

ELECTRONIC LOCK WITH FINGERPRINT IDENTIFICATION: OVERVIEW

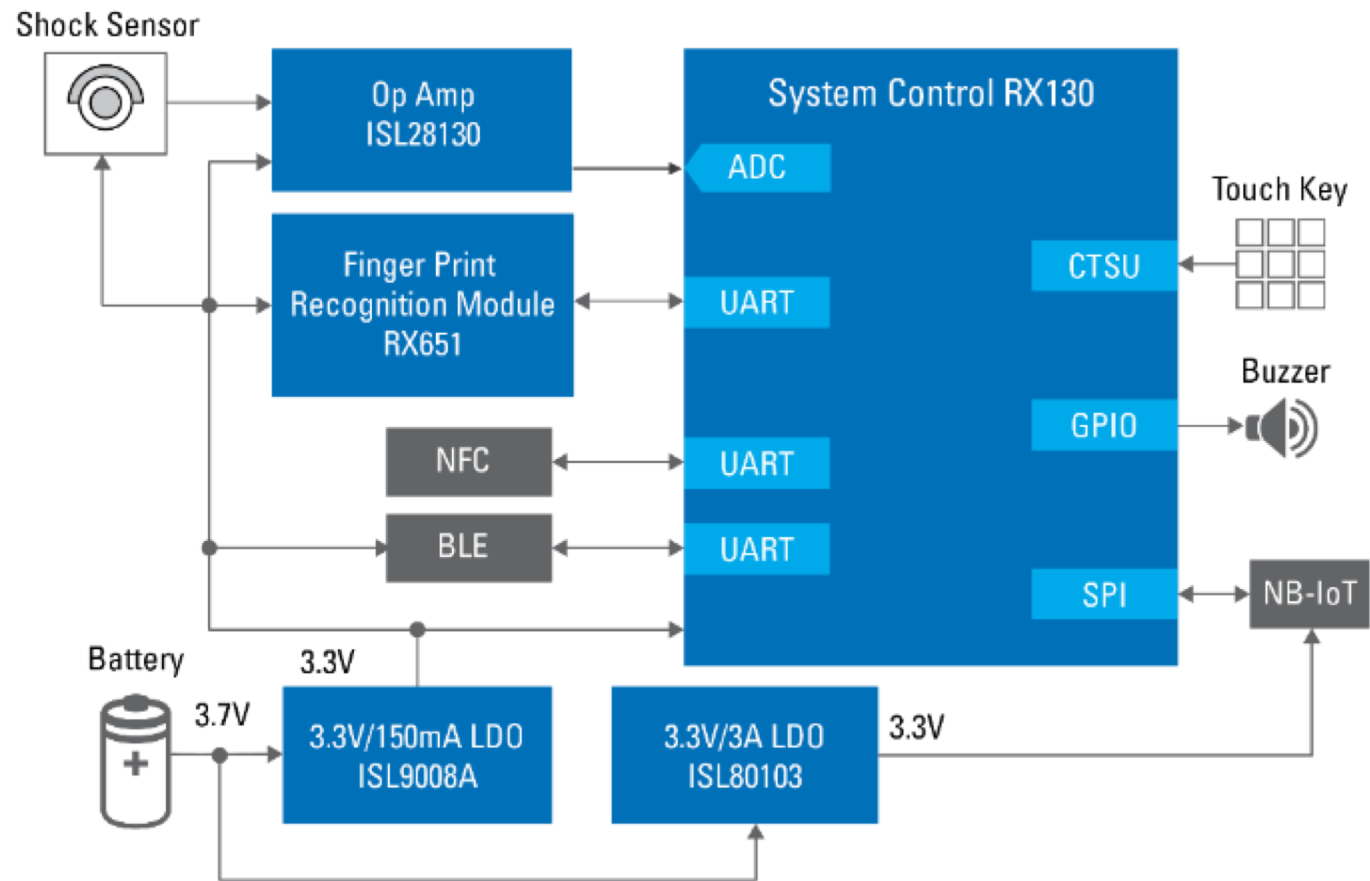
The smart lock is a rapidly growing trend in smart home appliances. Users can control smart locks by using fingerprints, Near Field Communication (NFC), capacitive touch, or low power Bluetooth® communication. With a low power design, NarrowBand-Internet of Things (NB-IoT) is also an option. As the RX130 MCU has integrated capacitive touch capabilities, it enables smaller board design and reduced cost. For advanced systems with more sophisticated fingerprint modules, an upgrade to the RX651 is an option for the algorithm design.

