

# FDS3570

## 80V N-Channel PowerTrench® MOSFET

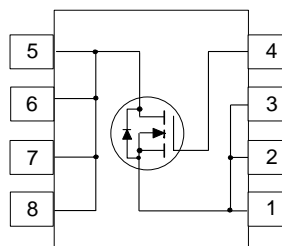
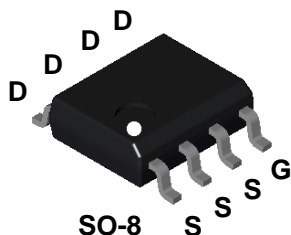
### General Description

This N-Channel Logic Level MOSFET has been designed specifically to improve the overall efficiency of DC/DC converters using either synchronous or conventional switching PWM controllers.

These MOSFETs feature faster switching and lower gate charge than other MOSFETs with comparable  $R_{DS(on)}$  specifications resulting in DC/DC power supply designs with higher overall efficiency.

### Features

- 9 A, 80 V.  $R_{DS(on)} = 0.020 \Omega @ V_{GS} = 10 \text{ V}$   
 $R_{DS(on)} = 0.023 \Omega @ V_{GS} = 6 \text{ V}$ .
- Fast switching speed.
- High performance trench technology for extremely low  $R_{DS(on)}$ .
- High power and current handling capability.



### Absolute Maximum Ratings $T_A = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Ratings	Units	
$V_{DSS}$	Drain-Source Voltage	80	V	
$V_{GSS}$	Gate-Source Voltage	$\pm 20$	V	
$I_D$	Drain Current - Continuous	9	A	
	- Pulsed	50		
$P_D$	Power Dissipation for Single Operation	(Note 1a)	2.5	W
		(Note 1b)	1.2	
		(Note 1c)	1	
$T_J, T_{stg}$	Operating and Storage Junction Temperature Range	-55 to +150	$^\circ\text{C}$	

### Thermal Characteristics

$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	(Note 1a)	50	$^\circ\text{C/W}$
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	(Note 1)	25	$^\circ\text{C/W}$

### Package Marking and Ordering Information

Device Marking	Device	Reel Size	Tape Width	Quantity
FDS3570	FDS3570	13"	12mm	2500 units

## Electrical Characteristics T<sub>A</sub> = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
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### Drain-Source Avalanche Ratings (Note 2)

W <sub>DSS</sub>	Single Pulse Drain-Source Avalanche Energy	V <sub>DD</sub> = 40 V, I <sub>D</sub> = 9 A			360	mJ
I <sub>AR</sub>	Maximum Drain-Source Avalanche Current				9	A

### Off Characteristics

BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> = 0 V, I <sub>D</sub> = 250 μA	80			V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	I <sub>D</sub> = 250 μA, Referenced to 25°C		77		mV/°C
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> = 64 V, V <sub>GS</sub> = 0 V			1	μA
I <sub>GSSF</sub>	Gate-Body Leakage, Forward	V <sub>GS</sub> = 20 V, V <sub>DS</sub> = 0 V			100	nA
I <sub>GSSR</sub>	Gate-Body Leakage, Reverse	V <sub>GS</sub> = -20 V, V <sub>DS</sub> = 0 V			-100	nA

### On Characteristics (Note 2)

V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250 μA	2	2.4	4	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate Threshold Voltage Temperature Coefficient	I <sub>D</sub> = 250 μA, Referenced to 25°C		-7		mV/°C
R <sub>DS(on)</sub>	Static Drain-Source On-Resistance	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 9 A V <sub>GS</sub> = 10 V, I <sub>D</sub> = 9 A, T <sub>J</sub> = 125°C V <sub>GS</sub> = 6 V, I <sub>D</sub> = 8.4 A		0.015 0.027 0.016	0.020 0.038 0.023	Ω
I <sub>D(on)</sub>	On-State Drain Current	V <sub>GS</sub> = 10 V, V <sub>DS</sub> = 5 V	25			A
g <sub>FS</sub>	Forward Transconductance	V <sub>DS</sub> = 5 V, I <sub>D</sub> = 7.6 A		40		S

### Dynamic Characteristics

C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> = 25 V, V <sub>GS</sub> = 0 V, f = 1.0 MHz		2750		pF
C <sub>oss</sub>	Output Capacitance			280		pF
C <sub>rss</sub>	Reverse Transfer Capacitance			140		pF

