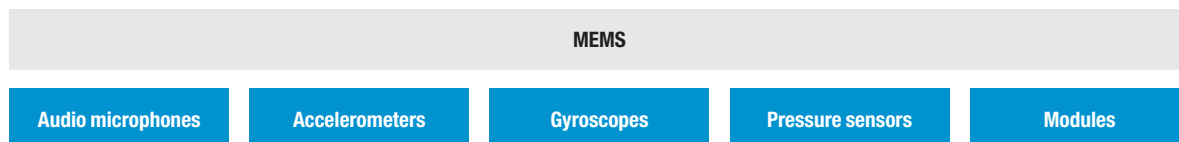
Sensors and human interfaces

MEMS (micro electro-mechanical systems) enable unique user-interface gesture recognition and motion detection. ST offers the widest and most complete MEMS portfolio on the market, and has shipped more than one billion MEMS sensors.

Micro-machined accelerometers, gyroscopes and magnetic modules have enabled motion-activated user interfaces in a number of popular consumer devices, such as game consoles, smartphones and remote controls, making these more accessible and appealing to people.

ST is now introducing digital microphones that allow more accurate sound capture and ambient noise cancellation. We are also introducing touch-sensor technology with multi-touch capabilities and force movement detection.

MEMS



Audio microphones

Omni-directional stereo digital microphones with sensing elements capable of detecting acoustic waves and an IC interface providing PDM stereo output

Accelerometers

MEMS inertial sensors to measure linear acceleration: analog and digital, up to 3 axes, with low-g and medium-g full scale (ultra-low power, with high performances and advanced embedded features)

Gyroscopes

MEMS inertial sensors to measure angular rate: analog and digital, up to 3 axes (yaw/pitch/roll)

Pressure sensors

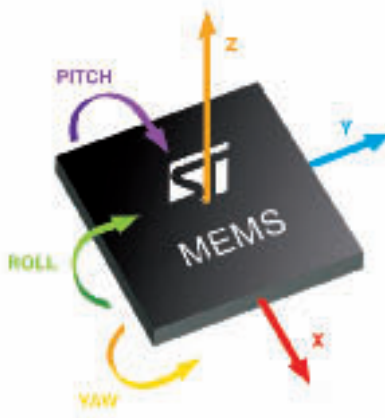
New MEMS sensor technology introduced for high-resolution, absolute digital output barometers

e-compass modules

Accelerometer and magnetometer combined to provide accurate movement tracking for an ideal compass solution

Key benefits

- MEMS microphones combining high audio quality with high-volume manufacturing capability
- Wide range of motion sensors with integrated features such as sleep-to-wake-up, 6D orientation and free-fall detection with programmable interrupts
- Modules integrating accelerometers with magnetometers for optimized size and cost



Touch sensing

Touch sensing

Touch key controllers, proximity sensors

Touchscreen controllers

Optical finger navigation

Capacitive touch keys

From 3 to 24 sensing channels, for simple switch to more complex slider/wheel applications, auto calibration, high level of sensitivity, high-performance noise immunity and proximity sensing

Resistive touchscreen controllers

Available for cost-sensitive and stylus-based products, high resolution and flexible features, low power consumption and small package size

Capacitive touchscreen controllers

Multi-touch controller with dedicated noise-tolerant sensing hardware, ultra-low-power operation and easy-to-use programming interface

Optical finger navigation

Optical finger motion sensor for pointer-based navigation in portable multimedia devices, also ideal for web browsing, document scrolling and more

Proximity sensors

Ultra-low-power, small-footprint and noise-immune solution for proximity detection (hand, ear, face...)

Key benefits

- Optimized solution for touch keys for both MCU and standalone architectures
- Complete set of touchscreen controllers for mono, dual and multi touch devices
- ST touchscreen controller offering includes both resistive and capacitive technology



Sensors and human interface products

Audio microphones		Touch key controllers, proximity sensors	
MP34DB01 ¹	Bottom port digital microphone	STMPE321	3-button capacitive touch key
MP45DT01	Top port digital microphone	STMPE821	8-button capacitive touch key with PWM
Accelerometers		STMPExxM31	16-button capacitive touch key with PWM, slider/wheel and proximity sensor
LIS331DLF	3-axis, digital 6-bit accelerometer	STM8L MCUs ²	Capacitive charge library for touch keys
LIS331DLM	3-axis, digital 8-bit accelerometer	STM8T14x	Single-channel touch and proximity sensors
LIS331DLH	3-axis, digital 12-bit accelerometer	STM8T143 ¹	Single-channel proximity sensor
LIS3DH	3-axis, digital 12-bit, ultra-low-power accelerometer	Touchscreen controllers	
Gyroscopes		STMPE812	4-wire resistive touchscreen controller
LPRxxxx	Pitch and yaw analog gyroscope family Full scale 30 to 6000 dps	STMT05N1 ¹	Capacitive multi-touch screen controller (up to 5")
LPYxxxx	Pitch and yaw analog gyroscope family Full scale 30 to 6000 dps	STM32TS60	ASSP dedicated to multi-touch resistive screens, up to 10 fingers, 2.5" to ~7" touchscreens with a single chip
L3G4200D	3-axis digital, full scale 250/500/2000 dps, FIFO Temperature sensor	Optical finger navigation	
Pressure sensors		VD5376	Low-power optical finger motion sensor
LPS001 ¹	300 to 1100 mbar digital barometer	VD5377 ¹	Ultra-low-power optical finger motion sensor
LPS001WP ¹	300 to 1100 mbar digital absolute barometer, LGA8	Temperature sensors	
LPS331AP	300 to 1100 mbar digital output barometer	STLM20	Ultra low current analog temperature sensor
Modules		STTS751 ¹	2.2 V low-voltage digital temperature sensor
LSM303DLH	e-compass module: 3-axis accelerometer and 3-axis magnetometer		

Note: 1. Under development. Target datasheet and samples available upon request.

