onsemi

System Solution Guide - Preview

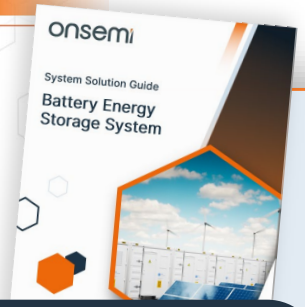
Battery Energy Storage System

onsemi.com

Table of Contents

Get Latest Version

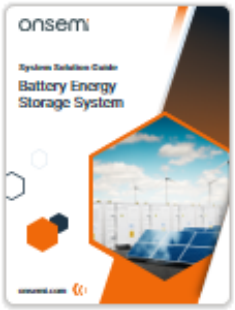
onsemi



Register now to unlock all System Solution Guides

Full Guide Preview

Get Latest Version



1


2


3

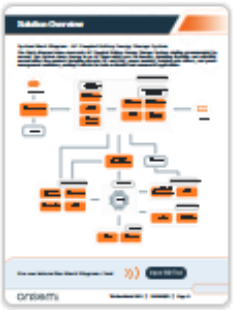

4


5

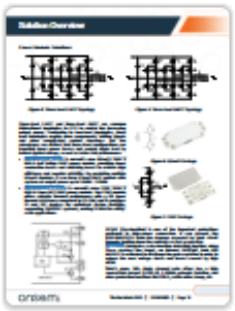

6


7


8


9

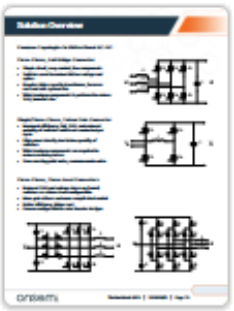

10

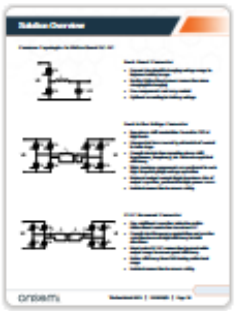

11

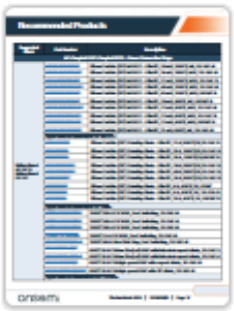

12


13


14


15


16


17


18


19

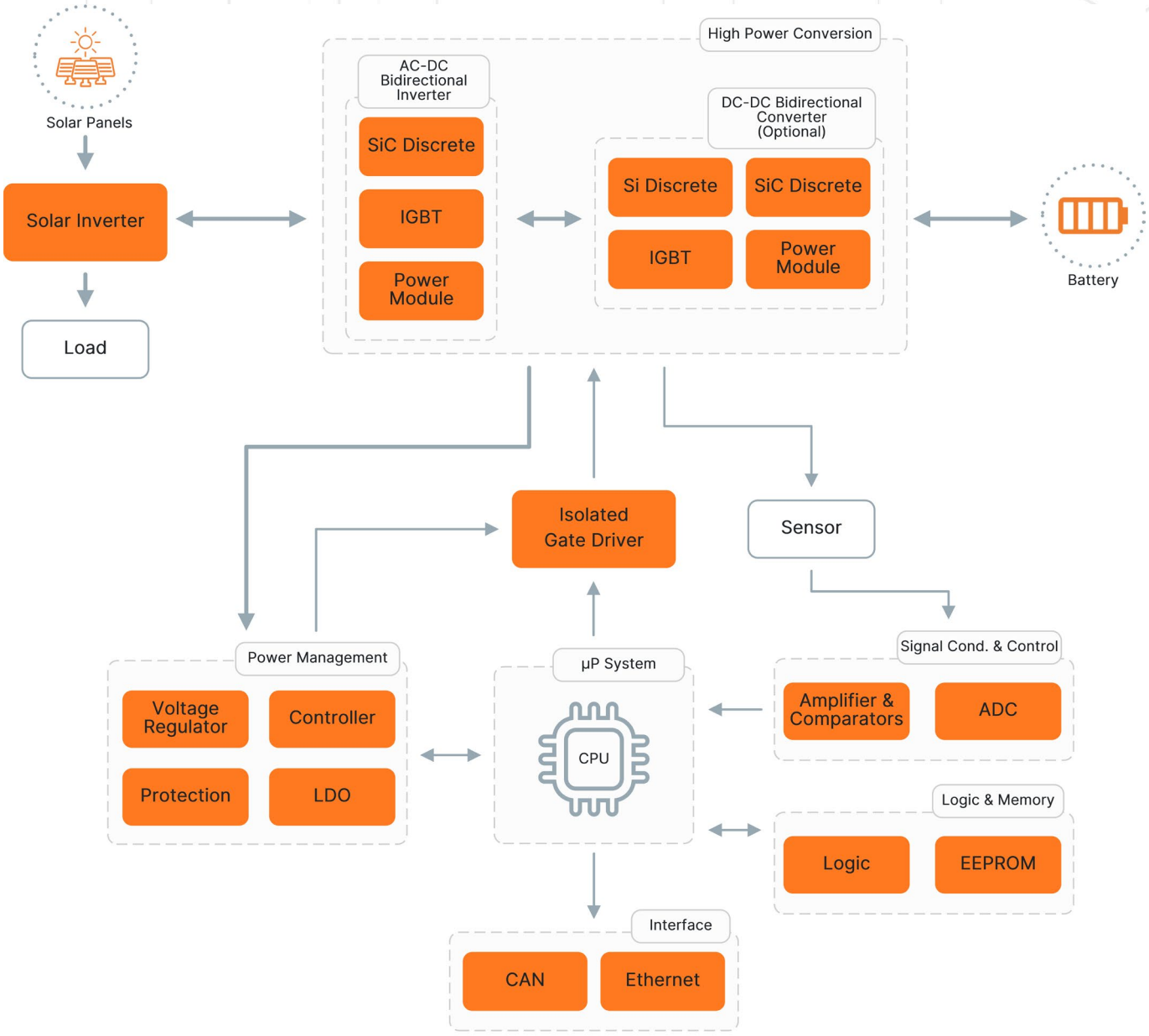

20

Block Diagram - AC Coupled BESS

Get Latest Version

Block Diagram - AC Coupled Battery Energy Storage System

The block diagram below represents AC Coupled Battery Energy Storage System solution recommended by **onsemi**. The system stores energy in an AC form which uses an inverter, providing flexibility and reliability. **onsemi** offers key products including discrete SiC and IGBT, power modules, isolated gate drivers, and power management controllers, making it suitable for both residential and commercial applications.



