

# FDN86246

## N-Channel PowerTrench® MOSFET 150 V, 1.6 A, 261 mΩ

### Features

- Max  $r_{DS(on)}$  = 261 mΩ at  $V_{GS} = 10$  V,  $I_D = 1.6$  A
- Max  $r_{DS(on)}$  = 359 mΩ at  $V_{GS} = 6$  V,  $I_D = 1.4$  A
- High performance trench technology for extremely low  $r_{DS(on)}$
- High power and current handling capability in a widely used surface mount package
- Fast switching speed
- 100% UIL tested
- RoHS Compliant

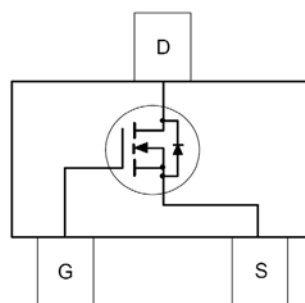
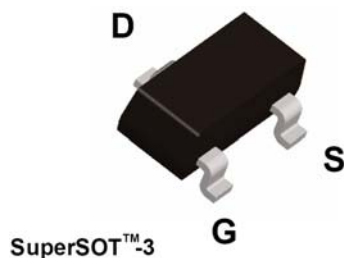


### General Description

This N-Channel MOSFET is produced using Fairchild Semiconductor's advanced Power Trench® process that has been optimized for  $r_{DS(on)}$ , switching performance and ruggedness.

### Application

- PD Switch



### MOSFET Maximum Ratings $T_A = 25$ °C unless otherwise noted

Symbol	Parameter	Ratings	Units
$V_{DS}$	Drain to Source Voltage	150	V
$V_{GS}$	Gate to Source Voltage	±20	V
$I_D$	-Continuous (Note 1a)	1.6	A
	-Pulsed	6	
$E_{AS}$	Single Pulse Avalanche Energy (Note 3)	13	mJ
$P_D$	Power Dissipation (Note 1a)	1.5	W
	Power Dissipation (Note 1b)	0.6	
$T_J, T_{STG}$	Operating and Storage Junction Temperature Range	-55 to +150	°C

### Thermal Characteristics

$R_{\theta JC}$	Thermal Resistance, Junction to Case (Note 1)	75	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient (Note 1a)	80	

### Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
246	FDN86246	SSOT-3	7 "	8 mm	3000 units

**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	$I_D = 250\text{ }\mu\text{A}$ , $V_{GS} = 0\text{ V}$	150			V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	$I_D = 250\text{ }\mu\text{A}$ , referenced to $25\text{ }^{\circ}\text{C}$		106		mV/ $^{\circ}\text{C}$
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS} = 120\text{ V}$ , $V_{GS} = 0\text{ V}$			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 (Note 2)**

$V_{GS(th)}$	Gate to Source Threshold Voltage	$V_{GS} = V_{DS}$ , $I_D = 250\text{ }\mu\text{A}$	2	3.4	4	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 $25\text{ }^{\circ}\text{C}$		-9		mV/ $^{\circ}\text{C}$
$r_{DS(on)}$	Static Drain to Source On Resistance	$V_{GS} = 10\text{ V}$ , $I_D = 1.6\text{ A}$		195	261	m $\Omega$
		$V_{GS} = 6\text{ V}$ , $I_D = 1.4\text{ A}$		242	359	
		$V_{GS} = 10\text{ V}$ , $I_D = 1.6\text{ A}$ , $T_J = 125\text{ }^{\circ}\text{C}$		359	481	
$g_{FS}$	Forward Transconductance	$V_{DS} = 10\text{ V}$ , $I_D = 1.6\text{ A}$		4		S

**Dynamic Characteristics**

$C_{iss}$	Input Capacitance	$V_{DS} = 75\text{ V}$ , $V_{GS} = 0\text{ V}$ , $f = 1\text{ MHz}$		168	225	pF
$C_{oss}$	Output Capacitance			21	30	pF
$C_{rss}$	Reverse Transfer Capacitance			1.6	5	pF
$R_g$	Gate Resistance			0.9		$\Omega$

**Switching Characteristics**

$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 75\text{ V}$ , $I_D = 1.6\text{ A}$ , $V_{GS} = 10\text{ V}$ , $R_{GEN} = 6\text{ }\Omega$		4.5	10	ns
$t_r$	Rise Time			1.1	10	ns
$t_{d(off)}$	Turn-Off Delay Time			8	16	ns
$t_f$	Fall Time			2.9	10	ns
$Q_g$	Total Gate Charge	$V_{GS} = 0\text{ V to }10\text{ V}$	$V_{DD} = 75\text{ V}$ , $I_D = 1.6\text{ A}$	2.9	5	nC
$Q_g$	Total Gate Charge	$V_{GS} = 0\text{ V to }5\text{ V}$		1.6	3	nC
$Q_{gs}$	Gate to Source Gate Charge			0.9		nC
$Q_{gd}$	Gate to Drain "Miller" Charge			0.8		nC

