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## FDPF3860T N-Channel PowerTrench<sup>®</sup> MOSFET 100 V, 20 A, 38.2 m $\Omega$

## Features

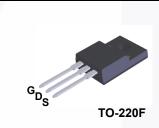
- $R_{DS(on)}$  = 29.1 m $\Omega$  (Typ.) @ V<sub>GS</sub> = 10 V, I<sub>D</sub> = 5.9 A
- Fast Switching Speed
- Low Gate Charge
- High Performance Trench Technology for Extremely Low  $R_{\mbox{DS}(\mbox{on})}$
- High Power and Current Handling Capability
- RoHS Compliant

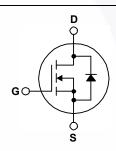
## Description

This N-Channel MOSFET is produced using Fairchild Semiconductor's advanced PowerTrench<sup>®</sup> process that has been tailored to minimize the on-state resistance while maintaining superior switching performance.

## Applications

- Consumer Appliances
- LCD/LED/PDP TV
- Synchronous Rectification
- Uninterruptible Power Supply
- Micro Solar Inverter





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

Symbol	Parameter		FDPF3860T	Unit	
V <sub>DSS</sub>	Drain to Source Voltage		100	V	
V <sub>GSS</sub>	Gate to Source Voltage		±20	V	
ID	Drain Current	- Continuous (T <sub>C</sub> = 25 <sup>o</sup> C)		20	Α
		- Continuous (T <sub>C</sub> = 100 <sup>o</sup> C)		12.7	
I <sub>DM</sub>	Drain Current	- Pulsed	(Note 1)	80	Α
E <sub>AS</sub>	Single Pulsed Avalanche Energy (Note 2)		(Note 2)	278	mJ
I <sub>AR</sub>	Avalanche Current		(Note 1)	20	А
E <sub>AR</sub>	Repetitive Avalanche Energy		(Note 1)	3.4	mJ
dv/dt	Peak Diode Recovery dv/dt (Note 3)		(Note 3)	15	V/ns
P <sub>D</sub>	Power Dissipation	$(T_{\rm C} = 25^{\rm o}{\rm C})$		33.8	W
		- Derate Above 25°C		0.27	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		econds	300	°C

## **Thermal Characteristics**

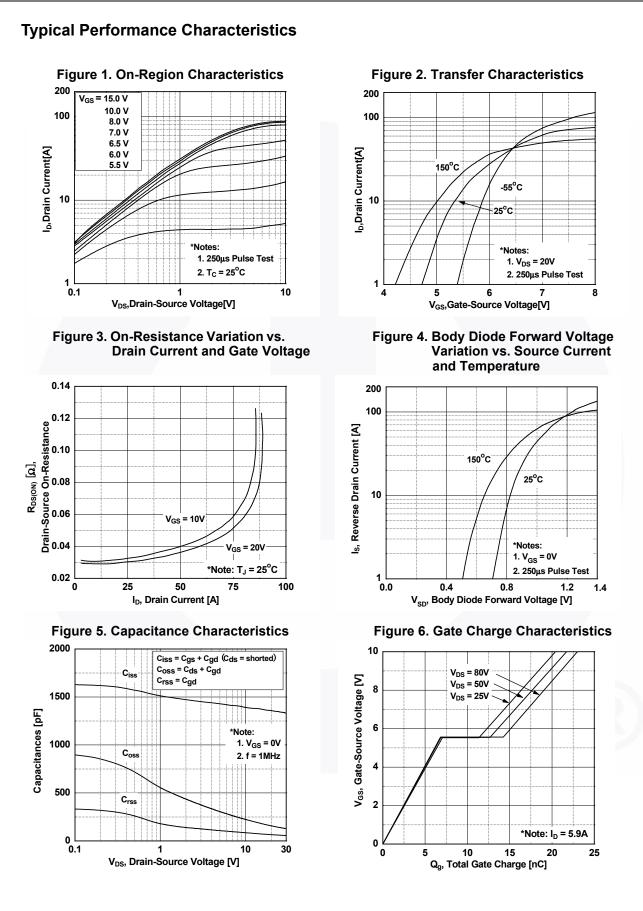
Symbol	Parameter	FDPF3860T	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case, Max.	3.7	°C/W
$R_{\thetaJA}$	Thermal Resistance, Junction to Ambient, Max.		°C/W

