

**Applications**

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

$V_{DSS}$	$R_{DS(on) \max}$	$I_D$
<b>600V</b>	<b>0.045Ω</b>	<b>59A</b>

**Benefits**

- Low Gate Charge  $Q_g$  Reduces Drive Required
- Improved Gate Resistance for Faster Switching
- Fully Characterized Capacitance and Avalanche Voltage and Current
- Lowest Conduction Loss in Package Outline
- Effective  $C_{OSS}$  specified (See AN 1001)



**Absolute Maximum Ratings**

	<b>Parameter</b>	<b>Max.</b>	<b>Units</b>
$I_D$ @ $T_C = 25^\circ\text{C}$	Continuous Drain Current, $V_{GS}$ @ 10V	59	A
$I_D$ @ $T_C = 100^\circ\text{C}$	Continuous Drain Current, $V_{GS}$ @ 10V	37	
$I_{DM}$	Pulsed Drain Current ①	240	
$P_D$ @ $T_C = 25^\circ\text{C}$	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	TBD	V/ns
$T_J$	Operating Junction and	-40 to + 150	
$T_{STG}$	Storage Temperature Range	-55 to + 150	
	Soldering Temperature, for 10 seconds	300 (1.6mm from case )	
	Recommended clip force	20	
			N

**Applicable Off Line SMPS Topologies:**

- Power Factor Correction Boost
- Full Bridge

# IRFPS59N60C

International  
IR Rectifier

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

	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	600	—	—	V	$V_{GS} = 0V, I_D = 250\mu A$
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	0.43	—	V/ $^\circ\text{C}$	Reference to $25^\circ\text{C}, I_D = 1\text{mA}$ Ⓞ
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	—	0.045	$\Omega$	$V_{GS} = 10V, I_D = 35A$ ④
$V_{GS(th)}$	Gate Threshold Voltage	4.0	—	6.0	V	$V_{DS} = V_{GS}, I_D = 250\mu A$
$I_{DSS}$	Drain-to-Source Leakage Current	—	—	100	$\mu A$	$V_{DS} = 600V, V_{GS} = 0V$
		—	—	500		$V_{DS} = 480V, V_{GS} = 0V, T_J = 125^\circ\text{C}$
$I_{GSS}$	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)

	Parameter	Min.	Typ.	Max.	Units	Conditions
$g_{fs}$	Forward Transconductance	35	—	—	S	$V_{DS} = 50V, I_D = 35A$
$Q_g$	Total Gate Charge	—	—	490	nC	$I_D = 35A$
$Q_{gs}$	Gate-to-Source Charge	—	—	100		$V_{DS} = 360V$
$Q_{gd}$	Gate-to-Drain ("Miller") Charge	—	—	250		$V_{GS} = 10V$ ④
$t_{d(on)}$	Turn-On Delay Time	—	33	—	ns	$V_{DD} = 300V$
$t_r$	Rise Time	—	110	—		$I_D = 35A$
$t_{d(off)}$	Turn-Off Delay Time	—	86	—		$R_G = 1.0\Omega$
$t_f$	Fall Time	—	18	—		$R_D = 8.5\Omega$ ④
$C_{iss}$	Input Capacitance	—	10490	—	pF	$V_{GS} = 0V$
$C_{oss}$	Output Capacitance	—	5140	—		$V_{DS} = 25V$
$C_{riss}$	Reverse Transfer Capacitance	—	280	—		$f = 1.0\text{MHz}$ ,
$C_{oss}$	Output Capacitance	—	24050	—		$V_{GS} = 0V, V_{DS} = 1.0V, f = 1.0\text{MHz}$
$C_{oss}$	Output Capacitance	—	220	—		$V_{GS} = 0V, V_{DS} = 480V, f = 1.0\text{MHz}$
$C_{oss\ eff.}$	Effective Output Capacitance	—	370	—		$V_{GS} = 0V, V_{DS} = 0V$ to $480V$ ⑤

