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FDMS3572

N-Channel UltraFET Trench® MOSFET

80V, 22A, 16.5mΩ

Features

- Max $r_{DS(on)}$ = 16.5mΩ at $V_{GS} = 10V$, $I_D = 8.8A$
- Max $r_{DS(on)}$ = 24mΩ at $V_{GS} = 6V$, $I_D = 8.4A$
- Typ Qg = 28nC at $V_{GS} = 10V$
- Low Miller Charge
- Optimized efficiency at high frequencies
- RoHS Compliant

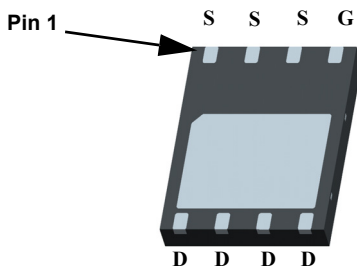


General Description

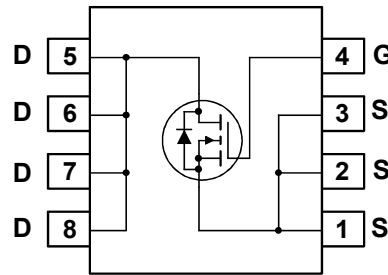
UltraFET devices combine characteristics that enable benchmark efficiency in power conversion applications. Optimized for $r_{DS(on)}$, low ESR, low total and Miller gate charge, these devices are ideal for high frequency DC to DC converters.

Application

- DC - DC Conversion



Power 56 (Bottom view)



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

Symbol	Parameter	Rated	Units
V_{DS}	Drain to Source Voltage	80	V
V_{GS}	Gate to Source Voltage	±20	V
I_D	Drain Current -Continuous (Package limited) $T_C = 25^\circ C$	22	A
	-Continuous (Silicon limited) $T_C = 25^\circ C$	48	
	-Continuous $T_A = 25^\circ C$ (Note 1a)	8.8	
	-Pulsed	50	
P_D	Power Dissipation $T_C = 25^\circ C$	78	W
	Power Dissipation $T_A = 25^\circ C$ (Note 1a)	2.5	
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	1.6	$^\circ C/W$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient (Note 1a)	50	

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDMS3572	FDMS3572	Power 56	13"	12mm	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	$I_D = 250\mu\text{A}, V_{GS} = 0\text{V}$	80			V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	$I_D = 250\mu\text{A}$, referenced to 25°C		76		$\text{mV}/^\circ\text{C}$
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 64\text{V}, V_{GS} = 0\text{V}$			1	μA
I_{GSS}	Gate to Source Leakage Current	$V_{GS} = \pm 20\text{V}, V_{DS} = 0\text{V}$			± 100	nA

On Characteristics

$V_{GS(th)}$	Gate to Source Threshold Voltage	$V_{GS} = V_{DS}, I_D = 250\mu\text{A}$	2	3.2	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°C		-11		$\text{mV}/^\circ\text{C}$
$r_{DS(on)}$	Drain to Source On Resistance	$V_{GS} = 10\text{V}, I_D = 8.8\text{A}$		13.5	16.5	m Ω
		$V_{GS} = 6\text{V}, I_D = 8.4\text{A}$		18.3	24	
		$V_{GS} = 10\text{V}, I_D = 8.8\text{A}, T_J = 125^\circ\text{C}$		22.2	29	
g_{FS}	Forward Transconductance	$V_{DS} = 10\text{V}, I_D = 8.8\text{A}$		23		S

Dynamic Characteristics

C_{iss}	Input Capacitance	$V_{DS} = 40\text{V}, V_{GS} = 0\text{V}, f = 1\text{MHz}$		1870	2490	pF
C_{oss}	Output Capacitance			275	365	pF
C_{rss}	Reverse Transfer Capacitance			78	120	pF
R_g	Gate Resistance	$f = 1\text{MHz}$		1.3		Ω