**Drain-Source Diode Characteristics**

$V_{SD}$	Source to Drain Diode Forward Voltage	$V_{GS} = 0\text{ V}$ , $I_S = 1.6\text{ A}$ (Note 2)		0.83	1.3	V
$t_{rr}$	Reverse Recovery Time	$I_F = 1.6\text{ A}$ , $di/dt = 100\text{ A}/\mu\text{s}$		44	70	ns
$Q_{rr}$	Reverse Recovery Charge			29	47	nC

**Notes:**

1.  $R_{\theta JA}$  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.  $R_{\theta JC}$  is guaranteed by design while  $R_{\theta CA}$  is determined by the user's board design.



a)  $80\text{ }^{\circ}\text{C/W}$  when mounted on a  $1\text{ in}^2$  pad of 2 oz copper



b)  $180\text{ }^{\circ}\text{C/W}$  when mounted on a minimum pad.

2. Pulse Test: Pulse Width  $< 300\text{ }\mu\text{s}$ , Duty cycle  $< 2.0\%$ .

3. Starting  $T_J = 25\text{ }^{\circ}\text{C}$ ; N-ch:  $L = 3\text{ mH}$ ,  $I_{AS} = 3\text{ A}$ ,  $V_{DD} = 150\text{ V}$ ,  $V_{GS} = 10\text{ V}$ .

