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November 2015

## FDMC4435BZ

# P-Channel Power Trench<sup>®</sup> MOSFET -30 V, -18 A, 20 m $\Omega$

#### **Features**

- Max  $r_{DS(on)} = 20 \text{ m}\Omega$  at  $V_{GS} = -10 \text{ V}$ ,  $I_D = -8.5 \text{ A}$
- Max  $r_{DS(on)}$  = 37 m $\Omega$  at  $V_{GS}$  = -4.5 V,  $I_D$  = -6.3 A
- Extended V<sub>GSS</sub> range (-25 V) for battery applications
- High performance trench technology for extremely low r<sub>DS(on)</sub>
- High power and current handling capability
- HBM ESD protection level >7 kV typical (Note 4)
- 100% UIL Tested
- Termination is Lead-free and RoHS Compliant

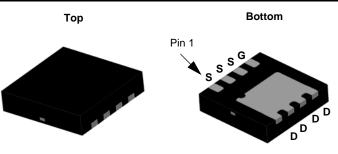
## General Description

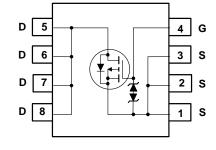
This P-Channel MOSFET is produced using Fairchild Semiconductor's advanced Power Trench® process that has been especially tailored to minimize the on-state resistance. This device is well suited for Power Management and load switching applications common in Notebook Computers and Portable Battery Packs.

#### **Applications**

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







MLP 3.3x3.3

## **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
$V_{GS}$	Gate to Source Voltage			±25	V
	Drain Current -Continuous	T <sub>C</sub> = 25 °C		-18	
I <sub>D</sub>	-Continuous	T <sub>A</sub> = 25 °C	(Note 1a)	-8.5	Α
	-Pulsed			-50	
E <sub>AS</sub>	Single Pulse Avalanche Energy		(Note 3)	32	mJ
Б	Power Dissipation	T <sub>C</sub> = 25 °C		31	W
$P_{D}$	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 Temperatu	ire Range		-55 to +150	°C

#### **Thermal Characteristics**

$R_{\theta JC}$	Thermal Resistance, Junction to Case	4	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient (Note 1	a) 53	- C/VV

#### **Package Marking and Ordering Information**

Device Marking	Device	Package	ackage Reel Size Tape Width		Quantity
FDMC4435BZ	FDMC4435BZ	MLP 3.3X3.3	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 <sub>DSS</sub>	Drain to Source Breakdown Voltage	$I_D = -250 \mu A, V_{GS} = 0 V$	-30			V
$\frac{\Delta BV_{DSS}}{\Delta T_{J}}$	Breakdown Voltage Temperature Coefficient	$I_D$ = -250 $\mu$ A, referenced to 25 °C		21		mV/°C
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	$V_{DS} = -24 \text{ V},$ $V_{GS} = 0 \text{ V},$ $T_{J} = 125 \text{ °C}$			-1 -100	μА
I <sub>GSS</sub>	Gate to Source Leakage Current	$V_{GS} = \pm 25 \text{ V}, V_{DS} = 0 \text{ V}$			±10	μА

#### **On Characteristics**

$V_{GS(th)}$	Gate to Source Threshold Voltage	$V_{GS} = V_{DS}, I_{D} = -250 \mu A$	-1.0	-1.8	-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		-5		mV/°C
		$V_{GS} = -10 \text{ V}, I_D = -8.5 \text{ A}$		14	20	
r	Static Drain to Source On Resistance	$V_{GS} = -4.5 \text{ V}, I_D = -6.3 \text{ A}$		21	37	mΩ
r <sub>DS(on)</sub> Static Drain to Source On Resistance	$V_{GS} = -10 \text{ V}, I_D = -8.5 \text{ A},$ $T_J = 125 ^{\circ}\text{C}$		20	29	11152	
9 <sub>FS</sub>	Forward Transconductance	V <sub>DD</sub> = -5 V, I <sub>D</sub> = -8.5 A		25		S

## **Dynamic Characteristics**

C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> = -15 V, V <sub>GS</sub> = 0 V, f = 1 MHz	1535	2040	pF
C <sub>oss</sub>	COUDUL CADACIIANCE		310	410	pF
C <sub>rss</sub>	Reverse Transfer Capacitance	1 - 1 1011 12	280	420	pF
$R_g$	Gate Resistance	f = 1 MHz	4		Ω