Switching Characteristics

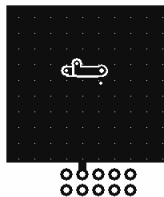
$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 40\text{V}, I_D = 8.8\text{A}$ $V_{GS} = 10\text{V}, R_{GEN} = 6\Omega$		11	20	ns
t_r	Rise Time			13	24	ns
$t_{d(off)}$	Turn-Off Delay Time			24	39	ns
t_f	Fall Time			12	22	ns
$Q_{g(TOT)}$	Total Gate Charge at 10V	$V_{GS} = 0\text{V}$ to 10V	$V_{DD} = 40\text{V}$ $I_D = 8.8\text{A}$	28	40	nC
Q_{gs}	Gate to Source Gate Charge			9		nC
Q_{gd}	Gate to Drain "Miller" Charge			8		nC

Drain-Source Diode Characteristics

V_{SD}	Source to Drain Diode Forward Voltage	$V_{GS} = 0\text{V}, I_S = 8.8\text{A}$ (Note 2)		0.8	1.2	V
t_{rr}	Reverse Recovery Time	$I_F = 8.8\text{A}, di/dt = 100\text{A}/\mu\text{s}$		43	65	ns
Q_{rr}	Reverse Recovery Charge			71	107	nC

Notes:

1: $R_{\theta JA}$ is determined with the device mounted on a 1in^2 pad 2 oz copper pad on a $1.5 \times 1.5\text{in.}$ 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. $50^\circ\text{C}/\text{W}$ when mounted on a 1in^2 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 $< 2.0\%$.

