

# FDC86244

## N-Channel Shielded Gate PowerTrench® MOSFET 150 V, 2.3 A, 144 mΩ

### Features

- Shielded Gate MOSFET Technology
- Max  $r_{DS(on)}$  = 144 mΩ at  $V_{GS} = 10$  V,  $I_D = 2.3$  A
- Max  $r_{DS(on)}$  = 188 mΩ at  $V_{GS} = 6$  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
- Fast switching speed
- 100% UIL Tested
- RoHS Compliant

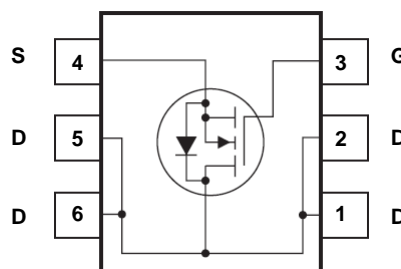
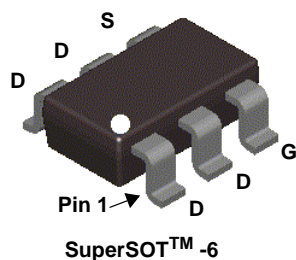


### General Description

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

### Applications

- Load Switch
- Synchronous Rectifier
- Primary Switch



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

Symbol	Parameter	Ratings	Units
$V_{DS}$	Drain to Source Voltage	150	V
$V_{GS}$	Gate to Source Voltage	$\pm 20$	V
$I_D$	Drain Current -Continuous	2.3	A
	-Pulsed	10	
$E_{AS}$	Single Pulse Avalanche Energy	12	mJ
$P_D$	Power Dissipation	1.6	W
	Power Dissipation	0.8	
$T_J, T_{STG}$	Operating and Storage Junction Temperature Range	-55 to +150	$^\circ\text{C}$

### Thermal Characteristics

$R_{\theta JC}$	Thermal Resistance, Junction to Case	30	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	78	

### Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
.244	FDC86244	SSOT-6	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 $25\text{ }^{\circ}\text{C}$		103		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**

$V_{GS(th)}$	Gate to Source Threshold Voltage	$V_{GS} = V_{DS}$ , $I_D = 250\text{ }\mu\text{A}$	2.0	2.5	4.0	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 $25\text{ }^{\circ}\text{C}$		-9		mV/ $^{\circ}\text{C}$
$r_{DS(on)}$	Static Drain to Source On Resistance	$V_{GS} = 10\text{ V}$ , $I_D = 2.3\text{ A}$		113	144	m $\Omega$
		$V_{GS} = 6\text{ V}$ , $I_D = 1.9\text{ A}$		128	188	
		$V_{GS} = 10\text{ V}$ , $I_D = 2.3\text{ A}$ , $T_J = 125\text{ }^{\circ}\text{C}$		214	273	
$g_{FS}$	Forward Transconductance	$V_{DD} = 5\text{ V}$ , $I_D = 2.3\text{ A}$		6		S

**Dynamic Characteristics**

$C_{iss}$	Input Capacitance	$V_{DS} = 75\text{ V}$ , $V_{GS} = 0\text{ V}$ , $f = 1\text{ MHz}$		260	345	pF
$C_{oss}$	Output Capacitance			32	45	pF
$C_{rss}$	Reverse Transfer Capacitance			1.7	5	pF
$R_g$	Gate Resistance			1.3		$\Omega$

**Switching Characteristics**

$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 75\text{ V}$ , $I_D = 2.3\text{ A}$ , $V_{GS} = 10\text{ V}$ , $R_{GEN} = 6\text{ }\Omega$		4.7	10	ns
$t_r$	Rise Time			1.4	10	ns
$t_{d(off)}$	Turn-Off Delay Time			10	20	ns
$t_f$	Fall Time			3.1	10	ns
$Q_{g(TOT)}$	Total Gate Charge	$V_{GS} = 0\text{ V to } 10\text{ V}$	$V_{DD} = 75\text{ V}$ $I_D = 2.3\text{ A}$	4.2	6	nC
	Total Gate Charge	$V_{GS} = 0\text{ V to } 5\text{ V}$		2.4	4	nC
$Q_{gs}$	Total Gate Charge			1.0		nC
$Q_{gd}$	Gate to Drain "Miller" Charge			1.0		nC

