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FDP4D5N10C / FDPF4D5N10C

N-Channel Shielded Gate PowerTrench[®] MOSFET 100 V, 128 A, 4.5 m Ω

Features

- Max $r_{DS(on)}$ = 4.5 m Ω at V_{GS} = 10 V, I_D = 100 A
- Extremely Low Reverse Recovery Charge, Qrr
- 100% UIL Tested
- RoHS Compliant

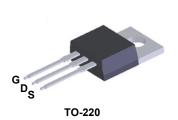
General Description

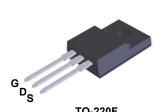
This N-Channel MV MOSFET is produced using ON Semiconductor's advanced PowerTrench® process that incorporates Shielded Gate technology. This process has been optimized to minimize on-state resistance and yet maintain superior switching performance with best in class soft body diode.

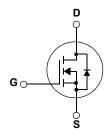
Applications

- Synchronous Rectification for ATX / Server / Telecom PSU
- Motor Drives and Uninterruptible Power Supplies
- Micro Solar Inverter









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

Symbol	Davamatan		Ratii	I I mito			
Symbol	Parameter -			FDP4D5N10C	FDPF4D5N10C	Units	
V_{DS}	Drain to Source Voltage			100	100	V	
V_{GS}	Gate to Source Voltage			±20	±20	V	
	Drain Current -Continuous T _C	= 25°C (N	Note 3)	128*	128*		
I_D	-Continuous T _C	= 100°C (N	Note 3)	91	91	Α	
	-Pulsed	1)	Note 1)	512	512		
E _{AS}	Single Pulse Avalanche Energy	1)	Note 2)	486		mJ	
П	Power Dissipation T _C	c = 25°C		150	37.5	W	
P_{D}	Power Dissipation T _A	_ = 25°C		2.4	2.4	VV	
T _J , T _{STG}	Operating and Storage Junction Tempera	ature Range		-55 to +175	-55 to +175	°C	

 $^{^{\}star}$ Drain current limited by maximum junction temperature. Package limitation current is 120A.

Thermal Characteristics

Symbol	Parameter	FDP4D5N10C	FDPF4D5N10C	Units
$R_{\theta JC}$	Thermal Resistance, Junction to Case	1.0	4.0	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	62.5	62.5	C/VV

Package Marking and Ordering Information

Device Marking	Device	Package	Packing Mode	Quantity
FDP4D5N10C	FDP4D5N10C	TO-220	Tube	50 units
FDPF4D5N10C	FDPF4D5N10C	TO-220F	Tube	50 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	$I_D = 250 \mu A, V_{GS} = 0 V$	100			V
$\frac{\Delta BV_{DSS}}{\Delta T_{J}}$	Breakdown Voltage Temperature Coefficient	I _D = 250 μA, referenced to 25 °C		53		mV/°C
1	Zero Gate Voltage Drain Current	V _{DS} = 80 V, V _{GS} = 0 V			1	μΑ
IDSS	Zero Gate voltage Drain Current	V _{DS} = 80 V, T _J = 150°C			500	μΑ
I _{GSS}	Gate to Source Leakage Current	$V_{GS} = \pm 20 \text{ V}, V_{DS} = 0 \text{ V}$			±100	nA

On Characteristics

V _{GS(th)}	Gate to Source Threshold Voltage	$V_{GS} = V_{DS}, I_D = 310 \mu A$	2.0	3.2	4.0	٧
r _{DS(on)}	Static Drain to Source On Resistance	V _{GS} = 10 V, I _D = 100 A		4.0	4.5	$m\Omega$
9 _{FS}	Forward Transconductance	V _{DS} = 5 V, I _D = 100 A		134		S

Dynamic Characteristics

C _{iss}	Input Capacitance	V _{DS} = 50 V, V _{GS} = 0 V, f = 1 MHz		3615	5065	pF
C _{oss}	Output Capacitance			2330	3265	pF
C _{rss}	Reverse Transfer Capacitance			18	35	pF
R_g	Gate Resistance		0.1	1.1	2.2	Ω

Switching Characteristics

t _{d(on)}	Turn-On Delay Time		29	47	ns
t _r	Rise Time	V _{DD} = 50 V, I _D = 100 A,	49	79	ns
t _{d(off)}	Turn-Off Delay Time	V_{GS} = 10 V, R_{GEN} = 6 Ω	41	66	ns
t _f	Fall Time		13	24	ns
Q_g	Total Gate Charge	V _{GS} = 0 V to 10 V	48	68	nC
Q _{gs}	Gate to Source Gate Charge	$V_{DD} = 50 \text{ V},$ $I_{D} = 100 \text{ A}$	19		nC
Q_{gd}	Gate to Drain "Miller" Charge	ID - 100 A	9		nC
Q _{oss}	Output Charge	V _{DD} = 50 V, V _{GS} = 0 V	150		nC

