The Future of Power Management

Discover nPM1300 Power Management IC (PMIC)

Nordic Semiconductor

July 2023

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Today's host

Geir Kjosavik

Product Director, Power Management

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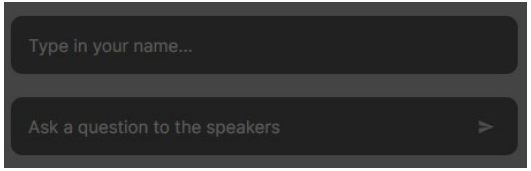
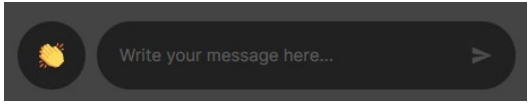
Practicalities

- Duration: 50 min presentation, 10 min Q&A
- Questions are encouraged!
  - Please type questions on the top of the right sidebar
  - All questions are anonymous
  - Try to keep them relevant to the topic
  - We will answer them toward the end
- The chat on the bottom of the right sidebar is not anonymous, and it should not be used for questions.
- Go to DevZone if you have more questions
- A recording of the webinar will be available together with the presentation at webinars.nordicsemi.com/on-demand





{ DevZone

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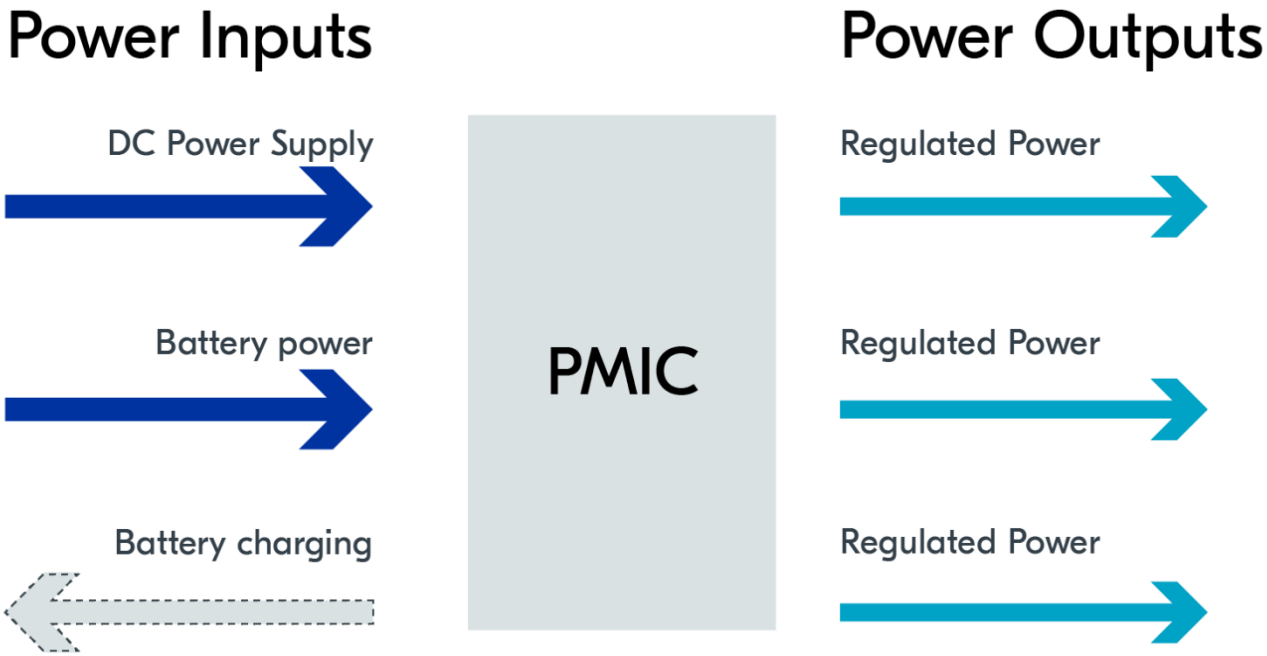
What is Power Management?



