



# CN214 Digital IC Burn-in System

February 2020

# Digital IC Burn-in System

## ■ Overview

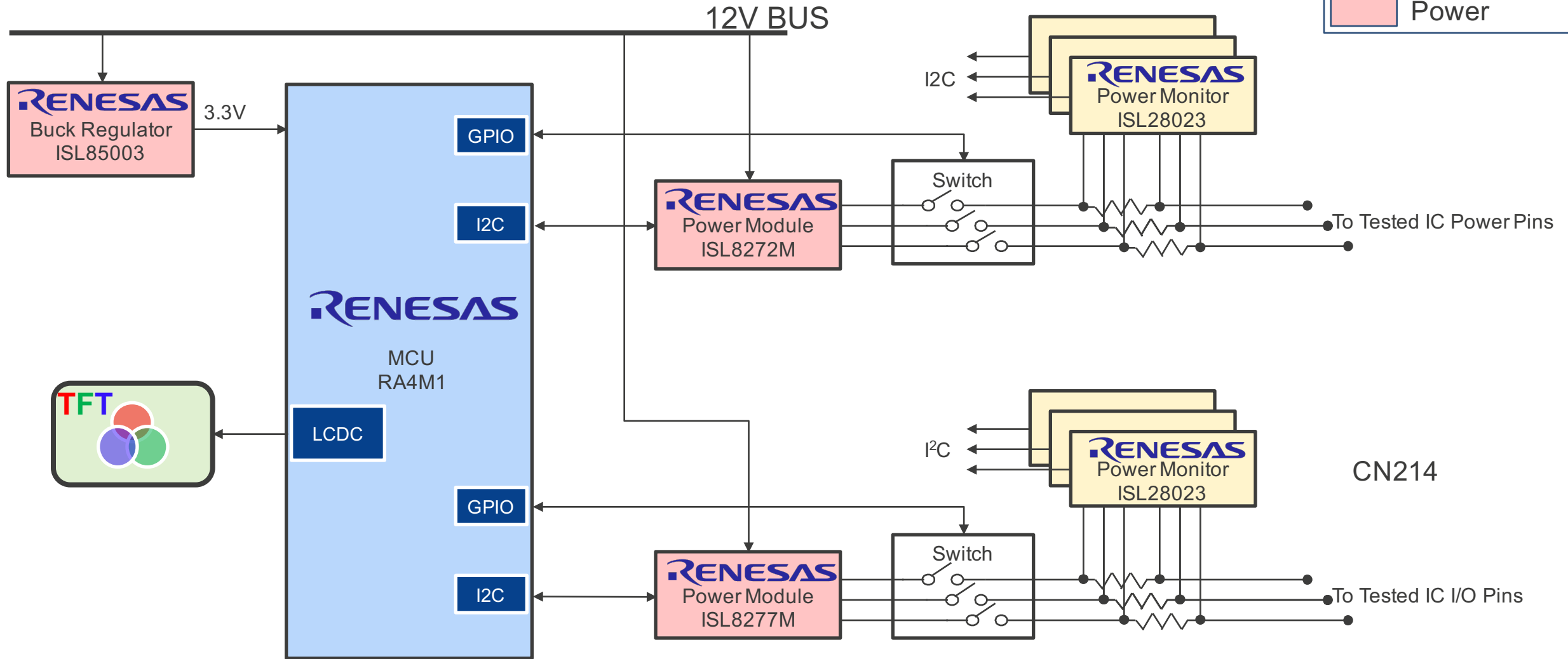
Renesas' Digital IC Burn-in System solution is based on a high-performance RA4 MCU, high performance power solutions, and power monitoring analog front-end ICs. The RA4 Arm®-based MCU could can fully meet your requirements for system control. The ISL8272M and ISL8277M high performance power modules provide 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

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Device Category	P/N	Key Features
MCU	RA4M1	48MHz Arm® Cortex®-M4 with LCD controller and cap touch for HMI
Power	ISL8272M	50A digital DC/DC PMBus power module
	ISL8277M	25A digital DC/DC PMBus power module
	ISL85003	Highly efficient 3A synchronous buck regulator
Analog	ISL28023	Precision digital power monitor with margining