2. SW

Power management

As a key supplier in the field of power management, ST's devices provide high efficiency, power density and low standby power consumption.

ST's high-efficiency and tiny sized illumination drivers are highly suited for mobile phones and other handheld devices.

Our innovative LED flash controllers with enhanced diagnostics and I²C communication provides brighter flash and higher quality pictures even under the most demanding lighting conditions.

ST's product offer also includes complete solutions for battery charge and monitoring functions.

Linear DC-DC conversion

Linear DC-DC conversion

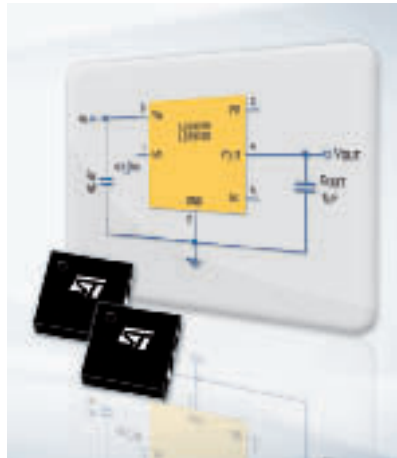
LDO regulators

LDO regulators

ST's low drop out regulators (LDO) offer an ultra-low quiescent current performance and miniaturized packages. This makes them ideal for micro-power applications and other applications where board space saving is a premium.

We offer a complete portfolio with voltages ranging from 0.8 to 5 V and current from 150 to 1000 mA. Many of the regulators are also available in dedicated low-noise versions.

The enable pin can further reduce current in the off state to less than 1 μ A.



Key benefits

- Ideal solutions for micro-power applications and when board space is at a premium
- Very low quiescent current ensuring extended battery life in applications with a very long standby time
- Latest capacitorless LDOs (no bypass capacitor) for PCB space saving
- Low system power consumption with low quiescent current

Battery management

Battery management

Li-ion battery management

Linear standalone battery charger family

Single input from wall adapter and dual inputs from USB and wall adapter, programmable charging current, up to 1.1 A output current

Battery monitor ICs for gas gauges

Monitoring of the battery voltage, current and temperature for accurate battery state-of-charge reporting



Key benefits

- Complete solutions for battery charge and monitoring functions in handheld applications
- Easy-to-build gas gauge system
- Extended battery lifetime

Switching DC-DC conversion

Switching DC-DC conversion

DC-DC converters

Flash LED drivers

Backlight drivers

OLED display power supplies

DC-DC converters

High-frequency switching, step-down, step-up and buck-boost topology family, ultra-small package optimized for battery powered applications.

Flash LED drivers

ST offers a complete portfolio of high-power LED drivers for camera flash applications. Our offer includes boost and buck-boost topologies that ensure optimized picture quality and battery performance in different ambient light conditions. In addition, I²C enables torch and video lighting control.

Drivers for displays and LCD backlight

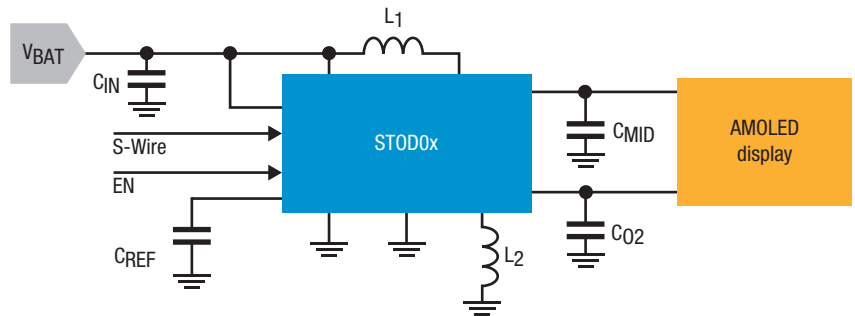
Boost converter for high-brightness LED drivers with multiple dimming controls, high-efficiency solutions for extended battery life.

OLED power supplies

Highly integrated power supply family for PMOLED and AMOLED display matrices. Optimized AMOLED low-noise DC-DC converter ensures excellent display accuracy and low external component count. Negative voltage capability via s-wire.

Key benefits

- Up to 6 MHz switching frequency to minimize the solution size
- Wide input operating range of 2.05 to 6 V to support applications powered from Li-ion batteries and extended usage time
- Low system power consumption with high efficiency
- Several package options: chip scale, DFN and BGA



Power management products

LDO regulators	
STLQ50	50 mA, I _o < 6 μA
LD39115J/SJ	150 mA, I _o < 30 μA, internal soft start
LD59015	150 mA, I _o < 30 μA, high PSSR
LDCL015	150 mA, I _o < 100 μA, capacitorless
LDLN015	150 mA, I _o < 100 μA, ultra LN
STLQ015	150 mA, I _o < 2 μA
LD39030SJ	300 mA, I _o < 30 μA, internal soft start
STLDLN015	150 mA, high PSRR, ultra-low noise, ultra-low quiescent current
Li-ion battery management	
STW4102	Dual-source USB Li-ion charger with gas gauge
STC3100	Battery monitor IC with Coulomb counter/gas gauge
ST4078	950 mA linear programmable dual input wall/USB Li-ion battery charger
STC4054	800 mA linear programmable Li-ion battery charger
STBC08	800 mA linear programmable Li-ion battery charger
L6924D/U	1 A wall/USB charger for Li-ion and LiP batteries
STBC21	1.2 A linear charger with battery temperature control
STUC02	1.6 A programmable 3 MHz USB switching charger for Li-ion and LiP batteries

