

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













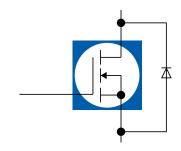


### CoolMOS™ CFD7 technology

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  $Q_{\rm rr}$  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  $Q_{\rm rr}$  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<sub>oss</sub>

- > 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<sub>DS(on)</sub>/package combinations

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

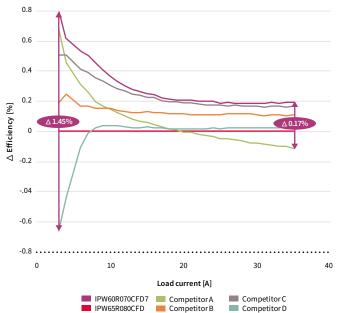
Specification	Symbol	IPW65R080CFD	IPW60R070CFD7	Benefits
On-state resistance: Maximum rating, 25°C	R <sub>DS(on)</sub>	80 mΩ	70 mΩ	Lower conduction losses
Total gate charge	Q <sub>g</sub>	170 nC	67 nC	Improved light load efficinecy
Breakdown voltage	V <sub>DS</sub>	650 V	600 V	
Reverse recovery charge	Q <sub>rr</sub>	1 μC	0.57 μC	Reduced switching losses
Energy stored in the output capacitance	E <sub>oss</sub> @ 400 V	12 µJ	7.7 µJ	Reduced switching losses
Reverse recovery time	t <sub>rr</sub>	180 nS	124 nS	Faster recovery

### What is the difference between CFD2 and CFDA?

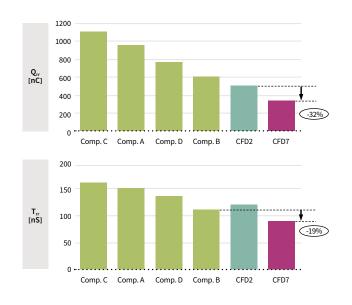
CoolMOS™ CFDA is based on the CFD2 technology, so the performance is comparable. CoolMOS™ CFD2 addresses consumer and industrial applications. The CFDA series is even qualified to automotive standard AEC-Q101, and therefore perfectly suitable for design into automotive applications.

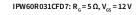
## Feature comparison between CFD2 and CFD7 and closest competition

