

July 2020





Contraction of the second



## **Smart Crutch**

#### Overview

As more individuals are living longer in China, a sharp demand for healthcare products is also increasing. The smart crutch provides auto alerts, such as GPS tracking, whether a user has fallen down, heart rate, etc., via the NB-IoT module. The smart crutch also integrates a heating element to the handle, as well as LED lighting. Additional features include IoT functions for auto-SOS, key-SOS, cloud/app monitoring, real-time positioning, tracking and monitoring, and other location-based services (LBS). This reference design features a microcontroller (MCU), temperature/humidity sensor, light sensor, sensor module, and power products.

#### System Benefits

- The RA4M1 32-bit MCU provides rich communication and a touch sensor
- Features the ISL29035 light sensor, OB1203 sensor module, and HS3003 high precision temperature/humidity sensor
- Includes a high efficiency charger and low quiescent current (IQ) power

CN043





BIG IDEAS FOR EVERY SPACE RENESAS

## **Smart Crutch**





## **Smart Crutch**

Device Category	P/N	Key Features
MCU	RA4M1	Arm® Cortex®-M4, FPU, offers a segment LCD controller and CTSU, built on a highly efficient low power process and is supported by an open and flexible ecosystem concept - the Flexible Software Package (FSP), built on FreeRTOS - and is expandable to use other RTOS and middleware.
E.	ISL9205D	High performance charger for single-cell Li-ion/Polymer batteries, charge current from 50mA to 900mA
Power	ISL91127	High efficiency buck-boost regulator. It is capable of delivering at least 2A continuous output current ( $V_{OUT} = 3.3V$ ) over a battery voltage range of 2.5V to 4.35V.
	ISL29035	Integrated ambient and infrared light-to-digital converter with I <sup>2</sup> C (SMBus compatible) interface
Analog	OB1203	Multi-channel digital RGB/ambient light, proximity and photoplethysmography sensor
HS3003		A highly-accurate, fully-calibrated relative humidity and temperature sensor





# RA4M1 – High Efficiency 48-MHz Arm® Cortex ®- M4 Core

For applications needing HMI/Control/ Security/Graphical and Capacitive Touch

#### **High Performance**

• 48MHz Arm<sup>®</sup> Cortex<sup>®</sup>-M4 CPU

#### **Highly Integrated Capabilities**

- 256KB Flash and 32KB SRAM
- 14-Bit ADC (25 ch.)
- 12-Bit DAC (1 ch.)/ 8-Bit DAC (2 ch.)

#### **Communication Interfaces**

- USB 2.0(Full Speed)
- CAN
- SCI x4/SPIx2/IICx2

#### **HMI Interface**

- Capacitive Touch Sensing Unit (27 ch.)
- Segment LCD Controller up to 34 segments x 8 commons

#### Wide Voltage and Low Power Consumption

- Wide operating voltage range of 1.6V to 5.5V
- Various Low Power Modes

Part #	Flash Memory	RAM	Temp	Package
R7FA4M1AB3CFP#AA0	256KB	32KB	40∼105°C	100 LQFP
R7FA4M1AB3CFM#AA0	256KB	32KB	40∼105°C	64 LQFP
R7FA4M1AB3CFL#AA0	256KB	32KB	40∼105°C	48 LQFP





#### RTK7EKA4M1S00001BU





# ISL9205 – Li-Ion Battery Charger

#### **Complete Charger for Li-Ion / Polymer Batteries**

#### Single IC Solution for Charging

- Integrated pass element and current sensor
- Charge current from 50mA to 900mA

#### **Multiple Charge Modes**

- Adjustable CC & End of Charge current via external resistors
- Ability to operate as pulse charger for current limited inputs
- Trickle charge for fully discharged batteries

#### **Protection Features**

- Incorporates Therma guard to prevent over temperature
- Foldback of charge current during over temperature events
- Ability to monitor temperature of battery pack

