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## FDPF10N50FT N-Channel UniFET<sup>TM</sup> FRFET<sup>®</sup> MOSFET 500 V, 9 A, 850 mΩ

### Features

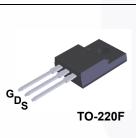
- $R_{DS(on)}$  = 710 m $\Omega$  (Typ.) @ V<sub>GS</sub> = 10 V, I<sub>D</sub> = 4.5 A
- Low Gate Charge (Typ. 18 nC)
- Low C<sub>rss</sub> (Typ. 10 pF)
- 100% Avalanche Tested
- · Improved dv/dt Capability
- RoHS Compliant

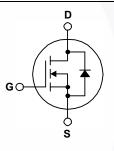
### Applications

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

### Description

UniFET<sup>TM</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. The body diode's reverse recovery performance of UniFET FRFET<sup>®</sup> MOSFET has been enhanced by lifetime control. Its t<sub>rr</sub> is less than 100nsec and the reverse dv/ dt immunity is 15V/ns while normal planar MOSFETs have over 200nsec and 4.5V/nsec respectively. Therefore, it can remove additional component and improve system reliability in certain applications in which the performance of MOSFET's body diode is significant. 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.





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

Symbol	Parameter		FDPF10N50FT	Unit		
V <sub>DSS</sub>	Drain to Source Voltage			500	V	
V <sub>GSS</sub>	Gate to Source Voltage		±30	V		
I <sub>D</sub>	Drain Current	- Continuous (T <sub>C</sub> = 25 <sup>o</sup> C)		9*	•	
		- Continuous (T <sub>C</sub> = 100 <sup>o</sup> C)		5.4*	A	
I <sub>DM</sub>	Drain Current	- Pulsed	- Pulsed (Note 1)		А	
E <sub>AS</sub>	Single Pulsed Avalanche Energy (Note 2)		(Note 2)	364	mJ	
I <sub>AR</sub>	Avalanche Current (Note 1)		(Note 1)	9	А	
E <sub>AR</sub>	Repetitive Avalanche Energy (Note 1)		(Note 1)	12.5	mJ	
dv/dt	Peak Diode Recovery dv/	/dt	(Note 3)	20	V/ns	
P <sub>D</sub>	Dower Dissinction	(T <sub>C</sub> = 25°C)		42	W	
	Power Dissipation	- Derate Above 25°C		0.33	W/ºC	
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**

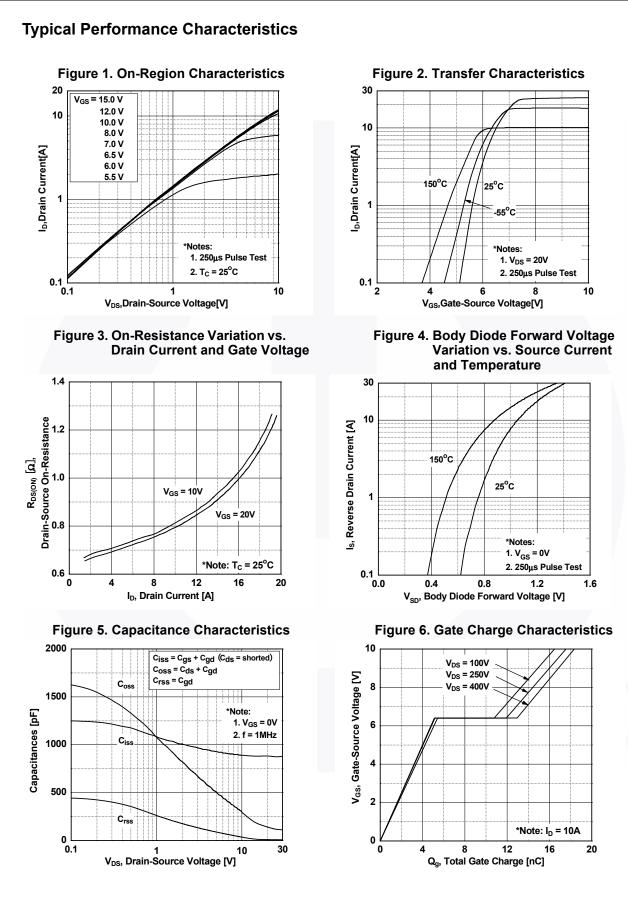
Symbol	Parameter	FDPF10N50FT	Unit
$R_{ extsf{ heta}JC}$	Thermal Resistance, Junction to Case, Max.	3.0	°C/W
$R_{\thetaJA}$	Thermal Resistance, Junction to Ambient, Max.	62.5	0/11

