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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

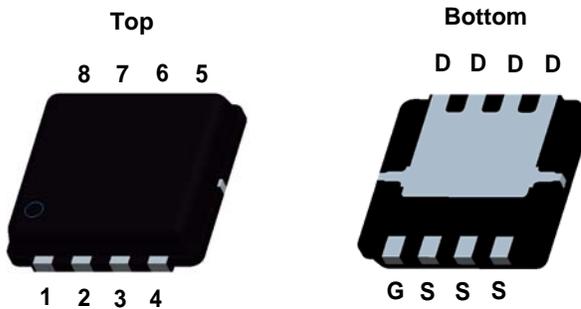


### General Description

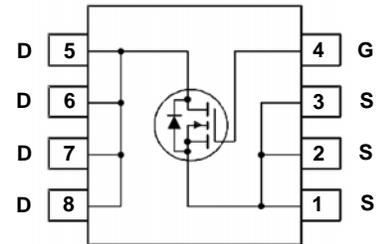
UltraFET device combines characteristics that enable benchmark efficiency in power conversion applications. Optimized for  $r_{DS(on)}$ , low ESR, low total and Miller gate charge, these devices are ideal for high frequency DC to DC converters.

### 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	±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	°C

### Thermal Characteristics

$R_{\theta JC}$	Thermal Resistance, Junction to Case (Note 1)	3.0	°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

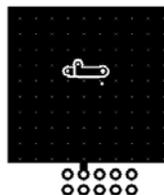
$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 100\text{V}, I_D = 1.0\text{A}$ $V_{GS} = 10\text{V}, R_{GEN} = 2.4\Omega$		9	18	ns
$t_r$	Rise Time			13	23	ns
$t_{d(off)}$	Turn-Off Delay Time			15	27	ns
$t_f$	Fall Time			21	34	ns
$Q_{g(TOT)}$	Total Gate Charge at 10V	$V_{GS} = 0\text{V to } 10\text{V}$	$V_{DD}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

