Volume MEMS and Analog Division (VMA)

Health and Wellness
Mobility
Cloud computing

June 2015

life.augmented

Where VMA products can bring **added value** for **HEALTH AND WELLNESS**?

Battery monitoring
Gas Gauge
STC3115AIJT
ppt - *www*

Heart rate monitoring
by light reflection
Op Amp
TSV711ICT
ppt - *www*

Gesture recognition by
electromyography
Op Amp
TSZ124IQ4T
ppt - *www*

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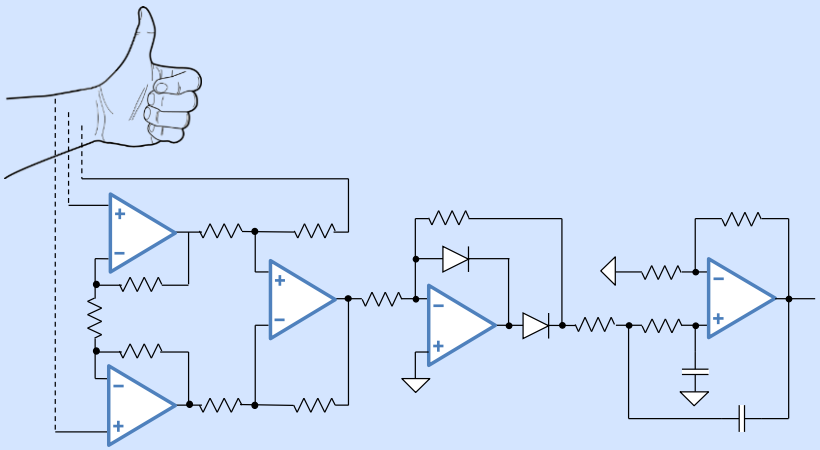
Gesture recognition by electromyography

CONTEXT

The measurement of muscles electrical activity appears as a fascinating new way to interface with machines. Simple analog processing allows gesture recognition by wearable devices.

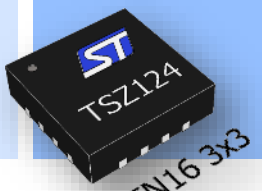
HOW DOES IT WORK?



Surface EMG signals are amplified by op amp in instrumentation configuration, then rectified and filtered to provide feedback to digital system.

ST OFFER

Feature	Benefit
Input offset voltage Vio < 5 µV @25°C Vio < 8 µV -40 to 125°C	Excellent measurement without trimming
Input offset voltage drift ΔVio/ΔT 30nV/°C max	Stability of measurement versus temperature change
Input bias current Iib < 200 pA	Compatible with high impedance sensor



Op Amp – Zero Drift

TSZ124IQ4T

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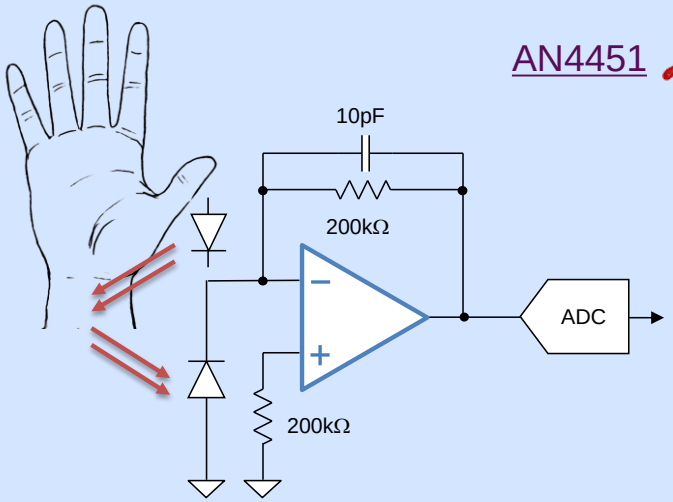
Heart rate monitor by light reflection

CONTEXT

The heart rate monitoring is one of the first physiological parameter for health monitoring devices first application of the quantified self movement.

HOW DOES IT WORK?

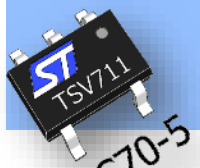
AN4451



The LED emits light into the skin of the user. The reflected light - synchronized with heart pulses - is measured by op amp in trans impedance configuration.