Switching DC-DC converters	
ST1S12	700 mA, 1.7 MHz step-down converter
ST1S15 ¹	6 MHz step-down converter
ST14R	3 MHz step-up converter, class D audio power
ST9R00 ¹	1200 mA step-up converter optimized for class D audio
L6928	800 mA high-efficiency PFM/PWM
STBB2 ¹	Buck-boost converter to support new battery generation, very low battery input down to 2.3 V

Flash LED drivers	
STCF04	High-power, SuperCap LED driver for up to 10 A discharge
STCF05	400 mA camera flash LED driver: drives 2 high-power LEDs in series
STCF06	1.5 A camera flash LED driver: drives 1 high-power LED
STCF11 ¹	320 mA LED flash driver
STCF05 ¹	Driver for high-power single LED, up to 400 mA min in 2 LEDs, very few external components, and very small PCB area for space saving Note: Possibility upon request to increase the output current

Backlight drivers	
STLA02	Step-up to 18 V @ 20 mA, 4 LEDs
STLD40D	Step-up to 40 V @ 20 mA, 10 LEDs
STLD41D	Step-up to 40 V @ 120 mA, up 40 LEDs (4 x 10)

OLED display power supplies	
STOD02	2.5 to 3" AMOLED displays, 150 mA step-up and inverting 1.6 MHz PWM
STOD03	4" AMOLED displays, 200 mA dual-channel DC-DC converter
STOD05	3 to 4" AMOLED displays, 200 mA, dual DC-DC converter
STOD1812	PMOLED displays, step-up converter, 10 to 120 mA

Note: 1. Under development. Target datasheet and samples available upon request.

Audio solutions

High-quality audio is a real plus for multimedia-rich mobile platforms. Our audio amplifier portfolio ranges from headphone drivers offering record-breaking PSRR and THD + N performances, to class D stereo-speaker drivers that deliver high-quality sound extremely efficiently.

Audio ICs



Speaker amplifiers

Wide range of standalone class AB and filterless class D audio amplifiers for mono and stereo applications with gain control, 3D sound effects and anti-clipping

Headphone amplifiers

Very high audio quality and low power consumption with capacitorless class AB, class G and class H architectures in tiny flip-chip packages

Key benefits

- Speaker amplifiers: Higher efficiency and longer battery life with class D
- Headphone amplifiers: High audio quality and performance in PSRR, SNR, THD+N and high efficiency



Audio products

Headphone amplifiers		Speaker amplifiers	
TS4909	Class AB, dual-mode, low-power 150 mW stereo, capacitorless and single-ended outputs	TS4994	Class AB, mono, 1.2 W, differential, external gain setting, optional fixed gain
TS4601	Class AB, high audio quality class AB stereo, I ² C volume control, board optimization with ground-referenced outputs, no external DC blocking capacitors needed	TS4990	Class AB, mono, 1.2 W, single-ended, external gain setting
TS4621	Class G, high audio quality, stereo, I ² C volume control, long battery life due to reduced quiescent current	TS4997	Class AB, stereo, 2 x 1 W, adjustable 3D sound effect
TS4631 ¹	Class H, high audio quality, stereo, quiescent current less than 0.9 mA, integrated ESD for low cost	TS4962M	Class D, filterless 3.0 W, mono (power @ 4 Ω load)
		TS2007	Class D, filterless 3 W, mono, internal adjustable gain (power @ 4 Ω load)
		TS2009 ¹	Class D, filterless 3 W, mono, anti-clipping (power @ 4 Ω load)
		TS2012	Class D, filterless 2.2 W, stereo, gain select (power @ 4 Ω load)
		TS4999	Class D, filterless stereo, 3D sound effect (power @ 4 Ω load)
		TS4915 ¹	Class D, high-quality, low-cost mono, 1.7 W, 5.5 V boost, analog input, battery monitoring (power @ 8 Ω load)
		TS4916 ¹	Class D, high-quality, low-cost mono, 1.7 W, 5.5 V boost, PDM input, battery monitoring (power @ 8 Ω load)

Note: 1. Under development. Target datasheet and samples available upon request.

Interface and interconnect devices

Interface secure digital (SD) cards with ST level translators.

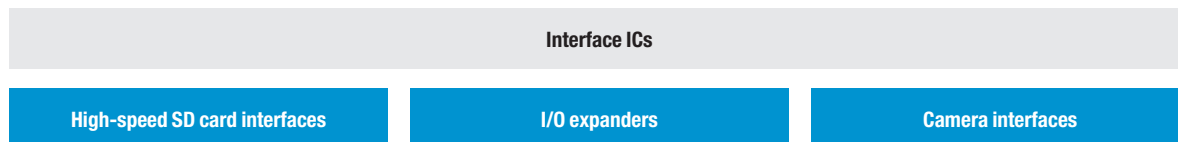
Increase the number of I/O ports and enhance the control capability of existing platforms with ST's Xpander™ technology.

Direct audio and data signals on mobile devices with audio and high-speed switches.

Improve design and user experience with smart reset devices when dedicated reset hole is not needed and there is no need to remove battery when device freezes.

Prevent over discharging and system start-up with low battery with supervisor devices.

Interface ICs



Memory card interfaces

High-speed 50 Mbit/s SD level shifter supporting SDA 2.0 specification.
High-speed 120 Mbit/s SD level shifter supporting SDA 3.0 specification.

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/CSI2.

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



Switch (NEATSwitch)

Switch (NEATSwitch)

Analog switches

Audio switches

For audio line multiplexing, for example between headset and phone speakers and microphone. Special negative rail switches are used to avoid pop-noise.

High ESD switches

Used in applications that are directly connected to phone connectors (risk of electrostatic discharge). ESD protection on the component reduces area on PWB and saves time in assembly.

