

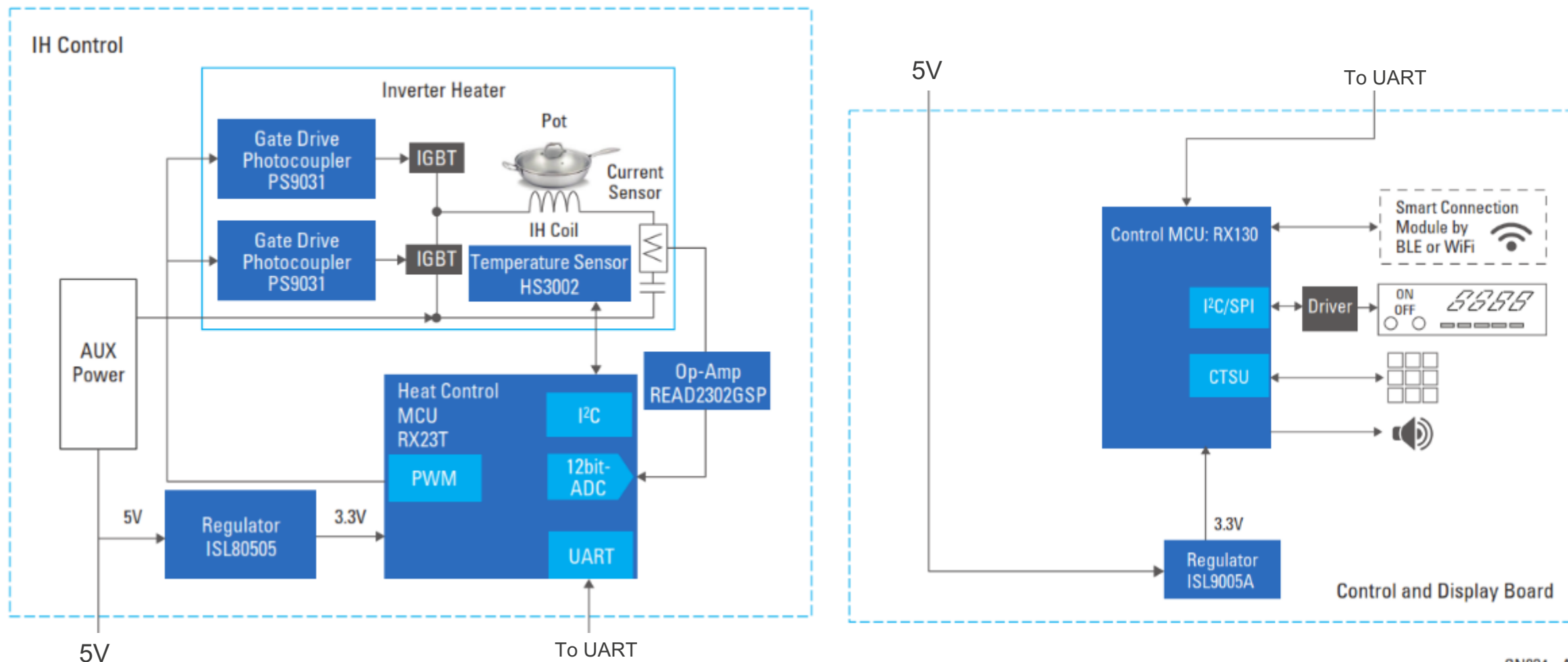
# INDUCTION HEATING COOKER: OVERVIEW

Induction Heat (IH) cooking is gaining popularity due to its low power requirements and safety advantages. IH cooking models capable of accommodating all types of metallics are now available and are ideal for the "all electric" home. These appliances require high-performance MCUs to control the heating process and need advanced controls such as touch displays which are now rapidly becoming the standard, as they are easy to use and easy to clean.

