

NDS8425

Single N-Channel, 2.5V Specified PowerTrench® MOSFET

General Description

This N-Channel 2.5V specified MOSFET is produced using Fairchild Semiconductor's advanced Power Trench process that has been especially tailored to minimize on-state resistance and yet maintain low gate charge for superior switching performance.

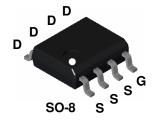
These devices have been designed to offer exceptional power dissipation in a very small footprint package.

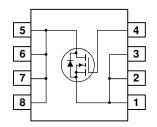
Applications

- DC/DC converter
- Load switch

Features

- 7.4 A, 20 V. $R_{DS(ON)} = 0.022 \ \Omega \ @ \ V_{GS} = 4.5 \ V$ $R_{DS(ON)} = 0.028 \ \Omega \ @ \ V_{GS} = 2.7 \ V$
- Fast switching speed
- Low gate charge (11nC typical)
- High performance trench technology for extremely low $R_{\text{DS}(\text{ON})}$
- High power and current handling capability in a widely used surface mount package





Absolute Maximum Ratings T_A=25°C unless otherwise noted

Symbol	Parameter		Ratings	Units	
V _{DSS}	Drain-Source Voltage		20	V	
V_{GSS}	Gate-Source Voltage		±8	V	
I _D	Drain Current - Continuous	(Note 1a)	±7.4	А	
	- Pulsed		±20		
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	°C	

Thermal Characteristics

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

Package Marking and Ordering Information

· achage markin	g and ordering	,			
Device Marking	Device Reel Size		Tape width	Quantity	
NDS8425 NDS8425		13"	12mm	2500 units	

Symbol	Parameter	Test Conditions	Min	Тур	Max	Units
Off Char	acteristics			I	I	
BV _{DSS}	Drain-Source Breakdown Voltage	$V_{GS} = 0 \text{ V}, I_{D} = 250 \mu\text{A}$	20			V
ΔBV _{DSS} ΔT _J	Breakdown Voltage Temperature Coefficient	I_D = 250 μ A, Referenced to 25°C		14		mV/°C
I _{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 16 \text{ V}, V_{GS} = 0 \text{ V}$ $V_{DS} = 16 \text{ V}, V_{GS} = 0 \text{ V}, T_{J} = 55^{\circ}\text{C}$			1 10	μΑ
I_{GSSF}	Gate-Body Leakage, Forward	$V_{GS} = 8 \text{ V}, \qquad V_{DS} = 0 \text{ V}$			100	nA
GSSR	Gate-Body Leakage, Reverse	$V_{GS} = -8 \text{ V}$ $V_{DS} = 0 \text{ V}$			-100	nA
On Char	acteristics (Note 2)					
V _{GS(th)}	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_{D} = 250 \mu\text{A}$	0.4	0.89	1.5	V
$\Delta V_{GS(th)} \over \Delta T_J$	Gate Threshold Voltage Temperature Coefficient	I_D = 250 μ A, Referenced to 25°C		-3		mV/°C
R _{DS(on)}	Static Drain–Source On–Resistance	V _{GS} = 4.5 V, I _D = 7.4 A V _{GS} = 4.5 V, I _D = 7.4 A, T _J =125°C V _{GS} =2.7 V, I _D = 7.2A		15 21 19	22 31 28	mΩ
D(on)	On-State Drain Current	$V_{GS} = 4.5 \text{ V}, \qquad V_{DS} = 5 \text{ V}$	20			Α
g _{FS}	Forward Transconductance	$V_{DS} = 5 \text{ V}, \qquad I_{D} = 7.4 \text{ A}$		31		S
Dynamic	Characteristics					
C _{iss}	Input Capacitance	$V_{DS} = 15 \text{ V}, \qquad V_{GS} = 0 \text{ V},$		1098		pF
C _{oss}	Output Capacitance	f = 1.0 MHz		240		pF
C _{rss}	Reverse Transfer Capacitance	7		115		рF
Switchir	ng Characteristics (Note 2)			•	•	•
d(on)	Turn-On Delay Time	$V_{DS} = 15 \text{ V}, \qquad I_{D} = 1 \text{ A},$		9	18	ns
tr	Turn-On Rise Time	$V_{GS} = 4.5 \text{ V}, \qquad R_{GEN} = 6 \Omega$		13	24	ns
-d(off)	Turn-Off Delay Time	7		26	42	ns
·f	Turn-Off Fall Time	7		11	20	ns
Q_g	Total Gate Charge	$V_{DS} = 10 \text{ V}, \qquad I_{D} = 7.4 \text{ A},$		11	18	nC
Q _{gs}	Gate-Source Charge	$V_{GS} = 4.5 \text{ V}$		2.5		nC
Q_{gd}	Gate-Drain Charge			3.1		nC
Drain–S	ource Diode Characteristics	and Maximum Ratings				
Is	Maximum Continuous Drain-Source				1.9	Α
V _{SD}	Drain-Source Diode Forward Voltage	$V_{GS} = 0 \text{ V}, I_{S} = 1.9 \text{ A} \text{(Note 2)}$		0.72	1.3	V