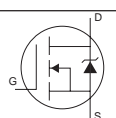
## Avalanche Characteristics

	Parameter	Typ.	Max.	Units
$E_{AS}$	Single Pulse Avalanche Energy②	—	TBD	mJ
$I_{AR}$	Avalanche Current①	—	35	A
$E_{AR}$	Repetitive Avalanche Energy①	—	39	mJ

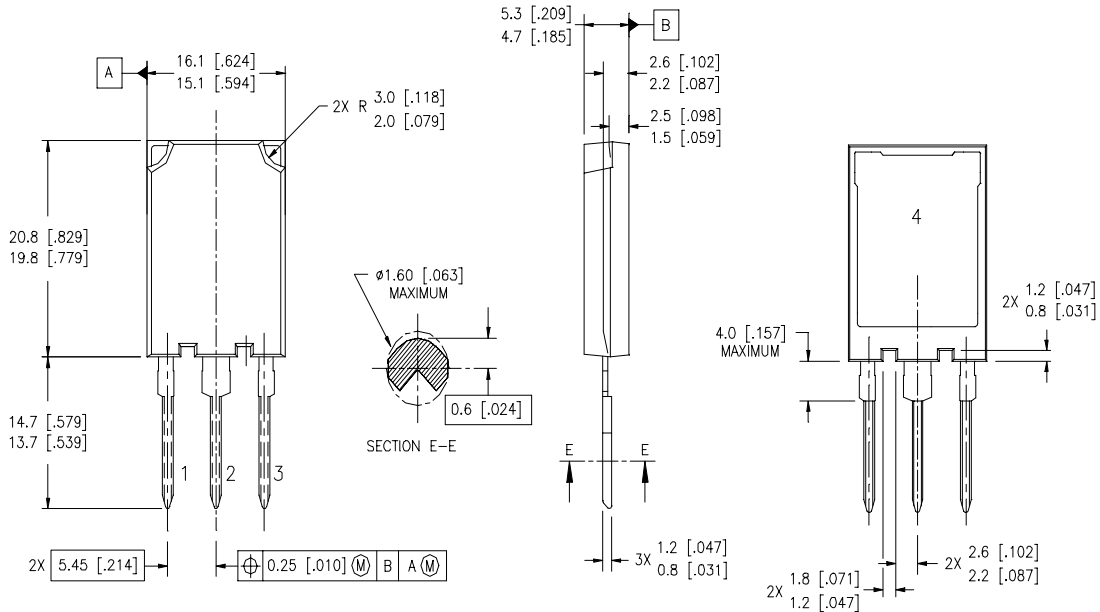
## Thermal Resistance

	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case	—	0.32	$^\circ\text{C/W}$
$R_{\theta CS}$	Case-to-Sink, Flat, Greased Surface	0.24	—	
$R_{\theta JA}$	Junction-to-Ambient	—	40	

## Diode Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
$I_S$	Continuous Source Current (Body Diode)	—	—	59	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	—	—	1.2	V	$T_J = 25^\circ\text{C}, I_S = 35A, V_{GS} = 0V$ ④
$t_{rr}$	Reverse Recovery Time	—	770	1150	ns	$T_J = 25^\circ\text{C}, I_F = 35A$
$Q_{rr}$	Reverse Recovery Charge	—	20	30	$\mu\text{C}$	$di/dt = 100A/\mu\text{s}$ ④
$t_{on}$	Forward Turn-On Time	Intrinsic turn-on time is negligible (turn-on is dominated by $L_S+L_D$ )				

## 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

**Notes:**

- ① Repetitive rating; pulse width limited by max. junction temperature.
- ② Starting  $T_J = 25^\circ\text{C}$ ,  $L = \text{TBDmH}$   
 $R_G = 25\Omega$ ,  $I_{AS} = 59\text{A}$ ,  $dv/dt = \text{TBD V/ns}$ .
- ③  $I_{SD} \leq \text{TBDA}$ ,  $di/dt \leq \text{TBDA}/\mu\text{s}$ ,  $V_{DD} \leq V_{(BR)DSS}$ ,  
 $T_J \leq 150^\circ\text{C}$
- ④ Pulse width  $\leq 300\mu\text{s}$ ; duty cycle  $\leq 2\%$ .