ST OFFER

Feature	Benefit
Input bias current Iib < 10 pA @ 25°C Iib < 300pA @ 125°C	Maintains excellent accuracy by not affecting diode current
Supply voltage range 1.5 to 5.5V	Compatible with wide choice of supplies
SC70-5 2mm x 2mm	Micro package with leads for optimized form factor and soldering on flex PCB



Op Amp – Micro Power

TSV711ICT

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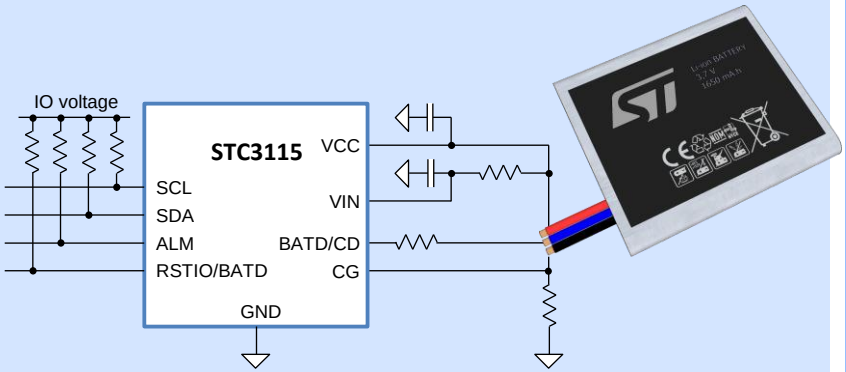
Battery monitoring

CONTEXT

Lithium-ion and Lithium-polymer are the leading technologies for portable energy storage, and they require dedicated monitoring circuit to operate safely and to provide accurate estimation of remaining use time.

HOW DOES IT WORK?

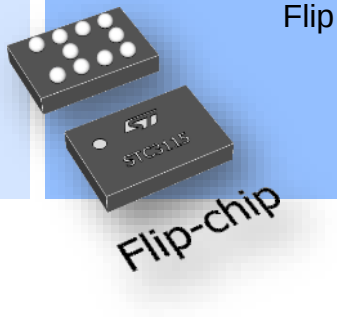


AN4324

The OptimGauge™ algorithm combines battery physical measurements to provide an accurate State of Charge indication.

ST OFFER

Feature	Benefit
Voltage mode only configuration	3% accuracy of battery state of charge no need for shunt resistor
Initial open circuit voltage (OCV) measurement	Accurate estimation of battery state of charge at power up
1.4 x 2.0 mm 10-bump Flip Chip	Minimum form factor

