System Solution Guide - Preview

Battery-powered Tools

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Table of Contents

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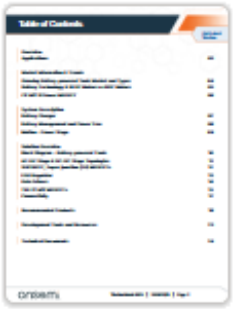
1


2


3


4


5

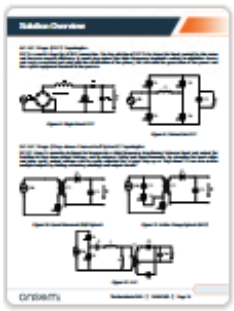

6

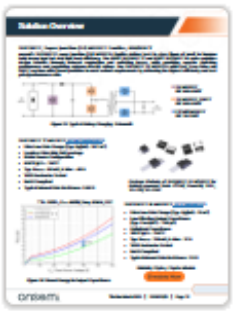

7

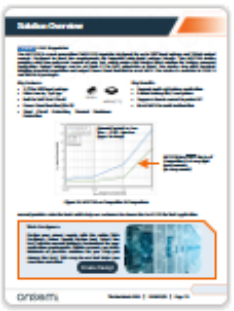

8


9


10


11


12


13


14


15


16


17


18


19


20

Block Diagram - Battery-powered Tools

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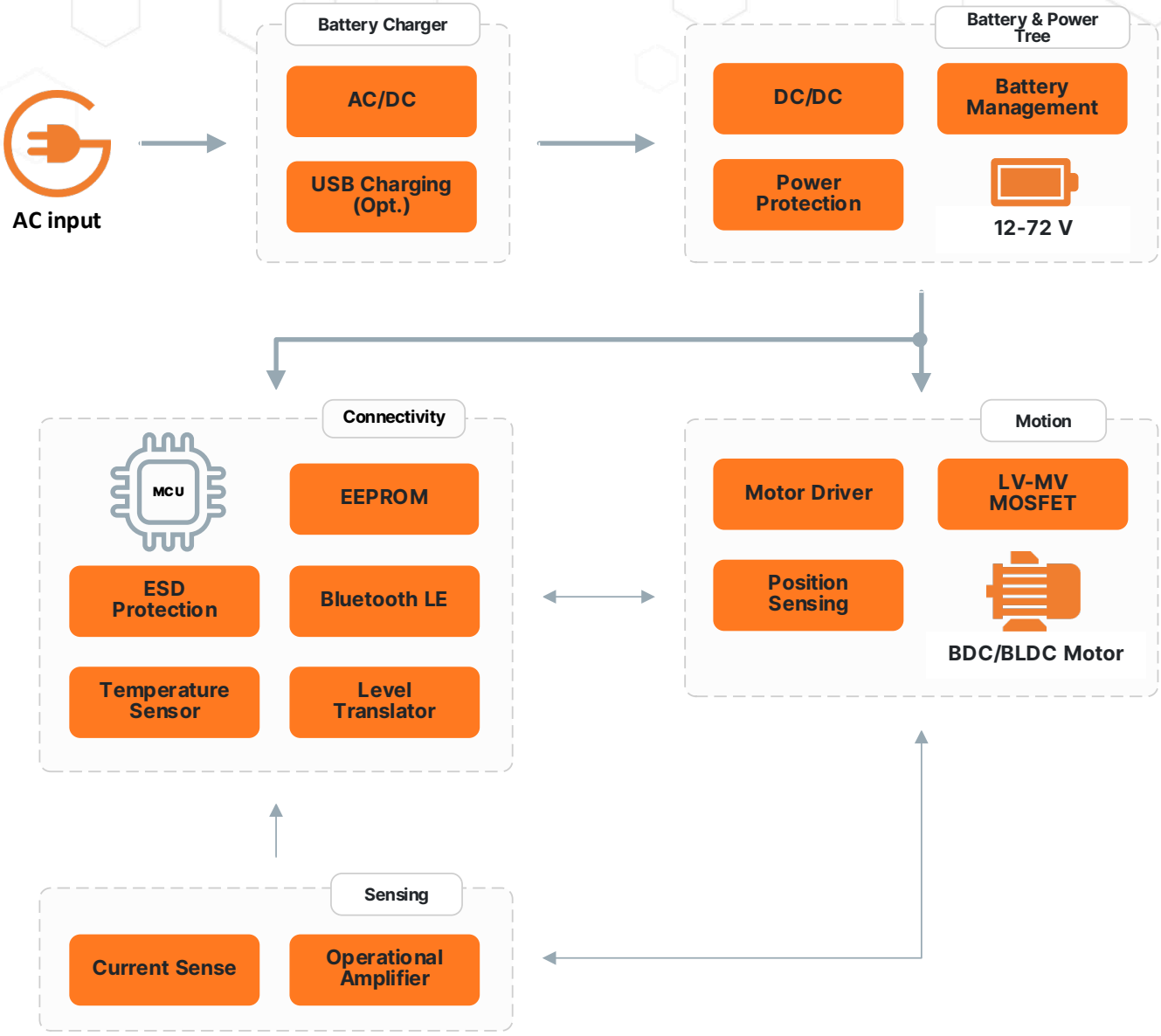
Block Diagram - Battery-powered Tools

