FDD86250

N-Channel Shielded Gate PowerTrench® MOSFET

150 V, 50 A, 22 mΩ

Features

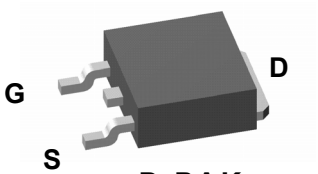
- Shielded Gate MOSFET Technology
- Max $r_{DS(on)}$ = 22 mΩ at V_{GS} = 10 V, I_D = 8 A
- Max $r_{DS(on)}$ = 31 mΩ at V_{GS} = 6 V, I_D = 6.5 A
- 100% UIL tested
- RoHS Compliant

General Description

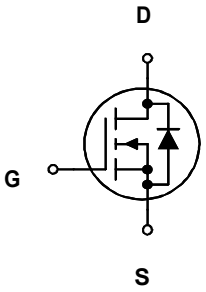
This N-Channel MOSFET is produced using Fairchild Semiconductor's advanced PowerTrench® process that incorporates Shielded Gate technology. This process has been optimized for the on-state resistance and yet maintain superior switching performance.

Application

- DC - DC Conversion



D-PAK
(TO-252)



MOSFET Maximum Ratings T_C = 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	Drain Current -Continuous	T_C = 25 °C		50	A
	-Continuous	T_A = 25 °C	(Note 1a)	8	
	-Pulsed			40	
E_{AS}	Single Pulse Avalanche Energy		(Note 3)	180	mJ
P_D	Power Dissipation	T_C = 25 °C		132	W
	Power Dissipation	T_A = 25 °C	(Note 1a)	3.1	
T_J, T_{STG}	Operating and Storage Junction Temperature Range			-55 to +150	°C

Thermal Characteristics

$R_{\theta JC}$	Thermal Resistance, Junction to Case	0.94	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient (Note 1a)	40	

Package Marking and Ordering Information

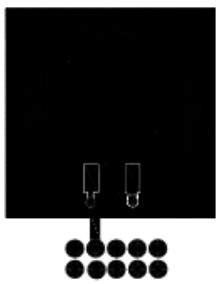
Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDD86250	FDD86250	D-PAK(TO-252)	13 ”	12 mm	2500 units

Electrical Characteristics T_J = 25 °C unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Off Characteristics						
BV_{DSS}	Drain to Source Breakdown Voltage	I_D = 250 μA, V_{GS} = 0 V	150			V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	I_D = 250 μA, referenced to 25 °C		106		mV/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 120 V, V_{GS} = 0 V			1	μA
I_{GSS}	Gate to Source Leakage Current	V_{GS} = ±20 V, V_{DS} = 0 V			±100	nA
On Characteristics						
$V_{GS(th)}$	Gate to Source Threshold Voltage	V_{GS} = V_{DS}, I_D = 250 μA	2.0	2.9	4.0	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate to Source Threshold Voltage Temperature Coefficient	I_D = 250 μA, referenced to 25 °C		-10		mV/°C
$r_{DS(on)}$	Static Drain to Source On Resistance	V_{GS} = 10 V, I_D = 8 A		18.4	22	mΩ
		V_{GS} = 6 V, I_D = 6.5 A		21.4	31	
		V_{GS} = 10 V, I_D = 8 A, T_J = 125 °C		35.8	45	
g_{FS}	Forward Transconductance	V_{DS} = 10 V, I_D = 8 A		28		S
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = 75 V, V_{GS} = 0 V, f = 1 MHz		1585	2110	pF
C_{oss}	Output Capacitance			167	225	pF
C_{rss}	Reverse Transfer Capacitance			7	15	pF
R_g	Gate Resistance			0.6		Ω
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{DD} = 75 V, I_D = 8 A, V_{GS} = 10 V, R_{GEN} = 6 Ω		11.2	20	ns
t_r	Rise Time			3.7	10	ns
$t_{d(off)}$	Turn-Off Delay Time			20	32	ns
t_f	Fall Time			4	10	ns
Q_g	Total Gate Charge	V_{GS} = 0 V to 10 V; V_{DD} = 75 V, I_D = 8 A		23	33	nC
Q_g	Total Gate Charge	V_{GS} = 0 V to 5 V; V_{DD} = 75 V, I_D = 8 A		12.8	18	nC
Q_{gs}	Gate to Source Charge	V_{DD} = 75 V, I_D = 8 A		6.7		nC
Q_{gd}	Gate to Drain “Miller” Charge	V_{DD} = 75 V, I_D = 8 A		4.7		nC
Drain-Source Diode Characteristics						
V_{SD}	Source-Drain Diode Forward Voltage	V_{GS} = 0 V, I_S = 8 A (Note 2)		0.78	1.3	V
		V_{GS} = 0 V, I_S = 2.6 A (Note 2)		0.73	1.2	
t_{rr}	Reverse Recovery Time	I_F = 8 A, di/dt = 100 A/μs		71	113	ns
Q_{rr}	Reverse Recovery Charge			104	166	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 $R_{\theta JA}$ is determined by the user's board design.



a) 40 °C/W when mounted on a 1 in^2 pad of 2 oz copper

b) 96 °C/W when mounted on a minimum pad

2: Pulse Test: Pulse Width < 300 μs, Duty cycle < 2.0%.

