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October 2014

FDMS7676

N-Channel PowerTrench® MOSFET

30 V, 5.5 mΩ

Features

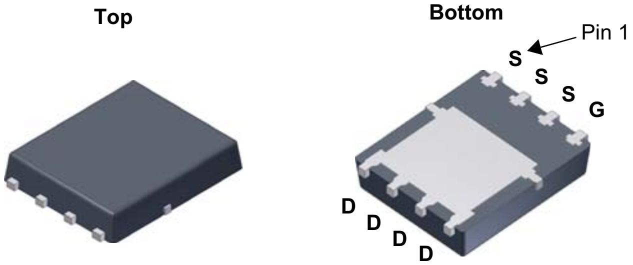
- Max $r_{DS(on)}$ = 5.5 mΩ at V_{GS} = 10 V, I_D = 19 A
- Max $r_{DS(on)}$ = 7.6 mΩ at V_{GS} = 4.5 V, I_D = 15 A
- Advanced Package and Silicon design for low $r_{DS(on)}$ and high efficiency
- Next generation enhanced body diode technology, engineered for soft recovery. Provides Schottky-like performance with minimum EMI in sync buck converter applications
- MSL1 robust package design
- 100% UIL tested
- RoHS Compliant

General Description

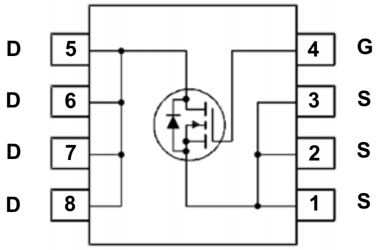
This N-Channel MOSFET has been designed specifically to improve the overall efficiency and to minimize switch node ringing of DC/DC converters using either synchronous or conventional switching PWM controllers. It has been optimized for low gate charge, low $r_{DS(on)}$, fast switching speed and body diode reverse recovery performance.

Applications

- IMVP Vcore Switching for Notebook
- VRM Vcore Switching for Desktop and Server
- OringFET / Load Switch
- DC-DC Conversion



Power 56



MOSFET Maximum Ratings T_A = 25 °C unless otherwise noted

Symbol	Parameter	Ratings	Units
V_{DS}	Drain to Source Voltage	30	V
V_{GS}	Gate to Source Voltage (Note 4)	±20	V
I_D	Drain Current -Continuous (Package limited) T_C = 25 °C	28	A
	-Continuous (Silicon limited) T_C = 25 °C	76	
	-Continuous T_A = 25 °C (Note 1a)	16	
	-Pulsed	90	
E_{AS}	Single Pulse Avalanche Energy (Note 3)	72	mJ
P_D	Power Dissipation T_C = 25 °C	48	W
	Power Dissipation T_A = 25 °C (Note 1a)	2.5	
T_J, T_{STG}	Operating and Storage Junction Temperature Range	-55 to +150	°C

Thermal Characteristics

$R_{\theta JC}$	Thermal Resistance, Junction to Case	2.6	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient (Note 1a)	50	

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDMS7676	FDMS7676	Power 56	13 ”	12 mm	3000 units

Electrical Characteristics T_J = 25 °C unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units

Off Characteristics

BV_{DSS}	Drain to Source Breakdown Voltage	I_D = 250 μA, V_{GS} = 0 V	30			V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	I_D = 250 μA, referenced to 25 °C		15		mV/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 24 V, V_{GS} = 0 V			1	μA
I_{GSS}	Gate to Source Leakage Current, Forward	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	1.25	2.0	3.0	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate to Source Threshold Voltage Temperature Coefficient	I_D = 250 μA, referenced to 25 °C		-7		mV/°C
$r_{DS(on)}$	Static Drain to Source On Resistance	V_{GS} = 10 V, I_D = 19 A		3.8	5.5	mΩ
		V_{GS} = 4.5 V, I_D = 15 A		5.4	7.6	
		V_{GS} = 10 V, I_D = 19 A, T_J = 125 °C		5.2	7.5	
g_{FS}	Forward Transconductance	V_{DS} = 5 V, I_D = 19 A		64		S

