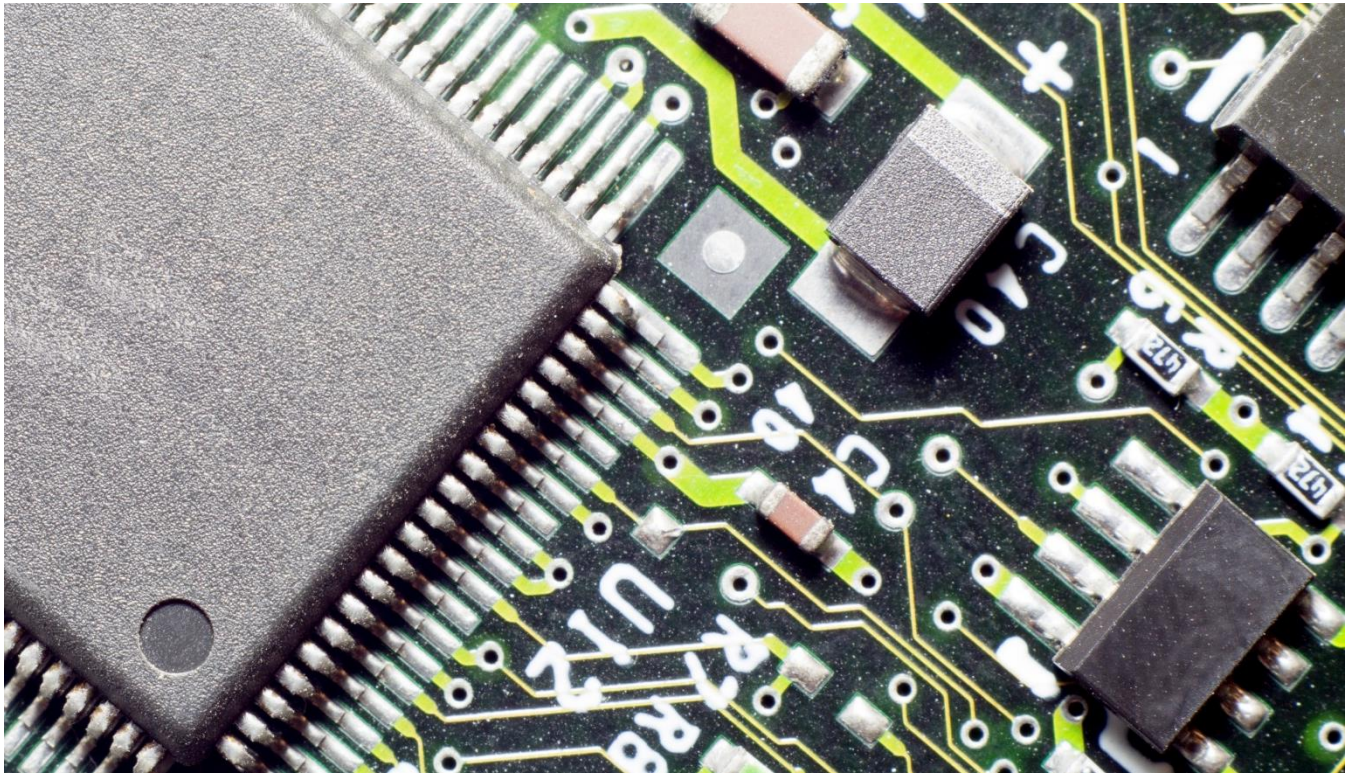
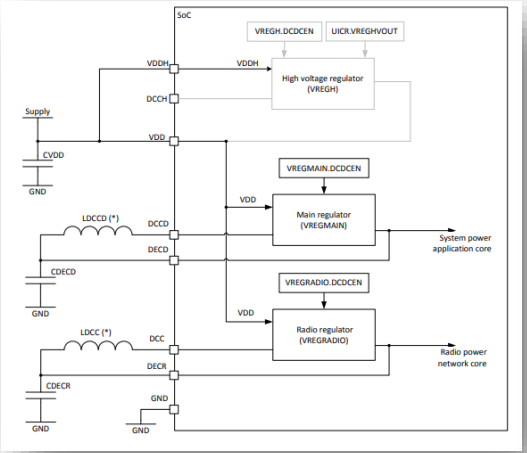
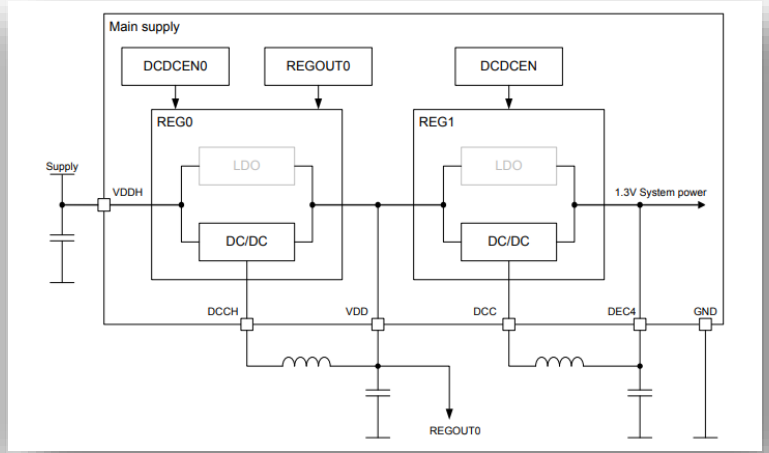
So many components, so little space …



