



# FDMC86261P

## P-Channel PowerTrench® MOSFET

-150 V, -9 A, 160 mΩ

### Features

- Max  $r_{DS(on)}$  = 160 mΩ at  $V_{GS} = -10$  V,  $I_D = -2.4$  A
- Max  $r_{DS(on)}$  = 185 mΩ at  $V_{GS} = -6$  V,  $I_D = -2.2$  A
- Very low RDS-on mid voltage P channel silicon technology optimised for low Qg
- This product is optimised for fast switching applications as well as load switch applications
- 100% UIL Tested
- RoHS Compliant



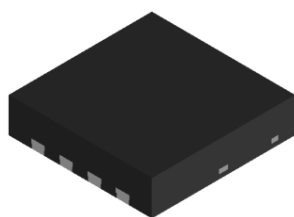
### General Description

This P-Channel MOSFET is produced using Fairchild Semiconductor's advanced PowerTrench® technology. This very high density process is especially tailored to minimize on-state resistance and optimized for superior switching performance.

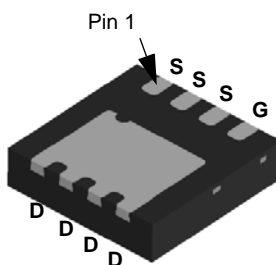
### Applications

- Active Clamp Switch
- Load Switch

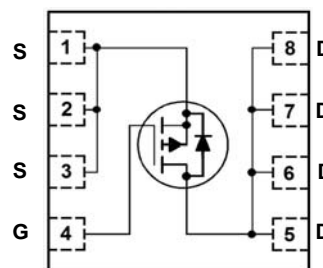
Top



Bottom



MLP 3.3x3.3



### 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	$\pm 25$	V
$I_D$	Drain Current -Continuous $T_C = 25^\circ\text{C}$	-9	A
	-Continuous $T_A = 25^\circ\text{C}$ (Note 1a)	-2.7	
	-Pulsed	-20	
$E_{AS}$	Single Pulse Avalanche Energy (Note 3)	121	mJ
$P_D$	Power Dissipation $T_C = 25^\circ\text{C}$	40	W
	Power Dissipation $T_A = 25^\circ\text{C}$ (Note 1a)	2.3	
$T_J, T_{STG}$	Operating and Storage Junction Temperature Range	-55 to + 150	$^\circ\text{C}$

### Thermal Characteristics

$R_{\theta JC}$	Thermal Resistance, Junction to Case	3.1	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient (Note 1a)	53	

### Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDMC86261P	FDMC86261P	Power 33	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 $25\text{ }^{\circ}\text{C}$		-132		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	$V_{GS} = \pm 25\text{ V}$ , $V_{DS} = 0\text{ V}$			$\pm 100$	nA

**On Characteristics**

$V_{GS(th)}$	Gate to Source Threshold Voltage	$V_{GS} = V_{DS}$ , $I_D = -250\text{ }\mu\text{A}$	-2	-3	-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 $25\text{ }^{\circ}\text{C}$		6		mV/ $^{\circ}\text{C}$
$r_{DS(on)}$	Static Drain to Source On Resistance	$V_{GS} = -10\text{ V}$ , $I_D = -2.4\text{ A}$		130	160	m $\Omega$
		$V_{GS} = -6\text{ V}$ , $I_D = -2.2\text{ A}$		141	185	
		$V_{GS} = -10\text{ V}$ , $I_D = -2.4\text{ A}$ , $T_J = 125\text{ }^{\circ}\text{C}$		218	269	
$g_{FS}$	Forward Transconductance	$V_{DS} = -10\text{ V}$ , $I_D = -2.4\text{ A}$		9		S

