PD - 90380

International
IOR Rectifier

PROVISIONAL

SMPS MOSFET

IRFPS59N60C

HEXFET® Power MOSFET

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

V_{DSS}	$R_{DS(on)}$ max	I_D
600V	**0.045Ω**	**59A**

Benefits
- Low Gate Charge Qg 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)

Super-247™

Absolute Maximum Ratings

	Parameter	Max.	Units
I_D @ T_C = 25°C	Continuous Drain Current, V_{GS} @ 10V	59	A
I_D @ T_C = 100°C	Continuous Drain Current, V_{GS} @ 10V	37	
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	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

Static @ T_J = 25°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 = 250µA
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	0.43	—	V/°C	Reference to 25°C, I_D = 1mA⑥
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	—	0.045	Ω	V_{GS} = 10V, I_D = 35A ④
$V_{GS(th)}$	Gate Threshold Voltage	4.0	—	6.0	V	V_{DS} = V_{GS}, I_D = 250µA
I_{DSS}	Drain-to-Source Leakage Current	—	—	100	µA	V_{DS} = 600V, V_{GS} = 0V
		—	—	500		V_{DS} = 480V, V_{GS} = 0V, T_J = 125°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°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 = 1.0Ω
t_f	Fall Time	—	18	—		R_D = 8.5Ω ④
C_{iss}	Input Capacitance	—	10490	—	pF	V_{GS} = 0V
C_{oss}	Output Capacitance	—	5140	—		V_{DS} = 25V
C_{rss}	Reverse Transfer Capacitance	—	280	—		f = 1.0MHz,
C_{oss}	Output Capacitance	—	24050	—		V_{GS} = 0V, V_{DS} = 1.0V, f = 1.0MHz
C_{oss}	Output Capacitance	—	220	—		V_{GS} = 0V, V_{DS} = 480V, f = 1.0MHz
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

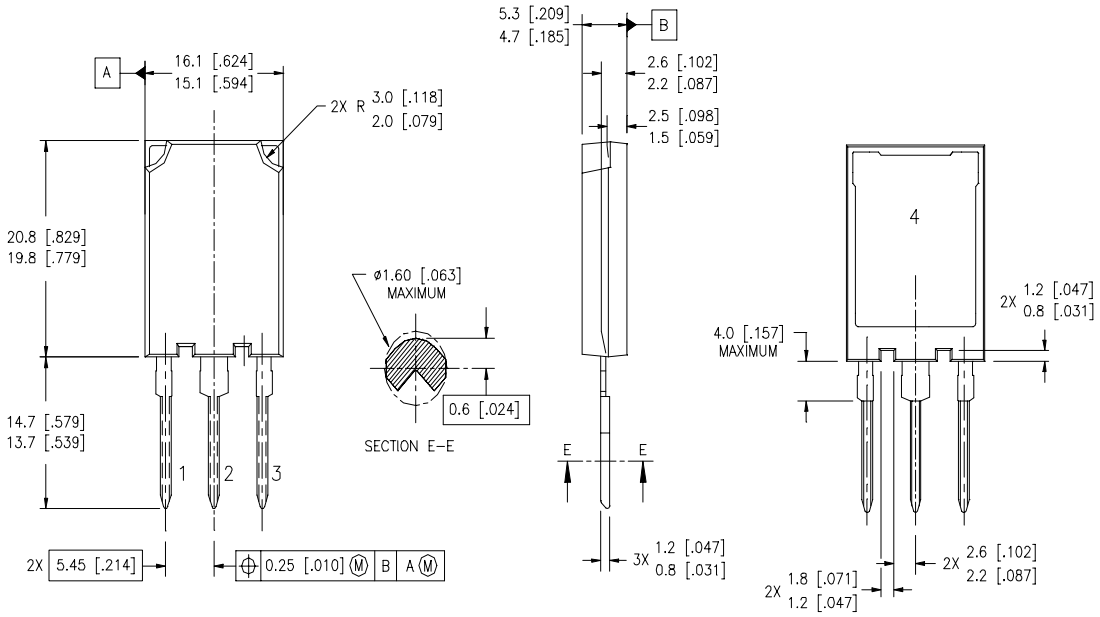
Thermal Resistance

	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case	—	0.32	°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°C, I_S = 35A, V_{GS} = 0V ④
t_{rr}	Reverse Recovery Time	—	770	1150	ns	T_J = 25°C, I_F = 35A
Q_{rr}	Reverse RecoveryCharge	—	20	30	µC	di/dt = 100A/µs 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°C, L = TBDmH
R_G = 25Ω, I_{AS} = 59A, dv/dt=TBD V/ns.

③ I_{SD} ≤ TBDA, di/dt ≤ TBDA/µs, V_{DD} ≤ $V_{(BR)DSS}$, T_J ≤ 150°C

④ Pulse width ≤ 300µs; duty cycle ≤ 2%.

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Data and specifications subject to change without notice. 11/99