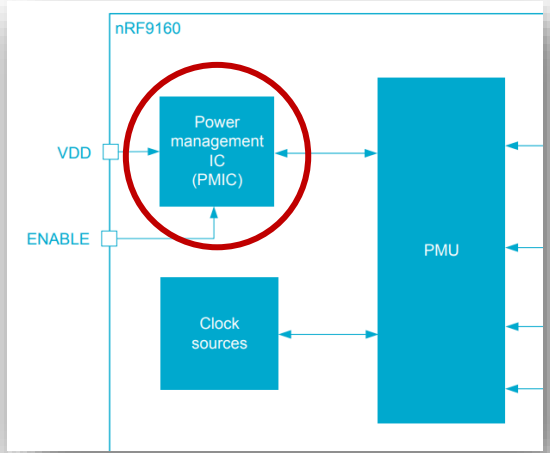
Nordic's Been a PMIC Company for a While



nRF52840



nRF5340



nRF9160

Now is the time to unleash the potential of 180nm

Wireless + Portable = Battery

nPM FAMILY

nRF 53 SERIES

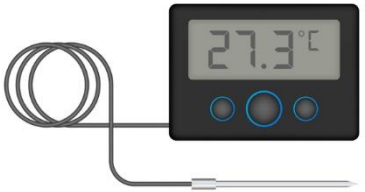
nRF 52 SERIES

Anything Small and Rechargeable

Remote control

Fitness tracker

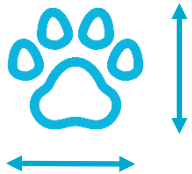