Block Diagram #CN214  
Jan, 2020



# 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

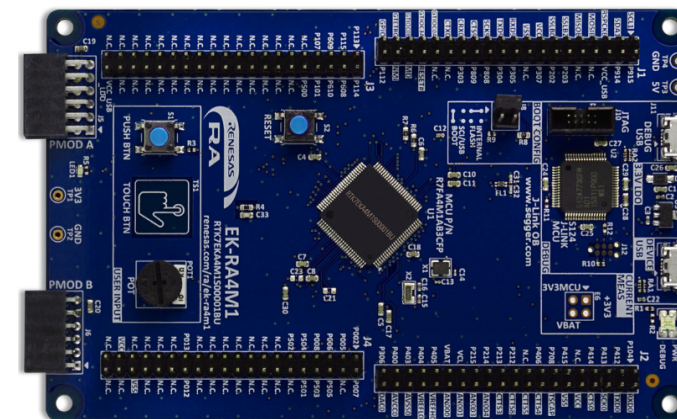
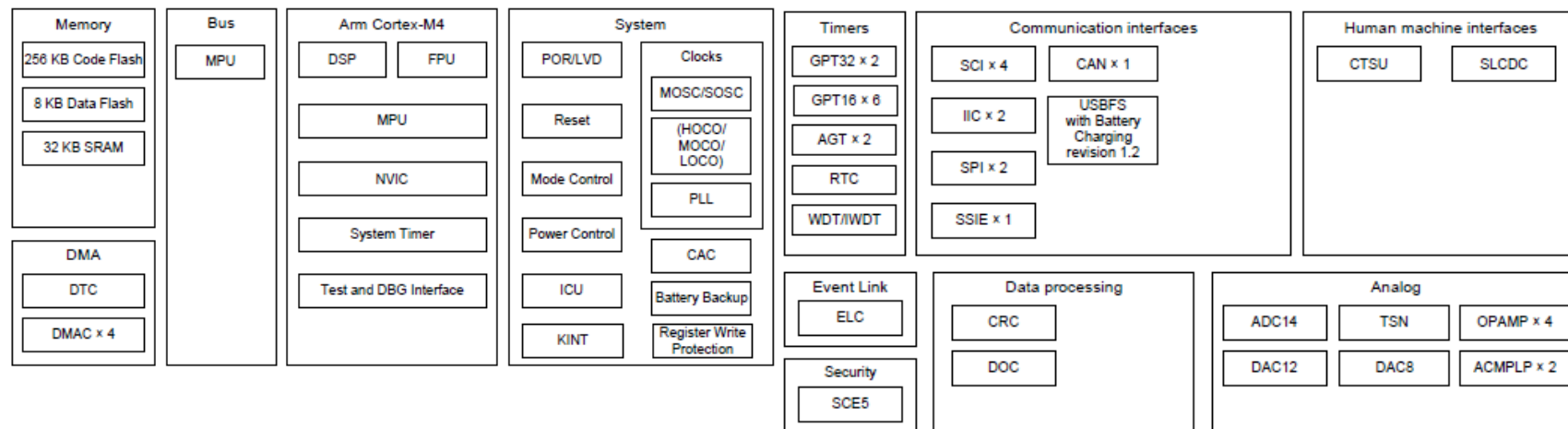
- USB 2.0 (Full Speed)
- CAN
- SCI x4/SPIx2/IICx2

## 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



RTK7EKA4M1S00001BU

Part #	Flash Memory	RAM	Temp	Package
<a href="#">R7FA4M1AB3CFP#AA0</a>	256KB	32KB	40 ~ 105°C	100 LQFP
R7FA4M1AB3CFM#AA0	256KB	32KB	40 ~ 105°C	64 LQFP

# ISL8272M – 50A Digital DC/DC PMBus Power Module

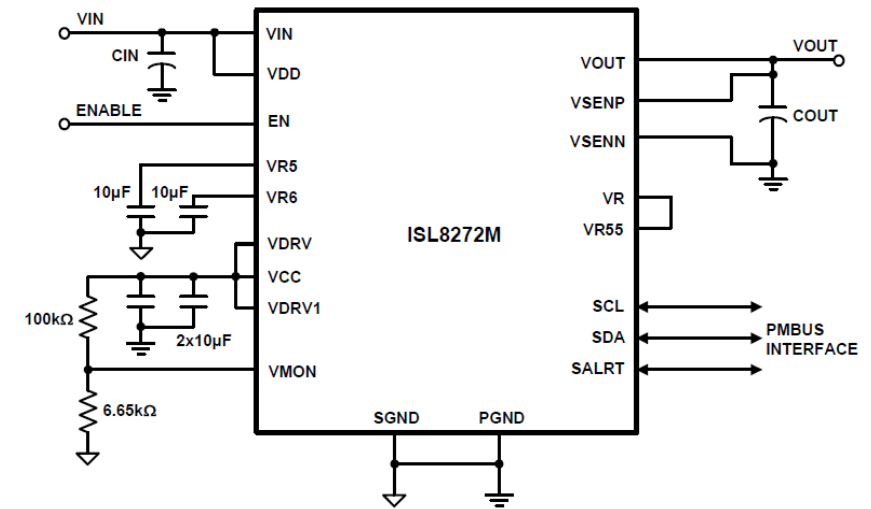
Servers, Telecom, Industrial/ ATE and Networking Equipment

