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FDP19N40 N-Channel UniFETTM MOSFET 400 V, 19 A, 240 mΩ

Features

- $R_{DS(on)}$ = 200 m Ω (Typ.) @ V_{GS} = 10 V, I_D = 9.5 A
- Low Gate Charge (Typ. 32 nC)
- Low C_{rss} (Typ. 20 pF)
- 100% Avalanche Tested
- Improved dv/dt Capability
- RoHS Compliant

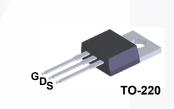
Applications

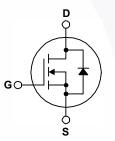
- Lighting
- Uninterruptible Power Supply
- AC-DC Power Supply

November 2013

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. 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_C = 25°C unless otherwise noted.

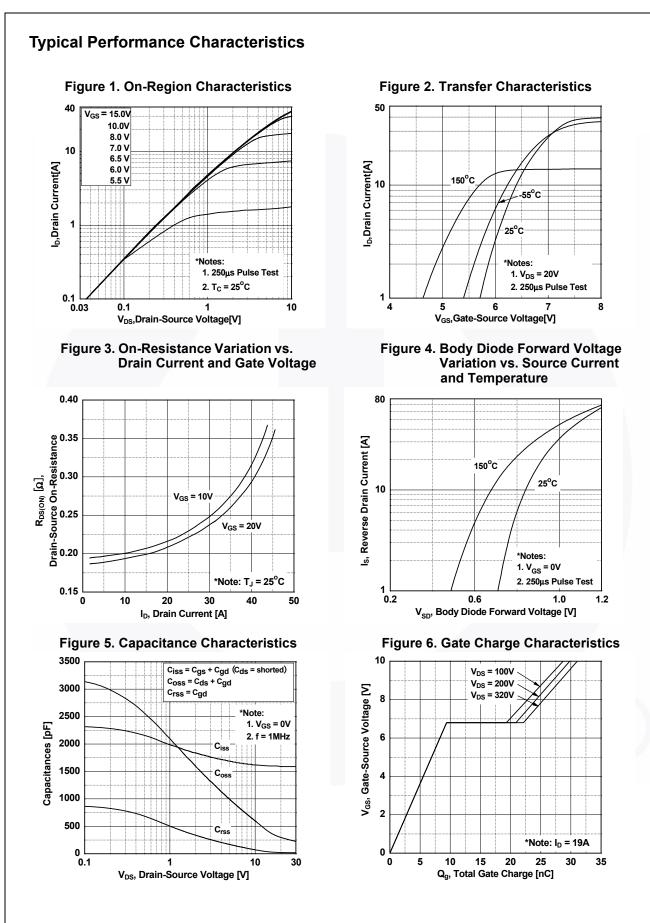
Symbol		Parameter		FDP19N40	Unit	
V _{DSS}	Drain to Source Voltage			400	V	
V _{GSS}	Gate to Source Voltage		±30	V		
I _D C	Drain Current	- Continuous (T _C = 25 ^o C)		19	А	
	Drain Current	- Continuous (T _C = 100 ^o C)		11.4	— A	
I _{DM}	Drain Current	- Pulsed	(Note 1)	76	A	
E _{AS}	Single Pulsed Avalanche Energy (Note 2)		(Note 2)	542	mJ	
I _{AR}	Avalanche Current (Note 1		(Note 1)	19	Α	
E _{AR}	Repetitive Avalanche Energy (Note 1)		(Note 1)	21.5	mJ	
dv/dt	Peak Diode Recovery du	//dt	(Note 3)	15	V/ns	
P _D	Power Dissipation	(T _C = 25 ^o C)		215	W	
		- Derate Above 25°C		1.65	W/ºC	
T _J , T _{STG}	Operating and Storage Temperature Range			-55 to +150	°C	
TL	Maximum Lead Temperature for Soldering, 1/8" from Case for 5 Seconds		r 5 Seconds	300	°C	

