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FDMC7692

May 2014

N-Channel Power Trench[®] MOSFET 30 V, 13.3 A, 8.5 m Ω

Features

- Max $r_{DS(on)}$ = 8.5 m Ω at V_{GS} = 10 V, I_D = 13.3 A
- Max $r_{DS(on)}$ = 11.5 m Ω at V_{GS} = 4.5 V, I_D = 10.6 A
- High performance technology for extremely low r_{DS(on)}
- Termination is Lead-free and RoHS Compliant

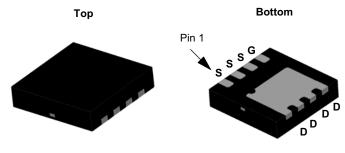


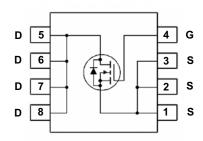
General Description

This N-Channel MOSFET is produced using Fairchild Semiconductor's advanced Power Trench® process that has been especially tailored to minimize the on-state resistance. This device is well suited for Power Management and load switching applications common in Notebook Computers and Portable Battery Packs.

Application

- DC DC Buck Converters
- Notebook battery power management
- Load switch in Notebook





MLP 3.3x3.3

MOSFET Maximum Ratings $T_A = 25 \, ^{\circ}\text{C}$ unless otherwise noted

Symbol	Parameter			Ratings	Units	
V _{DS}	Drain to Source Voltage			30	V	
V _{GS}	Gate to Source Voltage			±20	V	
	Drain Current -Continuous (Package limited)	T _C = 25 °C		16		
I _D	-Continuous	T _A = 25 °C	(Note 1a)	13.3	Α	
	-Pulsed			40		
E _{AS}	Single Pulse Avalanche Energy		(Note 3)	58	mJ	
D	Power Dissipation	T _C = 25 °C		29	W	
P_{D}	Power Dissipation	T _A = 25 °C	(Note 1a)	2.3	VV	
T _J , T _{STG}	Operating and Storage Junction Temperature R	lange		-55 to +150	°C	

Thermal Characteristics

$R_{\theta JC}$	Thermal Resistance, Junction to Case	4.3	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient (Note 1a)	53	C/VV

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDMC7692	FDMC7692	MLP 3.3x3.3	13 "	12 mm	3000 units

Electrical Characteristics T_J = 25 °C unless otherwise noted

Parameter

	<u> </u>					
Off Char	acteristics					
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		16		mV/°C
I _{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 24 \text{ V}, V_{GS} = 0 \text{ V}$ $T_{J} = 125 \text{ °C}$			1 250	μА
I _{GSS}	Gate to Source Leakage Current	V _{GS} = 20 V, V _{DS} = 0 V			100	nA

Test Conditions

Typ

Max Units

On Characteristics

Symbol

$V_{GS(th)}$	Gate to Source Threshold Voltage	$V_{GS} = V_{DS}, I_D = 250 \mu A$	1.2	1.9	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
		V _{GS} = 10 V, I _D = 13.3 A		7.2	8.5	
r _{DS(on)}	Static Drain to Source On Resistance	V _{GS} = 4.5 V, I _D = 10.6 A		9.5	11.5	mΩ
- (-)		$V_{GS} = 10 \text{ V}, I_D = 13.3 \text{ A}, T_J = 125 ^{\circ}\text{C}$		9.5	12.0	
9 _{FS}	Forward Transconductance	V _{DD} = 5 V, I _D = 13.3 A		60		S

Dynamic Characteristics

C _{iss}	Input Capacitance	V _{DS} = 15 V, V _{GS} = 0 V, f = 1 MHz	1260	1680	pF
Coss	Output Capacitance		480	635	pF
C _{rss}	Reverse Transfer Capacitance		65	100	pF
R_g	Gate Resistance		0.9	2.4	Ω

Switching Characteristics

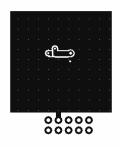
t _{d(on)}	Turn-On Delay Time		9	18	ns
t _r	Rise Time	V _{DD} = 15 V, I _D = 13.3 A,	4	10	ns
t _{d(off)}	Turn-Off Delay Time	$V_{GS} = 10 \text{ V}, R_{GEN} = 6 \Omega$	21	33	ns
t _f	Fall Time		3	10	ns
0		V _{GS} = 0 V to 10 V	21	29	nC
$Q_{g(TOT)}$	Total Gate Charge	$V_{GS} = 0 \text{ V to } 4.5 \text{ V}$ $V_{DD} = 15 \text{ V}$	10	14	nC
Q_{gs}	Total Gate Charge	I _D = 13.3 A	5		nC
Q_{gd}	Gate to Drain "Miller" Charge		3		nC