December 2013

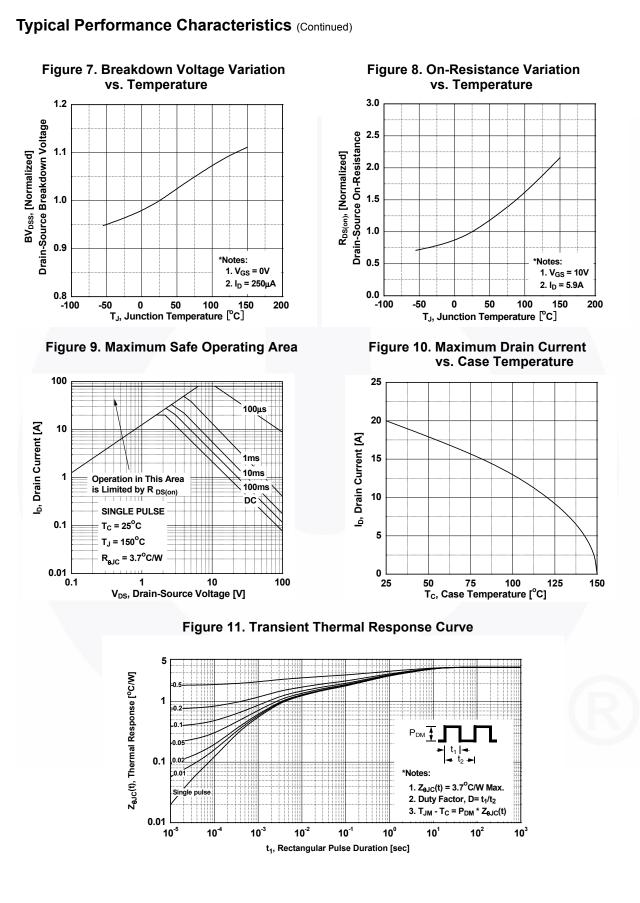
FDPF3860T     TC       naracteristics     T <sub>C</sub> = 25°C ur       Parameter       Stics       uin to Source Breakdown Voltage       wakdown Voltage Temperature       efficient       to Gate Voltage Drain Current	Test Con I <sub>D</sub> = 250 μA, V <sub>GS</sub> =		Min.	N/A Typ.	50 u Max.	units Unit
Parameter Stics ain to Source Breakdown Voltage akdown Voltage Temperature efficient	Test Con I <sub>D</sub> = 250 μA, V <sub>GS</sub> =		Min.	Тур.	Max.	Unit
Parameter Stics ain to Source Breakdown Voltage akdown Voltage Temperature efficient	Test Con I <sub>D</sub> = 250 μA, V <sub>GS</sub> =		Min.	Тур.	Max.	Unit
in to Source Breakdown Voltage akdown Voltage Temperature efficient		0 V, T <sub>J</sub> = 25°C				
akdown Voltage Temperature efficient		0 V, T <sub>J</sub> = 25 <sup>o</sup> C				
akdown Voltage Temperature efficient			100	-	-	V
o Gate Voltage Drain Current	$I_D = 250 \ \mu$ A, Referenced to $25^{\circ}$ C		-	0.1	-	V/ºC
e cale vollage brain ourient		$V_{DS} = 80 \text{ V}, V_{GS} = 0 \text{ V}$ $V_{DS} = 48 \text{ V}, T_C = 150^{\circ}\text{C}$		-	1 500	μA
te to Body Leakage Current	V <sub>GS</sub> = ±20 V, V <sub>DS</sub> =		-	-	±100	nA
stics						
	$V_{GS} = V_{DS}, I_{D} = 25$	i0 μA	2.5	-	4.5	V
			-	29.1	38.2	mΩ
ward Transconductance			-	21	-	S
acteristics	L					-
			-	1350	1800	pF
		0 V,	-	145	190	pF
	f = 1 MHz		-	60	90	pF
racteristics						
n-On Delay Time			-	15	40	ns
n-On Rise Time			-	17	45	ns
n-Off Delay Time	$V_{GS} = 10 V, R_{G} = 6$	δΩ	-	24	60	ns
n-Off Fall Time		(Note 4)	-	7	25	ns
al Gate Charge at 10V	V <sub>DS</sub> = 80 V, I <sub>D</sub> = 5.	.9 A,	-	23	35	nC
e to Source Gate Charge	V <sub>GS</sub> = 10 V		-	7	-	nC
e to Drain "Miller" Charge		(Note 4)	-	8	-	nC
Diode Characteristics						
kimum Continuous Drain to Source	Diode Forward Current		-	-	20	Α
kimum Pulsed Drain to Source Diod	e Forward Current		-	-	80	Α
in to Source Diode Forward Voltage	e V <sub>GS</sub> = 0 V, I <sub>SD</sub> = 5.9	9 A	-	-	1.3	V
verse Recovery Time			-	40	-	ns
erse Recovery Charge	dI <sub>F</sub> /dt = 100 A/µs		-	56	-	nC
	te Threshold Voltage tic Drain to Source On Resistance ward Transconductance acteristics ut Capacitance tput Capacitance verse Transfer Capacitance racteristics n-On Delay Time n-On Rise Time n-Off Delay Time n-Off Fall Time al Gate Charge at 10V te to Source Gate Charge te to Drain "Miller" Charge Diode Characteristics kimum Continuous Drain to Source kimum Pulsed Drain to Source Diod in to Source Diode Forward Voltage verse Recovery Time	te Threshold Voltage $V_{GS} = V_{DS}$ , $I_D = 25$ tic Drain to Source On Resistance $V_{GS} = 10 \text{ V}$ , $I_D = 5$ .ward Transconductance $V_{DS} = 10 \text{ V}$ , $I_D = 5$ .acteristics $V_{DS} = 10 \text{ V}$ , $I_D = 5$ .ut Capacitance $V_{DS} = 25 \text{ V}$ , $V_{GS} = 10 \text{ HHz}$ tput Capacitance $V_{DS} = 25 \text{ V}$ , $V_{GS} = 10 \text{ HHz}$ racteristics $V_{DD} = 50 \text{ V}$ , $I_D = 5$ .n-On Delay Time $V_{DD} = 50 \text{ V}$ , $I_D = 5$ .n-Off Delay Time $V_{DS} = 10 \text{ V}$ , $R_G = 6$ n-Off Fall Time $V_{DS} = 80 \text{ V}$ , $I_D = 5$ .al Gate Charge at 10V $V_{DS} = 80 \text{ V}$ , $I_D = 5$ .te to Source Gate Charge $V_{GS} = 10 \text{ V}$ te to Drain "Miller" Charge $V_{GS} = 0 \text{ V}$ , $I_{SD} = 5$ .Diode Characteristicssimum Continuous Drain to Source Diode Forward Currentkimum Pulsed Drain to Source Diode Forward Currentin to Source Diode Forward Voltage $V_{GS} = 0 \text{ V}$ , $I_{SD} = 5$ . $V_{GS} = 0 \text{ V}$ , $I_{SD} = 5$ .	