## Key Features:

- The RX23T is designed for complex inverter control algorithms for IH control and inverter heaters
- The RX130 solution provides a user interface and high performance touch interface
- Enables wireless connectivity for smart control systems

# INDUCTION HEATING COOKER: BLOCK DIAGRAM



CN034 - AB1

# INDUCTION HEATING COOKER: SUMMARY

## System benefits

- High integration MCU with Touch/LCD/ADC/DAC and high performance PWM control MCU
- High performance power design
- High performance analog elements by temp. sensor/photocoupler/op-amp

Device Category	P/N	Key Features
MCU	RX130 R5F5130xxxxx	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
	RX23T R5F523Txxxxx	32-bit microcontroller and suited for single inverter control and has a built-in FPU (floating-point processing unit) that enables it to easily program complex inverter control algorithms
Power	ISL9005A	300mA high performance LDO, very low quiescent current: 50µA . Low output noise.
	ISL80505	500mA output current and output voltage can be programmed from 0.8V to 5.5V
Analog	HS3002	Silicon-carbide capacitive sensing element, Excellent stability against aging, Temperature sensor accuracy of $\pm 0.2^{\circ}\text{C}$
	READ 2302GSP	Op-Amp
	PS9031	High-speed digital output photocouplers

# RX130: HIGH PERFORMANCE MCU WITH TOUCH KEY FUNCTION

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

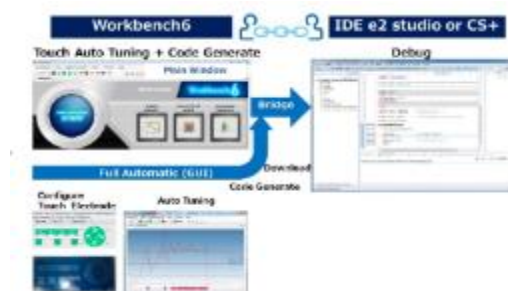
Features	Benefits	Applications
<ul style="list-style-type: none"> <li>32-bit MCU @ 32MHz</li> <li>Operation from a single 1.8 V to 5.5 V</li> <li>Three low power mode               <ul style="list-style-type: none"> <li>High Speed Mode : 96uA/MHz</li> <li>Software Standby Mode : 0.37uA</li> <li>Wakeup time from Standby Mode : 4.8uS</li> </ul> </li> <li>High sensitive 36pin(max.324 Key capacitive touch sensing unit.</li> <li>Useful functions for IEC60730 compliance</li> <li>Up to 512KB Flash and 48B RAM</li> <li>48pin, 52pin and 64pin LQFP packages</li> </ul>	<ul style="list-style-type: none"> <li>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.</li> </ul>	<ul style="list-style-type: none"> <li>Healthcare</li> <li>Home appliances</li> <li>Human Machine Interface</li> <li>Industrial sensor</li> <li>Capacitive Touch Control UI</li> </ul>

## Typical application and key performances

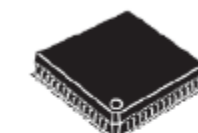
Cap Touch evaluation Kit



Touch workbench tools



Package



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

# RX23T: INDUSTRIAL AND MOTOR CONTROL MCU

*Industrial applications MCU series within the Renesas RX family*

Features	Benefits	Applications
<p>RX microcontrollers with RXv2 core</p> <p>Enhanced security</p> <p>Single precision floating point</p> <p>Enhanced DSP functions</p> <ul style="list-style-type: none"> <li>64k/128k KB 0 wait-state FLASH</li> <li>RAM 640 KB</li> <li>Data Flash 32 KB</li> <li>1uS ADC with 3 simultaneous S/H</li> <li>Built-in analog comparators (3 ch)</li> <li>Safety functions</li> </ul>	<ul style="list-style-type: none"> <li>Compact code size</li> <li>Low cost / high performance for control applications.               <ul style="list-style-type: none"> <li>Fast sampling ADC for sensors</li> <li>Fast math processing</li> </ul> </li> <li>BLDC Algorithms available</li> <li>In-circuit scope for motor control</li> </ul>	<ul style="list-style-type: none"> <li>Motor control               <ul style="list-style-type: none"> <li>HVAC, fan control, inverter control</li> </ul> </li> <li>General Industrial</li> </ul>