Personal medical devices



Portable sensors

nPM1100 Highlights

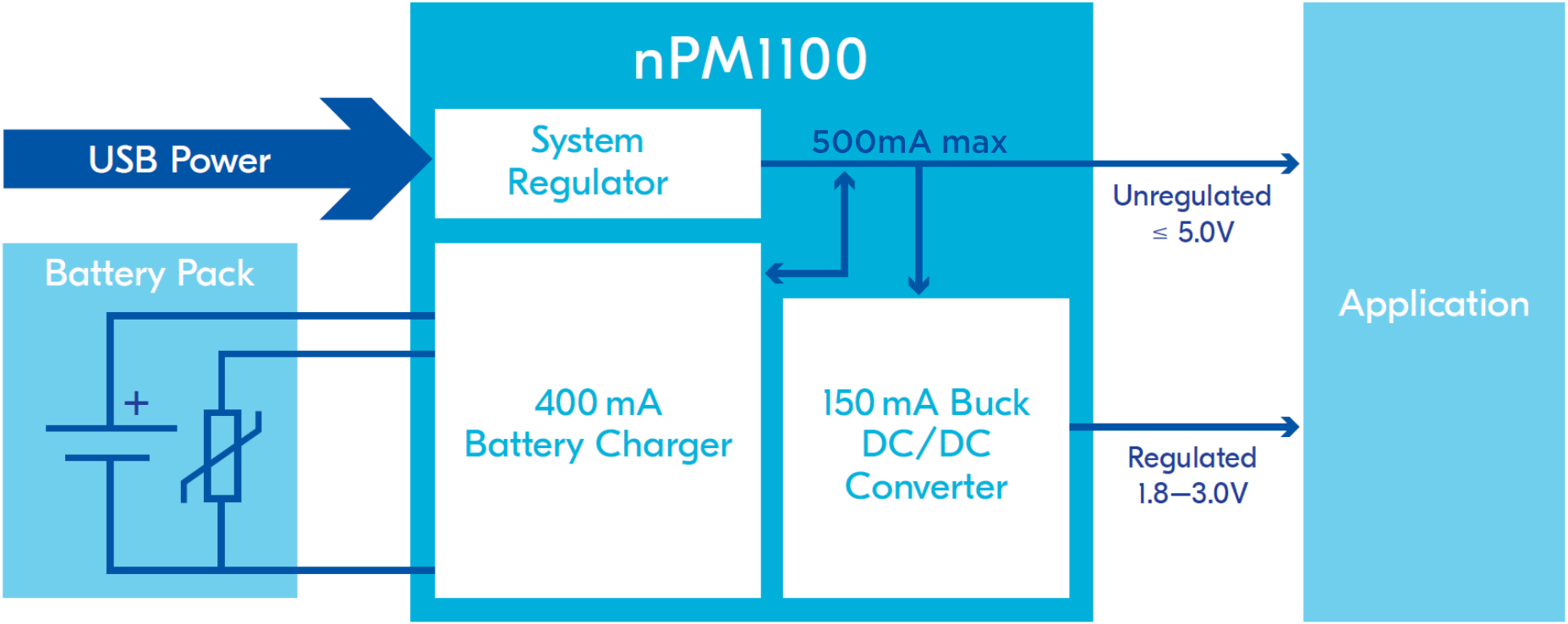
1. Small footprint: Only 23mm^2 PCB area including passives in most compact configuration



2. Inductorless 400mA single-cell Li-Ion or Li-Po charger

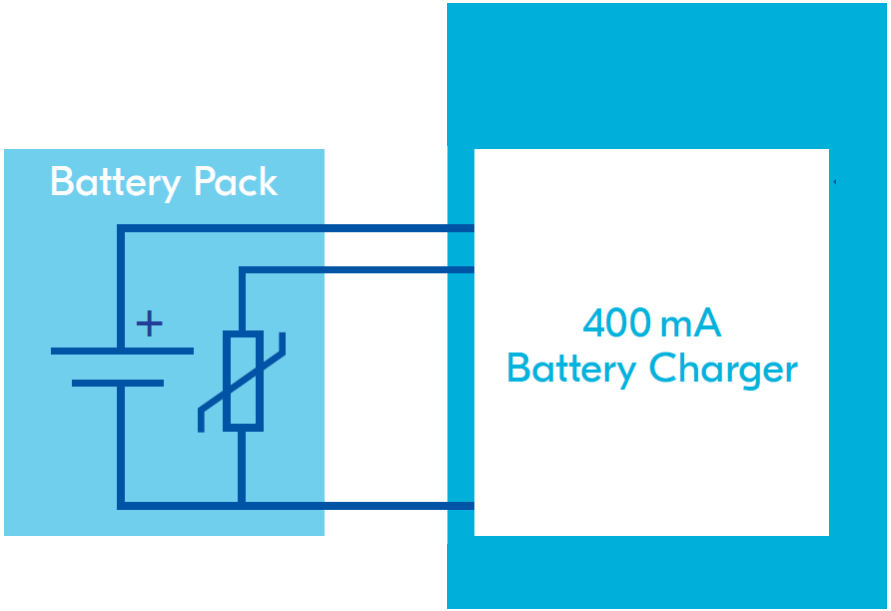
3. Two power outputs:
   - Unregulated
   - 150mA highly efficient buck DC/DC