High-speed switches

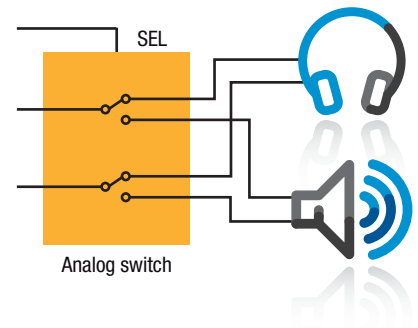
For high-frequency lines such as USB and CCP (compact camera port), designed to be compliant with USB 2.0 (HS) with bandwidth up to 950 MHz.

Multi-functional switches

Switches with additional features such as accessory detection.

Key benefits

- Flexibility in system design versus monolithic implementation
- Easier verification of subsystems
- Faster development time by using discrete components



Microprocessor supervisors and reset ICs

Microprocessor supervisors and reset ICs

Smart resets

Supervisors

Smart resets

Programmable push button solutions. Hardware reset or shutdown by using existing keys. Smart power on/off controllers.

Supervisors

Smart voltage supervisors with on/off controls. Prevent over-charging and starting system with low battery.

Key benefits

- Improve mobile device design
- Reset device without removing battery
- Re-use existing keys for reset, no need for dedicated reset key



Interface and interconnect products

High-speed SD card interfaces	
ST6G3244 ¹	High-speed 120 Mbit/s level shifter SDA 3.0 compatible
I/O expanders	
STMPE801	8-bit basic I/O expander
STMPE1600	16-bit basic I/O expander
STMPE1801	18-bit enhanced I/O expander 10 x 8 QWERTY keypad, low power, low EMI
STMPE2403	24-bit enhanced I/O expander keypad/LED/rotator wheel controller
Camera interfaces	
STMIPID02	Dual deserializer for MIPI/CSI2 and SMIA/CCP2 buses
STSMIA832	Deserializer for CCP1 and CCP2 imaging buses
Analog switches	
STG4260	High ESD dual audio switch
STG4160	High ESD single audio switch
STG4159	High ESD single audio switch
STG3220	High-speed dual data switch and USB switching
STG3820	High-speed octal data switch for dual SIM card solution
STG3696E ¹	High-speed, high ESD dual switch for USB/negative rail audio
STG3300	Application specific accessory switch for earphone jack detector
Smart resets	
STM65XX	Smart reset family allows hardware reset or shutdown by existing keys, selectable reset time-out
STM660X	Smart push button with on/off
Supervisors	
STM1068	Smart voltage supervisor with power-on control
STBP120	Overvoltage protection for battery

Note: 1. Under development. Target datasheet and samples available upon request.

Radio frequency

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. STMicroelectronics also provides a comprehensive portfolio of clock and timer ICs providing best-in-class performance for accuracy and low power consumption.

IPD for RF functions

IPD for RF functions

Couplers

Diplexers

Baluns

Couplers

Couples a known amount of the transmitted and reflected RF power in order to adjust the transmitter performance. Very high directivity (>25 dB) and low insertion losses.

Diplexers

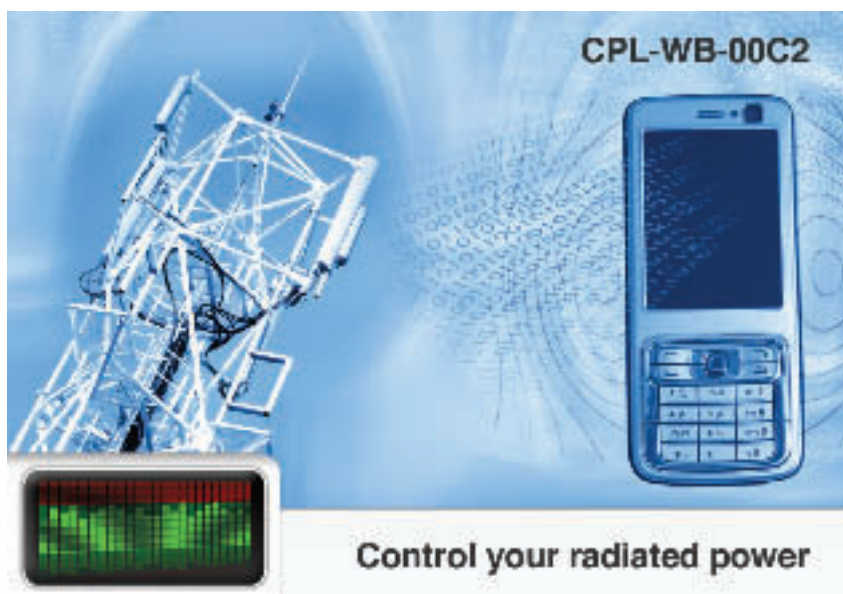
Cost- and size-efficient way to combine different complementary radio access paths into single antenna. Combine dual antenna feeds into single feeds or vice versa.

Baluns

Conversion between differential and single-ended RF signals, suitable for SIP, available in a variety of impedance ratios, flip-chip packages.

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
- Less board placement variation effects than discrete due to monolithic implementation
- High predictability from simulation to enable fast production response time



Clocks and timing circuits

Clocks and timing circuits

Clock distribution

Real-time clocks

Clock distribution

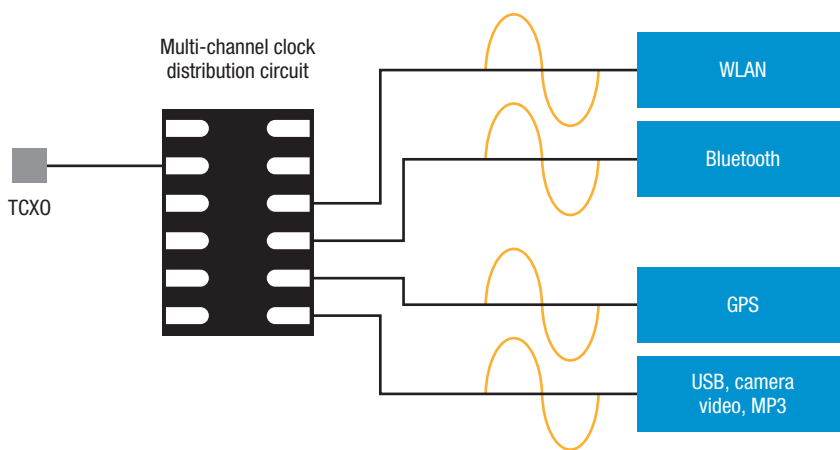
ST's multichannel clock distribution circuits do not need any coupling capacitor at the input, and have a very low standby current and an ultra-low phase noise. By distributing a single master clock to multiple clock domains, designers eliminate multiple individual clock sources for circuits supporting GSM, Bluetooth, WLAN, WiMAX or other RF communications.