Dynamic Characteristics

C_{iss}	Input Capacitance	V_{DS} = 15 V, V_{GS} = 0 V, f = 1 MHz		2225	2960	pF
C_{oss}	Output Capacitance			685	910	pF
C_{rss}	Reverse Transfer Capacitance			90	130	pF
R_g	Gate Resistance			0.7	1.5	Ω

Switching Characteristics

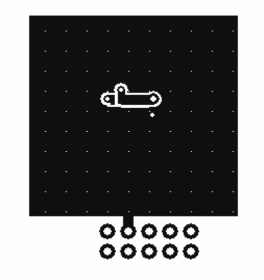
$t_{d(on)}$	Turn-On Delay Time	V_{DD} = 15 V, I_D = 19 A, V_{GS} = 10 V, R_{GEN} = 6 Ω		13	23	ns
t_r	Rise Time			5	10	ns
$t_{d(off)}$	Turn-Off Delay Time			25	40	ns
t_f	Fall Time			4	10	ns
Q_g	Total Gate Charge	V_{GS} = 0 V to 10 V V_{DD} = 15 V, I_D = 19 A		31	44	nC
Q_g	Total Gate Charge	V_{GS} = 0 V to 4.5 V		14	19	nC
Q_{gs}	Gate to Source Charge			7.6		nC
Q_{gd}	Gate to Drain “Miller” Charge			3.7		nC

Drain-Source Diode Characteristics

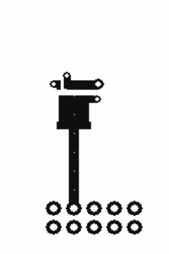
V_{SD}	Source to Drain Diode Forward Voltage	V_{GS} = 0 V, I_S = 2.1 A (Note 2)		0.7	0.95	V
		V_{GS} = 0 V, I_S = 19 A (Note 2)		0.8	1.1	
t_{rr}	Reverse Recovery Time	I_F = 19 A, di/dt = 100 A/μs		32	51	ns
Q_{rr}	Reverse Recovery Charge			14	24	nC
t_a	Reverse Recovery Fall Time			15		nC
t_b	Reverse Recovery Rise Time			17		nC
S	Softness (t_b/t_a)			1.1		
t_{rr}	Reverse Recovery Time	I_F = 19 A, di/dt = 300 A/μs		26	42	ns
Q_{rr}	Reverse Recovery Charge			25	40	nC

Notes:

1. $R_{\theta JA}$ is determined with the device mounted on a 1in^2 pad 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 $R_{\theta CA}$ is determined by the user's board design.



a. 50 °C/W when mounted on a 1 in^2 pad of 2 oz copper.



b. 125 °C/W when mounted on a minimum pad of 2 oz copper.

2. Pulse Test: Pulse Width < 300 μs, Duty cycle < 2.0%.
3. E_{AS} of 72 mJ is based on starting T_J = 25 °C, L = 1 mH, I_{AS} = 12 A, V_{DD} = 27 V, V_{GS} = 10 V. 100% test at L = 0.3 mH, I_{AS} = 17 A.
4. As an N-ch device, the negative Vgs rating is for low duty cycle pulse occurrence only. No continuous rating is implied.

