



ON Semiconductor®

# FDS8935

## Dual P-Channel PowerTrench® MOSFET

-80 V, -2.1 A, 183 mΩ

### Features

- Max  $r_{DS(on)}$  = 183 mΩ at  $V_{GS} = -10$  V,  $I_D = -2.1$  A
- Max  $r_{DS(on)}$  = 247 mΩ at  $V_{GS} = -4.5$  V,  $I_D = -1.9$  A
- High performance trench technology for extremely low  $r_{DS(on)}$
- High power and current handling capability in a widely used surface mount package
- 100% UIL Tested
- RoHS Compliant

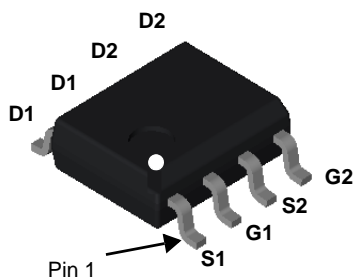


### General Description

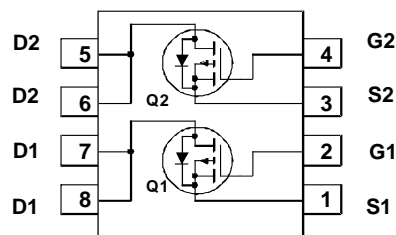
- This P-channel MOSFET is produced using ON Semiconductor's advanced PowerTrench® process that has been optimized for  $r_{DS(on)}$ , switching performance and ruggedness.

### Applications

- Load Switch
- Synchronous Rectifier



SO-8



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

Symbol	Parameter	Ratings	Units
$V_{DS}$	Drain to Source Voltage	-80	V
$V_{GS}$	Gate to Source Voltage	$\pm 20$	V
$I_D$	Drain Current -Continuous	-2.1	A
	-Pulsed	-10	
$E_{AS}$	Single Pulse Avalanche Energy (Note 3)	37	mJ
$P_D$	Power Dissipation $T_A = 25^\circ\text{C}$ (Note 1a)	3.1	W
	Power Dissipation $T_A = 25^\circ\text{C}$ (Note 1b)	1.6	
$T_J, T_{STG}$	Operating and Storage Junction Temperature Range	-55 to +150	$^\circ\text{C}$

### Thermal Characteristics

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

### Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDS8935	FDS8935	SO-8	13"	12 mm	2500 units

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

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
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### Off Characteristics

$BV_{DSS}$	Drain to Source Breakdown Voltage	$I_D = -250 \mu\text{A}, V_{GS} = 0 \text{ V}$	-80			V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	$I_D = -250 \mu\text{A}$ , referenced to $25^\circ\text{C}$		-61		mV/ $^\circ\text{C}$
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS} = -64 \text{ V}, V_{GS} = 0 \text{ V}$			-1	$\mu\text{A}$
$I_{GSS}$	Gate to Source Leakage Current	$V_{GS} = \pm 20 \text{ V}, V_{DS} = 0 \text{ V}$			$\pm 100$	nA

### On Characteristics

$V_{GS(th)}$	Gate to Source Threshold Voltage	$V_{GS} = V_{DS}, I_D = -250 \mu\text{A}$	-1	-1.8	-3	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate to Source Threshold Voltage Temperature Coefficient	$I_D = -250 \mu\text{A}$ , referenced to $25^\circ\text{C}$		5		mV/ $^\circ\text{C}$
$r_{DS(on)}$	Static Drain to Source On Resistance	$V_{GS} = -10 \text{ V}, I_D = -2.1 \text{ A}$		148	183	m $\Omega$
		$V_{GS} = -4.5 \text{ V}, I_D = -1.9 \text{ A}$		176	247	
		$V_{GS} = -10 \text{ V}, I_D = -2.1 \text{ A}, T_J = 125^\circ\text{C}$		249	308	
$g_{FS}$	Forward Transconductance	$V_{DS} = -10 \text{ V}, I_D = -2.1 \text{ A}$		6.4		S

### Dynamic Characteristics

$C_{iss}$	Input Capacitance	$V_{DS} = -40 \text{ V}, V_{GS} = 0 \text{ V},$ $f = 1\text{MHz}$		661	879	pF
$C_{oss}$	Output Capacitance			47	63	pF
$C_{rss}$	Reverse Transfer Capacitance			24	36	pF
$R_g$	Gate Resistance			6		$\Omega$

