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February 2016

FDMS7650

N-Channel PowerTrench[®] MOSFET 30 V, 267 A, 0.99 m Ω

Features

- Max $r_{DS(on)} = 0.99 \text{ m}\Omega$ at $V_{GS} = 10 \text{ V}$, $I_D = 36 \text{ A}$
- Max $r_{DS(on)} = 1.55 \text{ m}\Omega$ at $V_{GS} = 4.5 \text{ V}$, $I_D = 32 \text{ A}$
- Advanced Package and Silicon Combination for Low r_{DS(on)} and High Efficiency
- MSL1 Robust Package Design
- 100% UIL Tested
- RoHS Compliant

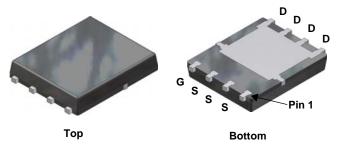


General Description

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 and extremely low $r_{DS(on)}$.

Applications

- OringFET
- Synchronous Rectifier



Power 56

D 5 4 G D 6 3 S D 7 2 S D 8 1 S

MOSFET Maximum Ratings T_C = 25 °C unless otherwise noted.

Symbol	Paran		Ratings	Units	
V_{DS}	Drain to Source Voltage			30	V
V_{GS}	Gate to Source Voltage		(Note 4)	±20	V
	Drain Current -Continuous	T _C = 25 °C	(Note 5)	267	
	-Continuous	T _C = 100 °C	(Note 5)	169	^
ID	-Continuous	T _A = 25 °C	(Note 1a)	36	Α
	-Pulsed		(Note 6)	1210	
E _{AS}	Single Pulse Avalanche Energy		(Note 3)	544	mJ
P _D	Power Dissipation	T _C = 25 °C		104	W
	Power Dissipation	T _A = 25 °C	(Note 1a)	2.5	VV
T _J , T _{STG}	Operating and Storage Junction Temper	rature 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	C/VV

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDMS7650	FDMS7650	Power 56	13 "	12 mm	3000 units

Electrical Characteristics $T_J = 25$ °C unless otherwise noted.

Symbol	Parameter	Test Conditions	Min.	Тур.	Max.	Units
Off Chara	acteristics					
BV_{DSS}	Drain to Source Breakdown Voltage	$I_D = 250 \mu A, V_{GS} = 0 V$	30			V
$\frac{\Delta BV_{DS}}{\Delta T_{J}}$	Breakdown Voltage Temperature Coefficient	I_D = 250 μ A, referenced to 25 °C		15		mV/°C
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = 24 V, V _{GS} = 0 V			1	μΑ
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	$V_{GS} = V_{DS}, I_{D} = 250 \mu A$	1	1.9	3	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate to Source Threshold Voltage Temperature Coefficient	I_D = 250 μ A, referenced to 25 °C		-6		mV/°C
r _{DS(on)}	Static Drain to Source On Resistance	$V_{GS} = 10 \text{ V}, I_D = 36 \text{ A}$		0.8	0.99	
		$V_{GS} = 4.5 \text{ V}, I_D = 32 \text{ A}$		1.1	1.55	mΩ
		$V_{GS} = 10 \text{ V}, I_D = 36 \text{ A}, T_J = 125 ^{\circ}\text{C}$		1.1	1.7	
g _{FS}	Forward Transconductance	$V_{DS} = 5 \text{ V}, I_{D} = 36 \text{ A}$		267		S

Dynamic Characteristics

C _{iss}	Input Capacitance	V 45.V.V 0.V	11250	14965	pF
C _{oss}	Output Capacitance	$V_{DS} = 15 \text{ V}, V_{GS} = 0 \text{ V},$ f = 1 MHz	3050	4055	рF
C _{rss}	Reverse Transfer Capacitance	1 - 1 1011 12	240	360	pF
R_{α}	Gate Resistance		1.4	3	Ω

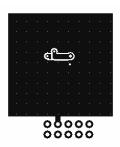
Switching Characteristics

t _{d(on)}	Turn-On Delay Time		28	45	ns
t _r	Rise Time	V _{DD} = 15 V, I _D = 36 A,	24	38	ns
t _{d(off)}	Turn-Off Delay Time	$V_{GS} = 10 \text{ V}, R_{GEN} = 6 \Omega$	83	133	ns
t _f	Fall Time		21	34	ns
Q_g	Total Gate Charge	V _{GS} = 0 V to 10 V	149	209	nC
Q_g	Total Gate Charge	$V_{GS} = 0 \text{ V to } 4.5 \text{ V}$ $V_{DD} = 15 \text{ V}$	63	88	nC
Q _{gs}	Gate to Source Charge	I _D = 36 A	34		nC
Q_{gd}	Gate to Drain "Miller" Charge		13		nC

Drain-Source Diode Characteristics

V _{SD}	Source to Drain Diode Forward Voltage	$V_{GS} = 0 \text{ V}, I_S = 2.1 \text{ A}$ (Note 2)	0.7	1.2	V
		$V_{GS} = 0 \text{ V}, I_S = 36 \text{ A}$ (Note 2)	0.8	1.3	
t _{rr}	Reverse Recovery Time	- I _E = 36 A, di/dt = 100 A/μs	69	97	ns
Q _{rr}	Reverse Recovery Charge	T _F = 36 A, α//αι = 100 A/μs	56	90	nC

^{1.} R_{BJA} is determined with the device mounted on a 1in² pad 2 oz copper pad on a 1.5 x 1.5 in. board of FR-4 material. R_{BJC} is guaranteed by design while R_{BCA} is determined by



a. 50 °C/W when mounted on a 1 in² pad of 2 oz copper.



