

NDS8926

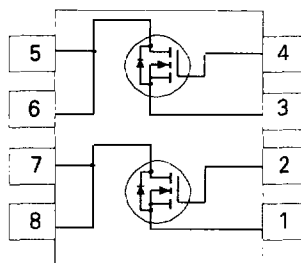
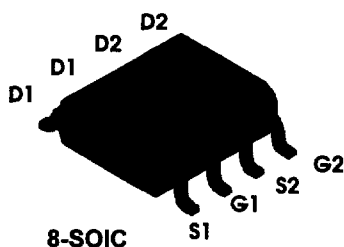
Dual N-Channel Enhancement Mode Field Effect Transistor

General Description

These N-Channel enhancement mode power field effect transistors are produced using National's proprietary, high cell density, DMOS technology. This very high density process is especially tailored to minimize on-state resistance and provide superior switching performance. These devices are particularly suited for low voltage applications such as notebook computer power management and other battery powered circuits where fast switching, low in-line power loss, and resistance to transients are needed.

Features

- 5.5A, 20V. $R_{DS(ON)} = 0.035\Omega @ V_{GS} = 4.5V$
 $R_{DS(ON)} = 0.045\Omega @ V_{GS} = 2.7V.$
- High density cell design for extremely low $R_{DS(ON)}$.
- High power and current handling capability in a widely used surface mount package.
- Dual MOSFET in surface mount package.



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

Symbol	Parameter	NDS8926	Units
V_{DS}	Drain-Source Voltage	20	V
V_{GS}	Gate-Source Voltage	8	V
I_D	Drain Current - Continuous (Note 1a)	5.5	A
	- Pulsed	20	
P_D	Power Dissipation for Dual Operation	2	W
	Power Dissipation for Single Operation (Note 1a)	1.6	
	(Note 1b)	1	
	(Note 1c)	0.9	
T_J, T_{STG}	Operating and Storage Temperature Range	-55 to 150	$^\circ\text{C}$

THERMAL CHARACTERISTICS

$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient (Note 1a)	78	$^\circ\text{C/W}$
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case (Note 1)	40	$^\circ\text{C/W}$

ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
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OFF CHARACTERISTICS

BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	20			V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 16\text{ V}, V_{GS} = 0\text{ V}$ $T_J = 55^\circ\text{C}$			1	μA
I_{GSSF}	Gate - Body Leakage, Forward	$V_{GS} = 8\text{ V}, V_{DS} = 0\text{ V}$			100	nA
I_{GSSR}	Gate - Body Leakage, Reverse	$V_{GS} = -8\text{ V}, V_{DS} = 0\text{ V}$			-100	nA

ON CHARACTERISTICS (Note 2)

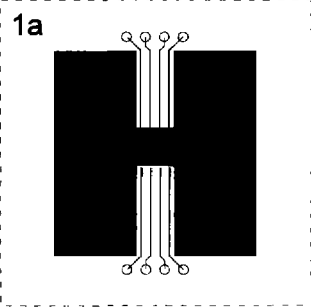
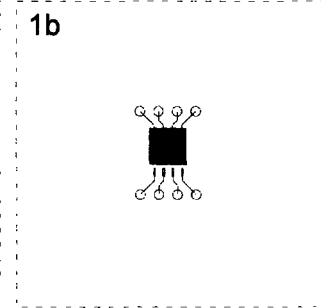
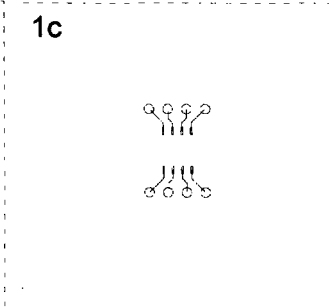
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$ $T_J = 125^\circ\text{C}$	0.4	0.6	1	V
$R_{DS(on)}$	Static Drain-Source On-Resistance	$V_{GS} = 4.5\text{ V}, I_D = 5.5\text{ A}$ $T_J = 125^\circ\text{C}$		0.029	0.035	Ω
		$V_{GS} = 2.7\text{ V}, I_D = 5\text{ A}$		0.035	0.045	
$I_{D(on)}$	On-State Drain Current	$V_{GS} = 4.5\text{ V}, V_{DS} = 5\text{ V}$	20			A
		$V_{GS} = 2.7\text{ V}, V_{DS} = 5\text{ V}$	10			
g_{FS}	Forward Transconductance	$V_{DS} = 10\text{ V}, I_D = 5.5\text{ A}$		14		S

