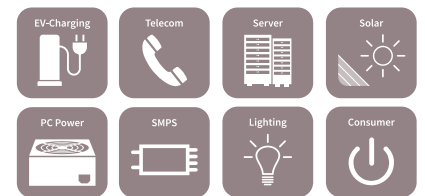




# 600 V/650 V CoolMOS™ fast body diode series (CFD2/CFD7/CFDA)

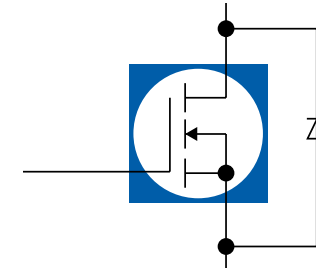


## CoolMOS™ CFD7 technology

CoolMOS™ CFD7 is Infineon's latest generation of fast switching superjunction MOSFETs with integrated fast body diode offering improved energy efficiency.

It is the best choice for resonant switching topologies in high power SMPS applications like telecom, server and EV charging.

In resonant topologies such as LLC or ZVS phase-shift full bridge under certain conditions hard commutation on the conduction body diode can occur. In these unwanted cases it is very important to reduce the generated losses by lowering the  $Q_{rr}$  level of the body diode. Otherwise this hard commutation will lead to higher thermal stress resulting in the destruction of the device. Infineon's fast body diode series CFD/CFD2/CFD7/CFDA offer the feature of industry leading  $Q_{rr}$  to avoid such failures during a hard commutation event.



MOSFET with integrated fast body diode

## Benefits of CoolMOS™ CFD7 series

CoolMOS™ CFD7 is the successor to the well established CoolMOS™ CFD2 series and targets new customer designs. This new high voltage CoolMOS™ series with integrated fast body diode completes the CoolMOS™ 7 family and offers valuable improvements compared to previous CoolMOS™ fast diode families. The product portfolio provides all benefits of fast switching superjunction MOSFETs and offers:

- > Increased light load efficiency due to lower gate charge value
- > Less energy gets stored in the output capacitance, which is crucial for efficiency in high line or light load conditions  $E_{oss}$

- > Limited voltage overshoot during hard commutation
- > BiC  $Q_{rr}$  and  $t_{rr}$  at repetitive commutation on body diode and low  $Q_{oss}$  enable lower switching losses
- > Improved cost/performance compared to 650 V CoolMOS™ CFD2 predecessor
- > Technology in THD and SMD packages offering BiC  $R_{DS(on)}$ /package combinations

Furthermore easy implementation as well as outstanding product quality and reliability remain key benefits of the CoolMOS™ CFD7 series.

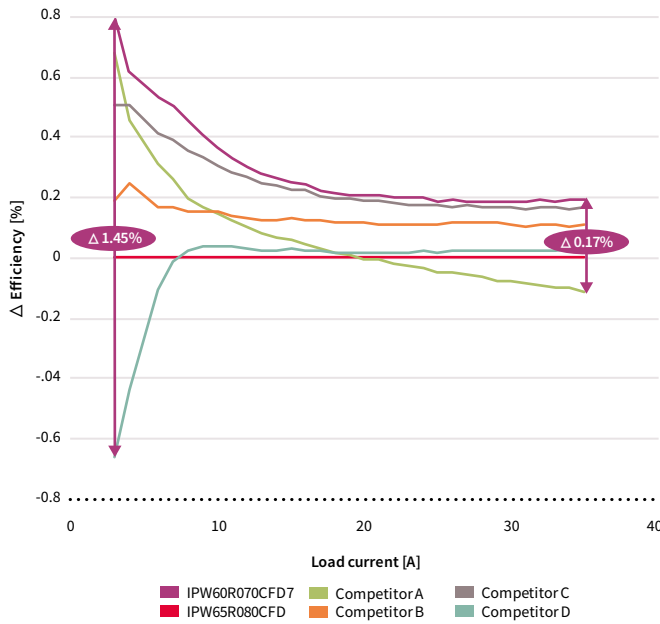
Specification	Symbol	IPW65R080CFD	IPW60R070CFD7	Benefits
On-state resistance: Maximum rating, 25°C	$R_{DS(on)}$	80 mΩ	70 mΩ	Lower conduction losses
Total gate charge	$Q_g$	170 nC	67 nC	Improved light load efficiency
Breakdown voltage	$V_{DS}$	650 V	600 V	
Reverse recovery charge	$Q_{rr}$	1 μC	0.57 μC	Reduced switching losses
Energy stored in the output capacitance	$E_{oss} @ 400 V$	12 μJ	7.7 μJ	Reduced switching losses
Reverse recovery time	$t_{rr}$	180 nS	124 nS	Faster recovery

## What is the difference between CFD2 and CFDA?

CoolMOS™ CFDA is based on the CFD2 technology, so the performance is comparable. CoolMOS™ CFD2 addresses consumer and industrial applications. The CFDA series is even qualified to automotive standard AEC-Q101, and therefore perfectly suitable for design into automotive applications.

