



FDPF15N65

N-Channel UniFET™ MOSFET

650 V, 15 A, 440 mΩ

Features

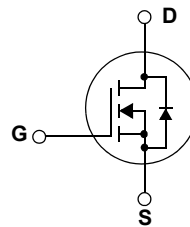
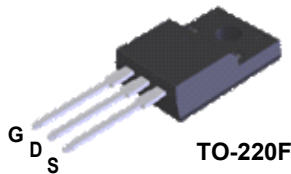
- $R_{DS(on)} = 440\text{ m}\Omega$ (Max.) @ $V_{GS} = 10\text{ V}$, $I_D = 7.5\text{ A}$
- Low Gate Charge (Typ. 48.5 nC)
- Low C_{rss} (Typ. 23.6 pF)
- 100% Avalanche Tested

Applications

- LCD/LED/PDP TV and Monitor
- Uninterruptible Power Supply

Description

UniFET™ 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

Symbol	Parameter		FDPF15N65	Unit
V_{DSS}	Drain-Source Voltage		650	V
I_D	Drain Current	- Continuous ($T_C = 25^\circ\text{C}$)	15*	A
		- Continuous ($T_C = 100^\circ\text{C}$)	9.5*	A
I_{DM}	Drain Current	- Pulsed (Note 1)	60*	A
V_{GSS}	Gate-Source voltage		± 30	V
E_{AS}	Single Pulsed Avalanche Energy (Note 2)		637	mJ
I_{AR}	Avalanche Current (Note 1)		15	A
E_{AR}	Repetitive Avalanche Energy (Note 1)		25.0	mJ
dv/dt	Peak Diode Recovery dv/dt (Note 3)		4.5	V/ns
P_D	Power Dissipation	($T_C = 25^\circ\text{C}$)	38.5	W
		- Derate above 25°C	0.3	W/ $^\circ\text{C}$
T_J, T_{STG}	Operating and Storage Temperature Range		-55 to +150	$^\circ\text{C}$
T_L	Maximum Lead Temperature for Soldering Purpose, 1/8" from Case for 5 Seconds		300	$^\circ\text{C}$

* Drain current limited by maximum junction temperature.

Thermal Characteristics

Symbol	Parameter	FDPF15N65	Unit
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case, Max.	3.3	$^\circ\text{C}/\text{W}$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient, Max.	62.5	

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDPF15N65	FDPF15N65	TO-220F	--	--	50

Electrical Characteristics T_C = 25°C unless otherwise noted

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Off Characteristics						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} = 0V, I _D = 250μA, T _J = 25°C	650	--	--	V
ΔBV _{DSS} / ΔT _J	Breakdown Voltage Temperature Coefficient	I _D = 250μA, Referenced to 25°C	--	0.65	--	V/°C
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = 650V, V _{GS} = 0V V _{DS} = 520V, T _C = 125°C	--	--	1 10	μA μA
I _{GSSF}	Gate-Body Leakage Current, Forward	V _{GS} = 30V, V _{DS} = 0V	--	--	100	nA
I _{GSSR}	Gate-Body Leakage Current, Reverse	V _{GS} = -30V, V _{DS} = 0V	--	--	-100	nA
On Characteristics						
V _{GS(th)}	Gate Threshold Voltage	V _{DS} = V _{GS} , I _D = 250μA	3.0	--	5.0	V
R _{DS(on)}	Static Drain-Source On-Resistance	V _{GS} = 10V, I _D = 7.5A	--	0.36	0.44	Ω
g _{FS}	Forward Transconductance	V _{DS} = 40V, I _D = 7.5A	--	19.2	--	S
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{DS} = 25V, V _{GS} = 0V, f = 1.0MHz	--	2380	3095	pF
C _{oss}	Output Capacitance		--	295	385	pF
C _{rss}	Reverse Transfer Capacitance		--	23.6	35.5	pF
Switching Characteristics						
t _{d(on)}	Turn-On Delay Time	V _{DD} = 325V, I _D = 15A R _G = 21.7Ω	--	65	140	ns
t _r	Turn-On Rise Time		--	125	260	ns
t _{d(off)}	Turn-Off Delay Time		--	105	220	ns
t _f	Turn-Off Fall Time		(Note 4)	--	65	140
Q _g	Total Gate Charge	V _{DS} = 520V, I _D = 15A V _{GS} = 10V	--	48.5	63.0	nC
Q _{gs}	Gate-Source Charge		--	14.0	--	nC
Q _{gd}	Gate-Drain Charge		(Note 4)	--	21.2	--
Drain-Source Diode Characteristics and Maximum Ratings						
I _S	Maximum Continuous Drain-Source Diode Forward Current		--	--	15	A
I _{SM}	Maximum Pulsed Drain-Source Diode Forward Current		--	--	60	A
V _{SD}	Drain-Source Diode Forward Voltage	V _{GS} = 0V, I _S = 15A	--	--	1.4	V
t _{rr}	Reverse Recovery Time	V _{GS} = 0V, I _S = 15A di _f /dt = 100A/μs	--	496	--	ns
Q _{rr}	Reverse Recovery Charge		--	5.69	--	μC