## High Current Out

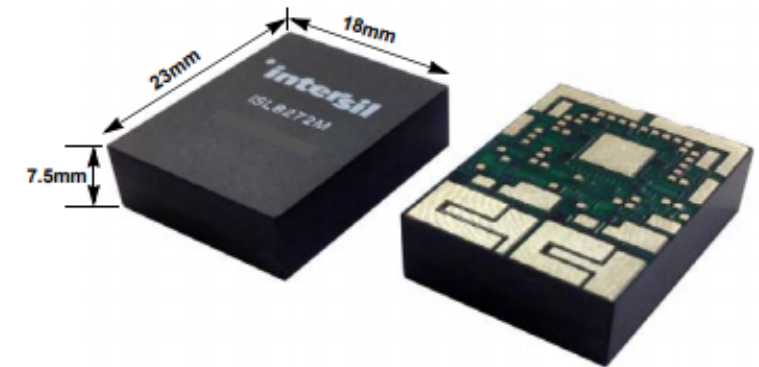
- 50A step-down PMBus compliant digital power module
- In current sharing configuration, four modules in parallel can deliver 200A continuous current
- Thermally-enhanced HDA package
- Monitor of VIN, VOUT, IOUT, temperature, duty cycle, switching frequency, power-good, and faults

## Flexibility and Accuracy

- $\pm 1.0\%$  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



Typical Application Circuit



Small Package for High Power Density

Part #	Load Current(A)	V <sub>OUT</sub> Range(V)	Package
ISL8272MBIRZ-T	50A	0.6 to 5.0	58L 18x23mm HDA Module
<a href="#">ISL8272MAIRZ-T</a>	50A	0.6 to 5.0	58L 18x23mm HDA Module

