

FAIRCHILD
SEMICONDUCTOR®

FDS8842NZ

N-Channel PowerTrench® MOSFET

40 V, 14.9 A, 7.0 mΩ

Features

- Max $r_{DS(on)}$ = 7.0 mΩ at $V_{GS} = 10$ V, $I_D = 14.9$ A
- Max $r_{DS(on)}$ = 11.6 mΩ at $V_{GS} = 4.5$ V, $I_D = 11.6$ A
- HBM ESD protection level of 4.4 kV typical(note 3)
- High performance trench technology for extremely low $r_{DS(on)}$ and fast switching
- High power and current handling capability
- Termination is Lead-free and RoHS Compliant

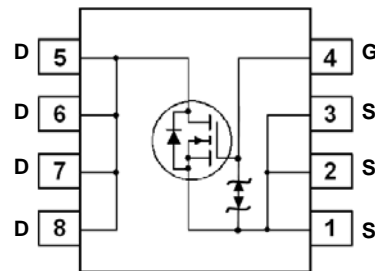
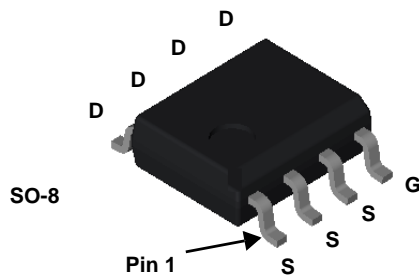


General Description

The FDS8842NZ has been designed to minimize losses in power conversion application. Advancements in both silicon and package technologies have been combined to offer the lowest $r_{DS(on)}$ while maintaining excellent switching performance.

Applications

- Synchronous Buck for Notebook Vcore and Server
- Notebook Battery
- Load Switch



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

Symbol	Parameter	Ratings	Units
V_{DS}	Drain to Source Voltage	40	V
V_{GS}	Gate to Source Voltage	± 20	V
I_D	Drain Current -Continuous	14.9	A
	-Pulsed	93	
E_{AS}	Single Pulse Avalanche Energy (Note 4)	253	mJ
P_D	Power Dissipation $T_A = 25^\circ\text{C}$ (Note 1a)	2.5	W
	Power Dissipation $T_A = 25^\circ\text{C}$ (Note 1b)	1.0	
T_J, T_{STG}	Operating and Storage Junction Temperature Range	-55 to +150	$^\circ\text{C}$

Thermal Characteristics

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

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDS8842NZ	FDS8842NZ	SO8	13"	12 mm	2500 units

FDS8842NZ N-Channel Power Trench® MOSFET



Electrical Characteristics $T_J = 25\text{ }^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
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Off Characteristics

BV_{DSS}	Drain to Source Breakdown Voltage	$I_D = 250\text{ }\mu\text{A}$, $V_{GS} = 0\text{ V}$	40			V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	$I_D = 250\text{ }\mu\text{A}$, referenced to $25\text{ }^\circ\text{C}$		35		mV/ $^\circ\text{C}$
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 32\text{ V}$, $V_{GS} = 0\text{ V}$			1	μA
I_{GSS}	Gate to Source Leakage Current	$V_{GS} = \pm 20\text{ V}$, $V_{DS} = 0\text{ V}$			± 10	μA

On Characteristics

$V_{GS(th)}$	Gate to Source Threshold Voltage	$V_{GS} = V_{DS}$, $I_D = 250\text{ }\mu\text{A}$	1.0	1.9	3.0	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate to Source Threshold Voltage Temperature Coefficient	$I_D = 250\text{ }\mu\text{A}$, referenced to $25\text{ }^\circ\text{C}$		-6		mV/ $^\circ\text{C}$
$r_{DS(on)}$	Static Drain to Source On Resistance	$V_{GS} = 10\text{ V}$, $I_D = 14.9\text{ A}$		5.6	7.0	m Ω
		$V_{GS} = 4.5\text{ V}$, $I_D = 11.6\text{ A}$		6.7	11.6	
		$V_{GS} = 10\text{ V}$, $I_D = 14.9\text{ A}$, $T_J = 125\text{ }^\circ\text{C}$		8.9	11.1	
g_{FS}	Forward Transconductance	$V_{DS} = 5\text{ V}$, $I_D = 14.9\text{ A}$		111		S

Dynamic Characteristics

C_{iss}	Input Capacitance	$V_{DS} = 15\text{ V}$, $V_{GS} = 0\text{ V}$, $f = 1\text{ MHz}$		2890	3845	pF
C_{oss}	Output Capacitance			340	455	pF
C_{rss}	Reverse Transfer Capacitance			220	330	pF
R_g	Gate Resistance		$f = 1\text{ MHz}$		0.8	