November 2013

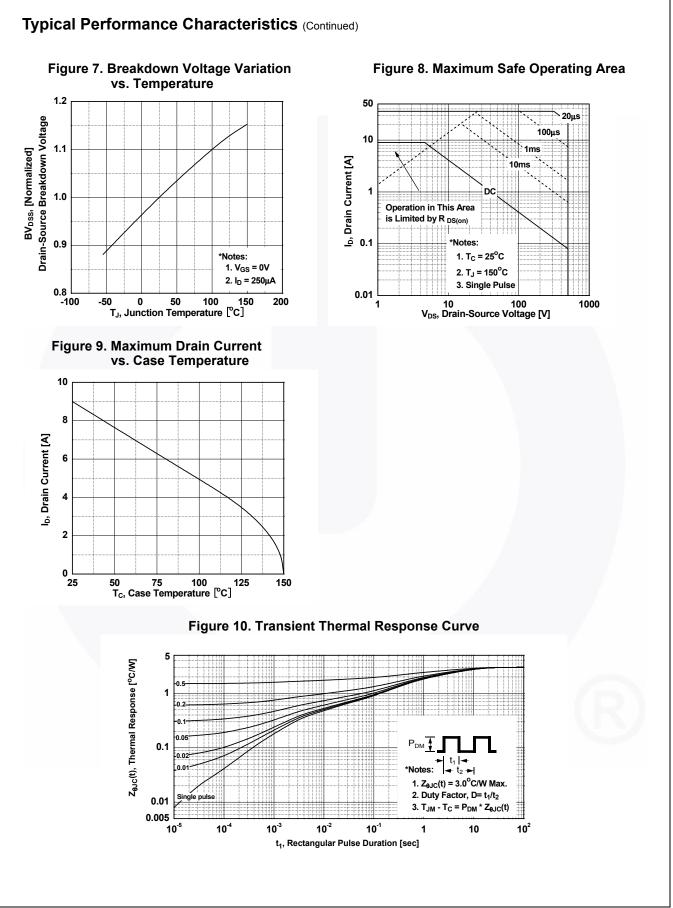
			Package TO-220F	<u> </u>		e Tape Width		Quantity 50 units	
Electrica	l Chara	cteristics T <sub>c</sub> = 25°C	C unless othe	erwise noted.					
Symbol		Parameter		Test Conditions	6	Min.	Тур.	Max.	Unit
Off Charac	cteristics								
BV <sub>DSS</sub>	Drain to S	Drain to Source Breakdown Voltage		I <sub>D</sub> = 250 μA, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 25 <sup>o</sup> C		500	-	-	V
ΔBV <sub>DSS</sub>		lown Voltago Tomporaturo		$I_D = 250 \ \mu\text{A}, \text{ Referenced to } 25^{\circ}\text{C}$					
$/\Delta T_J$	Coefficient		I <sub>D</sub> =			-	0.5	-	V/ºC
	Zero Cat	e Voltage Drain Current		<sub>s</sub> = 500 V, V <sub>GS</sub> = 0 V		-	-	10	μA
DSS	Zero Gale	e vollage Drain Current		$_{\rm S}$ = 400 V, T <sub>C</sub> = 125 <sup>o</sup> C		-	-	100	μΑ
GSS	Gate to B	ody Leakage Current	V <sub>G</sub>	<sub>S</sub> = ±30 V, V <sub>DS</sub> = 0 V		-	-	±100	nA
On Charac	toriotico								
V <sub>GS(th)</sub>		eshold Voltage		$_{\rm S} = V_{\rm DS}, I_{\rm D} = 250 \mu \text{A}$		3.0	-	5.0	V
R <sub>DS(on)</sub>		ain to Source On Resistance		$_{\rm S} = 10$ V, $I_{\rm D} = 4.5$ A		-	0.71	0.85	Ω
9 <sub>FS</sub>	Forward	Transconductance	VDS	<sub>S</sub> = 20 V, I <sub>D</sub> = 4.5 A		-	8.5	-	S
Dynamic C	Character	istics							
C <sub>iss</sub>	Input Cap					-	880	1170	pF
C <sub>oss</sub>		apacitance	V <sub>D</sub> s	V <sub>DS</sub> = 25 V, V <sub>GS</sub> = 0 V, f = 1 MHz			120	160	pF
O <sub>oss</sub> C <sub>rss</sub>	-	Transfer Capacitance	f =				120	15	pF
Q <sub>g</sub>		e Charge at 10V		400.1/1 40.4			18	24	nC
ag Q <sub>gs</sub>		ource Gate Charge		V <sub>DS</sub> = 400 V, I <sub>D</sub> = 10 A, V <sub>GS</sub> = 10 V (Note 4)		-	5	-	nC
∝ <sub>gs</sub> Q <sub>gd</sub>		rain "Miller" Charge	• G				7.5		nC
Switching t <sub>d(on)</sub>		Delay Time	V <sub>DD</sub> = 250 V, I <sub>D</sub> = 10 A,		-	20 40	50 90	ns ns	
t <sub>d(off)</sub>	Turn-Off	Delay Time	V <sub>G</sub>	$V_{GS}$ = 10 V, $R_{G}$ = 25 $\Omega$		-	45	100	ns
t <sub>f</sub>	Turn-Off F	all Time			(Note 4)	- /	30	70	ns
Drain-Sou	rce Diode	Characteristics			I				
I <sub>S</sub>		Continuous Drain to Source	ce Diode For	ward Current		-	-	9	Α
I <sub>SM</sub>		Pulsed Drain to Source Di				-	-	60	A
V <sub>SD</sub>		ource Diode Forward Volta		<sub>S</sub> = 0 V, I <sub>SD</sub> = 9 A		-	-	1.5	V
t <sub>rr</sub>		Recovery Time		$S = 0 V, I_{SD} = 9 A,$		-	95	-	ns
Q <sub>rr</sub>		Recovery Charge		$dt = 100 \text{ A}/\mu \text{s}$		-	0.2	· - ·	μC