**Drain-Source Diode Characteristics**

$V_{SD}$	Source to Drain Diode Forward Voltage	$V_{GS} = 0\text{ V}$ , $I_S = 2.3\text{ A}$ (Note 2)		0.8	1.3	V
$t_{rr}$	Reverse Recovery Time	$I_F = 2.3\text{ A}$ , $di/dt = 100\text{ A}/\mu\text{s}$		45	73	ns
$Q_{rr}$	Reverse Recovery Charge			33	53	nC

**NOTES:**

- $R_{\theta JA}$  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. 78  $^{\circ}\text{C}/\text{W}$  when mounted on  
a 1 in<sup>2</sup> pad of 2 oz copper



b. 175  $^{\circ}\text{C}/\text{W}$  when mounted on  
a minimum pad of 2 oz copper

- Pulse Test: Pulse Width < 300  $\mu\text{s}$ , Duty cycle < 2.0 %.
- Starting  $T_J = 25\text{ }^{\circ}\text{C}$ ,  $L = 1.0\text{ mH}$ ,  $I_{AS} = 5.0\text{ A}$ ,  $V_{DD} = 135\text{ V}$ ,  $V_{GS} = 10\text{ V}$ .

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

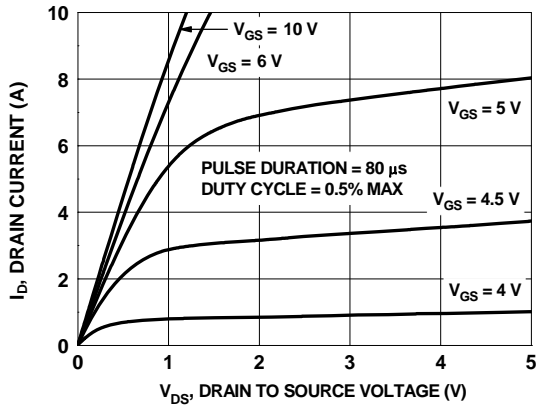


Figure 1. On-Region Characteristics

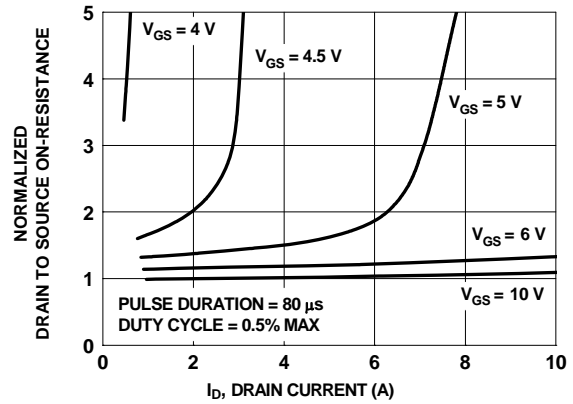


Figure 2. Normalized On-Resistance vs Drain Current and Gate Voltage

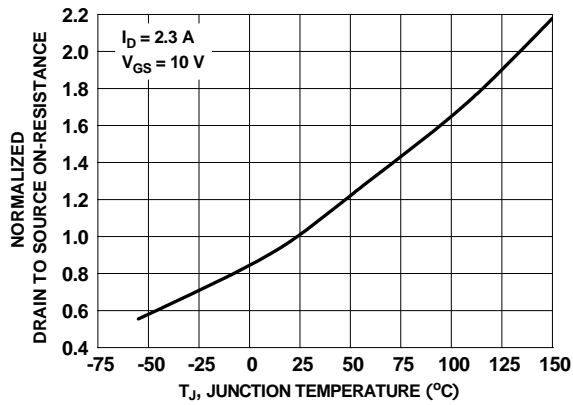


Figure 3. Normalized On-Resistance vs Junction Temperature

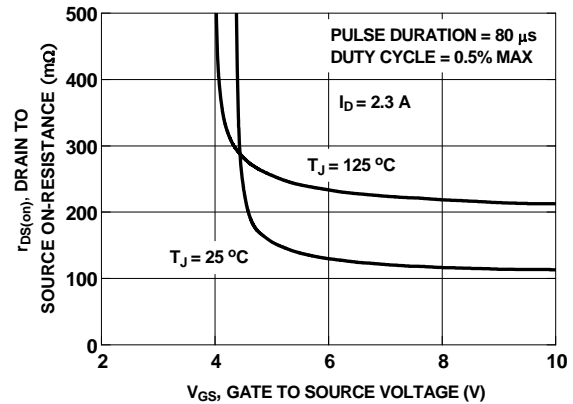


Figure 4. On-Resistance vs Gate to Source Voltage

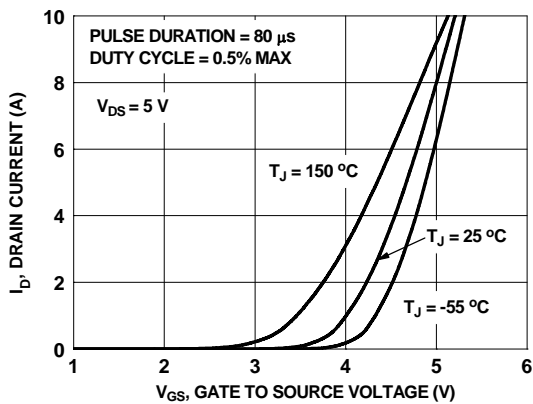


Figure 5. Transfer Characteristics

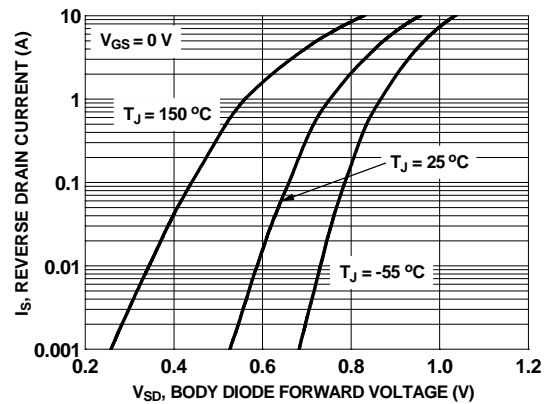


Figure 6. Source to Drain Diode Forward Voltage vs Source Current

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

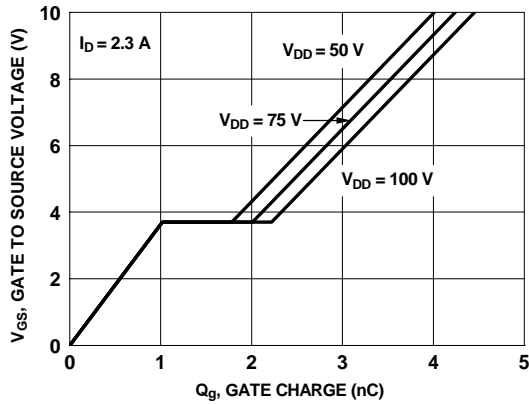


Figure 7. Gate Charge Characteristics

