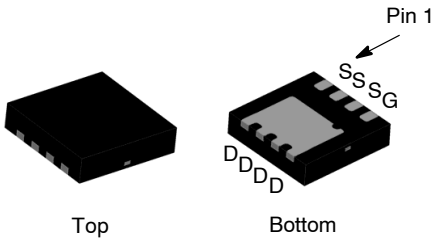
MOSFET – P-Channel, POWERTRENCH®
-60 V, -13.5 A, 100 mΩ

FDMC5614P, FDMC5614P-L701



Top Bottom

WDFN8 3.3x3.3, 0.65P
CASE 511DQ

FDMC5614P, FDMC5614P−L701

General Description

This P−Channel MOSFET is a rugged gate version of **onsemi**'s advanced POWERTRENCH process. It has been optimized for power management applications requiring a wide range of gate drive voltage ratings (4.5 V – 20 V).

Features

- Max $r_{DS(on)}$ = 100 mΩ at V_{GS} = −10 V, I_D = −5.7 A
- Max $r_{DS(on)}$ = 135 mΩ at V_{GS} = −4.5 V, I_D = −4.4 A
- Low Gate Charge
- Fast Switching Speed
- High Performance Trench Technology for Extremely Low $r_{DS(on)}$
- High Power and Current Handling Capability
- These Devices are Pb−Free and are RoHS Compliant

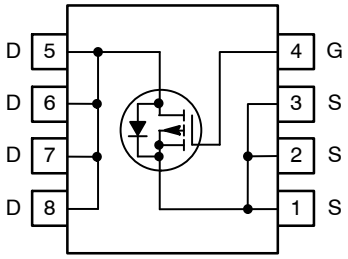
Applications

- Power Management
- Load Switch
- Battery Protection

MARKING DIAGRAM

$Y	= Logo
&Z	= Assembly Location
&2	= Date Code (Year and Week)
&K	= Lot Run Traceability Code
FDMC	= Specific Device Code
5614P	= Specific Device Code

PIN ASSIGNMENT



P−Channel MOSFET

ORDERING INFORMATION

See detailed ordering and shipping information on page 6 of this data sheet.

MOSFET MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

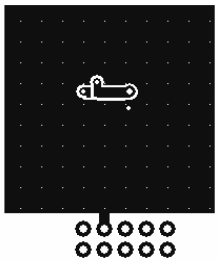
Symbol	Parameter			Rating	Unit
V_{DS}	Drain to Source Voltage			−60	V
V_{GS}	Gate to Source Voltage			±20	V
I_D	Drain Current	Continuous (Package Limited)	T_C = 25°C	−13.5	A
		Continuous (Silicon Limited)	T_C = 25°C	−14	
		Continuous (Note 1a)	T_A = 25°C	−5.7	
		Pulsed		−23	
P_D	Power Dissipation		T_C = 25°C	42	W
	Power Dissipation (Note 1a)		T_A = 25°C	2.1	
T_J, T_{STG}	Operating and Storage Junction Temperature Range			−55 to + 150	°C

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

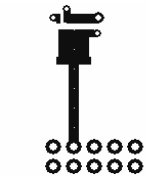
THERMAL CHARACTERISTICS

Symbol	Parameter	Rating	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case	3.0	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient (Note 1a)	60	

1. $R_{\theta JA}$ is determined with the device mounted on a 1 in^2 oz copper pad on a 1.5 x 1.5 in. board of FR−4 material. $R_{\theta JC}$ is guaranteed by design while $R_{\theta JA}$ is determined by the user's board design.
   a. $R_{\theta JA}$ = 60°C/W when mounted on a 1 in2 pad of 2 oz copper, 1.5' x1.5' x 0.062' thick PCB.
   b. $R_{\theta JA}$ = 135°C/W when mounted on a minimum pad of 2 oz copper.