- Block diagram below represents Battery-powered Tools solution created by **onsemi**.
- Majority of the functional block devices can be sourced by the **onsemi** solutions as shown in the following device tables.



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Battery Management and Power Tree

Battery, Battery Management and Power Tree systems are on-board parts of the power tools.

- Battery types differ case by case. Typically, cordless power tools adopt Li-ion from NiCd & NiMH batteries. Li-ion batteries have higher energy density and longer lifespan.
- Battery capacity and voltage depend on a required payload, a distance to be driven and by its charging type. Most used are battery pack systems in range of 12-72V which can be paralleled to boost the performance
- Power Tree supplies all logic levels and low voltage power rails in the system. Typically, it does not require isolation (with battery voltages below 50 V) and is implemented as multiple parallel buck converters, in combination with Linear regulators (LDOs).

The Battery Power Tree, utilizing both SMPS and LDOs, efficiently delivers necessary voltage levels to subsystems. onsemi's LDOs present an optimal solution for providing precise, low-current multiple voltage levels required by various sub-components like Gate Drivers or Image Sensors.

Linear Voltage Regulators (LDO)

onsemi's wide LDO families are based on a unique combination of features – ultra-low quiescent current, fast transient response and high input and output voltage ranges. Additional features, such as high PSRR & low noise, are being added as an option as well.

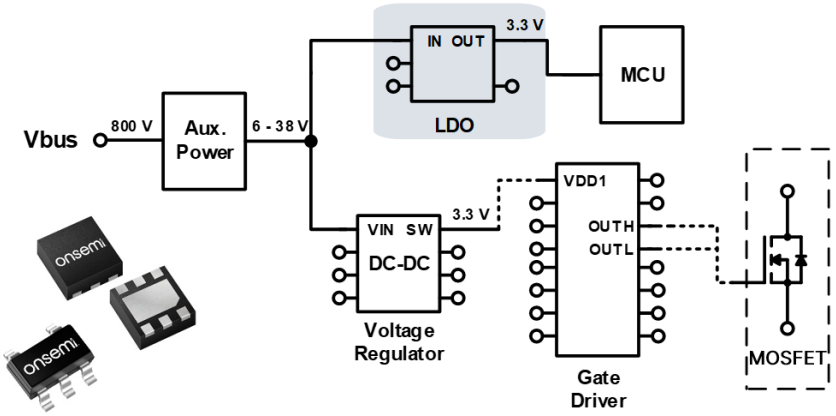
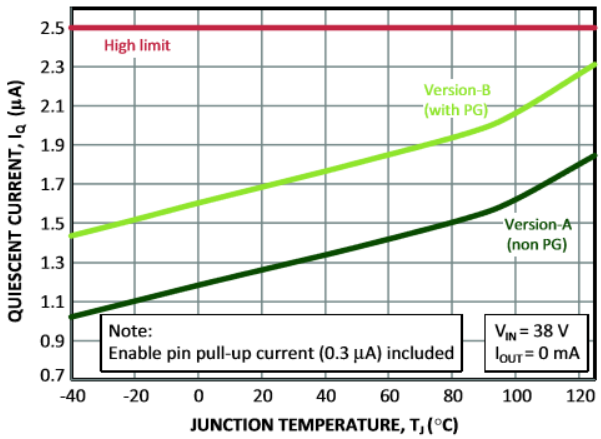


Figure 6: LDO Application Block Diagram

LDO Benefits for Power Tools

- Robust operation @ extreme condition at highest temperature
- The lowest quiescent current consumption (Typ. I_Q : 1.3uA @ 25°C) ⟶ Reduce charging time interval
- Safe Operating Area with Protection function (Thermal, Current)
- Diverse package availability, SOT-23, WDFN, DFN6
- Stable @ wide temp -40°C to 125°C
- Thermal Shutdown @ 165°C



T10 LV-MV MOSFETs

onsemi's LV-MV MOSFETs offer a comprehensive performance across various voltage ranges by minimizing power dissipation with low $R_{DS(on)}$ and providing efficient power subsystems. Leveraging the MOSFETs enhances power factor, active-mode efficiency, and standby-mode power consumption.
The new **onsemi's** T10 N-Channel MOSFET generation is gate shielded trench technology optimized for power applications. This devices technology presents superior figure of merits. The MOSFET includes an excellent body diode with a soft reverse recovery. Additionally, the technology works like having an integrated snubber enabling less ringing under switching applications.