te Threshold Voltage $V_{GS} = V_{DS}$ , $I_D = 250 \ \mu A$ tic Drain to Source On Resistance $V_{GS} = 10 \ V$ , $I_D = 5.9 \ A$ ward Transconductance $V_{DS} = 10 \ V$ , $I_D = 5.9 \ A$ acteristicsut Capacitance $V_{DS} = 25 \ V$ , $V_{GS} = 0 \ V$ , f = 1 MHztput Capacitance $V_{DS} = 25 \ V$ , $V_{GS} = 0 \ V$ , f = 1 MHzracteristicsn-On Delay Timen-On Rise Timen-Off Delay Timen-Off Fall Timen-Off Fal	te Threshold Voltage $V_{GS} = V_{DS}$ , $I_D = 250 \ \mu A$ 2.5 tic Drain to Source On Resistance $V_{GS} = 10 \ V$ , $I_D = 5.9 \ A$ - ward Transconductance $V_{DS} = 10 \ V$ , $I_D = 5.9 \ A$ - acteristics ut Capacitance $V_{DS} = 25 \ V$ , $V_{GS} = 0 \ V$ , f = 1 MHz - racteristics n-On Delay Time $V_{DD} = 50 \ V$ , $I_D = 5.9 \ A$ , n-Off Delay Time $V_{DD} = 50 \ V$ , $I_D = 5.9 \ A$ , n-Off Delay Time $V_{DS} = 10 \ V$ , $R_G = 6 \ \Omega$ - n-Off Fall Time $(Note \ 4)$ - al Gate Charge at 10V $V_{DS} = 80 \ V$ , $I_D = 5.9 \ A$ , te to Source Gate Charge $V_{GS} = 10 \ V$ te to Drain "Miller" Charge $V_{GS} = 10 \ V$ (Note 4) - Diode Characteristics stimum Continuous Drain to Source Diode Forward Current - stimum Pulsed Drain to Source Diode Forward Current - in to Source Diode Forward Voltage $V_{GS} = 0 \ V$ , $I_{SD} = 5.9 \ A$ , $V_{GS} = 0 \ V$ , $I_{SD} = 5.9 \ A$ , - $V_{SS} = 0 \ V$ , $I_{SD} = 5.9 \ A$ , - $V_{SS} = 0 \ V$ , $I_{SD} = 5.9 \ A$ , - $V_{SS} = 0 \ V$ , $I_{SD} = 5.9 \ A$ , - $V_{SS} = 0 \ V$ , $I_{SD} = 5.9 \ A$ , - $V_{SS} = 0 \ V$ , $I_{SD} = 5.9 \ A$ , - $V_{SS} = 0 \ V$ , $I_{SD} = 5.9 \ A$ , - $V_{SS} = 0 \ V$ , $I_{SD} = 5.9 \ A$ , - $V_{$	te Threshold Voltage $V_{GS} = V_{DS}, I_D = 250 \ \mu A$ 2.5	te Threshold Voltage $V_{GS} = V_{DS}$ , $I_D = 250 \ \mu A$ 2.5       -       4.5         tic Drain to Source On Resistance $V_{GS} = 10 \ V$ , $I_D = 5.9 \ A$ -       29.1       38.2         ward Transconductance $V_{DS} = 10 \ V$ , $I_D = 5.9 \ A$ -       21       -         acteristics       -       21       -       -         acteristics       -       21       -       -         acteristics       -       1350       1800       -       145       190         verse Transfer Capacitance       -       145       190       -       60       90         racteristics       -       -       15       40         n-On Delay Time       -       15       40         n-Off Delay Time       -       15       40         n-Off Fall Time       -       7       25         al Gate Charge at 10V       V_{DS} = 80 V, I_D = 5.9 A,       -       23       35         re to Source Gate Charge       V_{GS} = 10 V       -       7       -       24       60         no-Off Fall Time       -       7       -       23       35       -       7       -       -       7       -