Switching Characteristics

$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 20\text{ V}$, $I_D = 14.9\text{ A}$, $V_{GS} = 10\text{ V}$, $R_{GEN} = 6\text{ }\Omega$		13	23	ns	
t_r	Rise Time			7	14	ns	
$t_{d(off)}$	Turn-Off Delay Time			34	54	ns	
t_f	Fall Time			5	10	ns	
Q_g	Total Gate Charge		$V_{GS} = 0\text{ V to }10\text{ V}$		52	73	nC
Q_g	Total Gate Charge	$V_{GS} = 0\text{ V to }5\text{ V}$	$V_{DD} = 20\text{ V}$, $I_D = 14.9\text{ A}$		27	38	nC
Q_{gs}	Gate to Source Charge				8.6		nC
Q_{gd}	Gate to Drain "Miller" Charge				9.7		nC

Drain-Source Diode Characteristics

V_{SD}	Source to Drain Diode Forward Voltage	$V_{GS} = 0\text{ V}$, $I_S = 14.9\text{ A}$		0.8	1.2	V
		$V_{GS} = 0\text{ V}$, $I_S = 2.1\text{ A}$		0.7	1.2	
t_{rr}	Reverse Recovery Time	$I_F = 14.9\text{ A}$, $di/dt = 100\text{ A}/\mu\text{s}$		26	42	ns
Q_{rr}	Reverse Recovery Charge			15	27	nC

NOTES:

- $R_{\theta JA}$ is determined with the device mounted on a 1 in^2 pad 2 oz copper pad on a $1.5 \times 1.5\text{ in.}$ board of FR-4 material. $R_{\theta JC}$ is guaranteed by design while $R_{\theta CA}$ is determined by the user's board design.



a) $50\text{ }^\circ\text{C/W}$ when mounted on a 1 in^2 pad of 2 oz copper.



b) $125\text{ }^\circ\text{C/W}$ when mounted on a minimum pad.

- Pulse Test: Pulse Width < $300\text{ }\mu\text{s}$, Duty cycle < 2.0%.
- The diode connected between the gate and source serves only as protection against ESD. No gate overvoltage rating is implied.
- Starting $T_J = 25\text{ }^\circ\text{C}$, $L = 3\text{ mH}$, $I_{AS} = 13\text{ A}$, $V_{DD} = 40\text{ V}$, $V_{GS} = 10\text{ V}$.

