



ON Semiconductor®

FDMC6676PZ

P-Channel Power Trench® MOSFET General Description

-30 V, -20 A, 14.4 mΩ

Features

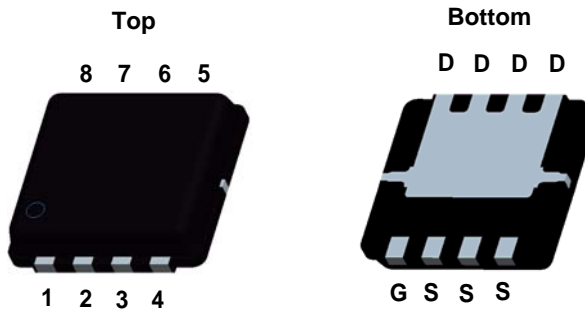
- Max $r_{DS(on)}$ = 14.4 mΩ at $V_{GS} = -10$ V, $I_D = -9.5$ A
- Max $r_{DS(on)}$ = 27.0 mΩ at $V_{GS} = -4.5$ V, $I_D = -6.9$ A
- HBM ESD protection level of 8 kV typical(note 3)
- Extended V_{GSS} range (-25 V) for battery applications
- High performance trench technology for extremely low $r_{DS(on)}$
- High power and current handling capability
- Termination is Lead-free and RoHS Compliant



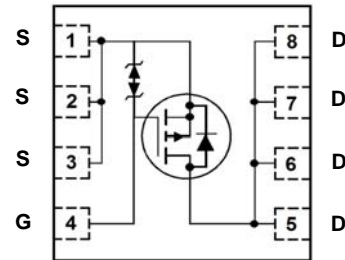
The FDMC6676PZ has been designed to minimize losses in load switch applications. Advancements in both silicon and package technologies have been combined to offer the lowest $r_{DS(on)}$ and ESD protection.

Application

- Load Switch in Notebook and Server
- Notebook Battery Pack Power Management



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	-30	V
V_{GS}	Gate to Source Voltage	± 25	V
I_D	Drain Current -Continuous (Package limited) $T_C = 25^\circ\text{C}$	-20	A
	-Continuous (Silicon limited) $T_C = 25^\circ\text{C}$	-40	
	-Continuous $T_A = 25^\circ\text{C}$ (Note 1a)	-9.5	
	-Pulsed	-32	
P_D	Power Dissipation $T_C = 25^\circ\text{C}$	36	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	3.4	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient (Note 1a)	53	
$R_{\theta JB}$	Thermal Resistance, Junction to Board (Note 1c)	7.4	

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
WUCIN	FDMC6676PZ	MLP 3.3X3.3	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	$I_D = -250\text{ }\mu\text{A}$, $V_{GS} = 0\text{ V}$	-30			V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	$I_D = -250\text{ }\mu\text{A}$, referenced to $25\text{ }^\circ\text{C}$		20		mV/ $^\circ\text{C}$
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = -24\text{ V}$, $V_{GS} = 0\text{ V}$ $T_J = 125\text{ }^\circ\text{C}$			-1 -100	μA
I_{GSS}	Gate to Source Leakage Current	$V_{GS} = \pm 25\text{ V}$, $V_{DS} = 0\text{ V}$			± 10	μA

On Characteristics

$V_{GS(th)}$	Gate to Source Threshold Voltage	$V_{GS} = V_{DS}$, $I_D = -250\text{ }\mu\text{A}$	-1.0	-1.9	-3.0	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 $25\text{ }^\circ\text{C}$		-6		mV/ $^\circ\text{C}$
$r_{DS(on)}$	Static Drain to Source On Resistance	$V_{GS} = -10\text{ V}$, $I_D = -9.5\text{ A}$		10.7	14.4	m Ω
		$V_{GS} = -4.5\text{ V}$, $I_D = -6.9\text{ A}$		17.4	27.0	
		$V_{GS} = -10\text{ V}$, $I_D = -9.5\text{ A}$, $T_J = 125\text{ }^\circ\text{C}$		15.2	20.5	
g_{FS}	Forward Transconductance	$V_{DD} = -5\text{ V}$, $I_D = -9.5\text{ A}$		28		S

