

International
IR Rectifier

PROVISIONAL

PD- 93932

SMPS MOSFET

IRFPS60N50C

HEXFET® Power MOSFET

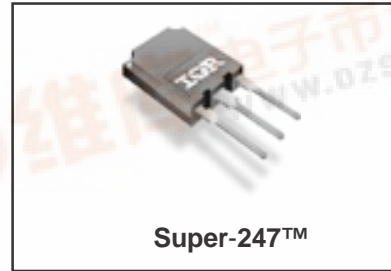
Applications

- Switch Mode Power Supply (SMPS)
- Uninterruptible Power Supply
- High Speed Power Switching

V_{DSS}	R_{DS(on)} typ.	I_D
500V	0.038Ω	60A

Benefits

- Low Gate Charge Qg results in Simple Drive Requirement
- Improved Gate, Avalanche and Dynamic dv/dt Ruggedness
- Fully Characterized Capacitance and Avalanche Voltage and Current



Absolute Maximum Ratings

	Parameter	Max.	Units
I _D @ T _C = 25°C	Continuous Drain Current, V _{GS} @ 10V	60	A
I _D @ T _C = 100°C	Continuous Drain Current, V _{GS} @ 10V	38	
I _{DM}	Pulsed Drain Current ①	240	
P _D @ T _C = 25°C	Power Dissipation	390	W
	Linear Derating Factor	3.1	W/°C
V _{GS}	Gate-to-Source Voltage	± 20	V
dv/dt	Peak Diode Recovery dv/dt ③	5.0	V/ns
T _J	Operating Junction and	-55 to + 150	
T _{STG}	Storage Temperature Range		
	Soldering Temperature, for 10 seconds (1.6mm from case)	300	°C
	Recommended clip force	20	N

Avalanche Characteristics

Symbol	Parameter	Typ.	Max.	Units
E _{AS}	Single Pulse Avalanche Energy②	—	600	mJ
I _{AR}	Avalanche Current①	—	60	A
E _{AR}	Repetitive Avalanche Energy①	—	39	mJ

Thermal Resistance

Symbol	Parameter	Typ.	Max.	Units
R _{θJC}	Junction-to-Case	—	0.32	°C/W
R _{θCS}	Case-to-Sink, Flat, Greased Surface	0.24	—	
R _{θJA}	Junction-to-Ambient	—	40	



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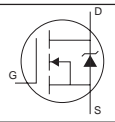
Static @ $T_J = 25^\circ\text{C}$ (unless otherwise specified)

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	—	0.68	—	V/ $^\circ\text{C}$	Reference to $25^\circ\text{C}, I_D = 1\text{mA}$ ⑥
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	0.038	0.043	Ω	$V_{GS} = 10V, I_D = 36A$ 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	—	—	25	μA	$V_{DS} = 500V, V_{GS} = 0V$ $V_{DS} = 400V, V_{GS} = 0V, T_J = 125^\circ\text{C}$
I_{GSS}	Gate-to-Source Forward Leakage	—	—	100	nA	$V_{GS} = 20V$
	Gate-to-Source Reverse Leakage	—	—	-100	nA	$V_{GS} = -20V$

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

Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
g_{fs}	Forward Transconductance	34	—	—	S	$V_{DS} = 50V, I_D = 36A$
Q_g	Total Gate Charge	—	330	—	nC	$I_D = 36A$ $V_{DS} = 400V$ $V_{GS} = 10V, \text{④}$
Q_{gs}	Gate-to-Source Charge	—	77	—		
Q_{gd}	Gate-to-Drain ("Miller") Charge	—	160	—		
$t_{d(on)}$	Turn-On Delay Time	—	39	—	ns	$V_{DD} = 250V$ $I_D = 36A$ $R_G = 1.3\Omega$ $V_{GS} = 10V, \text{④}$
t_r	Rise Time	—	49	—		
$t_{d(off)}$	Turn-Off Delay Time	—	94	—		
t_f	Fall Time	—	11	—		
C_{iss}	Input Capacitance	—	10760	—	pF	$V_{GS} = 0V$ $V_{DS} = 25V$ $f = 1.0\text{MHz}$ $V_{GS} = 0V, V_{DS} = 1.0V, f = 1.0\text{MHz}$ $V_{GS} = 0V, V_{DS} = 400V, f = 1.0\text{MHz}$ $V_{GS} = 0V, V_{DS} = 0V \text{ to } 400V \text{ ⑤}$
C_{oss}	Output Capacitance	—	6120	—		
C_{rss}	Reverse Transfer Capacitance	—	240	—		
C_{oss}	Output Capacitance	—	25760	—		
C_{oss}	Output Capacitance	—	240	—		
$C_{oss \text{ eff.}}$	Effective Output Capacitance	—	780	—		