Typical Characteristics $T_J = 25^\circ\text{C}$ unless otherwise noted

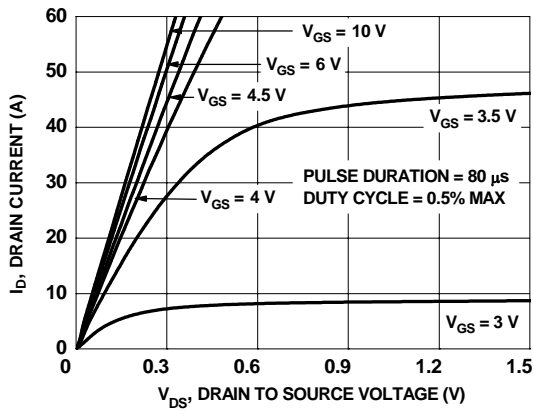


Figure 1. On-Region Characteristics

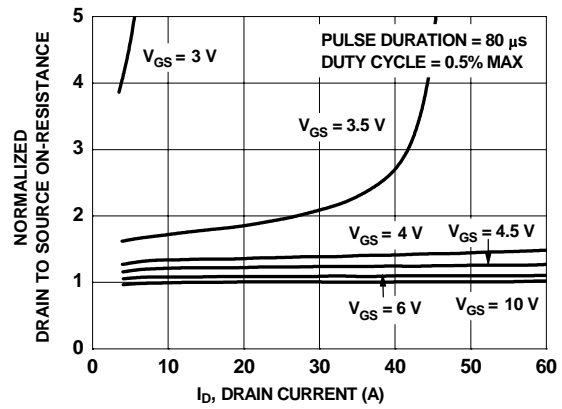


Figure 2. Normalized On-Resistance vs Drain Current and Gate Voltage

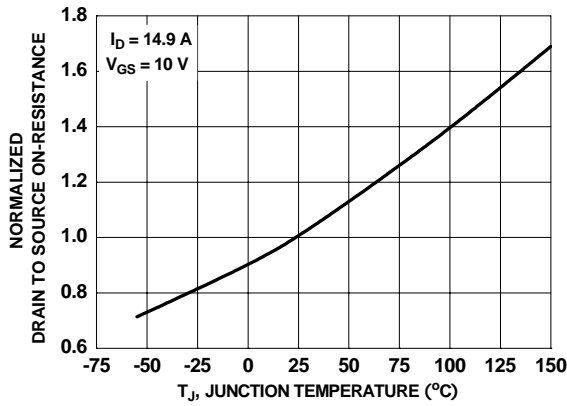


Figure 3. Normalized On-Resistance vs Junction Temperature

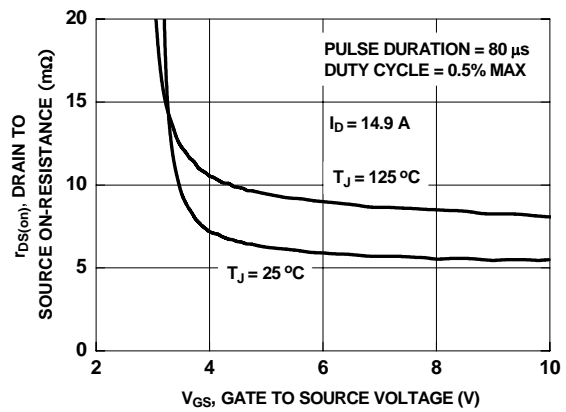


Figure 4. On-Resistance vs Gate to Source Voltage

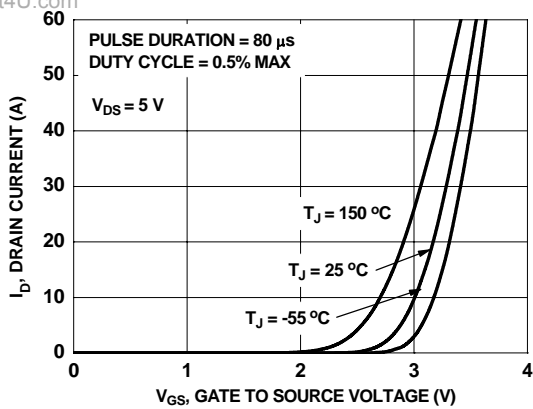


Figure 5. Transfer Characteristics

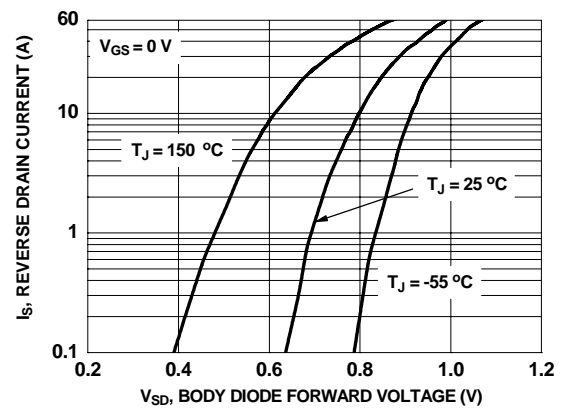


Figure 6. Source to Drain Diode Forward Voltage vs Source Current

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Typical Characteristics $T_J = 25\text{ }^\circ\text{C}$ unless otherwise noted