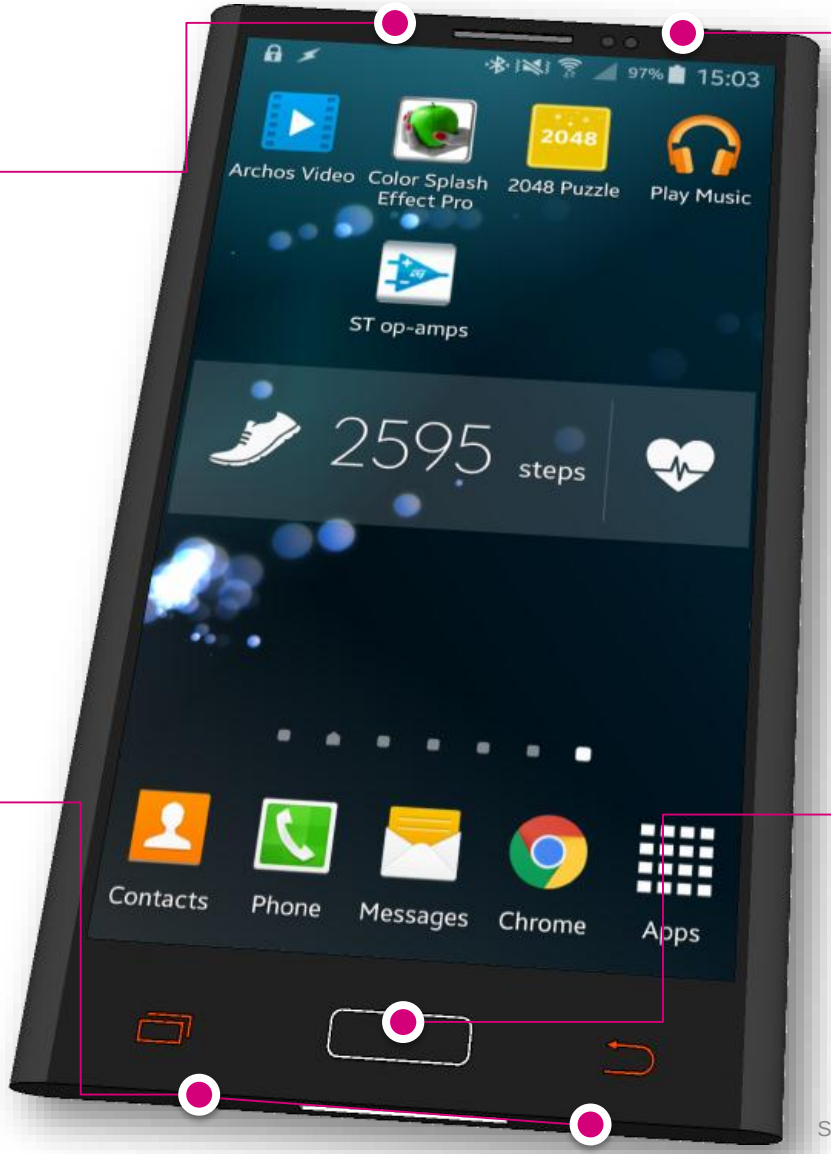


Gas Gauge

STC3115AIJT

Where VMA products can bring **added value** for **MOBILITY**?

Infrared emitter receiver for remote control
Op Amp
TSV991AIQ2T
ppt - *www*



Battery monitoring
Gas Gauge
STC3115AIQT
ppt - *www*

Active Noise Cancellation
MEMS Microphone
MP34DT01
ppt - *www*

Screen of death recovery
Smart Reset
STM6519
ppt - *www*

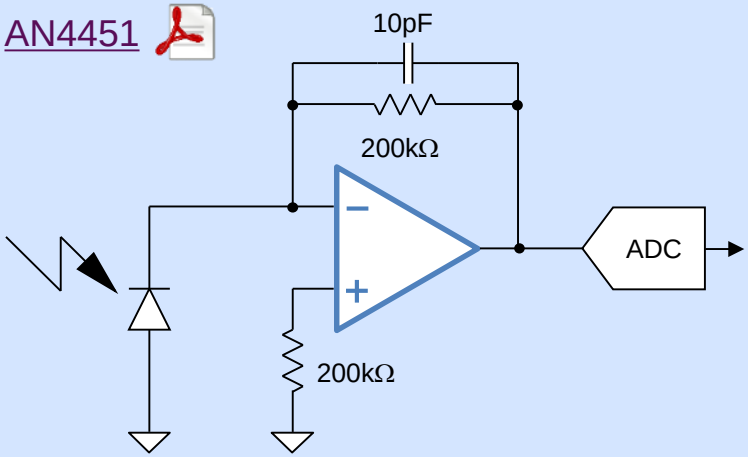
Infrared emitter receiver

CONTEXT

Smartphone is the electronic counterpart of the Swiss Army Knife: why not to use it as Infrared Remote Controls at home for TV sets or air conditioning? Op amps enable easy implementation of this feature.

HOW DOES IT WORK?

AN4451



The photodiode generates a reverse current proportional to the amount of light. This current is converted into voltage and amplified by op amp.

ST OFFER

Feature	Benefit
Input bias current Iib < 10 pA @ 25°C Iib < 100pA @ 125°C	Maintains excellent accuracy by not affecting diode current
Slew rate 10 V/µs	Compatible transmission frequency
DFN8 2mm*2mm (0.6mm thickness)	Shrinks device form factor

Op Amp

TSV991AIQ2T

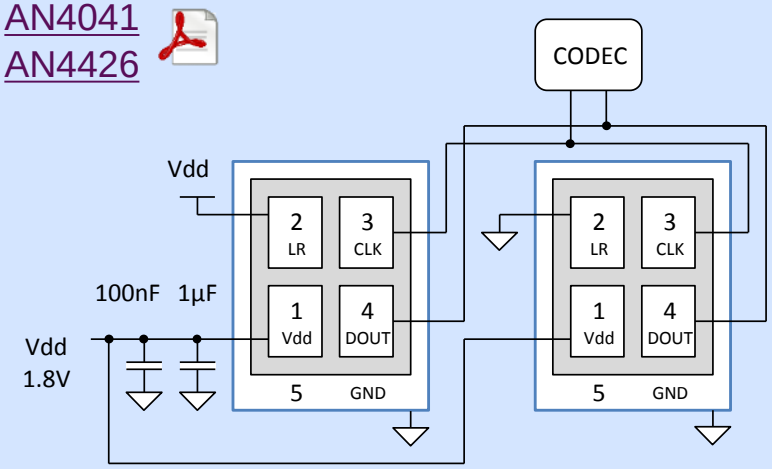
Active Noise Cancellation

CONTEXT

Silicon membrane microphones enable the multiplication of sound sensors and new applications as stereo recording, ambient noise reduction and active noise cancellation.