Drain-Source Diode Characteristics

V_{SD}	Source to Drain Diode Forward Voltage	$V_{GS} = 0 \text{ V}, I_{S} = 13.3 \text{ A}$	(Note 2)	0.86	1.2	V
	Source to Drain Diode 1 of Ward Voltage	$V_{GS} = 0 \text{ V}, I_{S} = 1.9 \text{ A}$	(Note 2)	0.75	1.2	V
t _{rr}	Reverse Recovery Time	I _F = 13.3 A, di/dt = 100 A/μs		24	38	ns
Q _{rr}	Reverse Recovery Charge			7	14	nC

NOTES

^{1.} $R_{\theta JA}$ is determined with the device mounted on a 1 in² 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. 53 °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



^{2.} Pulse Test: Pulse Width < 300 $\mu s,$ Duty cycle < 2.0 %.

^{3.} E_{AS} of 58 mJ is based on starting T_J = 25 °C, L = 1 mH, I_{AS} = 10.8 A, V_{DD} = 27 V, V_{GS} = 10 V. 100% test at L = 0.1 mH, I_{AS} = 21 A.

Typical Characteristics T_J = 25 °C unless otherwise noted

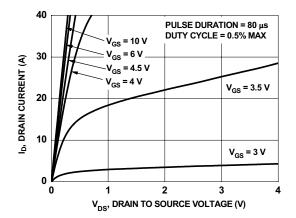


Figure 1. On-Region Characteristics

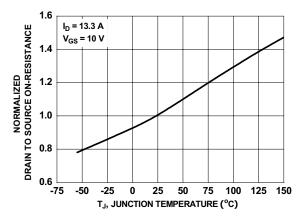


Figure 3. Normalized On-Resistance vs Junction Temperature

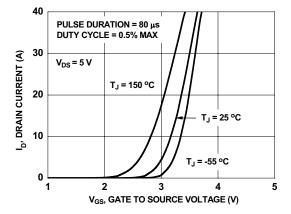


Figure 5. Transfer Characteristics

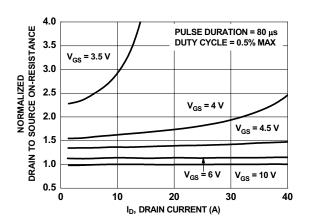


Figure 2. Normalized On-Resistance vs Drain Current and Gate Voltage

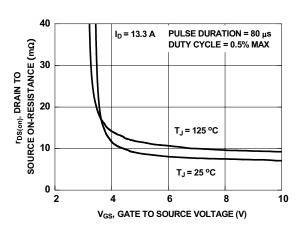


Figure 4. On-Resistance vs Gate to Source Voltage

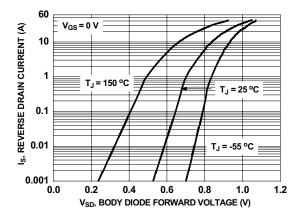


Figure 6. Source to Drain Diode Forward Voltage vs Source Current

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

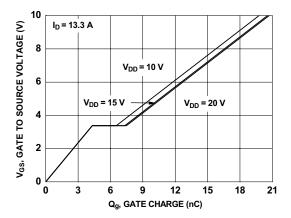


Figure 7. Gate Charge Characteristics

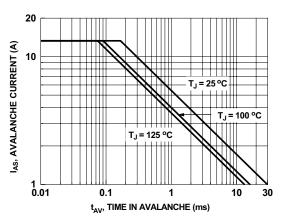


