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FDP20N50F / FDPF20N50FT N-Channel UniFETTM FRFET[®] MOSFET 500 V, 20 A, 260 m Ω

Features

- $R_{DS(on)}$ = 210 m Ω (Typ.) @ V_{GS} = 10 V, I_D = 10 A
- Low Gate Charge (Typ. 50 nC)
- Low C_{rss} (Typ. 27 pF)
- 100% Avalanche Aested
- Improve dv/dt Capability
- RoHS Compliant

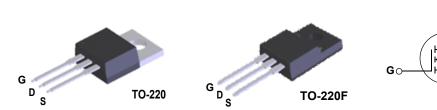
Applications

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

Description

UniFETTM 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[®] MOSFET has been enhanced by lifetime control. Its t_{rr} 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.

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MOSFET Maximum Ratings T_C = 25°C unless otherwise noted

Symbol		FDP20N50F	FDPF20N50FT	Unit			
V _{DSS}	Drain to Source Voltage	5	V				
V _{GSS}	Gate to Source Voltage	±	V				
I _D	DrainCurrent	- Continuous (T _C = 25 ^o C)	- Continuous (T _C = 25 ^o C)		20*	^	
		- Continuous (T _C = 100 ^o C)		12.9	12.9*	A	
I _{DM}	DrainCurrent	- Pulsed	(Note 1)	80	80*	А	
E _{AS}	Single Pulsed Avalanche Ene	(Note 2)	1110		mJ		
I _{AR}	Avalanche Current	(Note 1)	20		А		
E _{AR}	Repetitive Avalanche Energy	(Note 1)	25		mJ		
dv/dt	Peak Diode Recovery dv/dt		(Note 3)	20		V/ns	
P _D	Dower Dissinction	$(T_{\rm C} = 25^{\rm o}{\rm C})$		250	38.5	W	
	Power Dissipation	- Derate above 25°C		2.0	0.3	W/ºC	
T _J , T _{STG}	Operating and Storage Temperature Range			-55 to +150		°C	
TL	Maximum Lead Temperature for Soldering Purpose, 1/8" from Case for 5 Seconds			300		٥C	

Thermal Characteristics

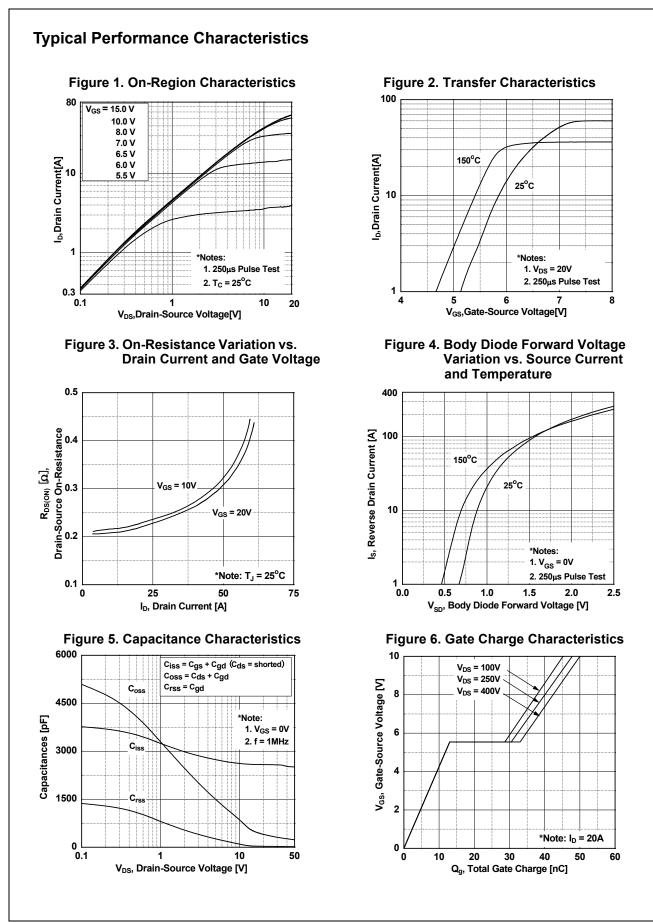
Symbol	Parameter	FDP20N50F	FDPF20N50FT	Unit	
$R_{ ext{ heta}JC}$	Thermal Resistance, Junction to Case, Max.	0.5	3.3		
$R_{\theta CS}$	Thermal Resistance, Case to Sink, Typ.	0.5	-	°C/W	
$R_{ hetaJA}$	Thermal Resistance, Junction to Ambient, Max.	62.5	62.5		