HOW DOES IT WORK?

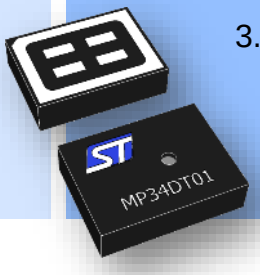
AN4041
AN4426



An array of microphones are working together to provide omnidirectional sound recording.

ST OFFER

Feature	Benefit
AOP: 120dBSPL SNR: 63dB Sensitivity: -26 dBFS	Outstanding audio performances
Stability of performances after soldering and drop test	Easy manufacturing and customer satisfaction during product lifetime
SMD package 3.0 x 4.0 x 1.0 mm	Enables application minimum form factor



MEMS Microphone

MP34DT01

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Battery monitoring

CONTEXT

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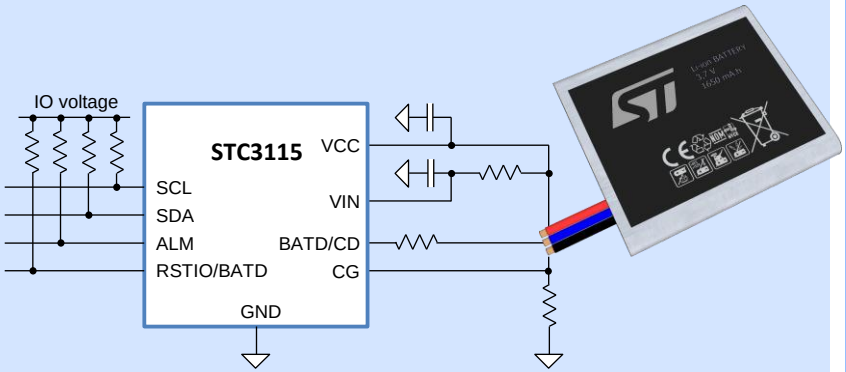
HOW DOES IT WORK?

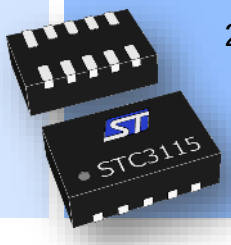


AN4324

The OptimGauge™ algorithm combines battery physical measurements to provide an accurate State of Charge indication.

ST OFFER

Feature	Benefit
Coulomb counter and voltage-mode gas gauge	1% accuracy of battery state of charge
Initial open circuit voltage (OCV) measurement	Accurate estimation of battery state of charge at power up
DFN10 2.0 x 3.0 x 0.55 mm	Minimum form factor



Gas Gauge

STC3115AIQT

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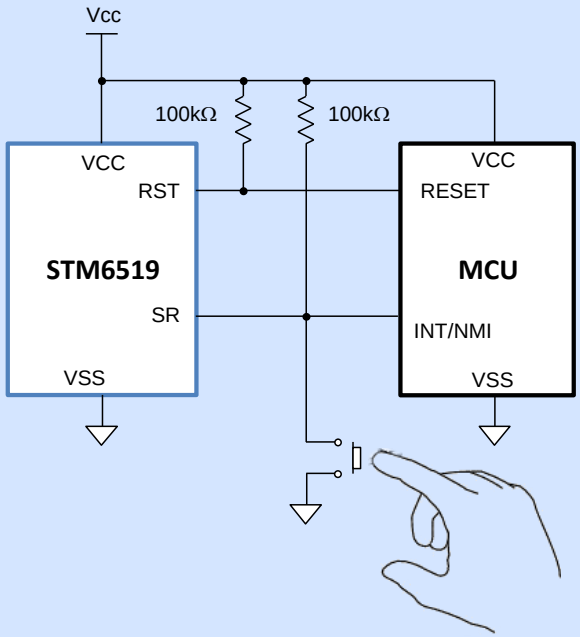
Single push-button Smart Reset

CONTEXT

The recovery of devices freeze by long push on hardware key or combination of several keys is now fully integrated into users' culture.

