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# FDPF16N50 / FDPF16N50T N-Channel UniFET™ MOSFET

# 500 V, 16 A, 380 m $\Omega$

### Features

- $R_{DS(on)}$  = 380 m $\Omega$  (Max.) @ V<sub>GS</sub> = 10 V, I<sub>D</sub> = 8 A
- Low Gate Charge (Typ. 32 nC)
- Low Crss (Typ. 20 pF)
- 100% Avalanche Tested

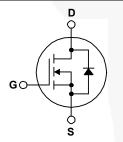
### Applications

- LCD/LED/PDP TV
- Lighting
- Uninterruptible Power Supply



UniFET<sup>™</sup> MOSFET is Fairchild Semiconductor's high voltage MOSFET family based on planar stripe and DMOS technology. This MOSFET is tailored to reduce on-state resistance, and to provide better switching performance and higher avalanche energy strength. This device family is suitable for switching power converter applications such as power factor correction (PFC), flat panel display (FPD) TV power, ATX and electronic lamp ballasts.





### Absolute Maximum Ratings T<sub>C</sub> = 25°C unless otherwise noted.

Symbol		Parameter		FDPF16N50 FDPF16N50T	Unit
V <sub>DSS</sub>	Drain-Source Voltage			500	V
ID		Continuous ( $T_C = 25^{\circ}C$ ) Continuous ( $T_C = 100^{\circ}C$		16* 9.6*	A A
I <sub>DM</sub>	Drain Current -	Pulsed	(Note 1)	64*	A
V <sub>GSS</sub>	Gate-Source voltage			±30	V
E <sub>AS</sub>	Single Pulsed Avalanch	e Energy	(Note 2)	780	mJ
I <sub>AR</sub>	Avalanche Current		(Note 1)	16	A
E <sub>AR</sub>	Repetitive Avalanche E	nergy	(Note 1)	20	mJ
dv/dt	Peak Diode Recovery d	v/dt	(Note 3)	4.5	V/ns
P <sub>D</sub>	Power Dissipation (T <sub>C</sub> = 25°C) - Derate above 25°C			38.5 0.3	W W/°C
T <sub>J,</sub> T <sub>STG</sub>	Operating and Storage Temperature Range			-55 to +150	°C
TL	Maximum Lead Temperature for Soldering, 1/8" from Case for 5 Seconds			300	°C

\* Drain current limited by maximum junction temperature.

### **Thermal Characteristics**

Symbol	Parameter	FDPF16N50 FDPF16N50T	Unit
$R_{ ext{ heta}JC}$	Thermal Resistance, Junction-to-Case, Max.	3.3	°C/W
$R_{\thetaJA}$	Thermal Resistance, Junction-to-Ambient, Max.	62.5	°C/W

November 2013

# Package Marking and Ordering Information

Part Number	Top Mark	Package	Packing Method	Reel Size	Tape Width	Quantity
FDPF16N50	FDPF16N50	TO-220F	Tube	N/A	N/A	50 units
FDPF16N50T	FDPF16N50T	TO-220F	Tube	N/A	N/A	50 units

