

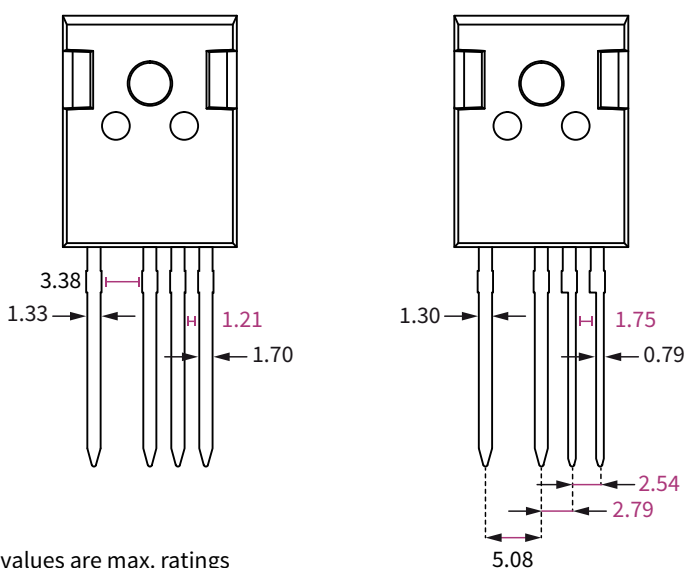
## Product brief

# CoolMOS™ SJ MOSFET in TO-247 4pin package

## A new innovative package using Kelvin Source concept

With new generations of power switches becoming faster and faster, the effect of the parasitic elements of package and board limits increasingly system performance. In many applications the switching losses are significantly increased by the negative feedback caused by the parasitic inductance in the source lead of the power switch. An effective measure to overcome this problem is to provide an additional connection to the source (Kelvin connection), that is used as a reference potential for the gate driving voltage, thereby eliminating the effect of voltage drops over the source inductance. The achievable efficiency improvement, resulting from faster switching transients, can in fact be significant.

Infineon offers the TO-247 4pin in conjunction with the CoolMOS™ SJ MOSFET technologies 600 V C7, 650 V C7 and 600 V P6. With the 600 V CoolMOS™ P7 Infineon introduces an improved version of the standard TO-247 4pin package. The TO-247 4pin with asymmetric leads comes along with 0.54 mm increased creepage distance between the critical leads and enables smoother wave soldering and reduced board yield loss.



displayed values are max. ratings

### Key features

- > 4<sup>th</sup> pin (Kelvin Source)
- > Increased creepage distance between high voltage pins
- > Gate signal optimization
- > Asymmetric leads increase critical pin distance

### Key benefits

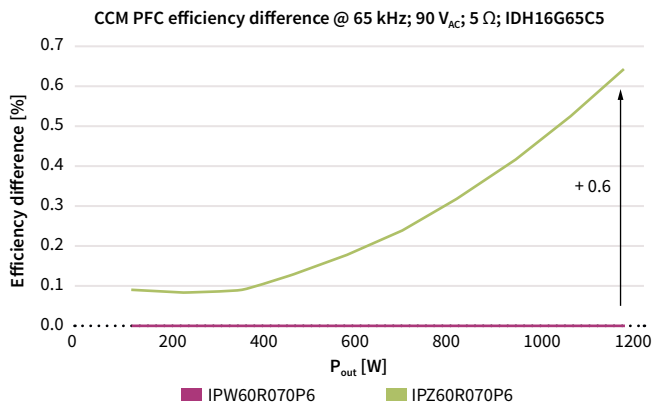
- > Reduced parasitic source inductance effects on the gate circuit enabling faster switching and increased efficiency
- > Using benefits of Kelvin Source efficiency allows usage of higher MOSFET  $R_{DS(on)}$  and reduction of BOM cost
- > Creepage distance meets 5000 m altitude requirement
- > Easier to design by customer
- > Asymmetric leads enable simplified wave soldering and improved board yield loss