Real-time clocks

ST's serial real-time clock devices combine the RTC function with the supervisor functions for different master devices such as microprocessors and NVRAMs.

Key benefits

- Ultra-low phase noise
- Improved crosstalk between channels
- Lower system cost by eliminating number of time bases and saving board space
- Autonomous clock distribution solution together with desired TCXO



Radio frequency products

Couplers	
CPL-WB-00C2	Single path, GSM, EDGE, WCDMA, $k \approx 34$ dB
CPL-WB-00D3 ¹	Small single path, GSM, EDGE, WCDMA, $k \approx 34$ dB
CPL-WB-01C2	Single path, TD-SCDMA, $k \approx 26$ dB
DCPL-WB-00C2	Dual path, GSM, EDGE, WCDMA, $k \approx 34$ dB
DCPL-WB-00D3 ¹	Small dual path, GSM, EDGE, WCDMA, $k \approx 34$ dB
Diplexers	
DIP1524-01D3 ¹	WLAN/GPS diplexer (ISM bands)
Baluns	
BAL-2593-D5U	50/50+j50, 2.45 GHz (ISM bands)
BAL-2690-D3U	50/30+j25, 2.45 GHz (ISM bands)
Clock distribution	
STCD10x0	2- to 4-channel clock distribution
STCD2x00	2- to 4-channel clock distribution, with LDO
Real-time clocks	
M41T62X	32 kHz oscillator

Note: 1. Under development. Target datasheet and samples available upon request.

Microcontrollers and secure MCUs

There is an increasing demand for lower power products in all types of market applications. Several factors are driving this: new national and international norms to reduce power consumption, the increasing number of battery-powered applications, cost reduction (through battery size reduction), development of new green technologies, or simply the need to be environmentally friendly.

Microcontrollers



STM8L

Full range of microcontrollers from 4 to 64 Kbytes of Flash memory in small footprint packages (ultra thin QFN and CSP) with data EEPROM, real-time clock, LCD controllers, I²C multimaster, SPI, USART, DMA, 12-bit ADC, DAC, comparators, multifunction timers and more.

STM32L

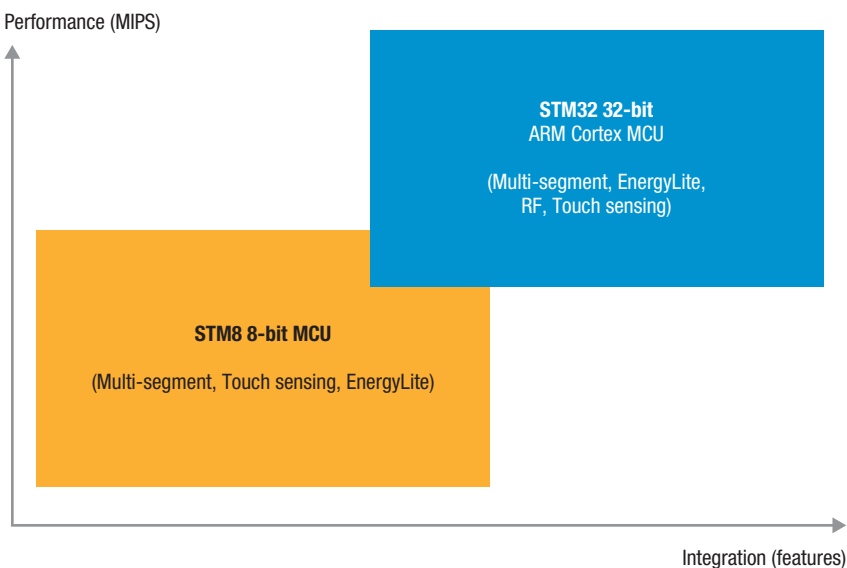
Full range of microcontrollers from 64 to 384 Kbytes of Flash memory in small footprint packages with data EEPROM, real-time clock, LCD controllers, I²C multimaster, SPI, USART, DMA, 12-bit ADC, DAC, comparators, multifunction timers and more.

STM32 F-2

High-performance STM32 core with supply voltages down to 1.8 V. Complements existing microcontrollers with more memory (up to 1 Mbyte), advanced features (USB OTG 480 Mbit/s) with close pinout, full software compatibility and very small footprint (WCSP). Fastest Cortex-M3 MCU with 150 DMIPs @ 120 MHz (Dhrystone 2.1).

