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August 2014

# FDM3622

## N-Channel PowerTrench<sup>®</sup> MOSFET

100V, 4.4A, 60mΩ

### Features

- Max  $r_{DS(on)}$  = 60mΩ at  $V_{GS} = 10V$ ,  $I_D = 4.4A$
- Max  $r_{DS(on)}$  = 80mΩ at  $V_{GS} = 6.0V$ ,  $I_D = 3.8A$
- Low Miller Charge
- Low QRR Body Diode
- Optimized efficiency at high frequencies
- UIS Capability (Single Pulse and Repetitive Pulse)
- RoHS Compliant

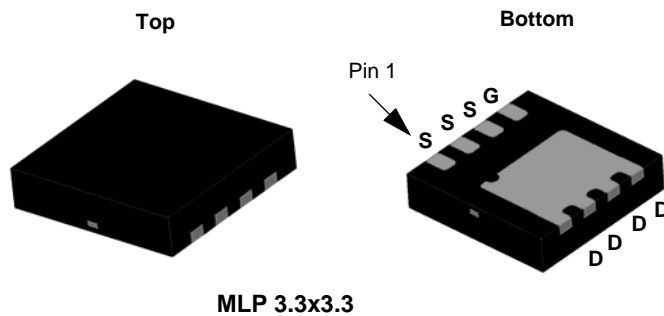


### General Description

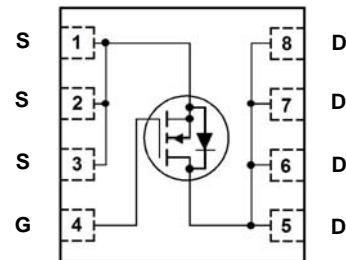
This N-Channel MOSFET is produced using Fairchild Semiconductor's advanced PowerTrench<sup>®</sup> process that has been especially tailored to minimize the on-state resistance and yet maintain low gate charge for superior switching performance.

### Applications

- Distributed Power Architectures and VRMs.
- Primary Switch for 24V and 48V Systems
- High Voltage Synchronous Rectifier
- Formerly developmental type 82744



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	100	V
$V_{GS}$	Gate to Source Voltage	$\pm 20$	V
$I_D$	Drain Current -Continuous	4.4	A
	-Pulsed	20	
EAS	Single Pulse Avalanche Energy	54	mJ
$P_D$	Power Dissipation	2.1	W
	Power Dissipation	0.9	
$T_J, T_{STG}$	Operating and Storage Junction Temperature Range	-55 to +150	$^\circ\text{C}$

### Thermal Characteristics

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

### Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDM3622	FDM3622	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	$I_D = 250\mu\text{A}, V_{GS} = 0\text{V}$	100			V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS} = 80\text{V}, V_{GS} = 0\text{V}$ $T_J = 100^\circ\text{C}$			1	$\mu\text{A}$
					250	
$I_{GSS}$	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		4	V
$r_{DS(on)}$	Static Drain to Source On Resistance	$V_{GS} = 10\text{V}, I_D = 4.4\text{A}$		44	60	$\text{m}\Omega$
		$V_{GS} = 6.0\text{V}, I_D = 3.8\text{A}$		56	80	
		$V_{GS} = 10\text{V}, I_D = 4.4\text{A}, T_J = 150^\circ\text{C}$		92	120	

### Dynamic Characteristics

$C_{iss}$	Input Capacitance	$V_{DS} = 25\text{V}, V_{GS} = 0\text{V},$ $f = 1\text{MHz}$		820	1090	$\text{pF}$
$C_{oss}$	Output Capacitance			125	170	
$C_{rss}$	Reverse Transfer Capacitance			35	55	
$R_g$	Gate Resistance	$V_{DS} = 15\text{mV}, f = 1\text{MHz}$	0.1	3.1	6.2	$\Omega$

### Switching Characteristics

$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 50\text{V}, I_D = 4.4\text{A}$ $V_{GS} = 10\text{V}, R_{GEN} = 24\Omega$		11	20	ns
$t_r$	Rise Time			25	40	
$t_{d(off)}$	Turn-Off Delay Time			35	56	
$t_f$	Fall Time			26	42	
$Q_g$	Total Gate Charge	$V_{GS} = 10\text{V}$		13	17	nC
$Q_{gs}$	Gate to Source Gate Charge	$V_{DD} = 50\text{V}$ $I_D = 4.4\text{A}$		3.6		nC
$Q_{gd}$	Gate to Drain "Miller" Charge			3.4		nC