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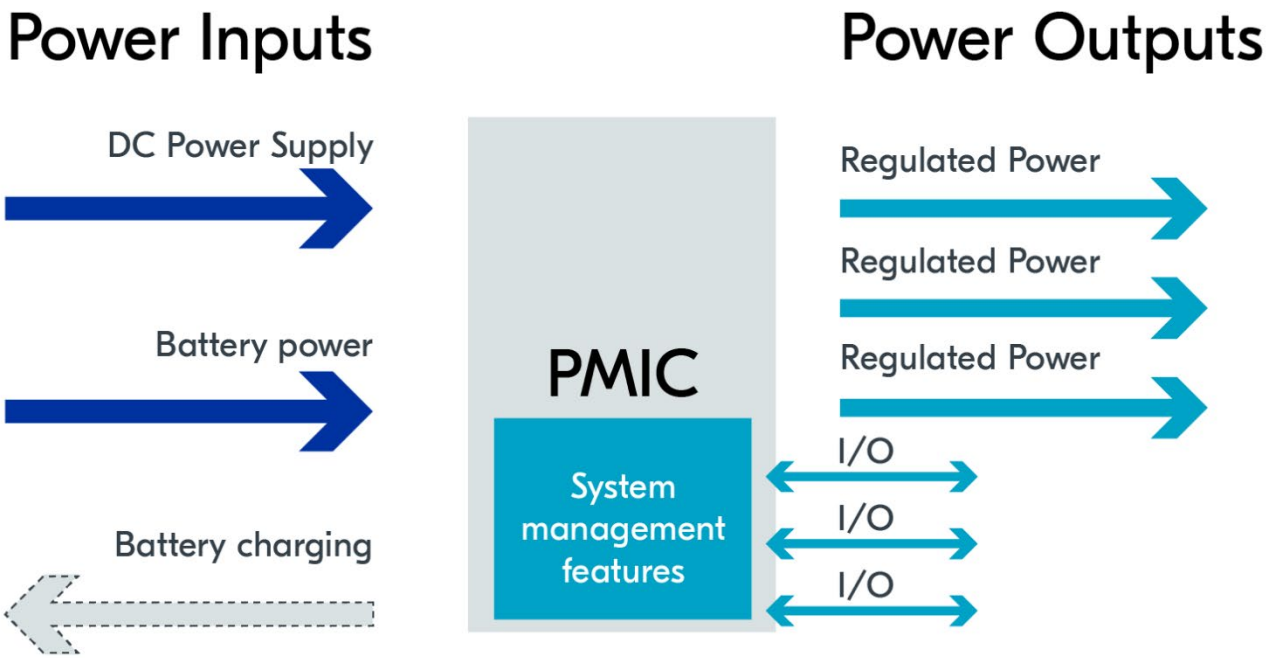
Next Generation Power Management



The One PMIC
To rule them all

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Customer requirements drive complexity

- Reset and recover functions
- Long battery life
- Fast charging
- Accurate battery level over temperature
- Unboxing ready to use

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So you'll need....

Charger IC + Power Regulation + Fuel Gauge + External Watchdog + Hard Reset IC

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...this!

nPM1300

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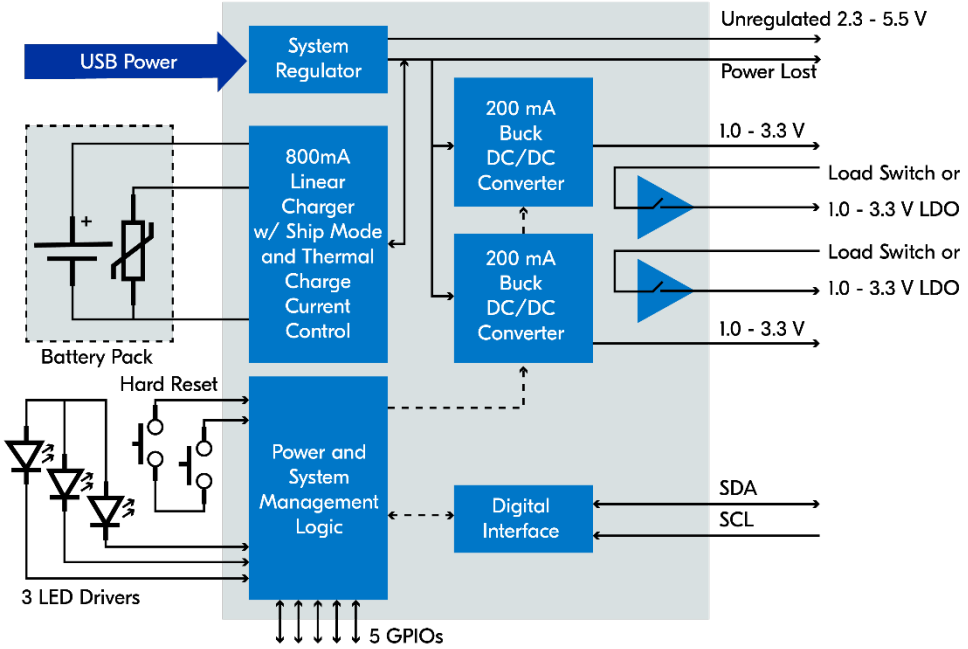
nPM1300