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

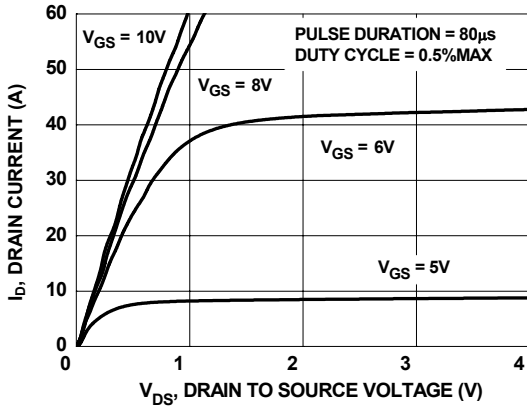


Figure 1. On Region Characteristics

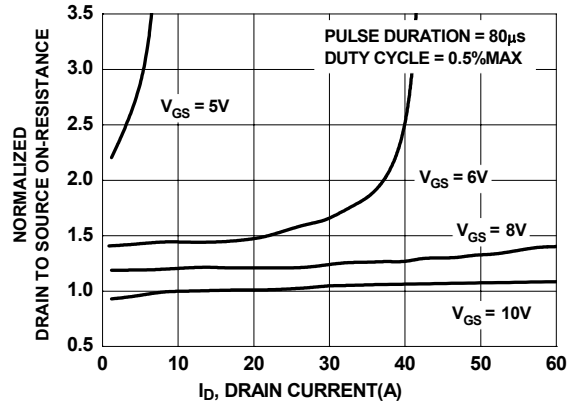


Figure 2. Normalized On-Resistance vs Drain Current and Gate Voltage

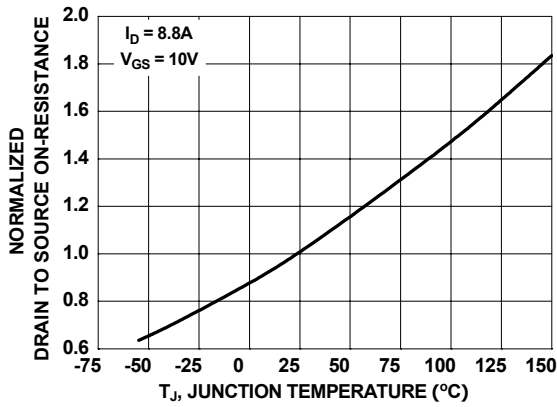


Figure 3. Normalized On Resistance vs Junction Temperature

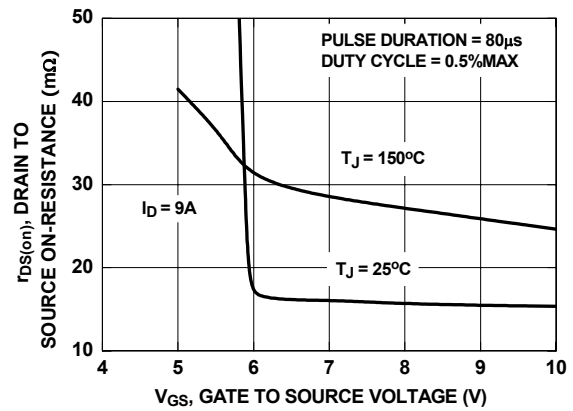


Figure 4. On-Resistance vs Gate to Source Voltage

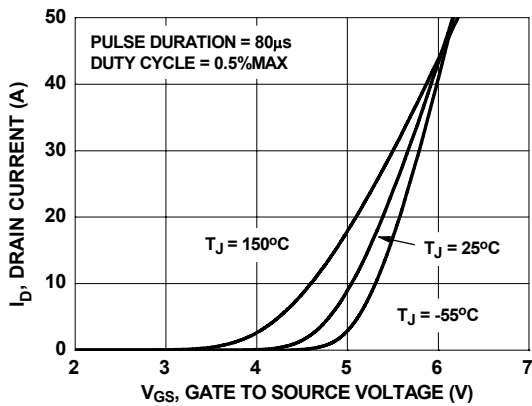


Figure 5. Transfer Characteristics

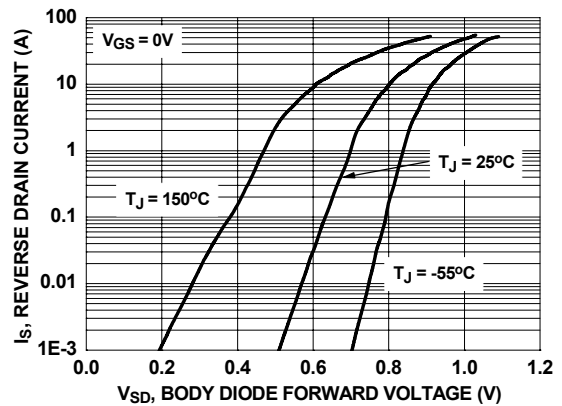


