CN214
Digital IC Burn-in System

February 2020
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Overview
Renesas’ Digital IC Burn-in System solution is based on a high-performance RA4 MCU, high performance power solutions, and power monitoring analog front-end ICs. The RA4 Arm®-based MCU could meet your requirements for system control. The ISL8272M and ISL8277M high performance power modules provide PMBus interfaces to adjust the output voltage of power supplies on tested ICs and best thermal performance in the market. The ISL28023 power monitoring IC provides feedback for the high precision testing voltage and current. With these solutions from Renesas, customers can make their burn-in system more compact and flexible for different ICs.

System Benefits
- RA4M1 integrated CTSU/12-bit ADC/display/USB with high performance
- ISL8272/ISL8277M PMBus compliant power modules provide the best flexibility for different voltage requirements in testing systems
- The ISL28023 precision power monitoring analog front end helps to optimize testing system accuracy
Digital IC Burn-in System

- **Buck Regulator**
  - ISL85003

- **MCU / MPU**
  - RA4M1

- **Power Modules**
  - ISL8272M
  - ISL8277M

- **OPAMP**
  - ISL28023

- **Power Monitor**
  - ISL28023

- **I2C**

- **GPIO**

- **LCDC**

- **TFT**

- **CN214**

- **12V BUS**

- **3.3V**

- **To Tested IC Power Pins**

- **To Tested IC I/O Pins**
## Digital IC Burn-in System

<table>
<thead>
<tr>
<th>Device Category</th>
<th>P/N</th>
<th>Key Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>MCU</td>
<td>RA4M1</td>
<td>48MHz Arm® Cortex®-M4 with LCD controller and cap touch for HMI</td>
</tr>
<tr>
<td>Power</td>
<td>ISL8272M</td>
<td>50A digital DC/DC PMBus power module</td>
</tr>
<tr>
<td></td>
<td>ISL8277M</td>
<td>25A digital DC/DC PMBus power module</td>
</tr>
<tr>
<td></td>
<td>ISL85003</td>
<td>Highly efficient 3A synchronous buck regulator</td>
</tr>
<tr>
<td>Analog</td>
<td>ISL28023</td>
<td>Precision digital power monitor with margining</td>
</tr>
</tbody>
</table>
RA4M1 – High Efficiency 48-MHz Arm® Cortex®-M4 Core
For applications that need HMI/Control/Security/Graphical and Capacitive Touch

High Performance
- 48MHz Arm® Cortex®-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/SPi x2/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

<table>
<thead>
<tr>
<th>Part #</th>
<th>Flash Memory</th>
<th>RAM</th>
<th>Temp</th>
<th>Package</th>
</tr>
</thead>
<tbody>
<tr>
<td>R7FA4M1AB3CFP#AA0</td>
<td>256KB</td>
<td>32KB</td>
<td>40 ~ 105°C</td>
<td>100 LQFP</td>
</tr>
<tr>
<td>R7FA4M1AB3CFM#AA0</td>
<td>256KB</td>
<td>32KB</td>
<td>40 ~ 105°C</td>
<td>64 LQFP</td>
</tr>
</tbody>
</table>
ISL8272M – 50A Digital DC/DC PMBus Power Module
Servers, Telecom, Industrial/ATE and Networking Equipment

High Current Out
- 50A step-down PMBus compliant digital power module
- In current sharing configuration, four modules in parallel can deliver 200A continuous current
- Thermally-enhanced HDA package
- Monitor of VIN, VOUT, IOUT, temperature, duty cycle, switching frequency, power-good, and faults

Flexibility and Accuracy
- ±1.0% VOUT accuracy over line, load, and temperature
- Wide input voltage range: 4.5V to 14V
- Programmable output voltage range: 0.6V to 5V
- Complete digital switch mode power supply

