

# FDMC86260

## N-Channel Power Trench® MOSFET 150 V, 16 A, 34 mΩ

### Features

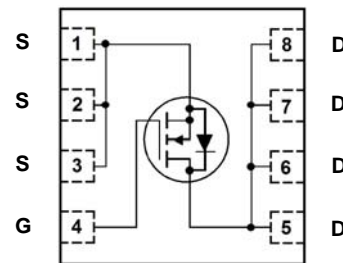
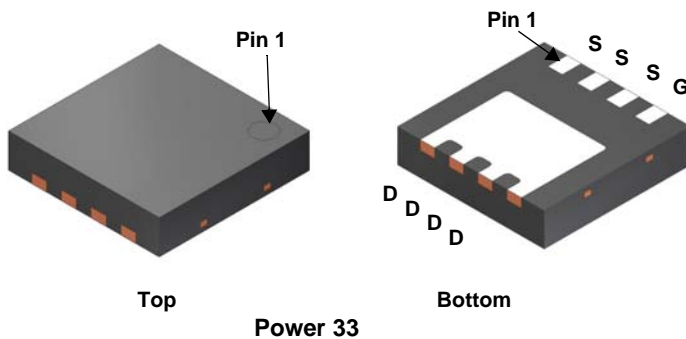
- Max  $r_{DS(on)}$  = 34 mΩ at  $V_{GS} = 10$  V,  $I_D = 5.4$  A
- Max  $r_{DS(on)}$  = 44 mΩ at  $V_{GS} = 6$  V,  $I_D = 4.8$  A
- High performance technology for extremely low  $r_{DS(on)}$
- 100% UIL Tested
- Termination is Lead-free
- RoHS Compliant

### General Description

This N-Channel MOSFET is produced using Fairchild Semiconductor's advanced Power Trench® process that has been especially tailored to minimize the on-state resistance and yet maintain superior switching performance.

### Application

- DC-DC Conversion



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

Symbol	Parameter	Rated	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	16	A
	-Continuous $T_A = 25$ °C (Note 1a)	5.4	
	-Pulsed	48	
$E_{AS}$	Single Pulse Avalanche Energy (Note 3)	121	mJ
$P_D$	Power Dissipation $T_C = 25$ °C	54	W
	Power Dissipation $T_A = 25$ °C (Note 1a)	2.3	
$T_J, T_{STG}$	Operating and Storage Junction Temperature Range	-55 to +150	°C

### Thermal Characteristics

$R_{\theta JC}$	Thermal Resistance, Junction to Case (Note 1)	2.3	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient (Note 1a)	53	

### Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDMC86260	FDMC86260	Power33	13 "	12 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 $25\text{ }^\circ\text{C}$		110		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	2.7	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	$V_{GS} = 10\text{ V}, I_D = 5.4\text{ A}$		27	34	m $\Omega$
		$V_{GS} = 6\text{ V}, I_D = 4.8\text{ A}$		31	44	
		$V_{GS} = 10\text{ V}, I_D = 5.4\text{ A}, T_J = 125\text{ }^\circ\text{C}$		55	69	
$g_{FS}$	Forward Transconductance	$V_{DD} = 10\text{ V}, I_D = 5.4\text{ A}$		19		S

### Dynamic Characteristics

$C_{iss}$	Input Capacitance	$V_{DS} = 75\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$		1000	1330	pF
$C_{oss}$	Output Capacitance			105	140	pF
$C_{rss}$	Reverse Transfer Capacitance			4.8	10	pF
$R_g$	Gate Resistance		0.1	0.6	1.8	$\Omega$

### Switching Characteristics

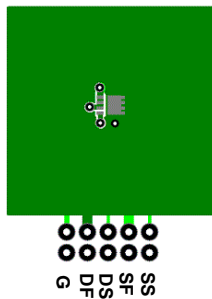
$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 75\text{ V}, I_D = 5.4\text{ A}, V_{GS} = 10\text{ V}, R_{GEN} = 6\text{ }\Omega$		9.5	19	ns
$t_r$	Rise Time			2	10	ns
$t_{d(off)}$	Turn-Off Delay Time			17	30	ns
$t_f$	Fall Time			3.3	10	ns
$Q_{g(TOT)}$	Total Gate Charge	$V_{GS} = 0\text{ V to } 10\text{ V}$	$V_{DD} = 75\text{ V}, I_D = 5.4\text{ A}$	15	21	nC
$Q_{g(TOT)}$	Total Gate Charge	$V_{GS} = 0\text{ V to } 6\text{ V}$		9.7	14	nC
$Q_{gs}$	Total Gate Charge			4.0		nC
$Q_{gd}$	Gate to Drain "Miller" Charge			3.1		nC