a. 60°C/W when mounted on a 1 in^2 pad of 2 oz copper



b. 135°C/W when mounted on a minimum pad of 2 oz copper

2. Pulse Test: Pulse Width < 300 μs, Duty cycle < 2.0%.

ELECTRICAL CHARACTERISTICS (T_J = 25°C unless otherwise noted)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
BV_{DSS}	Drain to Source Breakdown Voltage	I_D = −250 μA, V_{GS} = 0 V	−60	−	−	V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	I_D = −250 μA, referenced to 25°C	−	−54	−	mV/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = −48 V, V_{GS} = 0 V	−	−	−1	μA
I_{GSS}	Gate to Source Leakage Current	V_{GS} = ±20 V, V_{DS} = 0 V	−	−	±100	nA
ON CHARACTERISTICS						
$V_{GS(th)}$	Gate to Source Threshold Voltage	V_{GS} = V_{DS}, I_D = −250 μA	−1.0	−1.95	−3	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate to Source Threshold Voltage Temperature Coefficient	I_D = −250 μA, referenced to 25°C	−	4.7	−	mV/°C
$r_{DS(on)}$	Static Drain to Source On Resistance	V_{GS} = −10 V, I_D = −5.7 A	−	84	100	mΩ
		V_{GS} = −4.5 V, I_D = −4.4 A	−	108	135	
		V_{GS} = −10 V, I_D = −5.7 A, T_J = 125°C	−	140	168	
g_{FS}	Forward Transconductance	V_{DS} = −15 V, I_D = −5.7 A	−	11	−	S
DYNAMIC CHARACTERISTICS						
C_{iss}	Input Capacitance	V_{DS} = −30 V, V_{GS} = 0 V, f = 1 MHz	−	795	1055	pF
C_{oss}	Output Capacitance		−	140	185	pF
C_{rss}	Reverse Transfer Capacitance		−	60	90	pF
SWITCHING CHARACTERISTICS						
$t_{d(on)}$	Turn−On Delay Time	V_{DD} = −30 V, I_D = −1.0 A, V_{GS} = −10 V, R_{GEN} = 6 Ω	−	10	21	ns
t_r	Rise Time		−	11	23	ns
$t_{d(off)}$	Turn−Off Delay Time		−	32	65	ns
t_f	Fall Time		−	11	22	ns
$Q_{g(TOT)}$	Total Gate Charge at 10 V	V_{GS} = −10 V, V_{DD} = −30 V, I_D = −5.7 A	−	15	20	nC
Q_{gs}	Gate to Source Gate Charge		−	1.6	2.1	nC
Q_{gd}	Gate to Drain “Miller” Charge		−	2.7	3.5	nC
DRAIN−SOURCE DIODE CHARACTERISTICS						
V_{SD}	Source to Drain Diode Forward Voltage	V_{GS} = 0 V, I_S = −3.2 A	−	−0.8	−1.2	V
t_{rr}	Reverse Recovery Time	I_F = −3.2 A, di/dt = 100 A/μs	−	−	36	ns
Q_{rr}	Reverse Recovery Charge		−	−	29	nC

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

TYPICAL CHARACTERISTICS (T_J = 25°C unless otherwise noted)

