



## Designing residential ESS – Infineon’s offering

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### Behind-the-meter **Energy Storage Systems (ESS)**

SiC, multi-modular approach, BMS - Infineon tackles the latest trends

Dear valued customer,

Whenever in utility-independent, residential energy storage systems photovoltaic panels – mostly installed on rooftops - produce excess power, batteries get charged with the unconsumed energy. This allows fulfilling the demand for AC power at any time by using those batteries with an inverter.

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ENERGY STORAGE  
SYSTEMS (ESS)  
BROCHURE



#### NEWSLETTER QUICK NAVIGATION

##### Industry trend:

[Silicon carbide \(SiC\) technology in ESS](#)

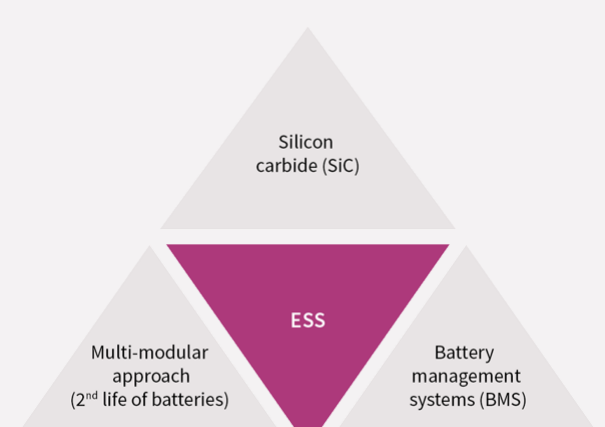
##### Industry trend:

[Modular multi-level approach \(2<sup>nd</sup> life of batteries\)](#)

##### Industry trend:

[BMS in ESS -> Battery protection and Battery monitoring](#)

Trends in energy storage systems (ESS)



#### Industry trend: Silicon carbide (SiC) technology in ESS

For a single-phase, bidirectional AC-DC stage a recommended topology is the continuous-conduction mode (CCM) totem-pole boost converter. For a three-phase, bidirectional AC-DC system the ideal topology is the three-level, active-neutral-point-clamping (ANPC) converter. Both topologies require switches with a low-reverse characteristic body diode.

**Infineon’s offering:** the newly launched, SiC-based CoolSiC™ trench MOSFET 650 V portfolio including the matching 2-channel galvanically isolated gate-driver IC, EiceDRIVER™ 2EDF9275F\*. Experience the revolution in power conversion.

Being the result of a state-of-the-art trench semiconductor process, this new high-performance MOSFET series **minimizes losses in the application and maximizes reliability in operation**.

\*soon available for ordering

#### Industry trend: modular multi-level approach (2<sup>nd</sup> life of batteries)

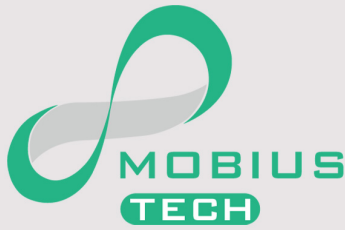
The use of IGBT discrete devices and modules for the power conversion stages limits the battery utilization to the weakest battery pack. The system keeps operating only until one pack reaches the minimum allowable charge level.

**Infineon’s offering:** the market leading OptiMOS™ family – highly efficient, low-voltage power MOSFETs for developing **modularly cascaded, multi-level architectures**. Advanced control schemes balance the state-of-charge (SOC) of different batteries among all the packs in the system by placing a **heavier load on those packs with higher SOC**, while at the same time bypassing stages with a battery SOC dropping below the minimum level.

**Optimal battery utilization is achieved.** Major advantage of the approach: enablement of **2<sup>nd</sup> life of batteries**, i.e. the environmentally friendly **use of recycled batteries**.

Associated partners of Infineon – click on the logos to discover the jointly developed multilevel energy storage turnkey solutions:

**S T A B L**



#### Industry trend: BMS in ESS -> Battery protection and Battery monitoring

During charging and discharging batteries must be monitored closely to protect against over- / under-voltage, inrush current, reverse current, and short circuits.

##### Infineon’s offering for battery protection:

Making customers benefit from

- Wider safe-operating area (SOA)
- Short-circuit protection with higher peak current rates
- Turn-on and turn-off solutions tailored to application requirements
- Cost-efficiency resulting from a reduced BOM count and from more effective parallelization solutions becomes noticeable

Monitoring cells in battery packs ensures operation within the safe-operating range. Various parameters, such as cell voltage, state of charge (SOC), state of health (SOH), and also the temperature have a decisive impact on the performance, safety, and lifetime of batteries. Cell balancing caters for even balancing between battery cells put in series.

##### Infineon’s offering for battery monitoring:

A general-purpose transceiver IC for multi-cell battery systems as well as a multi-channel battery monitoring and balancing system IC are currently in development. For updates get in touch with the responsible [Application Marketing Manager](#) at Infineon.

For more tech insights e-mail us!



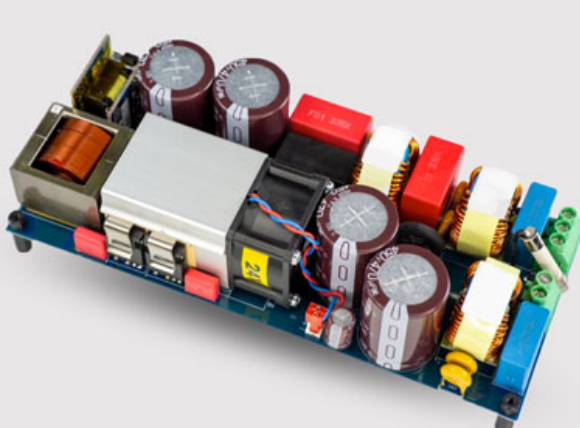
#### Recommended evaluation boards for ESS

##### EVAL\_3K3W\_BIDI\_PSF

OPN: EVAL3K3WBIDIPSFBO1

A complete system solution for a 3300 W bidirectional DC-DC converter that achieves 98% efficiency in buck mode and 97% in boost mode.

Check out the [interactive 3D model](#).



##### EVAL\_3K3W\_TP\_PFC\_SIC

OPN: EVAL3K3WTPPFCSICTO1

A system solution for a bridgeless totem-pole power factor corrector (PFC) with bidirectional power capability for applications requiring high efficiency (~99%) and high power density (72 W/in<sup>3</sup>).

Check out the [interactive 3D model](#).

#### EXCLUSIVE ACCESS

Upon serial number registration board owners are granted access to technical information / materials not available anywhere else!

[Click here](#) for more information!



Sincerely,

*Infineon Community Team*

Your Infineon Community Team