### Switching Characteristics

$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = -40 \text{ V}, I_D = -2.1 \text{ A},$ $V_{GS} = -10 \text{ V}, R_{GEN} = 6 \Omega$		5	10	ns
$t_r$	Rise Time			3	10	ns
$t_{d(off)}$	Turn-Off Delay Time			22	36	ns
$t_f$	Fall Time			3	10	ns
$Q_{g(TOT)}$	Total Gate Charge		$V_{GS} = 0 \text{ V to } -10 \text{ V}$		13	19
$Q_{g(TOT)}$	Total Gate Charge	$V_{GS} = 0 \text{ V to } -5 \text{ V}$		7	10	nC
$Q_{gs}$	Gate to Source Charge	$V_{DD} = -40 \text{ V},$ $I_D = -2.1 \text{ A}$		1.6		nC
$Q_{gd}$	Gate to Drain "Miller" Charge			2.6		nC

### Drain-Source Diode Characteristics

$V_{SD}$	Source to Drain Diode Forward Voltage	$V_{GS} = 0 \text{ V}, I_S = -2.1 \text{ A}$ (Note 2)		-1.8	-1.3	V
		$V_{GS} = 0 \text{ V}, I_S = -1.3 \text{ A}$ (Note 2)		-0.8	-1.2	
$t_{rr}$	Reverse Recovery Time	$I_F = -2.1 \text{ A}, di/dt = 300 \text{ A}/\mu\text{s}$		19	30	ns
$Q_{rr}$	Reverse Recovery Charge			34	54	nC

#### NOTES:

- $R_{\theta JA}$  is determined with the device mounted on a  $1 \text{ in}^2$  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.



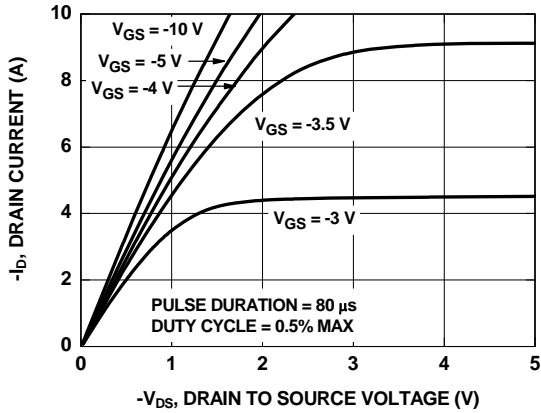
a)  $78^\circ\text{C/W}$  when mounted on a  $1 \text{ in}^2$  pad of 2 oz copper



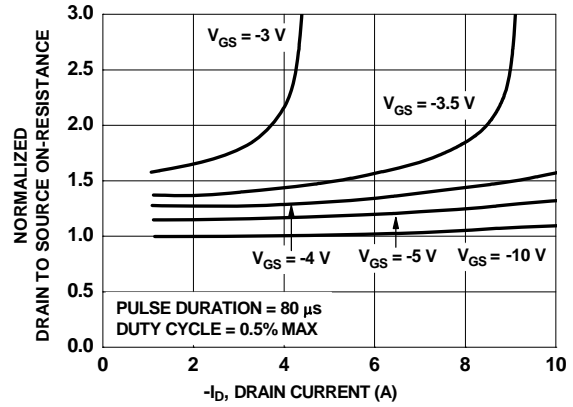
b)  $135^\circ\text{C/W}$  when mounted on a minimum pad

- Pulse Test: Pulse Width <  $300 \mu\text{s}$ , Duty cycle < 2.0%.
- Starting  $T_J = 25^\circ\text{C}$ ,  $L = 3.0 \text{ mH}$ ,  $I_{AS} = -5.0 \text{ A}$ ,  $V_{DD} = -80 \text{ V}$ ,  $V_{GS} = -10 \text{ V}$ .

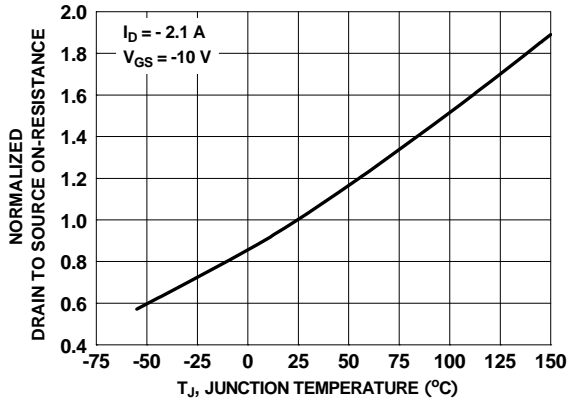
**Typical Characteristics**  $T_J = 25\text{ }^\circ\text{C}$  unless otherwise noted