Ultra-high efficiency

Unique system management features

Accurate, ultra-low-power fuel gauge



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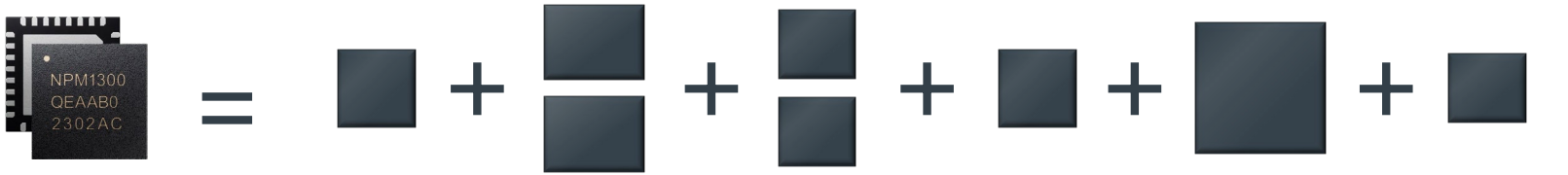
We took care of the complexity...



PMIC

Charger IC

2xBuck DC/DC

2xLoad Switch

Fuel Gauge

External Watchdog

Hard Reset IC

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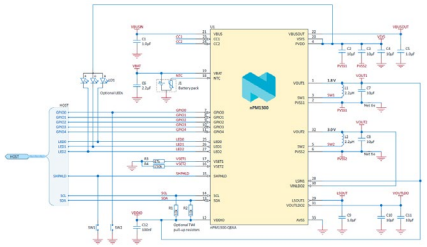
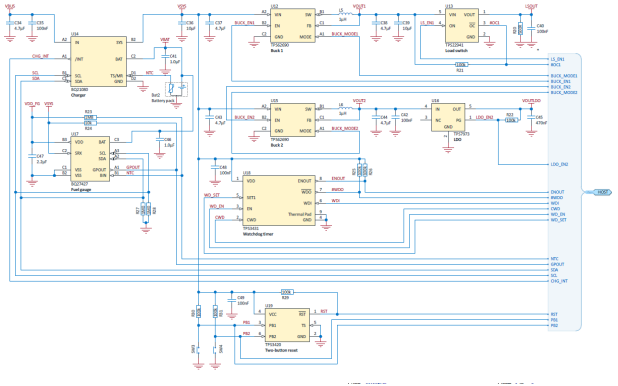
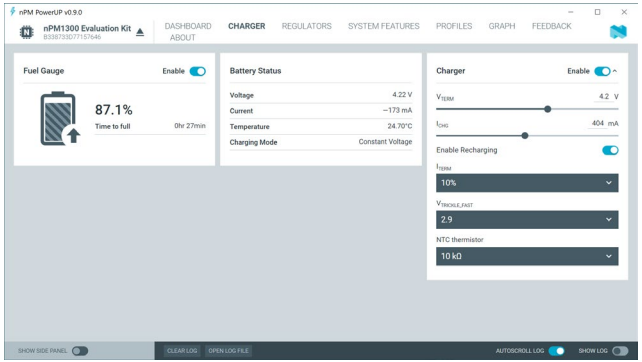
...so you don't have to



... vs ...





Register Name	Address	Current Value	15	14	13	12	11	10	9	8	7	6	5	4
STAT0	0x00	00	-	-	-	-	-	-	-	-	0	0	0	0
STAT1	0x01	0	-	-	-	-	-	-	-	-	0	0	0	0
STAT2	0x02	0	-	-	-	-	-	-	-	-	0	0	0	0
FLAG0	0x03	0	-	-	-	-	-	-	-	-	0	0	0	0
FLAG1	0x04	0	-	-	-	-	-	-	-	-	0	0	0	0
FLAG2	0x05	0	-	-	-	-	-	-	-	-	0	0	0	0
FLAG3	0x06	00	-	-	-	-	-	-	-	-	0	0	0	0
MASK0	0x07	00	-	-	-	-	-	-	-	-	0	0	0	0
MASK1	0x08	0	-	-	-	-	-	-	-	-	0	0	0	0
MASK2	0x09	0	-	-	-	-	-	-	-	-	0	0	0	0
MASK3	0x0A	0	-	-	-	-	-	-	-	-	0	0	0	0
VBAT_CTRL	0x12	0	-	-	-	-	-	-	-	-	0	0	0	0
ICHG_CTRL	0x13	0	-	-	-	-	-	-	-	-	0	0	0	0
PCHRGCTRL	0x14	0	-	-	-	-	-	-	-	-	0	0	0	0
TERMCTRL	0x15	0	-	-	-	-	-	-	-	-	0	0	0	0
BUVLO	0x16	0	-	-	-	-	-	-	-	-	0	0	0	0
CHARGERCTRL0	0x17	0	-	-	-	-	-	-	-	-	0	0	0	0
CHARGERCTRL1	0x18	0	-	-	-	-	-	-	-	-	0	0	0	0
ILIMCTRL	0x19	0	-	-	-	-	-	-	-	-	0	0	0	0