Typical Characteristics T_J = 25 °C unless otherwise noted

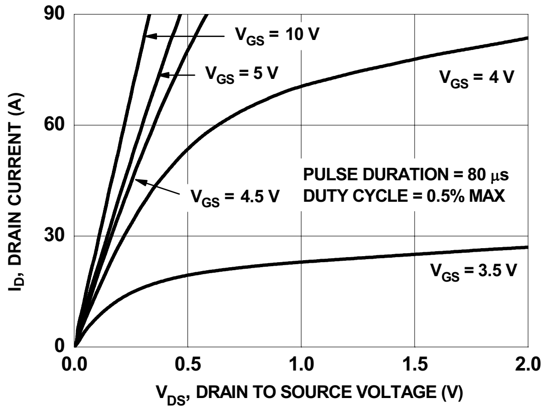


Figure 1. On Region Characteristics

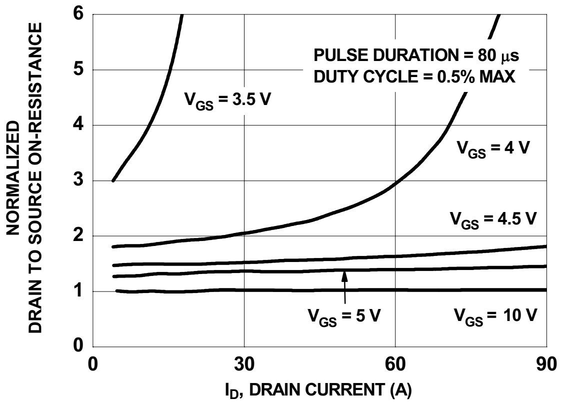


Figure 2. Normalized On-Resistance vs Drain Current and Gate Voltage

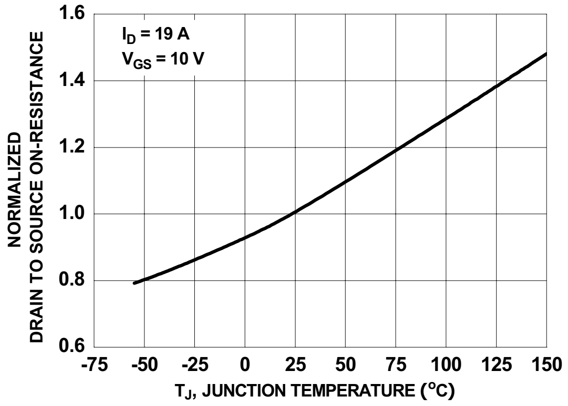


Figure 3. Normalized On Resistance vs Junction Temperature

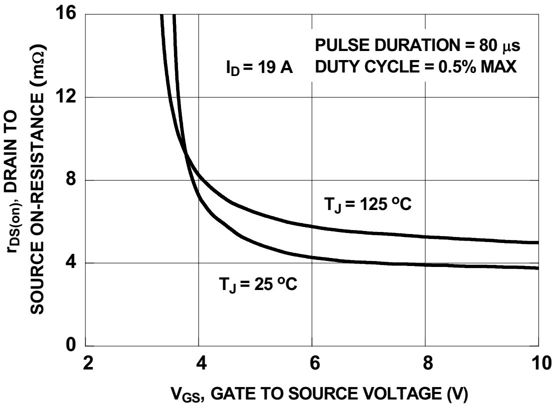


Figure 4. On-Resistance vs Gate to Source Voltage

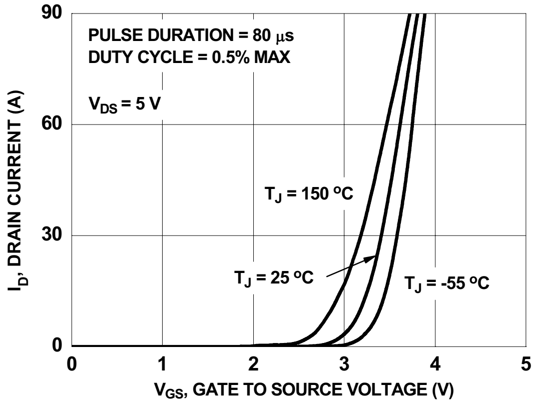


Figure 5. Transfer Characteristics