Figure 6. Source to Drain Diode Forward Voltage vs Source Current

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

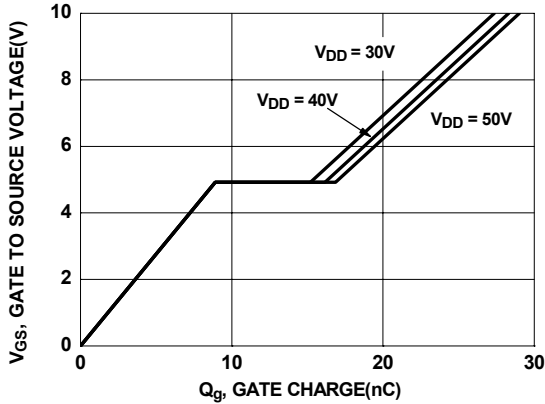


Figure 7. Gate Charge Characteristics

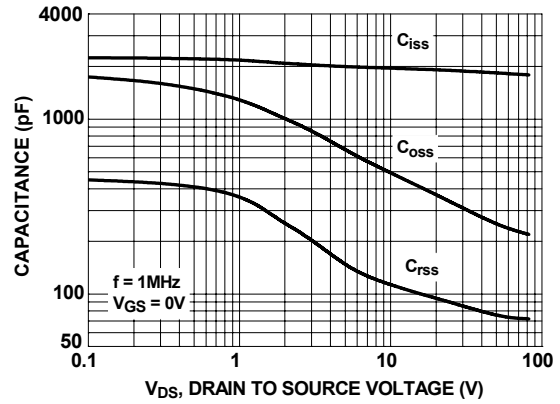


Figure 8. Capacitance vs Drain to Source Voltage

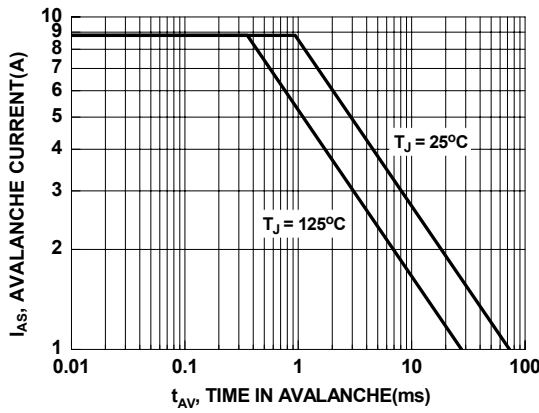


Figure 9. Unclamped Inductive Switching Capability

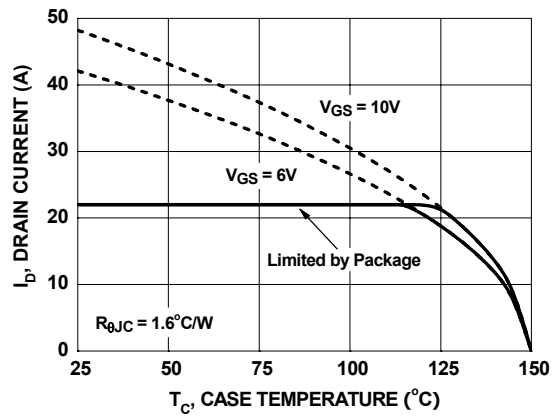


Figure 10. Maximum Continuous Drain Current vs Case Temperature

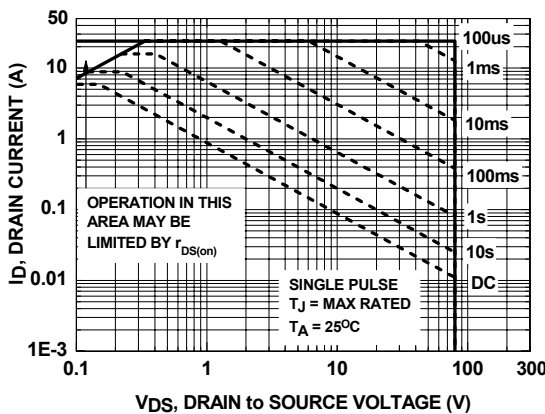


Figure 11. Forward Bias Safe Operating Area