Use our Interactive Block Diagrams Tool

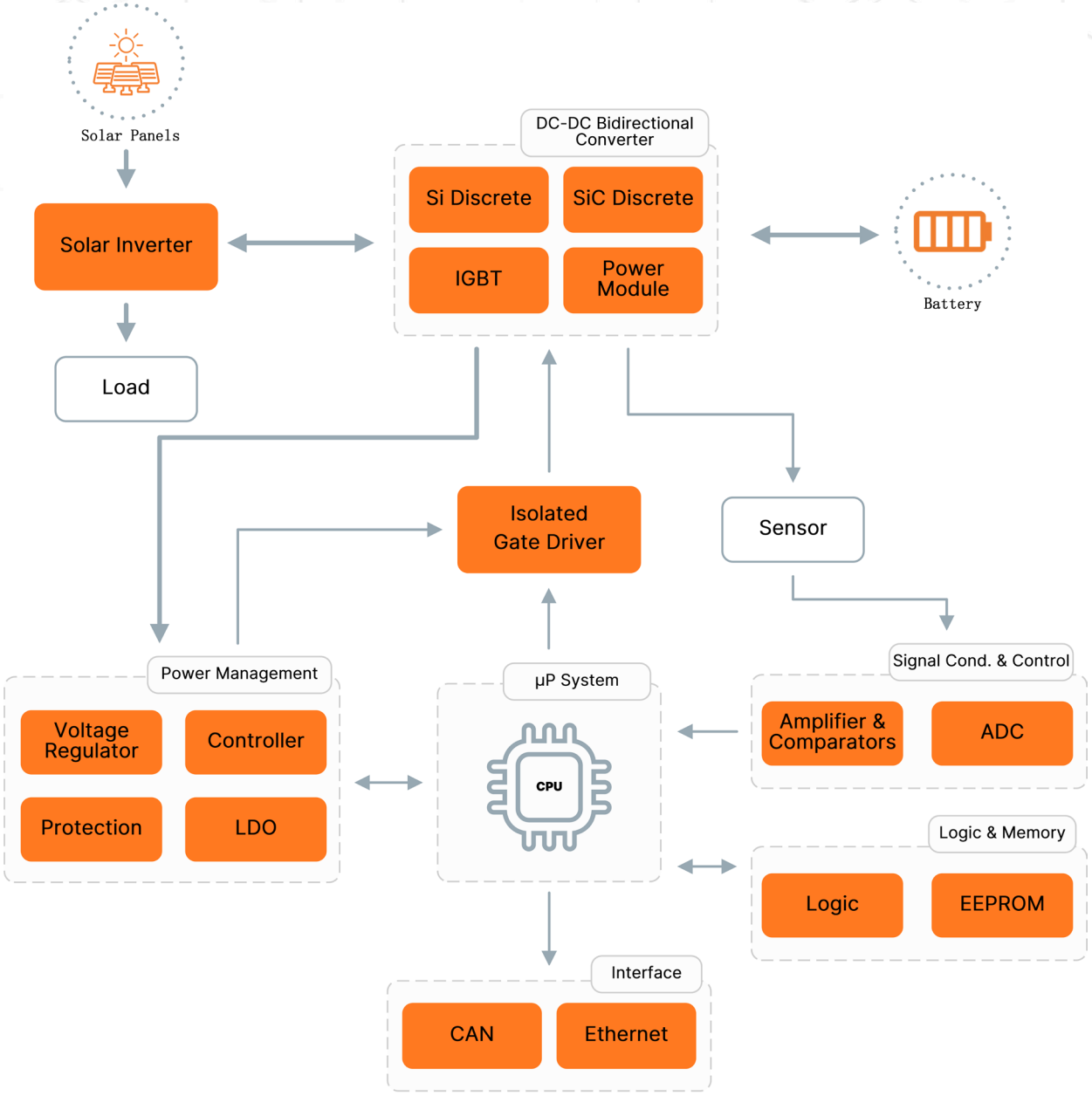
Open IBD Tool

Block Diagram - DC Coupled BESS

Get Latest Version

Block Diagram - DC Coupled Battery Energy Storage System

The block diagram below represents DC Coupled Battery Energy Storage System solution recommended by **onsemi**. The system stores energy directly from panels, reducing conversion losses and ensuring efficiency. **onsemi** offers key products including discrete SiC and IGBT, power modules, isolated gate drivers, and power management controllers, making it suitable for residential, commercial and utility applications.



Use our Interactive Block Diagrams Tool

Open IBD Tool

Power Module Solutions

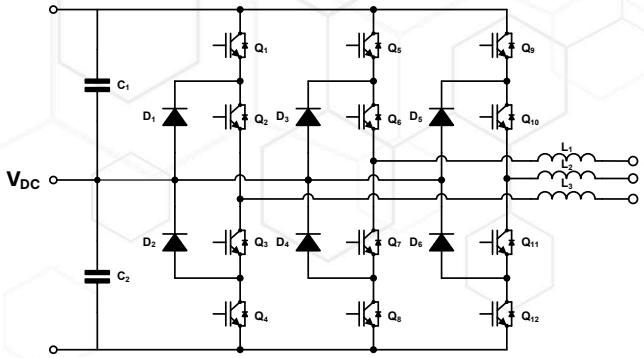


Figure 4: Three-level I-NPC Topology

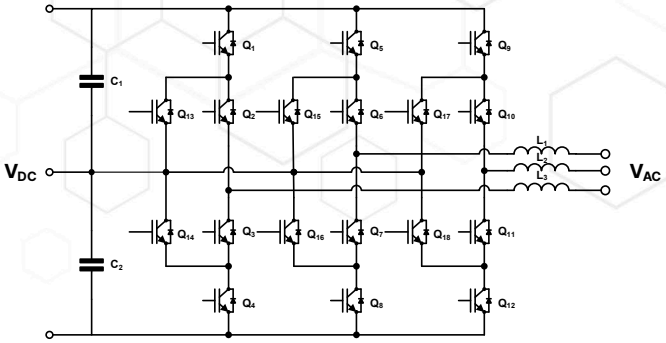


Figure 5: Three-level ANPC Topology

Three-level I-NPC and three-level ANPC are common bidirectional topologies in PCS to match the increasing output power. Comparing to two-level topologies, three level topologies require more components, driving signals and more complicated control structures. But the advantages are distinct that three-level configurations are targeting lower power losses and current ripple lead by halved applied voltage, as well as better EMI performance.

- NXH800H120L7QDSG is **onsemi's** new **QDual3** 1200 V 800 A half bridge IGBT power module, providing lower conduction losses and switching losses to achieve high efficiency and superior reliability. By paralleling multiple QDual3 modules, it can form 3-level ANPC module with system set output power up to 1.6MW - 1.8MW.
- NXH600N105L7F5S1HG is **onsemi's** new **F5BP** 1050 V 600 A I-type NPC IGBT power module. The F5BP module offers superior thermal performance with a 9% lower thermal resistance compared to F5-PIM, and it combines Si and SiC devices for optimized design flexibility, supporting 1500VDC systems, making it ideal for utility-scale applications.