Dynamic Characteristics

C_{iss}	Input Capacitance	$V_{DS} = -15\text{ V}$, $V_{GS} = 0\text{ V}$, $f = 1\text{ MHz}$		2154	2865	pF
C_{oss}	Output Capacitance			392	525	pF
C_{rss}	Reverse Transfer Capacitance			349	525	pF

Switching Characteristics

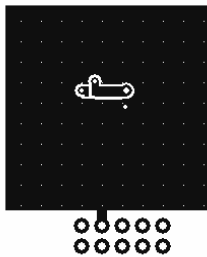
$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = -15\text{ V}$, $I_D = -9.5\text{ A}$, $V_{GS} = -10\text{ V}$, $R_{GEN} = 6\text{ }\Omega$		11	20	ns
t_r	Rise Time			10	20	ns
$t_{d(off)}$	Turn-Off Delay Time			44	71	ns
t_f	Fall Time			26	42	ns
$Q_{g(TOT)}$	Total Gate Charge		$V_{GS} = 0\text{ V to } -10\text{ V}$		46	65
	Total Gate Charge	$V_{GS} = 0\text{ V to } -5\text{ V}$		26	37	nC
Q_{gs}	Gate to Source Charge	$V_{DD} = -15\text{ V}$, $I_D = -9.5\text{ A}$		6.4		nC
Q_{gd}	Gate to Drain "Miller" Charge			13		nC

Drain-Source Diode Characteristics

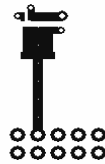
V_{SD}	Source to Drain Diode Forward Voltage	$V_{GS} = 0\text{ V}$, $I_S = -9.5\text{ A}$ (Note 2)		0.89	1.3	V
		$V_{GS} = 0\text{ V}$, $I_S = -1.6\text{ A}$ (Note 2)		0.73	1.2	V
t_{rr}	Reverse Recovery Time	$I_F = -9.5\text{ A}$, $di/dt = 100\text{ A}/\mu\text{s}$		24	38	ns
Q_{rr}	Reverse Recovery Charge			15	27	nC

NOTES:

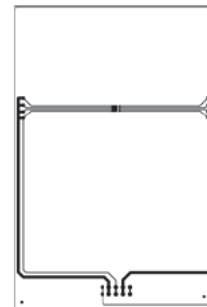
1. $R_{\theta JA}$ is determined with the device mounted on a 1 in² pad 2 oz copper pad on a 1.5 x 1.5 in. board of FR-4 material. $R_{\theta JC}$ is guaranteed by design while $R_{\theta CA}$ is determined by the user's board design.



a. 53 $^\circ\text{C}/\text{W}$ when mounted on a 1 in² pad of 2 oz copper



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



c. 7.4 $^\circ\text{C}/\text{W}$ when mounted on PCB and tested per EIA/JEDEC

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

3. The diode connected between the gate and source serves only as protection against ESD. No gate overvoltage rating is implied.

