

# BLOOD GLUCOSE METER: OVERVIEW

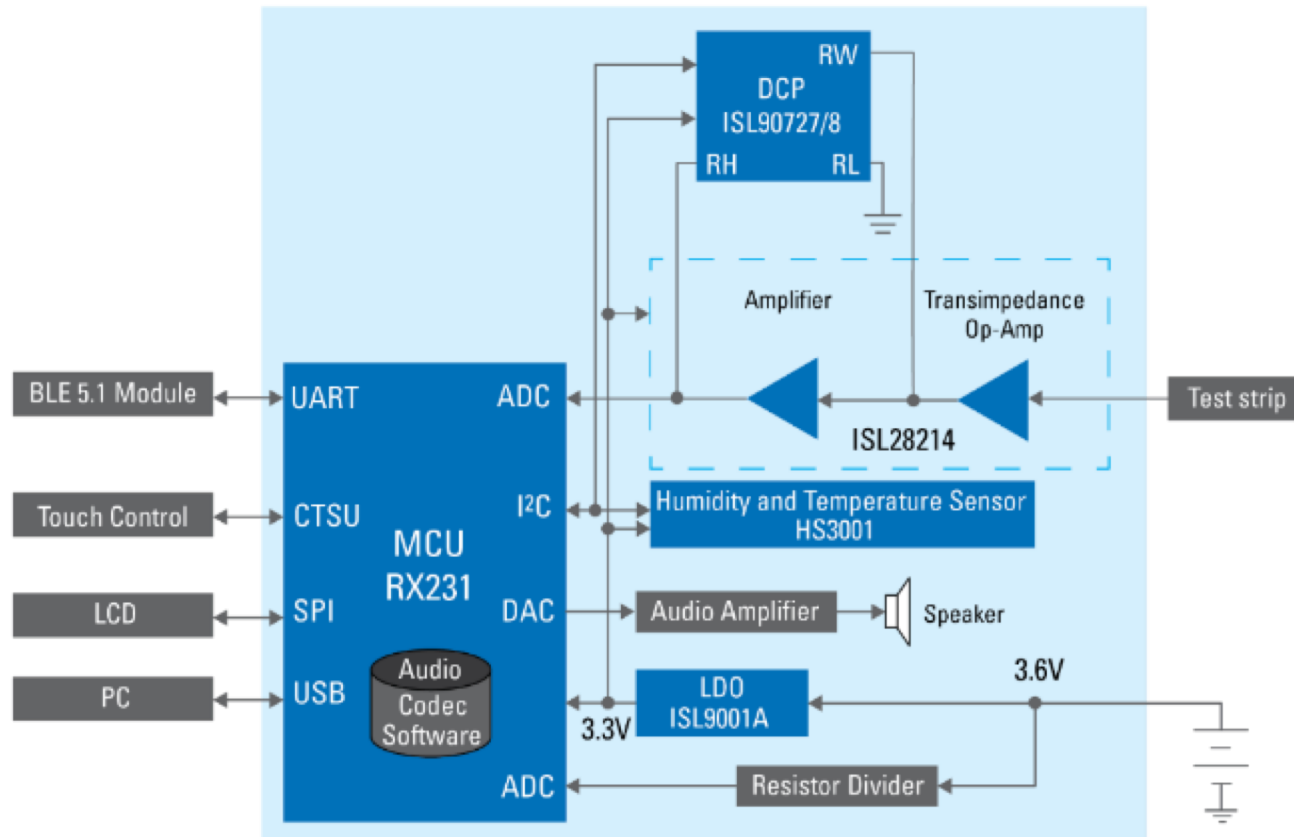
Blood glucose meters are devices used to measure blood sugar levels and help monitor health conditions. There is an increase in demand for these effective metering solutions, as the self-monitoring glucose meter market was valued at \$14.3 billion in 2017 and expected to grow at 5.1% CAGR through 2024.

Renesas' RX231 MCU provides an interface for the BLE module, touch sensing, LCD control and USB communication, all in one package. The ISL28214 is used for the transimpedance amplifier thanks to its low input offset and bias currents, while the ISL90727 digitally-controlled potentiometer provides programmable gain. The HS3001 temperature and humidity measurements enable offset calculations on the signal for accurate measurements. Our ISL9001A ensures a proper voltage is always maintained.