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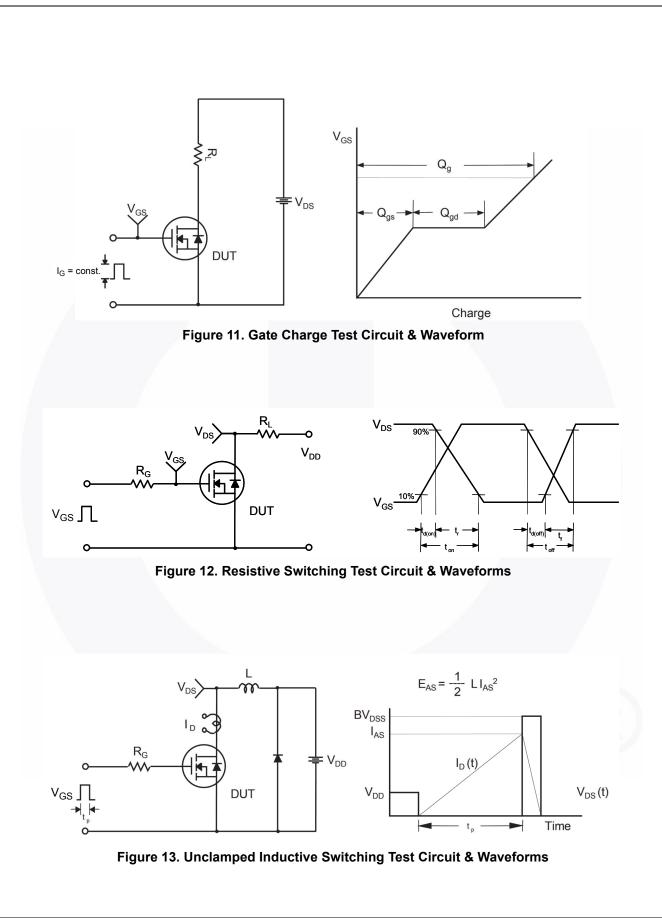




