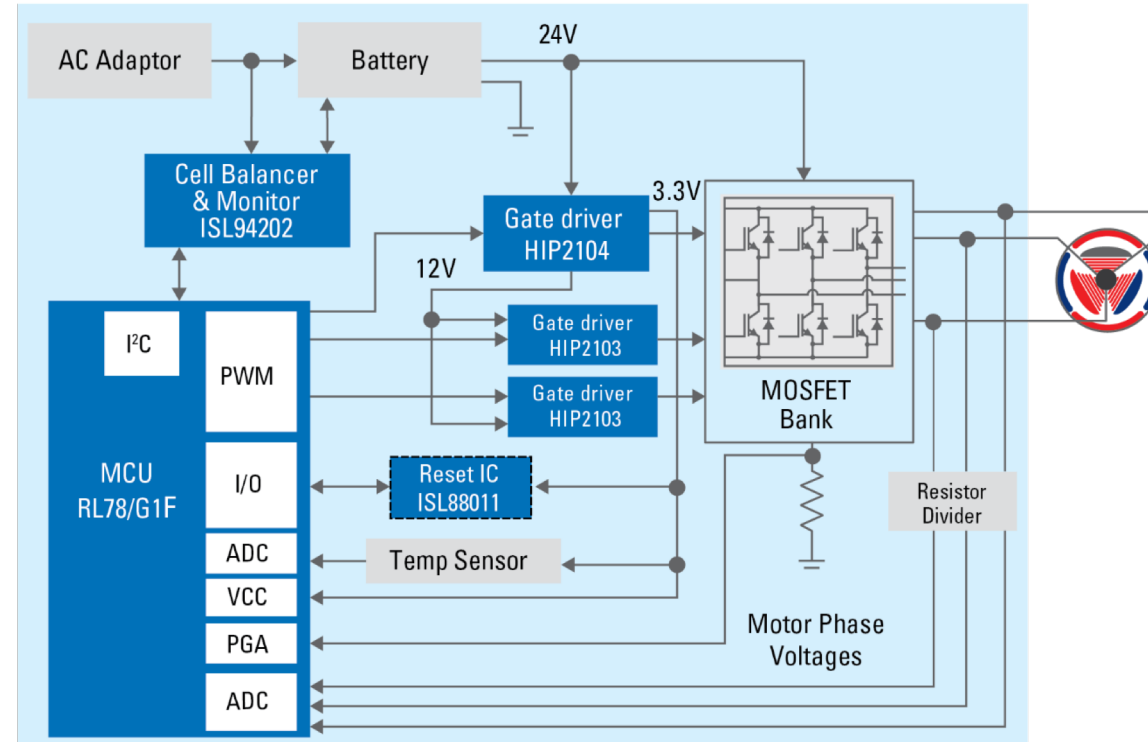


# Cordless vacuum cleaner: Overview

- Solutions for BLDC motor applications have been increasing rapidly because of the demand for products that are smaller in size and provide high efficiency. The core of a BLDC motor design is a robust and reliable motor control circuit and a versatile MCU for a safe control algorithm. A vacuum cleaner is one of the applications that uses a BLDC motor, but can be used in other similar applications. Key building blocks of a motor control circuit include a MOSFET driver, versatile MCU, voltage regulators, a cell balancer and the battery charger.
- Key Features:
  - Ultra-low power MCU
  - High speed wake up time 4 $\mu$ s
  - Integrated 12-bit ADC with op amp and comparator
  - High accuracy cell balancer and monitor with customer programmable EEPROM
- Applications:
  - Vacuum cleaner
  - Small motor equipment

# Cordless vacuum cleaner: block diagram



1. Ultra low power MCU
2. Gate driver circuit optimized for lower power consumption and low component count
3. Integrated cell balancer for optimal battery performance