HOW DOES IT WORK?



ST OFFER

Feature	Benefit
Extended Smart Reset input delay time	No system reset by inadvertent short reset push-button closures
Low supply current 1 µA	Zero impact on application lifetime
DFN6 1.00 mm x 1.45 mm	Minimum form factor

Smart reset

STM6519

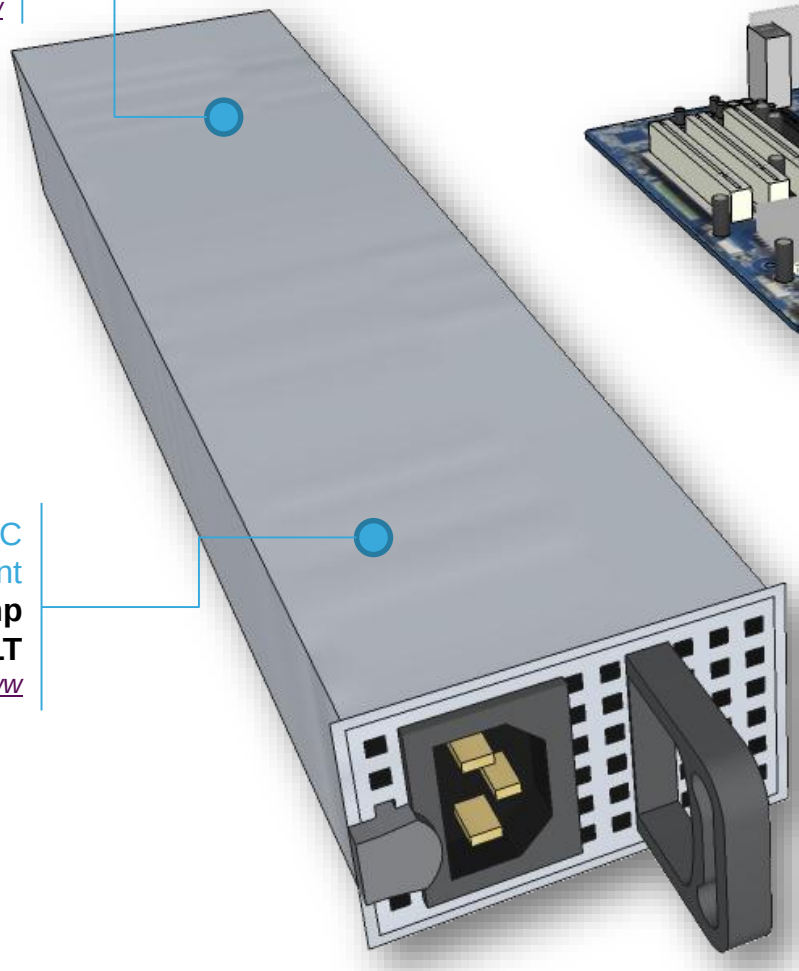
Where VMA products can bring **added value** for CLOUD COMPUTING?

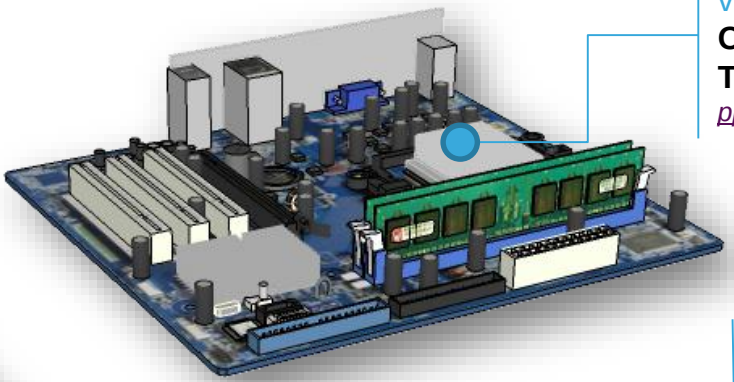
Server Power: output current measurement
Op Amp
TSX711ILT
ppt - *www*