Figure 9. Unclamped Inductive Switching Capability

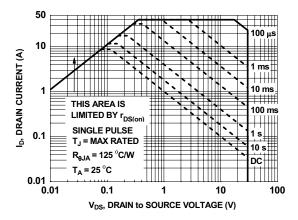


Figure 11. Forward Bias Safe Operating Area

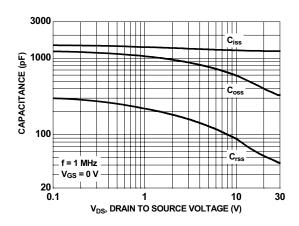


Figure 8. Capacitance vs Drain to Source Voltage

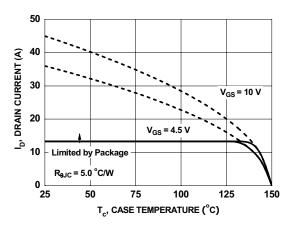


Figure 10. Maximum Continuous Drain Current vs Case Temperature

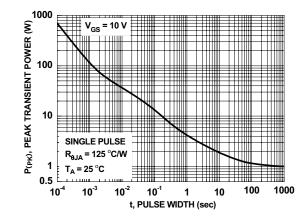


Figure 12. Single Pulse Maximum Power Dissipation

Typical Characteristics T_J = 25 °C unless otherwise noted

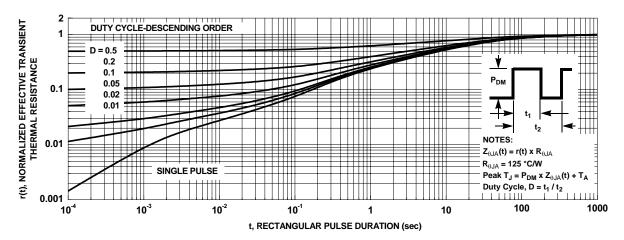
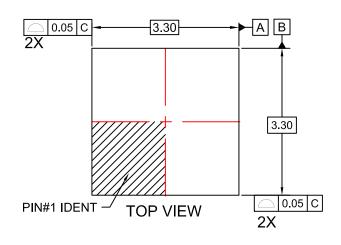
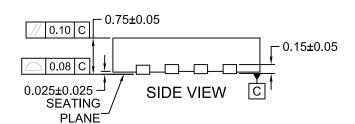
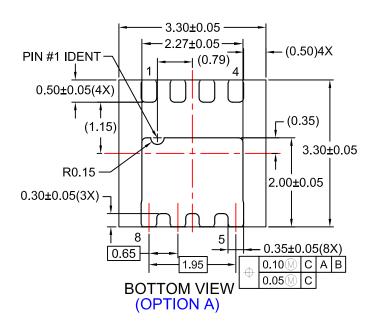
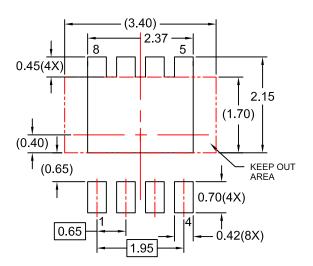


Figure 13. Transient Thermal Response Curve

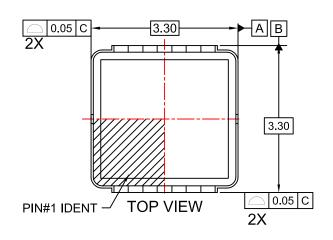


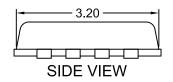


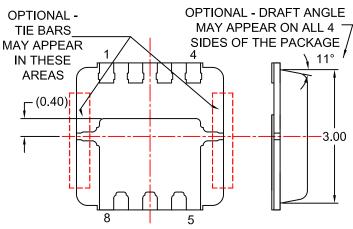






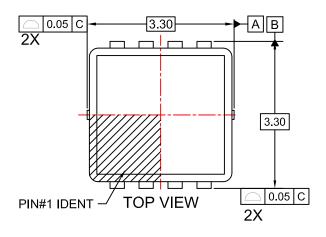


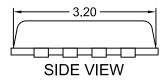


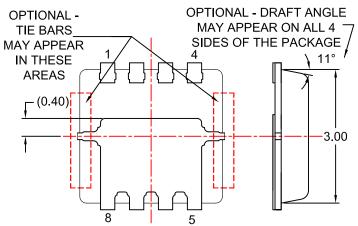


ALL DIMENSIONS AS PER OPTION A
UNLESS SPECIFIED
BOTTOM VIEW
(OPTION B)









ALL DIMENSIONS AS PER OPTION A
UNLESS SPECIFIED
BOTTOM VIEW
(OPTION C)

NOTES:

- A. PACKAGE DOES NOT FULLY CONFORM TO JEDEC REGISTRATION MO-240.
- B. DIMENSIONS ARE IN MILLIMETERS.
- C. DIMENSIONS AND TOLERANCES PER ASME Y14.5M, 2009.
- D. LAND PATTERN RECOMMENDATION IS EXISTING INDUSTRY LAND PATTERN
- E. DIMENSIONS DO NOT INCLUDE BURRS OR MOLD FLASH. BURRS OR MOLD FLASH SHALL NOT EXCEED 0.10MM.
- F. DRAWING FILENAME: MKT-MLP08Wrev3.
- G. OPTION A SAWN MLP, OPTIONS B & C PUNCH MLP.



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