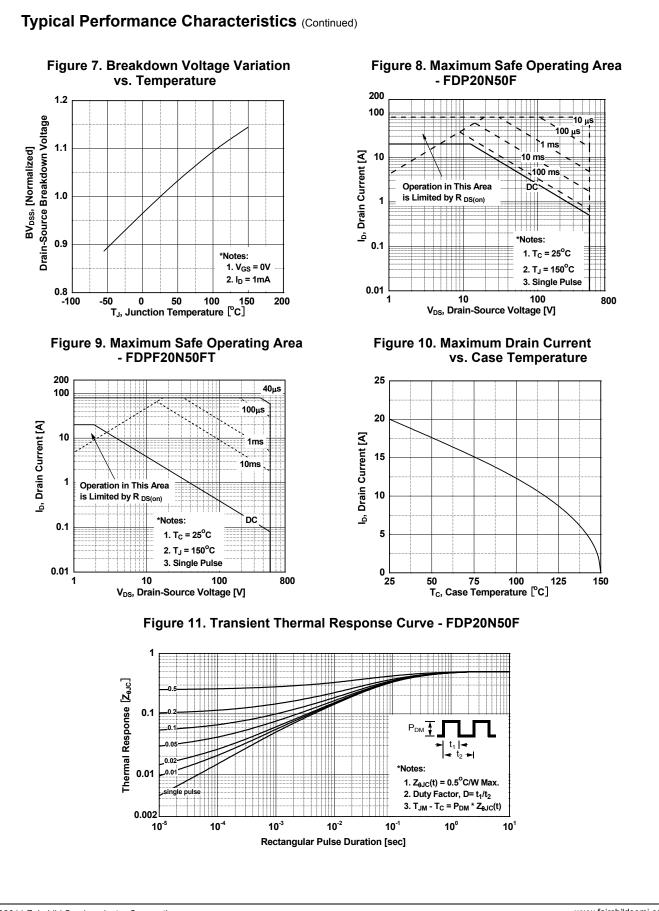
FDP20N50F FDP20N50F TO-2		Packag	je	Reel Size	Таре	e Width		Quantit	у	
		TO-22			-		50 50			
		TO-220	20F -							
Electrica	l Char	racteristics				-				
Symbol		Parameter			Test Conditions		Min.	Тур.	Max.	Unit
Off Charac	teristic	S								
BV _{DSS}	Drain to Source Breakdown Voltage			I _D = 250μA, V _{GS} = 0V, T _J = 25 ^o C			500	-	-	V
ΔBV _{DSS} / ΔT _{.1}	Breakd	Breakdown Voltage Temperature Coefficient		$I_D = 250 \mu A$, Referenced to $25^{\circ}C$			-	0.7	-	V/°C
				V _{DS} = 500V, V _{GS} = 0V			-	-	10	
I _{DSS}	Zero Gate Voltage Drain Current		$V_{\rm DS} = 400V, T_{\rm C} = 125^{\rm o}{\rm C}$			-	-	100	μA	
I _{GSS}	Gate to Body Leakage Current			$V_{GS} = \pm 30V, V_{DS} = 0V$			-	-	±100	nA
On Charac	teristic	S				1			1	1
V _{GS(th)}	1	hreshold Voltage		V _{GS} = V _{DS} , I _D = 250μA			3.0	-	5.0	V
R _{DS(on)}	Static E	Static Drain to Source On Resistance			V _{GS} = 10V, I _D = 10A			0.22	0.26	Ω
9 _{FS}	Forward Transconductance			V _{DS} = 20V, I _D = 10A			-	25	-	S
C _{iss} C _{oss} C _{rss}	Input Capacitance Output Capacitance Reverse Transfer Capacitance			– V _{DS} = 25V, V _{GS} = 0V – f = 1MHz			-	2550 350 27	3390 465 40	pF pF pF
		Total Gate Charge at 10V Gate to Source Gate Charge					-	50	40 65	nC
Q _{g(tot)} Q _{gs}					$V_{DS} = 400V, I_D = 20A$ $V_{GS} = 10V$			14	-	nC
								20	_	nC
Q _{gd}	Gate to Drain "Miller" Charge					(Note 4)	-	20	-	nc
Switching				1					100	1
t _{d(on)}		Turn-On Delay Time Turn-On Rise Time Turn-Off Delay Time Turn-Off Fall Time			250 / I_ = 204	-	-	45	100	ns
t _r					V _{DD} = 250V, I _D = 20A R _G = 25Ω		-	120 100	250 210	ns
t _{d(off)} t					_			60	130	ns
t _f Droin Cour	1		_	<u> </u>		(Note 4)	-	00	130	ns
		de Characteristic	-	- Forwa	ard Current		-		20	A
I _S I _{SM}	Maximum Continuous Drain to Source Diode Maximum Pulsed Drain to Source Diode For						-		80	A
V _{SD}		Source Diode Forward		$V_{GS} = 0V, I_{SD} = 20A$			-	-	1.5	V
<u>vs⊡</u> t _{rr}		e Recovery Time			0V, I _{SD} = 20A		-	154	-	ns
		verse Recovery Time verse Recovery Charge			dl _F /dt = 100A/μs				1	