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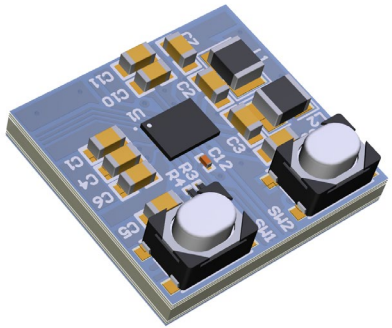
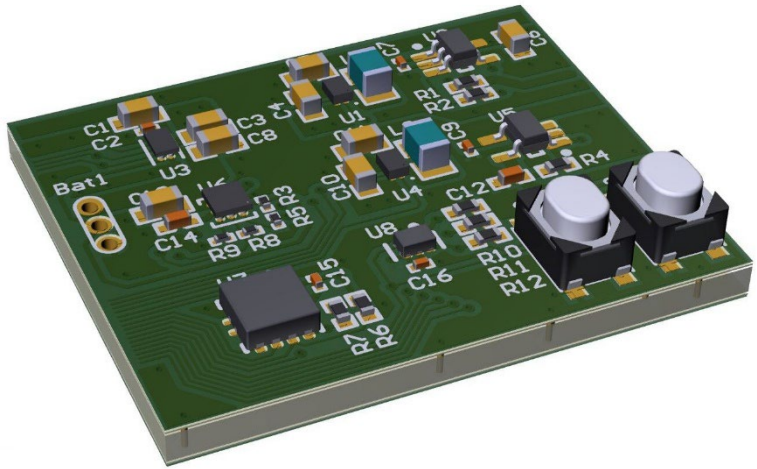
Which one do you prefer?





Still lacking a lot of functionality…

nPM1300

A quick overview

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Power Management

Two buck converters

Two load switches

Battery charger

USB-C input compatible

Ship mode

Fuel gauge

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System Management

Recovery from failed boot

Hard reset

Hibernate

Watchdog timer

Power Loss warning

5x GPIOs

3x LED Drivers

Configurable through TWI

USB-C CC-pins

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The most intelligent PMIC on the market

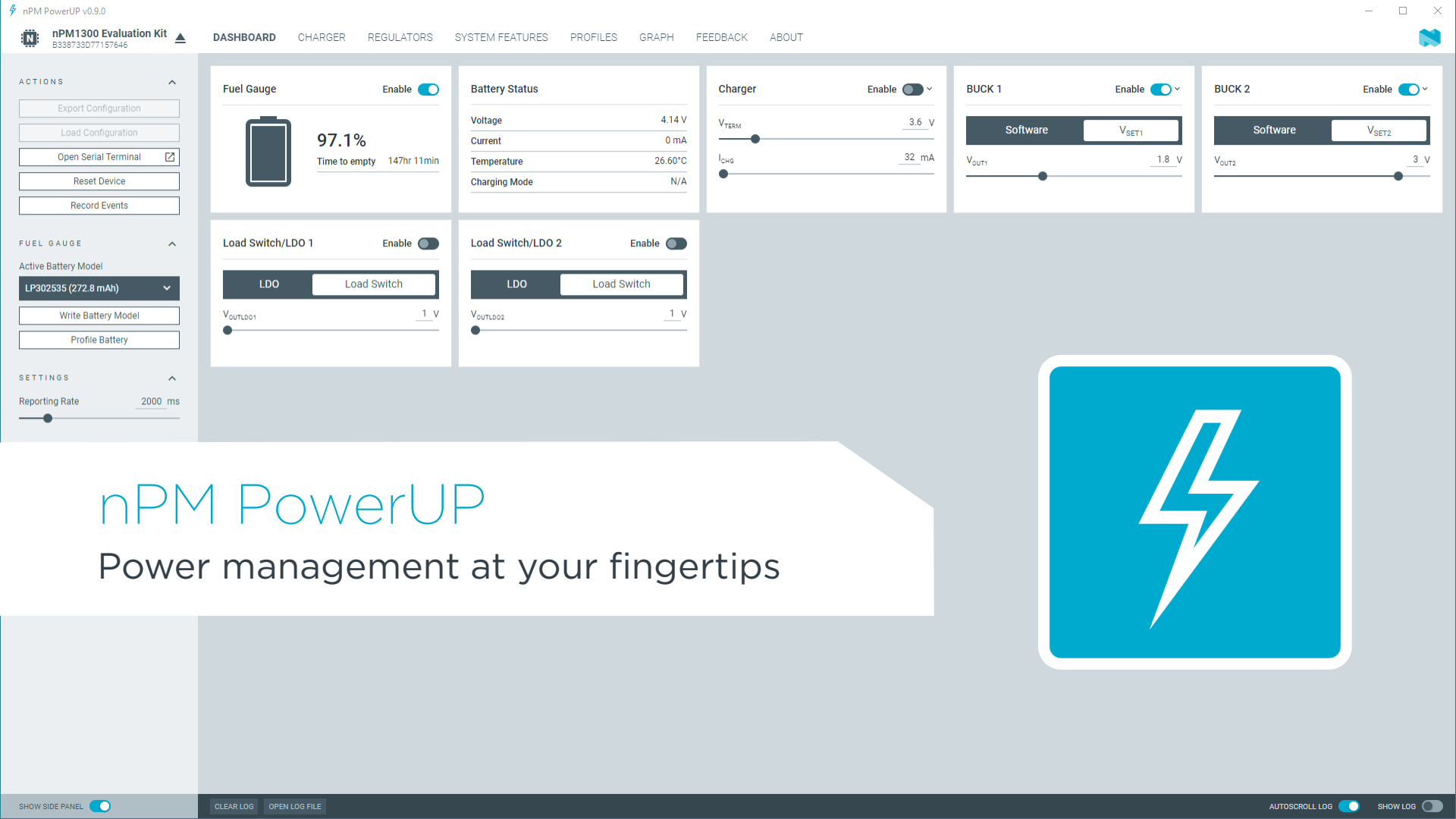
Failed boot recovery – Power cycle devices that hang before the watchdog is enabled