## Key Features:

- Highly integrated RX231 with built-in capacitive touch
- Programmable gain to maximize the output signal voltage for all inputs
- Reliable humidity and temperature measurements
- Simple voltage supply with low current consumption

# BLOOD GLUCOSE METER: BLOCK DIAGRAM



US018 - G12

# BLOOD GLUCOSE METER: SUMMARY

## ▪ System benefits

- Integrated with security function, touch key and LCD
- Has a rich communication interface
- Reliable and accurate humidity and temperature measurements

Device Category	P/N	Key Features
MCU	RX231	RXv2 Core, FPU, DSP, 48pin, 256K Flash, rich communication
Power	ISL9001A	LDO with low Iq (25uA) and high PSRR (90dB @ 1kHz ), able to source 300mA current
Sensor	HS300x	Humidity sensor with industry-leading accuracy, response time, and excellent stability
Analog	ISL90727	128-Tap, low power DCP in a small package
Analog	ISL28x14	General purpose RRIO operational amplifier with wide volt range from 1.8V to 5.5V, low current consumption (390uA), low input bias current, and 5MHz gain bandwidth

# RX231: 32 BIT, WIDE VIN MCU WITH BUILT-IN FPU

## Motor control MCU series within the RX Family

Features	Benefits	Applications
<ul style="list-style-type: none"> <li>• 32-bit MCU @ 54MHz</li> <li>• RX231 microcontrollers operate in a broad voltage range from 2.7 V to 5.5 V</li> <li>• Has a rich communication interface such as SD host interface, USB, and CAN</li> <li>• Integrated with security function, encryption function, and touch key</li> <li>• Up to 512kB Flash and 64kB RAM</li> <li>• 48pin, 64pin and 100pin LQFP packages</li> </ul>	<ul style="list-style-type: none"> <li>• The RX231 family is a 32-bit microcontroller with a built-in FPU (floating-point processing unit) that enables it to easily program complex inverter control algorithms. The RX24T family enables simultaneous control of up to 3 motors by max 80 MHz operating frequency CPU core and motor control peripherals.</li> </ul>	<ul style="list-style-type: none"> <li>• Industrial automation</li> <li>• Industrial process control</li> <li>• Office automation</li> <li>• Home appliances</li> <li>• Healthcare</li> <li>• IoT</li> </ul>

### Typical application and key performances

54-MHz 32-bit RX MCUs, built-in FPU, 88.56 DMIPS, up to 512-KB flash memory, up to 14 communication functions including USB 2.0 full-speed host/function/OTG, CAN, SD host interface, serial sound interface, cap-touch, 12-bit A/D, 12-bit D/A, RTC, AES, MPU security functions

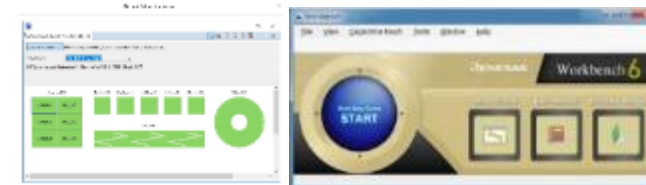


PLQP0100KB-B 14 × 14 mm, 0.5 mm pitch  
 PLQP0064KB-C 10 × 10 mm, 0.5 mm pitch  
 PLQP0048KB-B 7 × 7 mm, 0.5 mm pitch

PWQN0064KC-A 9 × 9 mm, 0.5 mm pitch  
 PWQN0048KB-A 7 × 7 mm, 0.5 mm pitch

PTLGD100KA-A 5.5 × 5.5 mm, 0.5 mm pitch  
 PVLG0064KA-A 5 × 5 mm, 0.5 mm pitch

Capacitive Touch Development Tool: "QE for Capacitive Touch" or "Workbench6"