DYNAMIC CHARACTERISTICS

C_{iss}	Input Capacitance	$V_{DS} = 10\text{ V}, V_{GS} = 0\text{ V},$ $f = 1.0\text{ MHz}$		760		pF
C_{oss}	Output Capacitance			440		pF
C_{rss}	Reverse Transfer Capacitance			160		pF

SWITCHING CHARACTERISTICS (Note 2)

$t_{D(on)}$	Turn - On Delay Time	$V_{DD} = 6\text{ V}, I_D = 1\text{ A},$ $V_{GEN} = 4.5\text{ V}, R_{GEN} = 6\text{ }\Omega$		10	20	ns
t_r	Turn - On Rise Time			30	50	ns
$t_{D(off)}$	Turn - Off Delay Time			55	80	ns
t_f	Turn - Off Fall Time			20	40	ns
Q_g	Total Gate Charge	$V_{DS} = 10\text{ V},$ $I_D = 5.5\text{ A}, V_{GS} = 4.5\text{ V}$		21	30	nC
Q_{gs}	Gate-Source Charge			2.3		nC
Q_{gd}	Gate-Drain Charge			6.8		nC

ELECTRICAL CHARACTERISTICS (T _A = 25°C unless otherwise noted)						
Symbol	Parameter	Conditions	Min	Typ	Max	Units
DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS						
I _S	Maximum Continuous Drain-Source Diode Forward Current				1.3	A
V _{SD}	Drain-Source Diode Forward Voltage	V _{GS} = 0 V, I _S = 1.3 A (Note 2)		0.8	1.2	V
Notes:						
1. R _{θJA} 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 _{θJC} is guaranteed by design while R _{θCA} is determined by the user's board design.						
$P_D(t) = \frac{T_J - T_A}{R_{\theta JA}(t)} = \frac{T_J - T_A}{R_{\theta JC} + R_{\theta CA}(t)} = I_D^2(t) \times R_{DS(ON)}@T_J$						
Typical R _{θJA} for single device operation using the board layouts shown below on 4.5"x5" FR-4 PCB in a still air environment:						
a. 78°C/W when mounted on a 0.5 in ² pad of 2oz copper.						
b. 125°C/W when mounted on a 0.02 in ² pad of 2oz copper.						
c. 135°C/W when mounted on a 0.003 in ² pad of 2oz copper.						
1a  1b  1c 						
Scale 1 : 1 on letter size paper.						
2. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2.0%.						

Typical Electrical Characteristics

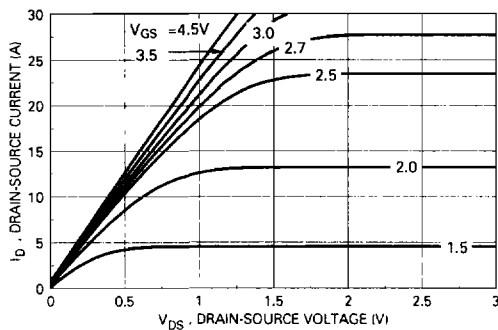


Figure 1. On-Resistance Characteristics.

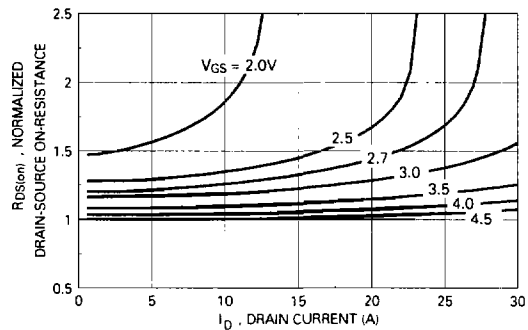


Figure 2. On-Resistance Variation with Gate Voltage and Drain Current.

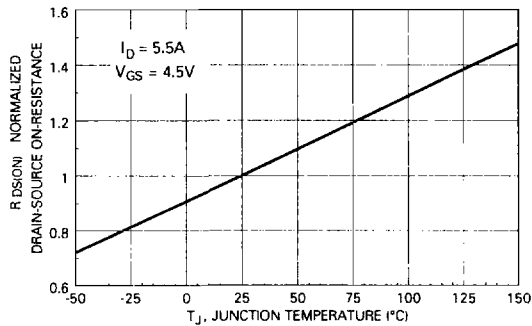


Figure 3. On-Resistance Variation with Temperature.