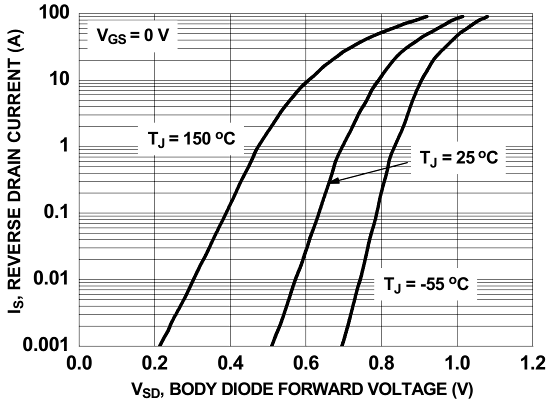


Figure 6. Source to Drain Diode Forward Voltage vs Source Current

Typical Characteristics T_J = 25 °C unless otherwise noted

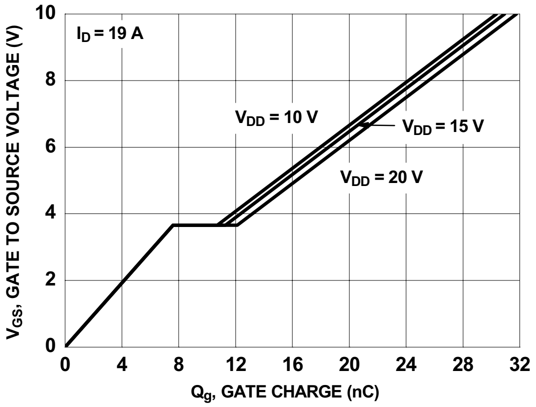


Figure 7. Gate Charge Characteristics

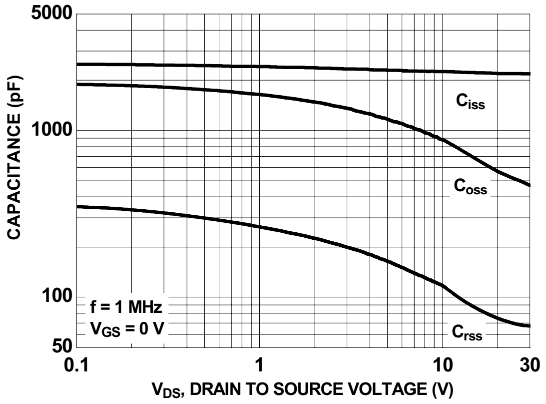


Figure 8. Capacitance vs Drain to Source Voltage

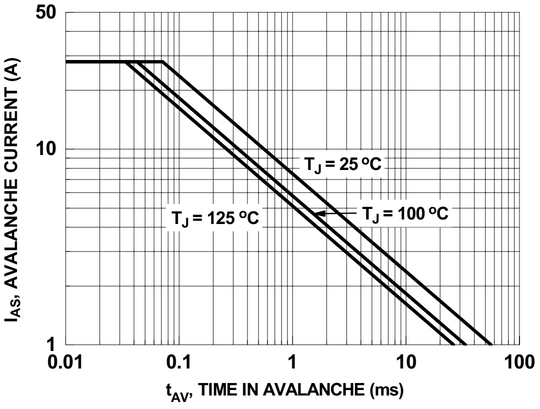


Figure 9. Unclamped Inductive Switching Capability

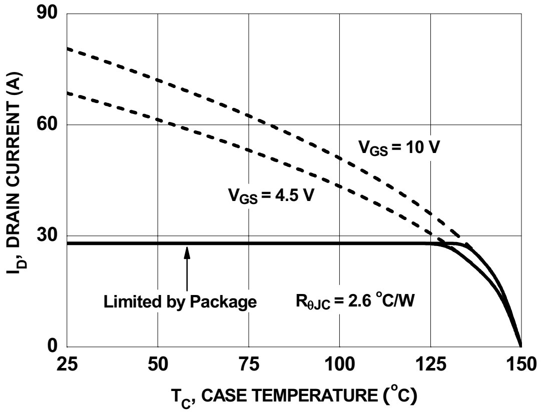


