

#### Is Now Part of



# ON Semiconductor®

# To learn more about ON Semiconductor, please visit our website at www.onsemi.com

Please note: As part of the Fairchild Semiconductor integration, some of the Fairchild orderable part numbers will need to change in order to meet ON Semiconductor's system requirements. Since the ON Semiconductor product management systems do not have the ability to manage part nomenclature that utilizes an underscore (\_), the underscore (\_) in the Fairchild part numbers will be changed to a dash (-). This document may contain device numbers with an underscore (\_). Please check the ON Semiconductor website to verify the updated device numbers. The most current and up-to-date ordering information can be found at <a href="www.onsemi.com">www.onsemi.com</a>. Please email any questions regarding the system integration to Fairchild <a href="guestions@onsemi.com">guestions@onsemi.com</a>.

ON Semiconductor and the ON Semiconductor logo are trademarks of Semiconductor Components Industries, LLC dba ON Semiconductor or its subsidiaries in the United States and/or other countries. ON Semiconductor owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of ON Semiconductor's product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent-Marking.pdf. ON Semiconductor reserves the right to make changes without further notice to any products herein. ON Semiconductor makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does ON Semiconductor assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using ON Semiconductor products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by ON Semiconductor. "Typical" parameters which may be provided in ON Semiconductor data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. ON Semiconductor does not convey any license under its patent rights nor the rights of others. ON Semiconductor products are not designed, intended, or authorized for use as a critical component in life support systems or any EDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use ON Semiconductor products for any such unintended or unauthorized application, Buyer shall indemnify and hold ON Semiconductor and its officer



June 2014

# FDMC510P

# P-Channel PowerTrench<sup>®</sup> MOSFET -20 V, -18 A, 8.0 m $\Omega$

#### **Features**

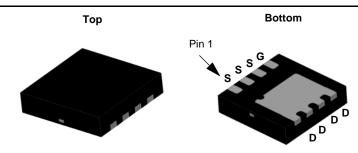
- Max  $r_{DS(on)}$  = 8.0 m $\Omega$  at  $V_{GS}$  = -4.5 V,  $I_D$  = -12 A
- Max  $r_{DS(on)}$  = 9.8 m $\Omega$  at  $V_{GS}$  = -2.5 V,  $I_D$  = -10 A
- Max  $r_{DS(on)} = 13 \text{ m}\Omega$  at  $V_{GS} = -1.8 \text{ V}$ ,  $I_D = -9.3 \text{ A}$
- Max  $r_{DS(on)} = 17 \text{ m}\Omega$  at  $V_{GS} = -1.5 \text{ V}$ ,  $I_D = -8.3 \text{ A}$
- High performance trench technology for extremely low r<sub>DS(on)</sub>
- High power and current handling capability in a widely used surface mount package
- 100% UIL Tested
- Termination is Lead-free and RoHS Compliant
- HBM ESD capability level >2 KV typical (Note 4)

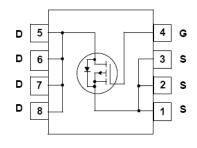
#### **General Description**

This P-Channel MOSFET is produced using Fairchild Semiconductor's advanced Power Trench® process that has been optimized for  $r_{DS(ON)}$ , switching performance and ruggedness.

#### **Applications**

- Battery Management
- Load Switch





MLP 3.3x3.3

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

Symbol	Param	eter		Ratings	Units
$V_{DS}$	Drain to Source Voltage			-20	V
$V_{GS}$	Gate to Source Voltage			±8	V
	Drain Current -Continuous	T <sub>C</sub> = 25 °C		-18	
I <sub>D</sub>	-Continuous	T <sub>A</sub> = 25 °C	(Note 1a)	-12	Α
	-Pulsed			-50	
E <sub>AS</sub>	Single Pulse Avalanche Energy			37	mJ
P <sub>D</sub>	Power Dissipation	T <sub>C</sub> = 25 °C		41	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 Temper	ature Range		-55 to +150	°C