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

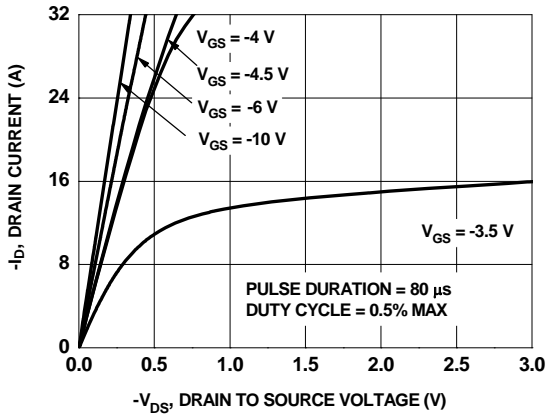


Figure 1. On Region Characteristics

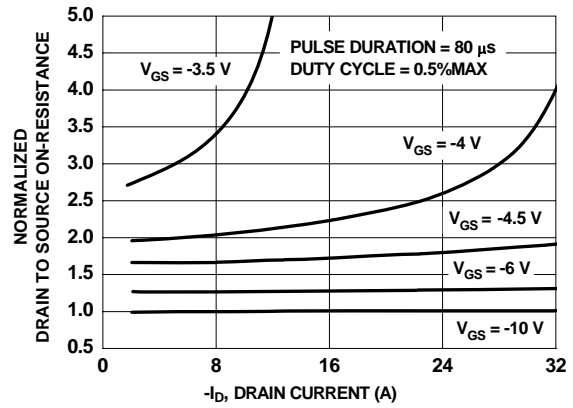


Figure 2. Normalized On-Resistance vs Drain Current and Gate Voltage

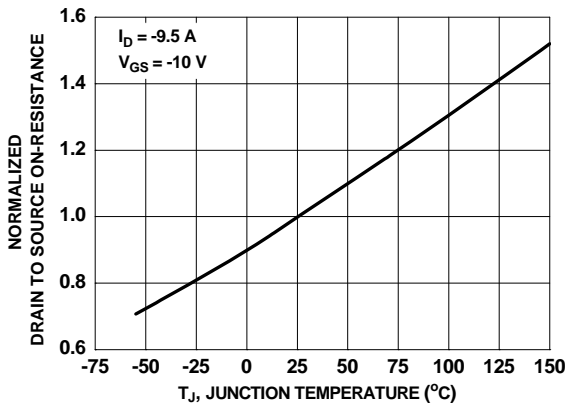


Figure 3. Normalized On Resistance vs Junction Temperature

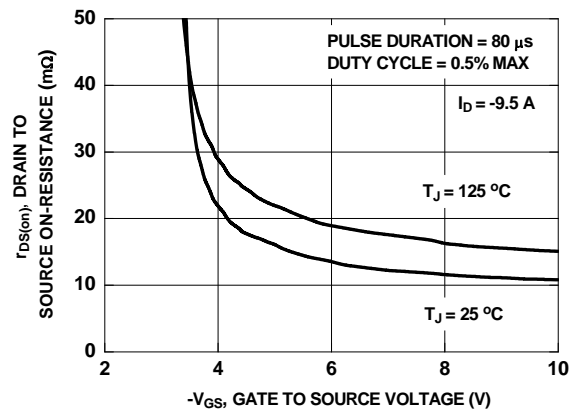