**Dynamic Characteristics**

$C_{iss}$	Input Capacitance	$V_{DS} = -75\text{ V}$ , $V_{GS} = 0\text{ V}$ , $f = 1\text{ MHz}$		1021	1360	pF
$C_{oss}$	Output Capacitance			87	120	pF
$C_{rss}$	Reverse Transfer Capacitance			4.7	10	pF
$R_g$	Gate Resistance		0.1	1.7	3.4	$\Omega$

**Switching Characteristics**

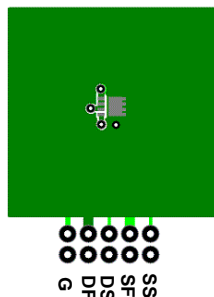
$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = -75\text{ V}$ , $I_D = -2.4\text{ A}$ , $V_{GS} = -10\text{ V}$ , $R_{GEN} = 6\text{ }\Omega$		11	20	ns
$t_r$	Rise Time			2.4	10	ns
$t_{d(off)}$	Turn-Off Delay Time			18	33	ns
$t_f$	Fall Time			9.2	20	ns
$Q_{g(TOT)}$	Total Gate Charge	$V_{GS} = 0\text{ V to } -10\text{ V}$	$V_{DD} = -75\text{ V}$ , $I_D = -2.4\text{ A}$	17	24	nC
$Q_{g(TOT)}$	Total Gate Charge	$V_{GS} = 0\text{ V to } -6\text{ V}$		11	16	nC
$Q_{gs}$	Total Gate Charge			4.2		nC
$Q_{gd}$	Gate to Drain "Miller" Charge			3.7		nC

**Drain-Source Diode Characteristics**

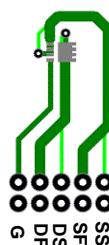
$V_{SD}$	Source to Drain Diode Forward Voltage	$V_{GS} = 0\text{ V}$ , $I_S = -2.4\text{ A}$ (Note 2)		-0.81	-1.3	V
		$V_{GS} = 0\text{ V}$ , $I_S = -1.9\text{ A}$ (Note 2)		-0.80	-1.2	V
$t_{rr}$	Reverse Recovery Time	$I_F = -2.4\text{ A}$ , $di/dt = 100\text{ A}/\mu\text{s}$		81	130	ns
$Q_{rr}$	Reverse Recovery Charge			197	315	nC

## NOTES:

1.  $R_{\theta JA}$  is determined with the device mounted on a 1 in<sup>2</sup> pad 2 oz copper pad on a 1.5 x 1.5 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  $^{\circ}\text{C}/\text{W}$  when mounted on a 1 in<sup>2</sup> pad of 2 oz copper



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

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

3. Starting  $T_J = 25\text{ }^{\circ}\text{C}$ ; P-ch: L = 3 mH,  $I_{AS} = -9\text{ A}$ ,  $V_{DD} = -150\text{ V}$ ,  $V_{GS} = -10\text{ V}$ . 100% test at L = 0.1 mH,  $I_{AS} = -28\text{ A}$ .

