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# FDMC2674

## N-Channel UltraFET Trench MOSFET

220V, 7.0A, 366mΩ

### Features

- Max  $r_{DS(on)}$  = 366mΩ at  $V_{GS} = 10V$ ,  $I_D = 1.0A$
- Typ  $Q_g = 12.7nC$  at  $V_{GS} = 10V$
- Low Miller charge
- Low  $Q_{rr}$  Body Diode
- Optimized efficiency at high frequencies
- UIS Capability ( Single Pulse and Repetitive Pulse)
- RoHS Compliant

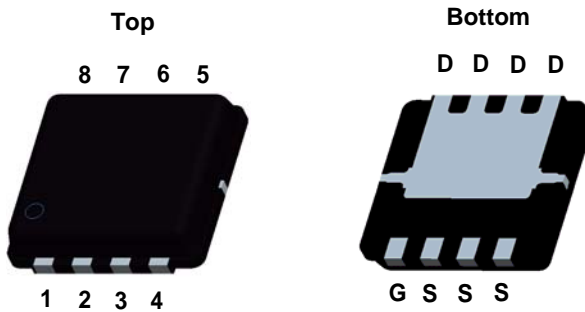


### General Description

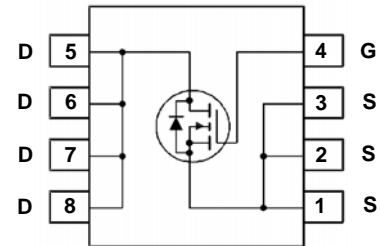
UltraFET device combines characteristics that enable benchmark efficiency in power conversion applications. Optimized for  $r_{DS(on)}$ , low ESR, low total and Miller gate charge, these devices are ideal for high frequency DC to DC converters.

### Application

- DC/DC converters and Off-Line UPS
- Distributed Power Architectures



MLP 3.3x3.3



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

Symbol	Parameter	Ratings	Units
$V_{DS}$	Drain to Source Voltage	220	V
$V_{GS}$	Gate to Source Voltage	$\pm 20$	V
$I_D$	Drain Current -Continuous (Silicon limited) $T_C = 25^\circ C$	7.0	A
	-Continuous $T_A = 25^\circ C$ (Note 1b)	1.0	
	-Pulsed	13.8	
$E_{AS}$	Single Pulse Avalanche Energy (Note 3)	11	mJ
$P_D$	Power Dissipation $T_C = 25^\circ C$	42	W
	Power Dissipation $T_A = 25^\circ C$ (Note 1a)	2.1	
$T_J, T_{STG}$	Operating and Storage Junction Temperature Range	-55 to +150	$^\circ C$

### Thermal Characteristics

$R_{\theta JC}$	Thermal Resistance, Junction to Case (Note 1)	3.0	$^\circ C/W$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient (Note 1a)	60	

### Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDMC2674	FDMC2674	MLP 3.3X3.3	13 "	12 mm	3000 units

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

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
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### Off Characteristics

$BV_{DSS}$	Drain to Source Breakdown Voltage	$I_D = 250\mu\text{A}, V_{GS} = 0\text{V}$	220			V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	$I_D = 250\mu\text{A}$ , referenced to $25^\circ\text{C}$		248		mV/ $^\circ\text{C}$
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS} = 176\text{V}, V_{GS} = 0\text{V}$			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	$V_{GS} = V_{DS}, I_D = 250\mu\text{A}$	2	3.4	4	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate to Source Threshold Voltage Temperature Coefficient	$I_D = 250\mu\text{A}$ , referenced to $25^\circ\text{C}$		-10.2		mV/ $^\circ\text{C}$
$r_{DS(on)}$	Static Drain to Source On Resistance	$V_{GS} = 10\text{V}, I_D = 1.0\text{A}$		305	366	m $\Omega$
		$V_{GS} = 10\text{V}, I_D = 1.0\text{A}, T_J = 150^\circ\text{C}$		678	814	

### Dynamic Characteristics

$C_{iss}$	Input Capacitance	$V_{DS} = 100\text{V}, V_{GS} = 0\text{V}, f = 1\text{MHz}$		880	1180	pF
$C_{oss}$	Output Capacitance			70	95	pF
$C_{rss}$	Reverse Transfer Capacitance			11	20	pF

