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# N-Channel PowerTrench<sup>®</sup> MOSFET 30 V, 18.8 A, 4.2 m $\Omega$

### Features

- Max  $r_{DS(on)}$  = 4.2 m $\Omega$  at V<sub>GS</sub> = 10 V, I<sub>D</sub> = 18.8 A
- Max  $r_{DS(on)}$  = 5.5 m $\Omega$  at V<sub>GS</sub> = 4.5 V, I<sub>D</sub> = 16.1 A
- High performance technology for extremely low r<sub>DS(on)</sub>
- Termination is Lead-free and RoHS Compliant

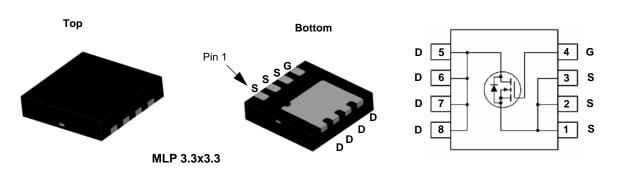


## **General Description**

This N-Channel MOSFET is produced using Fairchild Semiconductor's advanced Power Trench<sup>®</sup> 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.

## Applications

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



## MOSFET Maximum Ratings T<sub>A</sub> = 25 °C unless otherwise noted

Symbol	Parameter			Ratings	Units	
V <sub>DS</sub>	Drain to Source Voltage			30	V	
V <sub>GS</sub>	Gate to Source Voltage			±20	V	
ID	Drain Current -Continuous	T <sub>C</sub> = 25 °C		24		
	-Continuous	T <sub>A</sub> = 25 °C	(Note 1a)	18.8	Α	
	-Pulsed			60		
E <sub>AS</sub>	Single Pulse Avalanche Energy		(Note 3)	188	mJ	
P <sub>D</sub>	Power Dissipation	T <sub>C</sub> = 25 °C		45	w	
	Power Dissipation	T <sub>A</sub> = 25 °C	(Note 1a)	2.3	VV	
T <sub>J</sub> , T <sub>STG</sub>	Operating and Storage Junction Temperature Range			-55 to +150	°C	

#### Thermal Characteristics

$R_{ ext{ heta}JC}$	Thermal Resistance, Junction to Case	2.8	°C/W
$R_{ extsf{ heta}JA}$	Thermal Resistance, Junction to Ambient (Note 1	a) 53	C/VV

### Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDMC7664	FDMC7664	MLP 3.3x3.3	13 "	12 mm	3000 units

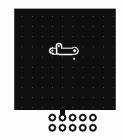
June 2014

FDMC7664
N-Channel
PowerTrench <sup>®</sup>
MOSFET

Symbol	Parameter	Test Conditions	Min	Тур	Max	Units
Off Chara	cteristics					
BV <sub>DSS</sub>	Drain to Source Breakdown Voltage	I <sub>D</sub> = 250 μA, V <sub>GS</sub> = 0 V	30			V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	$I_D = 250 \ \mu\text{A}$ , referenced to 25 °C		12		mV/°C
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	$V_{DS} = 24 V, V_{GS} = 0 V$			1	μA
		T <sub>J</sub> = 125 °C			250	μΛ
I <sub>GSS</sub>	Gate to Source Leakage Current, Forward	$V_{GS} = 20 \text{ V}, \text{ V}_{DS} = 0 \text{ V}$			100	nA
On Chara	cteristics					
V <sub>GS(th)</sub>	Gate to Source Threshold Voltage	$V_{GS} = V_{DS}, I_D = 250 \ \mu A$	1.0	1.9	3.0	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate to Source Threshold Voltage Temperature Coefficient	$I_D = 250 \ \mu$ A, referenced to 25 °C		-7		mV/°C
	Static Drain to Source On Resistance	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 18.8 A		3.6	4.2	
r <sub>DS(on)</sub> Static D		V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 16.1 A		4.5	5.5	mΩ
	State Drain to Source On Resistance	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 18.8 A T <sub>J</sub> = 125 °C		4.4	5.4	- 11152
9 <sub>FS</sub>	Forward Transconductance	V <sub>DD</sub> = 5 V, I <sub>D</sub> = 18.8 A		115		S
C <sub>iss</sub> C <sub>oss</sub>	Input Capacitance Output Capacitance Reverse Transfer Capacitance	V <sub>DS</sub> = 15 V, V <sub>GS</sub> = 0 V f = 1 MHz		3655 1100 115	4865 1465 170	pF pF pF
C <sub>oss</sub> C <sub>rss</sub>						
R <sub>g</sub>	Gate Resistance			0.8	2.2	Ω
Switching	g Characteristics					T
t <sub>d(on)</sub>	Turn-On Delay Time			15	27	ns
t <sub>r</sub>	Rise Time	V <sub>DD</sub> = 15 V, I <sub>D</sub> = 18.8 A		7	14	ns
t <sub>d(off)</sub>	Turn-Off Delay Time	$V_{GS}$ = 10 V, $R_{GEN}$ = 6 $\Omega$		37	59	ns
t <sub>f</sub>	Fall Time			6	12	ns
Q <sub>g(TOT)</sub>	Total Gate Charge	$V_{GS} = 0 V$ to 10 V		55	76	nC
Qg	Total Gate Charge	$V_{GS} = 0 \text{ V to } 4.5 \text{ V}$ $V_{DD} = 15 \text{ V}$		25	34	nC
Q <sub>gs</sub>	Gate to Source Charge	I <sub>D</sub> = 18.8 A		12		nC
Q <sub>gd</sub>	Gate to Drain "Miller" Charge			6		nC
Drain-Sou	urce Diode Characteristics					
\ <i>\</i>		V <sub>GS</sub> = 0 V, I <sub>S</sub> = 18.8 A (Note 2)		0.83	1.2	
V <sub>SD</sub>	Source to Drain Diode Forward Voltage	$V_{GS} = 0 V, I_S = 1.9 A$ (Note 2)		0.71	1.2	V
t <sub>rr</sub>	Reverse Recovery Time			41	65	ns
	Reverse Recovery Charge	I <sub>F</sub> = 18.8 A, di/dt = 100 A/μs		20	35	nC

