

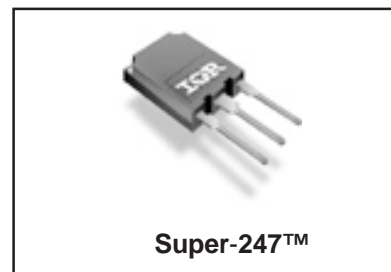
**Applications**

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

V <sub>DSS</sub>	R <sub>DS(on)</sub> typ.	I <sub>D</sub>
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 <sub>D</sub> @ T <sub>C</sub> = 25°C	Continuous Drain Current, V <sub>GS</sub> @ 10V	60	A
I <sub>D</sub> @ T <sub>C</sub> = 100°C	Continuous Drain Current, V <sub>GS</sub> @ 10V	38	
I <sub>DM</sub>	Pulsed Drain Current ①	240	
P <sub>D</sub> @ T <sub>C</sub> = 25°C	Power Dissipation	390	W
	Linear Derating Factor	3.1	W/°C
V <sub>GS</sub>	Gate-to-Source Voltage	± 20	V
dv/dt	Peak Diode Recovery dv/dt ③	5.0	V/ns
T <sub>J</sub> T <sub>STG</sub>	Operating Junction and Storage Temperature Range	-55 to + 150	°C
	Soldering Temperature, for 10 seconds (1.6mm from case )	300	
	Recommended clip force	20	

**Avalanche Characteristics**

Symbol	Parameter	Typ.	Max.	Units
E <sub>AS</sub>	Single Pulse Avalanche Energy②	—	600	mJ
I <sub>AR</sub>	Avalanche Current①	—	60	A
E <sub>AR</sub>	Repetitive Avalanche Energy①	—	39	mJ

**Thermal Resistance**

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

# IRFPS60N50C

PROVISIONAL

International  
IR Rectifier

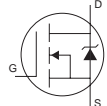
## Static @ $T_J = 25^\circ\text{C}$ (unless otherwise specified)

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	—	0.68	—	V/°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	$\Omega$	$V_{GS} = 10V, I_D = 36A$ 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	$\mu A$	$V_{DS} = 500V, V_{GS} = 0V$
		—	—	250		$V_{DS} = 400V, V_{GS} = 0V, T_J = 125^\circ\text{C}$
$I_{GSS}$	Gate-to-Source Forward Leakage	—	—	100	nA	$V_{GS} = 20V$
	Gate-to-Source Reverse Leakage	—	—	-100		$V_{GS} = -20V$

## 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	$I_D = 36A$
$Q_{gs}$	Gate-to-Source Charge	—	77	—		$V_{DS} = 400V$
$Q_{gd}$	Gate-to-Drain ("Miller") Charge	—	160	—		$V_{GS} = 10V, \text{④}$
$t_{d(on)}$	Turn-On Delay Time	—	39	—	ns	$V_{DD} = 250V$
$t_r$	Rise Time	—	49	—		$I_D = 36A$
$t_{d(off)}$	Turn-Off Delay Time	—	94	—		$R_G = 1.3\Omega$
$t_f$	Fall Time	—	11	—		$V_{GS} = 10V, \text{④}$
$C_{iss}$	Input Capacitance	—	10760	—	pF	$V_{GS} = 0V$
$C_{oss}$	Output Capacitance	—	6120	—		$V_{DS} = 25V$
$C_{rSS}$	Reverse Transfer Capacitance	—	240	—		$f = 1.0\text{MHz}$
$C_{oss}$	Output Capacitance	—	25760	—		$V_{GS} = 0V, V_{DS} = 1.0V, f = 1.0\text{MHz}$
$C_{oss}$	Output Capacitance	—	240	—		$V_{GS} = 0V, V_{DS} = 400V, f = 1.0\text{MHz}$
$C_{oss\ eff.}$	Effective Output Capacitance	—	780	—		$V_{GS} = 0V, V_{DS} = 0V \text{ to } 400V \text{ ⑤}$

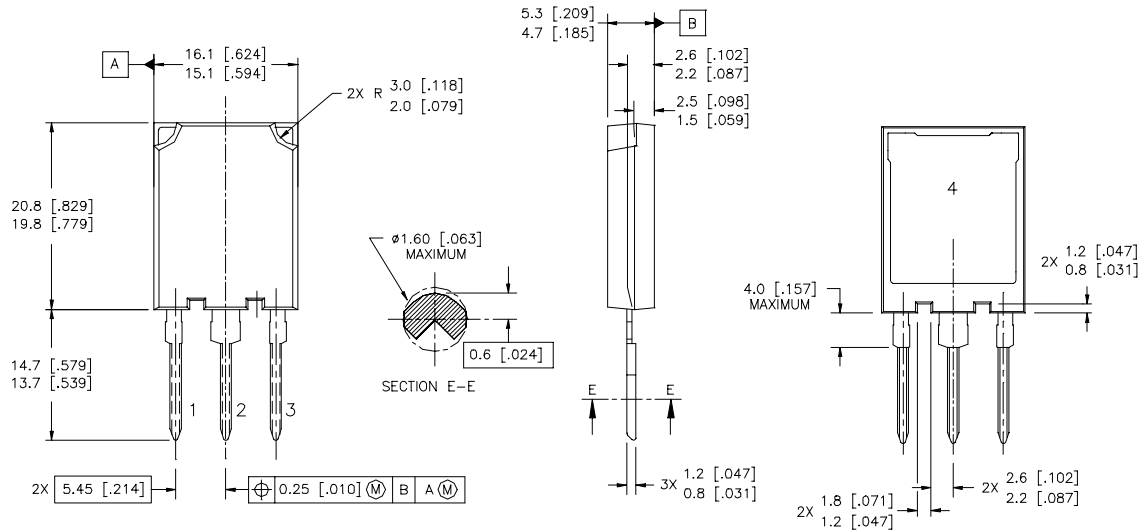
## Diode Characteristics

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	$\mu C$	$di/dt = 100A/\mu s$ 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  $I_{SD} \leq 36A$ ,  $di/dt \leq 42A/\mu s$ ,  $V_{DD} \leq V_{(BR)DSS}$ ,  $T_J \leq 150^\circ\text{C}$
- ④ Pulse width  $\leq 300\mu s$ ; duty cycle  $\leq 2\%$ .

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