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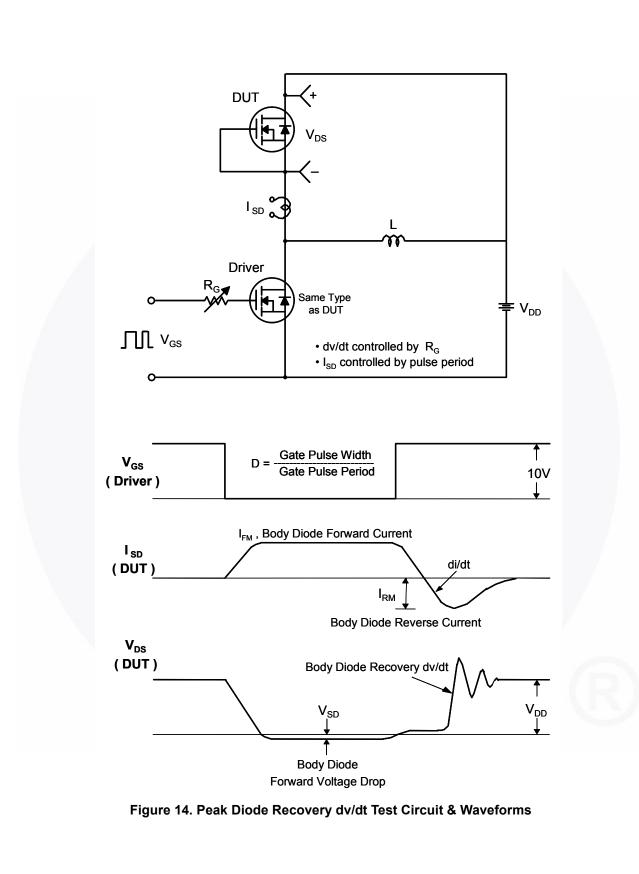


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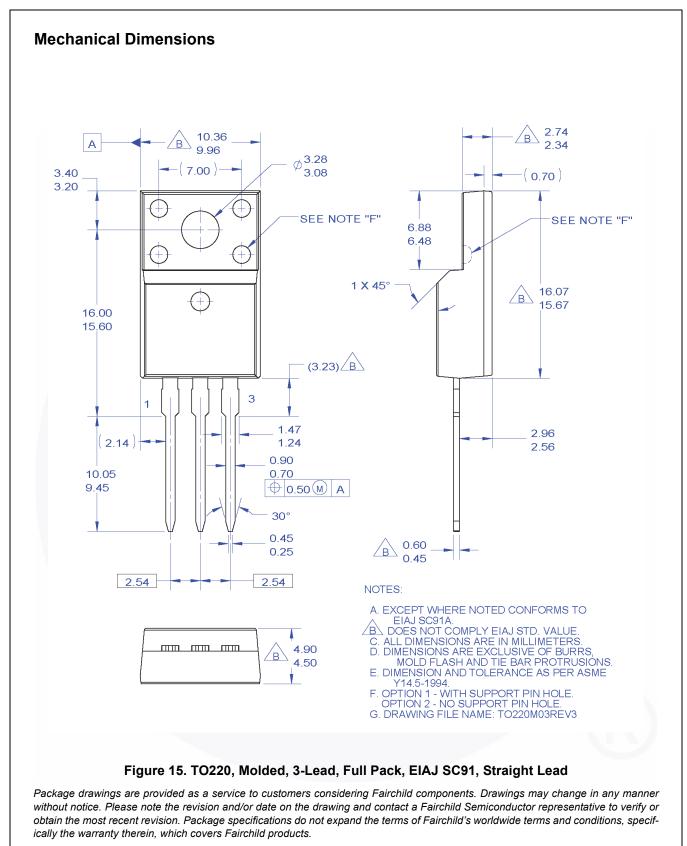
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