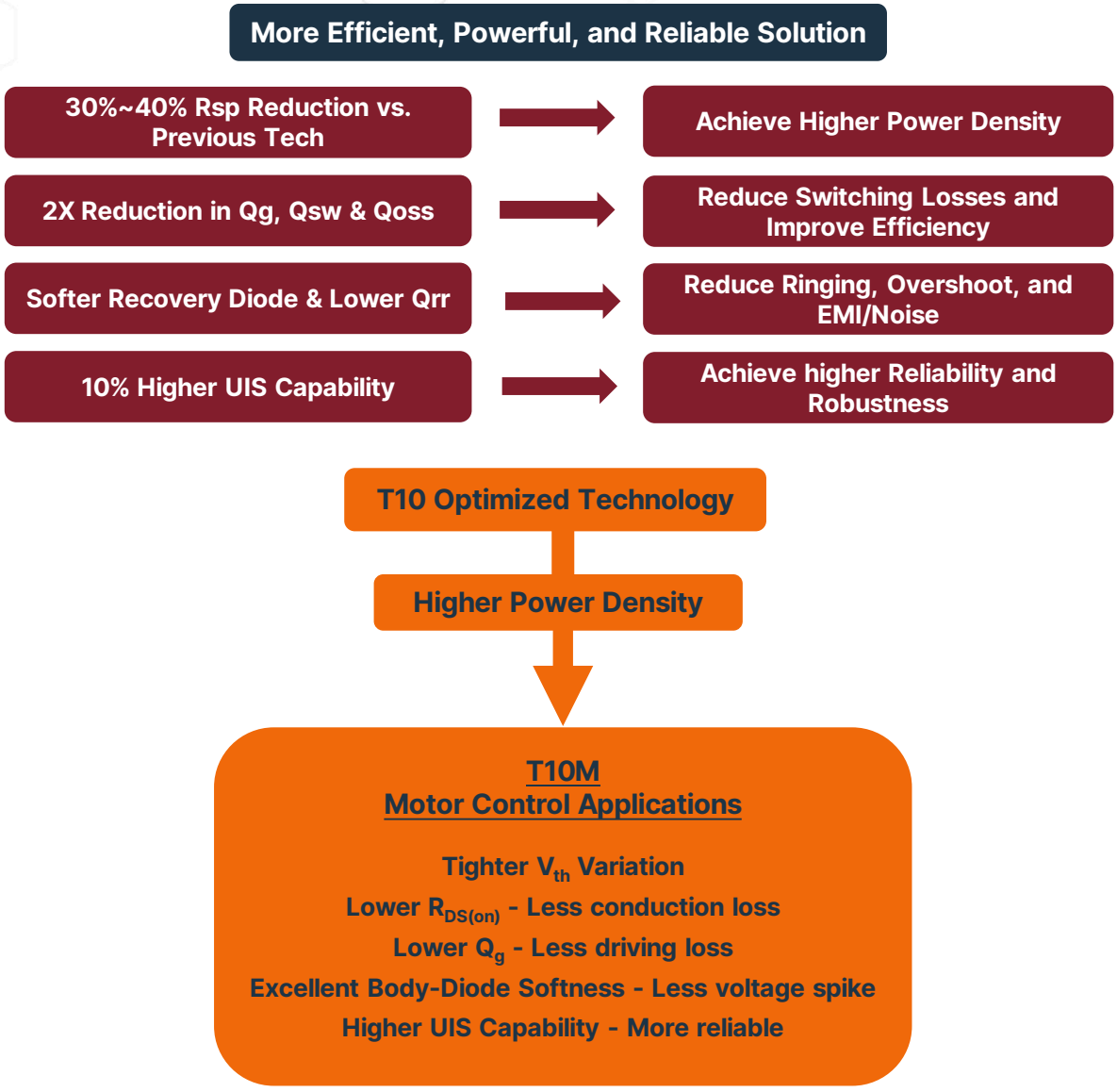


Figure 17: T10 Technology Value Proposition

Battery-powered Tools

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