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FDMS8320L

N-Channel PowerTrench® MOSFET

40 V, 248 A, 1.1 mΩ

Features

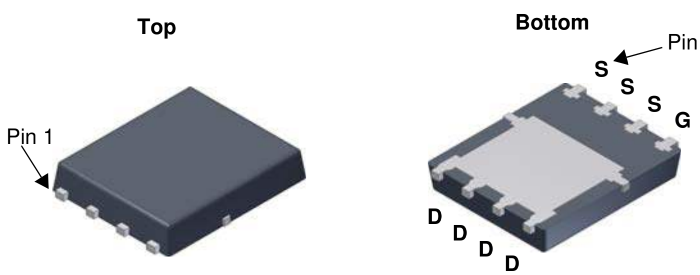
- Max $r_{DS(on)}$ = 1.1 mΩ at V_{GS} = 10 V, I_D = 32 A
- Max $r_{DS(on)}$ = 1.5 mΩ at V_{GS} = 4.5 V, I_D = 27 A
- Advanced Package and Silicon combination for low $r_{DS(on)}$ and high efficiency
- Next generation enhanced body diode technology, engineered for soft recovery
- MSL1 robust package design
- 100% UIL tested
- RoHS Compliant

General Description

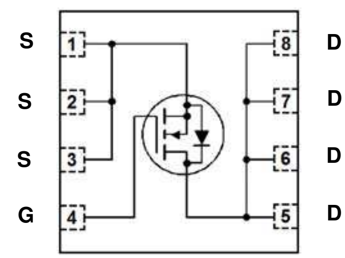
This N-Channel MOSFET has been designed specifically to improve the overall efficiency and to minimize switch node ringing of DC/DC converters using either synchronous or conventional switching PWM controllers.It has been optimized for low gate charge, low $r_{DS(on)}$, fast switching speed ang body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

Applications

- OringFET / Load Switching
- Synchronous Rectification
- 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			40	V
V_{GS}	Gate to Source Voltage			±20	V
I_D	Drain Current -Continuous	T_C = 25 °C	(Note 5)	248	A
	-Continuous	T_C = 100 °C	(Note 5)	157	
	-Continuous	T_A = 25 °C	(Note 1a)	36	
	-Pulsed		(Note 4)	943	
E_{AS}	Single Pulse Avalanche Energy		(Note 3)	264	mJ
P_D	Power Dissipation	T_C = 25 °C		104	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		1.2	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	(Note 1a)	50	

Package Marking and Ordering Information

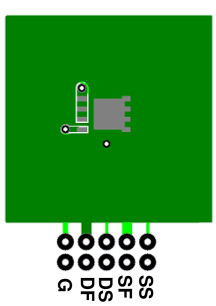
Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDMS8320L	FDMS8320L	Power 56	13 ”	12 mm	3000 units

Electrical Characteristics T_J = 25 °C unless otherwise noted.

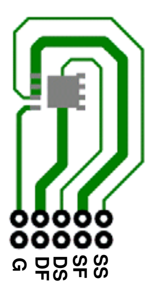
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
Off Characteristics						
BV_{DSS}	Drain to Source Breakdown Voltage	I_D = 250 μA, V_{GS} = 0 V	40			V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	I_D = 250 μA, referenced to 25 °C		21		mV/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 32 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	1.7	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		-6		mV/°C
$r_{DS(on)}$	Static Drain to Source On Resistance	V_{GS} = 10 V, I_D = 32 A		0.8	1.1	mΩ
		V_{GS} = 4.5 V, I_D = 27 A		1.0	1.5	
		V_{GS} = 10 V, I_D = 32 A, T_J = 125 °C		1.2	1.7	
g_{FS}	Forward Transconductance	V_{DS} = 5 V, I_D = 32 A		206		S
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = 20 V, V_{GS} = 0 V, f = 1 MHz		8350	11110	pF
C_{oss}	Output Capacitance			2840	3780	pF
C_{rss}	Reverse Transfer Capacitance			169	295	pF
R_g	Gate Resistance		0.1	1.3	2.6	Ω
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{DD} = 20 V, I_D = 32 A, V_{GS} = 10 V, R_{GEN} = 6 Ω		17	30	ns
t_r	Rise Time			19	35	ns
$t_{d(off)}$	Turn-Off Delay Time			68	110	ns
t_f	Fall Time			17	30	ns
Q_g	Total Gate Charge	V_{GS} = 0 V to 10 V; V_{DD} = 20 V, I_D = 32 A		121	170	nC
Q_g	Total Gate Charge	V_{GS} = 0 V to 4.5 V; V_{DD} = 20 V, I_D = 32 A		58	117	nC
Q_{gs}	Gate to Source Charge	V_{DD} = 20 V, I_D = 32 A		19.2		nC
Q_{gd}	Gate to Drain "Miller" Charge			16.5		nC
Drain-Source Diode Characteristics						
I_s	Diode Continuous Forward Current	T_C = 25 °C			248	A
$I_{s, pulse}$	Diode Pulse Current	T_C = 25 °C			943	A
V_{SD}	Source to Drain Diode Forward Voltage	V_{GS} = 0 V, I_S = 2.1 A (Note 2)		0.65	1.1	V
		V_{GS} = 0 V, I_S = 32 A (Note 2)		0.74	1.2	
t_{rr}	Reverse Recovery Time	I_F = 32 A, di/dt = 100 A/μs		68	108	ns
Q_{rr}	Reverse Recovery Charge			59	95	nC
t_{rr}	Reverse Recovery Time	I_F = 32 A, di/dt = 300 A/μs		53	85	ns
Q_{rr}	Reverse Recovery Charge			104	167	nC