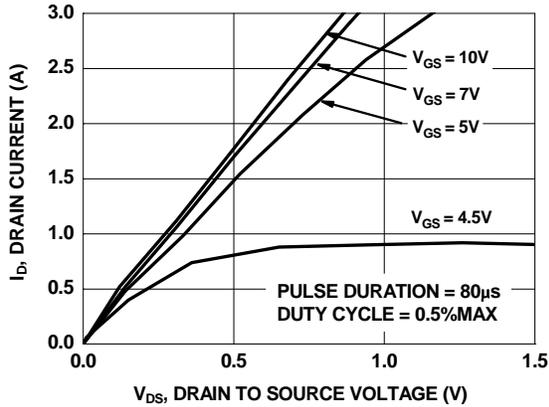


Figure 1. On-Region Characteristics

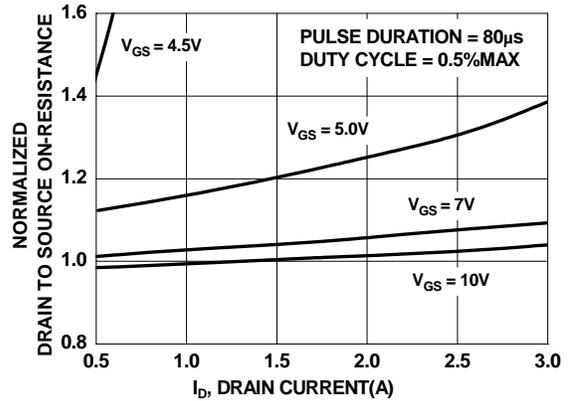


Figure 2. Normalized On-Resistance vs Drain Current and Gate Voltage

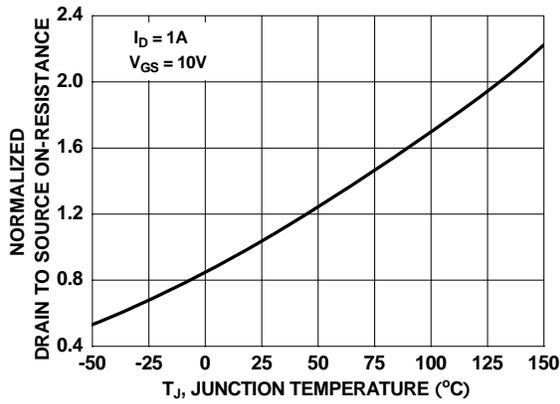


Figure 3. Normalized On-Resistance vs Junction Temperature

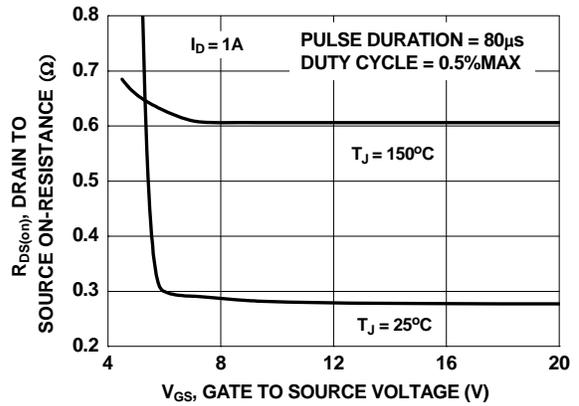


Figure 4. On-Resistance vs Gate to Source Voltage

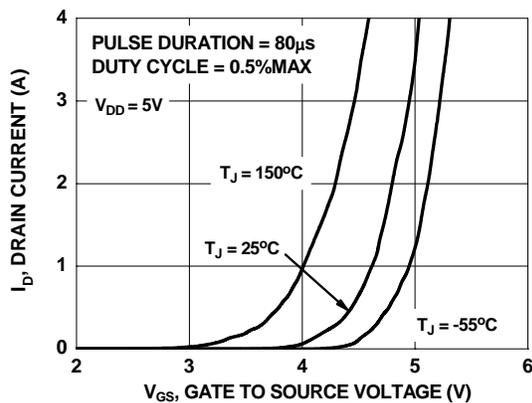


Figure 5. Transfer Characteristics

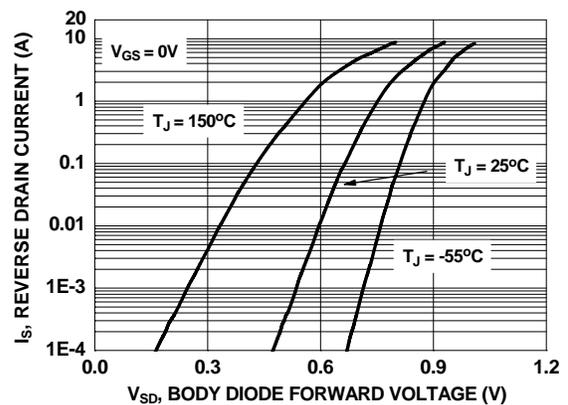
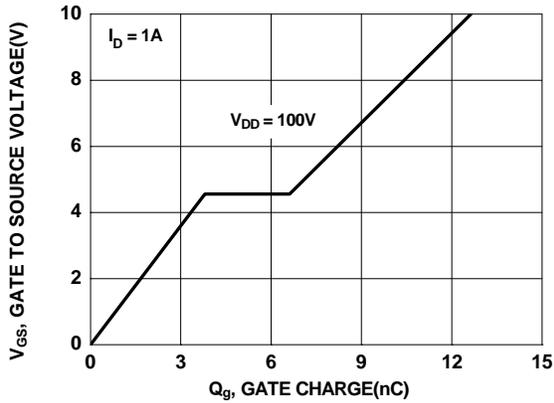
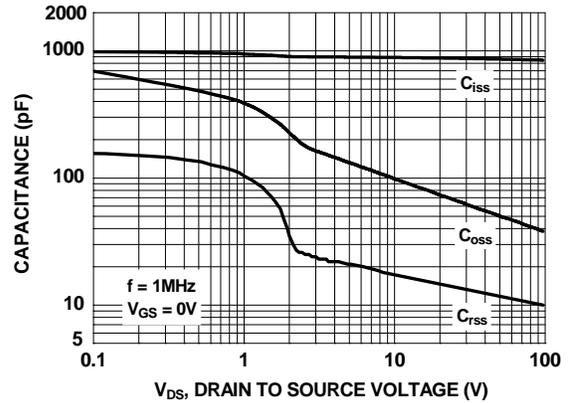


Figure 6. Source to Drain Diode Forward Voltage vs Source Current

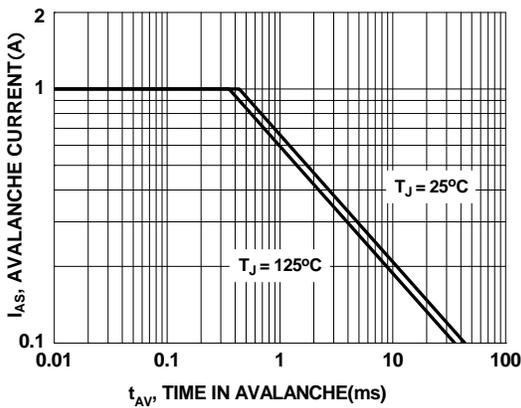
**Typical Characteristics**  $T_J = 25^\circ\text{C}$  unless otherwise noted