### Drain-Source Diode Characteristics

$V_{SD}$	Source to Drain Diode Forward Voltage	$V_{GS} = 0\text{ V}, I_S = 5.4\text{ A}$ (Note 2)		0.77	1.3	V
		$V_{GS} = 0\text{ V}, I_S = 1.9\text{ A}$ (Note 2)		0.72	1.2	V
$t_{rr}$	Reverse Recovery Time	$I_F = 5.4\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$		64	102	ns
$Q_{rr}$	Reverse Recovery Charge			85	137	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.  $53\text{ }^\circ\text{C/W}$  when mounted on a  $1\text{ in}^2$  pad of 2 oz copper



b.  $125\text{ }^\circ\text{C/W}$  when mounted on a minimum pad of 2 oz copper

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

- $E_{AS}$  of 121 mJ is based on starting  $T_J = 25\text{ }^\circ\text{C}$ ,  $L = 3\text{ mH}$ ,  $I_{AS} = 9\text{ A}$ ,  $V_{DD} = 150\text{ V}$ ,  $V_{GS} = 10\text{ V}$ . 100% test at  $L = 0.1\text{ mH}$ ,  $I_{AS} = 22\text{ A}$ .

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

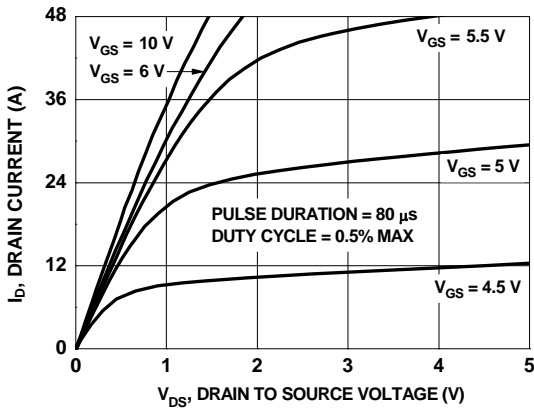


Figure 1. On-Region Characteristics

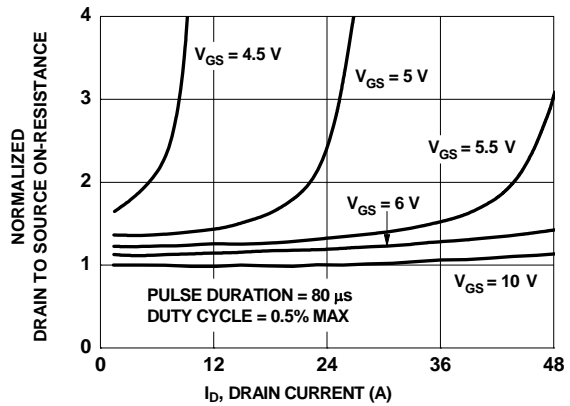


Figure 2. Normalized On-Resistance vs Drain Current and Gate Voltage

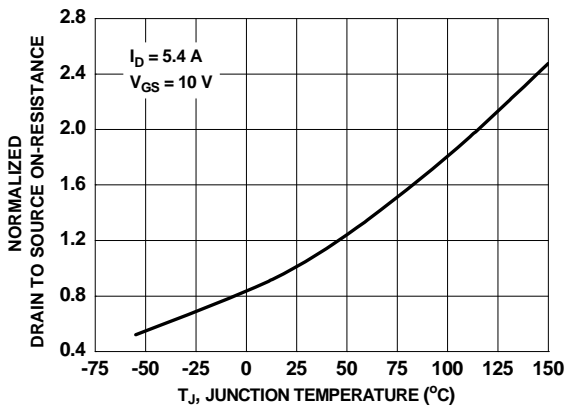


Figure 3. Normalized On-Resistance vs Junction Temperature

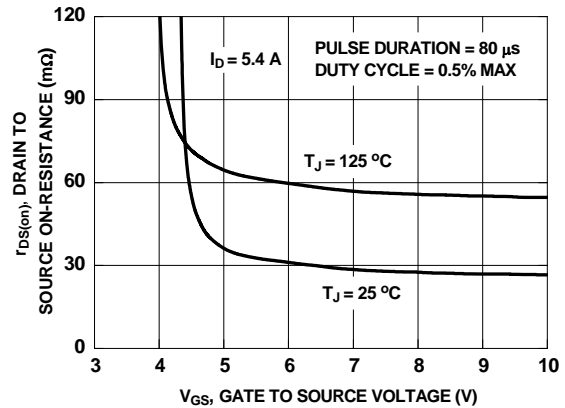


Figure 4. On-Resistance vs Gate to Source Voltage

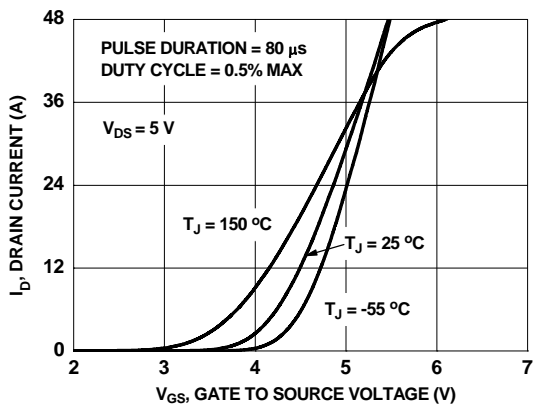


Figure 5. Transfer Characteristics

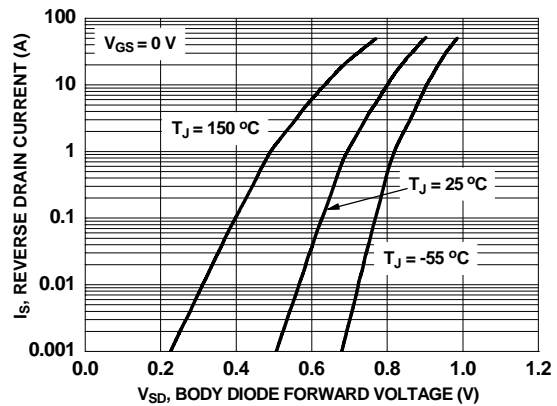
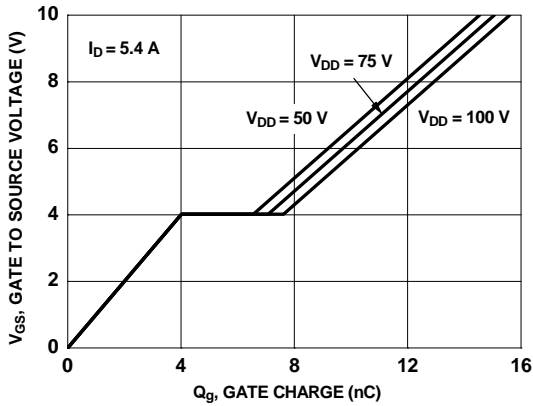
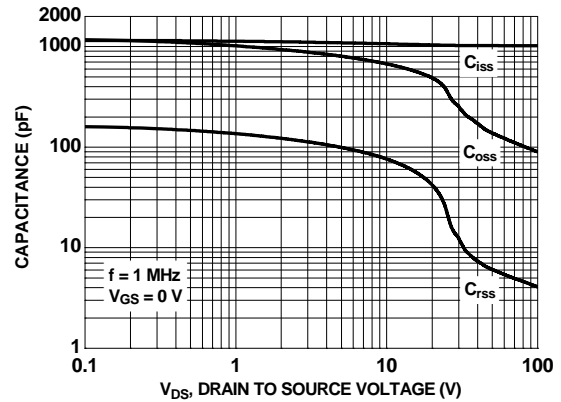


Figure 6. Source to Drain Diode Forward Voltage vs Source Current

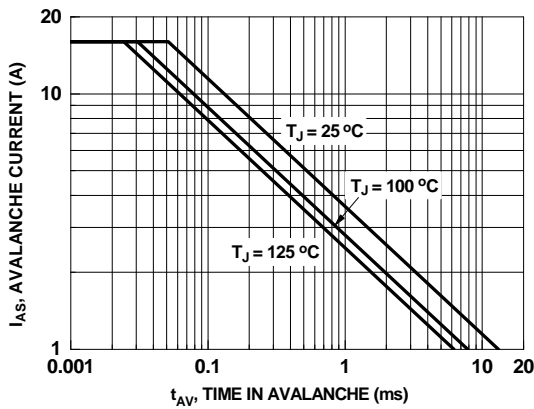
**Typical Characteristics**  $T_J = 25\text{ }^\circ\text{C}$  unless otherwise noted