Mother board voltage regulator
Op Amp
TSX561AICT
ppt - *www*

Hard disk drive protection
Op Amp
TSV631AICT
ppt - *www*

Server Power: PFC current measurement
Op Amp
TSX921ILT
ppt - *www*





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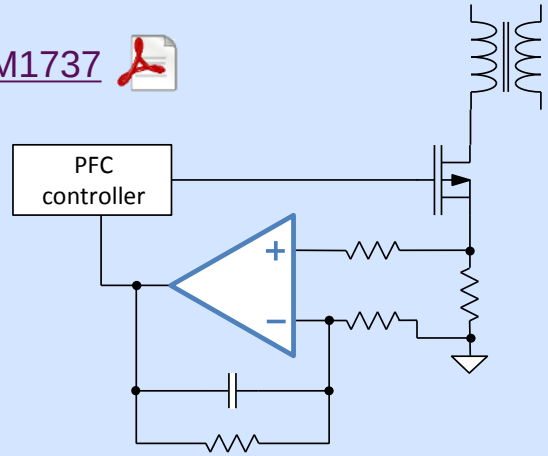
Server Power: PFC current measurement

CONTEXT

Power Factor Correction is required by government regulation for server power supplies. Additionally, the trend in power electronics is to implement digital controllers, which are efficiently seconded by op amps.

HOW DOES IT WORK?

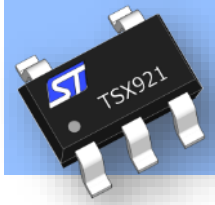
UM1737



The current of the power Mosfet is measured by a shunt resistor. The resulting voltage drop is amplified and filtered by the op amp and feedback to the controller.

ST OFFER

Feature	Benefit
Supply voltage range 4 to 16V	Same power supply as PWM controller
Gain Bandwidth Product 10 MHz	Real-time current measurement
SOT23-5 package	Small form factor and optimal solderability



Op Amp – 16V CMOS

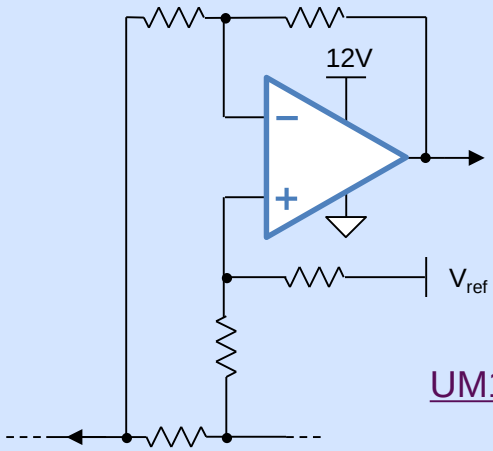
TSX921ILT

Server Power: output current measurement

CONTEXT

The electrical power required by servers is exponential. It implies fast protections against abnormal currents, accurate balance between redundant power supplies and feedback of current value to digital.

HOW DOES IT WORK?



UM1737

The output current of the power supply is measured on low-side by a shunt resistor. The resulting voltage drop is amplified by op amp.

ST OFFER

Feature	Benefit
Supply voltage range 2.7 to 16V	Direct supply by 12V output line
Input offset voltage Vio < 200 µV @25°C Vio < 460 µV -40 to 85°C	Minimizes shunt resistor cost
SOT23-5 package	Small form factor and optimal solderability

Op Amp – 16V CMOS

TSX711ILT

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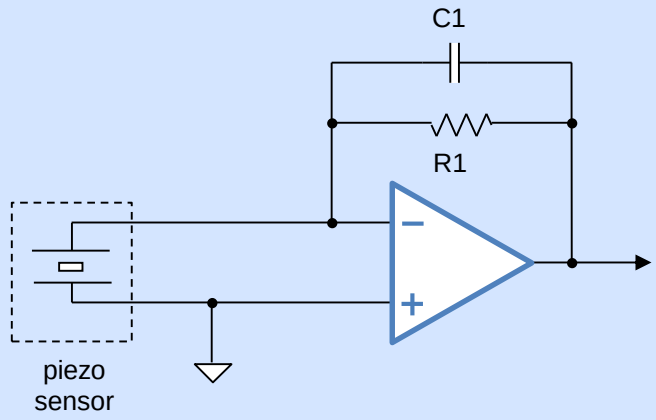
Hard disk drive protection

CONTEXT

State of the art hard disk drives are rotating at tremendous velocity, with reading heads as close as possible to the disk platter in order to optimize the reading speed. Every shock needs to be detected to protect platter.

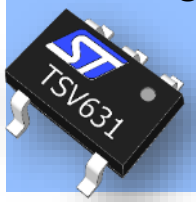
HOW DOES IT WORK?