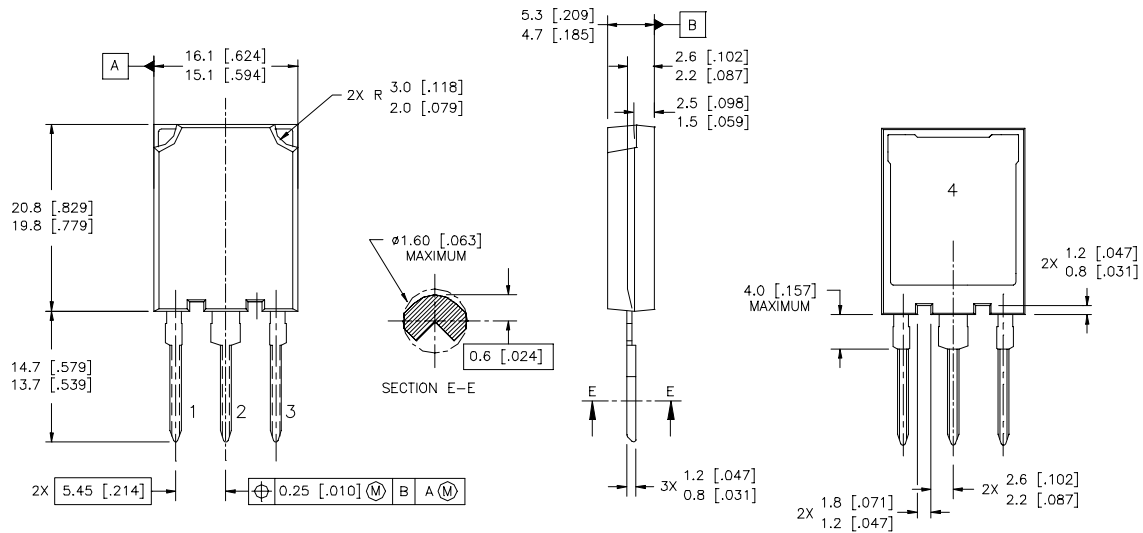
Diode Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	—	—	60	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I_{SM}	Pulsed Source Current (Body Diode) ①	—	—	240		
V_{SD}	Diode Forward Voltage	—	—	1.5	V	$T_J = 25^\circ\text{C}, I_S = 36A, V_{GS} = 0V$ ④
t_{rr}	Reverse Recovery Time	—	920	1380	ns	$T_J = 125^\circ\text{C}, I_F = 36A$
Q_{rr}	Reverse Recovery Charge	—	20	30	μC	$di/dt = 100A/\mu\text{s}$ ④
t_{on}	Forward Turn-On Time	Intrinsic turn-on time is negligible (turn-on is dominated by L_S+L_D)				

Notes:

- ① Repetitive rating; pulse width limited by max. junction temperature.
- ② Starting $T_J = 25^\circ\text{C}$, $L = 0.93\text{mH}$, $R_G = 25\Omega$, $I_{AS} = 36A$,
- ③ $I_{SD} \leq 36A$, $di/dt \leq 42A/\mu\text{s}$, $V_{DD} \leq V_{(BR)DSS}$, $T_J \leq 150^\circ\text{C}$
- ④ Pulse width $\leq 300\mu\text{s}$; duty cycle $\leq 2\%$.

Super-247™ Package Outline



- NOTES:
1. DIMENSIONS & TOLERANCING PER ASME Y14.5M-1994
 2. CONTROLLING DIMENSION: MILLIMETER
 3. DIMENSIONS ARE SHOWN IN MILLIMETRES [INCHES]

LEAD ASSIGNMENTS

MOSFET	IGBT
1 - GATE	1 - GATE
2 - DRAIN	2 - COLLECTOR
3 - SOURCE	3 - EMITTER
4 - DRAIN	4 - COLLECTOR