NOTES:

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. L = 5.23mH, I_{AS} = 15A, V_{DD} = 50V, R_G = 25Ω, Starting T_J = 25°C
3. I_{SD} ≤ 15A, di/dt ≤ 200A/μs, V_{DD} ≤ BV_{DSS}, Starting T_J = 25°C
4. Essentially Independent of Operating Temperature Typical Characteristics

Typical Performance Characteristics

Figure 1. On-Region Characteristics

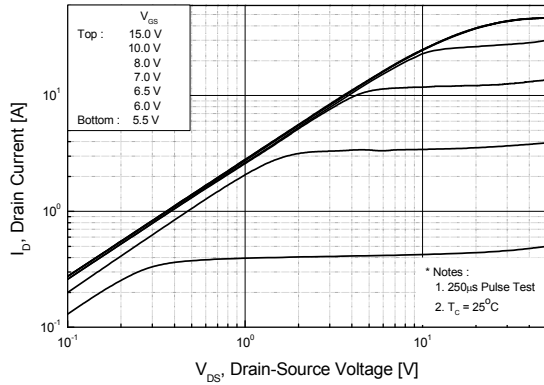


Figure 2. Transfer Characteristics

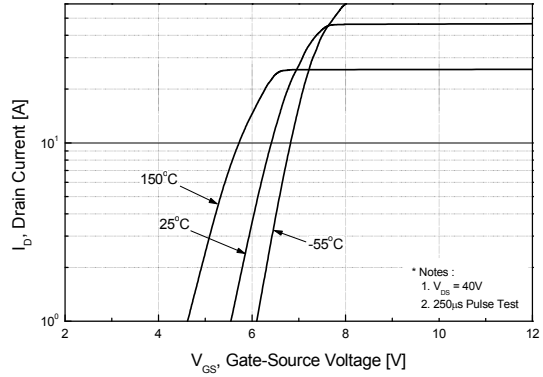


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

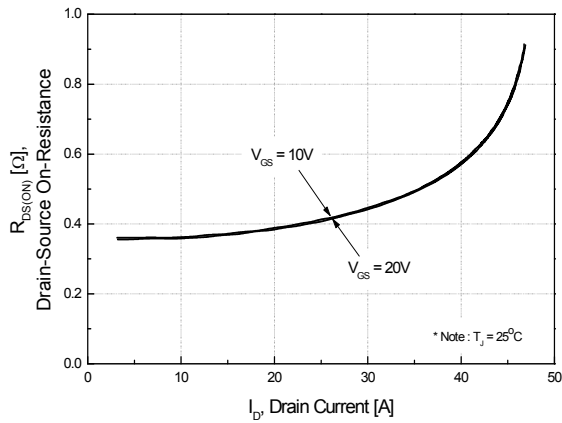


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

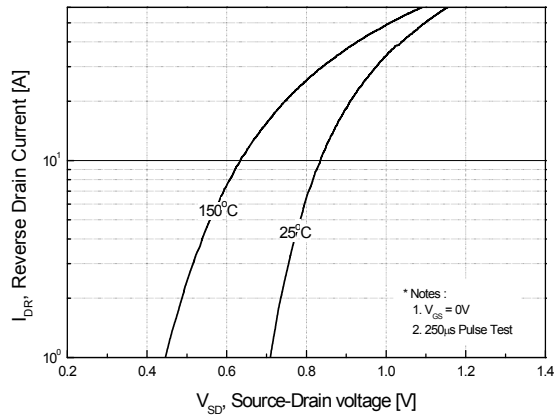


Figure 5. Capacitance Characteristics

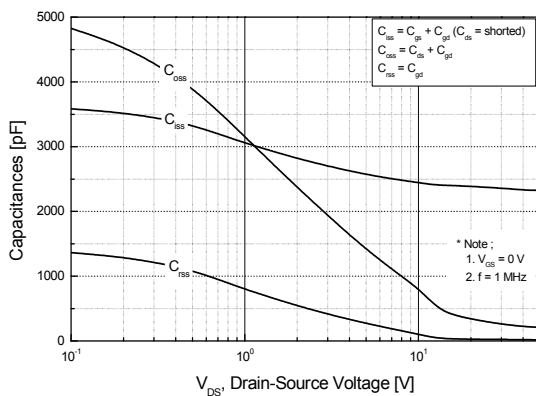
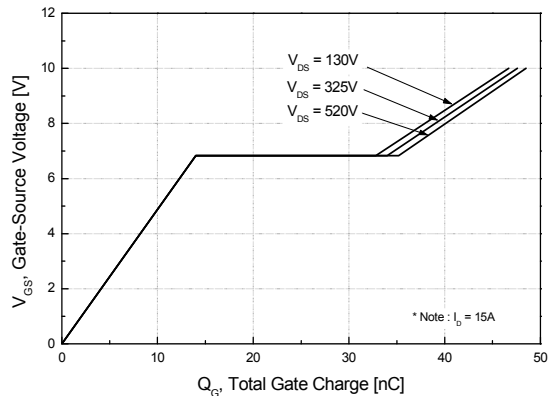


Figure 6. Gate Charge Characteristics



Typical Performance Characteristics (Continued)