The shock is detected by a piezo sensor, creating an electrical charge at its electrodes. The charge is converted into voltage and amplified by op amp.

ST OFFER

Feature	Benefit
Input bias current Iib < 10 pA @25°C Iib < 100 pA -40 to 125°C	Accurate measurement of small electric charges
Input offset voltage Vio < 500 µV @25°C Vio < 2 mV -40 to 125°C	Detection accuracy
SOT23-5 package	Small form factor and optimal solderability



Op Amp – Micropower

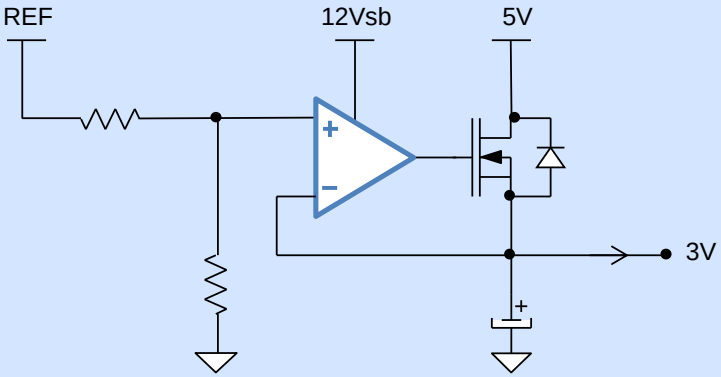
TSV631AILT

Mother board voltage regulator

CONTEXT

Mother boards include different levels of supply voltages with many conversion stages. Accuracy and stability are key performances.

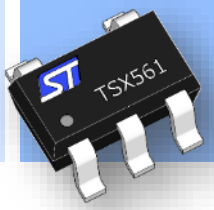
HOW DOES IT WORK?



The op amp is driving the gate of a power Mosfet used as a linear regulator.

ST OFFER

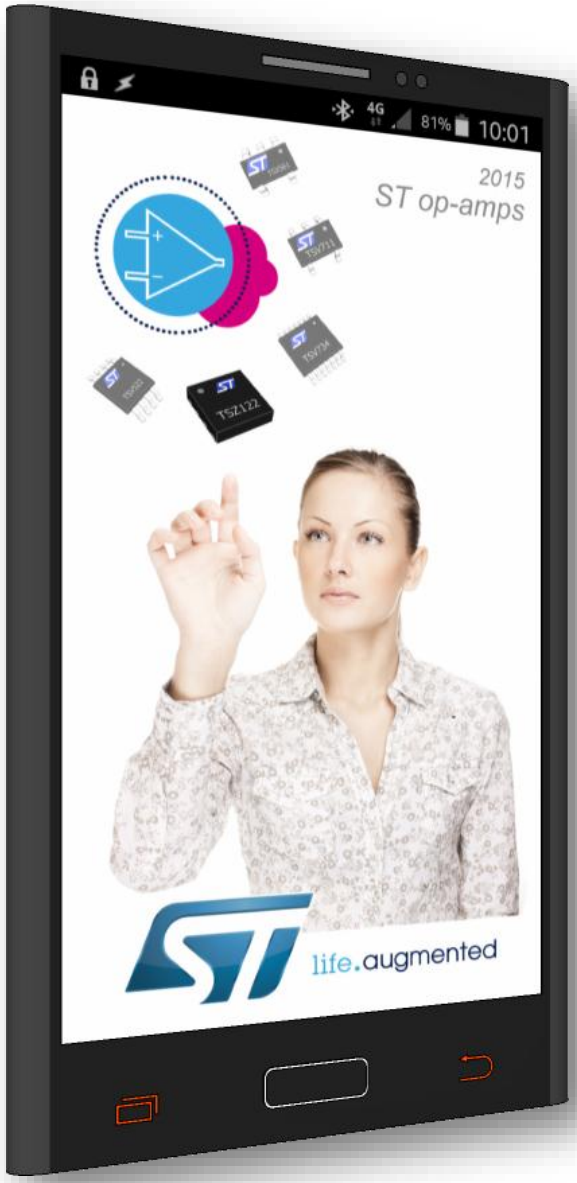
Feature	Benefit
Supply voltage range 3 to 16V	Direct supply by 12V output line
Input offset voltage Vio < 600 µV @25°C	Ensures regulation accuracy
SOT23-5 package	Small form factor and optimal solderability



Op Amp – 16V CMOS

TSX561AICT

Thank you for your attention!



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New version !
June 2015