Thermal Characteristics

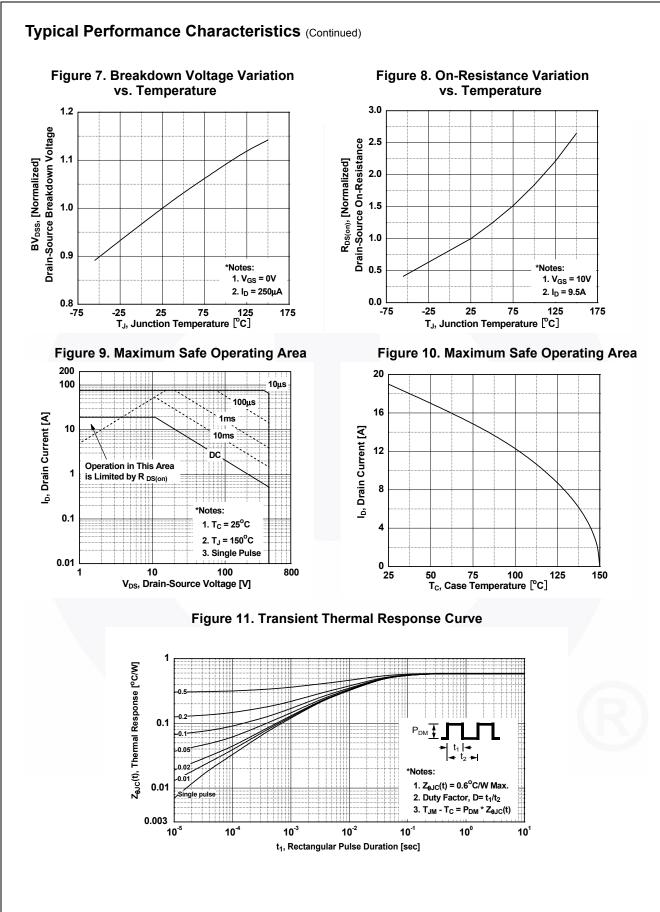
Symbol	Parameter	FDP19N40	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case, Max.	0.6	°C/W
R_{\thetaJA}	Thermal Resistance, Junction to Ambient, Max.	62.5	0/00