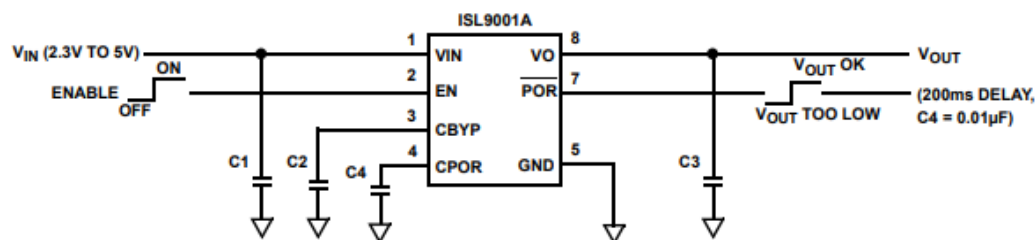
# ISL9001A: HIGH ACCURACY HIGH PSRR LDO IN TINY PACKAGE

*Low dropout regulator with low Iq and high PSRR*

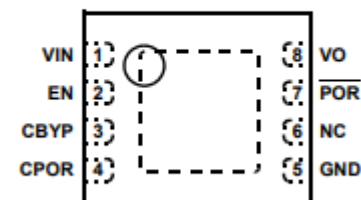
Features	Benefits	Applications
<ul style="list-style-type: none"> <li>• Excellent transient response to large current steps</li> <li>• Excellent load regulation: &lt;0.1% voltage change across full range of load current</li> <li>• High PSRR: 90dB @ 1kHz</li> <li>• Extremely low quiescent current: 25µA</li> <li>• Low dropout voltage: typically 200mV @ 300mA</li> <li>• Low output noise: typically 30µVRMS @ 100µA (1.5V)</li> </ul>	<ul style="list-style-type: none"> <li>• When coupled with a no load quiescent current of 25µA (typical), and 0.1µA shutdown current, the ISL9001A is an ideal choice for low power consumption application.</li> </ul>	<ul style="list-style-type: none"> <li>• PDAs, cell phones and smart phones</li> <li>• Portable instruments, MP3 players</li> <li>• Handheld devices, including medical handhelds</li> </ul>

## Typical application and key performances

Typical application circuit



ISL9001A  
(8 LD DFN)  
TOP VIEW

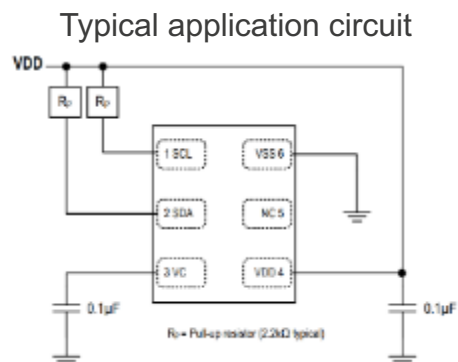


# HS300X: RELATIVE HUMIDITY AND TEMPERATURE SENSOR

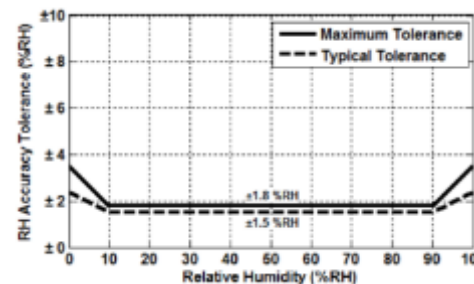
*Humidity sensor with industry-leading accuracy, response time, and excellent stability*

Features	Benefits	Applications
<ul style="list-style-type: none"> <li>• <math>\pm 1.5\%</math> relative humidity accuracy (HS3001)</li> <li>• Fast RH response time (Typical 6 seconds)</li> <li>• 14-bit resolution, 0.01%RH (Typical)</li> <li>• Low power consumption, 1.0<math>\mu</math>A average (one RH + T measurement per second)</li> <li>• Temperature sensor accuracy of <math>\pm 0.2^\circ</math> C (HS3001, HS3002)</li> <li>• Extended supply voltage, 1.8V to 5.5V</li> </ul>	<ul style="list-style-type: none"> <li>• Silicon-carbide capacitive sensing element</li> <li>• Excellent stability against aging</li> <li>• Highly robust protection from harsh environmental conditions and mechanical shock</li> <li>• Very low power consumption</li> <li>• Digital I<sup>2</sup>C Output</li> </ul>	<ul style="list-style-type: none"> <li>• Climate control systems</li> <li>• Home appliances</li> <li>• Weather stations</li> <li>• Industrial automation</li> <li>• Process controls and monitoring</li> <li>• Automotive climate control</li> <li>• Medical equipment</li> </ul>