#### **Thermal Characteristics**

$R_{\theta JC}$	Thermal Resistance, Junction to Case	3	°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	Reel Size	Tape Width	Quantity
FDMC510P	FDMC510P	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	cteristics					
BV <sub>DSS</sub>	Drain to Source Breakdown Voltage	$I_D = -250 \mu A, V_{GS} = 0 V$	-20			V
$\frac{\Delta BV_{DSS}}{\Delta T_{J}}$	Breakdown Voltage Temperature Coefficient	$I_D$ = -250 $\mu$ A, referenced to 25 °C		-12		mV/°C
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> = -16 V, V <sub>GS</sub> = 0 V			-1	μΑ
I <sub>GSS</sub>	Gate to Source Leakage Current	$V_{GS} = \pm 8 \text{ V}, V_{DS} = 0 \text{ V}$			±100	nA

#### **On Characteristics**

$V_{GS(th)}$	Gate to Source Threshold Voltage	$V_{GS} = V_{DS}, I_{D} = -250 \mu A$	-0.4	-0.5	-1.0	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		3		mV/°C
		$V_{GS} = -4.5 \text{ V}, I_D = -12 \text{ A}$		6.4	8.0	
		$V_{GS} = -2.5 \text{ V}, I_D = -10 \text{ A}$		7.6	9.8	
r <sub>DS(on)</sub>	Static Drain to Source On Resistance	$V_{GS} = -1.8 \text{ V}, I_D = -9.3 \text{ A}$		9.2	13	mΩ
		$V_{GS} = -1.5 \text{ V}, I_D = -8.3 \text{ A}$		11	17	
		$V_{GS} = -4.5 \text{ V}, I_D = -12 \text{ A}, T_J = 125 \text{ °C}$		8.5	12	
g <sub>FS</sub>	Forward Transconductance	$V_{DS} = -5 \text{ V}, I_{D} = -12 \text{ A}$		75		S

#### **Dynamic Characteristics**

C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> = -10 V, V <sub>GS</sub> = 0 V, f = 1 MHz	5910	7860	pF
C <sub>oss</sub>	Output Capacitance		840	1120	pF
C <sub>rss</sub>	Reverse Transfer Capacitance		738	1110	pF

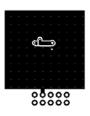
### **Switching Characteristics**

t <sub>d(on)</sub>	Turn-On Delay Time		15	27	ns
t <sub>r</sub>	Rise Time	$V_{DD} = -10 \text{ V}, I_{D} = -12 \text{ A},$	34	55	ns
t <sub>d(off)</sub>	Turn-Off Delay Time	$V_{GS} = -4.5 \text{ V}, R_{GEN} = 6 \Omega$	338	540	ns
t <sub>f</sub>	Fall Time		170	272	ns
$Q_{g(TOT)}$	Total Gate Charge	V <sub>GS</sub> = 0 V to -4.5 V	83	116	nC
$Q_{g(TOT)}$	Total Gate Charge	$V_{GS} = 0 \text{ V to -2.5 V} V_{DD} = -10 \text{ V},$	50	70	nC
Q <sub>gs</sub>	Gate to Source Charge	I <sub>D</sub> = -12 A	6.3		nC
$Q_{gd}$	Gate to Drain "Miller" Charge		20.4		nC

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

V <sub>SD</sub>	ISOURCE TO DISID DIODE FORWARD VOITAGE	$V_{GS} = 0 \text{ V}, I_S = -12 \text{ A}$ (Note	2)	-0.70	-1.3	\/
		$V_{GS} = 0 \text{ V}, I_S = -2 \text{ A}$ (Note	2)	-0.53	-1.2	V
t <sub>rr</sub>	Reverse Recovery Time	I <sub>F</sub> = -12 A, di/dt = 100 A/μs		35	57	ns
Q <sub>rr</sub>	Reverse Recovery Charge	IF = -12 A, α/αι = 100 A/μs		20	32	nC

<sup>1.5</sup> R<sub>0,JA</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>0,JC</sub> is guaranteed by design while R<sub>0,JA</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: Starting T $_J$  = 25°C; P-Ch: L = 3 mH, I $_{AS}$  = -5 A, V $_{DD}$  = -20 V, V $_{GS}$  = -4.5 V. 4: No gate overvoltage rating is implied.