Hard reset – Use one or two buttons to power cycle a frozen device

Hibernate – Run a timer at nA currents until it's time to wake up

Watchdog timer – Adds an extra layer of protection

Power Loss Warning – Get to know when the power is about to fail


nPM PowerUP v0.9.0
nPM1300 Evaluation Kit
B338733D77157646
DASHBOARD
CHARGER
REGULATORS
SYSTEM FEATURES
PROFILES
GRAPH
FEEDBACK
ABOUT
ACTIONS
Export Configuration
Load Configuration
Open Serial Terminal
Reset Device
Record Events
FUEL GAUGE
Active Battery Model
LP302535 (272.8 mAh)
Write Battery Model
Profile Battery
SETTINGS
Reporting Rate
2000 ms
Fuel Gauge
Enable
97.1%
Time to empty
147hr 11min
Battery Status
Voltage
4.14 V
Current
0 mA
Temperature
26.60°C
Charging Mode
N/A
Charger
Enable
VTERM
3.6 V
ICHG
32 mA
BUCK 1
Enable
Software
VSET1
VOUT1
1.8 V
BUCK 2
Enable
Software
VSET2
VOUT2
3 V
Load Switch/LDO 1
Enable
LDO
Load Switch
VOUTLDO1
1 V
Load Switch/LDO 2
Enable
LDO
Load Switch
VOUTLDO2
1 V
nPM PowerUP
Power management at your fingertips
SHOW SIDE PANEL
CLEAR LOG
OPEN LOG FILE
AUTOSCROLL LOG
SHOW LOG

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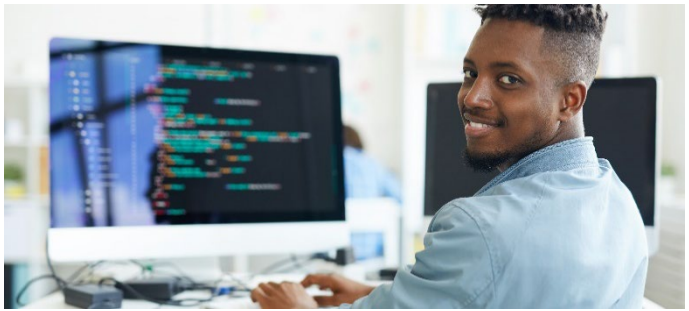
Quality of life for everyone!