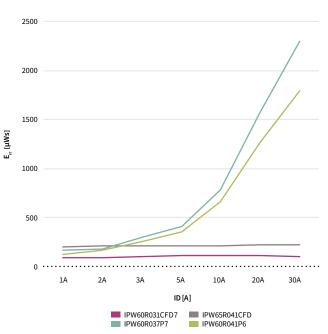




#### $Q_{rr}$ comparision of 170 m $\Omega$ CFD vs. 190 m $\Omega$ range competition





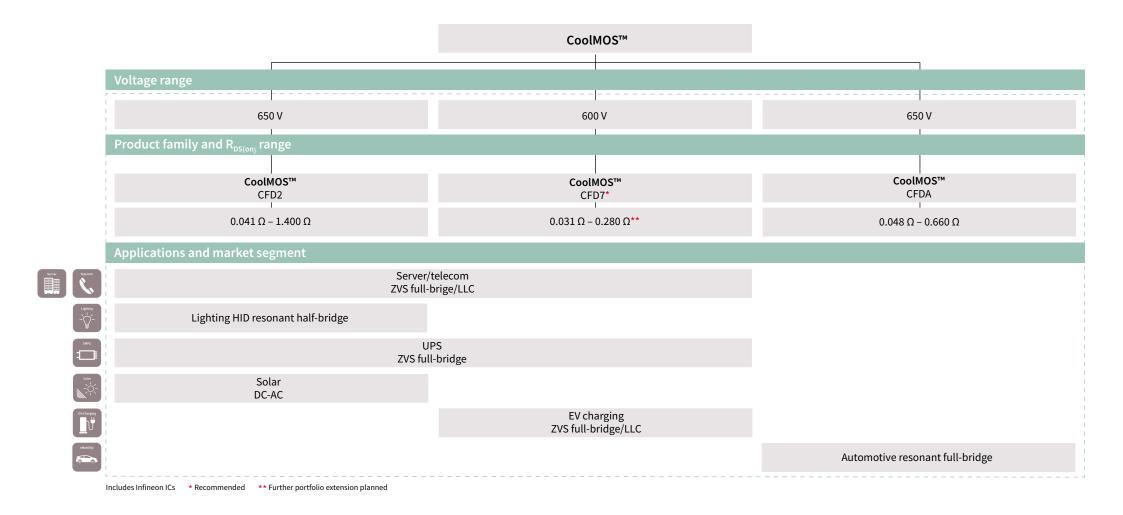


- > Improved energy efficiency over the whole load range
- > Light load efficiency improvement due to signifcant reduction of Q<sub>g</sub>
- Lower R<sub>DS(on)</sub> offers improvement of conduction losses and allows customers to go to higher power density designs

With CoolMOS™ CFD7 the world's best Q<sub>rr</sub> is reduced by another 32 percent leading to highest efficiency and highest reliabilty in resonant switching SMPS applications

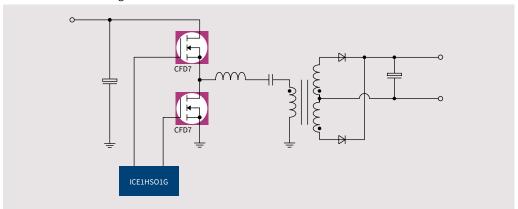
Due to BiC  $Q_{rr}$  CoolMOS<sup>TM</sup> CFD7 offers lowest reverse recover energy  $(E_{rr})$  at hard commutation events

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<sup>TM</sup> CFD7 offers highest reliabilty and an extra safety margin also under these conditions which makes it the ideal choice for resonant high power smps applications.

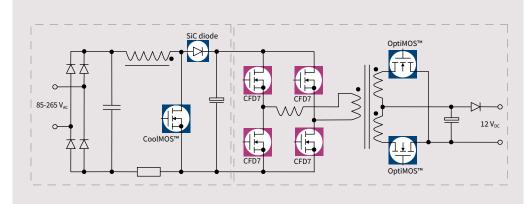


# Common CoolMOS™ applications and topologies

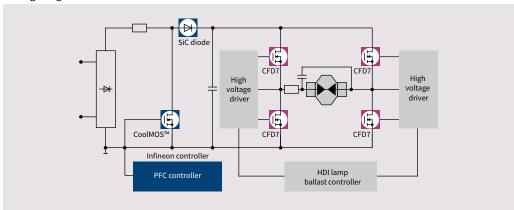
#### Resonant LLC half-bridge



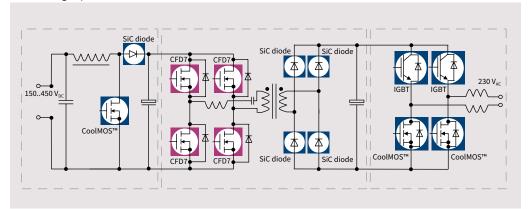
Phase shift ZVS (ZVS full-bridge)