Notes:

1. $R_{\theta JA}$ is determined with the device mounted on a 1 in^2 pad 2 oz copper pad on a 1.5 x 1.5 in. board of FR-4 material. $R_{\theta CA}$ 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. Starting T_J = 25 °C; N-ch: L = 0.3 mH, I_{AS} = 42 A, V_{DD} = 36 V, V_{GS} = 10 V.
4. Pulsed Id please refer to Fig 11 SOA graph for more details.
5. Computed continuous current limited to Max Junction Temperature only, actual continuous current will be limited by thermal & electro-mechanical application board design.

Typical Characteristics T_J = 25 °C unless otherwise noted.

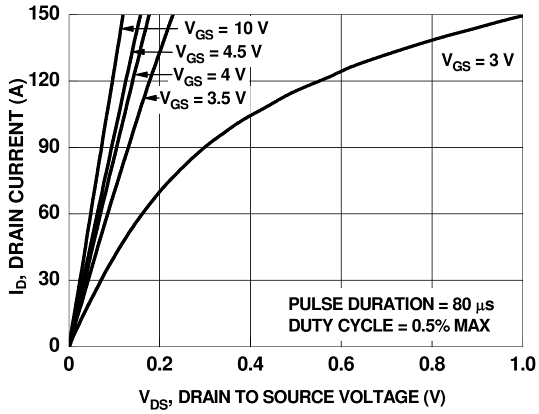


Figure 1. On Region Characteristics

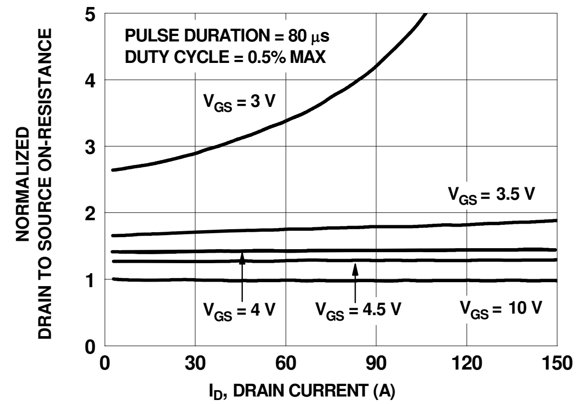


Figure 2. Normalized On-Resistance vs. Drain Current and Gate Voltage

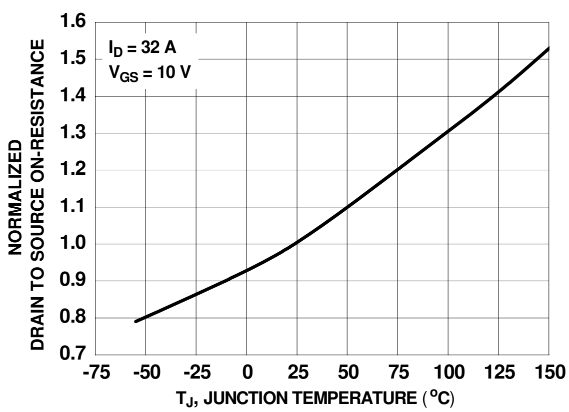


Figure 3. Normalized On Resistance vs. Junction Temperature

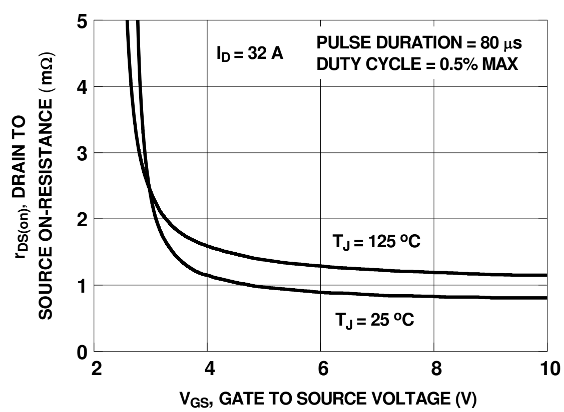


Figure 4. On-Resistance vs. Gate to Source Voltage

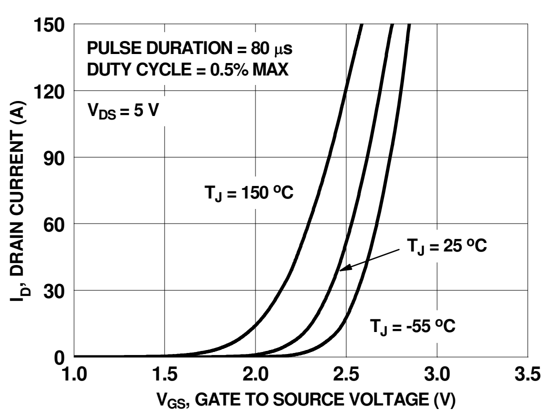


Figure 5. Transfer Characteristics

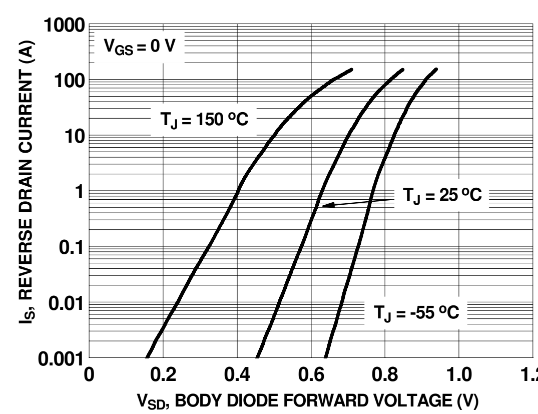


Figure 6. Source to Drain Diode Forward Voltage vs. Source Current

Typical Characteristics T_J = 25 °C unless otherwise noted.