### Switching Characteristics

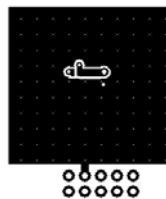
$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 100\text{V}, I_D = 1.0\text{A}$ $V_{GS} = 10\text{V}, R_{GEN} = 2.4\Omega$		9	18	ns
$t_r$	Rise Time			13	23	ns
$t_{d(off)}$	Turn-Off Delay Time			15	27	ns
$t_f$	Fall Time			21	34	ns
$Q_{g(TOT)}$	Total Gate Charge at 10V	$V_{GS} = 0\text{V to } 10\text{V}$	$V_{DD} = 15\text{V}$ $I_D = 1.0\text{A}$	12.7	18	nC
$Q_{gs}$	Gate to Source Gate Charge			3.8		nC
$Q_{gd}$	Gate to Drain "Miller" Charge			2.9		nC

### Drain-Source Diode Characteristics

$V_{SD}$	Source to Drain Diode Forward Voltage	$V_{GS} = 0\text{V}, I_S = 2.2\text{A}$ (Note 2)		0.8	1.5	V
$t_{rr}$	Reverse Recovery Time	$I_F = 1.0\text{A}, di/dt = 100\text{A}/\mu\text{s}$			60	ns
$Q_{rr}$	Reverse Recovery Charge				109	nC

#### Notes:

- $R_{\theta JA}$  is determined with the device mounted on a 1 in<sup>2</sup> oz copper pad on a 1.5 x 1.5 in. board of FR-4 material.  $R_{\theta JC}$  is guaranteed by design while  $R_{\theta JA}$  is determined by the user's board design.
  - $R_{\theta JA} = 60^\circ\text{C}/\text{W}$  when mounted on a 1 in<sup>2</sup> pad of 2 oz copper, 1.5x1.5x0.062" thick PCB.
  - $R_{\theta JA} = 135^\circ\text{C}/\text{W}$  when mounted on a minimum pad of 2 oz copper.



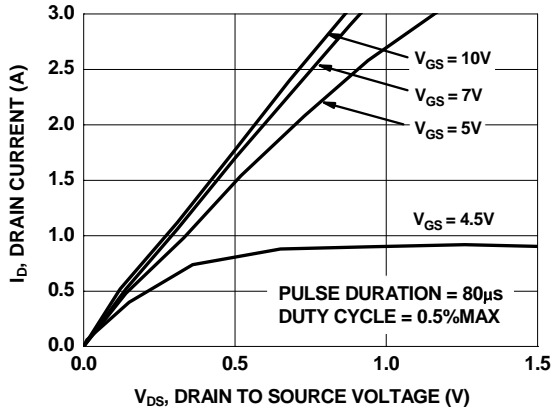
a.  $60^\circ\text{C}/\text{W}$  when mounted on a 1 in<sup>2</sup> pad of 2 oz copper



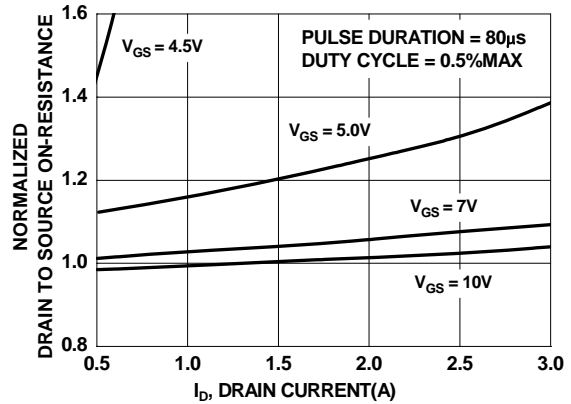
b.  $135^\circ\text{C}/\text{W}$  when mounted on a minimum pad of 2 oz copper

- Pulse Test: Pulse Width < 300 $\mu\text{s}$ , Duty cycle < 2.0%.
- Starting  $T_J = 25^\circ\text{C}$ ; N-ch: L = 1mH,  $I_{AS} = 4.7\text{A}$ ,  $V_{DD} = 25\text{V}$ ,  $V_{GS} = 10\text{V}$ .

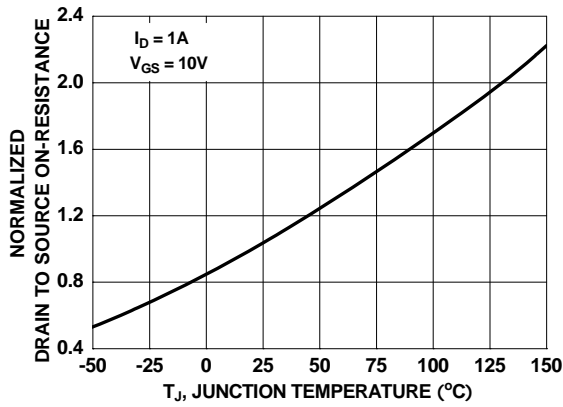
**Typical Characteristics**  $T_J = 25^\circ\text{C}$  unless otherwise noted