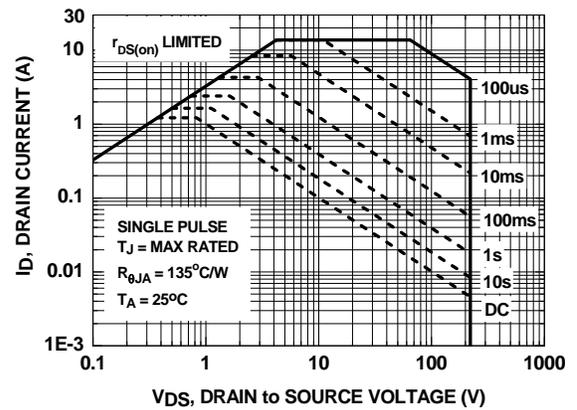
**Figure 7. Gate Charge Characteristics**



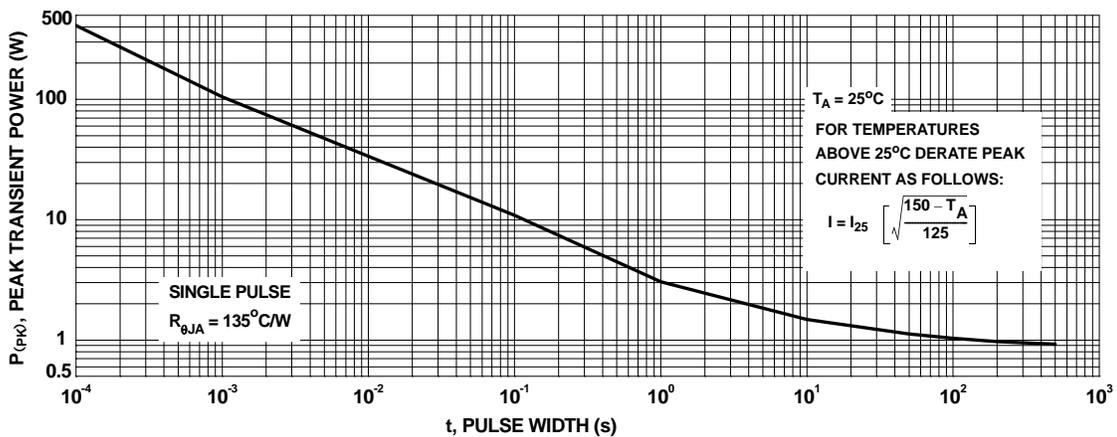
**Figure 8. Capacitance vs Drain to Source Voltage**