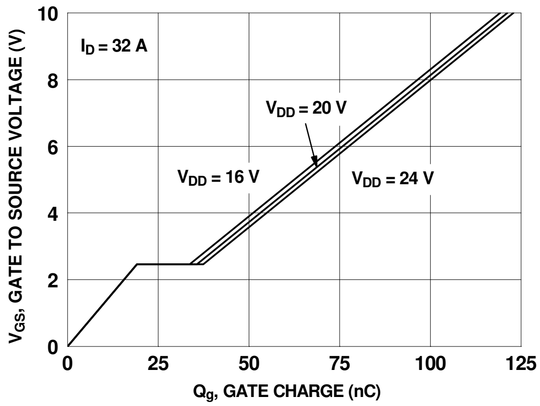


Figure 7. Gate Charge Characteristics

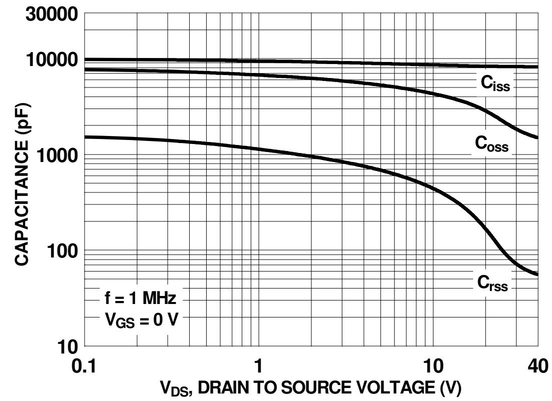


Figure 8. Capacitance vs. Drain to Source Voltage

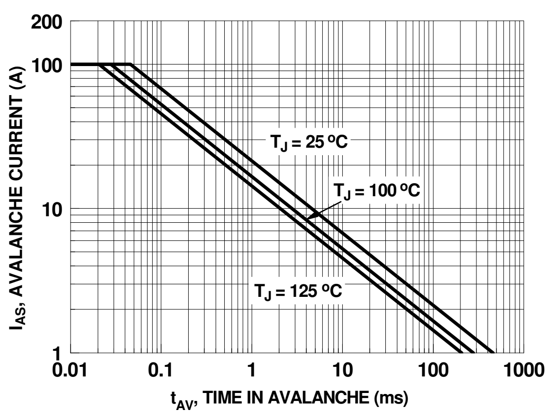


Figure 9. Unclamped Inductive Switching Capability

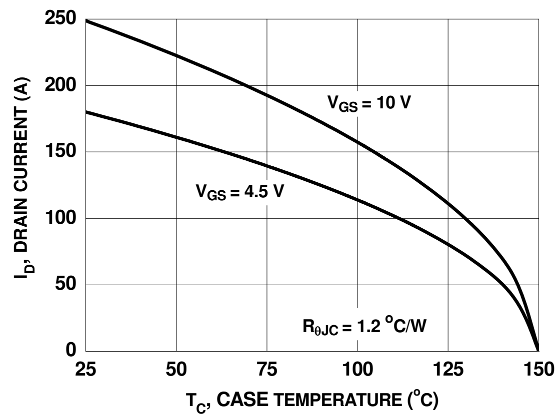


Figure 10. Maximum Continuous Drain Current vs. Case Temperature