No need to write code

For the Hardware Designer

No need to study datasheets



For the Software Developer

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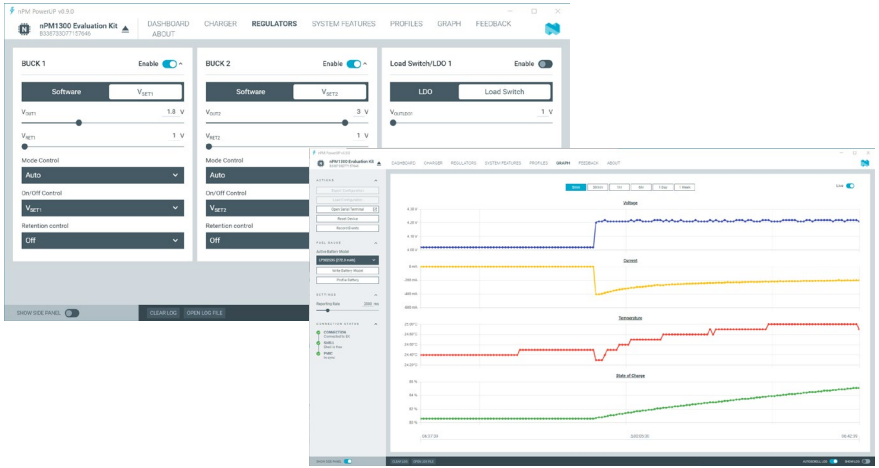
Ease-of-use

Intuitive GUI



Complete integration

Configure → Export → Implement

Fuel Gauge

Enable

87.1%

Time to full 0hr 27min

Battery Status

Voltage	4.22 V
Current	−173 mA
Temperature	24.70°C
Charging Mode	Constant Voltage