Figure 7. Breakdown Voltage Variation vs. Temperature

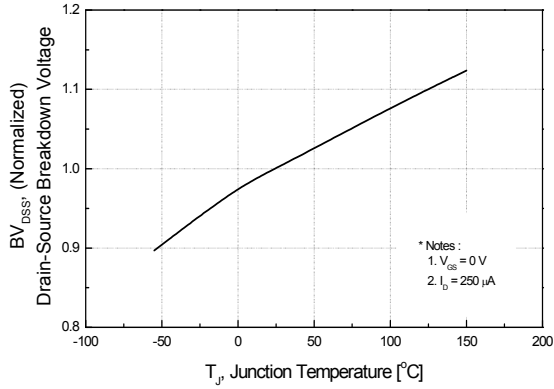


Figure 8. On-Resistance Variation vs. Temperature

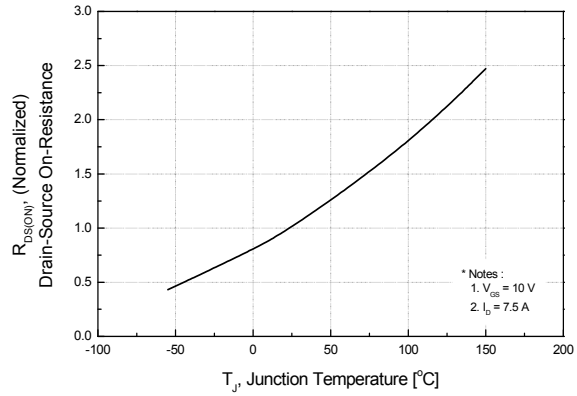


Figure 9. Safe Operating Area

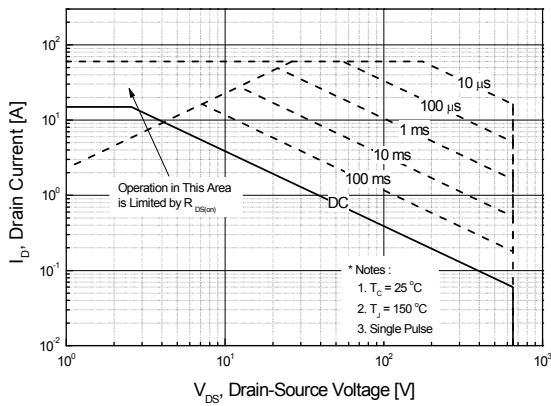


Figure 10. Maximum Drain Current vs. Case Temperature

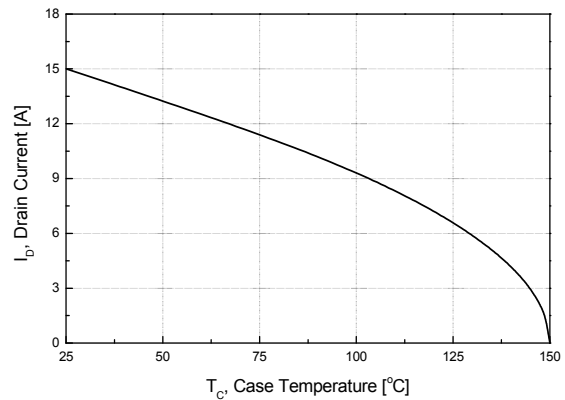