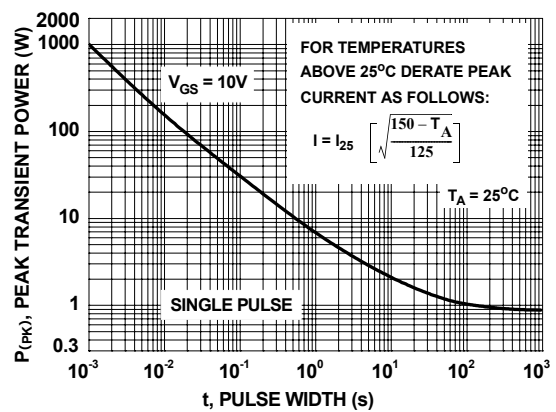


Figure 12. Single Pulse Maximum Power Dissipation

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

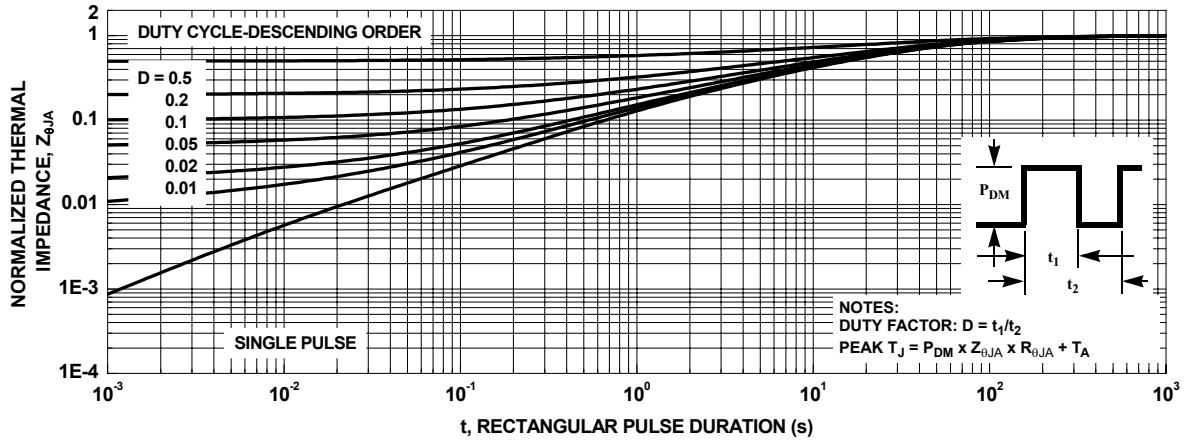
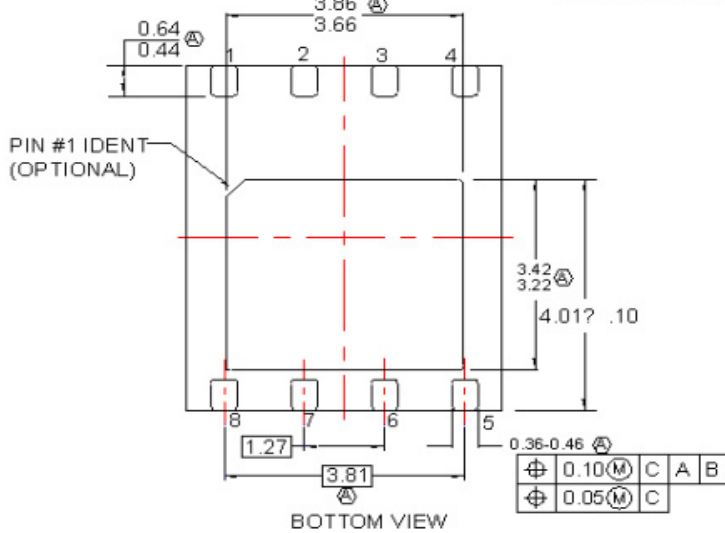
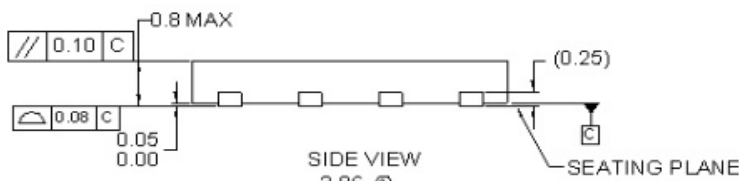
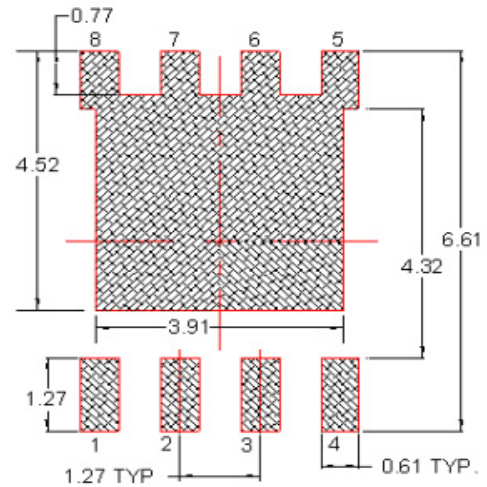
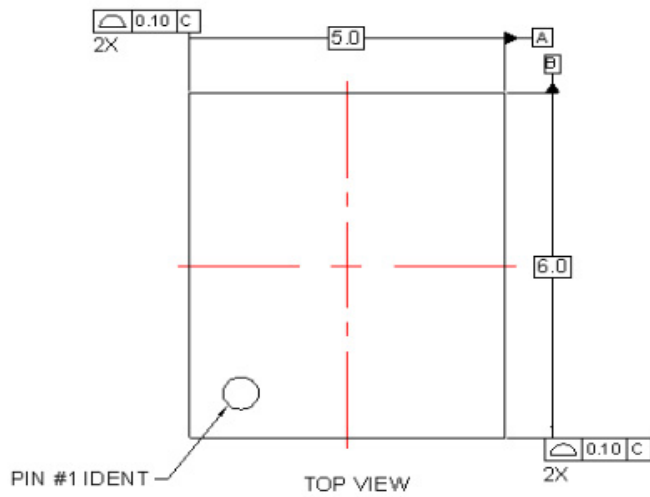


Figure 13. Transient Thermal Response Curve



NOTES:

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- B. DIMENSIONS ARE IN MILLIMETERS.
- C. DIMENSIONS AND TOLERANCES PER ASME Y14.5M, 1994
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