

MOSFET

Metal Oxide Semiconductor Field Effect Transistor

CoolMOS™ C6 600V

600V CoolMOS™ C6 Power Transistor
IPU60R1K4C6

Data Sheet

Rev. 2.0
Final

Industrial & Multimarket

1 Description

CoolMOS™ is a revolutionary technology for high voltage power MOSFETs, designed according to the superjunction (SJ) principle and pioneered by Infineon Technologies. CoolMOS™ C6 series combines the experience of the leading SJ MOSFET supplier with high class innovation. The resulting devices provide all benefits of a fast switching SJ MOSFET while not sacrificing ease of use. Extremely low switching and conduction losses make switching applications even more efficient, more compact, lighter and cooler.

Features

- Extremely low losses due to very low FOM $R_{ds(on)} \cdot Q_g$ and E_{oss}
- Very high commutation ruggedness
- Easy to use/drive
- Pb-free plating
- Qualified for industrial grade applications according to JEDEC (J-STD20 and JESD22)

Applications

PFC stages, hard switching PWM stages and resonant switching PWM stages for e.g. PC Silverbox, Adapter, LCD & PDP TV, Lighting, Server, Telecom and UPS.

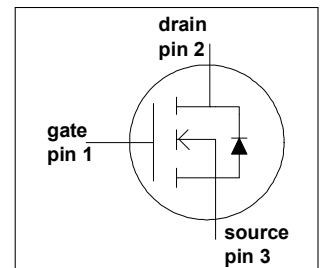


Table 1 Key Performance Parameters

Parameter	Value	Unit
$V_{DS} @ T_{j \max}$	650	V
$R_{DS(on),max}$	1.4	Ω
Q_g, typ	9.4	nC
$I_D, pulse$	8	A
$E_{oss} @ 400V$	1	μJ
Body diode di/dt	500	A/ μs

Type / Ordering Code	Package	Marking	Related Links
IPU60R1K4C6	PG-TO 251	6R1K4C6	see Appendix A

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2 Maximum ratings

at $T_j = 25^\circ\text{C}$, unless otherwise specified

Table 2 Maximum ratings

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Continuous drain current ¹⁾	I_D			3.2	A	$T_C = 25^\circ\text{C}$
				2.0		$T_C = 100^\circ\text{C}$
Pulsed drain current ²⁾	$I_{D,pulse}$			8	A	$T_C = 25^\circ\text{C}$
Avalanche energy, single pulse	E_{AS}			26	mJ	$I_D = 0.6\text{A}$, $V_{DD} = 50\text{V}$ (see table 18)
Avalanche energy, repetitive	E_{AR}			0.09	mJ	$I_D = 0.6\text{A}$, $V_{DD} = 50\text{V}$
Avalanche current, repetitive	I_{AR}			0.6	A	
MOSFET dv/dt ruggedness	dv/dt			50	V/ns	$V_{DS} = 0 \dots 480\text{V}$
Gate source voltage	V_{GS}	-20		20	V	static
		-30		30		AC ($f > 1\text{ Hz}$)
Operating and storage temperature	T_j, T_{stg}	-55		150	$^\circ\text{C}$	
Continuous diode forward current	I_S			2.8	A	$T_C = 25^\circ\text{C}$
Diode pulse current	$I_{S,pulse}$			8	A	$T_C = 25^\circ\text{C}$
Reverse diode dv/dt ³⁾	dv/dt			15	V/ns	$V_{DS} = 0 \dots 480\text{V}$, $I_{SD} \leq I_D$, $T_j = 25^\circ\text{C}$ (see table 16)
Maximum diode commutation speed	di _f /dt			500	A/ μs	
Power dissipation	P_{tot}			28.4	W	$T_C = 25^\circ\text{C}$

¹⁾ Limited by $T_{j\text{ max}}$. Maximum duty cycle $D=0.75$

²⁾ Pulse width t_p limited by $T_{j\text{ max}}$

³⁾ Identical low side and high side switch with identical R_G

3 Thermal characteristics

Table 3 Thermal characteristics IPAK

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Thermal resistance, junction - case	R_{thJC}			4.4	°C/W	
Thermal resistance, junction - ambient ¹⁾	R_{thJA}			62	°C/W	leaded
			35			SMD version, device on PCB, 6cm ² cooling area
Soldering temperature, wave- & reflowsoldering allowed	T_{sold}			260	°C	1.6 mm (0.063 in.) from case for 10s

¹⁾ Device on 40mm*40mm*1.5mm one layer epoxy PCB FR4 with 6cm² copper area (thickness 70µm) for drain connection. PCB is vertical without air stream cooling.