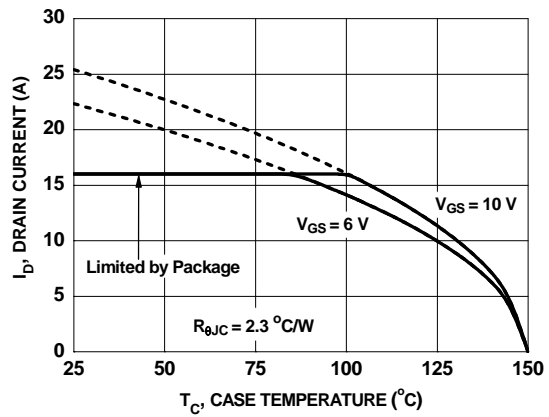
**Figure 7. Gate Charge Characteristics**



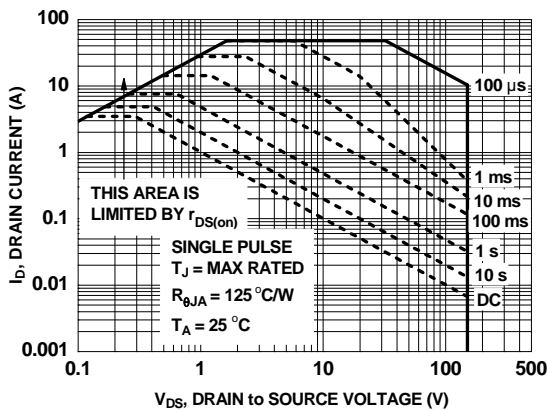
**Figure 8. Capacitance vs Drain to Source Voltage**



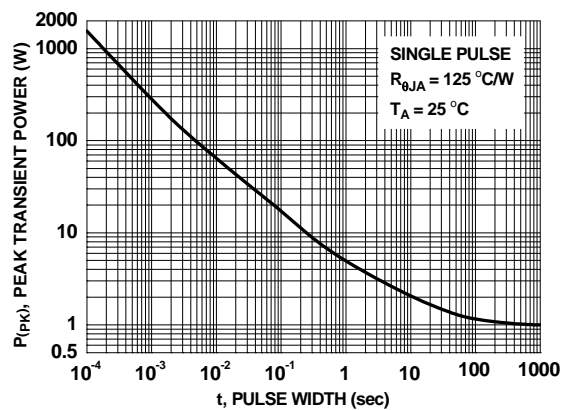
**Figure 9. Unclamped Inductive Switching Capability**



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

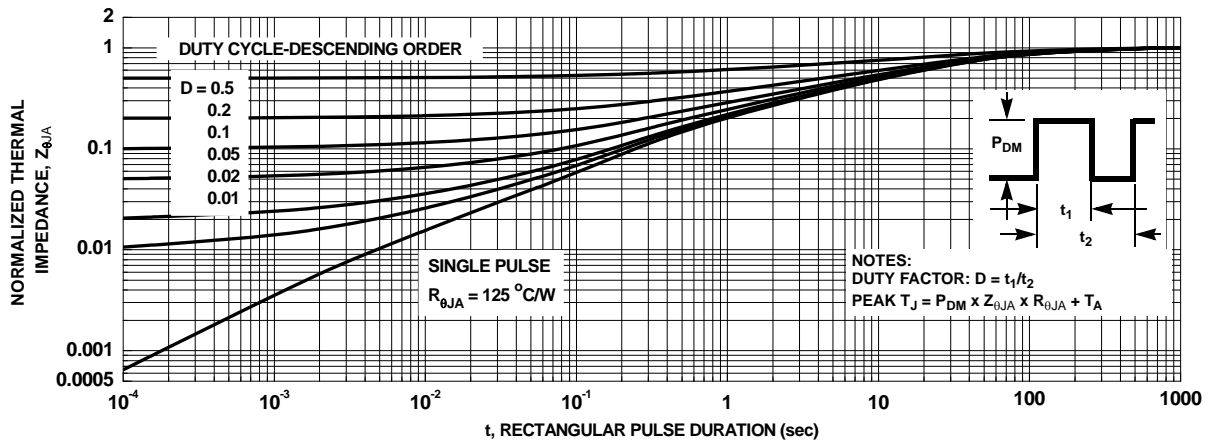


**Figure 11. Forward Bias Safe Operating Area**



**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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