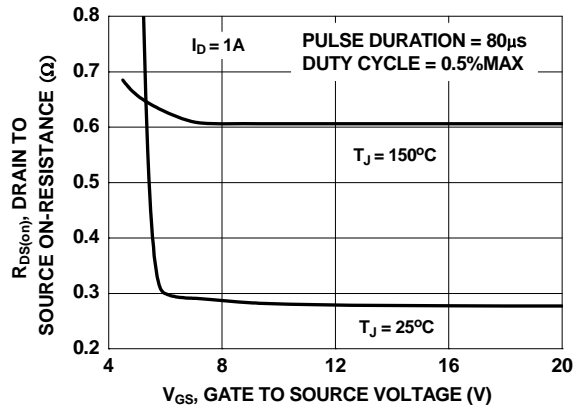
**Figure 1. On-Region Characteristics**



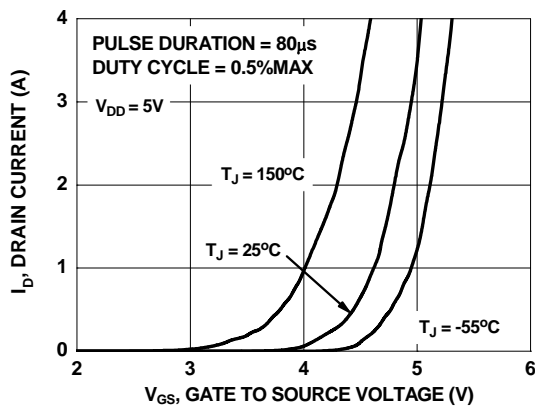
**Figure 2. Normalized On-Resistance vs Drain Current and Gate Voltage**



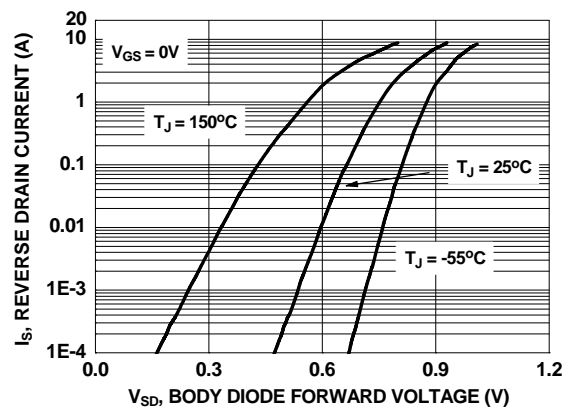
**Figure 3. Normalized On-Resistance vs Junction Temperature**