### Switching Characteristics (Note 2)

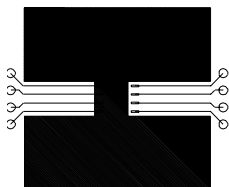
t <sub>d(on)</sub>	Turn-On Delay Time	V <sub>DD</sub> = 40 V, I <sub>D</sub> = 1 A, V <sub>GS</sub> = 10 V, R <sub>GEN</sub> = 6 Ω		20	32	ns
t <sub>r</sub>	Turn-On Rise Time			12	24	ns
t <sub>d(off)</sub>	Turn-Off Delay Time			60	95	ns
t <sub>f</sub>	Turn-Off Fall Time			24	38	ns
Q <sub>g</sub>	Total Gate Charge	V <sub>DS</sub> = 40 V, I <sub>D</sub> = 9 A, V <sub>GS</sub> = 10 V		54	76	nC
Q <sub>gs</sub>	Gate-Source Charge			9.6		nC
Q <sub>gd</sub>	Gate-Drain Charge			14		nC

### Drain-Source Diode Characteristics and Maximum Ratings

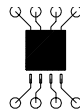
I <sub>S</sub>	Maximum Continuous Drain-Source Diode Forward Current			2.1	A	
V <sub>SD</sub>	Drain-Source Diode Forward Voltage	V <sub>GS</sub> = 0 V, I <sub>S</sub> = 2.1 A (Note 2)		0.72	1.2	V

#### Notes:

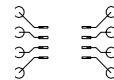
- R<sub>θJA</sub> is the sum of the junction-to-case and case-to-ambient thermal resistance where the case thermal reference is defined as the solder mounting surface of the drain pins. R<sub>θJC</sub> is guaranteed by design while R<sub>θCA</sub> is determined by the user's board design.



a) 50° C/W when mounted on a 1 in<sup>2</sup> pad of 2 oz. copper.



b) 105° C/W when mounted on a 0.04 in<sup>2</sup> pad of 2 oz. copper.



c) 125° C/W when mounted on a minimum pad.

Scale 1 : 1 on letter size paper

- Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2.0%

### Typical Characteristics

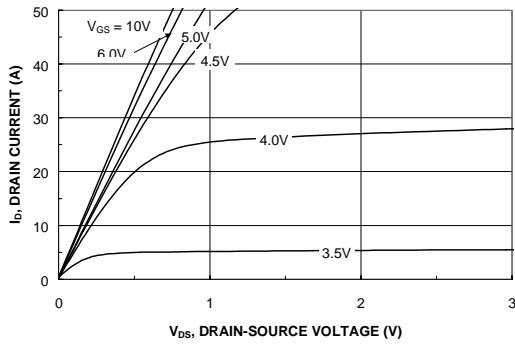


Figure 1. On-Region Characteristics.

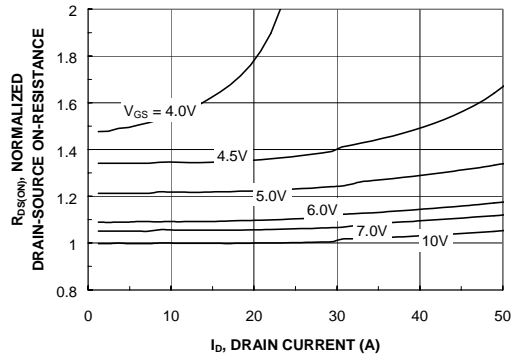


Figure 2. On-Resistance Variation with Drain Current and Gate Voltage.

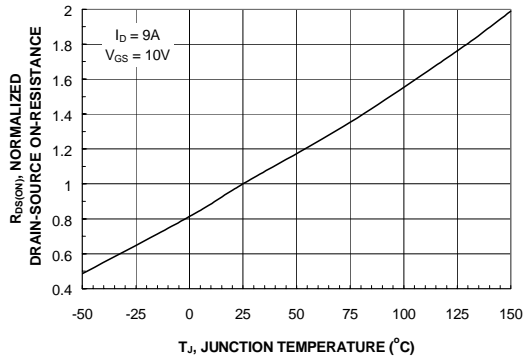


Figure 3. On-Resistance Variation with Temperature.

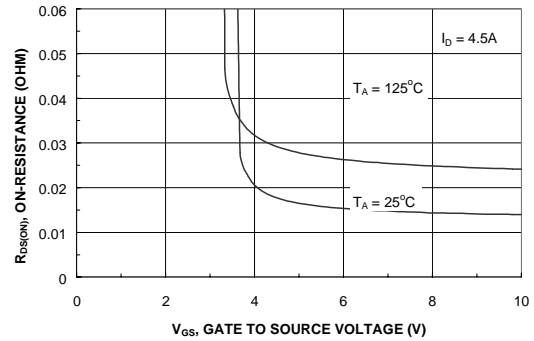


Figure 4. On-Resistance Variation with Gate-to-Source Voltage.

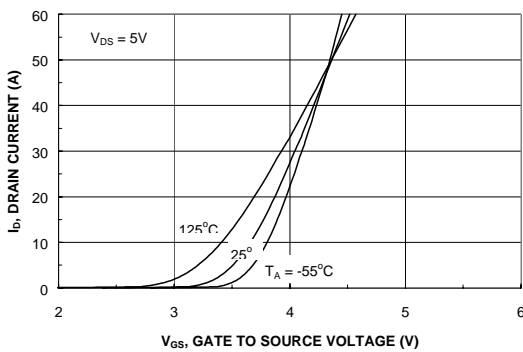


Figure 5. Transfer Characteristics.