nPM1100 Block Diagram



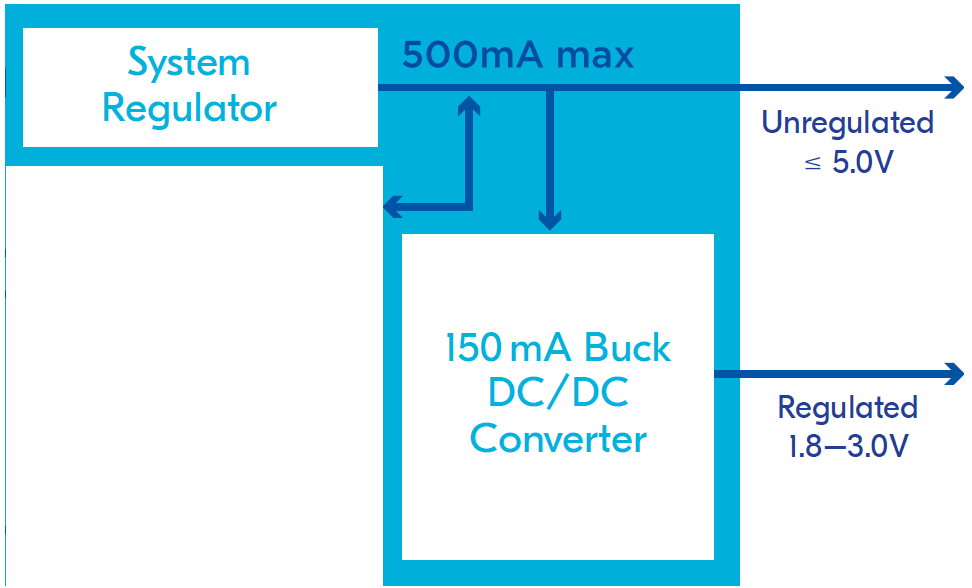
nPM1100 Battery Charger

- 3.6 or 3.7 V Li-ion or Li-Polymer batteries
  - 4.1 or 4.2 V termination voltage
- 400mA max current
  - Charges a 400mAh battery at 1C (1+ hour charge time 0-100%)
- JEITA compliant
- Thermal protection

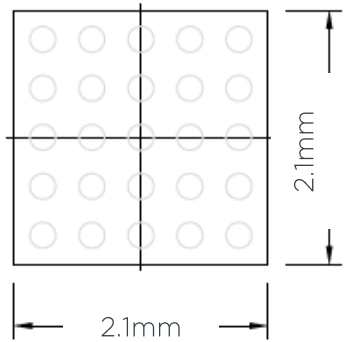


nPM1100 Power Supply

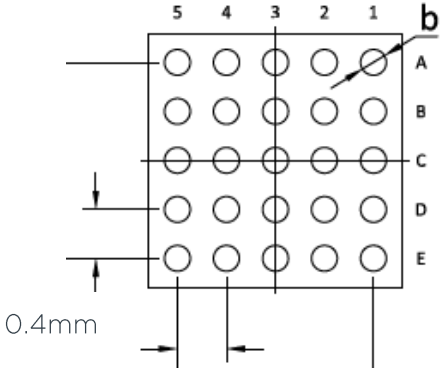
- Buck regulator
  - Highly efficient – up to 92%
  - Dual mode: PWM or hysteretic
    - Auto + Force PWM
  - 4 selectable voltages:
    1.8, 2.1, 2.7, 3.0 V
  - 150 mA current limit