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

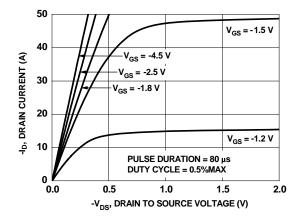


Figure 1. On Region Characteristics

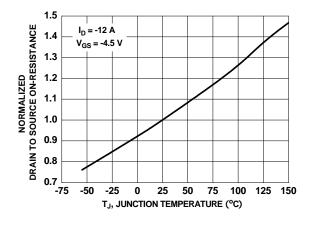


Figure 3. Normalized On Resistance vs. Junction Temperature

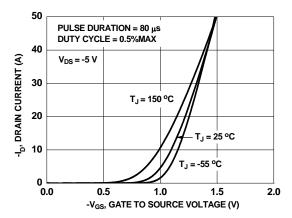


Figure 5. Transfer Characteristics

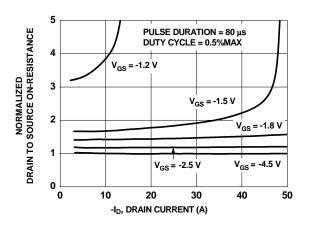


Figure 2. Normalized On-Resistance vs. Drain Current and Gate Voltage

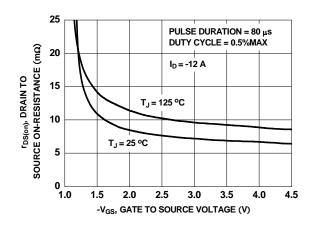


Figure 4. On-Resistance vs. Gate to Source Voltage

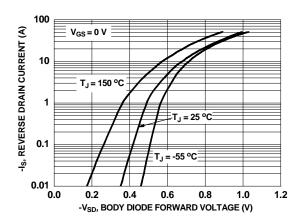


Figure 6. Source to Drain Diode Forward Voltage vs. Source Current

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

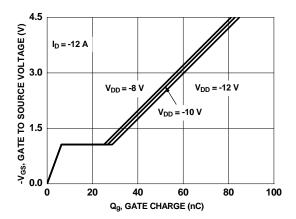


Figure 7. Gate Charge Characteristics

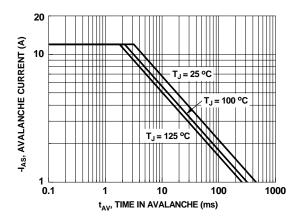


Figure 9. Unclamped Inductive Switching Capability

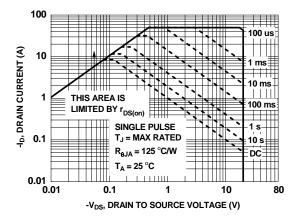


Figure 11. Forward Bias Safe Operating Area

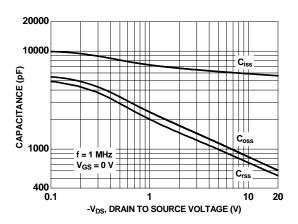


Figure 8. Capacitance vs. Drain to Source Voltage

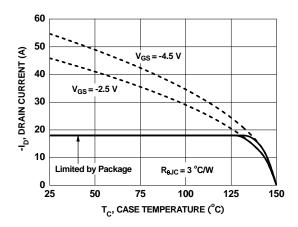


Figure 10. Maximum Continuous Drain Current vs. Case Temperature

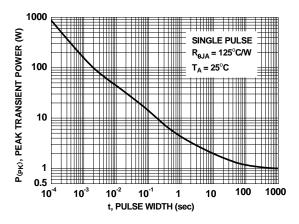


Figure 12. Single Pulse Maximum Power Dissipation



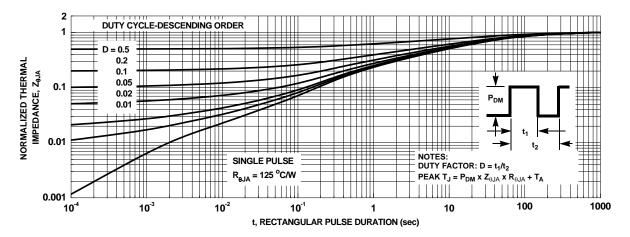
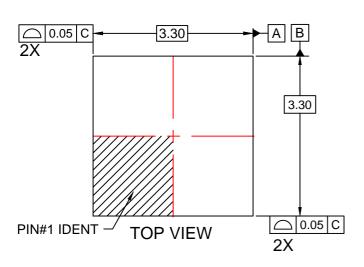
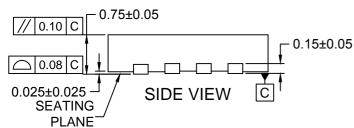
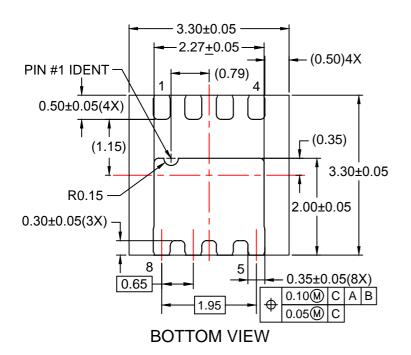
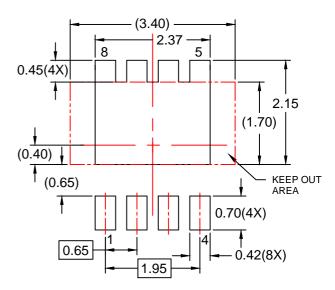


Figure 13. Junction-to-Ambient Transient Thermal Response Curve









RECOMMENDED LAND PATTERN

#### NOTES:

- A. DOES NOT CONFORM TO JEDEC REGISTRATION MO-229
- B. DIMENSIONS ARE IN MILLIMETERS.
- C. DIMENSIONS AND TOLERANCES PER ASME Y14.5M, 2009.
- D. LAND PATTERN RECOMMENDATION IS EXISTING INDUSTRY LAND PATTERN.
- E. DRAWING FILENAME: MKT-MLP08Srev3.



ON Semiconductor and in are trademarks of Semiconductor Components Industries, LLC dba ON Semiconductor or its subsidiaries in the United States and/or other countries. ON Semiconductor owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of ON Semiconductor's product/patent coverage may be accessed at <a href="www.onsemi.com/site/pdt/Patent-Marking.pdf">www.onsemi.com/site/pdt/Patent-Marking.pdf</a>. ON Semiconductor reserves the right to make changes