# Electrical Characteristics T<sub>c</sub> = 25°C unless otherwise noted.

Symbol	Parameter	Conditions	Min.	Тур.	Max	Unit
Off Charac	teristics					
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> = 0V, I <sub>D</sub> = 250µA	500			V
ΔΒV <sub>DSS</sub> / ΔT <sub>J</sub>	Breakdown Voltage Temperature Coefficient	$I_D = 250 \mu A$ , Referenced to 25°C		0.5		V/∘C
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	$V_{DS} = 500V, V_{GS} = 0V$ $V_{DS} = 400V, T_{C} = 125^{\circ}C$			1 10	μΑ μΑ
I <sub>GSSF</sub>	Gate-Body Leakage Current, Forward	V <sub>GS</sub> = 30V, V <sub>DS</sub> = 0V			100	nA
I <sub>GSSR</sub>	Gate-Body Leakage Current, Reverse	V <sub>GS</sub> = -30V, V <sub>DS</sub> = 0V			-100	nA
On Charac	teristics					<b></b>
V <sub>GS(th)</sub>	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250 \mu A$	3.0		5.0	V
R <sub>DS(on)</sub>	Static Drain-Source On-Resistance	V <sub>GS</sub> = 10V, I <sub>D</sub> = 8A	+	0.31	0.38	Ω
9 <sub>FS</sub>	Forward Transconductance	V <sub>DS</sub> = 40V, I <sub>D</sub> = 8A		23		S
Dynamic C	haracteristics					
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> = 25V, V <sub>GS</sub> = 0V,		1495	1945	pF
C <sub>oss</sub>	Output Capacitance	f = 1.0MHz		235	310	pF
C <sub>rss</sub>	Reverse Transfer Capacitance			20	30	pF
Switching	Characteristics					
t <sub>d(on)</sub>	Turn-On Delay Time	V <sub>DD</sub> = 250V, I <sub>D</sub> = 16A		40	90	ns
t <sub>r</sub>	Turn-On Rise Time	$R_{G} = 25\Omega$		150	310	ns
t <sub>d(off)</sub>	Turn-Off Delay Time			65	140	ns
t <sub>f</sub>	Turn-Off Fall Time	(Note 4)		80	170	ns
Qg	Total Gate Charge	V <sub>DS</sub> = 400V, I <sub>D</sub> = 16A		32	45	nC
Q <sub>gs</sub>	Gate-Source Charge	V <sub>GS</sub> = 10V	-	8.5		nC
Q <sub>gd</sub>	Gate-Drain Charge	(Note 4)	-	14		nC
Drain-Sour	ce Diode Characteristics and Maximur	n Ratings			1	
I <sub>S</sub> Maximum Continuous Drain-Source Diode Forward Current				9.2	Α	
I <sub>SM</sub>	Maximum Pulsed Drain-Source Diode Forward Current				37	Α
V <sub>SD</sub>	Drain-Source Diode Forward Voltage	V <sub>GS</sub> = 0V, I <sub>S</sub> = 16A			1.4	V
t <sub>rr</sub>	Reverse Recovery Time	V <sub>GS</sub> = 0V, I <sub>S</sub> = 16A		490		ns
Q <sub>rr</sub>	Reverse Recovery Charge	$dI_{\rm F}/dt = 100 {\rm \AA}/{\rm \mu s}$		5.0		μC

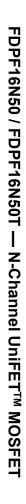
NOTES:

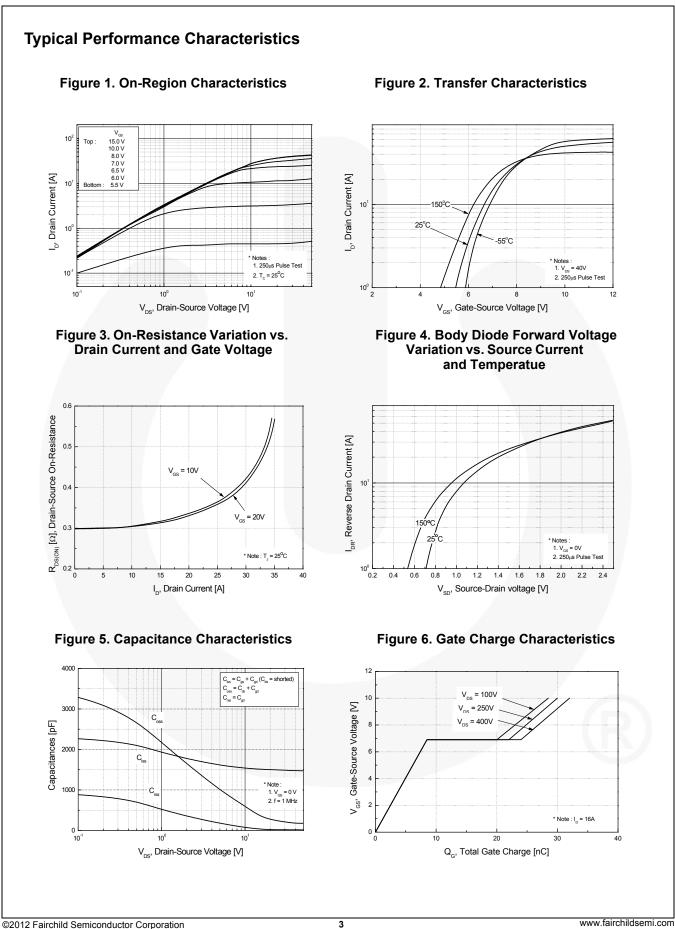
1. Repetitive rating: pulse-width limited by maximum junction temperature.