**Figure 9. Unclamped Inductive Switching Capability**

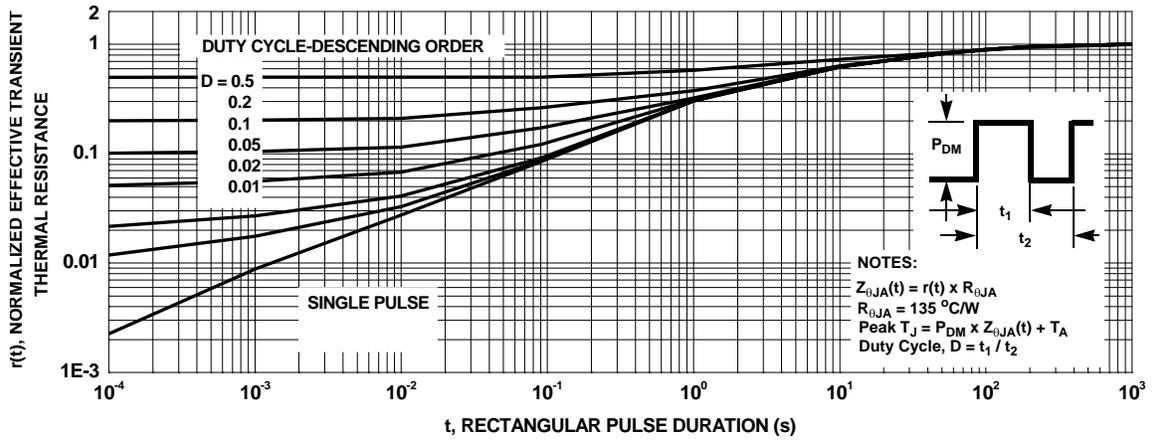


**Figure 10. Forward Bias Safe Operating Area**

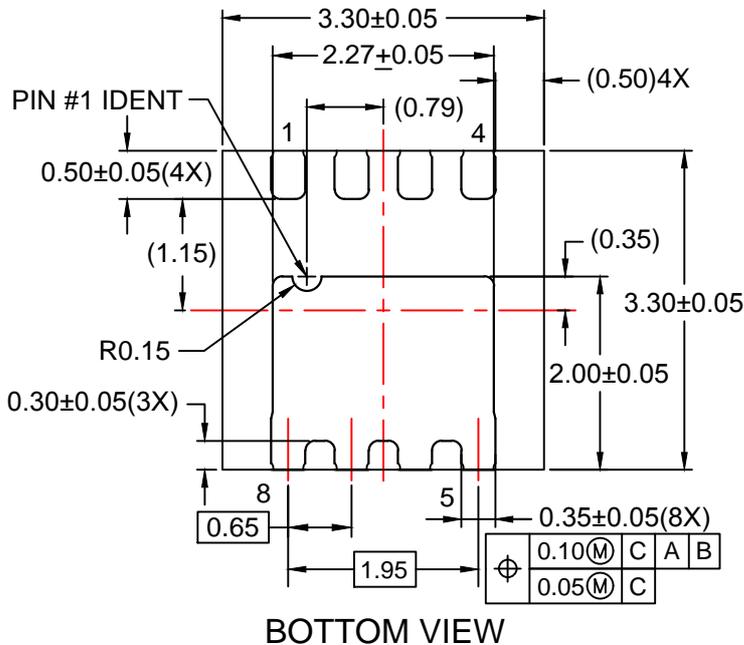
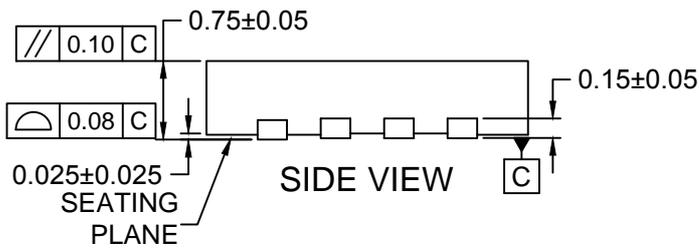
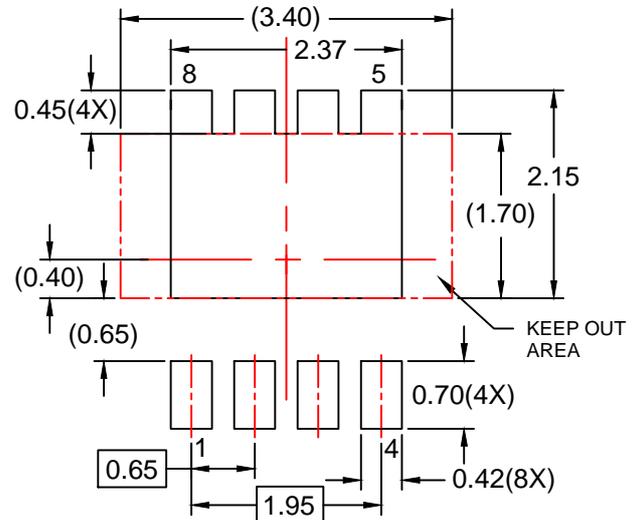
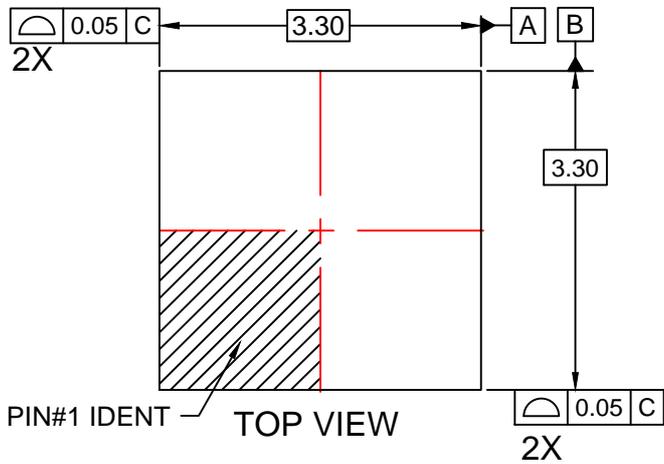


**Figure 11. Single Pulse Maximum Power Dissipation**

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



**Figure 12. Transient Thermal Response Curve**



#### NOTES:

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- B. DIMENSIONS ARE IN MILLIMETERS.
- C. DIMENSIONS AND TOLERANCES PER ASME Y14.5M, 2009.
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