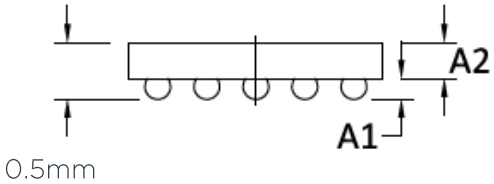
Packaging



TOP VIEW

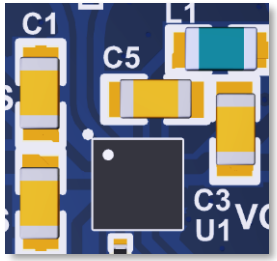


BOTTOM VIEW



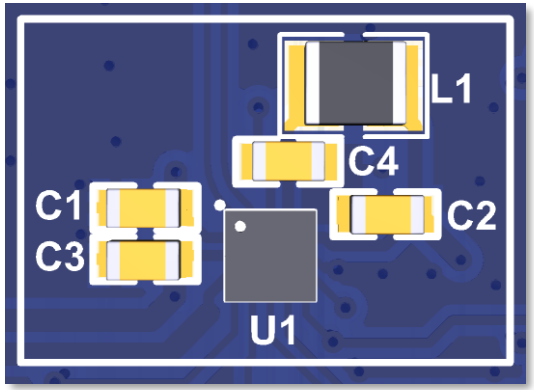
SIDE VIEW

Size / Performance Trade-Off



Size Optimized

- Up to 88% DC/DC efficiency
- 23mm^2 PCB area

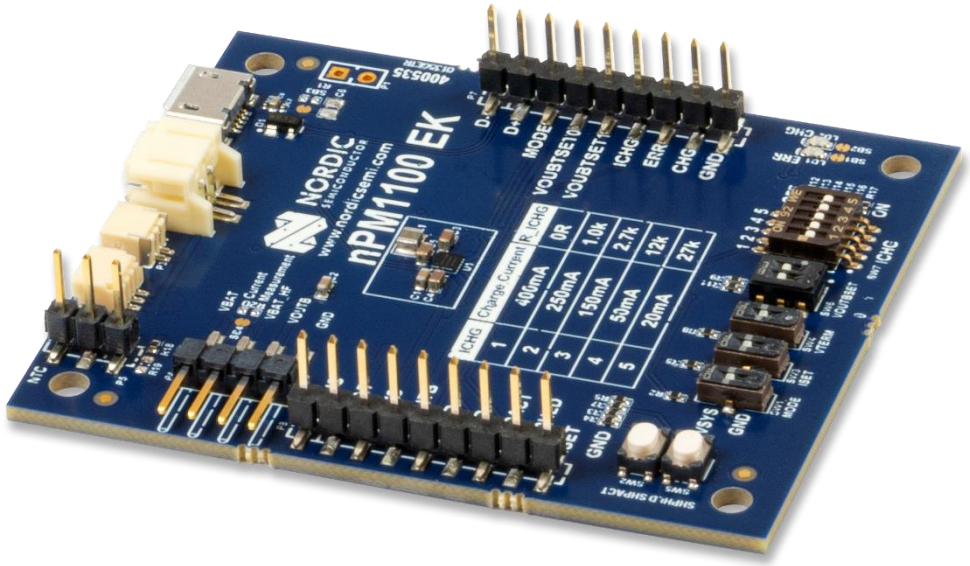


Performance Optimized

- Up to 92% DC/DC efficiency
- 27mm^2 PCB area

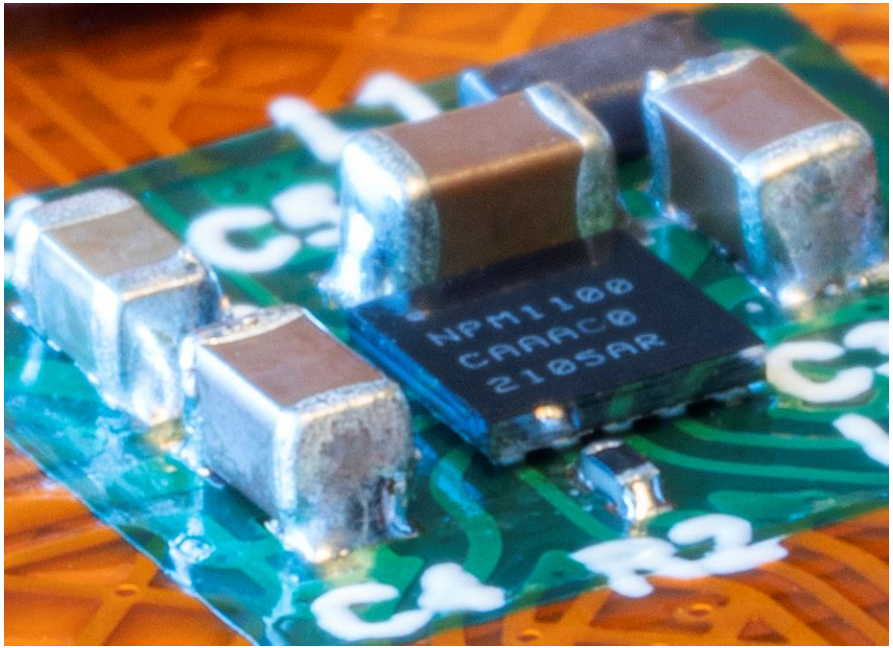
nPM100 Evaluation Kit

- nPM1100 in performance optimized configuration
- Allows for use with any nRF52® or nRF53® Series development kit
- Access to all functions and DIP-switches controls all configurations