Figure 10. Maximum Continuous Drain Current vs Case Temperature

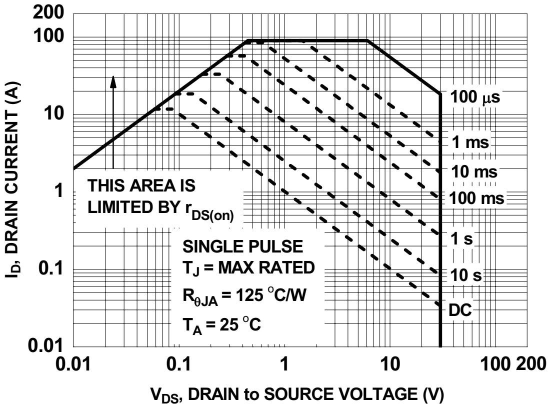


Figure 11. Forward Bias Safe Operating Area

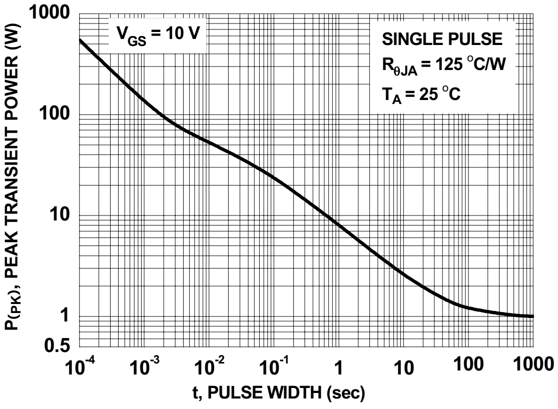


Figure 12. Single Pulse Maximum Power Dissipation

Typical Characteristics T_J = 25 °C unless otherwise noted

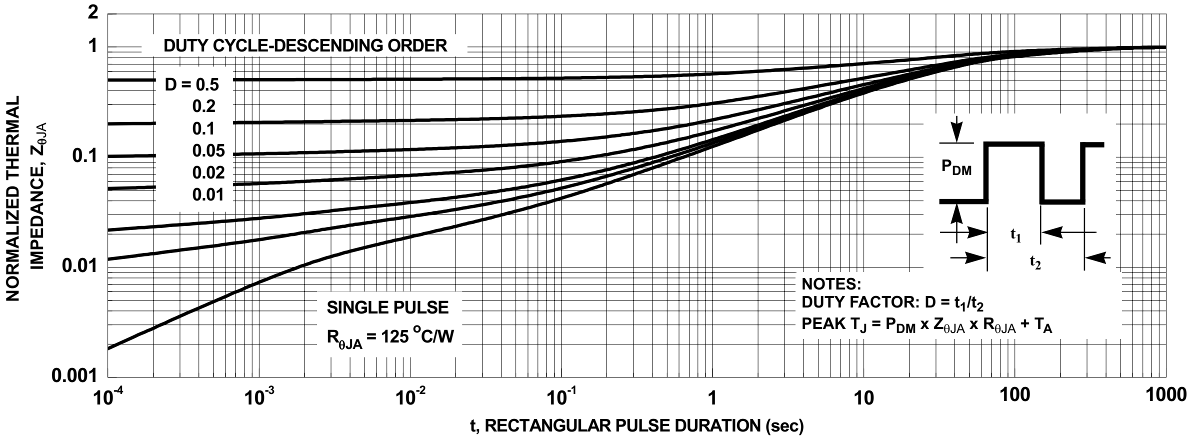


Figure 13. Junction-to-Ambient Transient Thermal Response Curve

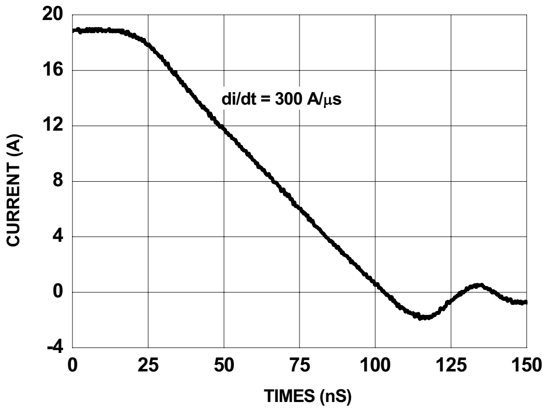
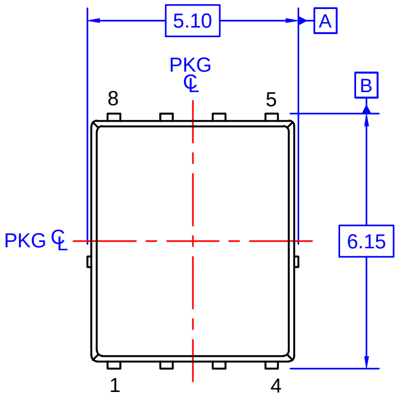
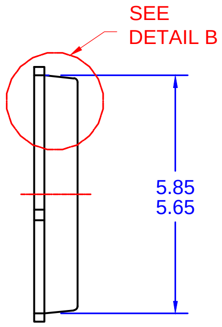