Drain-Source Diode Characteristic

I _S	Maximum Continuous Drain to Source Diode Forward Current		-	-	128	Α
I _{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	512	Α
V_{SD}	Source to Drain Diode Forward Voltage	V _{GS} = 0 V, I _S = 100 A		1.0	1.3	V
t _{rr}	Reverse Recovery Time	V _{GS} = 0 V, V _{DD} = 50 V,		82	132	ns
Q _{rr}	Reverse Recovery Charge	$I_F = 100 \text{ A}, dI_F/dt = 100 \text{ A}/\mu\text{s}$		106	170	nC
t _{rr}	Reverse Recovery Time	V _{GS} = 0 V, V _{DD} = 50 V,		71	114	ns
Q _{rr}	Reverse Recovery Charge	$I_F = 100 \text{ A}, dI_F/dt = 300 \text{ A/}\mu\text{s}$		258	413	nC

Notes:

- ${\bf 1.\ Pulsed\ Id\ please\ refer\ to\ Figure\ "Forward\ Bias\ Safe\ Operating\ Area"\ for\ more\ details.}$
- 2. E_{AS} of 486 mJ is based on starting T_J = 25 °C, L = 3 mH, I_{AS} = 18 A, V_{DD} = 100 V, V_{GS} = 10 V. 100% test at L = 0.1 mH, I_{AS} = 58 A.
- 3. Computed continuous current limited to Max Junction Temperature only, actual continuous current will be limited by thermal & electro-mechanical application board design.

Typical Characteristics T_J = 25 °C unless otherwise noted.

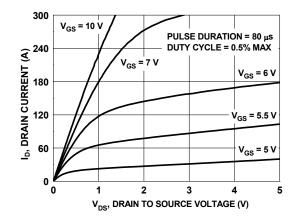


Figure 1. On Region Characteristics

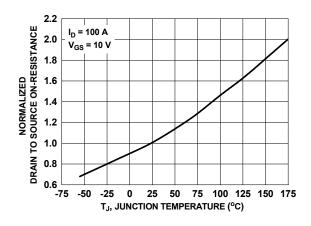


Figure 3. Normalized On Resistance vs. Junction Temperature

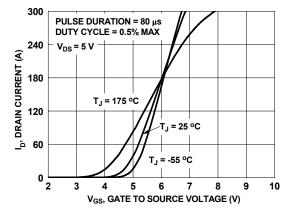


Figure 5. Transfer Characteristics

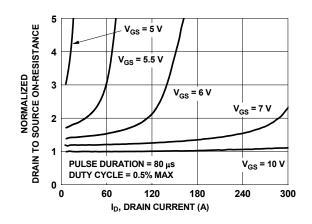


Figure 2. Normalized On-Resistance vs. Drain Current and Gate Voltage

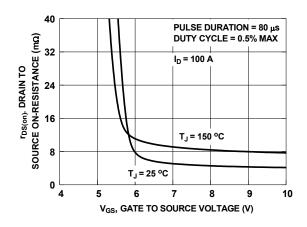


Figure 4. On-Resistance vs. Gate to Source Voltage

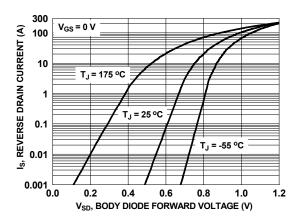


Figure 6. Source to Drain Diode Forward Voltage vs. Source Current

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

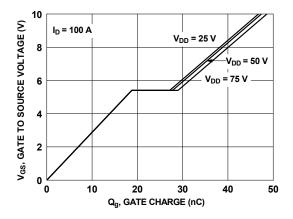


Figure 7. Gate Charge Characteristics

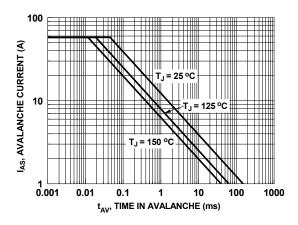


Figure 9. Unclamped Inductive Switching Capability

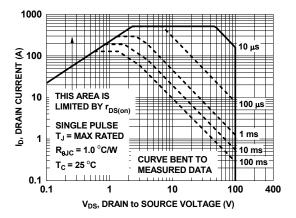


Figure 11. Forward Bias Safe Operating Area for FDP4D5N10C

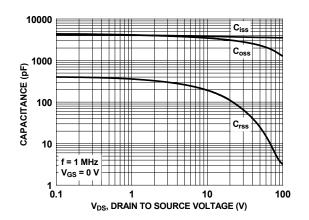


Figure 8. Capacitance vs. Drain to Source Voltage

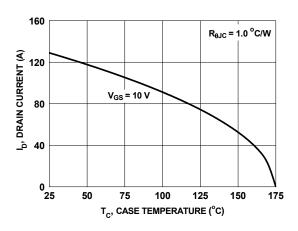


Figure 10. Maximum Continuous Drain Current vs. Case Temperature

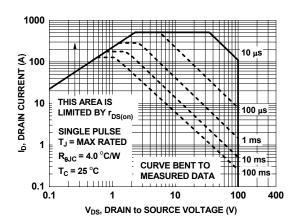
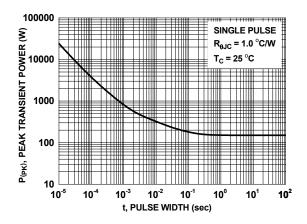


Figure 12. Forward Bias Safe Operating Area for FDPF4D5N10C

Typical Characteristics T_J = 25 °C unless otherwise noted.