Part #	V <sub>BAT</sub>	Vsen	Temp	Timeout	Package
ISL9205IRZ-T	4.2	Yes	Yes	Yes	16L 3x3 TQFN
ISL9205AIRZ-T	4.2	Yes	No	No	10L 3x3 TQFN
ISL9205BIRZ-T	4.2	Yes	No	Yes	10L 3x3 TQFN
ISL9205CIRZ-T	4.256	Yes	No	Yes	10L 3x3 TQFN
ISL9205DIRZ-T	4.2	No	Yes	Yes	10L 3x3 TQFN



**Typical Application Circuit** 



#### **Evaluation Board**



RENESAS

# ISL91127 – Buck-Boost Regulator with 4.5A Switches

**High Efficiency for Battery-Powered Devices** 

#### **Flexible Operation Mode**

- Accept input voltage above or below regulated V<sub>OUT</sub>
- Automatic and seamless transitions between buck and boost mode

### **High Efficiency**

- High efficiency: up to 96%
- 30µA quiescent current maximizes light-load efficiency

### **Compact Space with Safety Design**

- 2.5MHz switching frequency minimizes external component size
- 20 Ld 4mmx4mm QFN package
- Fully protected for short-circuit, over-temperature and undervoltage

Part #	Vin (V)	Vout (V)	Package
ISL91127IRNZ-T	1.8V to 5.5V	3.3	20Ld 4x4 QFN
ISL91127IRAZ-T	1.8V to 5.5V	ADJ	20Ld 4x4 QFN



**Typical Application Circuit** 



**BIG IDEAS FOR EVERY** 



## ISL29035 – Integrated Digital Light Sensor with Interrupt

Ambient and Infrared Light-to-Digital Converter with I<sup>2</sup>C (SMBus compatible) Interface

#### **Integrated Functions and Small Package**

- 6 pin 1.5mmx1.3mm ODFN
- On-chip 16-bit ADC
- I<sup>2</sup>C (SMBus compatible) Interface
- Integrated noise reduction 50/60Hz

#### **High Performance**

- Dynamic Range 1: 4,200,000
- Close to human eye response with excellent IR/UV rejection
- Operation across -40 to +85°C

#### Low Power Design

- Normal operation 57uA
- 2 power down mode support shutdown current < 0.51uA</p>

Part #	ALS Sensing	Interrupt Pin	Package
ISL29035IROZ-T7	Yes	Yes	6 Ld 1.5x1.6 ODFN
ISL29035IROZ-T7A	Yes	Yes	6 Ld 1.5x1.6 ODFN





ISL29035EVAL1Z Evaluation Board





# **OB1203 – All-In-One Bio and Light Sensor**

#### Fully Integrated Clinical-Grade Calibrated Module

#### **Fully Integrated Module**

- Color, Ambient Light, Proximity and Biosensor in a single module
- No external components needed
- Factory calibrated to clinical grade accuracy

### Virtually Invisible

- Sensor works behind IR-ink
- Improved Industrial Design

### **Smallest Form Factor**

- Smallest biosensor module 4.2 x 2 x 1.2mm
- Optimized optical package with low cross talk

#### **Complete Solution**

- Includes PulsOx algorithm
- Other algorithms can be added

Part #	Feature	Package
OB1203SD-C4	All-In-One Biosensor	14 pin 4.2x 2.0x1.2mm







# HS300X – Relative Humidity and Temperature Sensor

High Accuracy Humidity and Temperature Measurement for Environmental Monitoring

### **High Accuracy**

- ±1.5%RH accuracy (HS3001)
- ±0.2°C temperature accuracy (HS3001, HS3002)

### **Excellent Stability**

- 0.1%RH per year drift
- MEMS silicon-carbide sensor technology

## Fast Response

- Less than 4 seconds humidity response, in still air
- Less than 2 seconds temperature response

## **Extended Supply Voltage**

- 2.3V to 5.5V, 24.4µA at 3.3V (one RH+Temp per second)
- 1.8V custom order

Part #	Feature	Package
HS3001	±1.5%RH	3×2.41×0.8 LGA
HS3002	±1.8%RH	3×2.41×0.8 LGA
<u>HS3003</u>	±2.8%RH	3×2.41×0.8 LGA
HS3004	±3.8%RH	3×2.41×0.8 LGA







#### SDAH02 Evaluation Kit