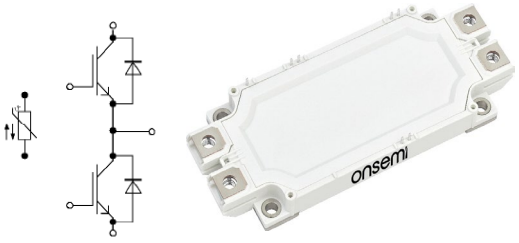


Figure 6: QDual3 Package

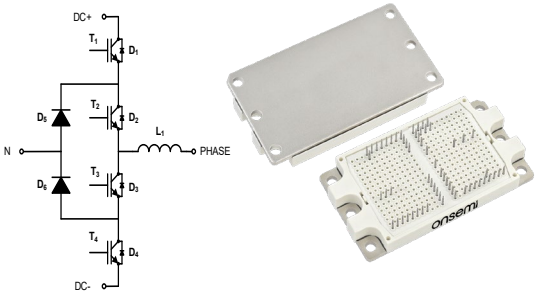
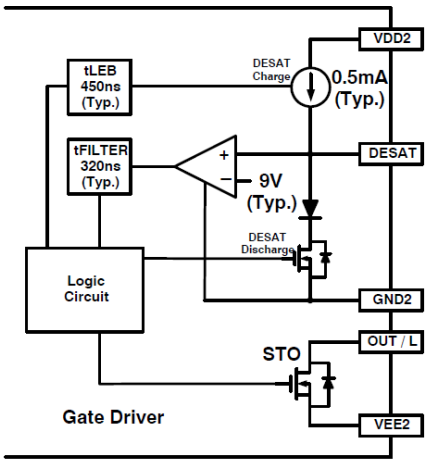


Figure 7: F5BP Package



DESAT (Desaturation) is one of the important protections preferred in high-power conversion. It can prevent the IGBTs/MOSFETs from the damage occurred by short circuit through shutting down the switches as fast as possible.

NCD57000 integrates a desaturation detecting function, when V_{CESAT} reaches the target, an internal STO(Soft Turn Off) MOSFET is activated to discharge the gate capacitor in order to reduce the over voltage stress and losses caused by high dV/dt.

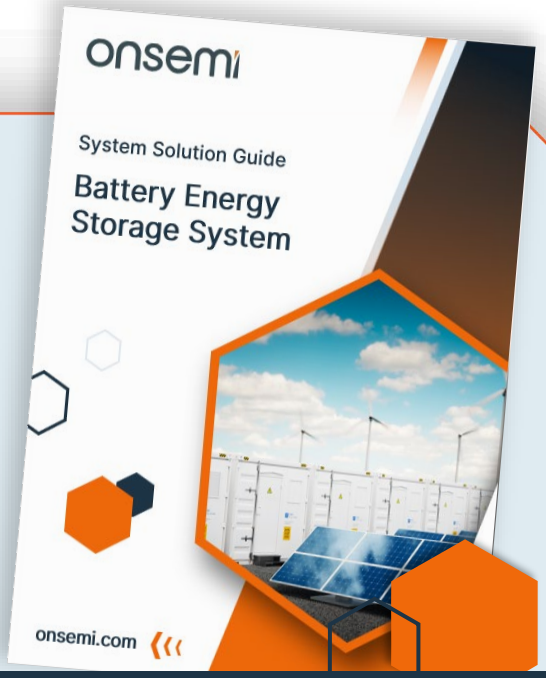
What's more, this single channel gate driver has a high source/sink current (4 A/6 A), 5 kVrms galvanic isolation, and other protection functions like UVLO, active miller clamp, etc.

Battery Energy Storage System

Get Latest Version

onsemi™

Intelligent Technology. Better Future.



Register now to unlock all System Solution Guides and get additional exclusive benefits!

- Join the conversation on community forum.
- Utilize Elite Power Simulator & other developer tools.
- Watch exclusive webinars and seminars.

Open full System Solution Guide

onsemi, the **onsemi** logo, and other names, marks, and brands are registered and/or common law trademarks of Semiconductor Components Industries, LLC dba "**onsemi**" or its affiliates and/or subsidiaries in the United States and/or other countries. **onsemi** owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of **onsemi**'s product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent−Marking.pdf. **onsemi** reserves the right to make changes at any time to any products or information herein, without notice. The information herein is provided "as−is" and **onsemi** makes no warranty, representation or guarantee regarding the accuracy of the information, product features, availability, functionality, or suitability of its products for any particular purpose, nor does **onsemi** assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using **onsemi** products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by **onsemi**. "Typical" parameters which may be provided in **onsemi** data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. **onsemi** does not convey any license under any of its intellectual property rights nor the rights of others. **onsemi** products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use **onsemi** products for any such unintended or unauthorized application, Buyer shall indemnify and hold **onsemi** and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that **onsemi** was negligent regarding the design or manufacture of the part. **onsemi** is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.