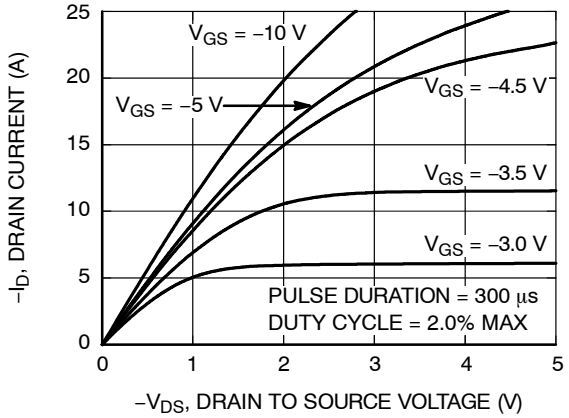


Figure 1. On Region Characteristics

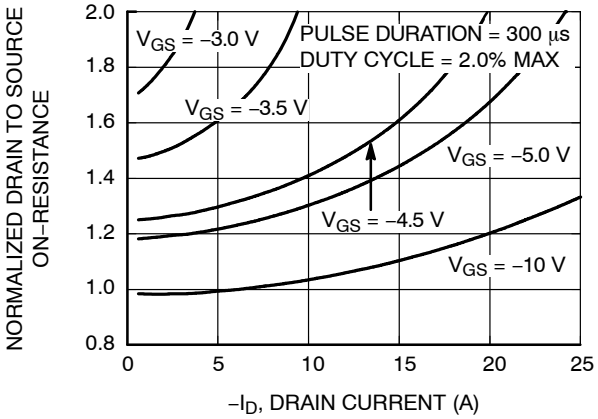


Figure 2. Normalized On−Resistance vs. Drain Current and Gate Voltage

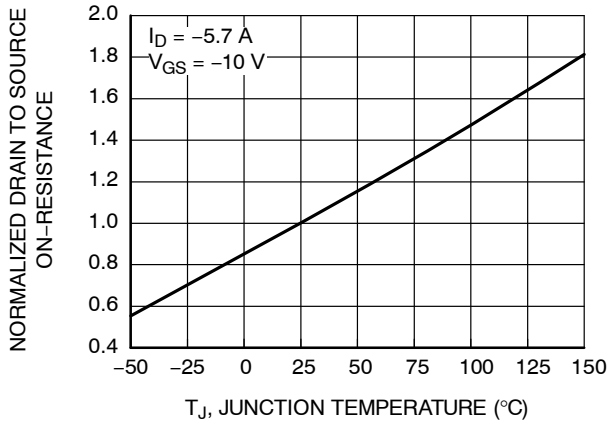


Figure 3. Normalized On Resistance vs. Junction Temperature

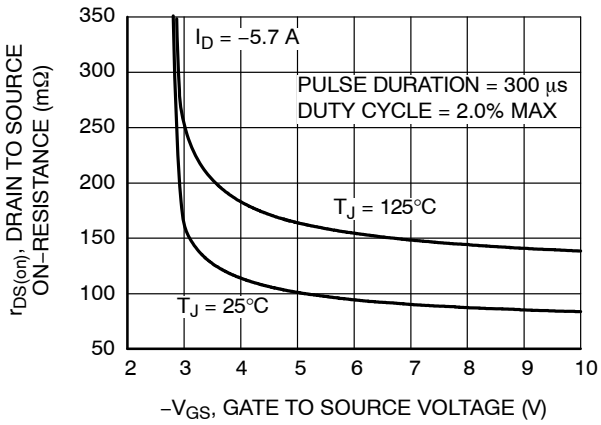


Figure 4. On−Resistance vs. Gate to Source Voltage

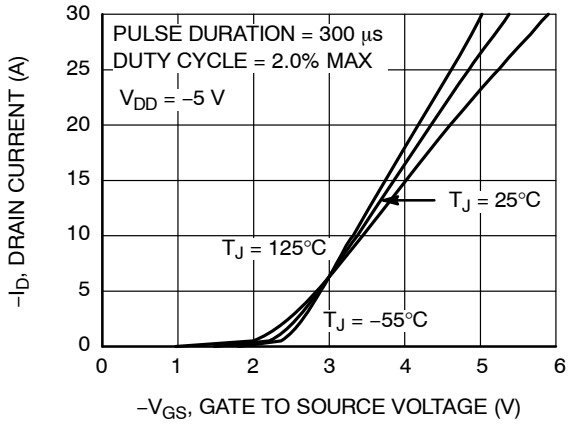


Figure 5. Transfer Characteristics

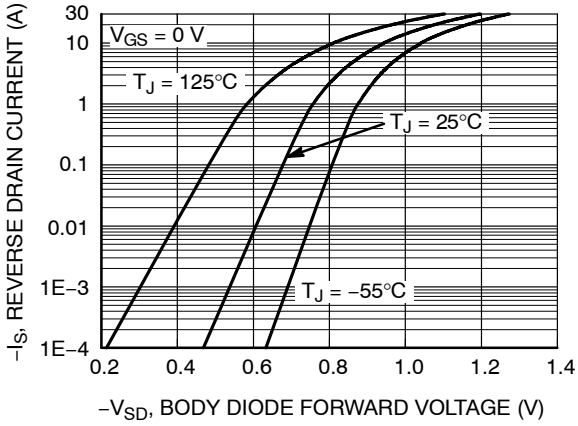


Figure 6. Source to Drain Diode Forward Voltage vs. Source Current

TYPICAL CHARACTERISTICS (T_J = 25°C unless otherwise noted) (continued)