without further notice to any products herein. ON Semiconductor assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using ON Semiconductor products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by ON Semiconductor. "Typical" parameters which may be provided in ON Semiconductor data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. ON Semiconductor does not convey any license under its patent rights nor the rights of others. ON Semiconductor products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use ON Semiconductor products for any such unintended or unauthorized application, Buyer shall indemnify and hold ON Semiconductor and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and exp

#### **PUBLICATION ORDERING INFORMATION**

#### LITERATURE FULFILLMENT:

Literature Distribution Center for ON Semiconductor 19521 E. 32nd Pkwy, Aurora, Colorado 80011 USA Phone: 303-675-2175 or 800-344-3860 Toll Free USA/Canada Fax: 303-675-2176 or 800-344-3867 Toll Free USA/Canada Email: orderlit@onsemi.com N. American Technical Support: 800-282-9855 Toll Free USA/Canada
Europe, Middle East and Africa Technical Support:
Phone: 421 33 790 2910
Japan Customer Focus Center
Phone: 81-3-5817-1050

ON Semiconductor Website: www.onsemi.com

Order Literature: http://www.onsemi.com/orderlit

For additional information, please contact your local Sales Representative

# **Mouser Electronics**

**Authorized Distributor** 

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

ON Semiconductor:

FDMC510P

## **ПОСТАВКА** ЭЛЕКТРОННЫХ КОМПОНЕНТОВ

многоканальный

Общество с ограниченной ответственностью «МосЧип» ИНН 7719860671 / КПП 771901001 Адрес: 105318, г.Москва, ул.Щербаковская д.3, офис 1107

# Данный компонент на территории Российской Федерации Вы можете приобрести в компании MosChip.

Для оперативного оформления запроса Вам необходимо перейти по данной ссылке:

#### http://moschip.ru/get-element

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

#### Офис по работе с юридическими лицами:

105318, г. Москва, ул. Щербаковская д. 3, офис 1107, 1118, ДЦ «Щербаковский»

Телефон: +7 495 668-12-70 (многоканальный)

Факс: +7 495 668-12-70 (доб.304)

E-mail: info@moschip.ru

Skype отдела продаж:

moschip.ru moschip.ru\_6 moschip.ru\_4 moschip.ru\_9