NOTES:

1. R<sub>BJA</sub> is determined with the device mounted on a 1 in<sup>2</sup> pad 2 oz copper pad on a 1.5 x 1.5 in. board of FR-4 material. R<sub>BJC</sub> is guaranteed by design while R<sub>BCA</sub> is determined by the user's board design.



a. 53 °C/W when mounted on a 1 in<sup>2</sup> pad of 2 oz copper

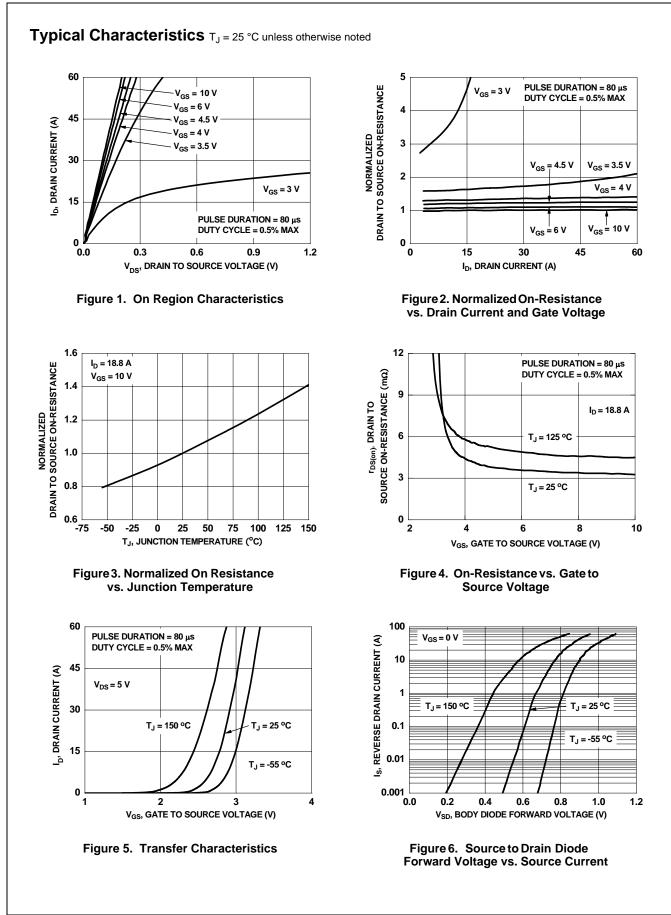
b.125 °C/W when mounted on a minimum pad of 2 oz copper



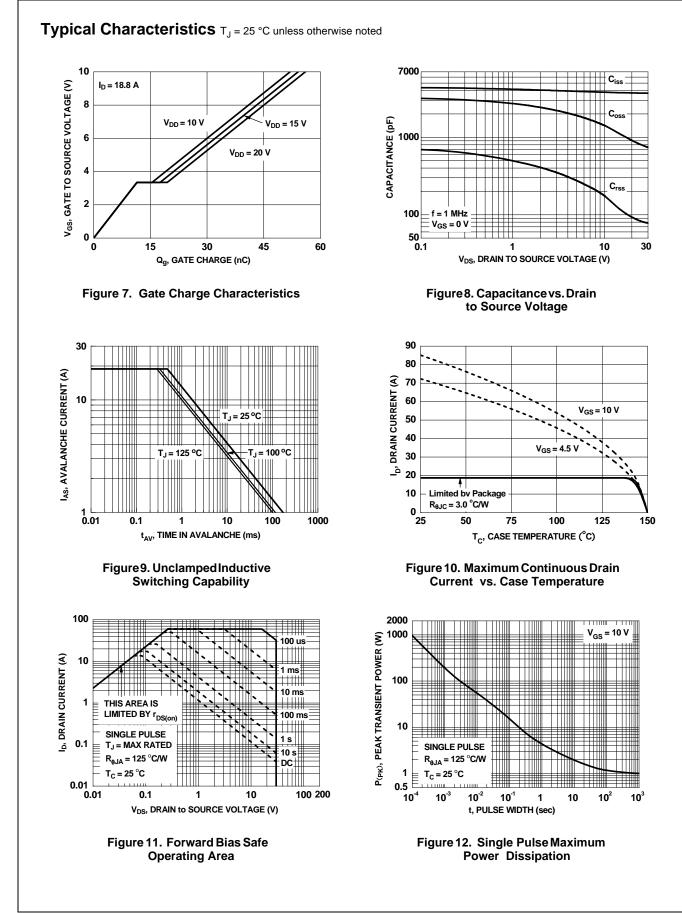
2. Pulse Test: Pulse Width < 300  $\mu s,$  Duty cycle < 2.0 %.