## Typical application and key performances

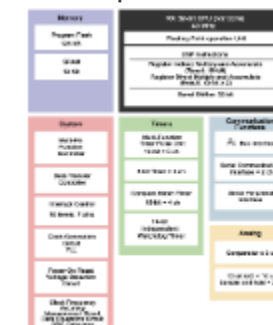
Motor Control Kit



Renesas Motor Workbench 2.0: Motor Control Development Tool 2.0



Chip Block



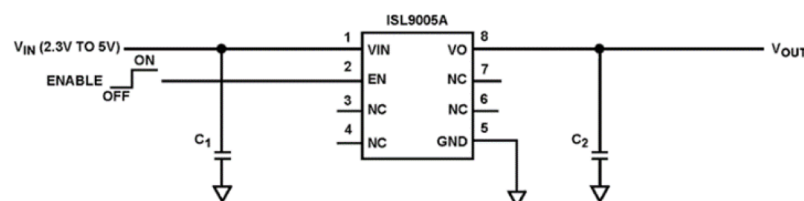
# ISL9005A: LDO WITH LOW ISUPPLY, HIGH PSRR

## High performance 300mA LDO

Features	Benefits	Applications
<ul style="list-style-type: none"> <li>300mA high performance LDO</li> <li>Very low quiescent current: 50<math>\mu</math>A</li> <li>Low output noise: typically 45<math>\mu</math>VRMS @ 100<math>\mu</math>A (1.5V)</li> <li><math>\pm 1.8\%</math> accuracy over all operating conditions</li> <li>High PSRR: 75dB @ 1kHz</li> <li>Low dropout voltage: typically 200mV @ 300mA</li> </ul>	<ul style="list-style-type: none"> <li>Very low quiescent current: 50<math>\mu</math>A</li> <li>Excellent load regulation: &lt;0.1% voltage change across full range of load current</li> <li>Soft-start to limit input current surge during enable</li> <li>Wide input voltage capability: 2.3V to 6.5V</li> </ul>	<ul style="list-style-type: none"> <li>Handheld devices, including medical handhelds</li> <li>PDA's, cell phones and smart phones</li> <li>Portable instruments, MP3 players</li> </ul>

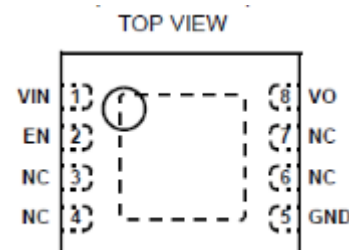
## Typical application and key performances

Typical application circuit



C<sub>1</sub>, C<sub>2</sub>: 1 $\mu$ F X5R CERAMIC CAPACITOR

Pinout



PSRR

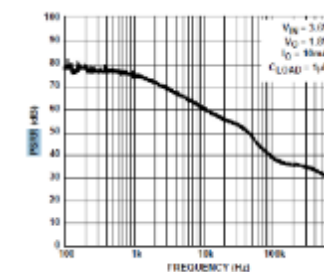


FIGURE 17. PSRR vs FREQUENCY

# ISL80505: SINGLE OUTPUT LOW DROPOUT REGULATOR

## High performance 500mA LDO

### Features

- $\pm 1.8\%$   $V_{OUT}$  accuracy guaranteed over line, load, and  $T_J = -40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$
- Very low 45mV dropout voltage at  $V_{OUT} = 2.5\text{V}$
- Stable with a  $4.7\mu\text{F}$  output ceramic capacitor
- Very fast transient response
- Programmable output soft-start time
- Excellent PSRR over wide frequency range
- Current limit protection
- Thermal shutdown function