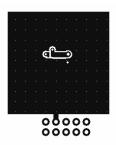
## **Switching Characteristics**

t <sub>d(on)</sub>	Turn-On Delay Time			10	20	ns
t <sub>r</sub>	Rise Time	V <sub>DD</sub> = -15 V, I <sub>D</sub> = -8.	5 A,	9	18	ns
t <sub>d(off)</sub>	Turn-Off Delay Time	V <sub>GS</sub> = -10 V, R <sub>GEN</sub> =	: 6 Ω	35	56	ns
t <sub>f</sub>	Fall Time			19	34	ns
$Q_g$	Total Gate Charge	V <sub>GS</sub> =0V to -10V		38	53	nC
Qg	Total Gate Charge	$V_{GS} = 0 \text{ V to -4.5 V}$	$V_{DD} = -15 \text{ V},$	20	28	nC
$Q_{gs}$	Gate to Source Charge		I <sub>D</sub> = -8.5 A	4.3		nC
$Q_{gd}$	Gate to Drain "Miller" Charge			11		nC

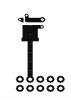
#### **Drain-Source Diode Characteristics**

\/		$V_{GS} = 0 \text{ V}, I_{S} = -8.5 \text{A}$	(Note 2)	0.86	1.5	\/
V SD		$V_{GS} = 0 \text{ V}, I_{S} = -1.9 \text{ A}$	(Note 2)	0.74	1.2	· ·
t <sub>rr</sub>	Reverse Recovery Time	I <sub>F</sub> = -8.5 A, di/dt = 100 A/μs		26	40	ns
Q <sub>rr</sub>	Reverse Recovery Charge			12	20	nC

<sup>1.</sup> R<sub>0JA</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.  $R_{\theta JC}$  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 in<sup>2</sup> pad of 2 oz copper



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

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

<sup>3.</sup> Starting  $T_J$  = 25°C; P-ch: L = 1mH,  $I_{AS}$  = -8A,  $V_{DD}$  = -27V,  $V_{GS}$  = -10V.

<sup>4.</sup> The diode connected between the gate and source servers only as protection against ESD. No gate overvoltage rating is implied.