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0 FDP19N40 Characteristics T _C = 2 Parameter ristics	TO-2 25°C unless	s otherwise no	Tube oted. est Condition	N/A		N/A	50	units
Parameter	25°C unless							
Parameter	_							
ristics			st contaition	IS	Min.	Тур.	Max.	Unit
Prain to Source Breakdown Volt	age	I _D = 250 μA	, V _{GS} = 0 V, ⁻	Г. ₁ = 25 ^о С	400	-	-	V
reakdown Voltage Temperature		$I_D = 250 \ \mu\text{A}$, Referenced to 25°C		-	0.5	-	V/ºC	
Zero Gate Voltage Drain Current					-	-	1	μA
				,				nA
		•63 200	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,				1100	
ristics								T
Sate Threshold Voltage					3.0	-	5.0	V
	tance	00	5		-	-	0.24	Ω
orward Transconductance		V _{DS} = 20 V,	I _D = 9.5 A		-	18.3		S
aracteristics								
nput Capacitance					-	1590	2115	pF
Output Capacitance		V _{DS} = 25 V, V _{GS} = 0 V, f = 1 MHz			-	255	340	pF
everse Transfer Capacitance				-	20	29	pF	
otal Gate Charge at 10V		V _{DS} = 320 V	/, I _D = 19 A,		-	32	40	nC
Sate to Source Gate Charge		V _{GS} = 10 V		-	10	-	nC	
Sate to Drain "Miller" Charge				(Note 4)	-	13	-	nC
naracteristics								
urn-On Delay Time					-	31	72	ns
urn-On Rise Time		V _{DD} = 200 V, I _D = 19 A,		-	70	150	ns	
urn-Off Delay Time		V _{GS} = 10 V,	$R_{G} = 25 \Omega$		-	82	174	ns
urn-Off Fall Time				(Note 4)	· · /	49	108	ns
Diode Characteristics								
laximum Continuous Drain to S	ource Diod	e Forward Cu	rrent		7 -	-	19	Α
					-	-	76	Α
rain to Source Diode Forward	/oltage	V _{GS} = 0 V, I	_{SD} = 19 A		-	-	1.4	V
everse Recovery Time		V _{GS} = 0 V, I _{SD} = 19 A,			-	349		ns
everse Recovery Charge		$dI_F/dt = 100$	A/μs		-	3.56	-	μC
	coefficient ero Gate Voltage Drain Curren Gate to Body Leakage Current ristics Gate Threshold Voltage Static Drain to Source On Resis forward Transconductance tracteristics oput Capacitance put Capacitance output Capacitance teverse Transfer Capacitance otal Gate Charge at 10V Gate to Source Gate Charge Gate to Drain "Miller" Charge tracteristics urn-On Delay Time urn-On Rise Time urn-Off Fall Time Diode Characteristics aximum Continuous Drain to S aximum Pulsed Drain to Source rain to Source Diode Forward V everse Recovery Time everse Recovery Charge	Bioefficient ero Gate Voltage Drain Current Gate to Body Leakage Current ristics Gate Threshold Voltage Bate to Characteristics Bate to Drain "Miller" Charge Bate to Drain Time urn-On Delay Time urn-Off Fall Time Diode Characteristics aximum Continuous Drain to Source Diode Formard Voltage everse Recovery Time	coefficientID $250 \ \mu A$ ero Gate Voltage Drain Current $V_{DS} = 400 \ V_{DS} = 320 \ V_{DS} = 320 \ V_{DS} = 320 \ V_{CS} = 320 \ V_{CS} = 320 \ V_{CS} = 10 \ V_{CS} = 20 \ V_{CS} = 10 \ V_{CS$	coefficientID= 250 μ A, Referencedero Gate Voltage Drain Current $V_{DS} = 400 \vee, V_{GS} = 0 \vee$ Gate to Body Leakage Current $V_{GS} = 400 \vee, V_{GS} = 0 \vee$ risticsVGate Threshold Voltage $V_{GS} = \pm 30 \vee, V_{DS} = 0 \vee$ risticsSate Threshold Voltage $V_{GS} = \pm 30 \vee, V_{DS} = 0 \vee$ risticsSate Threshold Voltage $V_{GS} = 10 \vee, I_D = 9.5 \Lambda$ convard Transconductance $V_{DS} = 20 \vee, I_D = 9.5 \Lambda$ reverse Transfer Capacitance $V_{DS} = 25 \vee, V_{GS} = 0 \vee, f = 1 MHz$ reverse Transfer Capacitance $V_{DS} = 320 \vee, I_D = 19 \Lambda, V_{GS} = 10 \vee$ reverse Transfer Capacitance $V_{DS} = 320 \vee, I_D = 19 \Lambda, V_{GS} = 