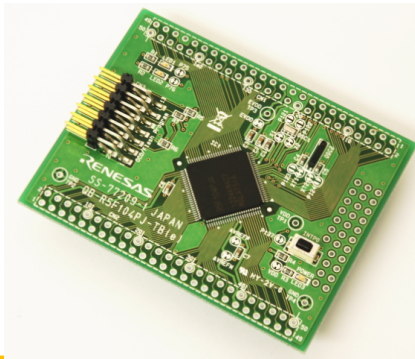
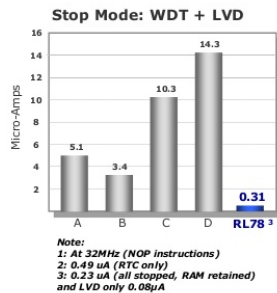
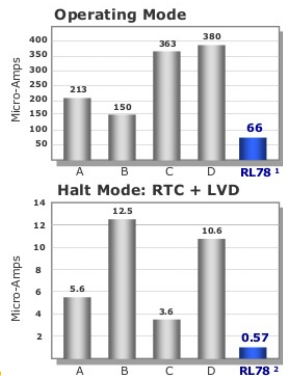
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# RL78 / G1F: 16bit, 32 MHz MCU with wide Vin operation

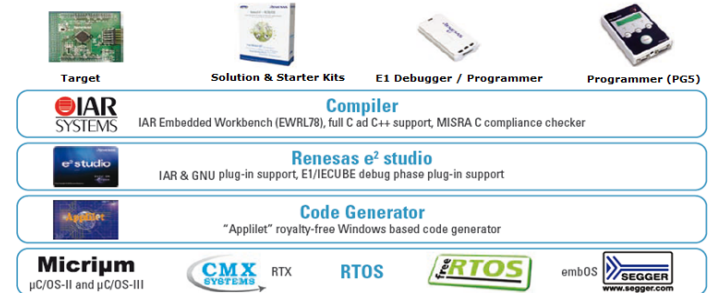
Low power MCU series within the RL78 Family

Features	Benefits	Applications
<ul style="list-style-type: none"> <li>• True Low Power 16bit 32MHz uC</li> <li>• Broad Scalability w/ pin/FLASH/RAM options</li> <li>• High Performance w/ 1.6V to 5.5V operation</li> <li>• High Integration including oscillators, power-on-reset, low voltage detection, watchdog, real time clocks and analog functions</li> <li>• Comprehensive Tools and Support                             <ul style="list-style-type: none"> <li>– Advanced Tools, 3<sup>rd</sup> Party, Online resources and training</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• RL78 provide many options in-order to scale power based on application requirements by using combination of the clock selection and advanced power modes.</li> <li>• RL78 offer scalability via &gt; 600 devices with wide pin count, packages, I/O peripheral mapping and large memory options</li> <li>• Integration options allow for many of the functions necessary to make the solution smaller, more reliable and lower cost</li> </ul>	<ul style="list-style-type: none"> <li>• HVAC Systems</li> <li>• Climate control systems</li> <li>• Smart Thermostats</li> <li>• Smart Speakers</li> <li>• Bathroom fans</li> <li>• Kitchen exhaust hoods</li> <li>• Smart outlets &amp; receptacles</li> <li>• Home appliance</li> <li>• Weather stations</li> <li>• Industrial automation</li> </ul>

## Typical application and key performances



Explore → Evaluate → Develop → Manufacture



# HIP2103/4: Integrated LDO for MCU and drivers

## 60V half bridge Drivers

Features	Benefits	Applications
<ul style="list-style-type: none"> <li>Optimized for battery powered applications from 5V to 60V</li> <li>Small packages: 8 ld 3x3 DFN (HIP2103), 12 ld 4x4 DFN (HIP2104)</li> <li>Two integrated LDOs with enables (HIP2104 only)</li> <li>1A sourcing, 2A sinking driving current</li> <li>Very robust by offering -10V voltage transients on HB pin</li> </ul>	<ul style="list-style-type: none"> <li>Proprietary sleep mode eliminates the need for additional I/O control pins</li> <li>10uA Iq eliminates the need for a disconnect switch</li> <li>Simple power supply needs</li> <li>Integrated 3.3V LDO eliminated uC power supply needs</li> <li>Pb-free (RoHS compliant)</li> </ul>	<ul style="list-style-type: none"> <li>Power Tools</li> <li>Handheld Vacuums</li> <li>Robotics</li> <li>Drones</li> </ul>