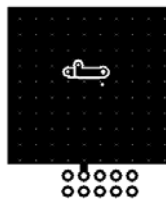
### Drain-Source Diode Characteristics

$V_{SD}$	Source to Drain Diode Forward Voltage	$V_{GS} = 0\text{V}, I_S = 4.4\text{A}$			1.25	V
		$V_{GS} = 0\text{V}, I_S = 2.2\text{A}$			1.0	V
$t_{rr}$	Reverse Recovery Time	$I_F = 4.4\text{A}, di/dt = 100\text{A}/\mu\text{s}$			56	ns
$Q_{rr}$	Reverse Recovery Charge				108	nC

#### Notes:

1:  $R_{\theta JA}$  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.

- (a)  $R_{\theta JA} = 60^\circ\text{C}/\text{W}$  when mounted on a 1 in<sup>2</sup> pad of 2 oz copper, 1.5x1.5x0.062" thick PCB.  
 (b)  $R_{\theta JA} = 135^\circ\text{C}/\text{W}$  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

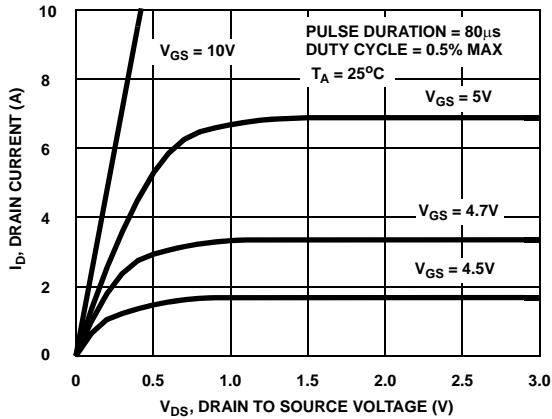


b.  $135^\circ\text{C}/\text{W}$  when mounted on a minimum pad of 2 oz copper

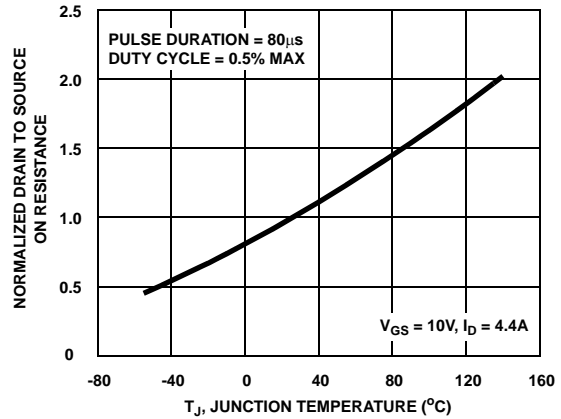
2: Pulse Test: Pulse Width < 300 $\mu\text{s}$ , Duty cycle < 2.0%.

3:  $E_{AS}$  of 54 mJ is based on starting  $T_J = 25^\circ\text{C}$ ; N-ch:  $L = 3\text{ mH}, I_{AS} = 6\text{ A}, V_{DD} = 100\text{ V}, V_{GS} = 10\text{ V}$ .

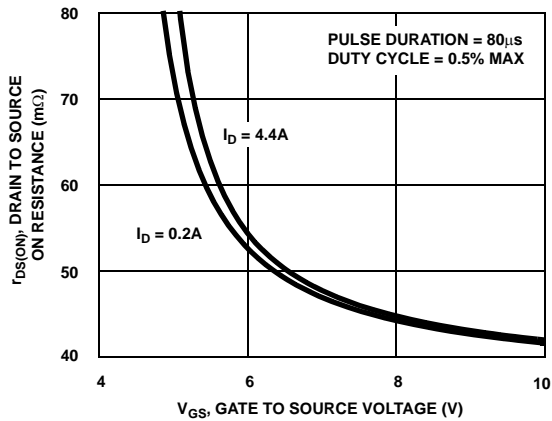
**Typical Characteristics**  $T_J = 25^\circ\text{C}$  unless otherwise noted