This solution can support Bluetooth communication with mobile or smart home routers. Additionally, the NB-IoT modem can directly support WLAN and directly send an alarm condition to the cloud.

Key Features:

- Highly integrated RX130 with built-in capacitive touch
- Low power design for extended battery life
- Shock sensor monitoring to alert for potential tampering and break-ins

ELECTRONIC LOCK WITH FINGERPRINT IDENTIFICATION: BLOCK DIAGRAM



CN038 - ABY

ELECTRONIC LOCK WITH FINGERPRINT IDENTIFICATION: SUMMARY

▪ System benefits

- RX130 integrated 36 channel cap touch and rich communication interface
- RX651 with high performance and large Flash to run fingerprint algorithm

Device Category	P/N	Key Features
MCU	RX130	RX core, low power, 5.5V, 36ch cap touch, rich communication I/F
MCU	RX651	RXv2 core, FPU, DSP, Max to 120 MHz, 640K RAM, TFT-LCDC, rich communication
Power	ISL9008A	3.3V/0.15A LDO high accuracy high PSRR in tiny package
Power	ISL80103	Option 3.3V/3A LDO for NB-IoT connection, disconnect in low power mode
Analog	ISL28130	The ISL28130, ISL28230 and ISL28430 are single, dual and quad micropower, low offset drift operational amplifiers

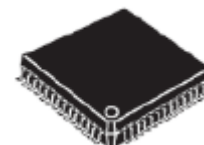
RX130: HIGH PERFORMANCE MCU WITH TOUCH KEY FUNCTION

Built-in functional safety hardware and can easily support the IEC/UL60730 safety standard

Features	Benefits	Applications
<ul style="list-style-type: none"> 32-bit MCU @ 32MHz Operation from a single 1.8 V to 5.5 V Three low power mode <ul style="list-style-type: none"> High Speed Mode : 96uA/MHz Software Standby Mode : 0.37uA Wakeup time from Standby Mode : 4.8uS High sensitive 36pin(max.324 Key capacitive touch sensing unit. Useful functions for IEC60730 compliance Up to 512KB Flash and 48B RAM 48pin, 52pin and 64pin LQFP packages 	<ul style="list-style-type: none"> The RX130 family integrates a built-in max. 36-channel capacitive touch sensor. The capacitive touch sensor uses an improved detection method compared to previous products and so has vastly improved noise immunity, sensitivity and water resistance. 	<ul style="list-style-type: none"> Healthcare Home appliances Human Machine Interface Industrial sensor Capacitive touch control UI

Typical application and key performances

32-MHz, 32-bit RX MCUs, 50 DMIPS, up to 512-KB flash memory, up to 36 pins capacitive touch sensing unit, up to 6 comms channels, 12-bit A/D, D/A, RTC, IEC60730 compliance, 1.8-V to 5.5-V single supply



PLQP0100KB-B 14 × 14mm, 0.5mm pitch
 PLQP0080KB-B 12 × 12mm, 0.5mm pitch
 PLQP0064GA-A 14 × 14mm, 0.8mm pitch
 PLQP0064KB-C 10 × 10mm, 0.5mm pitch
 PLQP0048KB-B 7 × 7mm, 0.5mm pitch