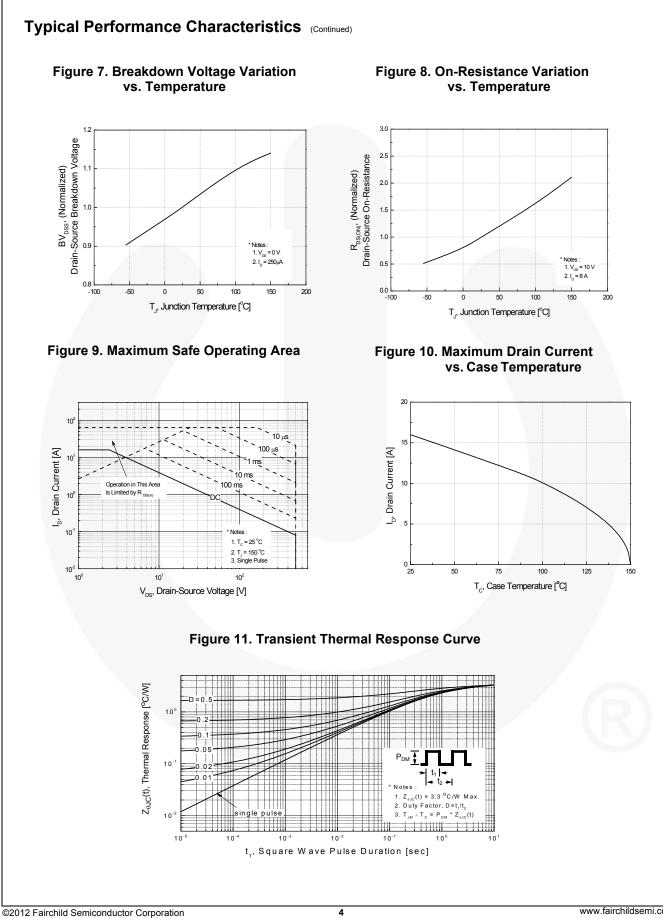
2. L = 5.5 mH, I<sub>AS</sub> = 16 A, V<sub>DD</sub> = 50 V, R<sub>G</sub> = 25  $\Omega$ , starting T<sub>J</sub> = 25°C.

3. I\_{SD} \leq 16 A, di/dt  $\leq$  200 A/µs, V\_{DD}  $\leq$  BV\_{DSS}, starting T\_J = 25°C.

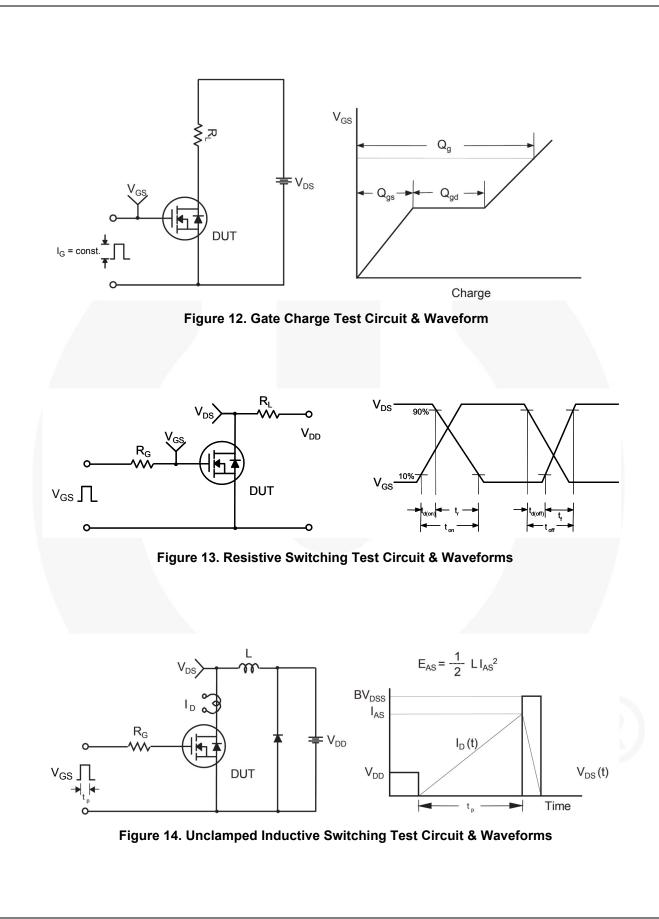
4. Essentially independent of operating temperature typical characteristics.