Figure 4. On-Resistance vs Gate to Source Voltage

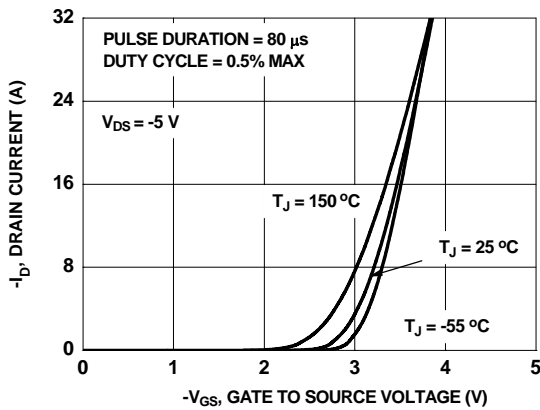


Figure 5. Transfer Characteristics

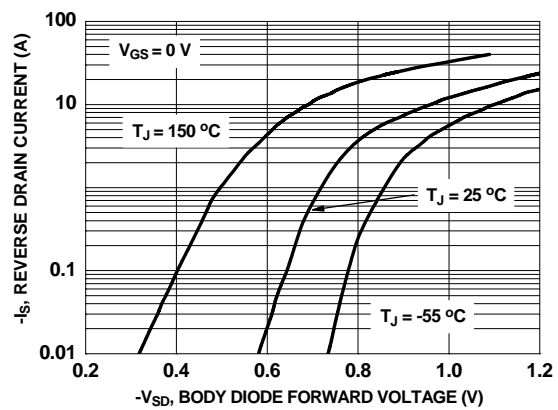


Figure 6. Source to Drain Diode Forward Voltage vs Source Current

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

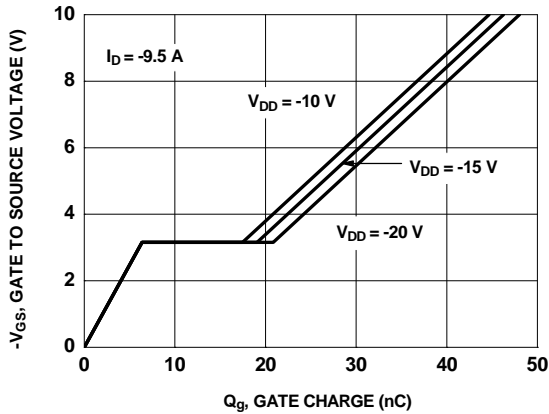


Figure 7. Gate Charge Characteristics

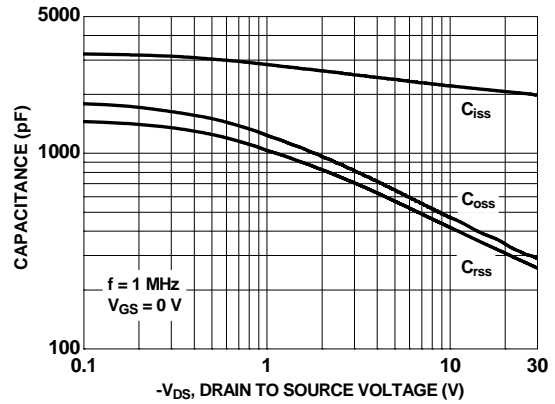