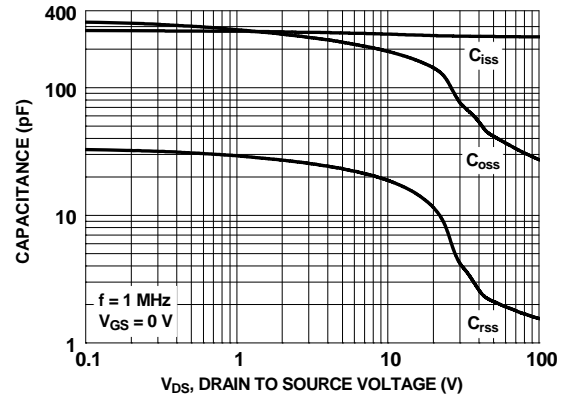


Figure 8. Capacitance vs Drain to Source Voltage

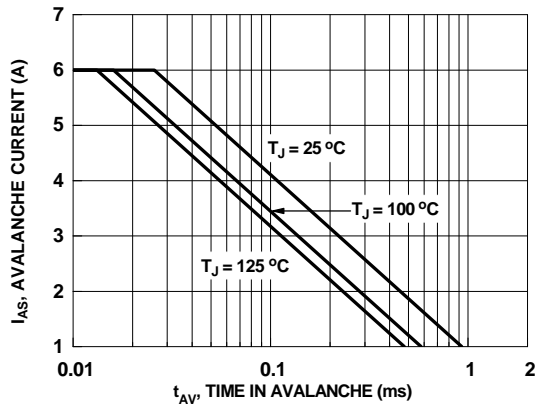


Figure 9. Unclamped Inductive Switching Capability

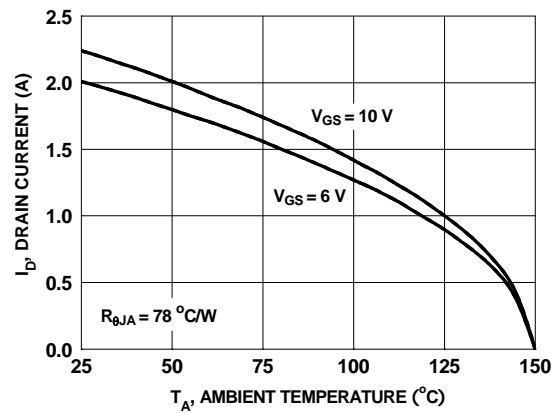


Figure 10. Maximum Continuous Drain Current vs Ambient Temperature

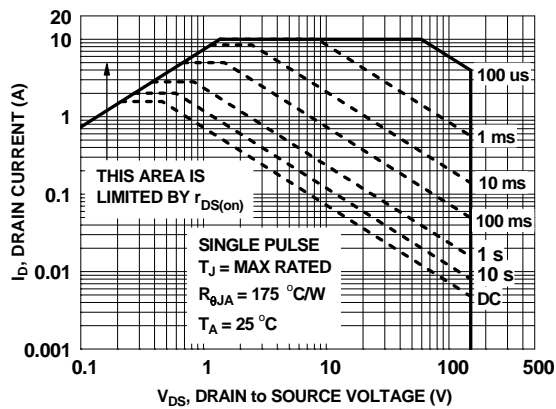


Figure 11. Forward Bias Safe Operating Area

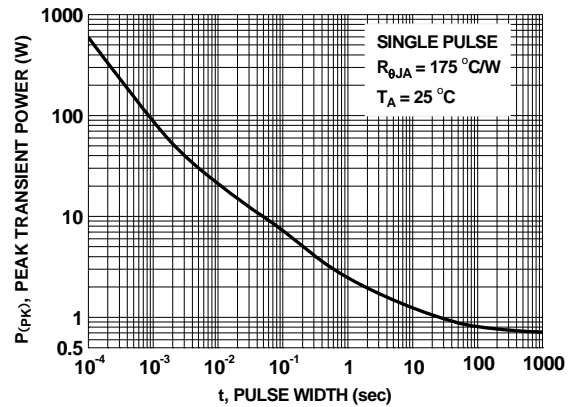
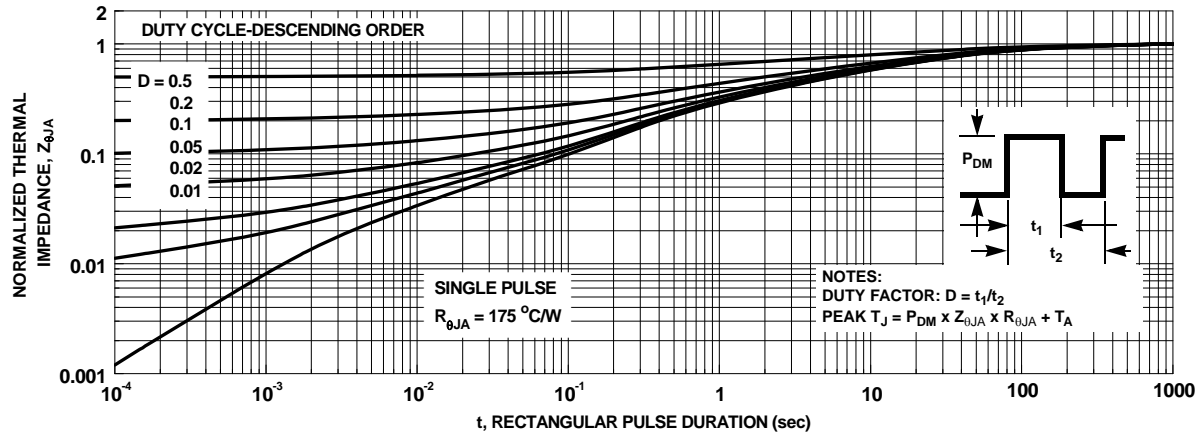
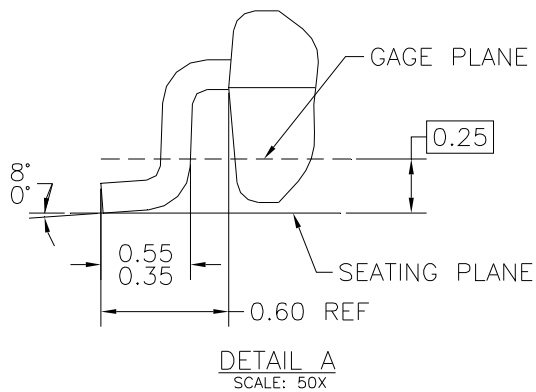
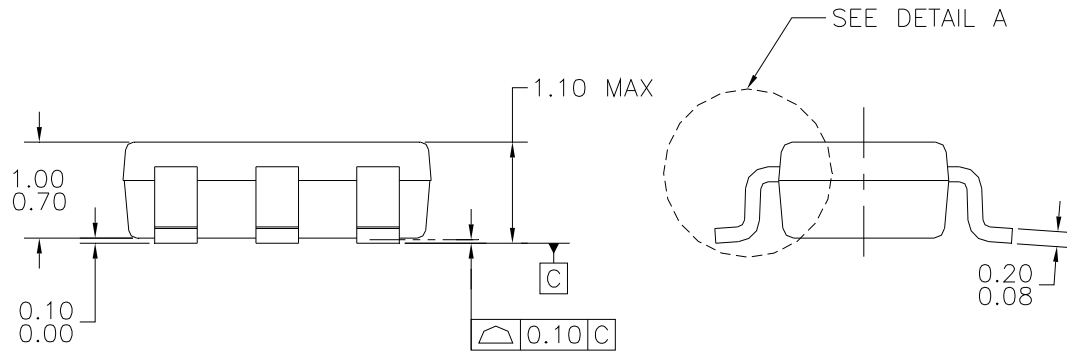
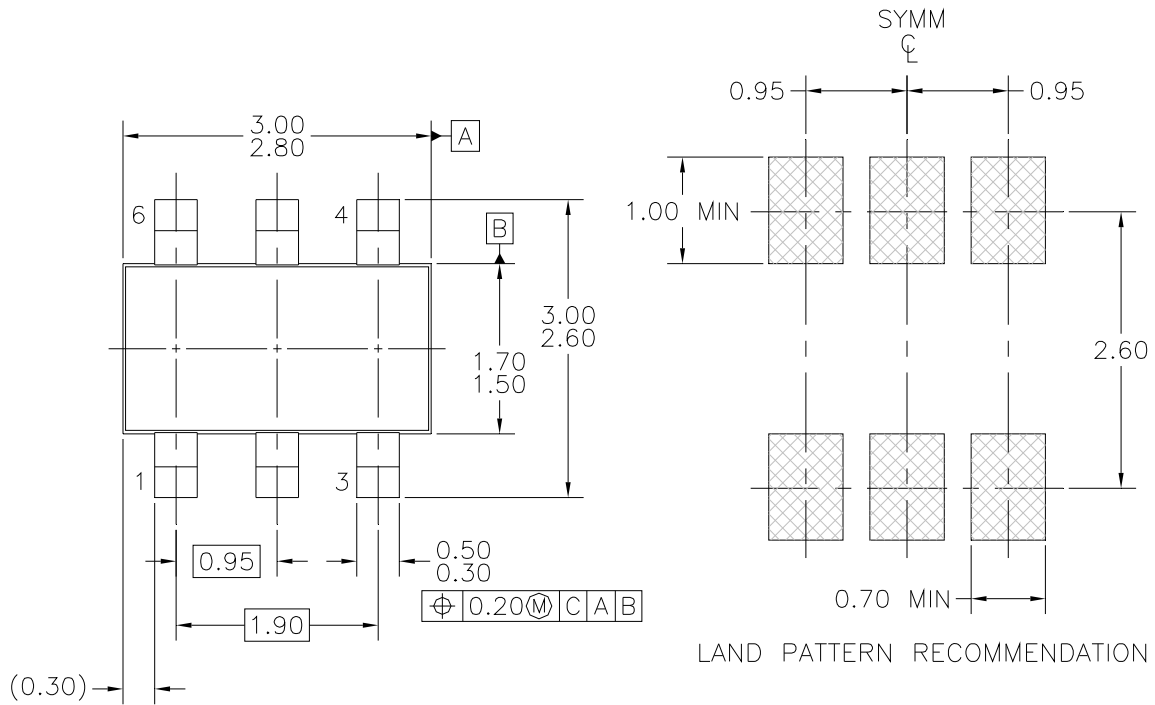


Figure 12. Single Pulse Maximum Power Dissipation

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



## Dimensional Outline and Pad Layout





NOTES: UNLESS OTHERWISE SPECIFIED

- A) THIS PACKAGE CONFORMS TO JEDEC MO-193. VAR. AA, ISSUE C, DATED JANUARY 2000.
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Datasheet Identification	Product Status	Definition
Advance Information	Formative / In Design	Datasheet contains the design specifications for product development. Specifications may change in any manner without notice.
Preliminary	First Production	Datasheet contains preliminary data; supplementary data will be published at a later date. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve design.
No Identification Needed	Full Production	Datasheet contains final specifications. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve the design.
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Rev. I64

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