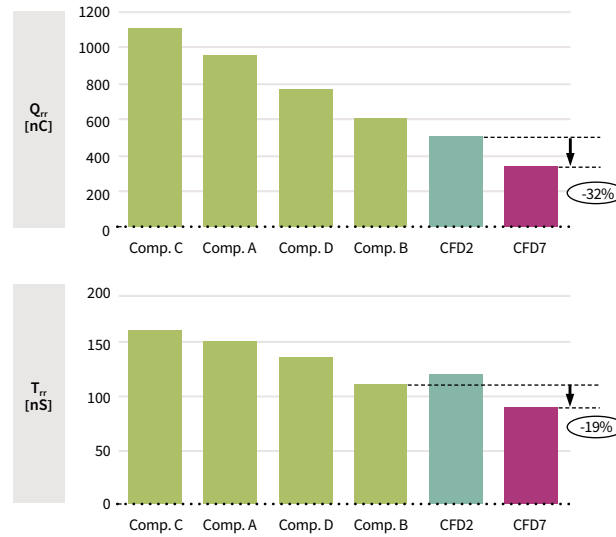
# Feature comparison between CFD2 and CFD7 and closest competition

Efficiency comparison between CFD7, CFD2 and competition in 2 kW ZVS board



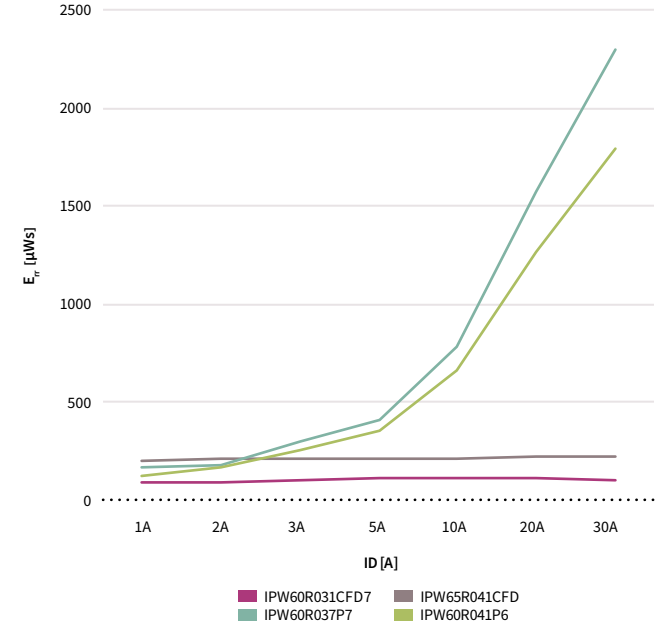
- > Improved energy efficiency over the whole load range
- > Light load efficiency improvement due to significant reduction of  $Q_{rr}$
- > Lower  $R_{DS(on)}$  offers improvement of conduction losses and allows customers to go to higher power density designs

$Q_{rr}$  comparison of 170 m $\Omega$  CFD vs. 190 m $\Omega$  range competition