Figure 8. Capacitance vs Drain to Source Voltage

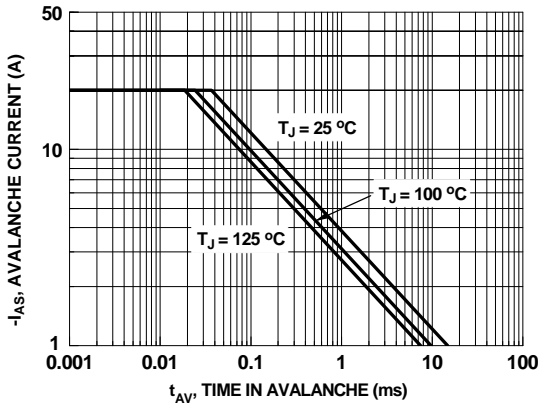


Figure 9. Unclamped Inductive Switching Capability

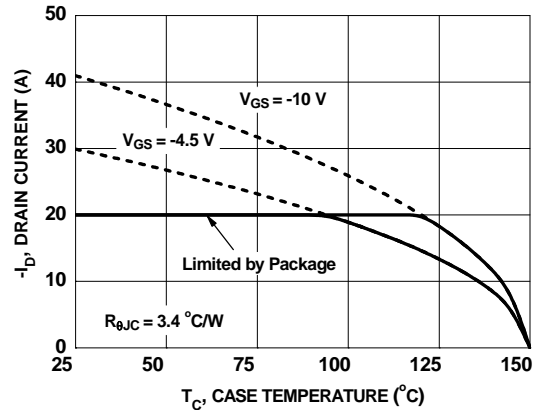


Figure 10. Maximum Continuous Drain Current vs Case Temperature

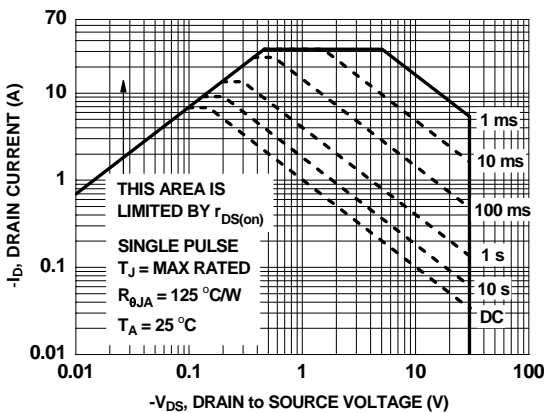


Figure 11. Forward Bias Safe Operating Area

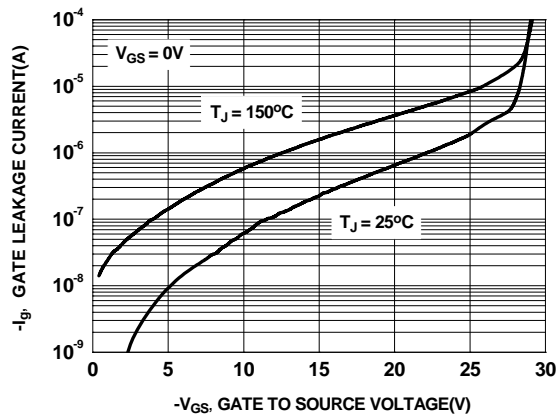


Figure 12. I_{gss} vs V_{gss}