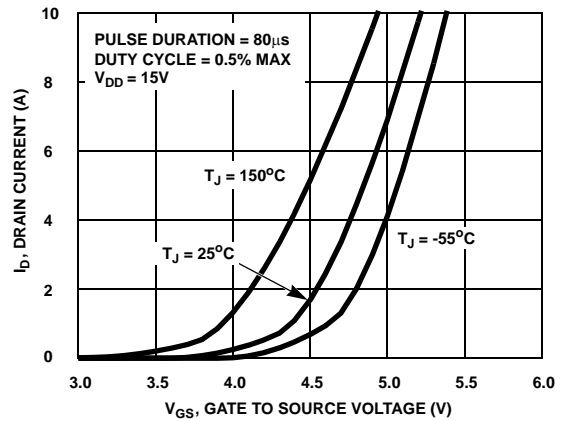
**Figure 1. On-Region Characteristics**



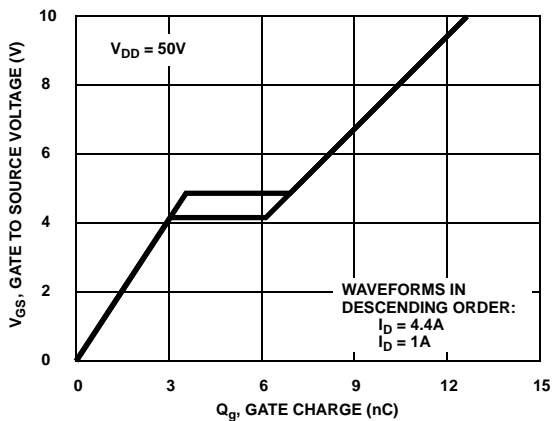
**Figure 2. Normalized On-Resistance vs Junction Temperature**



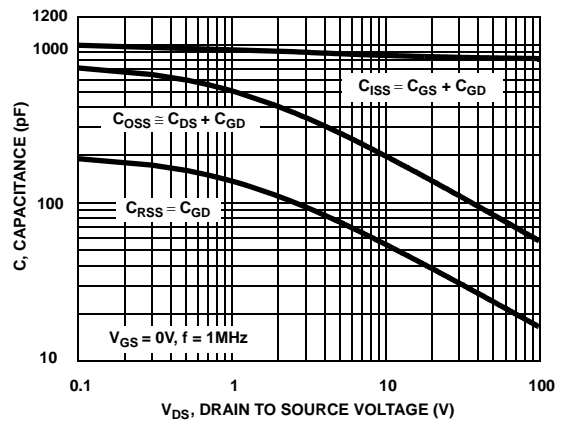
**Figure 3. On-Resistance vs Gate to Source Voltage**