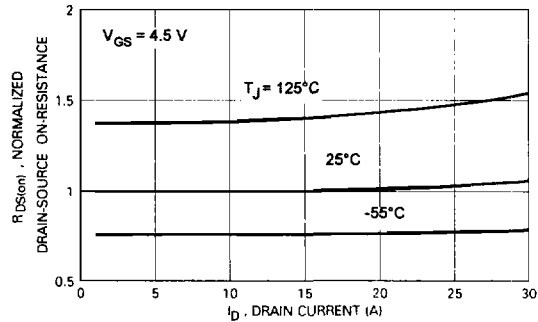


Figure 4. On-Resistance Variation with Drain Current and Temperature.

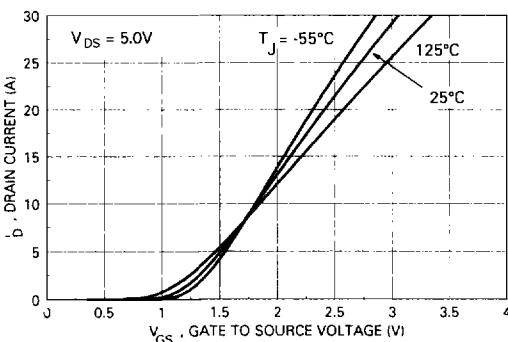


Figure 5. Transfer Characteristics.

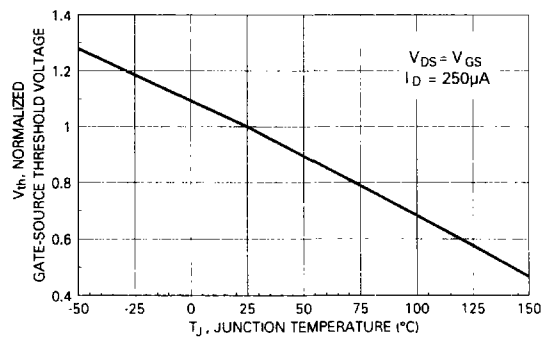


Figure 6. Gate Threshold Variation with Temperature.

Typical Electrical Characteristics

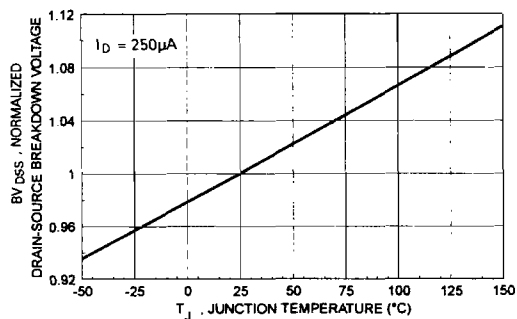


Figure 7. Breakdown Voltage Variation with Temperature.

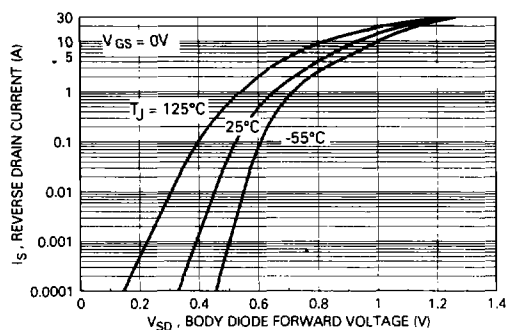


Figure 8. Body Diode Forward Voltage Variation with Current and Temperature.

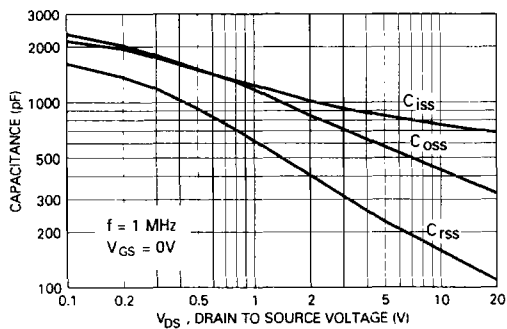


Figure 9. Capacitance Characteristics.

