

On-board charger (OBC)



인피니언 전력반도체 솔루션
가상부스에 오신 걸 환영합니다!



Headline: Charging boost on all power levels

Products

From low cost to ultra power

Featuring

- › **Best price/performance** with **automotive TRENCHSTOP™ 5**: Enables the world's lowest switching and conduction losses for on-board chargers. The great performance of TRENCHSTOP™ 5 offers a cost-optimized solution for use cases where engineers previously only used MOSFETs.
- › **Maximum economy** with **Eco-PACK**: Ideal for the PFC stage of on-board charger designs, Eco-PACK combines the best of both worlds to provide the most economic result. The hybrid of IGBT and automotive CoolSiC™ diode maximizes the performance level while keeping the system costs very low.
- › **Higher power** and **reliability** with **automotive CoolMOS™ CFD7A MOSFETs**: Suitable for hard- and resonant-switched topologies with a broad portfolio of SMD and TO packages. Increased efficiency with reduced switching losses and broad $R_{DS(on)}$ portfolio.
- › **Ultra power** with **automotive CoolSiC™ MOSFETs**: Specifically designed to meet the high reliability, quality and performance requirements demanded by the automotive industry in 800 V or 3-phase systems. Higher switching frequency can yield significant cost reductions when using CoolSiC™ MOSFETs.

Success stories

Quality and performance leader

Key benefits

- › Over 20 years' field experience in IGBT, Si and SiC
- › Hyper-performing, fast-switching IGBTs even outperform competitor SiC devices
- › Higher battery voltage at same rate of reliability allowing for 475 V battery voltage thanks to excellent cosmic radiation robustness of CFD7A CoolMOS™ MOSFETs
- › Kelvin source concept for CFD7A CoolMOS™ MOSFETs boosts PFC efficiency further
- › Commitment in supporting the xEV ramp-up with investments in a new fully automated 300 mm chip factory
- › Proven track record with over 150 million discrete devices shipped for xEV applications

<https://www.infineon.com/cms/en/applications/automotive/electric-drive-train/onboard-battery-charger/>

Infinion offers the complete automotive-grade portfolio of discrete SiC components