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

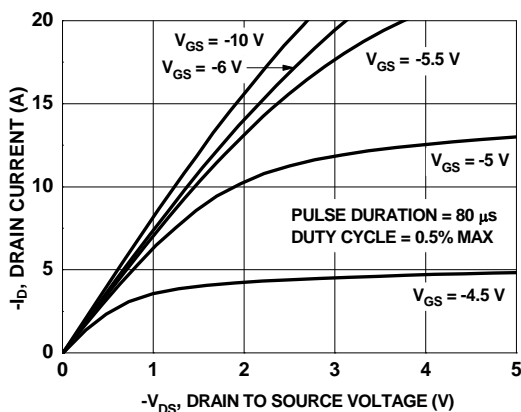


Figure 1. On Region Characteristics

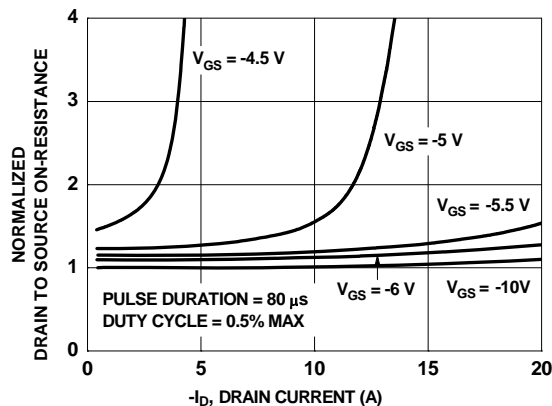


Figure 2. Normalized On-Resistance vs Drain Current and Gate Voltage

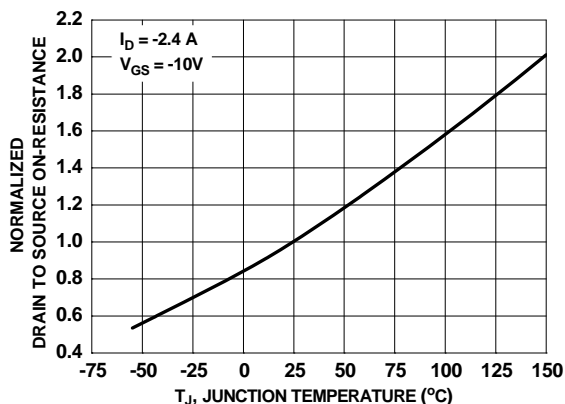


Figure 3. Normalized On Resistance vs Junction Temperature

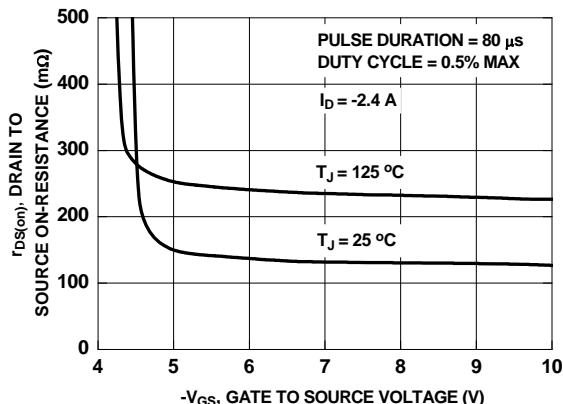


Figure 4. On-Resistance vs Gate to Source Voltage

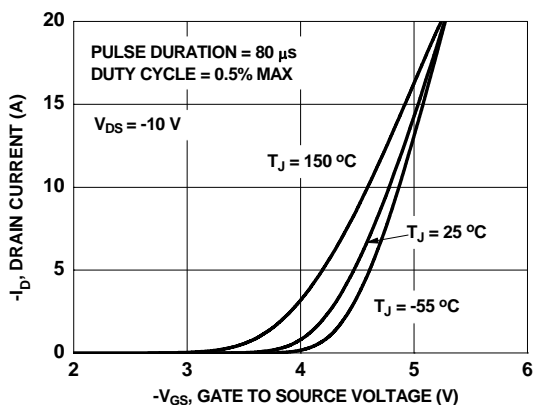


Figure 5. Transfer Characteristics

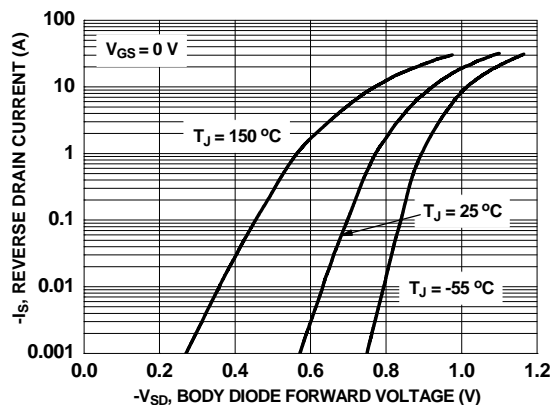