### Applications

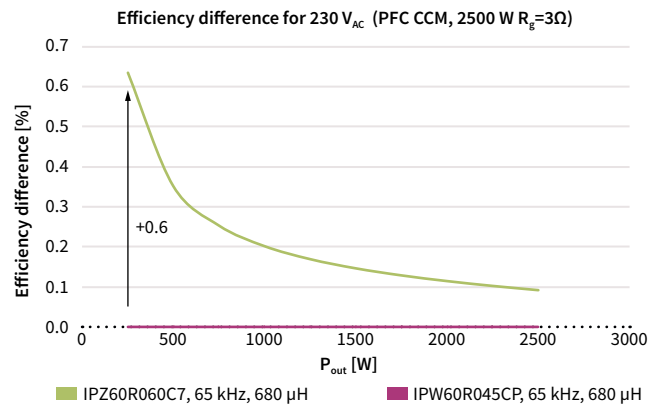
- > Telecom
- > Server
- > Solar
- > Industrial



**Benefits in efficiency against 3 pin variants (600 V P6) & benefit in light load and cost by reducing  $R_{DS(on)}$  value (600 V C7)**

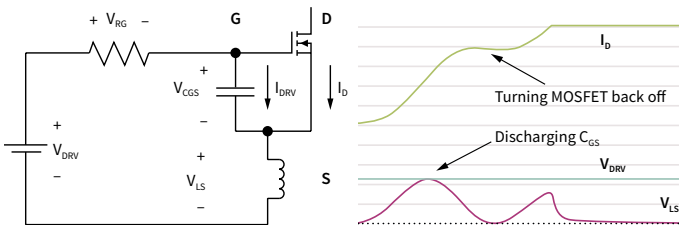


Performance gain of 0.6% full load efficiency (TO-247 4pin 600 V P6 vs. TO-247-3 600 V P6).

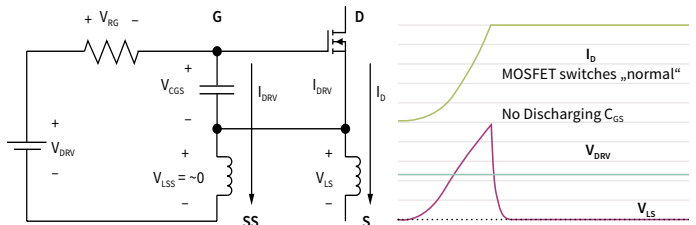


Lower full load losses with 4pin part allow for next 'smaller' MOSFET (60 mΩ instead of 45 mΩ) enabling a customer to have BOM cost reduction from the smaller MOSFET  $R_{DS(on)}$  with better low load efficiency.

**The TO-247 4pin concept - TO-247 vs. TO-247 4pin**



- > Re-turn<sub>on</sub> of MOSFET triggered by discharge of CGS
- > Loss of efficiency
- > Above simulation caused E<sub>on</sub> losses of 130 μJ



- > Clean waveform secured by 4th pin
- > >2x reduction of turn-on losses
- > Above simulation using TO-247 4pin reduced losses by half E<sub>on</sub> = 63 μJ

**CoolMOS™ SJ MOSFET TO-247 4pin Portfolio**

Series	650 V C7	600 V C7	600 V P6	600 V P7
180 mΩ				IPZA60R180P7
120/125 mΩ			IPZ60R125P6	IPZA60R120P7
95/99 mΩ	IPZ65R095C7	IPZ60R099C7	IPZ60R099P6	IPZA60R099P7
70/80 mΩ			IPZ60R070P6	IPZA60R080P7
60/65 mΩ	IPZ65R065C7	IPZ60R060C7		IPZA60R060P7
37/40/41/45 mΩ	IPZ65R045C7	IPZ60R040C7	IPZ60R041P6	IPZA60R037P7
17/19 mΩ	IPZ65R019C7	IPZ60R017C7		

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