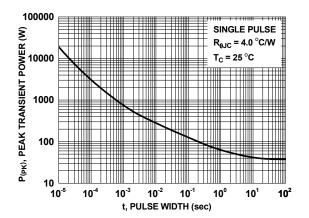


Figure 13. Single Pulse Maximum Power Dissipation for FDP4D5N10C

Figure 14. Single Pulse Maximum Power Dissipation for FDPF4D5N10C

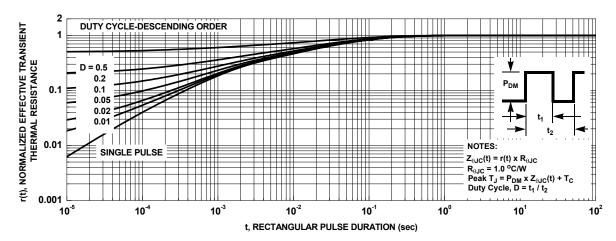


Figure 15. Junction-to-Case Transient Thermal Response Curve for FDP4D5N10C

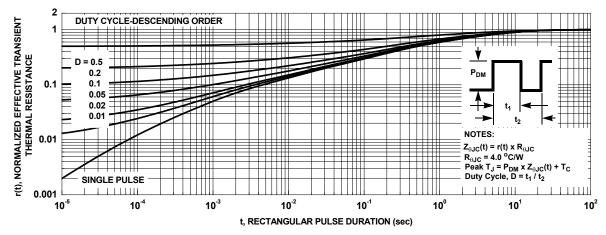
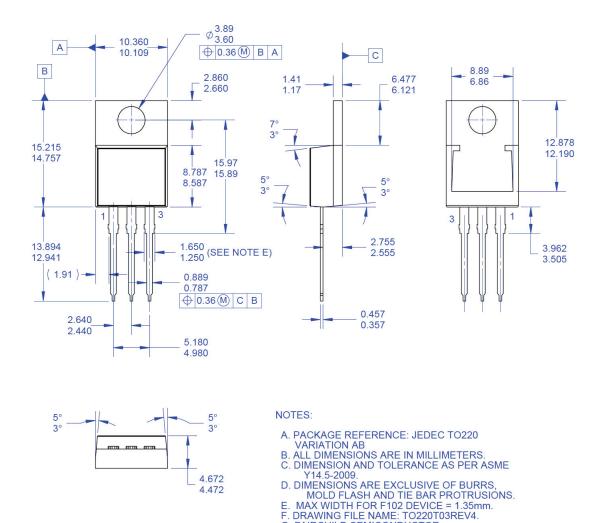


Figure 16. Junction-to-Case Transient Thermal Response Curve for FDPF4D5N10C

Dimensional Outline and Pad Layout



TO-220, Molded, 3-Lead, Jedec Variation AB (Delta)

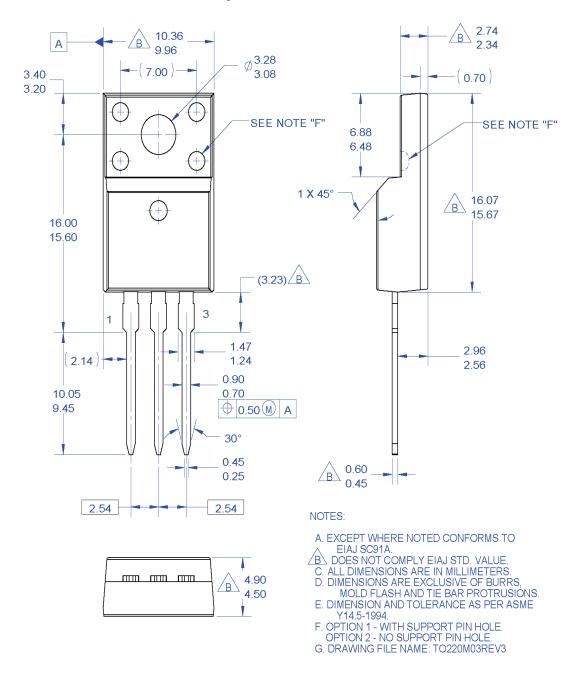
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Dimensional Outline and Pad Layout



TO220, Molded, 3-Lead, Full Pack, EIAJ SC91, Straight Lead

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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