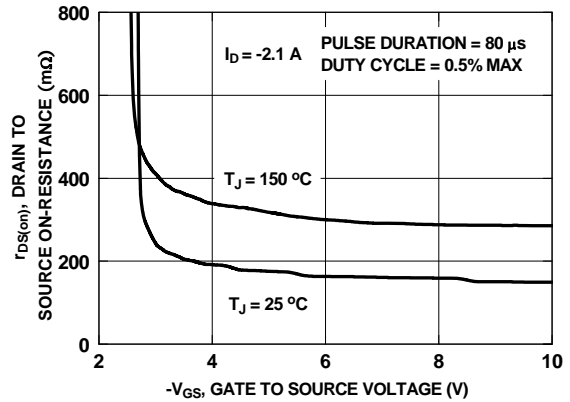
**Figure 1. On-Region Characteristics**



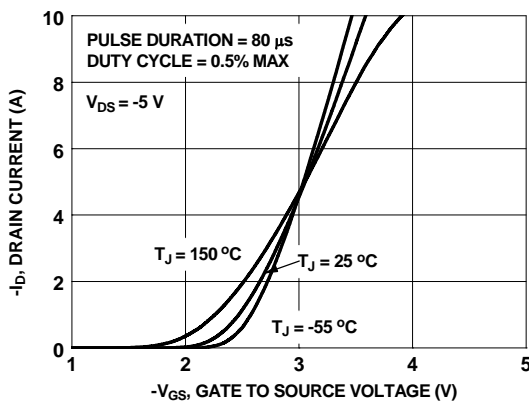
**Figure 2. Normalized On-Resistance vs Drain Current and Gate Voltage**



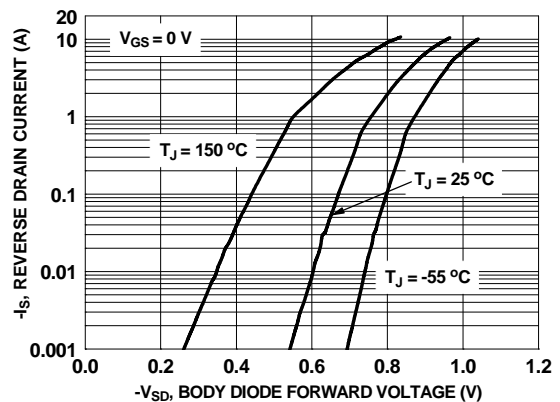
**Figure 3. Normalized On-Resistance vs Junction Temperature**



**Figure 4. On-Resistance vs Gate to Source Voltage**

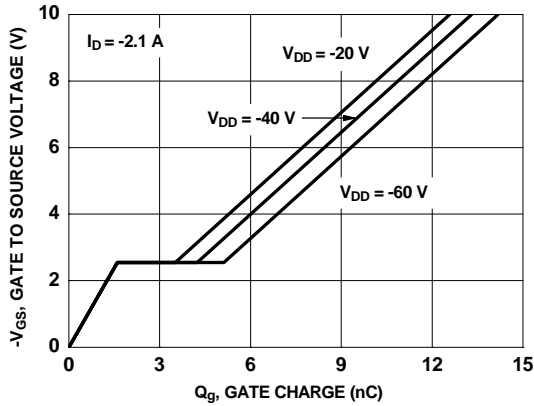


**Figure 5. Transfer Characteristics**

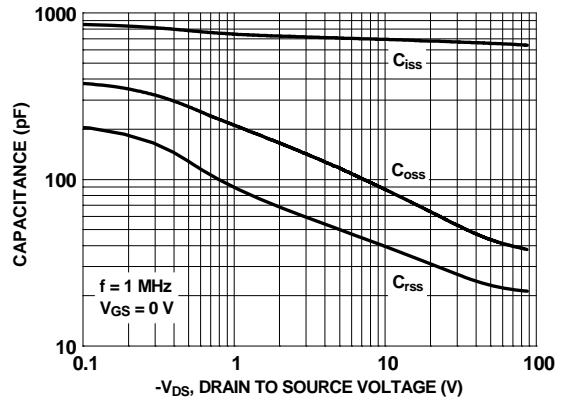


**Figure 6. Source to Drain Diode Forward Voltage vs Source Current**

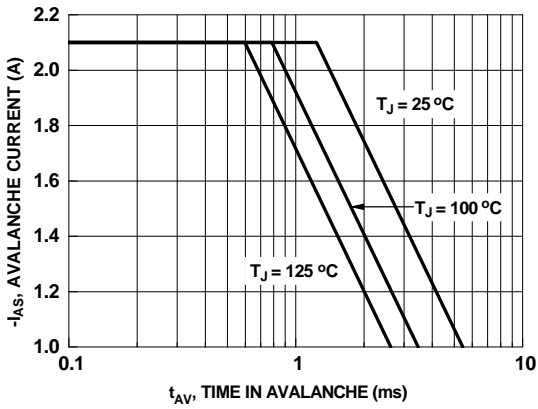
**Typical Characteristics**  $T_J = 25\text{ }^\circ\text{C}$  unless otherwise noted