### Benefits

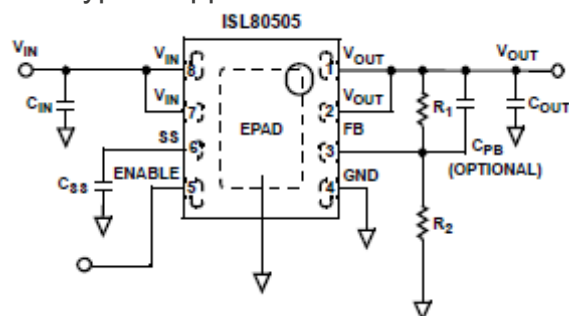
- A submicron BiCMOS process is utilized for this product family to deliver the best-in-class analog performance and overall value.
- State-of-the-art internal compensation achieves a very fast load transient response and excellent PSRR.

### Applications

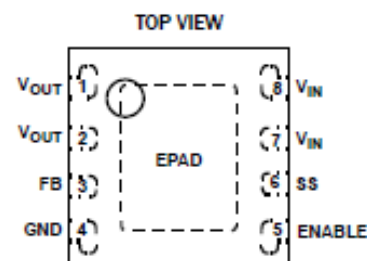
- Noise sensitive instrumentation systems
- Post regulation of switched mode power supplies
- Industrial systems
- Medical equipment
- Telecommunications and networking equipment
- Servers
- Hard disk drives (HD/HDD)

## Typical application and key performances

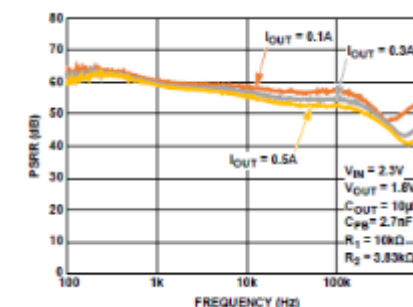
Typical application circuit



Pinout  
8LD QFN



PSRR

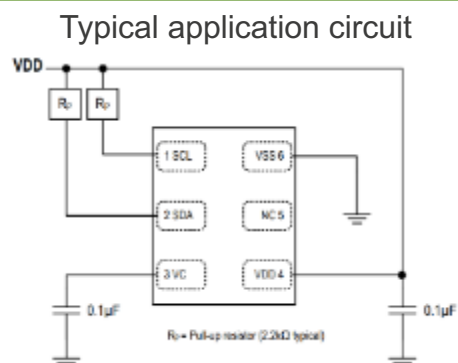


# HS300X: RELATIVE HUMIDITY AND TEMPERATURE SENSOR

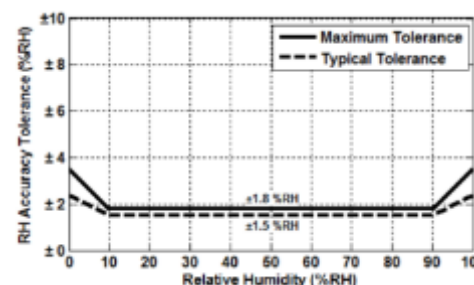
*Humidity sensor with industry-leading accuracy, response time, and excellent stability*

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\text{C}</math> (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 appliance</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>

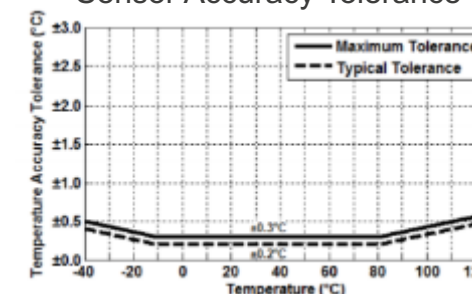
## Typical application and key performances