PWQN0048KB-A 7 × 7mm, 0.5mm pitch

RX651: COMMUNICATION MCU WITH ENHANCED SECURITY

Communication MCU with RXv2 core and large capacity RAM

Features	Benefits	Applications
<ul style="list-style-type: none"> • 32-bit MCU @ 120MHz • Ideal to carry out high-speed communication processing that is required for various communication interfaces such as Ethernet (RX65N only), USB, CAN, SD host/slave interface, and quad SPI. • Large-capacity memory of up to 2MB Flash and 640kB RAM • 100pin – 177pin packages 	<ul style="list-style-type: none"> • RX65N and RX651 families are new mainstream RX microcontrollers with RXv2 core, large-capacity RAM, and enhanced security, connectivity, and HMI • Cost optimized due to latest 40nm process technology 	<ul style="list-style-type: none"> • Process controls and monitoring • Oil and gas leak detection • HVAC and air control systems • CPAP and respiratory devices • Breathalyzer • Automotive MAF • Air speed and wind meter • Liquid dispensing/metering systems • Medical infusion pumps

Typical application and key performances

120-MHz 32-bit RX MCU, on-chip FPU, 240 DMIPS, up to 2-MB flash memory (supportive of the dual bank function), 640-KB SRAM, various communications interfaces including Ethernet MAC (RX65N only), SD host interface (optional), SD slave interface (optional), quad SPI, and CAN, 12-bit A/D converter, RTC, Encryption functions (optional), CMOS camera interface, Graphic-LCD controller, 2D drawing engine



ISL9008A: HIGH ACCURACY HIGH PSRR LDO IN TINY PACKAGE

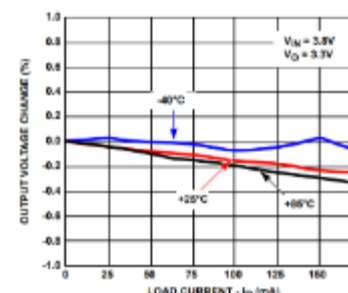
Low dropout regulator with low IQ low noise and high PSRR

Features	Benefits	Applications
<ul style="list-style-type: none"> • High performance LDO with 150mA continuous output wide input voltage capability: 2.3V to 6.5V • Low dropout voltage: typically 200mV @ 150mA • High PSRR: 65dB at 1kHz • ±1.8% accuracy over all operating conditions • Soft-start limits input current surge during enable • Current limit and overheat protection 	<ul style="list-style-type: none"> • The ISL9008A has a high PSRR of 65dB and output noise less than 45µVRMS. When coupled with a no load quiescent current of 46µA (typical), and 0.5µA shutdown current. • Excellent transient response to large current steps • Excellent load regulation: <0.1% voltage change across full range of load current 	<ul style="list-style-type: none"> • PDAs, cell phones and smart phones • Portable instruments, MP3 players • Handheld devices, including medical handhelds

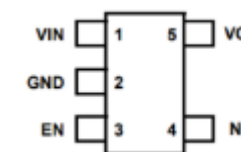
Typical application and key performances

The ISL9008A is a high performance single low noise, high PSRR LDO that delivers a continuous 150mA of load current. It has a low standby current and is stable with 1µF of MLCC output capacitance with an ESR of up to 200mohm.

Output voltage change Vs. Load current



PIN CONNECTION (5 LD SC-70) (Top view)