**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

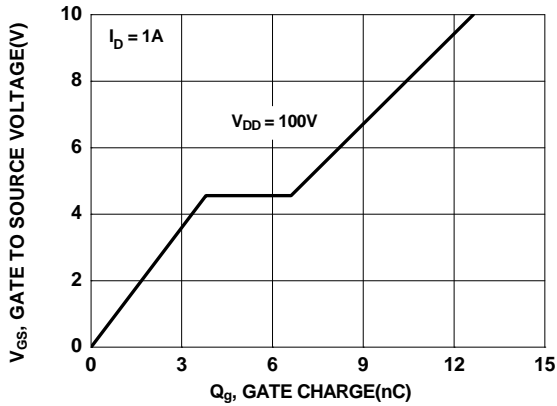


Figure 7. Gate Charge Characteristics

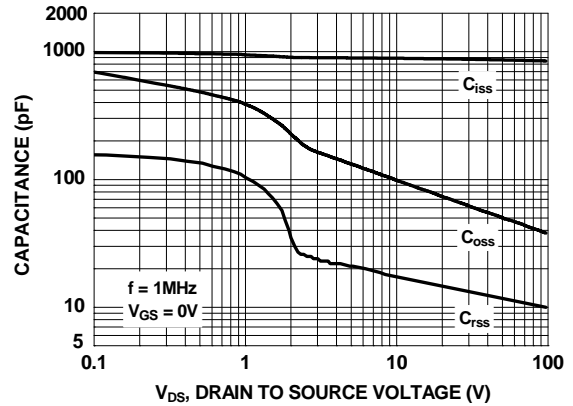


Figure 8. Capacitance vs Drain to Source Voltage

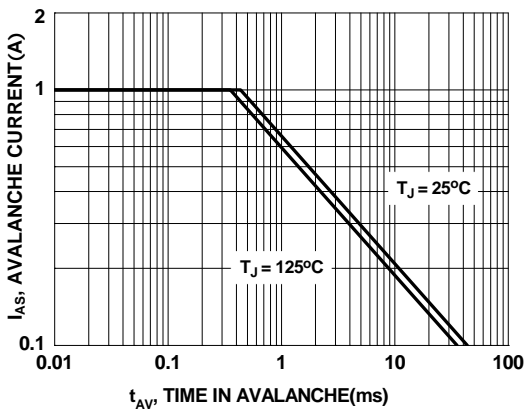


Figure 9. Unclamped Inductive Switching Capability

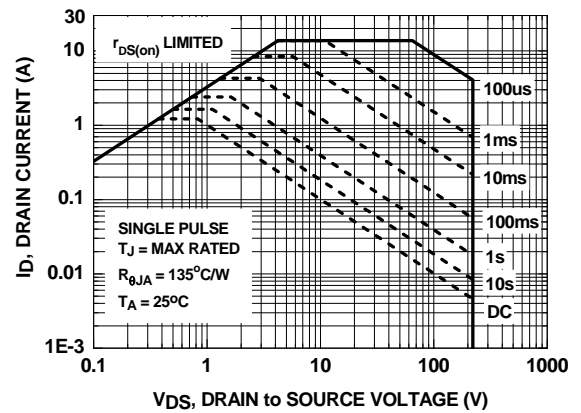


Figure 10. Forward Bias Safe Operating Area

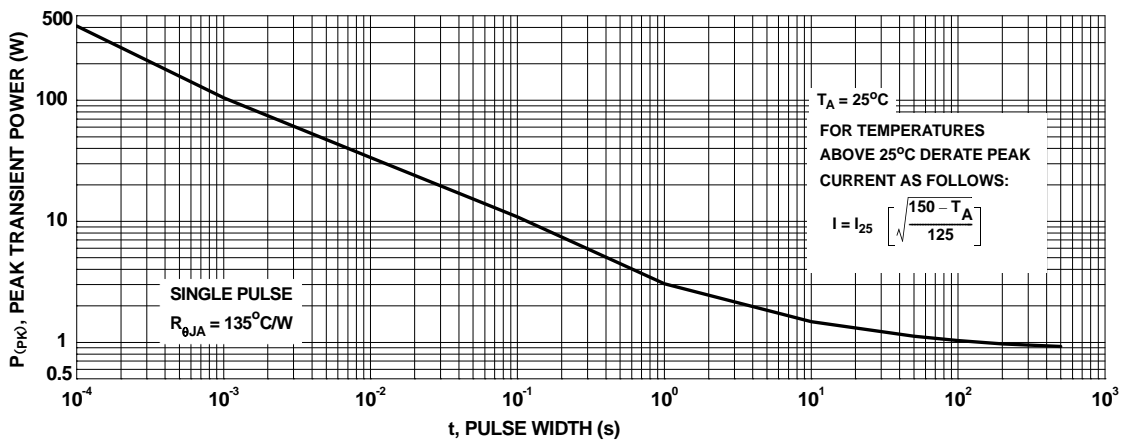