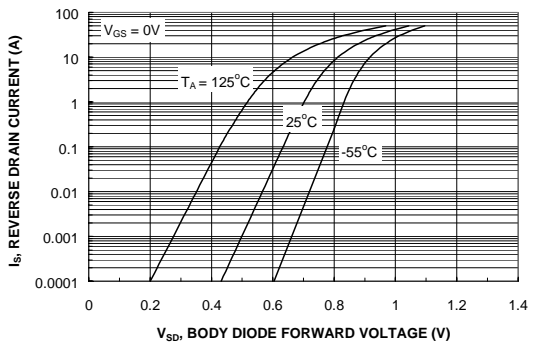
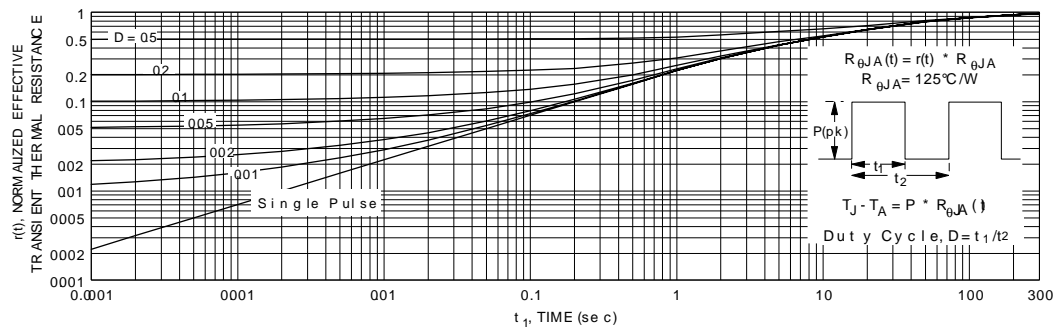
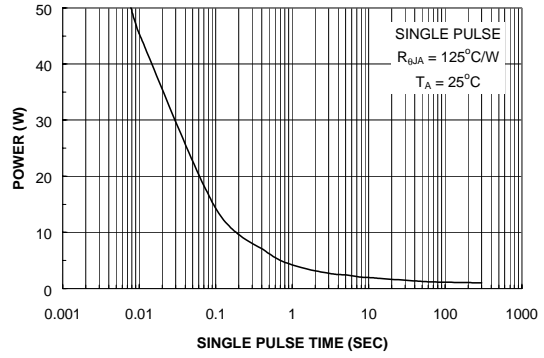
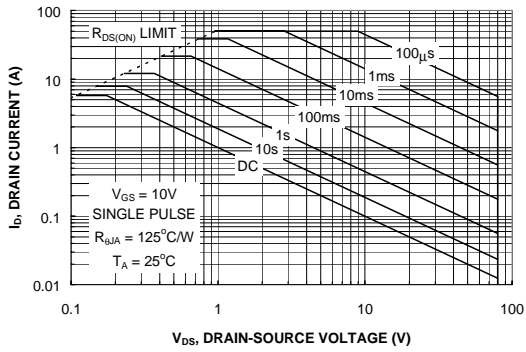
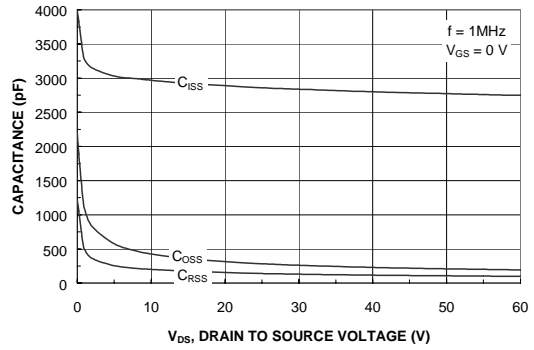
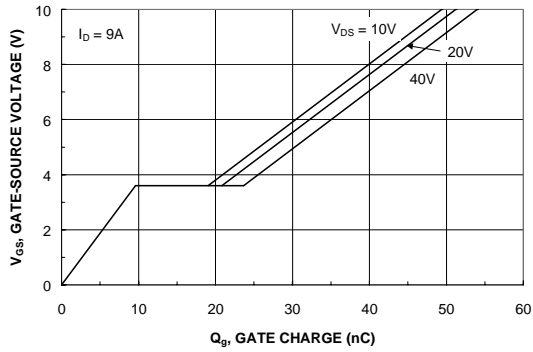


Figure 6. Body Diode Forward Voltage Variation with Source Current and Temperature.



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