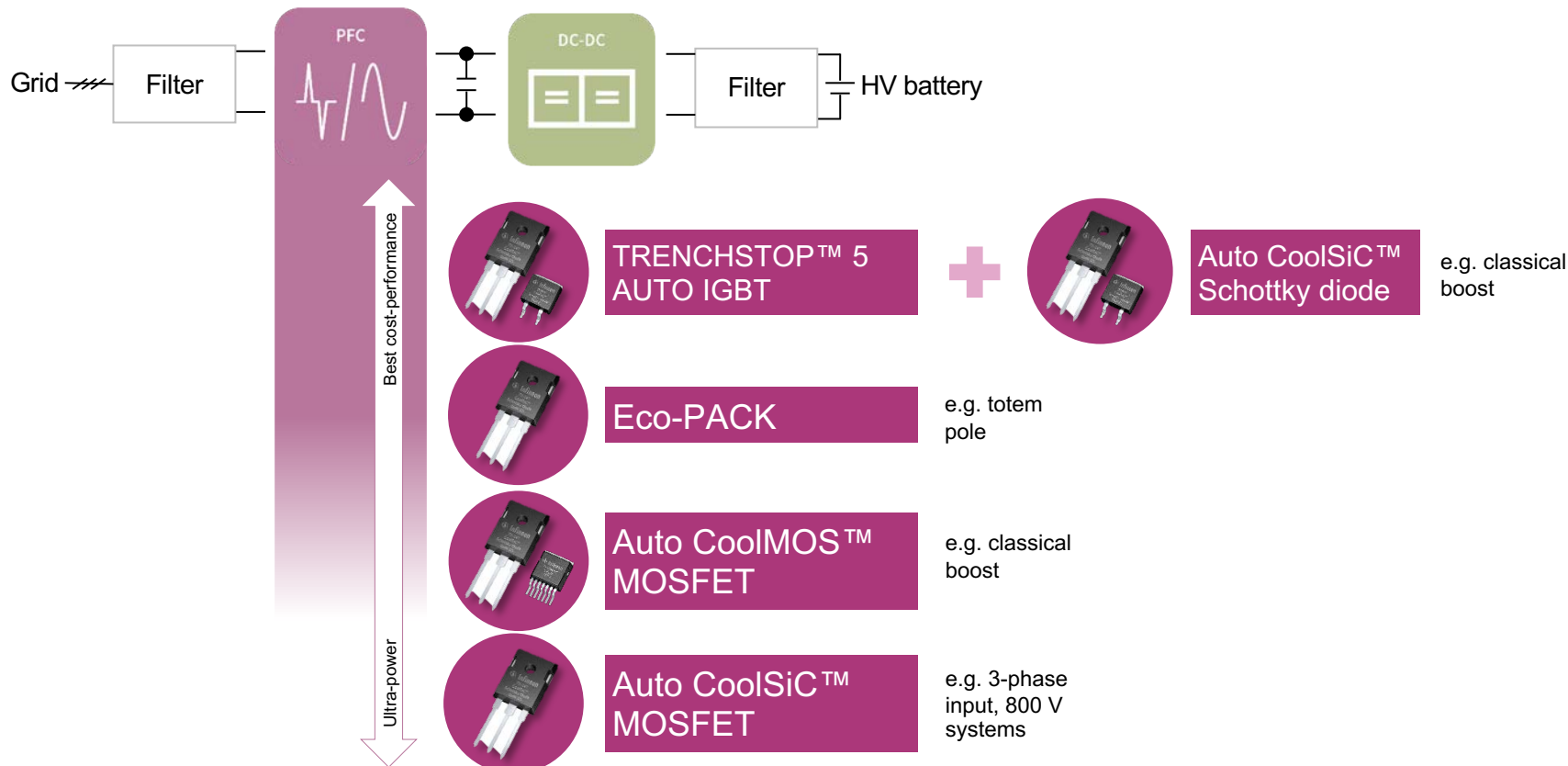


The image shows a hand holding three panels, each representing a different SiC component. Each panel includes a title, an application icon (On-Board Charger), a component image, and a status label.

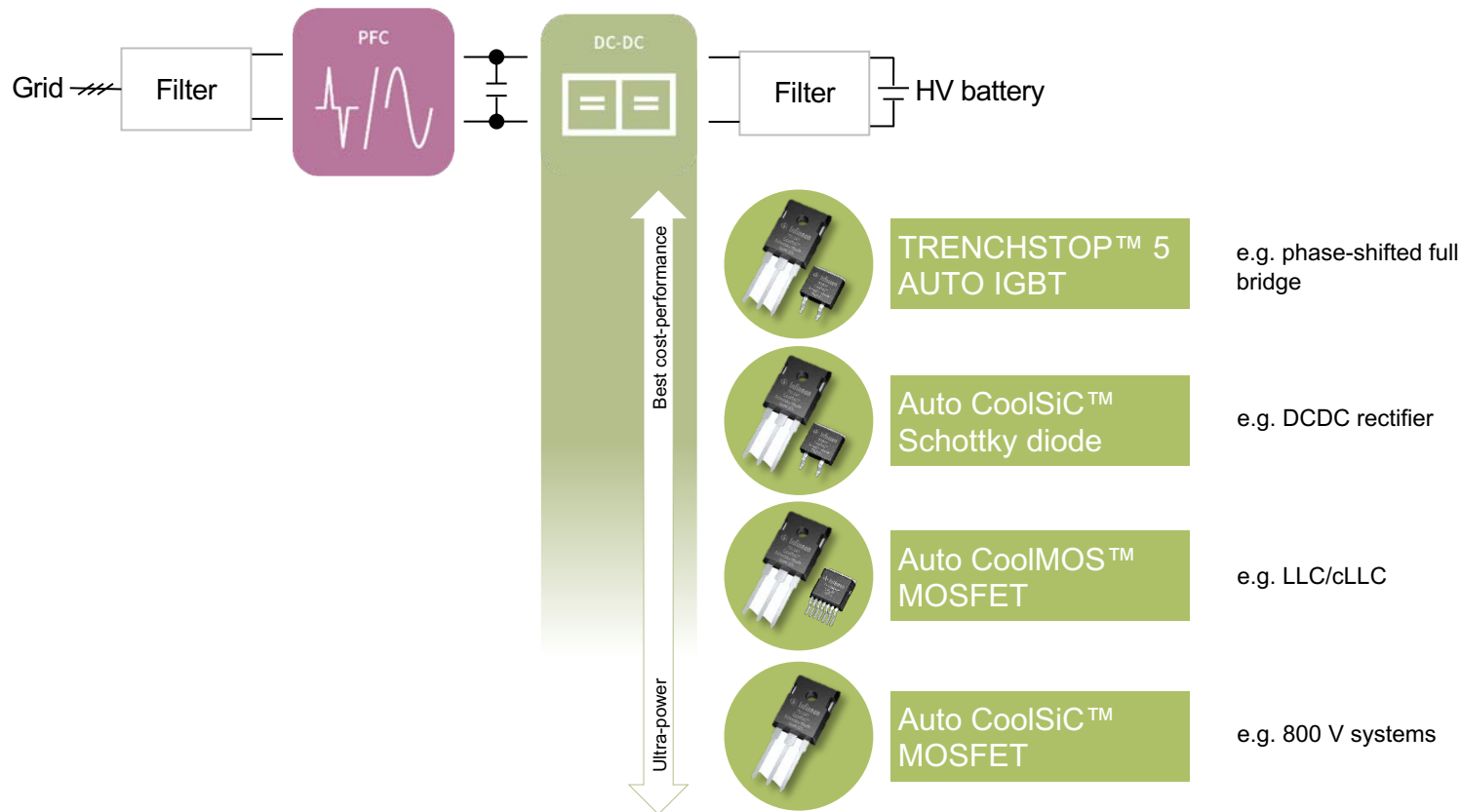
Automotive CoolSiC™ Schottky diodes	Automotive CoolSiC™ MOSFETs	Eco-PACK: Hybrid of IGBT + CoolSiC™ diode
Released	Released	Coming in 2020