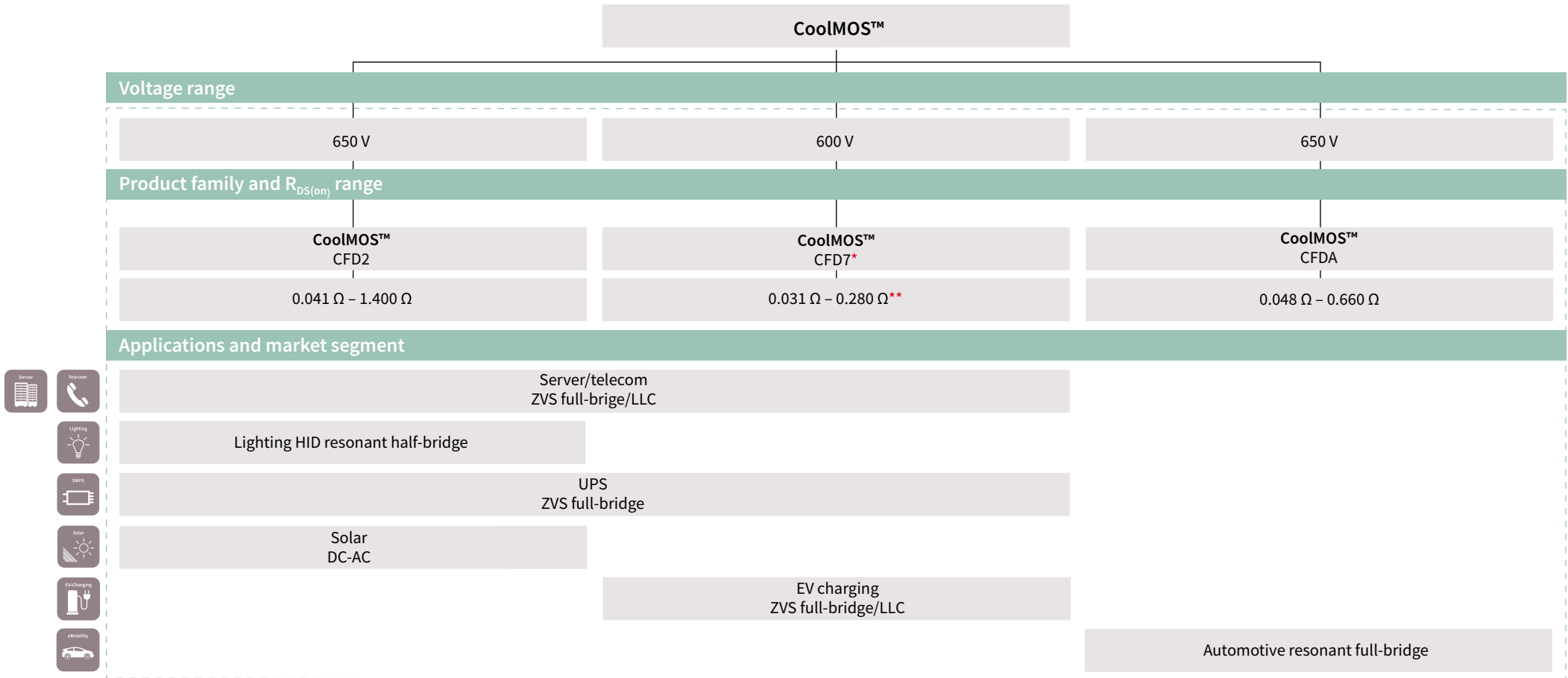
With CoolMOS™ CFD7 the world's best  $Q_{rr}$  is reduced by another 32 percent leading to highest efficiency and highest reliability in resonant switching SMPS applications

IPW60R031CFD7:  $R_{\theta c} = 5 \Omega$ ,  $V_{GS} = 12 V$



Due to BiC  $Q_{rr}$  CoolMOS™ CFD7 offers lowest reverse recover energy ( $E_{rr}$ ) at hard commutation events

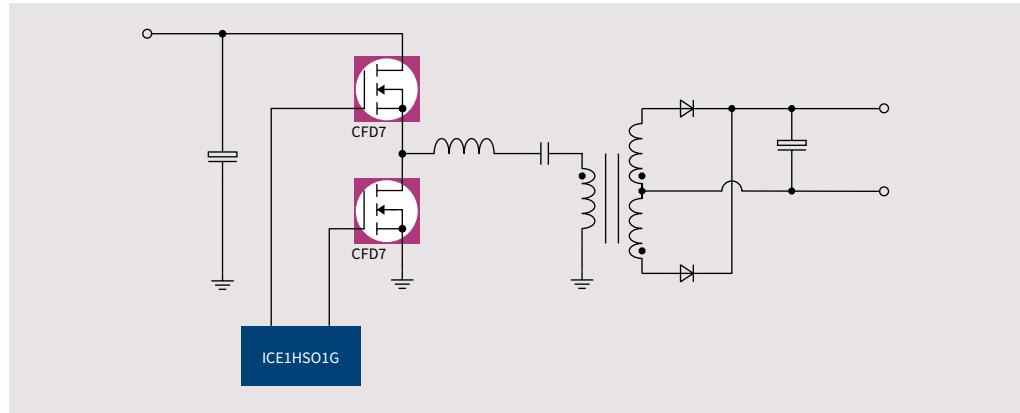
In some operating conditions a repetitive hard commutation can occur. Due to a significant reduction of  $Q_{rr}/t_{rr}/I_{rrm}$  compared to a non fast diode device, CoolMOS™ CFD7 offers highest reliability and an extra safety margin also under these conditions which makes it the ideal choice for resonant high power smps applications.