Key benefits

- 130 nm ultra-low-leakage process technology allowing major improvement in power consumption in static and dynamic modes
- High performance/power-consumption ratio due to new specific architecture
- Common architecture allowing seamless migration from one family to another
- Wide range of microcontrollers from 4 Kbytes to 1 Mbyte of Flash memory with state-of-the-art peripheral set and performance



Near Field Communication

Near Field Communication

NFC controller (ST21)

Secure element (ST33)

NFC controller

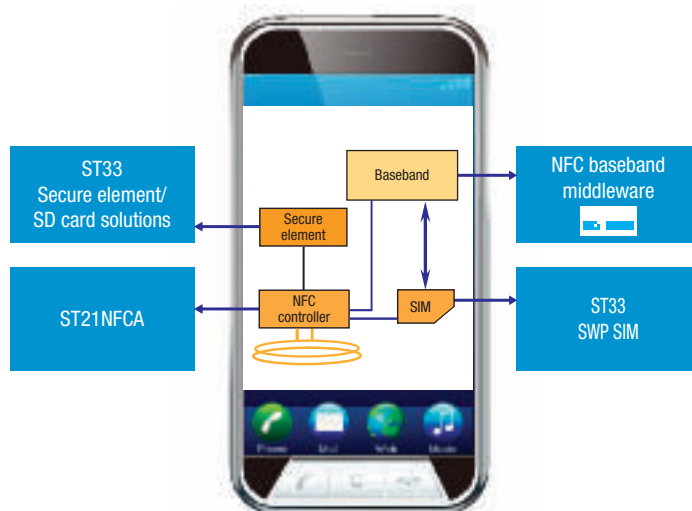
The ST21NFCA is based on a microcontroller architecture with embedded EEPROM and multiple connectivity channels. By integrating a complete set of firmware, and complying with all relevant standards, the ST21NFCA is perfectly suited to address all possible NFC use cases.

Secure element

The ST33 family has been designed to meet the advanced security and performance requirements, combining the latest 90 nm Flash technologies with the highest security levels on the ARM SC300 (secure ARM Cortex™-M3). The ST33F1M is the first product in this family and embeds a large Flash memory combined with a 30-Kbyte RAM and an SWP interface for NFC connectivity. It is certifiable for secure and banking applications.

Key benefits

- Low external component count
- Competitive PWB footprint
- Ready-to-use solution with full embedded firmware
- Complete solution combined with Stollmann NFC stack and ST33F1M SIM card IC
- ST license available for all MIFARE technologies



Microcontrollers and secure MCU products

8-bit microcontroller family (STM8L)	
STM8L101	Entry-level, low-voltage family for simple applications with small packages
STM8L151	Feature-rich, low-voltage family for complex applications
STM8L152	With LCD support, low-voltage family for complex applications
32-bit microcontroller family (STM32L)	
STM32L151	ARM Cortex core, low-voltage family for calculation power applications
STM32L152	With LCD support, ARM Cortex core, low-voltage family for high calculation power applications
32-bit high-performance microcontroller family (STM32 F-2)	
STM32F205 ¹	ARM Cortex-M3 120 MHz core, down to 1.65 V supply voltage with very high performance and peripherals, WLCSP64 package, less than 4 mm x 4 mm
STM32F207 ¹	ARM Cortex-M3 120 MHz core, down to 1.8 V supply voltage with very high performance and additional camera and Ethernet peripherals, WLCSP64 package, less than 4 mm x 4 mm
NFC controller	
ST21NFCA	Card emulation A/B/B'/F Reader A/B/F/ISO 15693, NFC Tag 1, 2, 3, 4 Peer-to-peer ISO 18092 Battery off and battery low I ² C, SPI for terminal interface SWP interface for (U)SIM interface Supports MIFARE Classic (U)SIM application through SWP-CLT Full embedded firmware (contact and contactless drivers and HCI)
Secure element	
ST33F1M	Highly secure MCU with 32-bit ARM® SecurCore® SC300™ CPU and 1.25-Mbyte Flash memory, MIFARE capable with firmware

Note: 1. Under development. Target datasheet and samples available upon request.

Imaging solutions

STMicroelectronics offers a wide range of sensors and camera modules. With our 12 years of experience and expertise in the complete imaging chain (sensors, optics, processing), ST's cameras produce high image quality in compact form factors at a low cost. Our internal high-volume supply chain guarantees supply, while still providing for short-term upside flexibility.

Imaging sensors

Imaging sensors

Up to 8 Mpixels

High system integration

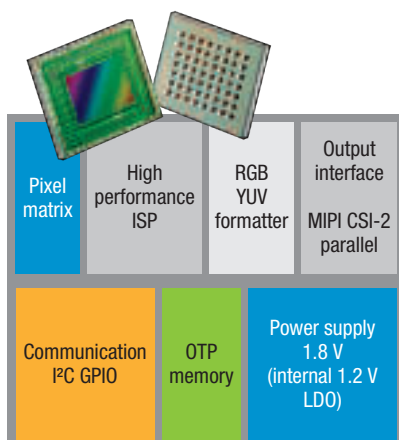
VCM driver, EDOF processing, ISP integrateable on chip

Standard interfaces

MIPI CSI-2, CCP2, MDDI and parallel supported

Bayer and SoC

Bayer available up to 8 Mpixels and SoC up to 5 Mpixels



Key benefits

- ST's advanced pixel technology for great image quality
- ST's ultra-low optical-pixel stack enables realization of ultra-low z-height camera modules
- ST's high-density technology for smallest die size and small modules

EDOF – extended depth of field camera modules

EDOF – extended depth of field camera modules

3 Mpixels

5 Mpixels

Near and far focus

Allows near and far objects to be in focus at the same time

Small footprint

SMIA65 for 3 and 5 Mpixels

Standard interfaces

MIPI CSI-2 and CCP2 supported

EMC shielding

Integral EMC shielding and EMI reduction techniques

Socket or flex

Socket for trouble-free volume manufacturing

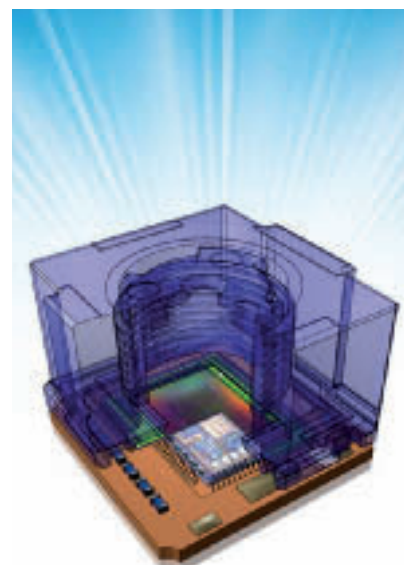
Simple construction

Solid-state, similar to fixed focus modules, superior mechanical robustness compared to auto-focus camera modules