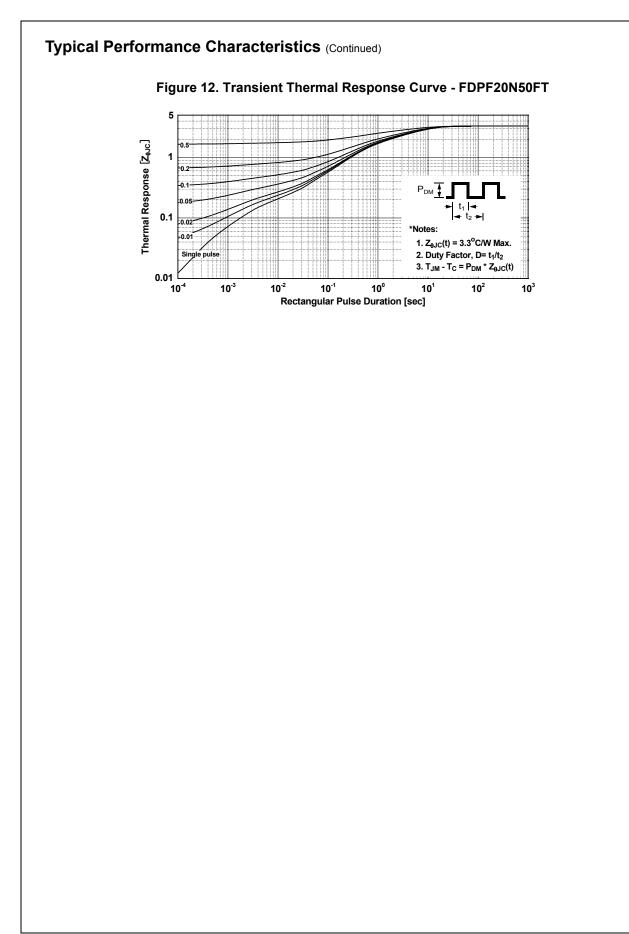
2. L = 5mH, I_{AS} = 20A, V_{DD} = 50V, R_G = 25 Ω , Starting T_J = 25 $^{\circ}$ C