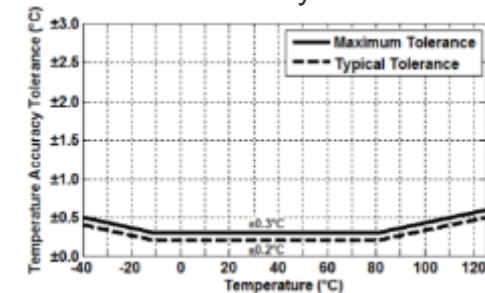
## Typical application and key performances



HS3001 RH Accuracy Tolerance at 25°C



HS3001 Temperature Sensor Accuracy Tolerance



# ISL90727: DIGITALLY CONTROLLED POTENTIOMETER (DCP)

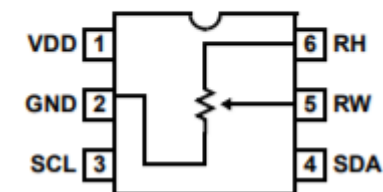
*128-Tap, low power DCP in a small package*

Features	Benefits	Applications
<ul style="list-style-type: none"> <li>• 128 resistor taps</li> <li>• I<sup>2</sup>C serial interface</li> <li>• Power supply: 2.7V to 5.5V</li> <li>• Available RTOTAL Values = 50kΩ, 10kΩ</li> <li>• Low Power:               <ul style="list-style-type: none"> <li>• Active current 200uA Max.</li> <li>• Standby current 500nA Max.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• The I<sup>2</sup>C interface provides easy control of the registers and wiper position.</li> <li>• Power-on Preset to Midscale</li> <li>• Additional device (ISL90728) with different address for up to two devices per bus</li> </ul>	<ul style="list-style-type: none"> <li>• Mechanical potentiometer replacement</li> <li>• Transducer adjustment of pressure, temperature, position, chemical, and optical sensors</li> <li>• RF amplifier biasing</li> <li>• LCD brightness and contrast adjustment</li> <li>• Gain control and offset adjustment</li> </ul>

## Typical application and key performances

The ISL90727 is a volatile memory digitally controlled potentiometer ideal for low power applications. To reduce the package size, it is internally configured to operate in voltage divider mode with a connection from one terminal to ground.

ISL90727, ISL90728  
(6 LD SC-70)  
TOP VIEW

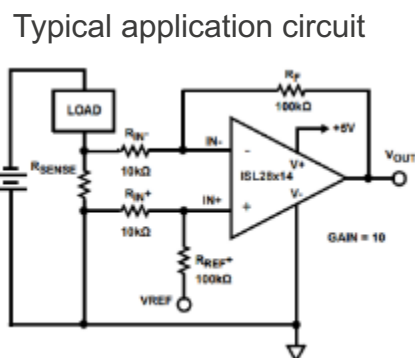


# ISL28X14: GENERAL PURPOSE OPERATIONAL AMPLIFIER

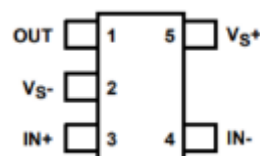
General purpose micropower, RRIO operational amplifier

Features	Benefits	Applications
<ul style="list-style-type: none"> <li>• Low current consumption: 390<math>\mu</math>A</li> <li>• Wide supply range: 1.8V to 5.5V</li> <li>• Gain-bandwidth product: 5MHz</li> <li>• Input bias current: 20pA, Max</li> <li>• Operating temperature range: 40C to +125C</li> </ul>	<ul style="list-style-type: none"> <li>• It is designed to operate from single supply with wide volt range from 1.8V to 5.5V, or dual supply (<math>\pm 0.9V</math> to <math>\pm 2.75V</math>).</li> <li>• The parts have an input common-mode range that extends 100mV above and below the power supply voltage rails.</li> </ul>	<ul style="list-style-type: none"> <li>• Power supply control/regulation</li> <li>• Process control</li> <li>• Signal gain/buffers</li> <li>• Active filters</li> <li>• Current shunt sensing</li> <li>• Transimpedance amp</li> </ul>

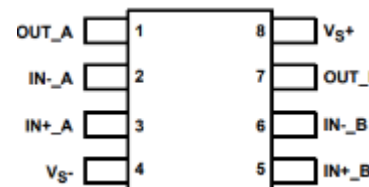
## Typical application and key performances



ISL28114  
(5 LD SOT-23)



ISL28214  
(8 LD MSOP, 8 LD SOIC, 8 LD SOT-23)



ISL28414  
(14 LD TSSOP, 14 LD SOIC)