- › More than 30 leading OEMs and tier-1s are evaluating Infineon's SiC solutions for automotive applications
- › Over 20 years of field experience channeled into ramping up this new technology to the automotive world
- › Infineon's internal quality test procedures exceed common industry standards; test results prove that Infineon's SiC products reach that quality level
- › Industry's broadest portfolio allows customers to "pick what they need" rather than "take what we have"

Usage of the discrete line-up for the on-board charger application



Usage of the discrete line-up for the on-board charger application

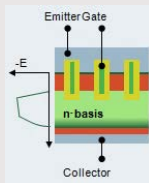


Automotive TRENCHSTOP™ 5 IGBT

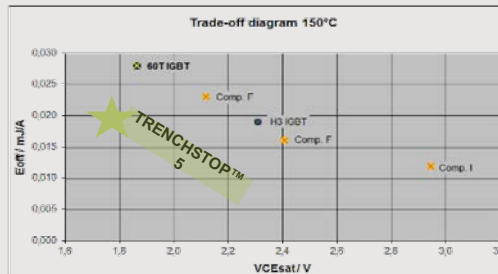


Technology

- › TRENCHSTOP™ 5 technology with **low V_{CEsat}**
- › **650 V** blocking voltage
- › Very fast switching (up to **150 kHz**)
- › Automotive qualified



Competitiveness

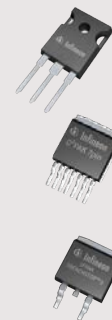


Key features

- › Max. junction temperature **175°C**
- › **Highest efficiency**
 - very low conduction losses
 - very low switching losses
- › Very low junction and case temperature
- › High power density design
- › High device reliability
- › **Applications:**
 - **PFC**
 - **DCDC**

Portfolio

- › TO247-3L and SMD (D²Pak)
- › TRENCHSTOP™ 5: **H5** and **F5**
- › Single IGBT or
- › Copack with silicon RAPID1 diode or
- › Copack with CoolSiC™ diode
- › Current classes from 15 A – 50 A

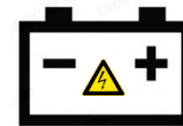
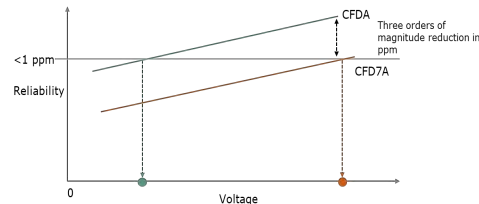


Automotive CoolMOS™ 650 V CFD7A



1 Technology robustness

Higher application voltages possible
(at same proven reliability level)

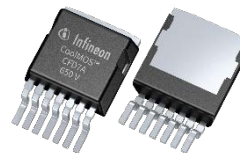


400 V → 475 V

*Schematic representation, real-life benefits depend on individual customer use profile

2 SMD packages

D²PAK 7-pin with increased creepage distance and Kelvin source

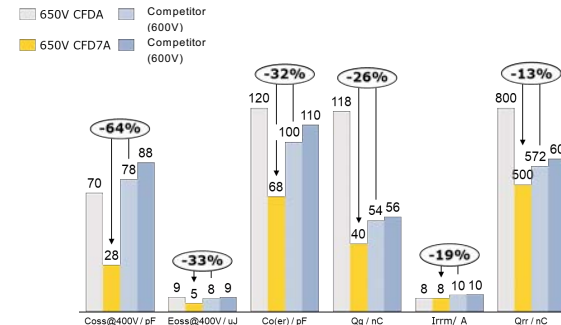


First products
already available
(IPB65R115CFD7A and
IPBE65R115CFD7A)