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

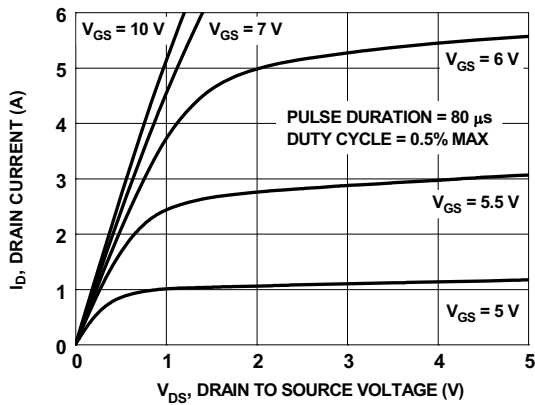


Figure 1. On-Region Characteristics

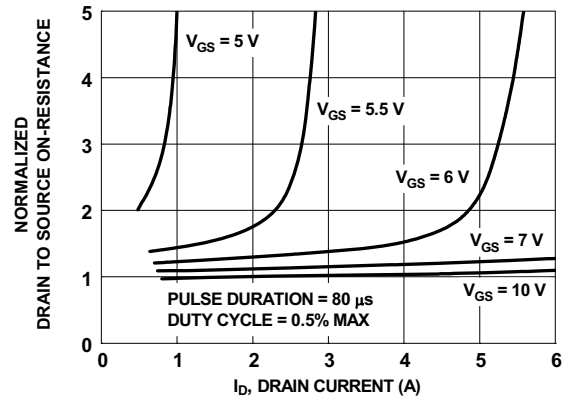


Figure 2. Normalized On-Resistance vs Drain Current and Gate Voltage

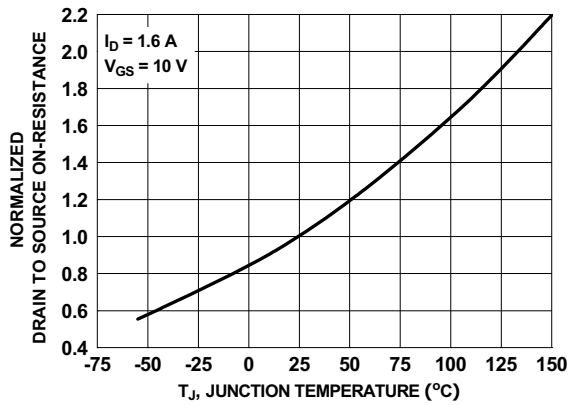


Figure 3. Normalized On-Resistance vs Junction Temperature

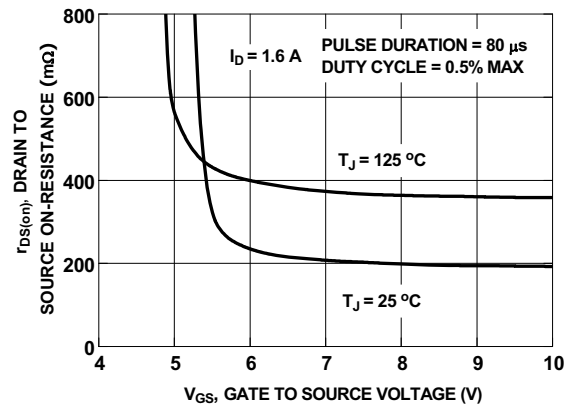


Figure 4. On-Resistance vs Gate to Source Voltage

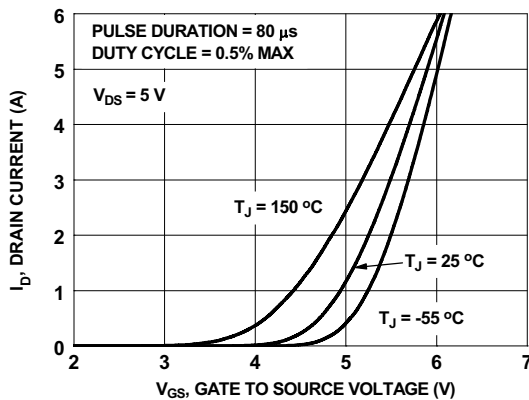


Figure 5. Transfer Characteristics

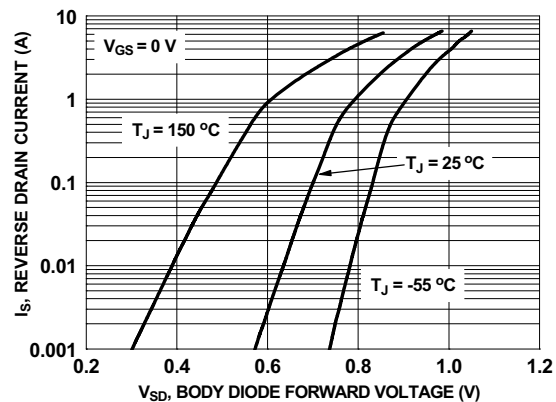


Figure 6. Source to Drain Diode Forward Voltage vs Source Current

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

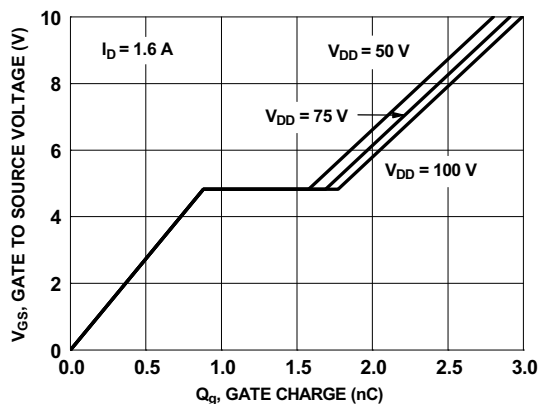