3: Starting T_J = 25 °C, L = 1.0 mH, I_{AS} = 19 A, V_{DD} = 135 V, V_{GS} = 10 V.

Typical Characteristics T_J = 25 °C unless otherwise noted

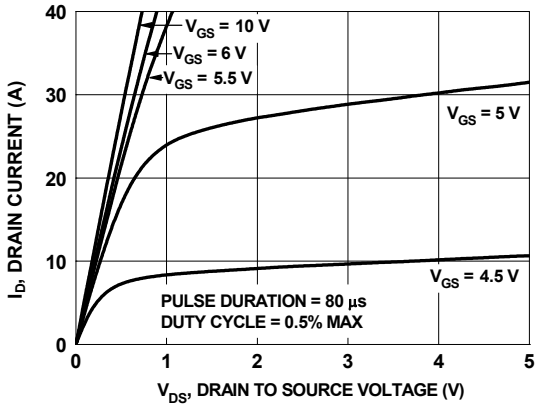


Figure 1. On-Region Characteristics

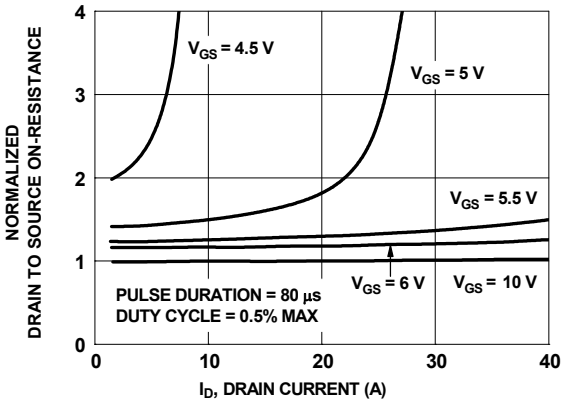


Figure 2. Normalized On-Resistance vs Drain Current and Gate Voltage

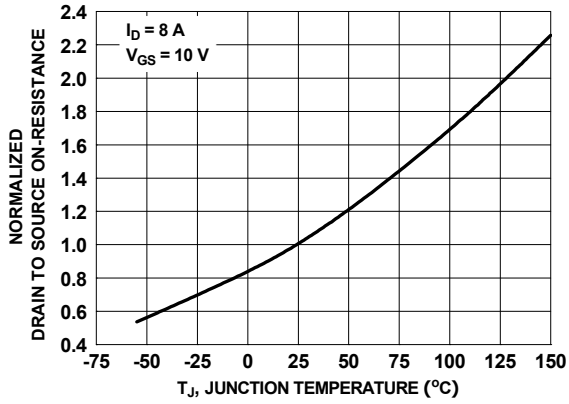


Figure 3. Normalized On-Resistance vs Junction Temperature

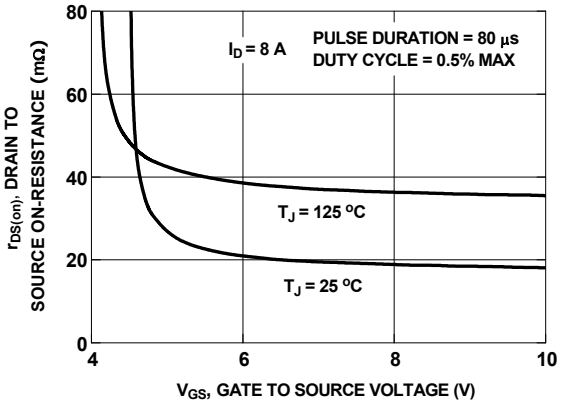


Figure 4. On-Resistance vs Gate to Source Voltage

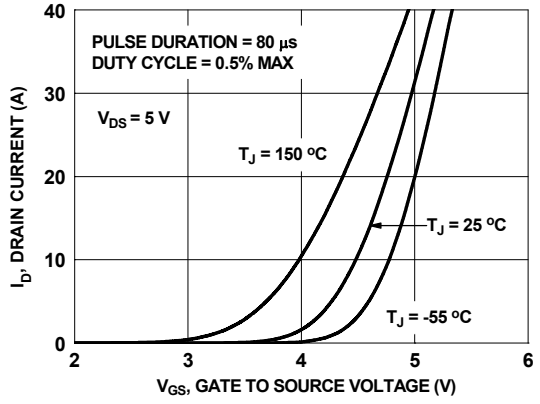


Figure 5. Transfer Characteristics

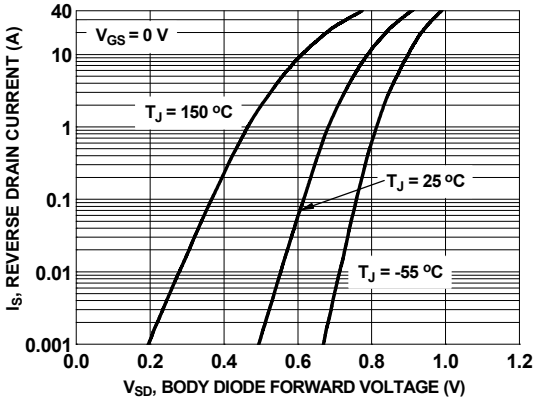


Figure 6. Source to Drain Diode Forward Voltage vs Source Current