## Typical application and key performances

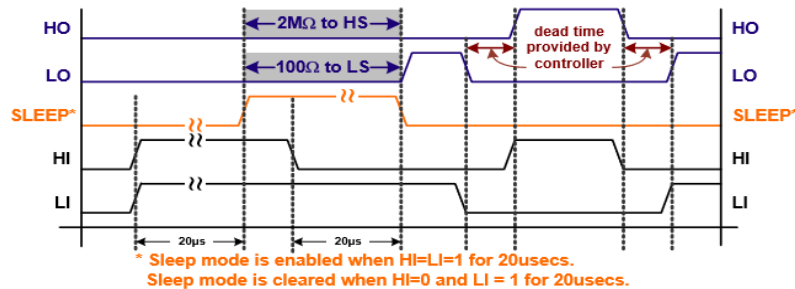


FIGURE 4. SLEEP MODE ENABLED OR CLEARED BY HI AND LI INPUTS

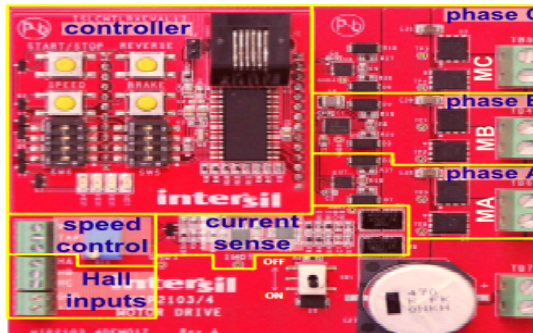
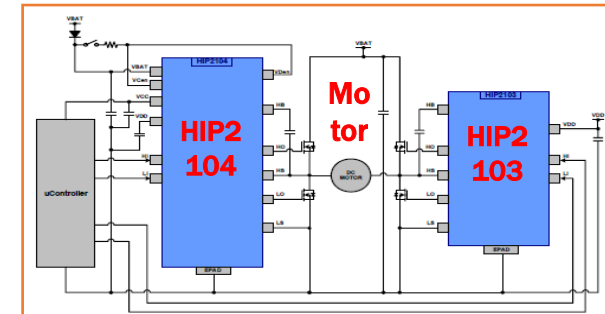


FIGURE 1. HIP2103-4DEMO1Z INPUTS AND OUTPUTS



# ISL8801x:low current, high accuracy, small SOT-23 pkg

*Dual voltage supervisor with monitoring or watchdog timer Capability*

Features	Benefits	Applications
<ul style="list-style-type: none"> <li>• Single/dual voltage monitoring supervisors</li> <li>• Fixed-voltage options allow precise monitoring of +2.5V, +3.0V, +3.3V, and +5.0V power supplies</li> <li>• Adjustable POR timeout delay options</li> <li>• Watchdog timer with 1.6s normal and 51s start-up timeout durations</li> </ul>	<ul style="list-style-type: none"> <li>• Manual reset input on all devices</li> <li>• Reset signal valid down to VDD = 1V</li> <li>• Accurate <math>\pm 1.5\%</math> voltage threshold</li> <li>• Immune to power-supply transients</li> <li>• Ultra low 5.5<math>\mu</math>A supply current</li> <li>• Small 5 Ld SOT-23 Pb-Free package</li> <li>• Pb-Free (RoHS Compliant)</li> </ul>	<p>Process control systems</p> <ul style="list-style-type: none"> <li>• Intelligent instruments</li> <li>• Embedded control systems</li> <li>• Computer systems</li> <li>• Critical <math>\mu</math>P and <math>\mu</math>C power monitoring</li> <li>• Portable/battery-powered equipment</li> <li>• PDA and handheld PC devices</li> </ul>

## Typical application and key performances

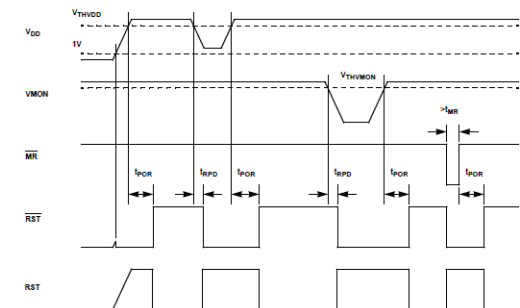
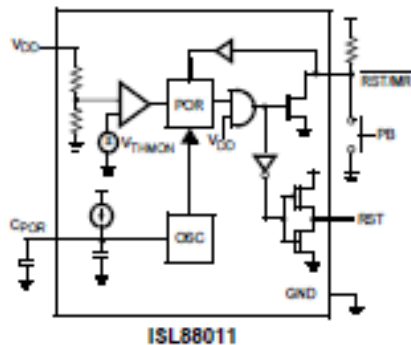


FIGURE 1. VOLTAGE MONITORING TIMING DIAGRAM