Figure 7. Gate Charge Characteristics

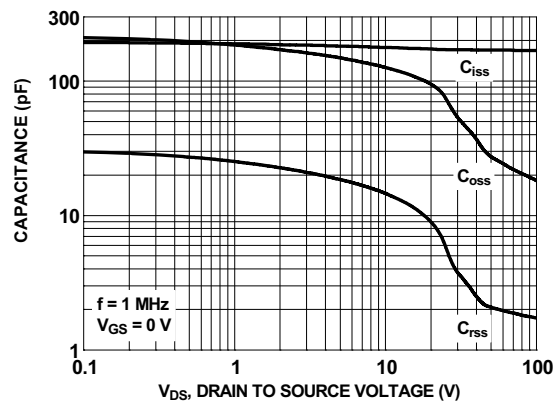


Figure 8. Capacitance vs Drain to Source Voltage

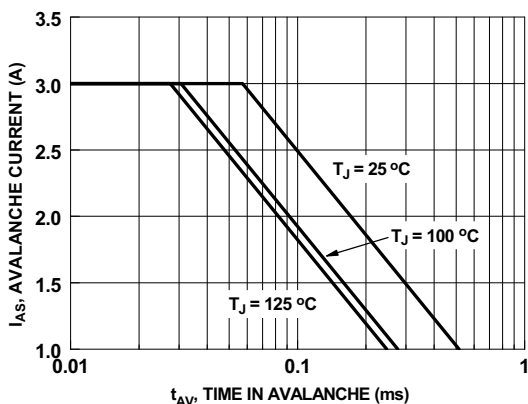


Figure 9. Unclamped Inductive Switching Capability

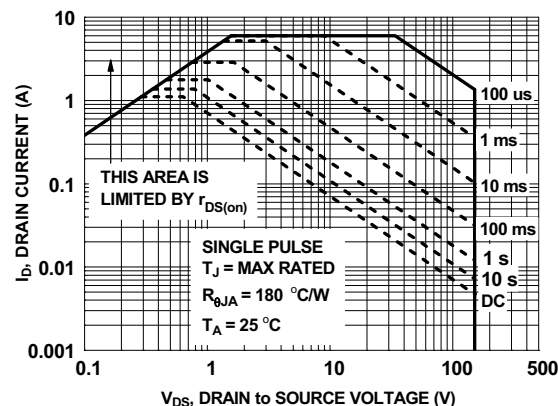


Figure 10. Forward Bias Safe Operating Area

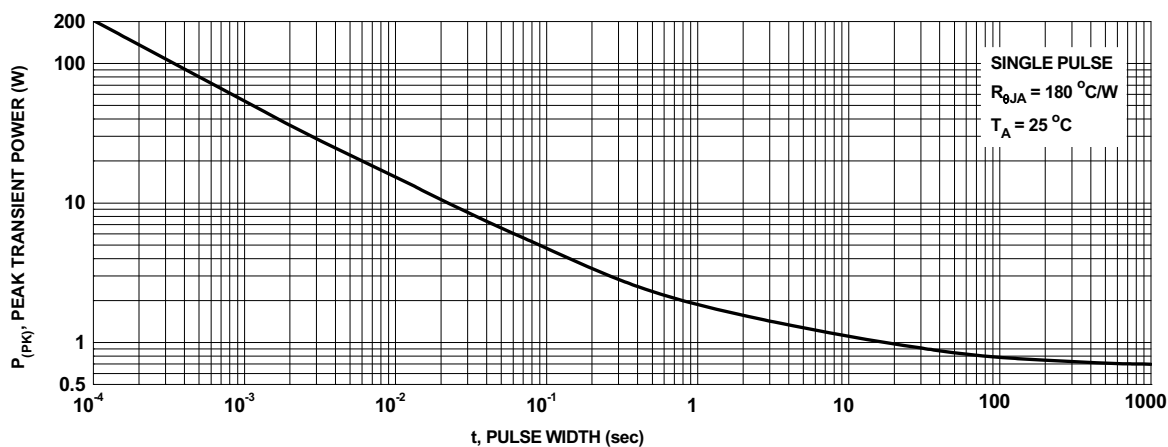


Figure 11. Single Pulse Maximum Power Dissipation

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

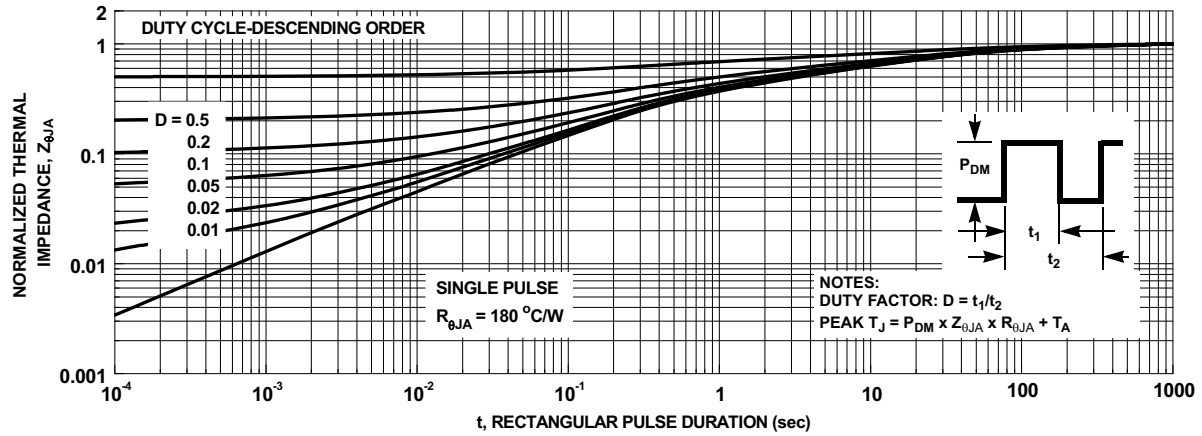







Figure 12. Junction-to-Ambient Transient Thermal Response Curve



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Rev. I51

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