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

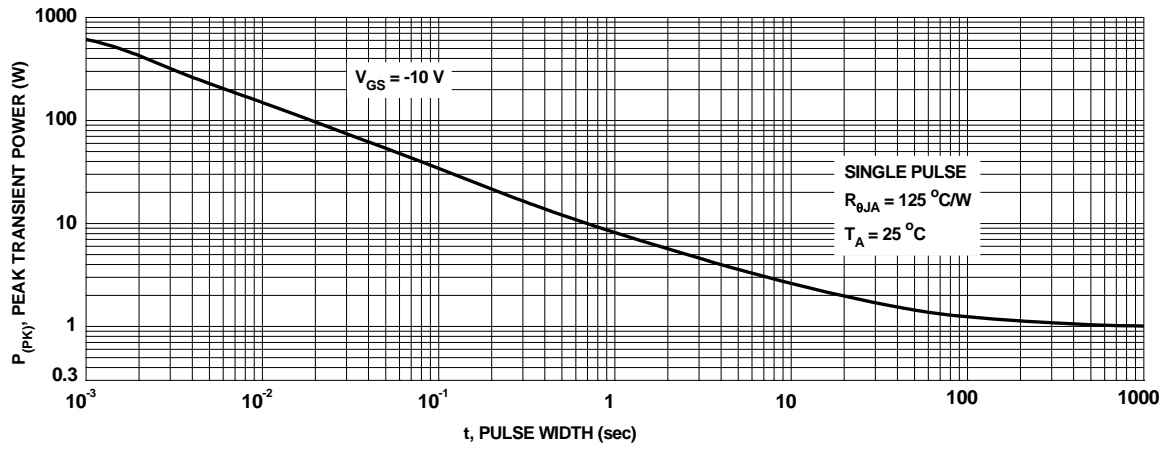


Figure 13. Single Pulse Maximum Power Dissipation

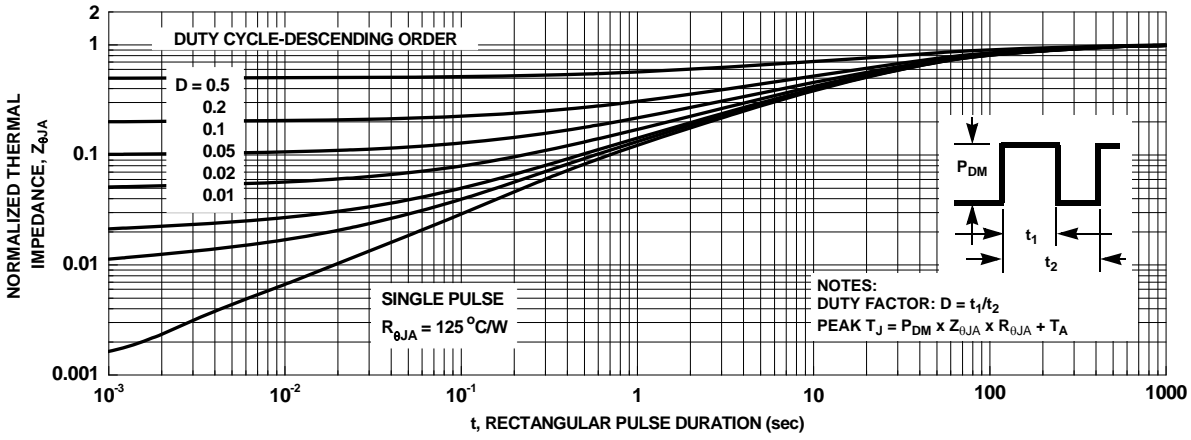
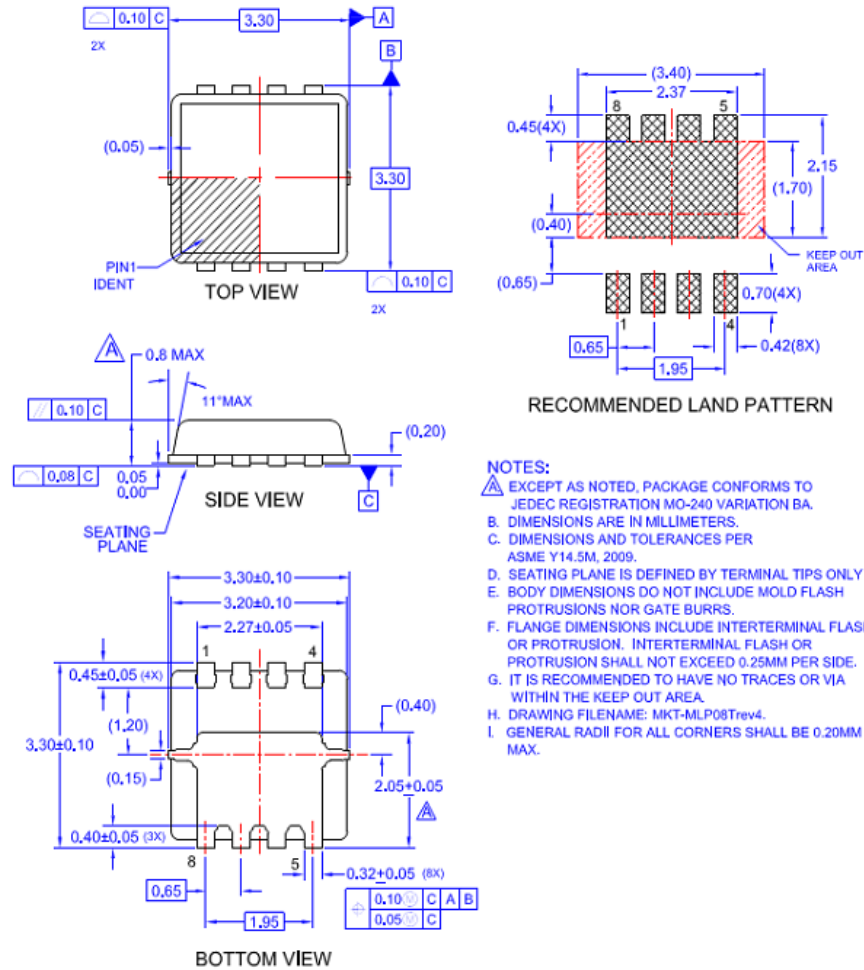



Figure 14. Junction-to-Ambient Transient Thermal Response Curve

Dimensional Outline and Pad Layout



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