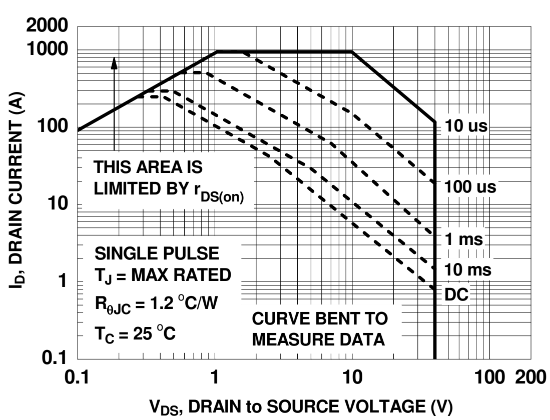


Figure 11. Forward Bias Safe Operating Area

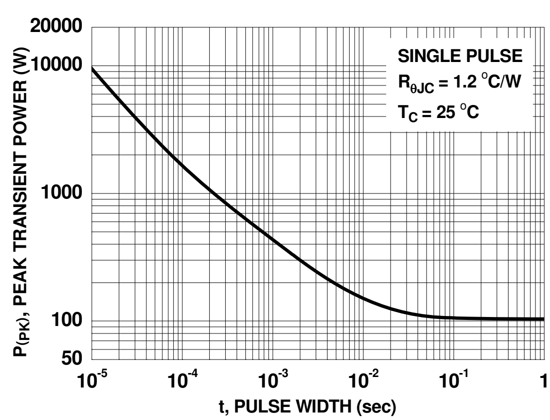


Figure 12. Single Pulse Maximum Power Dissipation

Typical Characteristics T_J = 25 °C unless otherwise noted.

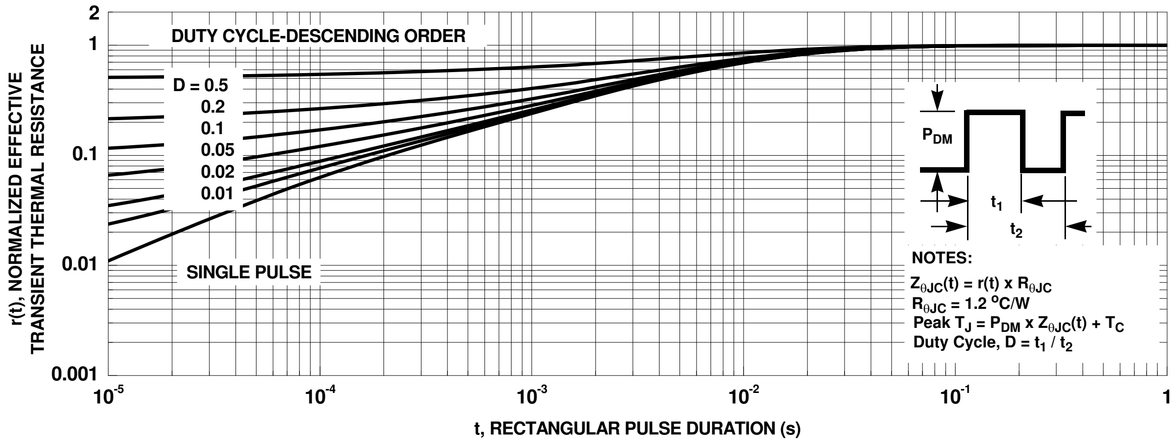


Figure 13. Transient Thermal Response Curve

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