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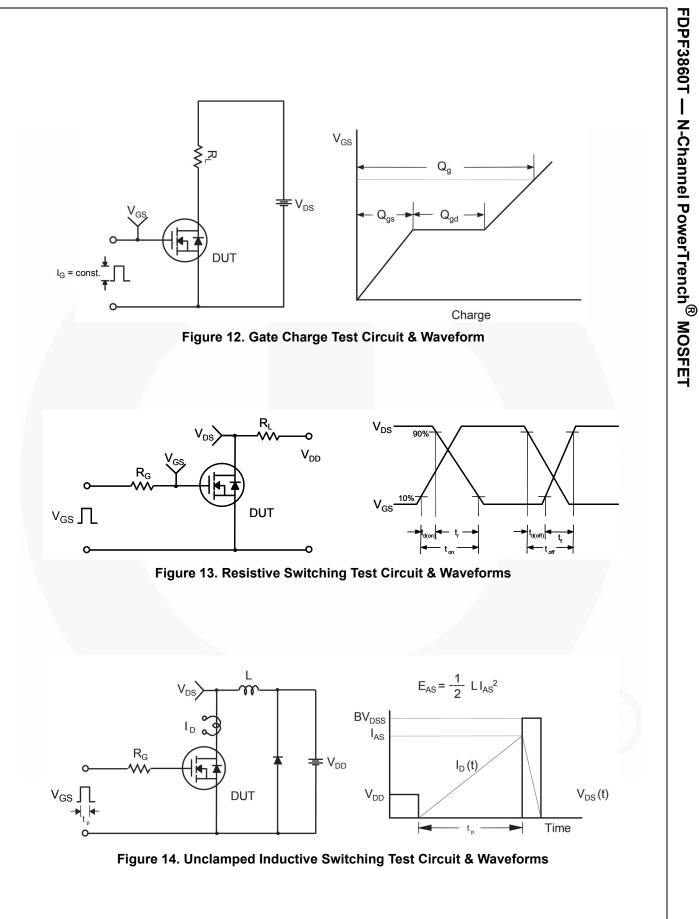