Figure 6. Source to Drain Diode Forward Voltage vs Source Current

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

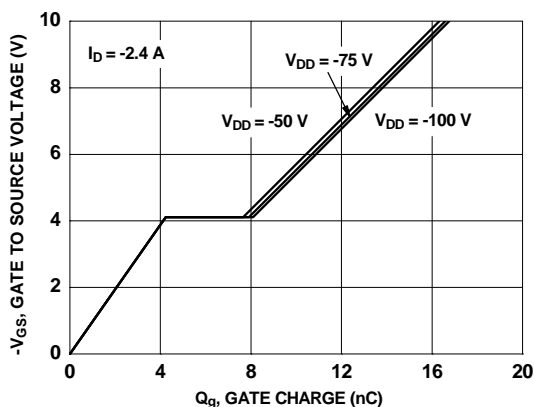


Figure 7. Gate Charge Characteristics

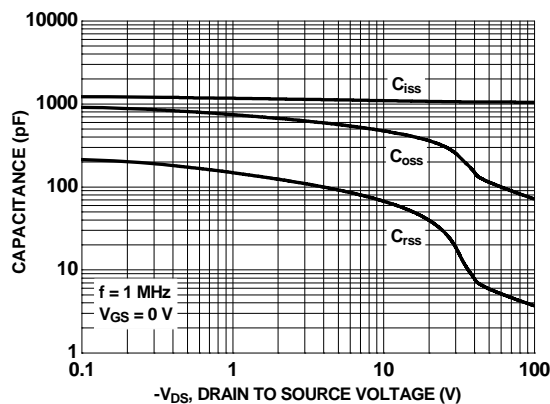


Figure 8. Capacitance vs Drain to Source Voltage

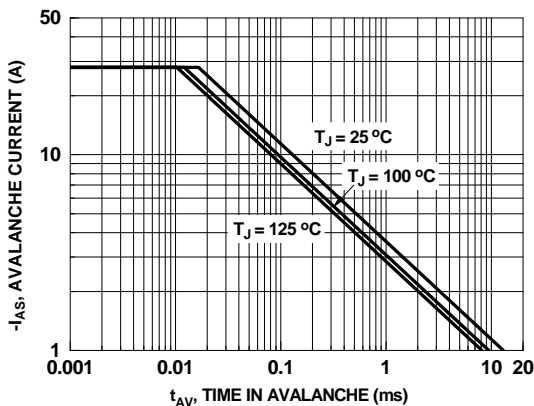


Figure 9. Unclamped Inductive Switching Capability

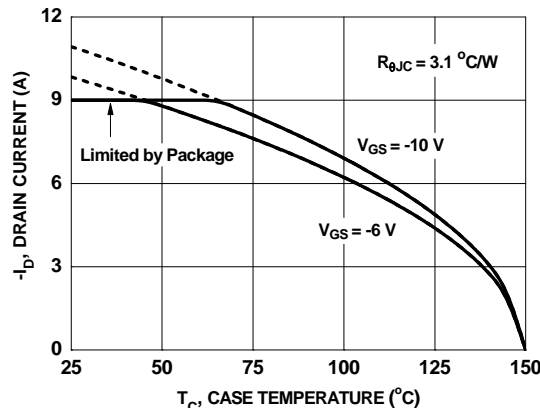


Figure 10. Maximum Continuous Drain Current vs Case Temperature

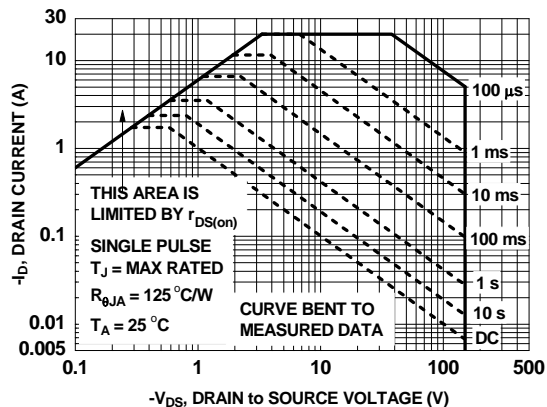


Figure 11. Forward Bias Safe Operating Area

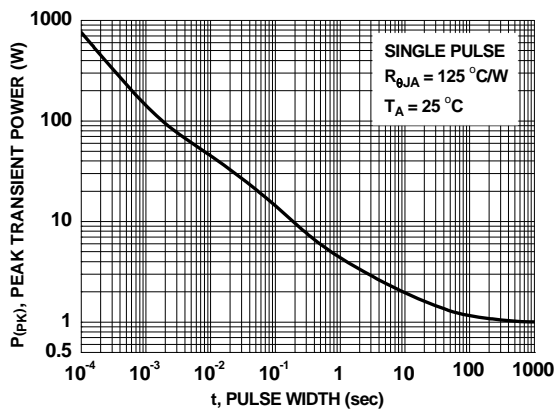