Key benefits

Improved performance over fixed focus

- Near and far fields in focus simultaneously
- No need for more costly autofocus in some applications
- No auto-focus latency



Reflowable camera modules

Reflowable camera modules

2-Mpixel primary

VGA video call

Simple construction

Package directly connectable to the product PCB avoiding extra cost of socket or flex PCB

Small footprint

Innovative package techniques yielding ultra-small, ultra-low-cost, surface-mount modules

Standard interfaces

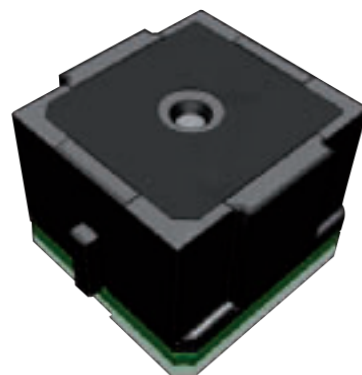
MIPI-SCI2 and CCP2 both supported

EMC shielding

Integral EMC shielding and EMI reduction techniques

Key benefits

- ST's ground-breaking through-silicon via (TSV) packaging technology delivers ultra-small modules at an ultra-low cost
- Ultra-fast production with direct SMD reflow process
- Efficient low height second camera solutions
- Very low cost primary cameras targeting entry level phones



SoC – system-on-chip fixed-focus camera modules

SoC – system-on-chip fixed-focus camera modules

2 Mpixels

High system integration

Image signal processing functions carried out on chip

Small footprint

No secondary ISP required

Standard interfaces

Industry-standard parallel interface supported

Full scalar

For high-quality viewfinder and video capture

Advanced algorithms

Adaptive to give optimal performance under all viewing conditions

Socket or flex

Socket for trouble-free volume manufacturing

Key benefits

- SoC solution allows reduced development time and resource impact on platform provider
- Image quality tuning carried out once only and independent of platform



Co-processors – hardware accelerated ISP

Co-processors – hardware accelerated ISP

Up to 1.3 Mpixels

Up to 2 Mpixels

Up to 5 Mpixels

Up to 8 Mpixels

Video capability

Up to 30 fps HD video. A dual video pipe generates concurrent viewfinder and still/movie image generation.

Small footprint

Available in TFBGA packages

Standard interfaces

ITU parallel, CCP2 and 1-Gbit/s MIPI supported

Streaming engine

Low latency with JPEG compression with programmable target size or target quality, dual-pipe architecture for concurrent still and video and view finder, low-cost streaming architecture with no frame store

Advanced algorithms

Advanced noise filtering for improved low light performance, smart lighting, color enhancement, state-of-the-art AWB and part-to-part variation support for high-quality images, fast autofocus control

Advanced features

Face or object detection and tracking, video stabilization, auto ISO



Key benefits

- Connects two cameras to a host having a single camera input port
- Virtually zero shutter lag using twin video pipeline
- Simplifies camera module integration and adapts different camera modules to a system without modifying host software
- Provides DSC-class ISP to systems with no or poor ISP embedded in the host

Imaging products

Imaging sensors – raw Bayer

VD6558/559	VGA, 2.2 µm pixel, optical format 1/10", COB, CP2 or MIPI-CSI2
VD6803	3 Mpixels, 1.75 µm pixel, optical format 1/4", EDOF, COB or TSV, CCP2 or ITU parallel
VD6963	5 Mpixels, 1.4 µm pixel, optical format 1/4", EDOF, COB, CCP2 or MIPI
VD6868	3 Mpixels, 2.8 µm pixel, optical format 1/2.5", VCM driver, COB, CCP2 or dual MIPI
VD6955	5 Mpixels, 1.4 µm pixel, optical format 1/4", COB, dual MIPI 30 fps @ full resolution

Imaging sensors – SoC (embedded ISP)

VD6525	VGA, 2.2 µm pixel, optical format 1/10", COB, ITU parallel
VD6725	2 Mpixels, 1.75 µm pixel, optical format 1/5", COB or TSV, MIPI or ITU parallel
VD6826	3 Mpixels, 1.4 µm pixel, optical format 1/5", EDOF, COB, MIPI or ITU parallel
VD6926	5 Mpixels, 1.4 µm pixel, optical format 1/4", EDOF, COB, dual MIPI or ITU parallel

System-on-chip camera modules

VS6725C	2-Mpixel, fixed-focus socket module with ITU interface
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Autofocus camera modules

VB6851	3-Mpixel, SMIA65 module with CCP interface
VB6871	3-Mpixel, SMIA65 module with MDDI interface

EDOF camera modules

VX6854C	3-Mpixel, SMIA65 EDOF module with MIPI or CCP interface
VX6953C	5-Mpixel, SMIA65 EDOF module with MIPI or CCP interface

Reflowable camera modules

VW6754	2-Mpixel, 5.0 x 5.0 x 3.8 mm module with CCP2 interface
VW6558	VGA 3.03 x 3.5 x 2.5 mm module with CCP2 interface
VW6559	VGA 3.03 x 3.5 x 2.5 mm module with MIPI CSI2 interface

