JP105 In-Home Air Quality Monitor System



April 2020



In-Home Air Quality Monitor System

Overview

This solution monitors the air quality of a room. It measures a few variables, such as temperature, humidity, total volatile organic compound (TVOC) gases. It also provides estimated carbon dioxide levels (eCO_2), which is compliant with UBA standards. This solution also has the ability to control motors using complementary PWM mode operations.

System Benefits

- Uses the RL78/G14 fast prototyping board for easy customization and evaluation of in-home appliance applications
- The ZMOD4410 gas sensor module is designed for detecting total volatile organic compounds, which can be used to estimate CO₂ levels or gases which indicate poor air quality

JP105



SST

In-Home Air Quality Monitor System



SST

In-Home Air Quality Monitor System

Device Category	P/N	Key Features		
MCU	RL78/G14	High performance and low power consumption 32-MHz MCU which is highly suitable for motor control as well as system control for home appliances, industrial, and metering applications.		
Analog	ZMOD4410	Highly reliable gas sensor for measuring TVOC gases and provide estimated CO_2 levels (eCO ₂) which is compliant with UBA standards		
	HS3002	Silicon Carbide capacitive sensing element, excellent stability against aging, temperature sensor accuracy of $\pm 0.2^\circ$ C		
Power	ISL80505 High performance 0.5A LDO high PSRR			

JP105

RL78/G14 – Advanced Functions MCU

Suitable for Motor Control as well as Industrial and Metering Applications Added Instruction Functions to CPU core

- Added multiply, divide, and multiply-accumulate instructions that enable high-speed operation by direct execution without needing to utilize library functions
- High calculation performance: 51.2 DMIPS (32 MHz)

High Performance Peripheral Functions

- Timer RD (Complementary PWM Mode for brushless DC motor control), Timer RG (Phase Count Mode), Timer RJ (asynchronous timer)
- Data Transfer Controller (DTC); Event Link Controller (ELC)
- Comparator, 8bit Digital Analog Converter

Easy to Develop and Use

- Scalable lineup packages, pin-counts and Flash ROM, RAM
- Released Starter Kit and Motor Solution Evaluation Kit

Part #	Flash ROM	RAM	Package(mm)
R5F104A			30-LSSOP(7.62)
R5F104B	16 ~ 128 KB	2.5 ~ 16 KB	32-HWQFN(5 \times 5), 32-LQFP(7 \times 7)
R5F104C			36-WFLGA(4 \times 4)
R5F104E	16 ~ 192 KB	2.5 ~ 20 KB	40-HWGFN(6 × 6)
R5F104F	16 ~ 256 KB	2.5 ~ 24 KB	44-LQFP(10 × 10)
R5F104G	16 ~ 512 KB	2.5 ~ 48 KB	48-LFQFP(7 \times 7), 48-HWQFN(7 \times 7)
R5F104J	32 ~ 256 KB	4 ~ 24 KB	52-LQFP(10 × 10)
R5F104L	32 ~ 512 KB	4 ~ 48 KB	64-LFQFP(10 × 10), 64-LQFP(12 × 12), 64-LQFP(14 × 14)*, 64-WFLGA(5 × 5)
R5F104M			80-LFQFP(12 × 12), 80-LQFP(14 × 14)
R5F104P	90 ~ 215 KB	12 ~ 40 NB	100-LFQFP(14× 14), 100-LQFP(14 ×20)
			*This product do not exist 384KB/512KB



Timer output





Renesas Starter Kit for RL78/G14

RL78 Family Motor Solution Evaluation Kit



24V Motor Control fo Evaluation System for RX23T

RL78/G14 CPU Card for Motor Control





ZMOD4410 – Indoor Air Quality Sensor Platform **TVOC Sensor for Indoor Air Quality Application**

Flexible Measure Target

- Measurement of total organic compounds (TVOC)
- Concentrations and indoor air quality (IAQ)
- Module algorithm estimates carbon dioxide level (eCO2)
- Algorithm to set a control signal to trigger an external action based on IAQ and odor change
- Configurable alarm/interrupt output with static and adaptive Levels

Low Power

- Very low average power consumption down to 1mW
- Excellent for low-voltage and low-power battery applications

Easy to Use

- ZMOD4410 Evaluation Kit
- Manuals, application notes, blog, and white papers
- Instructional videos
- Programming libraries, example codes, and
- Algorithm support to optimize performance
- Third-party certification for compliance with well-accepted international IAQ standards

Part #	Operation Condition	Package
ZMOD4410AI1V ZMOD4410AI1R	1.7-3.6V -40° to +65° Est. CO2 400-5000ppm Ethanol in air 0-1000ppm	3.0 × 3.0 × 0.7mm, 12-LGA





ZMOD4410 typical application

AQ

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 6 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
<u>HS3002</u>	±1.8%RH	3×2.41×0.8 LGA
HS3003	±2.8%RH	3×2.41×0.8 LGA
HS3004	±3.8%RH	3×2.41×0.8 LGA







SDAH02 Evaluation Kit



ISL80505/510 – High Performance 0.5A/1A LDO

High PSRR for Instrumentation, Industrial, and Medical Applications

Stable Output Voltage

- $\pm 1.8\%$ V_{OUT} accuracy guaranteed over line, load
- Stable with a 4.7µF output ceramic capacitor

High Efficiency

- Very low 45mV dropout voltage at V_{OUT} = 2.5V
- Very fast transient response

High Performance

- Excellent PSRR over wide frequency range
- Programmable output soft-start time

Excellent Safety

- Current limit protection
- Thermal shutdown function

Vin (V)	lout (A)	Package
1.8V to 6V	0.5	3x3 DFN
2.2V to 6V	1	3x3 DFN
	Vin (V) 1.8V to 6V 2.2V to 6V	Vin (V) lout (A) 1.8V to 6V 0.5 2.2V to 6V 1



BIG IDEAS FOR EVERY SPACE





ISL80510EVAL1Z 1A LDO Eval Board

RENESAS