Figure 12. Single Pulse Maximum Power Dissipation

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

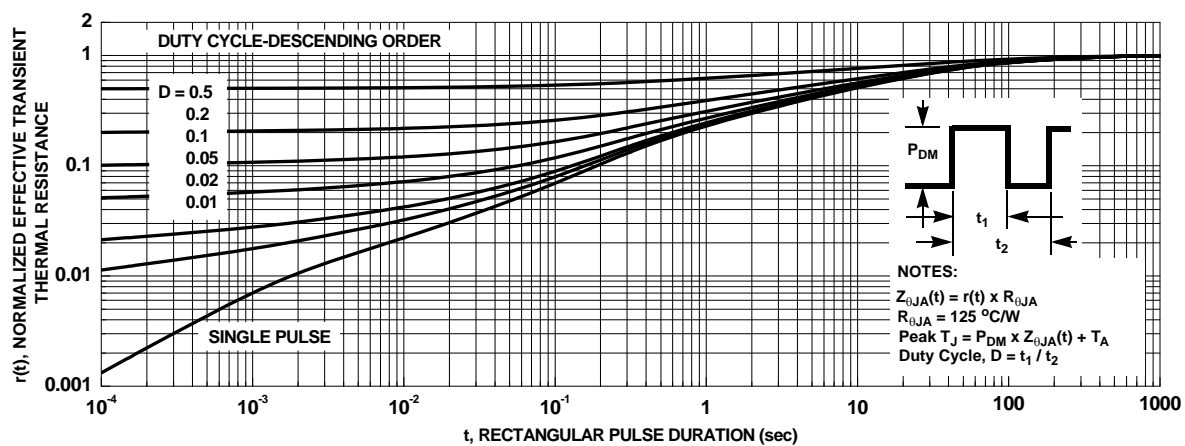
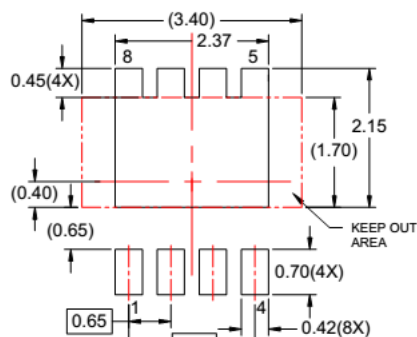


Figure 13. Junction-to-Ambient Transient Thermal Response Curve



## RECOMMENDED LAND PATTERN

NOTES:

- A. DOES NOT CONFORM TO JEDEC REGISTRATION MO-229
- B. DIMENSIONS ARE IN MILLIMETERS.
- C. DIMENSIONS AND TOLERANCES PER ASME Y14.5M, 2009.
- D. LAND PATTERN RECOMMENDATION IS EXISTING INDUSTRY LAND PATTERN.
- E. DRAWING FILENAME: MKT-MLP08Srev3.




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