Charger

Enable

V_{TERM} 4.2 V

I_{CHG} 404 mA

Enable Recharging

I_{TERM}

10%

$V_{TRICKLE_FAST}$

2.9

NTC thermistor

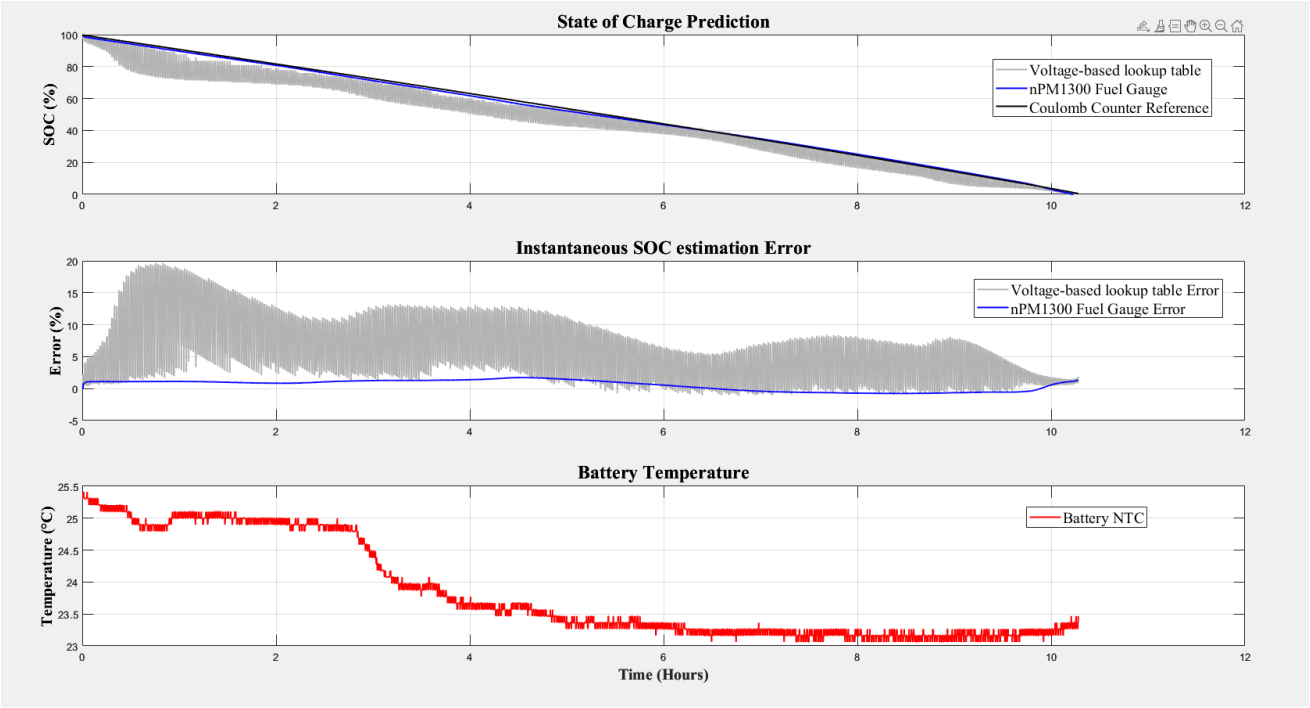
10 kΩ

Fuel gauge

Highly accurate and easy to use

© Nordic Semiconductor

Fuel gauge at room temperature



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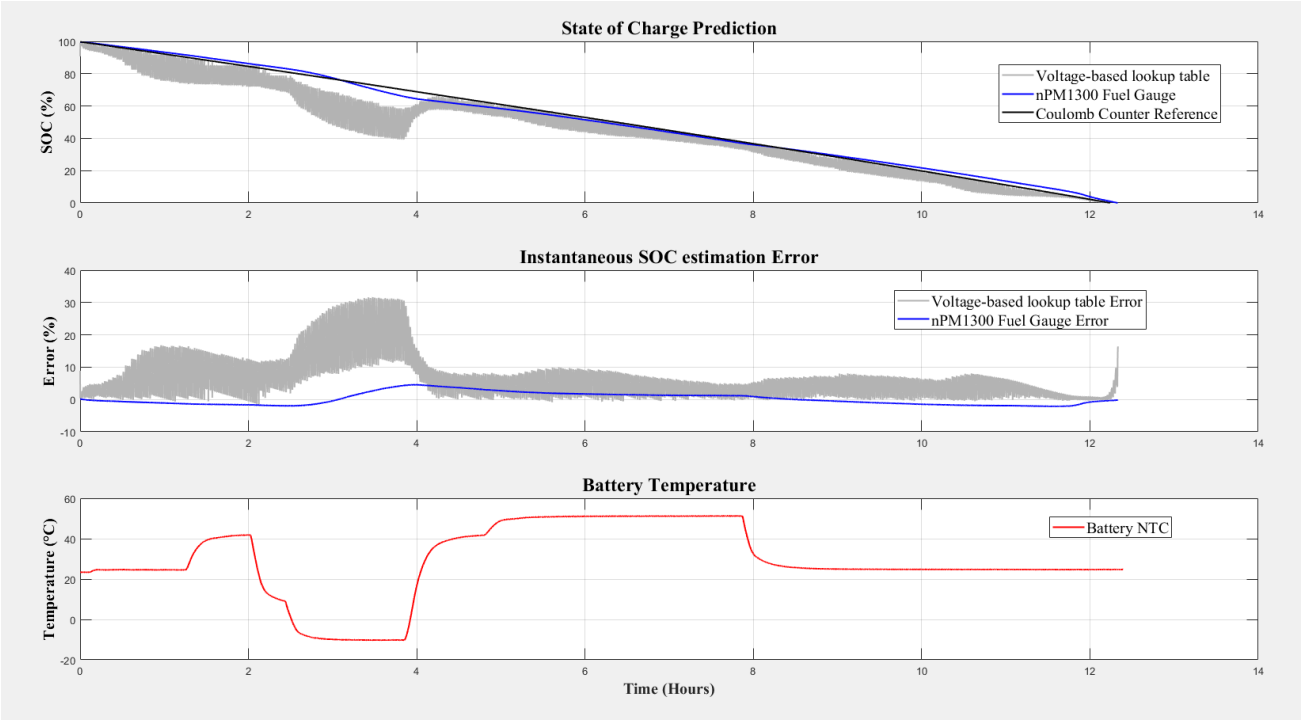
Fuel gauge accuracy with large temp swings