**Figure 4. Transfer Characteristics**

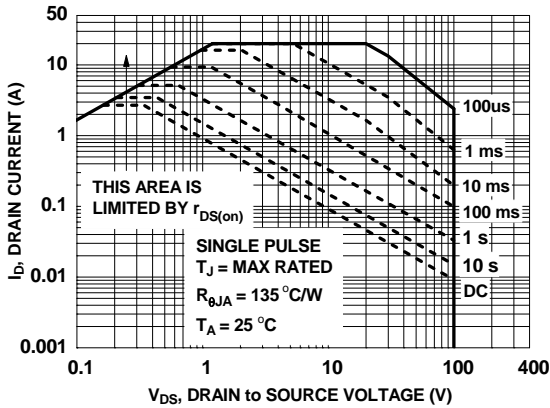


**Figure 5. Gate Charge Characteristics**

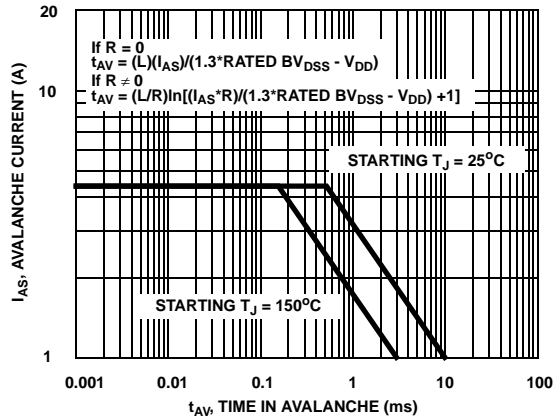


**Figure 6. Capacitance vs Drain to Source Voltage**

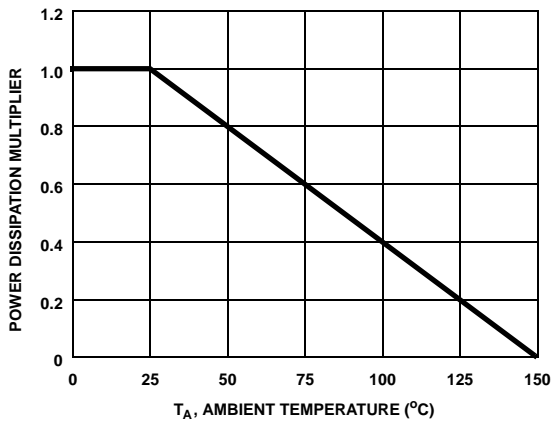
**Typical Characteristics**  $T_J = 25^\circ\text{C}$  unless otherwise noted



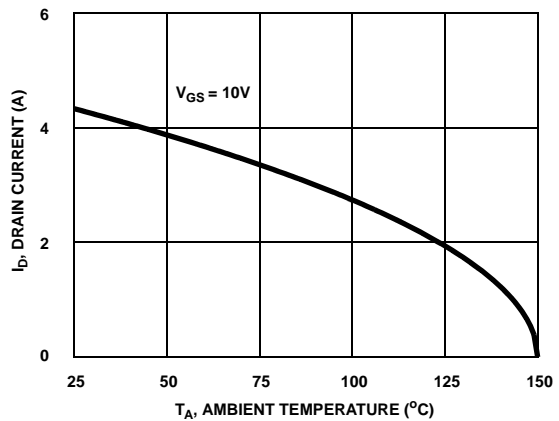
**Figure 7. Forward Bias Safe Operating Area**



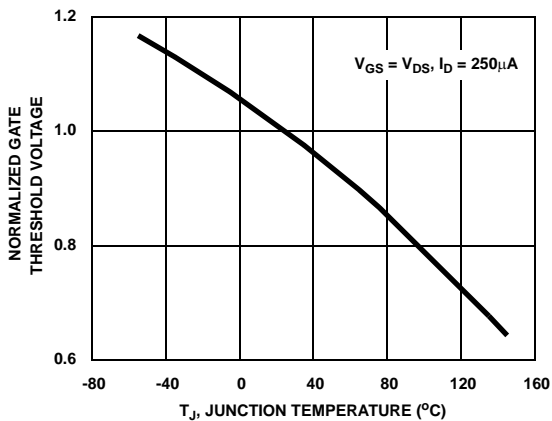
**Figure 8. Unclassified Inductive Switching Capability**



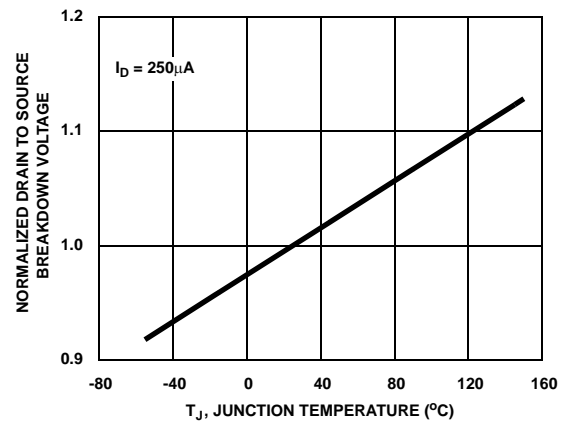
**Figure 9. Normalized Power dissipation vs Ambient Temperature**