- Supports current measurements through the Power Profiler Kit (PPK)

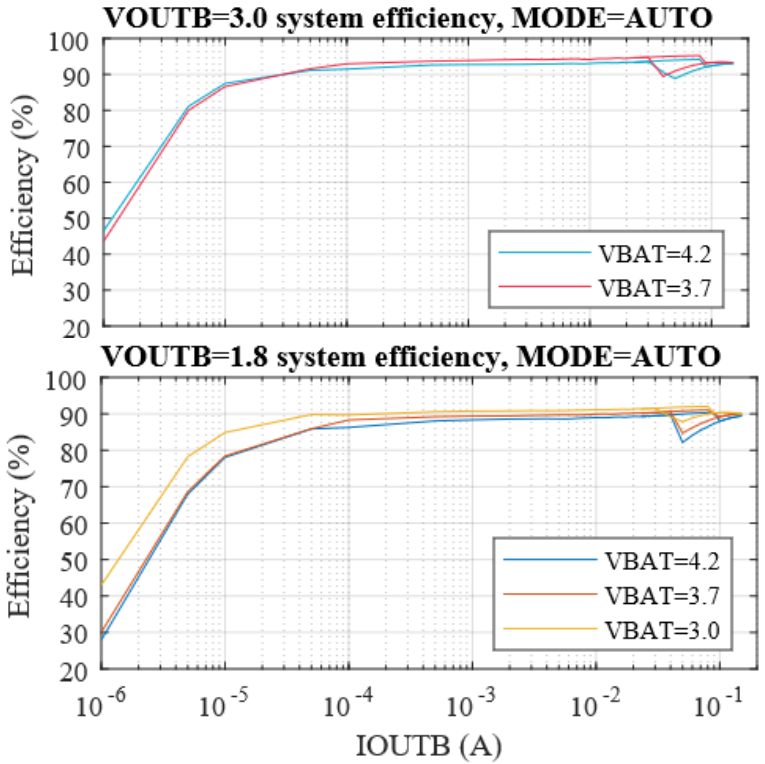


Unbeatable Combo

Small Size



High Efficiency



Case Study – Fitness Tracker Redesign

- 151mAh battery
- Time between each charge: 48 hours
- Average battery current draw:
  151mAh / 48 = 3.14 mA @ 1.8V
- PMIC: TI BQ25150
- Redesign challenge. Increase battery life by at least 36 hrs to 84 hrs or more

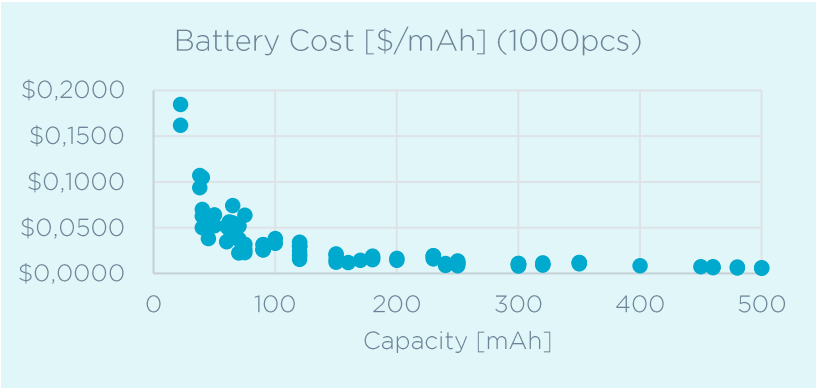
Supplier	Model	Digikey 1K price	Inductor cost	Regulator	Board space
TI	BQ25150	$1.70	$0.00	LDO	12mm^2
Nordic	nPM1100	$1.73	$0.10	DCDC	23mm^2