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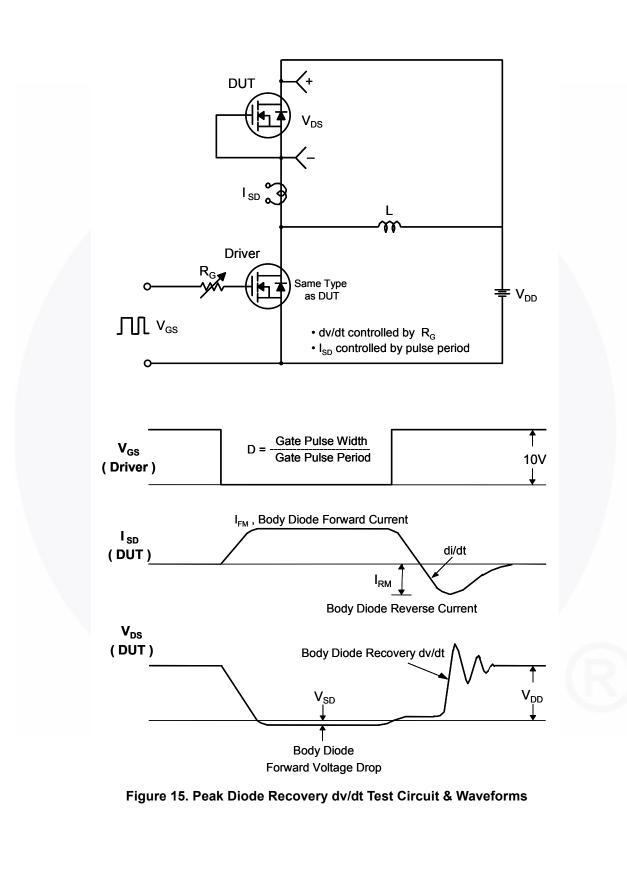


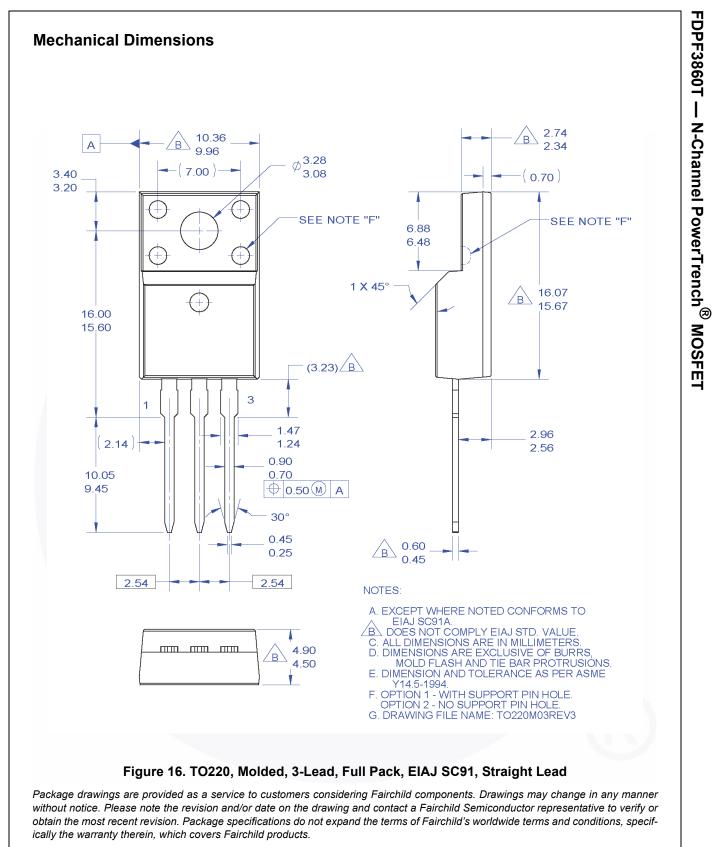
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