10 \vee$ reacteristics $V_{DD} = 200 \vee, I_D = 19 \Lambda, V_{GS} = 10 \vee, I_D = 19 \Lambda, V_{GS} = 10 \vee, I_D = 200 \vee, I_D = 19 \Lambda, V_{GS} = 10 \vee, I_D = 200 \vee, I_D = 19 \Lambda, V_{GS} = 10 \vee, I_D = 25 \Omega$ run-On Delay Time $V_{DD} = 200 \vee, I_D = 19 \Lambda, V_{GS} = 10 \vee, R_G = 25 \Omega$ run-Off Delay Time $V_{CS} = 0 \vee, I_S = 19 \Lambda, V_{GS} = 0 \vee, I_S = 19 \Lambda, V_{$	coefficientID= 250 µA, Referenced to 25°Cero Gate Voltage Drain Current $V_{DS} = 400 V, V_{GS} = 0 V$ Sate to Body Leakage Current $V_{GS} = 320 V, T_C = 125°C$ Sate to Body Leakage Current $V_{GS} = 320 V, V_{DS} = 0 V$ risticsSate Threshold Voltage $V_{GS} = 10 V, I_D = 9.5 A$ Sate Threshold Voltage $V_{GS} = 10 V, I_D = 9.5 A$ static Drain to Source On Resistance $V_{DS} = 20 V, I_D = 9.5 A$ static Drain to Source On Resistance $V_{DS} = 25 V, V_{GS} = 0 V, I_D = 9.5 A$ state to Body Leakage at 10V $V_{DS} = 25 V, V_{GS} = 0 V, I_D = 9.5 A$ state to Charge at 10V $V_{DS} = 320 V, I_D = 19 A, V_{GS} = 10 V$ state to Source Gate Charge $V_{DS} = 320 V, I_D = 19 A, V_{GS} = 10 V$ state to Drain "Miller" Charge $V_{DD} = 200 V, I_D = 19 A, V_{GS} = 10 V, R_G = 25 \Omega$ urn-On Delay Time $V_{DD} = 200 V, I_D = 19 A, V_{GS} = 10 V, R_G = 25 \Omega$ urn-Off Delay Time $V_{DD} = 200 V, I_D = 19 A, V_{GS} = 10 V, R_G = 25 \Omega$ urn-Off Fall Time $V_{DS} = 10 V, R_G = 25 \Omega$ stimum Continuous Drain to Source Diode Forward Currentaximum Pulsed Drain to Source Diode Forward Currentrain to Source Diode Forward Voltage $V_{GS} = 0 V, I_{SD} = 19 A, V_{GS} = 0 V, I_{SD} = 19 A, V_{SS} = 0$	coefficientID= 250 μ A, Referenced to 25°C-ero Gate Voltage Drain Current $V_{DS} = 400 \text{ V}, V_{GS} = 0 \text{ V}$ -Sate to Body Leakage Current $V_{GS} = 430 \text{ V}, V_{DS} = 0 \text{ V}$ -risticsSate Threshold Voltage $V_{GS} = \pm 30 \text{ V}, V_{DS} = 0 \text{ V}$ -risticsSate Threshold Voltage $V_{GS} = 10 \text{ V}, I_D = 9.5 \text{ A}$ -forward Transconductance $V_{GS} = 20 \text{ V}, I_D = 9.5 \text{ A}$ -orward Transconductance $V_{DS} = 25 \text{ V}, V_{GS} = 0 \text{ V},$ -futput Capacitance $V_{DS} = 25 \text{ V}, V_{GS} = 0 \text{ V},$ -futput Capacitance $V_{DS} = 25 \text{ V}, V_{GS} = 0 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400 \text{ V}, V_{DS} = 0 \text{ V}$ sate to Body Leakage Current $V_{GS} = 125^{\circ}$ CristicsSate Threshold Voltage $V_{GS} = V_{DS}, I_D = 250 \mu$ A3.0risticsSate Threshold Voltage $V_{GS} = V_{DS}, I_D = 250 \mu$ A3.0risticsSate Threshold Voltage $V_{GS} = 10 \text{ V}, I_D = 9.5 \text{ A}$ -0.2forward Transconductance $V_{DS} = 25 \text{ V}, V_{GS} = 0 \text{ V}, I_D = 9.5 \text{ A}$ -18.3racteristicsput Capacitance $V_{DS} = 25 \text{ V}, V_{CS} = 0 \text{ V}, I_D = 9.5 \text{ A}$ -1590otal Gate Charge at 10V $V_{DS} = 320 \text{ V}, I_D = 19 \text{ A}, V_{GS} = 10 \text{ V}$ -32value to Source Gate Charge $V_{GS} = 10 \text{ V}, I_D = 19 \text{ A}, V_{CS} = 10 \text{ V}$ -10value to Drain "Miller" Charge $V_{DD} = 200 \text{ V}, I_D = 19 \text{ A}, V_{CS} = 10 \text{ V}$ -31urn-On Delay Time $V_{DS} = 10 \text{ V}, R_G = 25 \Omega$ -82urn-Off Fall Time $V_{CS} = 0 \text{ V}, I_S = 19 \text{ A},32urn-Off Fall TimeV_{GS} = 0 \text{ V}, I_S = 19 \text{ A},verse Recovery 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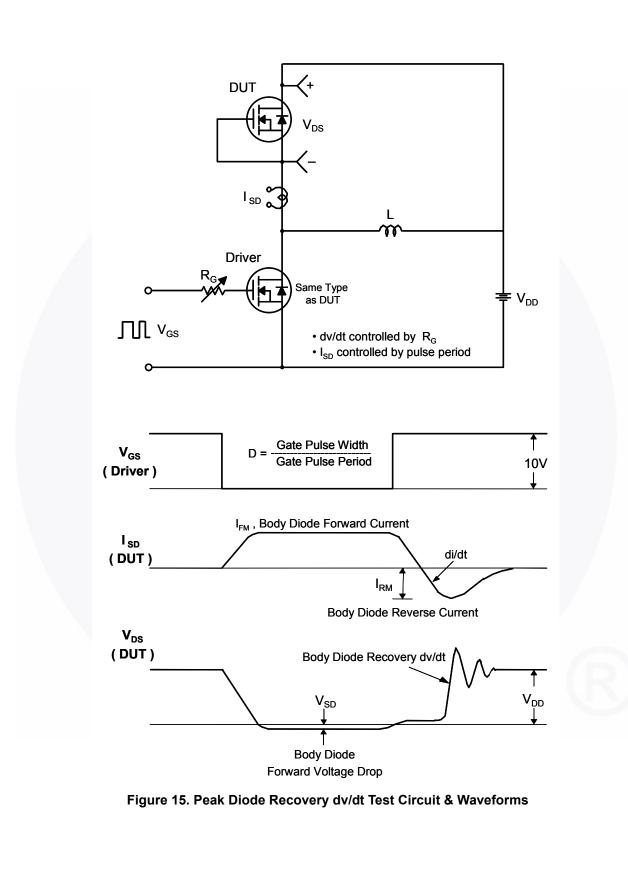