Co-processors – hardware accelerated ISP

STV0977	30 fps at SVGA, 15 fps at 1.3 Mpixels, dynamic defect correction and anti-shading, CCP2 interface, TFBGA, 84 balls, 6 x 6 x 1.2 mm
STV0984S	30 fps at SVGA, 15 fps at 1.3 Mpixels, dynamic defect correction and anti-shading, dual video pipe, LED flash support, ITU parallel and CCP2 interfaces, TFBGA, 84 balls, 6 x 6 x 1.2 mm
STV0986	30 fps at 2 Mpixels, 15 fps at 5 Mpixels, HD 720p video @ 30 fps, dual video pipe, low-latency autofocus and LED flash support, MIPI, ITU parallel and CCP2 interfaces, TFBGA, 84 balls, 6 x 6 x 1.2 mm
STV0987	30 fps at 5 Mpixels, 15 fps at 8 Mpixels, improved anti-shaking and video stabilization, HD 1080p @ 30 fps, face detection and tracking, low latency auto focus, auto ISO and LED flash support, MIPI, ITU parallel and CCP2 interfaces, TFBGA, 84 balls, 6 x 6 x 1.2 mm

Protection and EMI filtering

IPAD™ products integrate the various functions required by wireless applications, such as ESD protection diodes, EMI low-pass or common-mode filters, line terminations, pull-up or pull-down resistors, and RF components.

With its complete protection and filtering range, as integrated or standalone solutions, ST offers design flexibility while bringing space saving and high system immunity.

Protection devices



ESD protection

Multi-purpose ESD protection devices, available in a single-line, ultra-small package (0201) for flexibility, as well as multi-line for high integration

EOS protection

EOS + 15 kV ESD protection in SOD-523 package, for example ESDAxx-1K 450 W

Key benefits

- High ESD protection at system level including high-speed serial interfaces
- PWB space saving by discrete component replacement and high-density capacitor capability of IPAD™
- Minimized track parasitic inductances through integration and high-density package



EMI filtering

EMI filtering

EMI filtering

Common-mode filtering

EMI filtering

Strong attenuation at 900 MHz and higher frequencies for different applications including:

- Displays and cameras
- Keypads and touch pads
- Memory and SIM cards
- Headsets, loudspeakers and microphones
- USB, video-out, HDMI

Common-mode filtering

High-performance for common-mode noise filtering and integrated ESD protection of high-speed serial interfaces with IPAD such as:

- Camera serial interfaces
- Display serial interfaces
- HDMI 1.4
- High-speed USB

Key benefits

- Best LC filter trade-off between bandwidth and RF attenuation with strong ESD protection up to + 30 kV
- Minimized track parasitic inductances through integration and high-density package



Protection and EMI filtering products

EMI filtering	
EMIF01-TV01F3	TV composite filter
EMIF01-TV02F3	TV composite + reconstruction filter
EMIF01-1003M3	1-line, high-attenuation filter
EMIF02-MIC03M6	Microphone filter in microQFN
EMIF02-MIC06F3	Microphone filter + biasing
EMIF02-MIC07F3	Microphone filter + AC decoupling
EMIF02-SPK02F2	Speaker filter
EMIF02-USB04F3	USB LS/FS OTG filter
EMIF03-SIM02M8	SIM card filter, mQFN9
EMIF03-SIM03F3	SIM card filter, CSP
EMIF03-SIM04F3	SIM card filter + USB IF
EMIF04-EAR01M8	Headset audio filter, earphone + mic
HDMI05-CLOxF3	HDMI filter
EMIF06-1002F2	6-line μ SD filter
EMIF06-1005N12	6-line filter for keypads
EMIF06-AUD01F2	Headset microphone and speaker filter
EMIF06-mSD02C3	6-line mini and μ SD + pull-up
EMIF06-SD03F3	μ SD card filter + LS + LDO
EMIF08-LCD04M16	8-line filter for LCDs
EMIF10-COM01F2	10-line filter, CSP, 0.5 mm pitch
EMIF0x-1502Mx	4- or 6-line filter for video
EMIFxx-LCD02F3	10- or 7-line filter, CSP, 0.4 mm pitch
EMIFxx-LCD03F3	10- or 7-line LC filter for LCDs
Common-mode filters	
ECMF02-2AMX6	Differential pair low-pass filter for USB 2.0 with 7 GHz differential bandwidth, includes differential pair ESD protection
ECMF04-4AMX12	Differential pair low-pass filter for HSSI with 7 GHz differential bandwidth, includes differential pair ESD protection
EOS + ESD protection	
ESDA6V1-5T6	5-line, 1 x 1 mm ESD protection
ESDA8V2-1MY2	500 W, 8/20 μ s power surge protection + 15 kV ESD in μ DFN (1 x 1.45 mm)
ESDALC6V1M3	Low-capacitance ESD protection
ESDALC6V1-1U2	Low-capacitance 0.6 x 0.3 mm ESD protection
ESDALC6V1-5T6	5-line, 1 x 1 mm, low-capacitance ESD protection
ESDARF01-1BM2	Ultra-low capacitance. Protection for FM TX, DVB-H, GPS and GSM antenna
ESDARF02-1C2 ¹	Ultra-low capacitance. Protection for FM TX, DVB-H, GPS and GSM antenna
ESDARF03-1BF3	Ultra-low capacitance. Protection for FM TX, DVB-H, GPS and GSM antenna
ESDAVLC8-1BU2	Bidirectional audio ESD protection
ESDAXLC6-1MY2	μ USB connector, data line
ESDAxx-1K	450 W, 8/20 μ s power surge protection + 15 kV ESD in SOD-523 (1.6 x 0.8 mm)
HDMIULC6-4F3	HDMI data-line protection
HSP061-4NY8	Flow-thru, 2 x 1 mm, 4 high-speed lines
USBP01-5M8 ¹	μ USB connector full protection
USBULC1606-4M8	USB 2.0 + battery charger protection
USBULC6-2F3/M6	μ USB connector, data lines + Vbus
USBULC6-3F3	μ USB connector protection with ID

Note: 1. Under development. Target datasheet and samples available upon request.




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