# ISL8277M – 25A Digital DC/DC PMBus Power Module

## Servers, Telecom, Industrial/ ATE and Networking Equipment, General Purpose Power

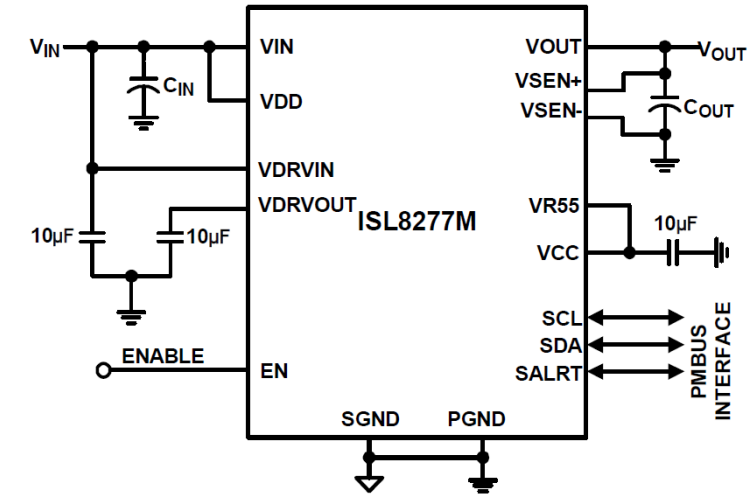
### High Current Out

- 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

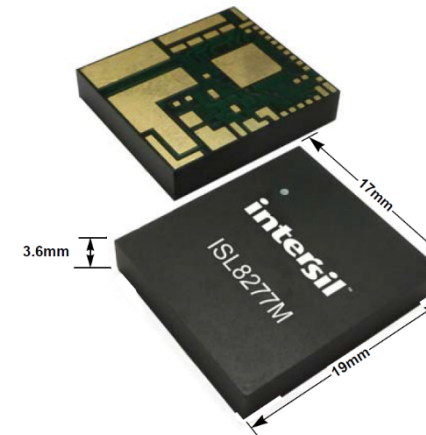
### Flexibility and Accuracy

- $\pm 1.0\%$   $V_{OUT}$  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

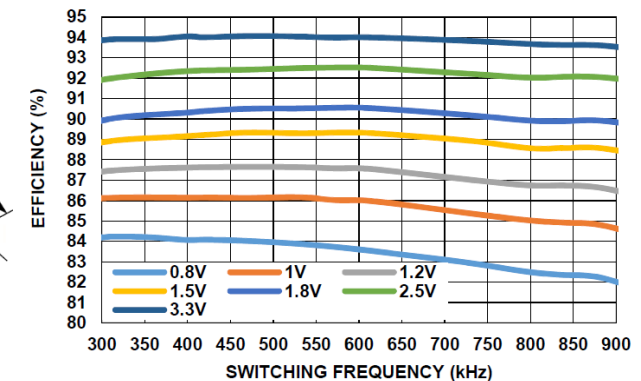
Part #	Load Current(A)	$V_{OUT}$ Range(V)	Package
ISL8277MAIRZ	25A	0.6 to 5.0	41L 17x19mm HDA Module



Typical Application Circuit



Small Package for High Power Density



Efficiency vs Switching Freq at  $V_{IN} = 5V$ ,  $I_{OUT} = 25A$  for Various Output Voltages

# 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

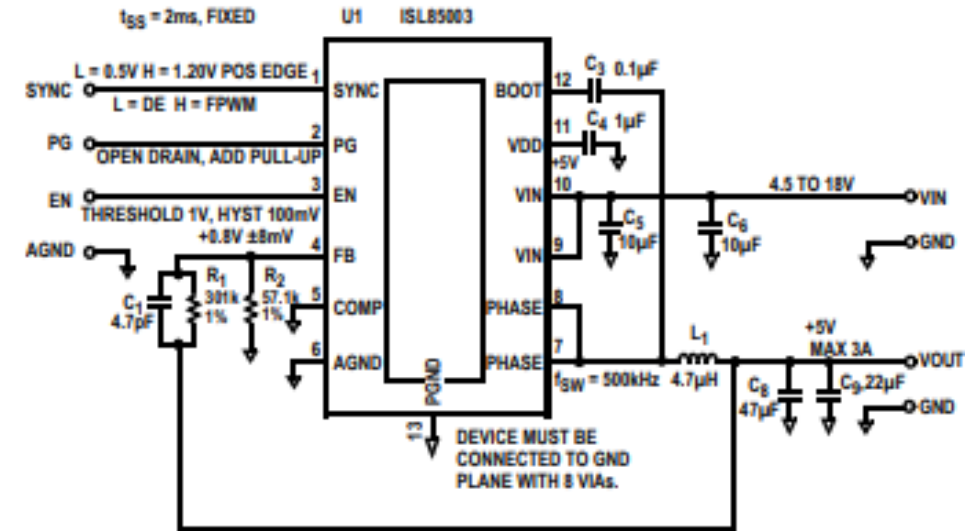
### High Efficiency and Accuracy

- Efficiency up to 95%
- High-side NFET  $R_{ds(on)}$  of 65m $\Omega$  and low-side NFET  $R_{ds(on)}$  of 45m $\Omega$
- Precision 0.8V,  $\pm 1\%$  accurate voltage reference

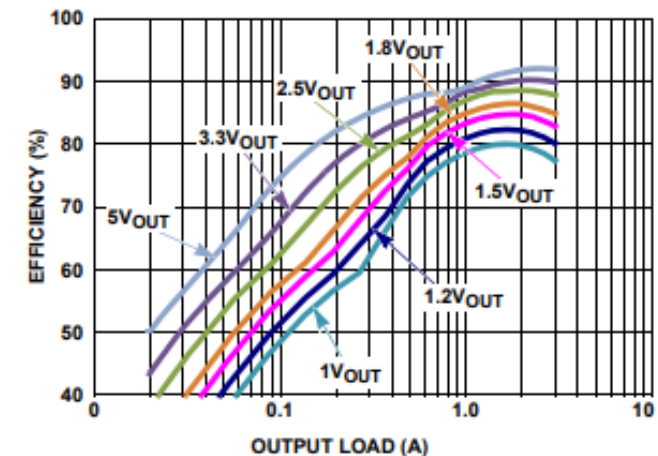
### Built-in Protection

- Positive and negative overcurrent protection
- Overvoltage and thermal protection

Part #	External clock synchronization	Programmable soft start	Package
<a href="#">ISL85003FRZ</a>	Yes	No	12L 3x4mm DFN
ISL85003AFRZ	No	Yes	12L 3x4mm DFN



Typical Application Circuit



Efficiency vs Load, 18V<sub>IN</sub> 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