Using nPM1100 to Extend Battery Life

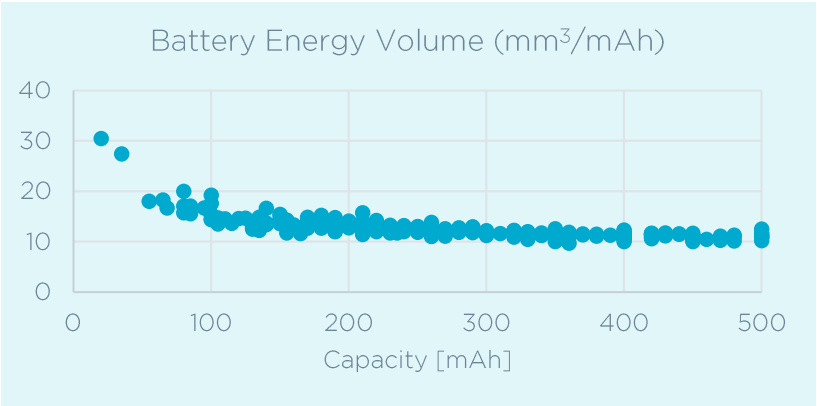
Supplier	Model	Application current	Battery current	Efficiency	Battery Life
TI	BQ25150	3.14mA @1.8V	3.14mA @3.7V	45%	48hrs
Nordic	nPM1100	3.14mA @1.8V	1.74mA @3.7V	88%	87hrs

- 81% longer battery life
- Cost:
  - ~11 mm3 extra volume (assuming flex PCB)
  - $0.13 component cost

… vs the Cost of Throwing mAh at the Problem



Supplier	Model	$ cost of 87hr battery life
TI	BQ25150	$0.31
Nordic	nPM1100	$0.13

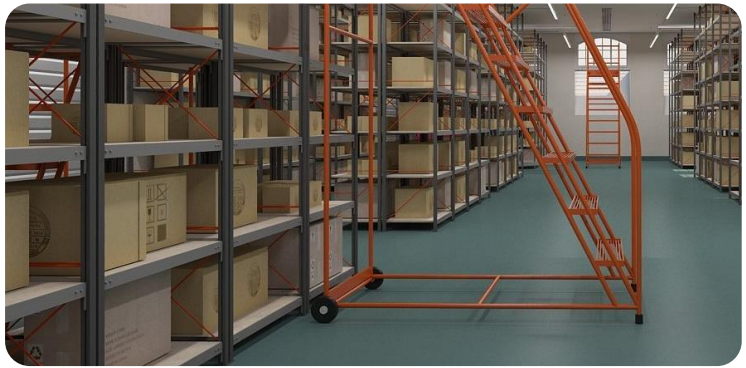


Supplier	Model	Volume cost of 87hr battery life
TI	BQ25150	960 mm^3
Nordic	nPM1100	11 mm^3

Sources: https://lipolbattery.com/lithium%20polymer%20battery.html https://www.powerstream.com/li-pol.htm

What About Ship Mode?

- Sleep mode nano amps is the new "megapixels"
- Fitness tracker battery has about 6.3µA constant self-discharge current*



Device	Ship Mode Current	Total Constant Current Drain	SoC six months after shipping @50%
BQ25150	10nA	6.310µA	31.9%
nPM1100	470nA	6.770µA	30.6%

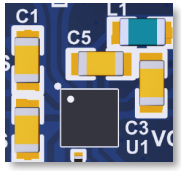
*) Based on 3% typical state-of-charge loss per month

nPM1100 Summary

1 23mm^2 PCB area

2 400 mA charging

3 150 mA highly efficient regulated power



Because bigger batteries are not an option