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



**Figure 11. Normalized Gate Threshold voltage vs Junction Temperature**



**Figure 12. Normalized Drain to Source Breakdown Voltage vs Junction Temperature**

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

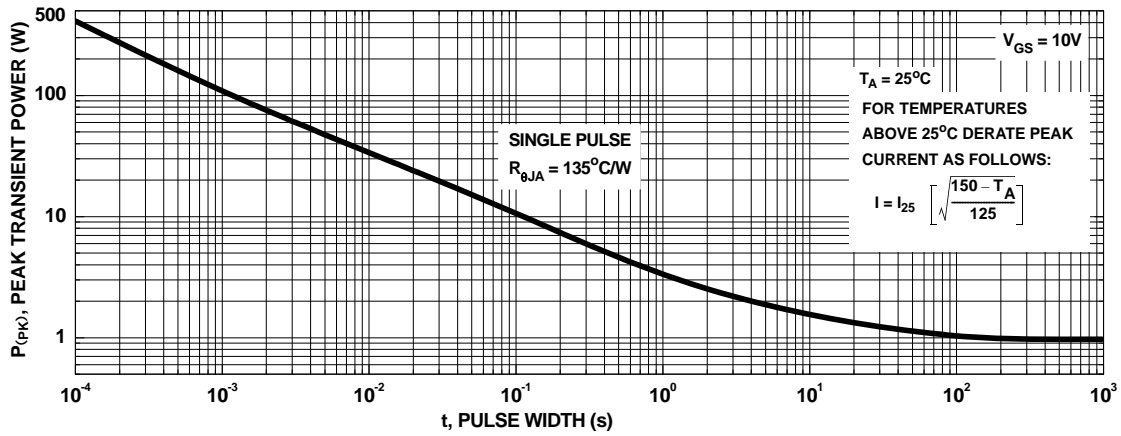


Figure 13. Peak Current Capability

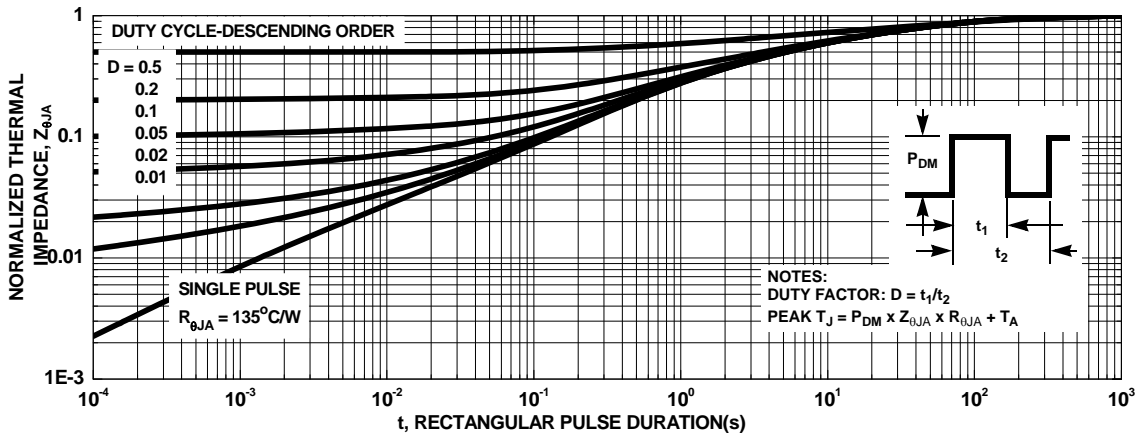
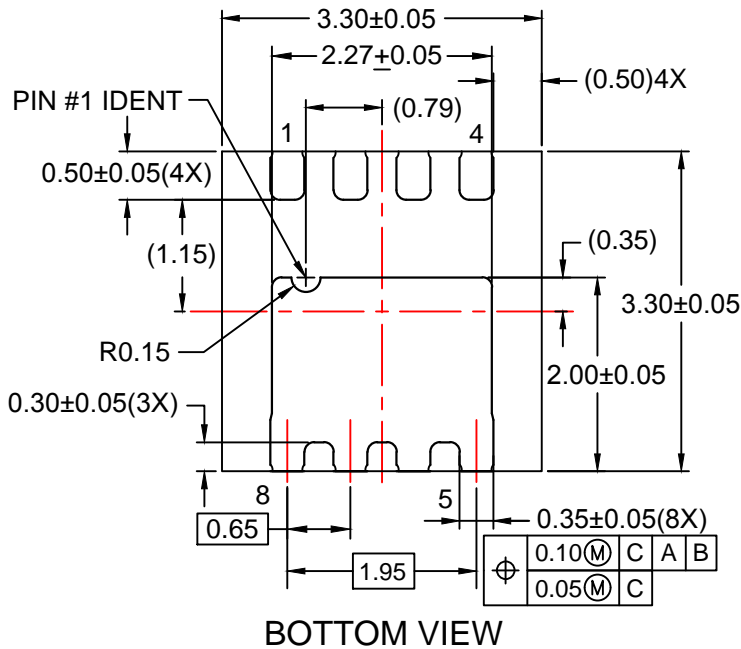


Figure 14. Transient Thermal Response Curve



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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