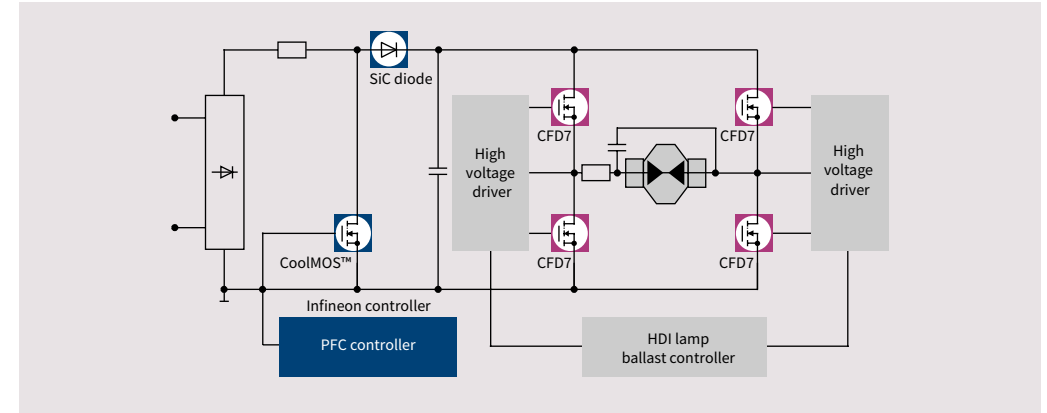
Includes Infineon ICs \* Recommended \*\* Further portfolio extension planned