HS3001 RH Accuracy Tolerance at 25°C



HS3001 Temperature Sensor Accuracy Tolerance





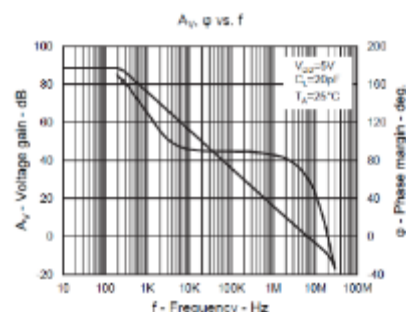
# READ2302G: 6MHZ GBW OPAMP, TSSOP8 PKG

*Single and dual precision rail-to-rail input-output op amps with very low input bias current*

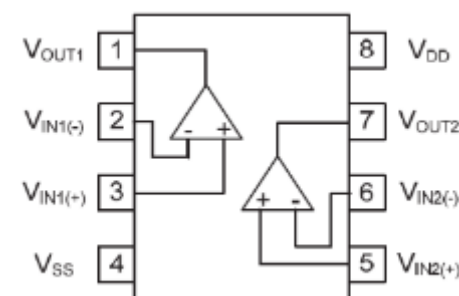
Features	Benefits	Applications
<ul style="list-style-type: none"> <li>• 6MHz gain bandwidth product</li> <li>• 750<math>\mu</math>A supply current (per amplifier)</li> <li>• 1pA typical input bias current</li> <li>• Down to 2.5V single supply operation</li> <li>• Rail-to-rail input and output</li> <li>• -40°C to +105°C operation</li> <li>• Pb-free (RoHS compliant)</li> </ul>	<ul style="list-style-type: none"> <li>• The parts are optimized for single supply operation from 2.5V to 5.5V, allowing operation from one lithium cell or two Ni-Cd batteries</li> </ul>	<ul style="list-style-type: none"> <li>• Low-end audio</li> <li>• 4mA to 20mA current loops</li> <li>• Medical devices</li> <li>• Sensor amplifiers</li> <li>• ADC buffers</li> <li>• DAC output amplifiers</li> </ul>

## Typical application and key performances

GAIN vs FREQUENCY vs SUPPLY VOLTAGE



Pinout TSSOP8



# PS9031: IGBT GATE DRIVE PHOTOCOUPPLERS

**2.5A output current, high CMR, IGBT gate drive**

## Features

- Long creepage distance (8 mm MIN.)
- Large peak output current (2.5 A MAX., 2.0 A MIN.)
- High speed switching ( $t_{PLH} \square t_{PHL} = 175 \text{ ns MAX.}$ )
- UVLO (Under Voltage Lock Out) protection with hysteresis
- High common mode transient immunity (CMH,  $CML = \square 50 \text{ kV}/\square \text{s MIN.}$ )
- Operating ambient temperature ( $125 \square \text{C MAX.}$ )

## Benefits

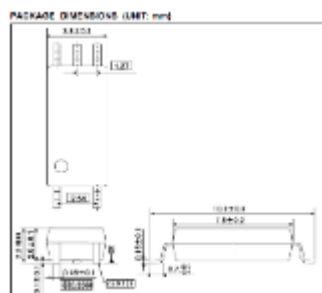
- The PS9031 is optically coupled isolators containing a GaAlAs LED on the input side and a photo diode, signal processing circuit and power output transistor on the output side in a single chip. This coupler is designed specifically to provide high common mode transient immunity (CMR) and a high output current, and has an active miller clamp and high switching speed, making it ideal for driving IGBTs and MOSFETs.

## Applications

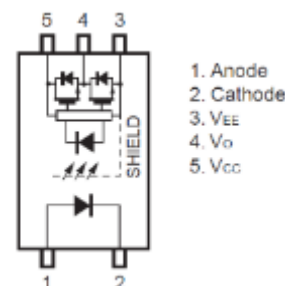
- IGBT, power MOSFET gate driver
- Industrial inverter
- AC servo

## Typical application and key performances

Package



Pin assignments



Chip Block Diagram