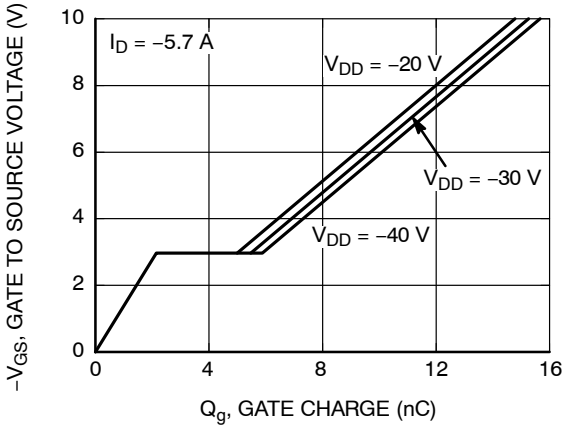


Figure 7. Gate Charge Characteristics

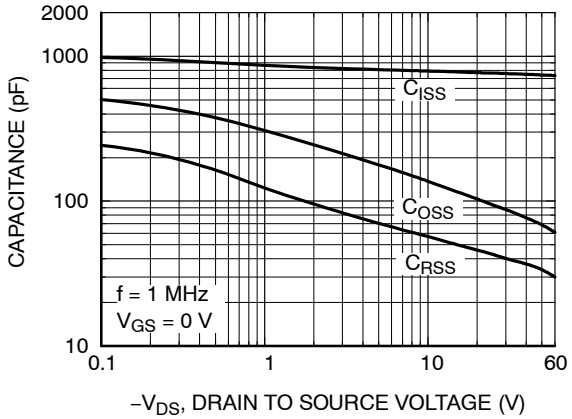


Figure 8. Capacitance vs. Drain to Source Voltage

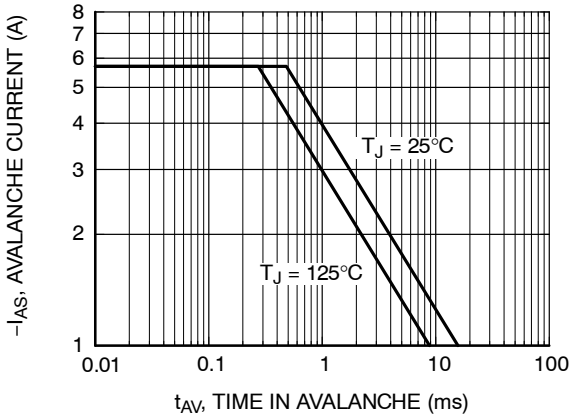


Figure 9. Unclamped Inductive Switching Capability

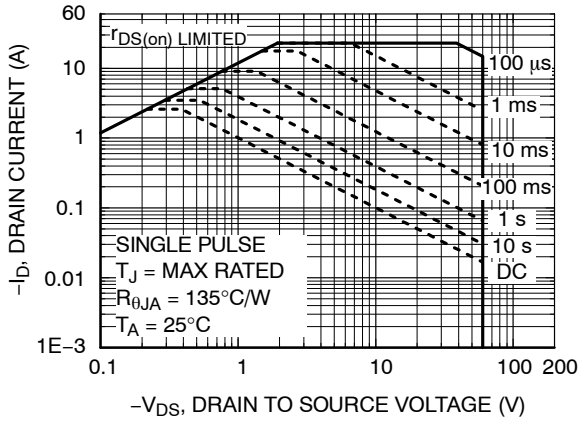


Figure 10. Forward Bias Safe Operating Area

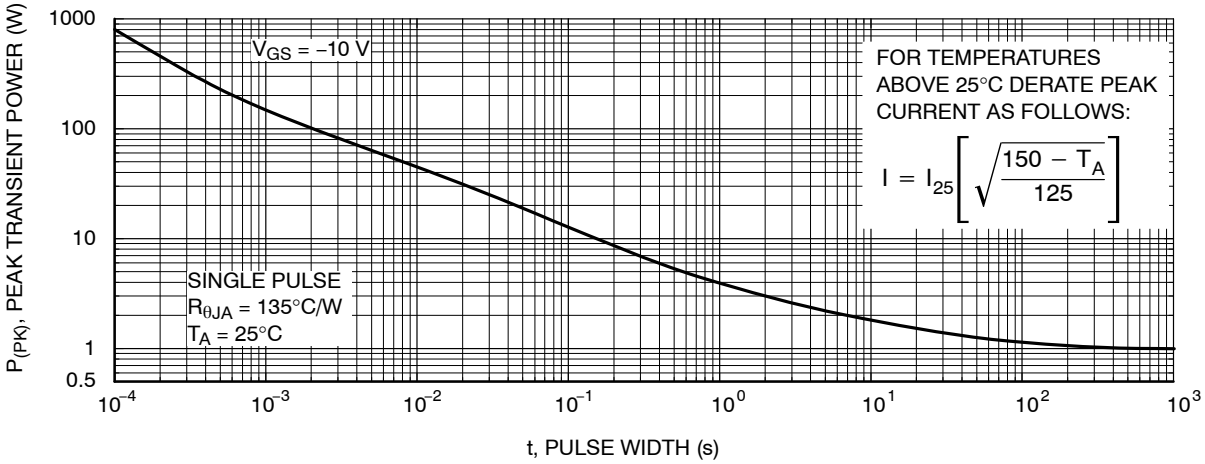


Figure 11. Single Pulse Maximum Power Dissipation

TYPICAL CHARACTERISTICS (T_J = 25°C unless otherwise noted) (continued)

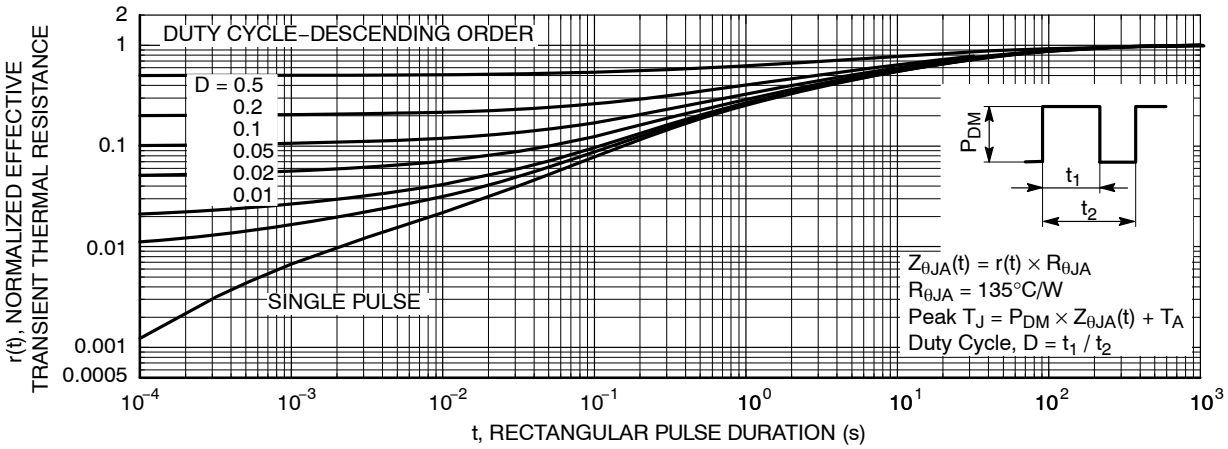


Figure 12. Transient Thermal Response Curve

ORDERING INFORMATION

Device	Device Marking	Package Type	Reel Size	Tape Width	Shipping†
FDMC5614P	FDMC5614P	WDFN8 3.3x3.3, 0.65P Power 33 (Pb−Free)	7”	8 mm	3000 / Tape & Reel
FDMC5614P−L701	FDMC5614P	WDFN8 3.3x3.3, 0.65P Power 33 (Pb−Free)	7”	8 mm	3000 / Tape & Reel

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

ADDITIONAL INFORMATION

TECHNICAL PUBLICATIONS:
Technical Library: www.onsemi.com/design/resources/technical−documentation
onsemi Website: www.onsemi.com

ONLINE SUPPORT: www.onsemi.com/support
For additional information, please contact your local Sales Representative at www.onsemi.com/support/sales