# Common CoolMOS™ applications and topologies

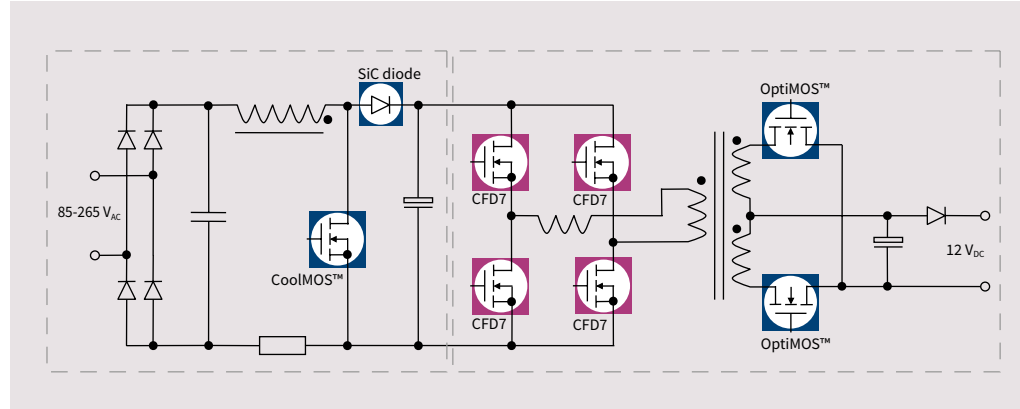
Resonant LLC half-bridge



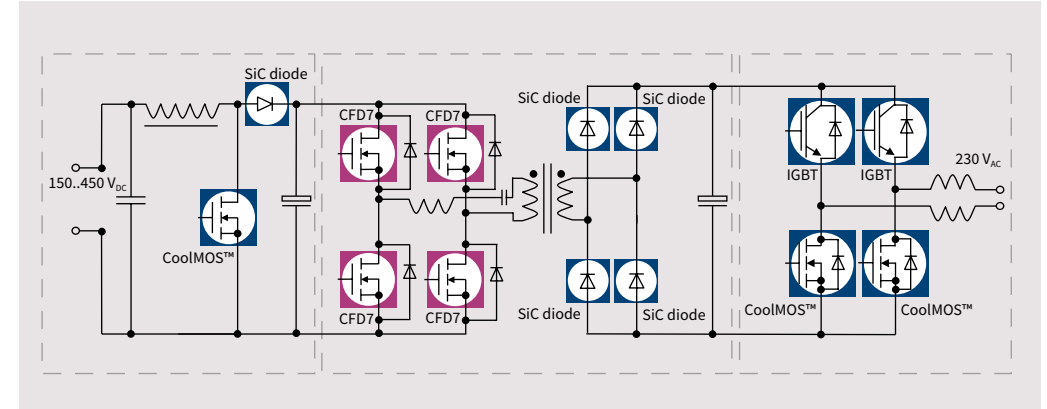
HID lighting



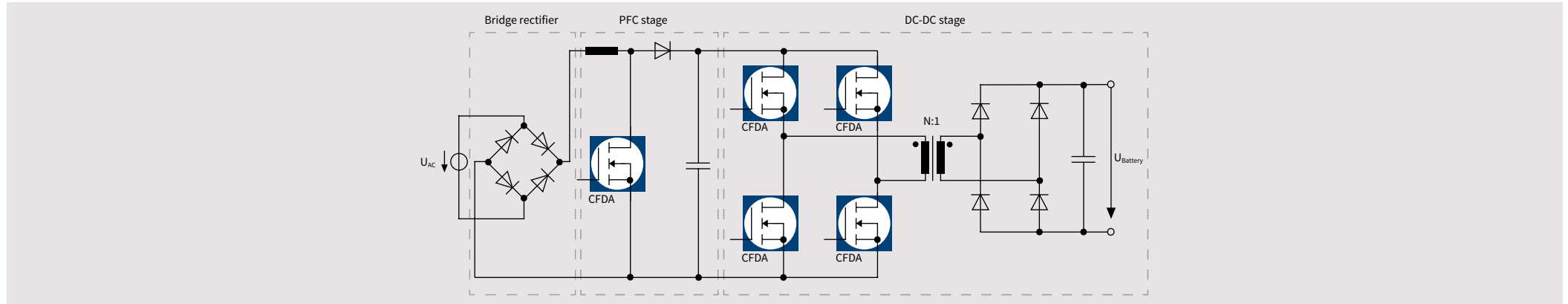
Phase shift ZVS (ZVS full-bridge)



Solar – single-phase solution, isolated



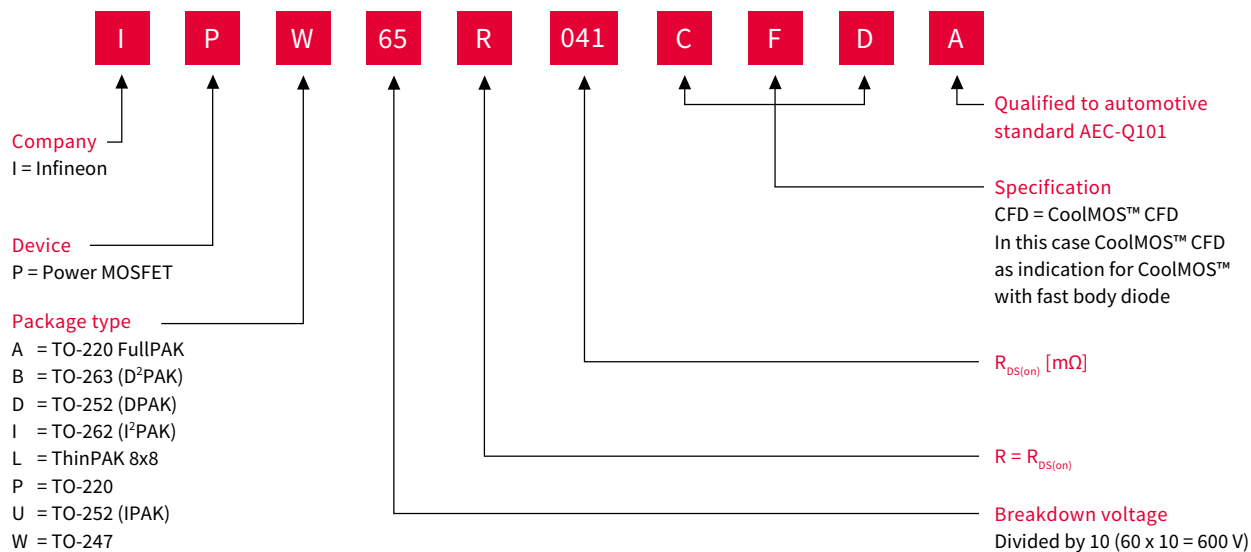
Automotive topology (on-board battery charger with ZVS phase shifted topology)







## Power MOSFETs nomenclature



CFD7 and CFDA are recommended for new designs.  
 For further information please go on:  
[www.infineon.com/CFD7](http://www.infineon.com/CFD7)  
[www.infineon.com/CFDA](http://www.infineon.com/CFDA)

## Where to buy

Infineon distribution partners and sales offices:  
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## Service hotline

Infineon offers its toll-free 0800/4001 service hotline as one central number, available 24/7 in English, Mandarin and German.

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- > China, mainland ..... 4001 200 951 (Mandarin/English)
- > India ..... 000 800 4402 951 (English)
- > USA ..... 1-866 951 9519 (English/German)
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