

Applications

- Telecom and Data-Com off-Line SMPS
- Uninterruptible Power Supply

Benefits

- Low On-Resistance
- High Speed Switching
- Low Gate Drive Current Due to Improved Gate Charge Characteristics
- Improved Avalanche Ruggedness and Dynamic dv/dt, Fully Characterized Avalanche Voltage and Current

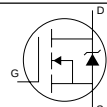
V_{DSS}	$R_{DS(on)}$ typ.	I_D
500V	0.073 Ω	43A



Absolute Maximum Ratings

	Parameter	Max.	Units
I_D @ $T_C = 25^\circ\text{C}$	Continuous Drain Current, V_{GS} @ 10V	43	A
I_D @ $T_C = 100^\circ\text{C}$	Continuous Drain Current, V_{GS} @ 10V	27	
I_{DM}	Pulsed Drain Current ①	170	
P_D @ $T_C = 25^\circ\text{C}$	Power Dissipation	450	W
	Linear Derating Factor	3.6	W/ $^\circ\text{C}$
V_{GS}	Gate-to-Source Voltage	± 30	V
dv/dt	Peak Diode Recovery dv/dt ③	19	V/ns
T_J	Operating Junction and	-55 to + 150	$^\circ\text{C}$
T_{STG}	Storage Temperature Range		
	Soldering Temperature, for 10 seconds (1.6mm from case)	300	

Diode Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions	
I _S	Continuous Source Current (Body Diode)	—	—	43	A	MOSFET symbol showing the integral reverse p-n junction diode. 	
I _{SM}	Pulsed Source Current (Body Diode) ①	—	—	170			
V _{SD}	Diode Forward Voltage	—	—	1.5	V		T _J = 25°C, I _S = 43A, V _{GS} = 0V ④
t _{rr}	Reverse Recovery Time	—	680	—	ns		T _J = 125°C, I _F = 43A di/dt = 100A/μs ④
Q _{rr}	Reverse RecoveryCharge	—	15	—	μC		
I _{RRM}	Reverse RecoveryCurrent	—	41	—	A		
t _{on}	Forward Turn-On Time	Intrinsic turn-on time is negligible (turn-on is dominated by L _S +L _D)					

Typical SMPS Topologies

- Hard Switching Full and Half Bridge Circuits
- Hard Switching Single Transistor Circuits
- Power Factor Correction Circuits

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IRFPS43N50K

PROVISIONAL

International
IR Rectifier

Static @ $T_J = 25^\circ\text{C}$ (unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	500	—	—	V	$V_{GS} = 0V, I_D = 250\mu A$
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	0.50	—	V/°C	Reference to 25°C , $I_D = 1mA$ ⑥
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	0.073	0.086	Ω	$V_{GS} = 10V, I_D = 26A$ ④
$V_{GS(th)}$	Gate Threshold Voltage	3.5	—	5.5	V	$V_{DS} = V_{GS}, I_D = 250\mu A$
I_{DSS}	Drain-to-Source Leakage Current	—	—	50	μA	$V_{DS} = 500V, V_{GS} = 0V$
		—	—	250	μA	$V_{DS} = 400V, V_{GS} = 0V, T_J = 125^\circ\text{C}$
I_{GSS}	Gate-to-Source Forward Leakage	—	—	100	nA	$V_{GS} = 30V$
	Gate-to-Source Reverse Leakage	—	—	-100		$V_{GS} = -30V$

Dynamic @ $T_J = 25^\circ\text{C}$ (unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
g_{fs}	Forward Transconductance	29	—	—	S	$V_{DS} = 50V, I_D = 26A$
Q_g	Total Gate Charge	—	—	335	nC	$I_D = 43A$
Q_{gs}	Gate-to-Source Charge	—	—	130		$V_{DS} = 400V$
Q_{gd}	Gate-to-Drain ("Miller") Charge	—	—	155		$V_{GS} = 10V$ ④
$t_{d(on)}$	Turn-On Delay Time	—	22	—	ns	$V_{DD} = 250V$
t_r	Rise Time	—	74	—		$I_D = 43A$
$t_{d(off)}$	Turn-Off Delay Time	—	72	—		$R_G = 0.85\Omega$
t_f	Fall Time	—	71	—		$V_{GS} = 10V$ ④
C_{iss}	Input Capacitance	—	9100	—	pF	$V_{GS} = 0V$
C_{oss}	Output Capacitance	—	930	—		$V_{DS} = 25V$
C_{rss}	Reverse Transfer Capacitance	—	56	—		$f = 1.0MHz$

Avalanche Characteristics

Symbol	Parameter	Typ.	Max.	Units
E_{AS}	Single Pulse Avalanche Energy②	—	1060	mJ
I_{AR}	Avalanche Current①	—	43	A
E_{AR}	Repetitive Avalanche Energy①	—	45	mJ

Thermal Resistance

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case	—	0.28	°C/W
$R_{\theta CS}$	Case-to-Sink, Flat, Greased Surface	0.24	—	
$R_{\theta JA}$	Junction-to-Ambient	—	40	

Notes:

- ① Repetitive rating; pulse width limited by max. junction temperature.
 ② Starting $T_J = 25^\circ\text{C}$, $L = 1.1mH$, $R_G = 25\Omega$, $I_{AS} = 43A$
 ③ $I_{SD} \leq 43A$, $di/dt \leq 680A/\mu s$, $V_{DD} \leq V_{(BR)DSS}$, $T_J \leq 150^\circ\text{C}$

- ④ Pulse width $\leq 300\mu s$; duty cycle $\leq 2\%$.

- ⑤ C_{oss} eff. is a fixed capacitance that gives the same charging time as C_{oss} while V_{DS} is rising from 0 to 80% V_{DSS}

Super-247™ Package Outline