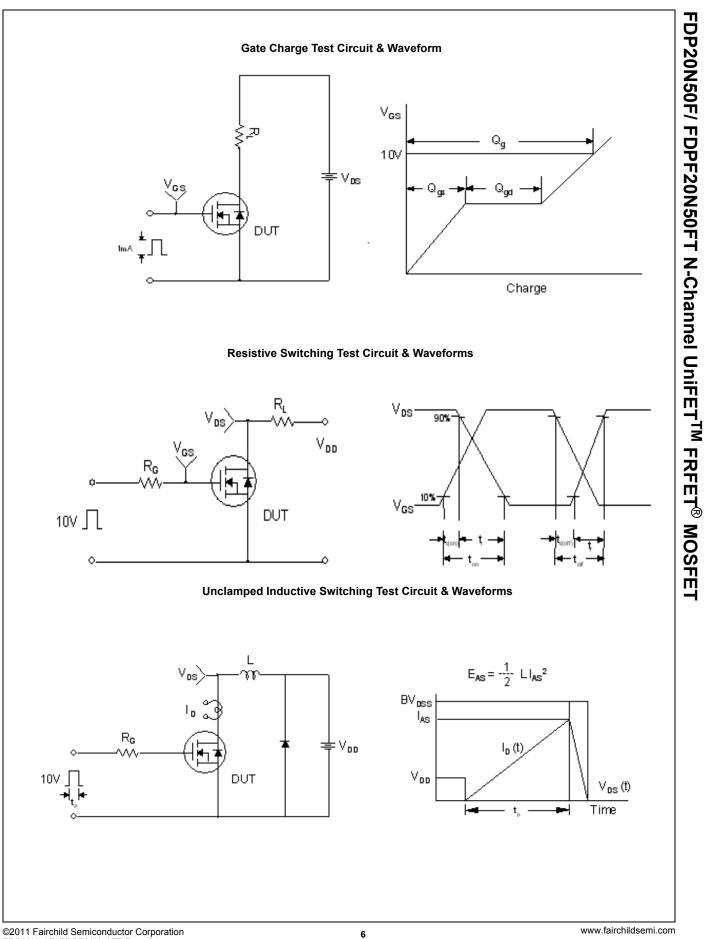
3. I_{SD} \leq 20A, di/dt \leq 200A/µs, V_{DD} \leq BV_{DSS}, Starting T_J = 25°C