3.  $E_{AS}\,$  of 188 mJ is based on starting  $T_J$  = 25  $^oC,\,L$  = 1 mH,  $I_{AS}$  = 19.4 A,  $V_{DD}$  = 27 V,  $V_{GS}$  = 10 V.

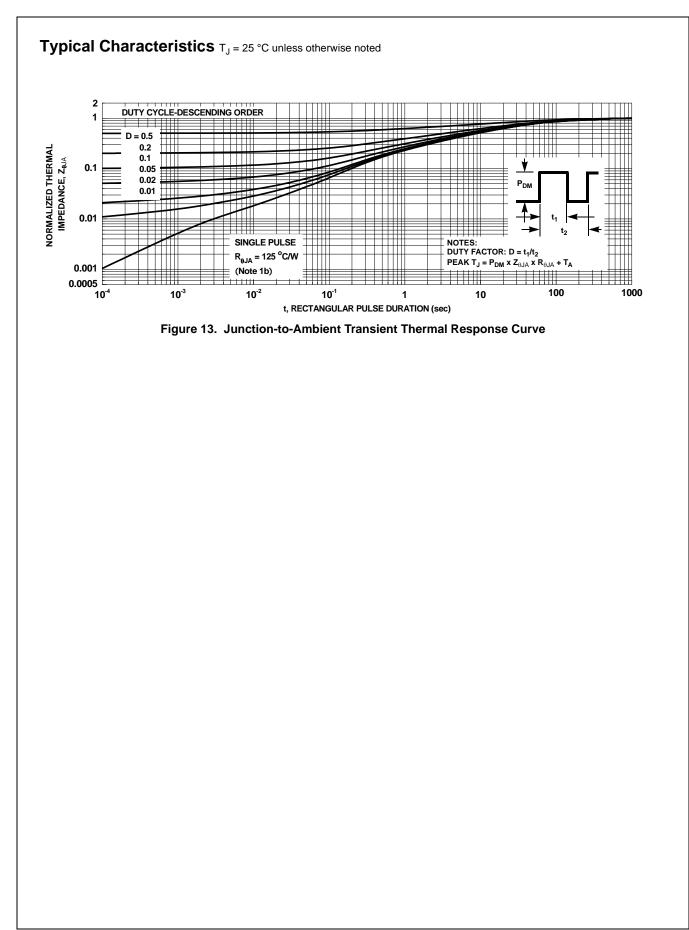
FDMC7664 N-Channel PowerTrench<sup>®</sup> MOSFET

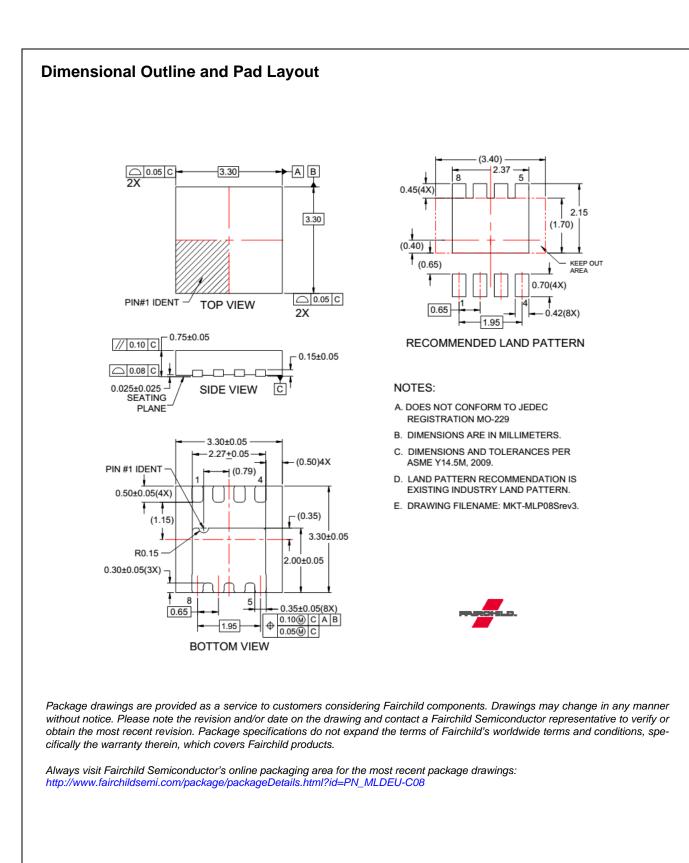






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