<table>
<thead>
<tr>
<th>Part #</th>
<th>Load Current(A)</th>
<th>VOUT Range(V)</th>
<th>Package</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISL8272MBIRZ-T</td>
<td>50A</td>
<td>0.6 to 5.0</td>
<td>58L 18x23mm HDA Module</td>
</tr>
<tr>
<td>ISL8272MAIRZ-T</td>
<td>50A</td>
<td>0.6 to 5.0</td>
<td>58L 18x23mm HDA Module</td>
</tr>
</tbody>
</table>
ISL8277M – 25A Digital DC/DC PMBus Power Module
Servers, Telecom, Industrial/ATE and Networking Equipment, General Purpose Power

High Current Out
- 25A step-down PMBus compliant digital power module
- 25A of continuous output current can be delivered without a need of airflow or a heatsink
- Thermally-enhanced HDA package
- Monitor of \( V_{IN} \), \( V_{OUT} \), \( I_{OUT} \), temperature, duty cycle, switching frequency, and faults

Flexibility and Accuracy
- ±1.0% \( V_{OUT} \) accuracy over line, load, and temperature
- Wide input voltage range: 4.5V to 14V
- Programmable output voltage range: 0.6V to 5V
- Programmable \( V_{OUT} \), margining, UV/OV, \( I_{OUT} \) limit, soft-start/stop, sequencing, and external synchronization

<table>
<thead>
<tr>
<th>Part #</th>
<th>Load Current(A)</th>
<th>( V_{OUT} ) Range(V)</th>
<th>Package</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISL8277MAIRZ</td>
<td>25A</td>
<td>0.6 to 5.0</td>
<td>41L 17x19mm HDA Module</td>
</tr>
</tbody>
</table>
ISL85003 – Efficient 3A Synchronous Buck Regulator
Network and Communication Equipment, Industrial Control, Point-of-load Regulators

Flexible Power
- Input voltage range 4.5V to 18V
- Adjustable output voltage as low as 0.8V
- DCM/CCM

High Efficiency and Accuracy
- Efficiency up to 95%
- High-side NFET Rds(on) of 65mΩ and low-side NFET Rds(on) of 45mΩ
- Precision 0.8V, ±1% accurate voltage reference

Built-in Protection
- Positive and negative overcurrent protection
- Overvoltage and thermal protection

<table>
<thead>
<tr>
<th>Part #</th>
<th>External clock synchronization</th>
<th>Programmable soft start</th>
<th>Package</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISL85003FRZ</td>
<td>Yes</td>
<td>No</td>
<td>12L 3x4mm DFN</td>
</tr>
<tr>
<td>ISL85003AFRZ</td>
<td>No</td>
<td>Yes</td>
<td>12L 3x4mm DFN</td>
</tr>
</tbody>
</table>

Typical Application Circuit

Efficiency vs Load, 18V_{IN} DCM
ISL28022/23/25 – 60V, 0.05%, Bi-directional DPM
Precision Current, Voltage, Power sensing AFE with Real Time Alerts

Current, Voltage, Power Monitoring / Sensing
- Current Sense: High-side, Low-side, Bi-directional
- Wide Common-mode Input Voltage Range: 0V to 60V

High Precision
- 16 bit sigma delta ADC
- 0.05% Current and Voltage gain error (ISL28025)

Real-time Alerts
- Over/Under Voltage, Over Current Fault Monitoring
- Programmable delay

Integrated Features
- 3.3V Regulator
- Internal Temp Sensor (1°C accuracy)
- 8 bit DAC (ISL28023/25)

<table>
<thead>
<tr>
<th>Part #</th>
<th>CM V</th>
<th>Ch</th>
<th>DAC</th>
<th>I2C Add</th>
<th>Pkg</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISL28025FI60Z-T7A</td>
<td>60 V</td>
<td>2</td>
<td>No</td>
<td>55</td>
<td>16L 2x2 WLCSP</td>
</tr>
<tr>
<td>ISL28023FR60Z-T7A</td>
<td>60 V</td>
<td>2</td>
<td>Yes</td>
<td>55</td>
<td>24L 4x4 QFN</td>
</tr>
<tr>
<td>ISL28022FUZ-T7A</td>
<td>60 V</td>
<td>1</td>
<td>No</td>
<td>16</td>
<td>16L 3x3 QFN</td>
</tr>
</tbody>
</table>