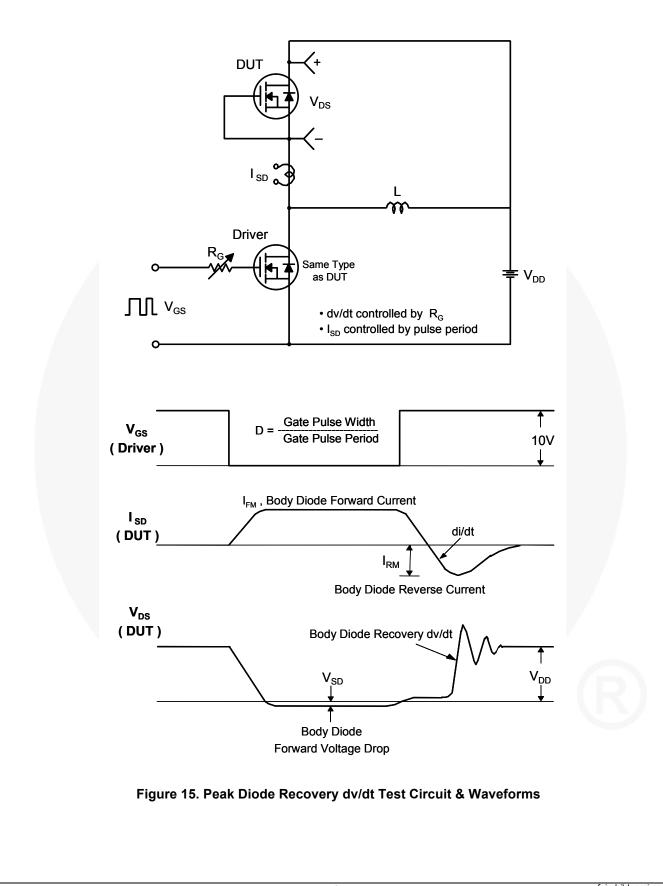


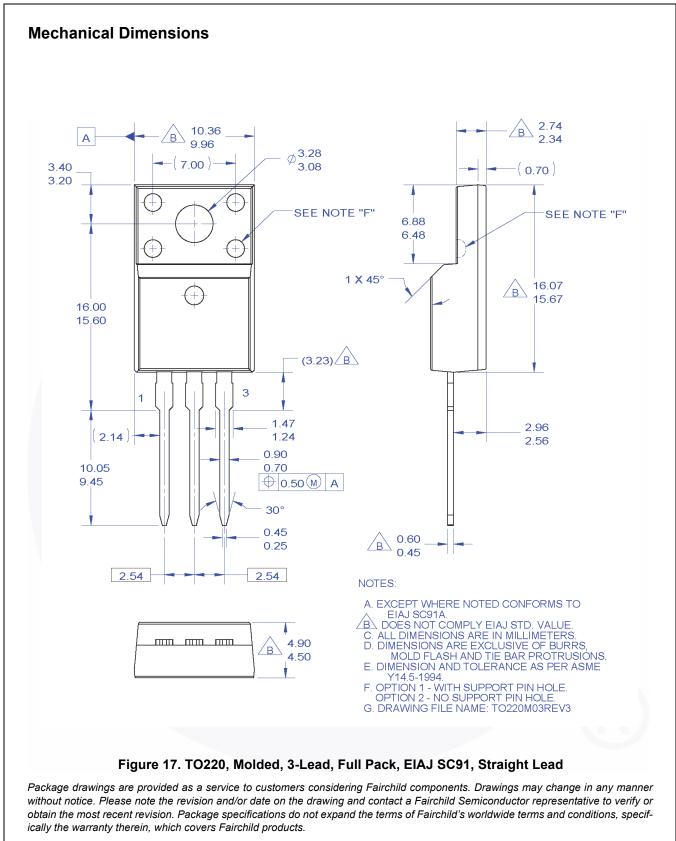




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FDPF16N50 / FDPF16N50T — N-Channel UniFET<sup>™</sup> MOSFET



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