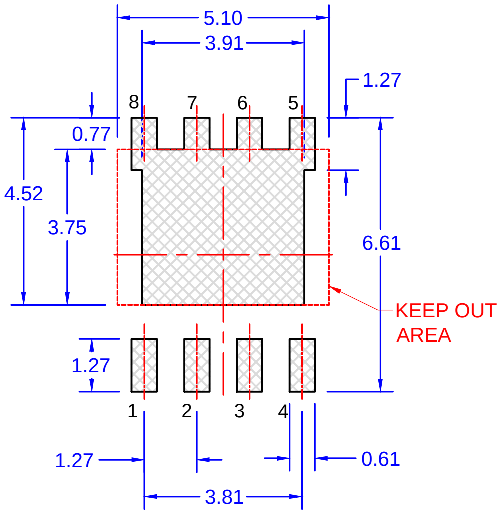
Figure 14. Body Diode Reverse Recovery Characteristics

PQFN8 5X6, 1.27P
CASE 483AE
ISSUE A

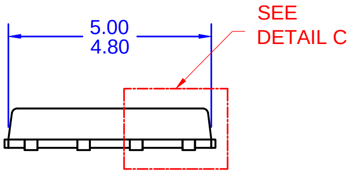


TOP VIEW

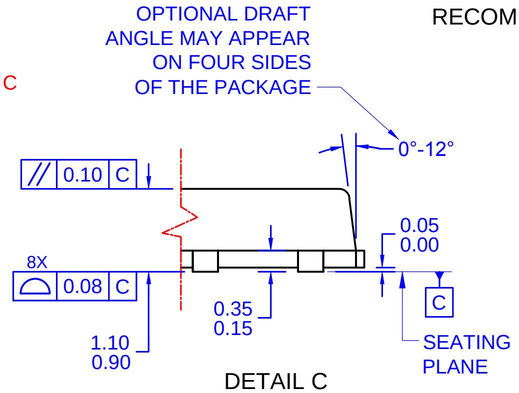




LAND PATTERN RECOMMENDATION



SIDE VIEW



DETAIL C

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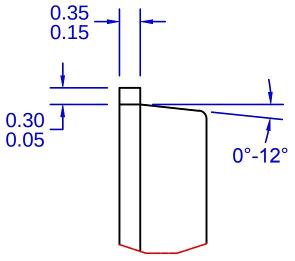

DETAIL B

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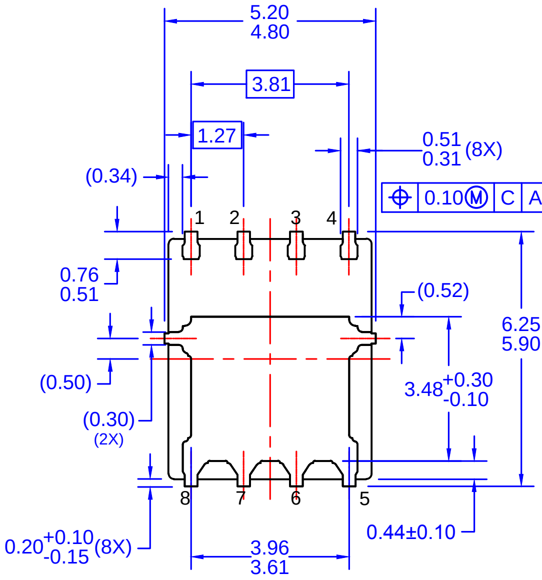

BOTTOM VIEW

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