

Product Brief

600 V CoolMOS™ C7 series

Highest efficiency superjunction MOSFET for hard and soft switching applications (PFC and LLC)

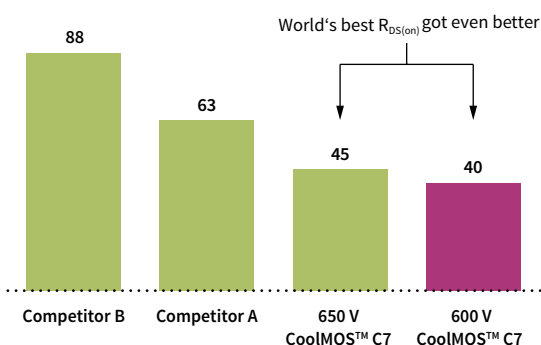
The new 600 V CoolMOS™ C7 series from Infineon offers a ~50 percent reduction in turn-off losses (E_{oss}) compared to the CoolMOS™ CP, offering a GaN-like level of performance in PFC, TTF and other hard switching topologies.

Efficiency and TCO (total cost of ownership) driven applications benefit from the higher efficiency offered by CoolMOS™ C7. Gains of 0.3 to 0.7 percent in PFC and 0.1 percent in LLC topologies can be achieved. In the case of a 2.5 kW server PSU, for example, using 600 V C7 MOSFETs in a TO-247 4pin package can result in energy cost reductions of ~10 percent for PSU energy loss.

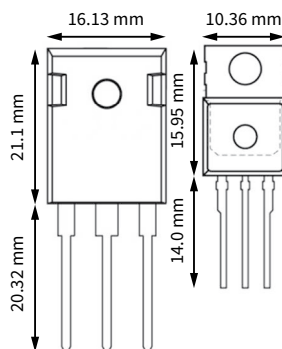
BOM (bill of material) cost driven applications can use the efficiency gained at full load by the combination of C7 and TO-247 4pin package. This is done by increasing the $R_{DS(on)}$ of the MOSFET so that it matches previous 3pin package full load efficiency enabling benefits in costs (i.e. 40 mΩ versus 70 mΩ device). Doubling the switching frequency can also save magnetic component material. Cost savings of up to 30 percent in copper windings and 45 percent in core (dependent on material used) can be achieved.

The 600 V CoolMOS™ C7 comes with the lowest $R_{DS(on)}$ in TO-220/TO-262/TO-263 and offers TO-220 replacement for TO-247 competitor parts

C7 best-in-class $R_{DS(on)}$ max. [mΩ] competitor comparison for TO-220 and D²PAK



Package size reduction



600 V C7 in TO-220 with 36 percent lower $R_{DS(on)}$ than nearest competitor

Key features

- > Reduced switching loss parameters such as Q_G , C_{oss} , enabling higher switching frequency
- > 50 percent E_{oss} reduction compared to older CP technology and close to GaN
- > Lowest $R_{DS(on)}$ * A in the world ($<1 \Omega \text{ mm}^2$)
- > Suitable for high-end resonant topologies

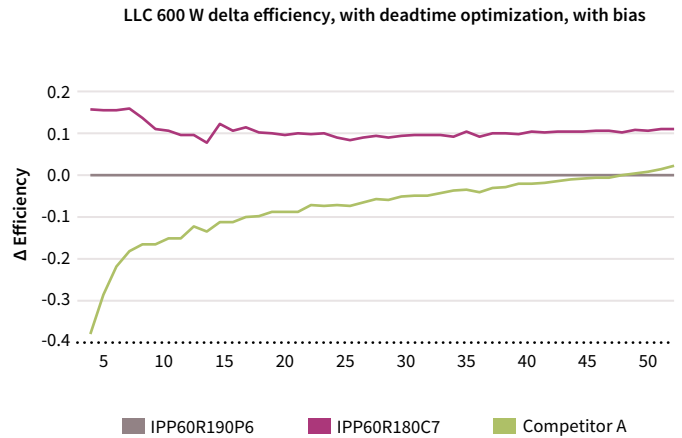
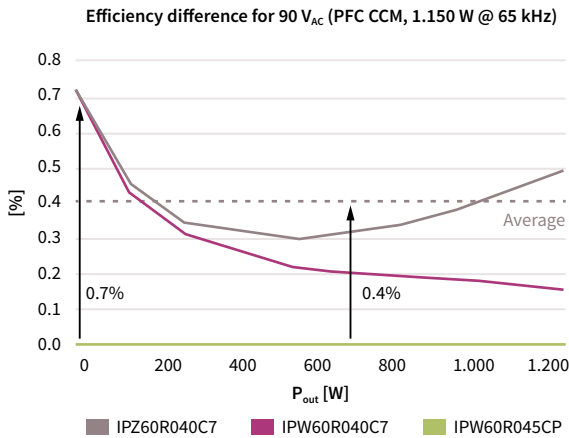
Key benefits

- > Doubling the switching frequency will reduce the size and cost of magnetic components (e.g. 65 kHz-130 kHz)
- > Increased efficiency in PFC and TTF topologies
- > Smaller packages for same $R_{DS(on)}$ lead to power density benefits
- > Suitable for high-end LLC circuits

Applications

- > Telecom
- > Server
- > High-end PC power
- > Solar
- > Industrial

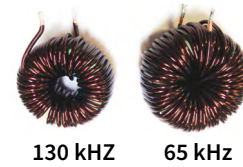
Highest efficiency in PFC (power factor correction) and resonant LLC



Device parameters	Competitor A	Competitor B	600 V CoolMOS™ C7 IPW60R040C7	Comments
$R_{DS(on)}$ max. [mΩ]	38	40	40	Similar $R_{DS(on)}$ for real comparison
Gate charge $Q_{G,typ}$ [nC]	185	135	107	Q_G, C_{oss}, E_{oss} to show advantages in switching losses
C_{oss} [pF]	200	140	85	
F.O.M $R_{DS(on)} * Q_G$ [Ω.nc]	7.0	5.4	4.3	Benefits over light load and full load

Status: May 2015

Choke example from Infineon 800 W 130 kHz demonstrator board



Similar losses at higher frequency leads to cost reduction of magnetic components with improved power density.

Product portfolio 600 V CoolMOS™ C7 series

$R_{DS(on)}$ [mΩ]	TO-220	TO-263 (D ² PAK)	TO-220 FullIPAK	TO-247	TO-247 4pin	TO-252 (DPAK)	ThinPAK 8X8
17				IPW60R017C7	IPZ60R017C7		
40	IPP60R040C7	IPB60R040C7		IPW60R040C7	IPZ60R040C7		
60	IPP60R060C7	IPB60R060C7	IPA60R060C7	IPW60R060C7	IPZ60R060C7		
65							IPL60R065C7
99	IPP60R099C7	IPB60R099C7	IPA60R099C7	IPW60R099C7	IPZ60R099C7		
104							IPL60R104C7
120	IPP60R120C7	IPB60R120C7	IPA60R120C7	IPW60R120C7			
125							IPL60R125C7
180	IPP60R180C7	IPB60R180C7	IPA60R180C7	IPW60R180C7		IPD60R180C7	
185							IPL60R185C7

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