3 One part for soft and hard switching (economies of scale)

Considerable improvement in key parameters (higher efficiency)

Comparison of 110mΩ class IFX vs. next best discrete alternative on market



Automotive CoolSiC™ Schottky diode Gen 5



Key features

- › 650 V class
- › Excellent figure of merit ($Q_c \times V_F$)
- › No reverse recovery charge
- › High operating temperature (T_j max = 175°C)
- › Robust against surge currents
- › Automotive qualified

Benefits

- › Highest reliability against environmental conditions
- › Best match with CoolMOS™ and IGBT TRENCHSTOP™
- › Mature technology: several years' field experience in industrial applications □

Released:



- › 10 A
- › 12 A
- › 16 A
- › 20 A
- › 30 A
- › 40 A

Released:

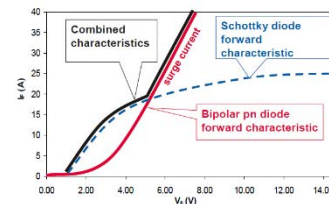
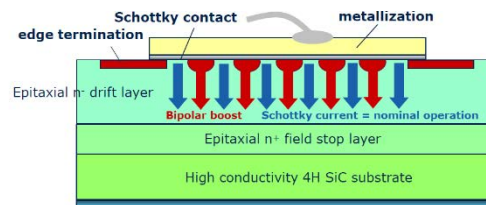


- › 8 A
- › 10 A
- › 12 A

Coming in 2020:

- › 16 A

Diode Gen 5 concept



Automotive CoolSiC™ discrete MOSFET generation 1



Key features

- › 1200 V / 45 mΩ trench MOSFET
- › Low device capacitances
- › Temperature-independent switching losses
- › Intrinsic diode with low reverse recovery charge
- › Short-circuit robustness

Advantages

- › Superior gate oxide reliability
- › Best-in-class switching and conduction losses
- › IGBT-compatible driving voltage ($V_{GS} = -5\text{ V} / +15\text{ V}$ or $+18\text{ V}$).
- › Threshold voltage prevents parasitic turn-on ($V_{th} = 4\text{ V}$)



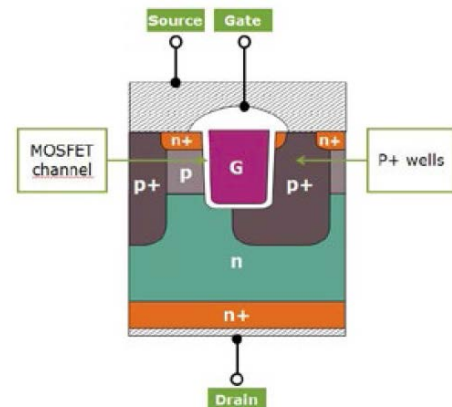
Released:

- › 45 mΩ

Coming in 2020:

- › 35 mΩ
- › 60 mΩ
- › 80 mΩ

MOSFET Gen 1 concept



Automotive CoolSiC™ EasyPACK™ 1B FF08MR12W1MA1_B11A - in production



Key features & benefits

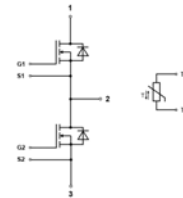
- › 1200 V CoolSiC™ trench MOSFET Gen 1
 - FF08 version: 150 A (DC rating)
- › Low stray inductance 5 nH
- › Intrinsic diode with low reverse recovery
- › PressFIT pins for easier assembly process
- › IGBT-compatible driving voltage ($V_{GS} = -5 \text{ V} / +15 \text{ V}$)
- › Superior gate oxide and cosmic ray reliability
- › High gate threshold voltage prevents parasitic turn-on ($V_{th} = 4.4 \text{ V}$)
- › Qualified according AQG 324

Three variants:

$R_{DS(ON),typ} = 22 \text{ m}\Omega$ FF22MR12W1MA1_B11A (on request)

$R_{DS(ON),typ} = 11 \text{ m}\Omega$ FF11MR12W1MA1_B11A (on request)

$R_{DS(ON),typ} = 7.33 \text{ m}\Omega$ **FF08MR12W1MA1_B11A**



Applications

- › DC/DC converters
- › Auxiliary inverters
- › E-compressors (e.g. FCEV)

Schedule (FF08):

- › SOP July 2020
- › Engineering samples available



Part of your life. Part of tomorrow.