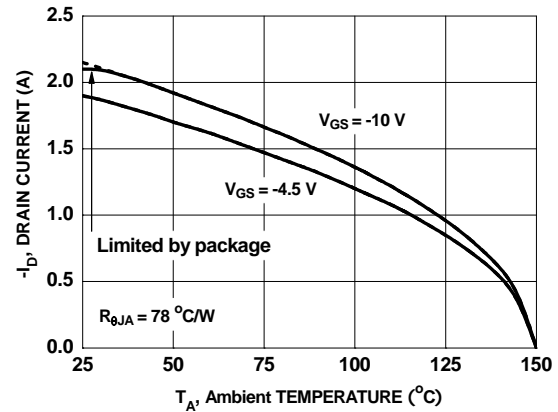
**Figure 7. Gate Charge Characteristics**



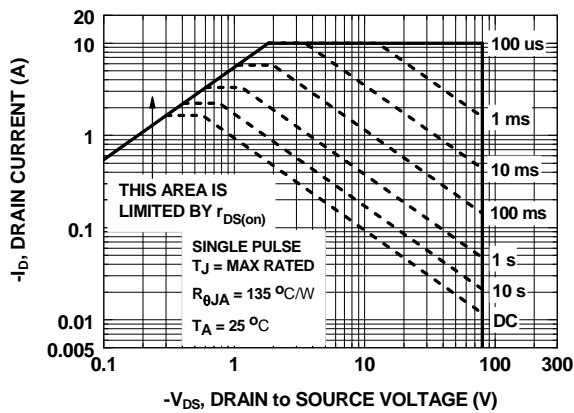
**Figure 8. Capacitance vs Drain to Source Voltage**



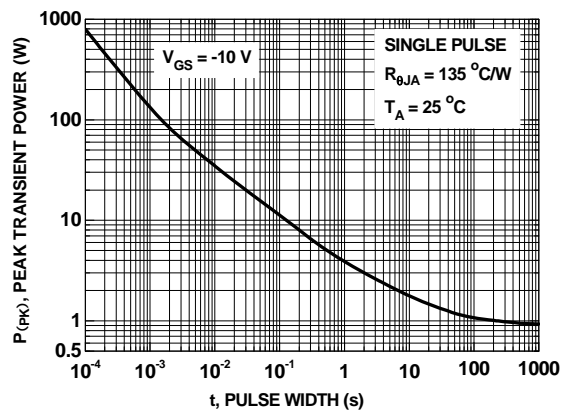
**Figure 9. Unclamped Inductive Switching Capability**



**Figure 10. Maximum Continuous Drain Current vs Ambient Temperature**

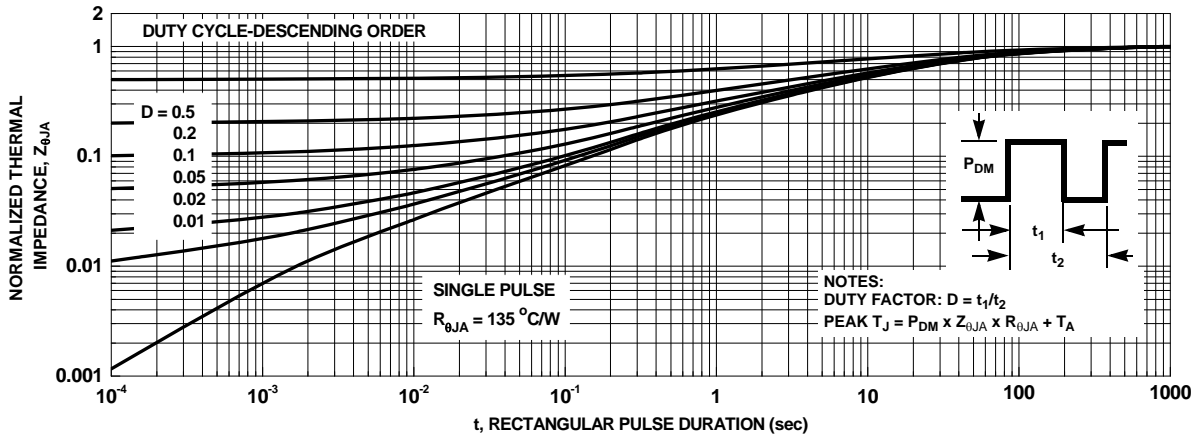


**Figure 11. Forward Bias Safe Operating Area**



**Figure 12. Single Pulse Maximum Power Dissipation**

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



**Figure 13. Junction-to-Ambient Transient Thermal Response Curve**

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