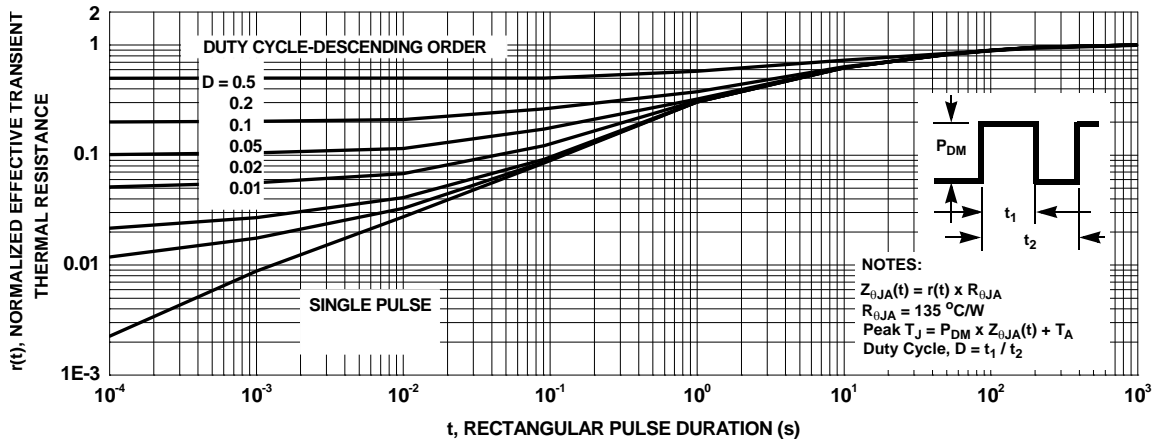
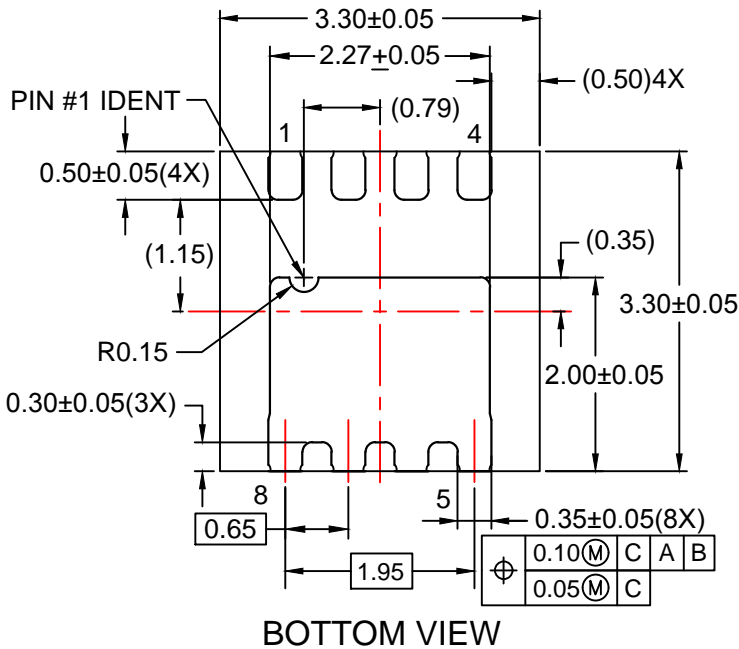
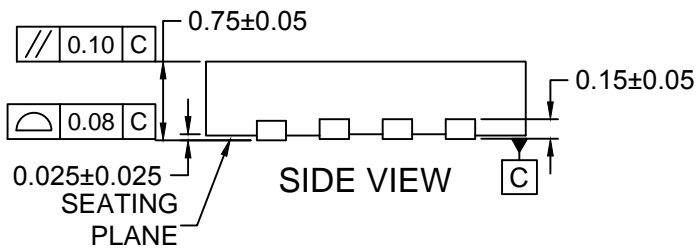
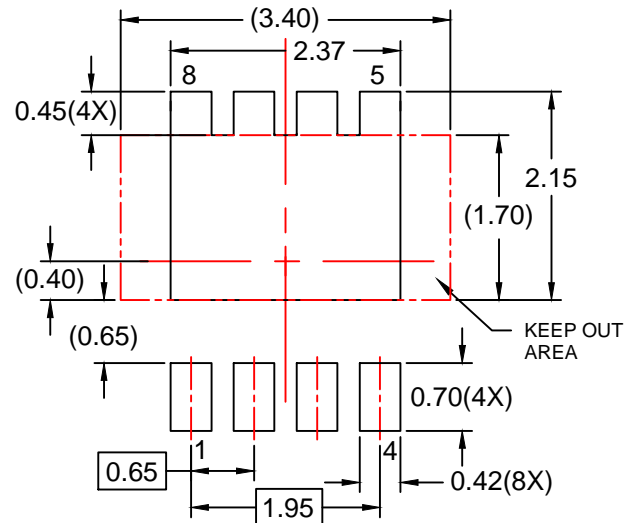
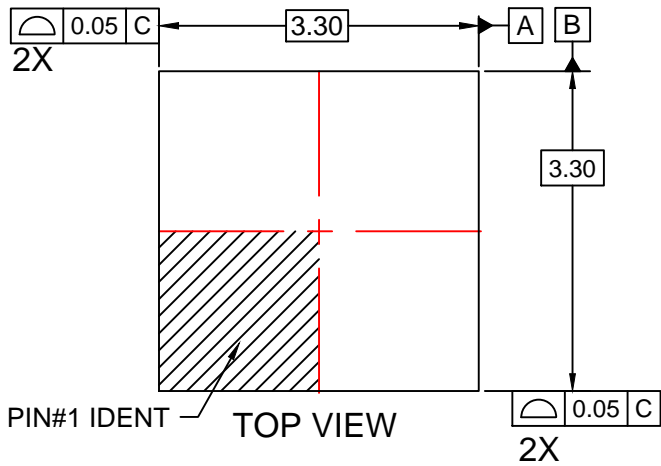


Figure 11. Single Pulse Maximum Power Dissipation

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



**Figure 12. Transient Thermal Response Curve**



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