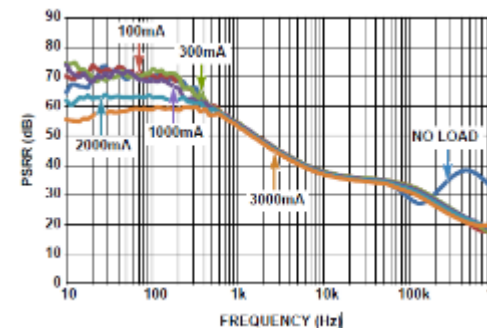
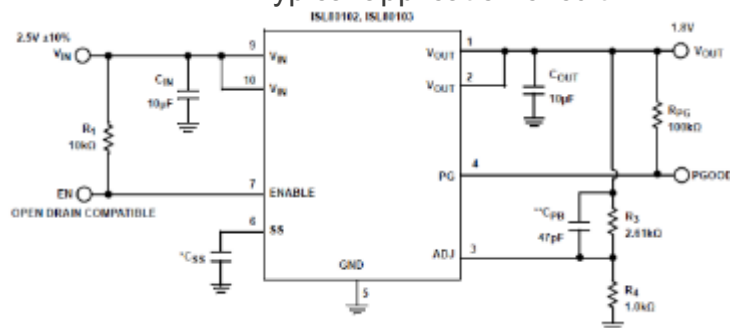
ISL80103: LOW VOLTAGE, SINGLE OUTPUT 3A LDO

High performance 5V/3A LDO

Features	Benefits	Applications
<ul style="list-style-type: none"> • Input voltage 2.2V to 6V • Output voltage 0.8V to 5V • $\pm 1.8\%$ Vout accuracy over line, load and temperature variation • Very low 120mV dropout voltage at 3A • Short-circuit and over-temperature protection 	<ul style="list-style-type: none"> • Thermally enhanced 10LD DFN package • Adjustable inrush current limiting • Very fast transient response • It achieves a very fast load transient response and excellent PSRR 	<ul style="list-style-type: none"> • Routers & switchers • Instrumentation systems • Medical equipment • Telecommunications and networking • Servers

Typical application and key performances

Typical application circuit



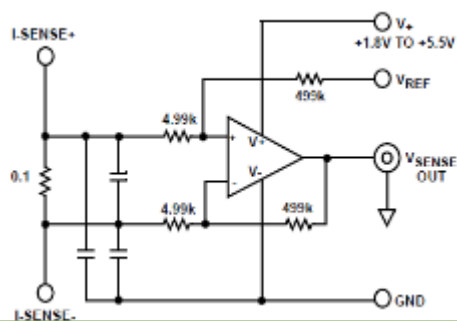
ISL28130: LOW SPEED OPAMP, SOT-23/SC70/SO8 PKG

Single micropower, low drift, RRIO operational amplifier

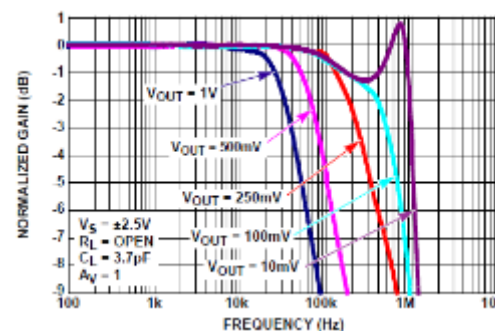
Features	Benefits	Applications
<ul style="list-style-type: none"> • Low input offset voltage: 40μV, Max • Low offset drift: 150nV/$^{\circ}$C, Max. • Input bias current: 250 pA, Max. • Quiescent current (per amplifier): 20μA, Typ. • Rail-to-rail input and output • Single supply range: +1.8V to +5.5V • Dual supply range: \pm0.9V to \pm2.75V • Low noise (0.01Hz to 10Hz): 1.1μV_{P-P}, Typ. 	<ul style="list-style-type: none"> • The parts are optimized for single supply operation from 1.8V to 5.5V, allowing operation from one lithium cell or two Ni-Cd batteries 	<ul style="list-style-type: none"> • Bi-directional current sense • Temperature measurement • Medical devices • Electronic weigh scales • Precision/strain gauge sensor • Precision regulation • Low Ohmic current sense • High gain analog front ends

Typical application and key performances

Typical application circuit



GAIN vs FREQUENCY vs SUPPLY VOLTAGE



Pinout