4. Essentially Independent of Operating Temperature Typical Characteristics

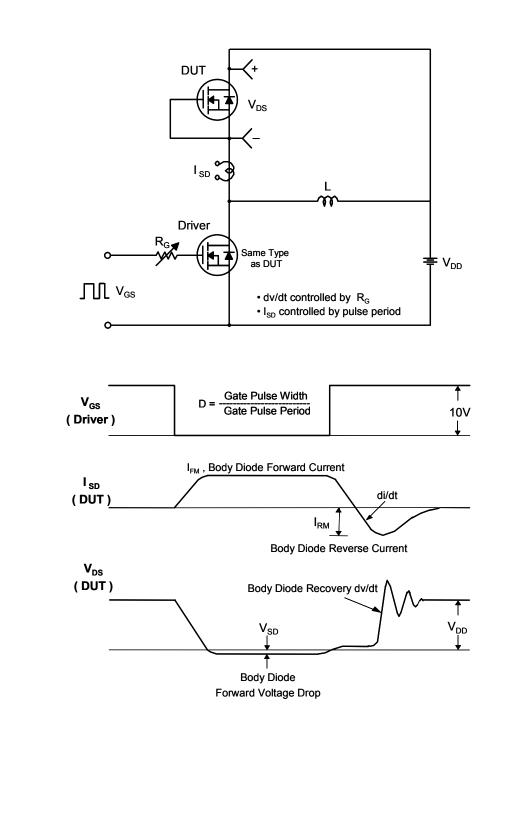


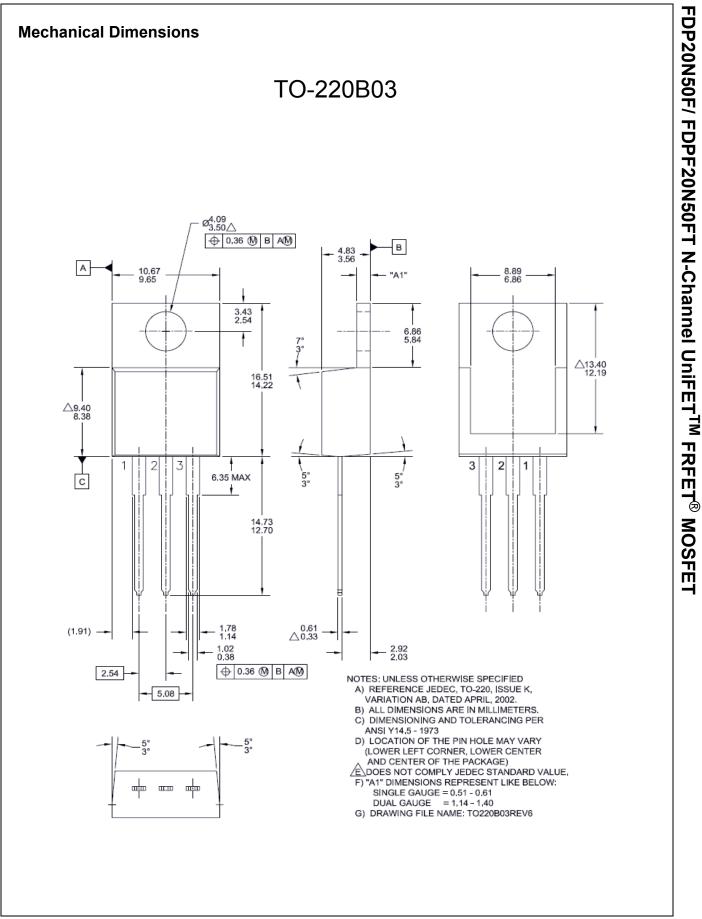


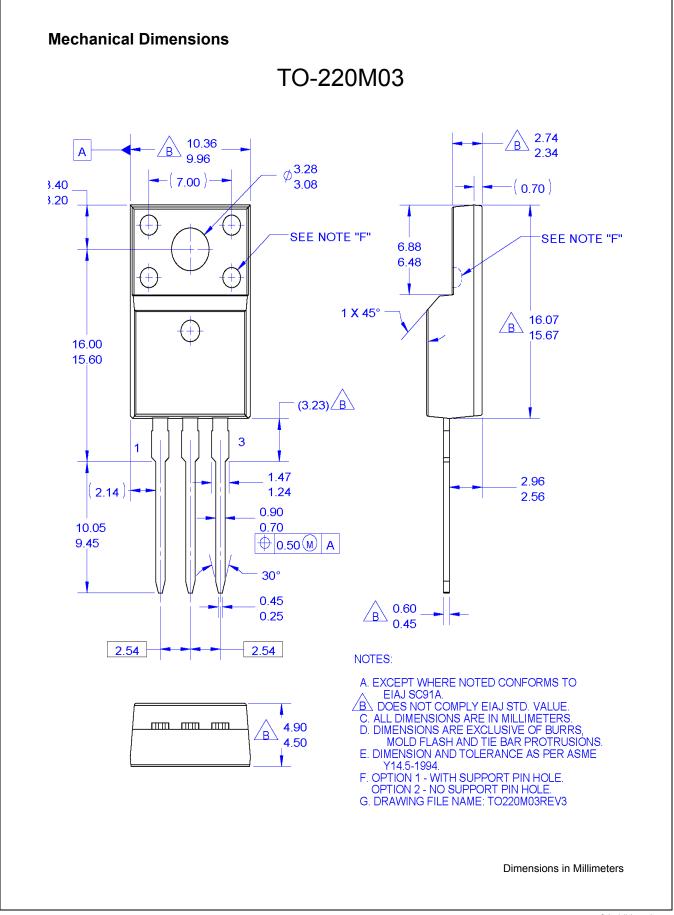




Peak Diode Recovery dv/dt Test Circuit & Waveforms









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