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 V_{GS} ξ א Q_g FV_{DS} Q_{gd} Q_{gs} • DUT I_G = const. Charge Figure 12. Gate Charge Test Circuit & Waveform R VDS V_{DS} 90% ο V_{DD} GS R_{G} 10% V_{GS} DUT V_{GS} ∏ 0 Figure 13. Resistive Switching Test Circuit & Waveforms L $E_{AS} = \frac{1}{2} L I_{AS}^2$ V_{DS} $\mathsf{BV}_{\mathsf{DSS}}$ ID o I_{AS} R_{G} ŧν_{DD} $I_{D}(t)$ V_{GS}] $V_{DS}(t)$ V_{DD} DUT Time t_p Figure 14. Unclamped Inductive Switching Test Circuit & Waveforms

FDP19N40 — N-Channel UniFETTM MOSFET



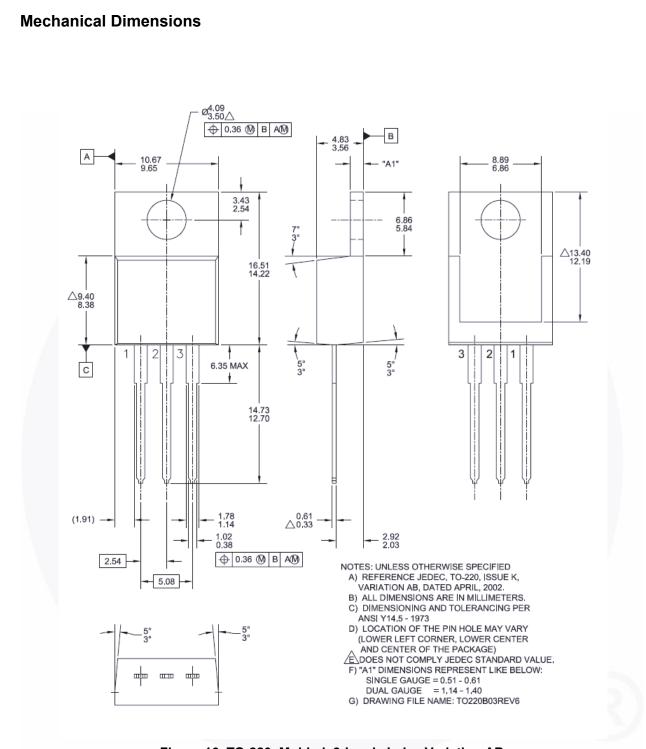


Figure 16. TO-220, Molded, 3-Lead, Jedec Variation AB

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