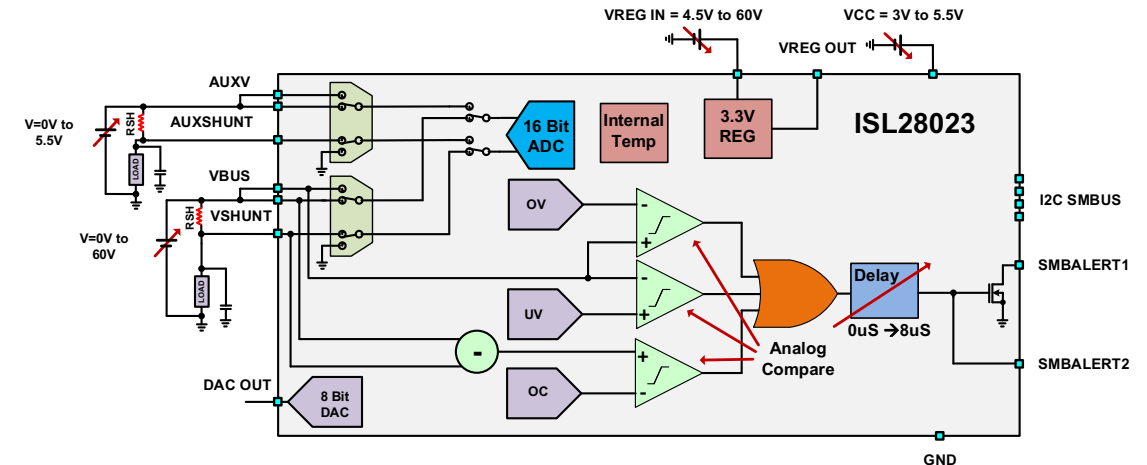
- 16 bit sigma delta ADC
- 0.05% Current and Voltage gain error (ISL28025)

### Real-time Alerts

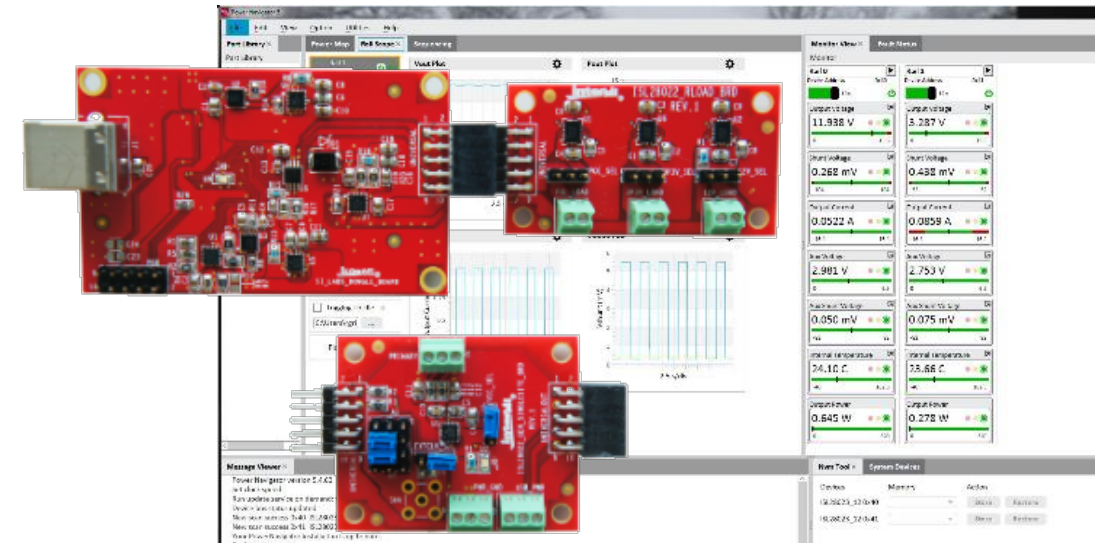
- Over/Under Voltage, Over Current Fault Monitoring
- Programmable delay

### Integrated Features

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



Typical Operating Circuit



Evaluation Kit

Part #	CM V	Ch	DAC	I2C Add	Pkg
ISL28025FI60Z-T7A	60 V	2	No	55	16L 2x2 WLCSP
<a href="#">ISL28023FR60Z-T7A</a>	60 V	2	Yes	55	24L 4x4 QFN
ISL28022FUZ-T7A	60 V	1	No	16	16L 3x3 QFN

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[Renesas.com](https://www.renesas.com)