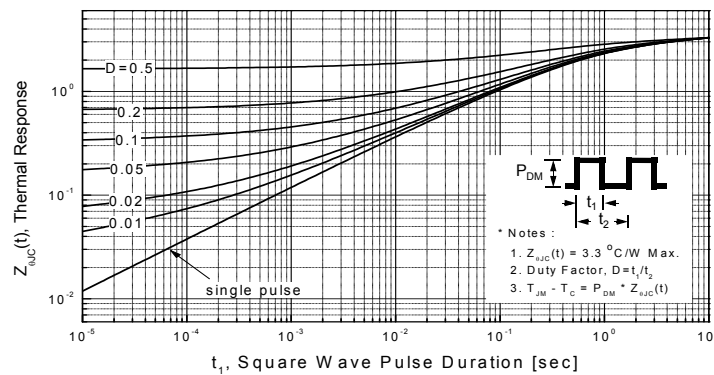
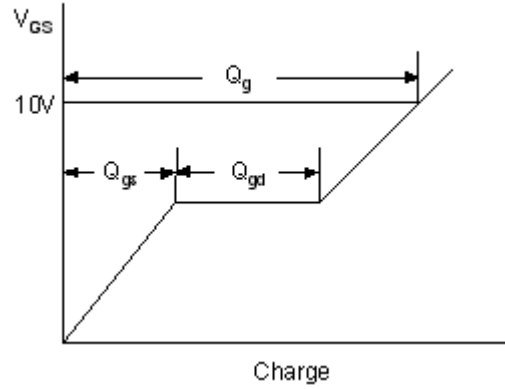


Figure 11. Transient Thermal Response Curve



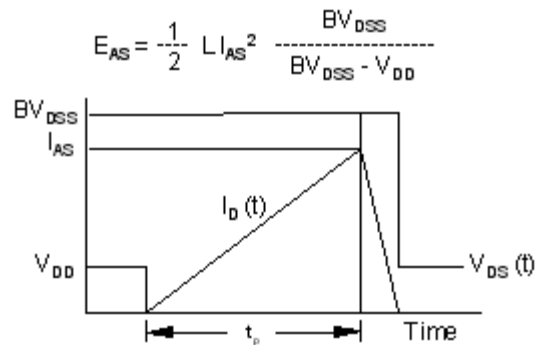
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching Test Circuit & Waveforms



Peak Diode Recovery dv/dt Test Circuit & Waveforms





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