Notes:

 R_{aJA} 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_{aJC} is guaranteed by design while R_{eCA} is determined by the user's board design.



a) 50 °/W when mounted on a 1 in² pad of 2 oz copper



b) 105 °/W when mounted on a .04 in² pad of 2 oz copper



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

Scale 1 : 1 on letter size paper

2. Pulse Test: Pulse Width < 300µs, Duty Cycle < 2.0%

Typical Characteristics

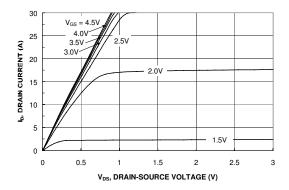


Figure 1. On-Region Characteristics.

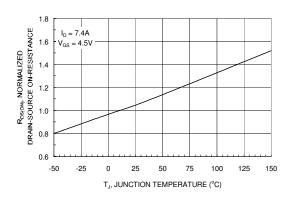


Figure 3. On-Resistance Variation with Temperature.

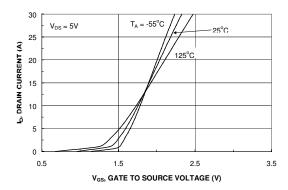


Figure 5. Transfer Characteristics.

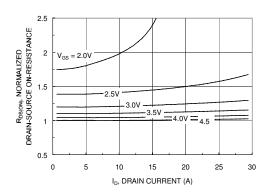


Figure 2. On-Resistance Variation with Drain Current and Gate Voltage.

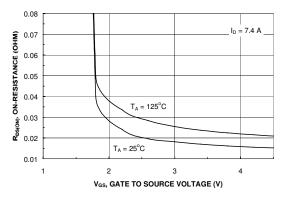


Figure 4. On-Resistance Variation with Gate-to-Source Voltage.

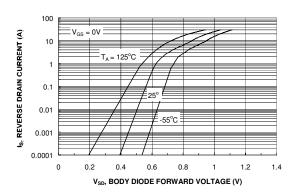
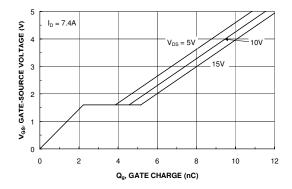


Figure 6. Body Diode Forward Voltage Variation with Source Current and Temperature.

Typical Characteristics (continued)



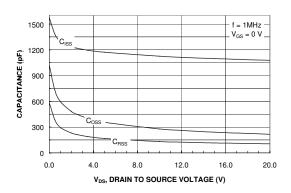
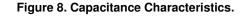
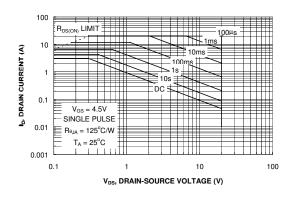


Figure 7. Gate Charge Characteristics.





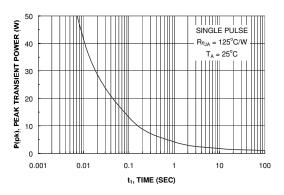


Figure 9. Maximum Safe Operating Area.

Figure 10. Single Pulse Maximum Power Dissipation.

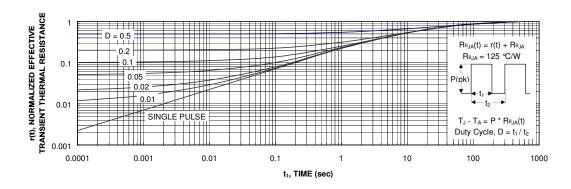


Figure 11. Transient Thermal Response Curve.

Thermal characterization performed using the conditions described in Note 1c. Transient thermal response will change depending on the circuit board design.

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