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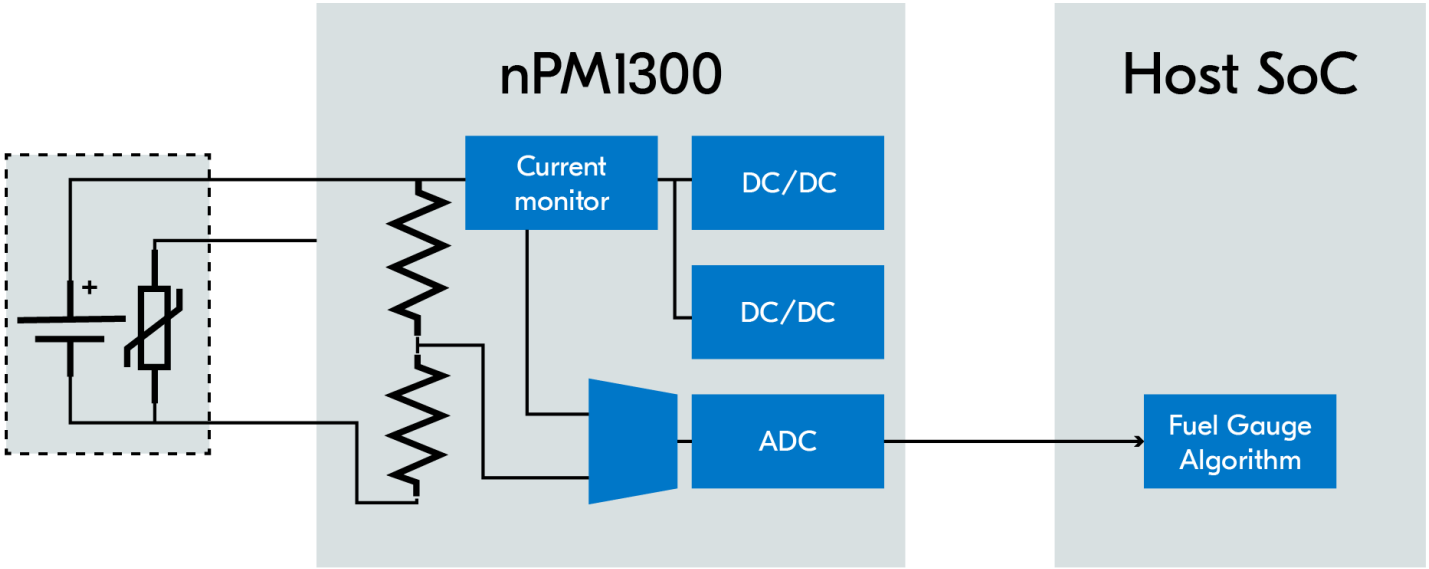
Fuel gauge principle



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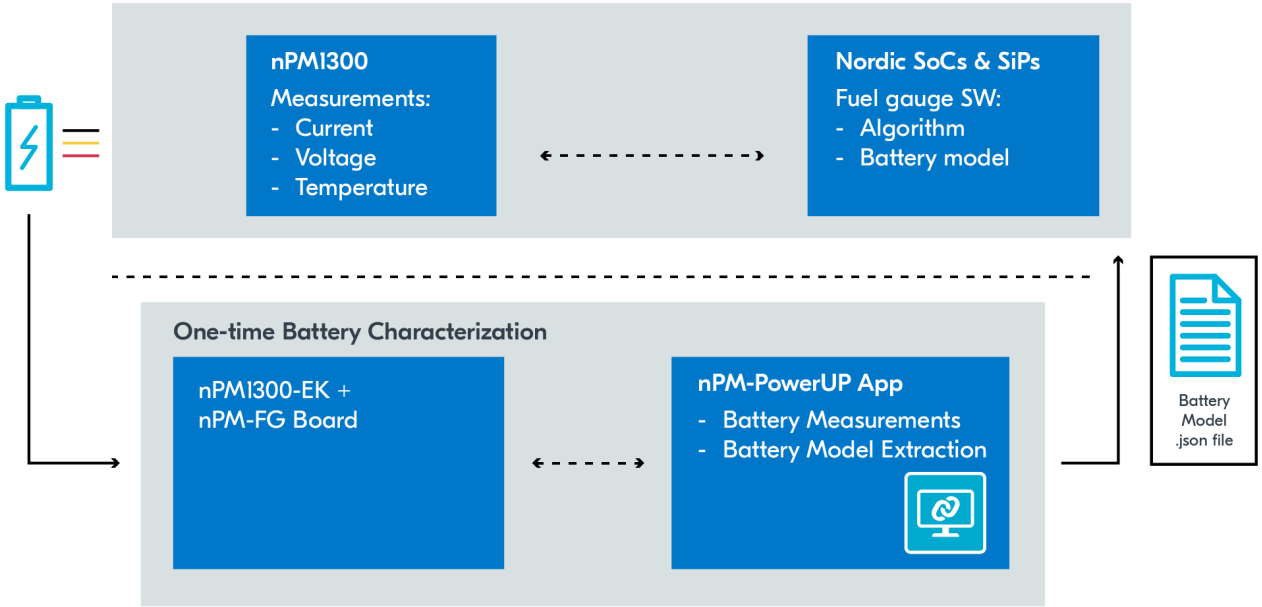
Nordic fuel gauge system



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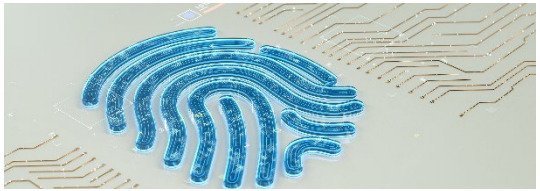
Summary



Unique system management features

Easy-to-use, code-free development software

The ideal companion to Nordic SoCs and SiPs

Q&A

Get on it

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#2 Get tech support and join our community at **devzone.nordicsemi.com**

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