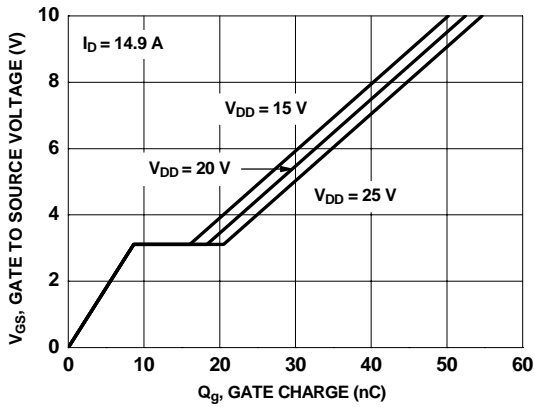


Figure 7. Gate Charge Characteristics

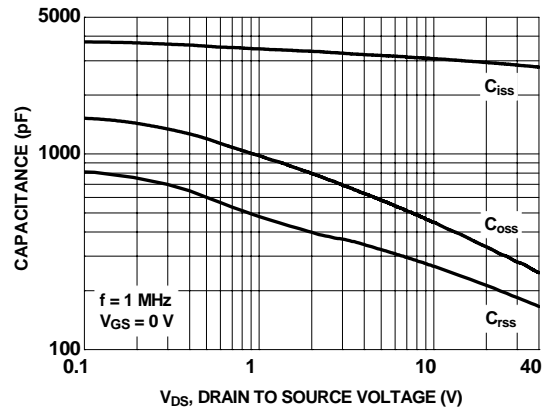


Figure 8. Capacitance vs Drain to Source Voltage

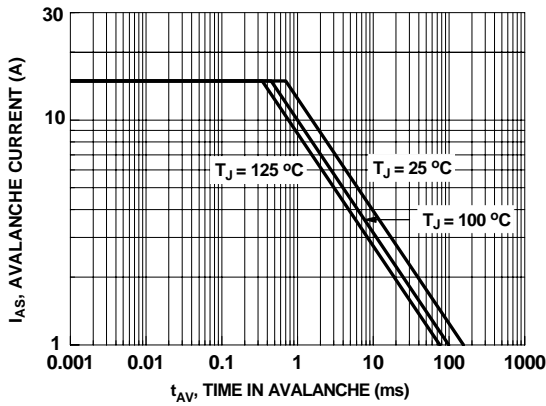


Figure 9. Unclamped Inductive Switching Capability

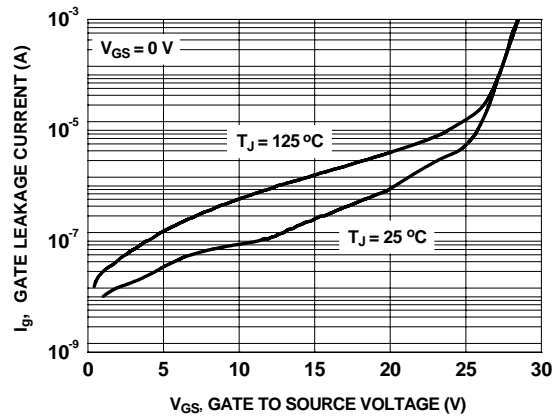


Figure 10. Igss vs Vgs

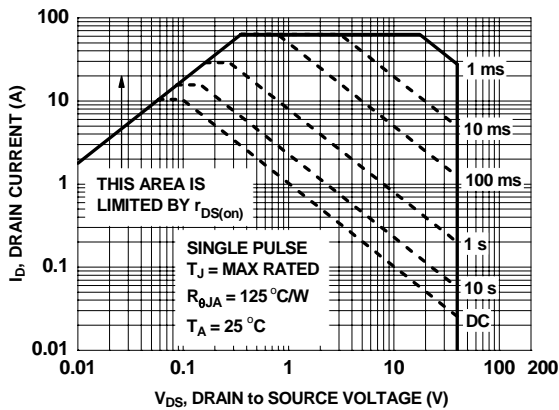


Figure 11. Forward Bias Safe Operating Area

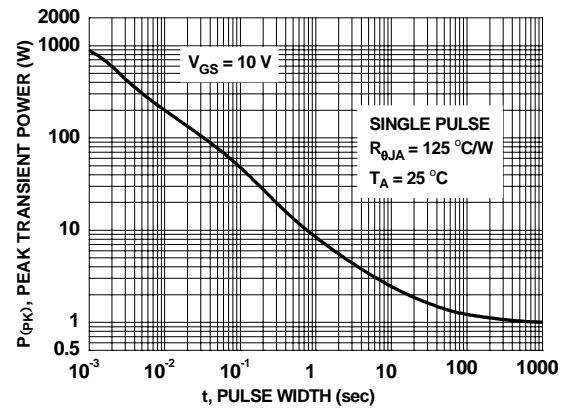


Figure 12. Single Pulse Maximum Power Dissipation

Typical Characteristics $T_J = 25\text{ }^\circ\text{C}$ unless otherwise noted

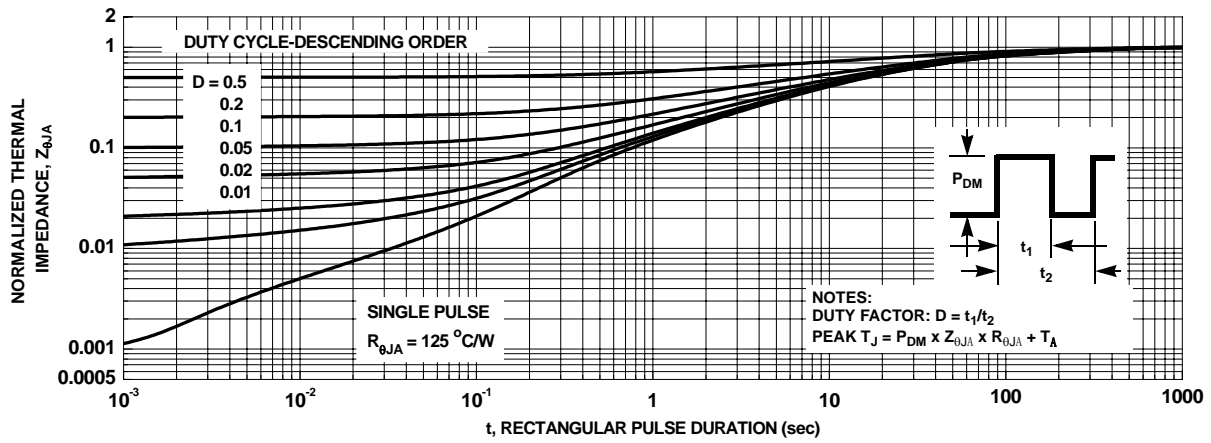



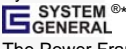


Figure 13. Transient Thermal Response Curve



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