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

- Pulse Test: Pulse Width < 300 ms, Duty cycle < 2.0%.
 Starting T_J = 25 °C, L = 1 mH, I_{AS} = 33 A, V_{DD} = 27 V, V_{GS} = 10 V.
 As an N-ch device, the negative Vgs rating is for low duty cycle pulse ocurrence only. No continuous rating is implied.
 Computed continuous current limited to Max Junction Temperature only, actual continuous current will be limited by thermal & electro-mechanical application board design.
 Pulsed Id please refer to Fig 11 SOA graph for more details.

Typical Characteristics $T_J = 25$ °C unless otherwise noted.

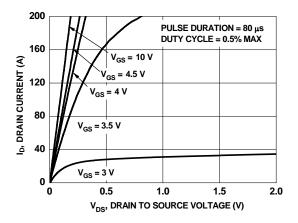


Figure 1. On Region Characteristics

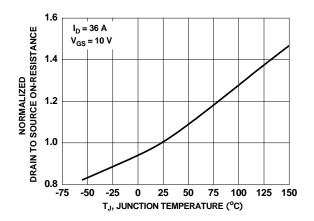


Figure 3. Normalized On Resistance vs. Junction Temperature

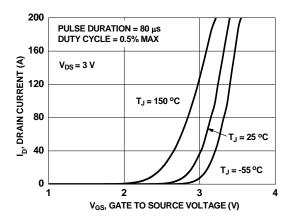


Figure 5. Transfer Characteristics

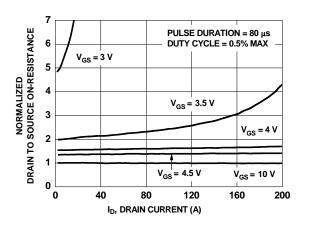


Figure 2. Normalized On-Resistance vs. Drain Current and Gate Voltage

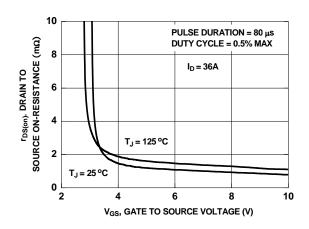


Figure 4. On-Resistance vs. Gate to Source Voltage

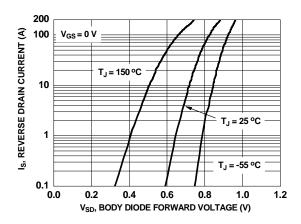


Figure 6. Source to Drain Diode Forward Voltage vs. Source Current

Typical Characteristics $T_J = 25$ °C unless otherwise noted.

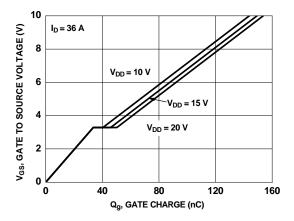


Figure 7. Gate Charge Characteristics

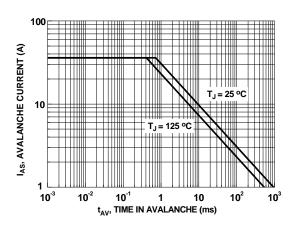


Figure 9. Unclamped Inductive Switching Capability

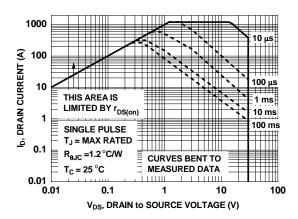


Figure 11. Forward Bias Safe Operating Area

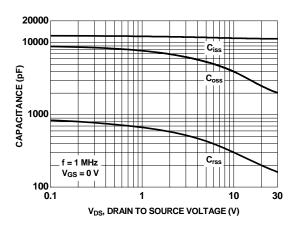


Figure 8. Capacitance vs. Drain to Source Voltage

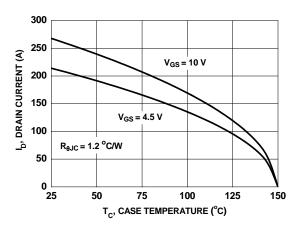


Figure 10. Maximum Continuous Drain Current vs. Case Temperature

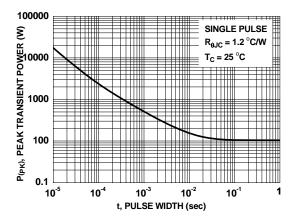


Figure 12. Single Pulse Maximum Power Dissipation

Typical Characteristics $T_J = 25$ °C unless otherwise noted.

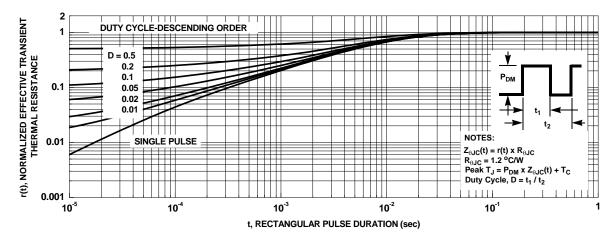


Figure 13. Junction-to-Case Transient Thermal Response Curve



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