## Typical Characteristics T<sub>J</sub> = 25°C unless otherwise noted

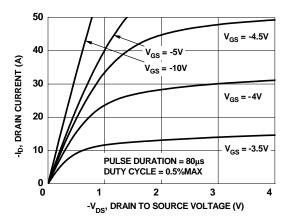


Figure 1. On-Region Characteristics

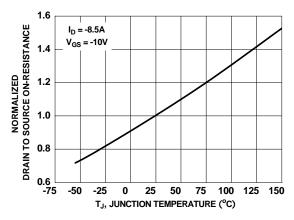


Figure 3. Normalized On-Resistance vs Junction Temperature

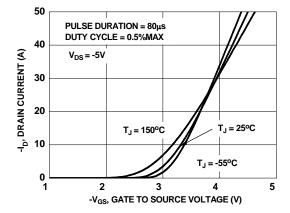


Figure 5. Transfer Characteristics

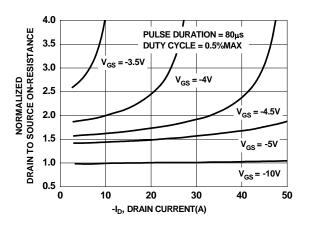


Figure 2. Normalized On-Resistance vs Drain Current and Gate Voltage

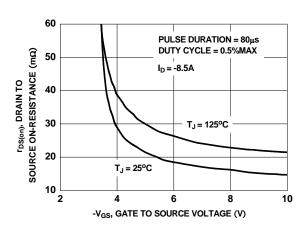


Figure 4. On-Resistance vs Gate to Source Voltage

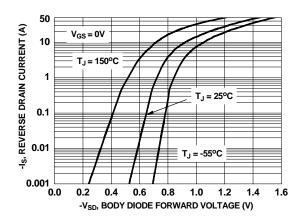


Figure 6. Source to Drain Diode Forward Voltage vs Source Current

## Typical Characteristics T<sub>J</sub> = 25°C unless otherwise noted

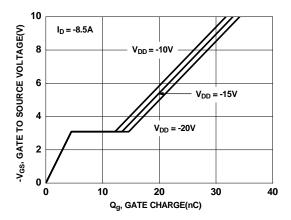


Figure 7. Gate Charge Characteristics

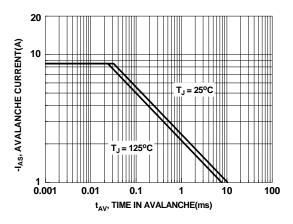


Figure 9. Unclamped Inductive Switching Capability

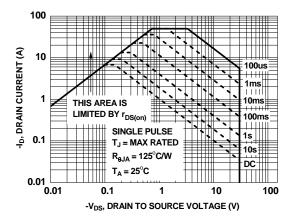


Figure 11. Forward Bias Safe Operating Area

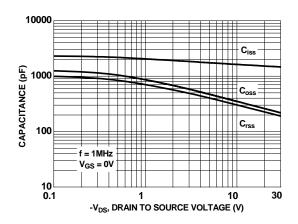


Figure 8. Capacitance vs Drain to Source Voltage

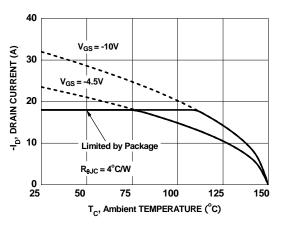


Figure 10. Maximum Continuous Drain Current vs Case Temperature

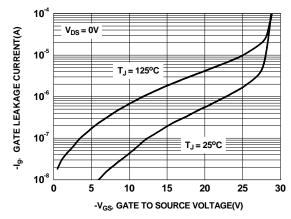


Figure 12. Igss vs Vgss

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

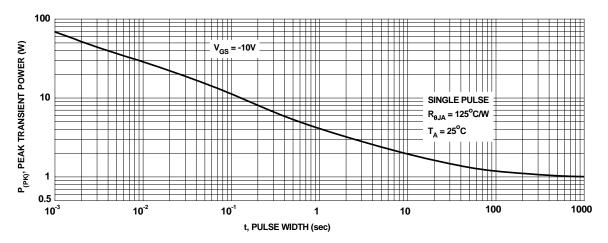


Figure 13. Single Pulse Maximum Power Dissipation

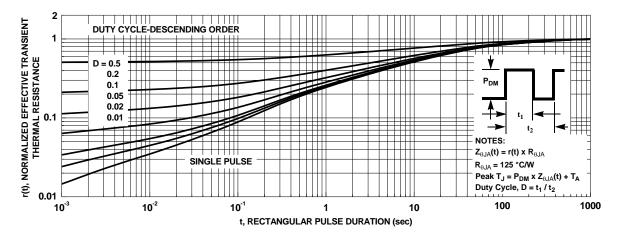
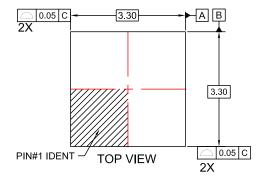
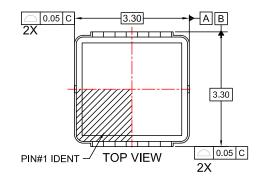
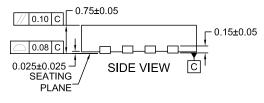


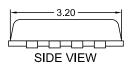
Figure 14. Transient Thermal Response Curve

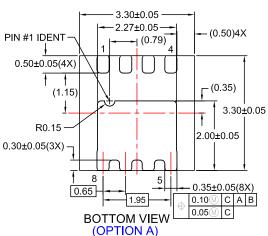
## **Dimensional Outline and Pad Layout**

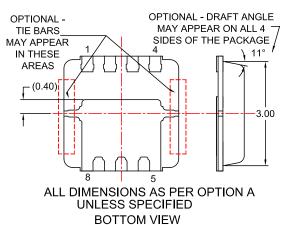




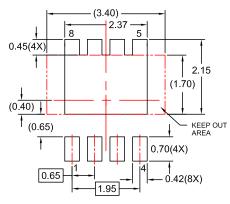






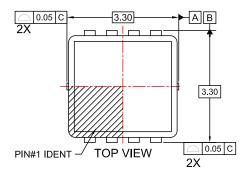


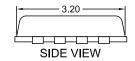
(OPTION B)

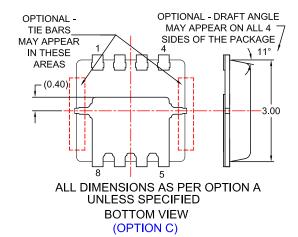




## **Dimensional Outline and Pad Layout**







#### 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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## Definition of Terms

Datasheet Identification	Product Status	Definition
Advance Information	Formative / In Design	Datasheet contains the design specifications for product development. Specifications may change in any manner without notice.
Preliminary First Production		Datasheet contains preliminary data; supplementary data will be published at a later date. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve design.
No Identification Needed Full Production		Datasheet contains final specifications. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve the design.
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Вы можете разместить у нас заказ для любого Вашего проекта, будь то серийное производство или разработка единичного прибора.

В нашем ассортименте представлены ведущие мировые производители активных и пассивных электронных компонентов.

Нашей специализацией является поставка электронной компонентной базы двойного назначения, продукции таких производителей как XILINX, Intel (ex.ALTERA), Vicor, Microchip, Texas Instruments, Analog Devices, Mini-Circuits, Amphenol, Glenair.

Сотрудничество с глобальными дистрибьюторами электронных компонентов, предоставляет возможность заказывать и получать с международных складов практически любой перечень компонентов в оптимальные для Вас сроки.

На всех этапах разработки и производства наши партнеры могут получить квалифицированную поддержку опытных инженеров.

Система менеджмента качества компании отвечает требованиям в соответствии с ГОСТ Р ИСО 9001, ГОСТ РВ 0015-002 и ЭС РД 009

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