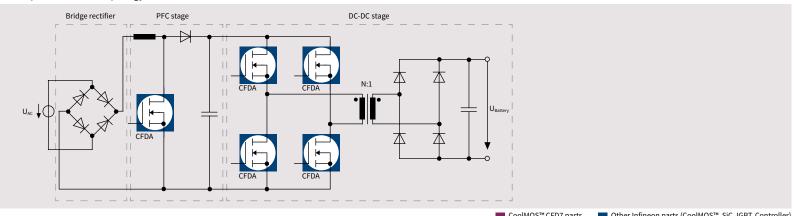
HID lighting



Solar – single-phase solution, isolated



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



# Available CoolMOS™ fast body diode portfolio

Industrial product portfolio

#### 600 V CoolMOS™ CFD7 SJ MOSFETs







R <sub>DS(on)</sub> [ <b>m</b> Ω]	ThinPAK 8x8	TO-252 DPAK	TO-262 I <sup>2</sup> PAK	TO-263 D²PAK	TO-220	TO-220 FullPAK	TO-247
360		IPD60R360CFD7*		IPB60R360CFD7*	IPP60R360CFD7*	IPA60R360CFD7*	
280		IPD60R280CFD7		IPB60R280CFD7*	IPP60R280CFD7	IPA60R280CFD7	
210/225	IPL60R225CFD7*	IPD60R210CFD7		IPB60R210CFD7*	IPP60R210CFD7	IPA60R210CFD7	
170/185	IPL60R185CFD7	IPD60R170CFD7		IPB60R170CFD7*	IPP60R170CFD7	IPA60R170CFD7	IPW60R170CFD7
145/160	IPL60R160CFD7	IPD60R145CFD7		IPB60R145CFD7*	IPP60R145CFD7	IPA60R145CFD7	IPW60R145CFD7
125/140	IPL60R140CFD7			IPB60R125CFD7*	IPP60R125CFD7	IPA60R125CFD7	IPW60R125CFD7
105/115	IPL60R115CFD7			IPB60R105CFD7*	IPP60R105CFD7		IPW60R105CFD7
90/95	IPL60R095CFD7			IPB60R090CFD7*	IPP60R090CFD7		IPW60R090CFD7
70/75	IPL60R075CFD7			IPB60R070CFD7*	IPP60R070CFD7		IPW60R070CFD7
55/60	IPL60R060CFD7			IPB60R055CFD7*			IPW60R055CFD7
40				IPB60R040CFD7*			IPW60R040CFD7
31							IPW60R031CFD7
24							IPW60R024CFD7*
18							IPW60R018CFD7

<sup>\*</sup> Coming soon

#### GEOV COOLMOSTM CEDS











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650 V COOLMOS ··· CFD2						an	
1400		IPD65R1K4CFD					
950		IPD65R950CFD					
660/725	IPL65R725CFD	IPD65R660CFD	IPI65R660CFD	IPB65R660CFD	IPP65R660CFD	IPA65R660CFD	IPW65R660CFD
420/460	IPL65R460CFD	IPD65R420CFD	IPI65R420CFD	IPB65R420CFD	IPP65R420CFD	IPA65R420CFD	IPW65R420CFD
310/340	IPL65R340CFD		IPI65R310CFD	IPB65R310CFD	IPP65R310CFD	IPA65R310CFD	IPW65R310CFD
190/210	IPL65R210CFD		IPI65R190CFD	IPB65R190CFD	IPP65R190CFD	IPA65R190CFD	IPW65R190CFD
150/165	IPL65R165CFD		IPI65R150CFD	IPB65R150CFD	IPP65R150CFD	IPA65R150CFD	IPW65R150CFD
110			IPI65R110CFD	IPB65R110CFD	IPP65R110CFD	IPA65R110CFD	IPW65R110CFD
80							IPW65R080CFD
41							IPW65R041CFD

### Automotive product portfolio

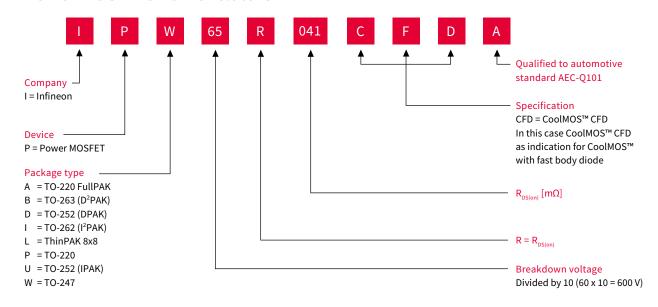
#### 650 V CoolMOS™ CFDA



660	IPD65R660CFDA	IPB65R660CFDA	IPP65R660CFDA	
420	IPD65R420CFDA			
310		IPB65R310CFDA	IPP65R310CFDA	
190		IPB65R190CFDA	IPP65R190CFDA	IPW65R190CFDA
150		IPB65R150CFDA	IPP65R150CFDA	IPW65R150CFDA
110		IPB65R110CFDA	IPP65R110CFDA	IPW65R110CFDA
80				IPW65R080CFDA
48				IPW65R048CFDA



### Power MOSFETs nomenclature



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

# Where to buy

Infineon distribution partners and sales offices: www.infineon.com/wheretobuy



Mobile product catalog

Mobile app for iOS and Android.

### 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)
- > Other countries ....... 00\* 800 951 951 951 (English/German)
- Direct access ......+49 89 234-0 (interconnection fee, German/English)

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