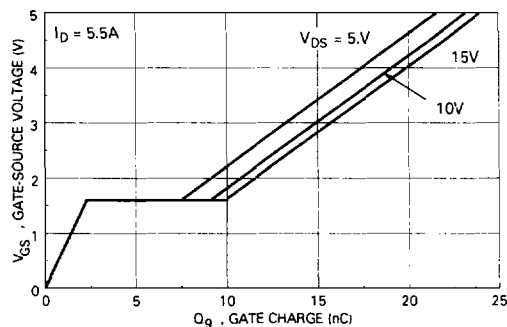


Figure 10. Gate Charge Characteristics.

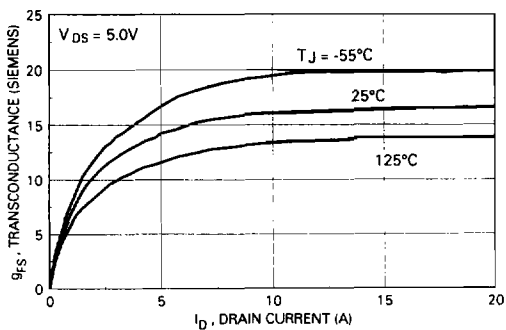


Figure 11. Transconductance Variation with Drain Current and Temperature.

Typical Thermal Characteristics

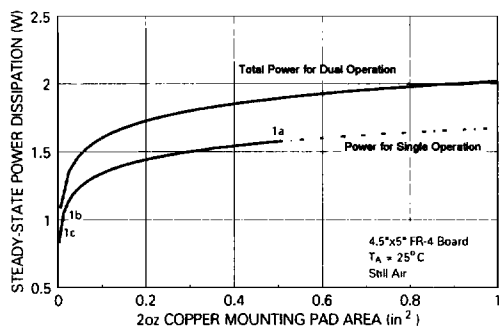


Figure 12. SO-8 Dual Package Maximum Steady-State Power Dissipation versus Copper Mounting Pad Area.

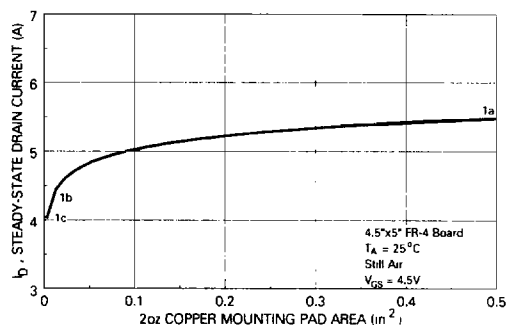


Figure 13. Maximum Steady-State Drain Current versus Copper Mounting Pad Area.

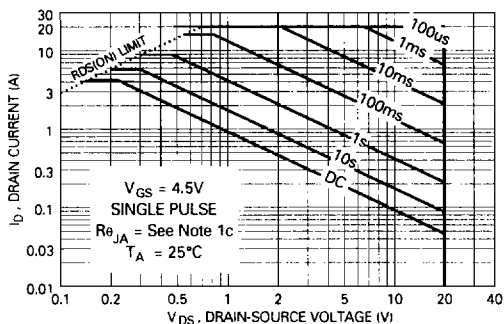


Figure 14. Maximum Safe Operating Area.

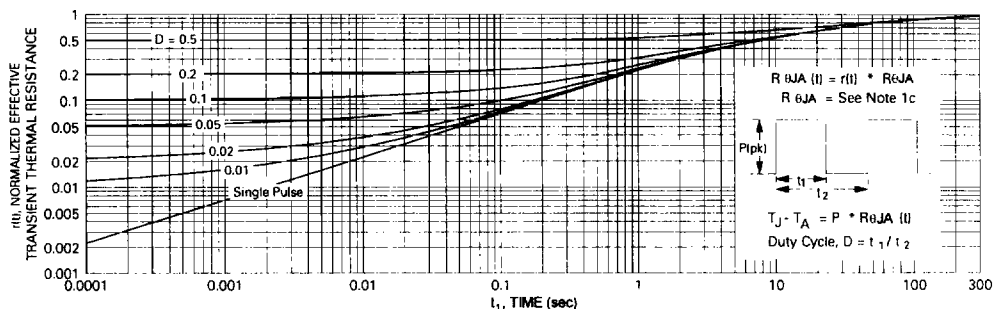


Figure 15. Transient Thermal Response Curve.

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