

FDMS2572

N-Channel UltraFET Trench® MOSFET

150V, 4.5A, 47mΩ

General Description

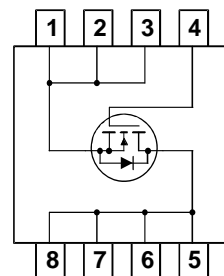
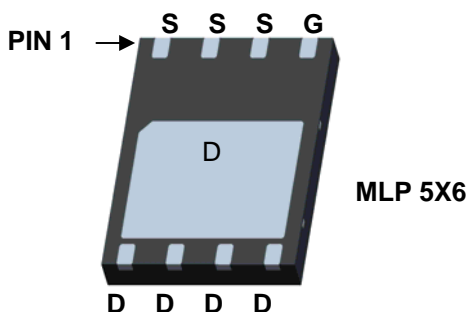
UltraFET devices combine characteristics that enable benchmark efficiency in power conversion applications. Optimized for low $r_{DS(on)}$, low ESR, low total and Miller gate charge, these devices are ideal for high frequency DC to DC converters.

Applications

- Distributed Power Architectures and VRMs
- Primary Switch for 24V and 48V Systems
- High Voltage Synchronous Rectifier

Features

- Max $r_{DS(on)}$ = 47mΩ at $V_{GS} = 10V$, $I_D = 4.5A$
- Typ Qg = 31nC at $V_{GS} = 10V$
- Low Miller Charge
- Optimized efficiency at high frequencies



Absolute Maximum Ratings $T_A=25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Ratings	Units
V_{DS}	Drain-Source Voltage	150	V
V_{GS}	Gate-Source Voltage	± 20	V
I_D	Drain Current – Continuous (Note 1a)	4.5	A
	– Pulsed	30	
P_D	Power Dissipation for Single Operation (Note 1a)	2.8	W
		1.1 (Note 1b)	
T_J, T_{STG}	Operating and Storage Junction Temperature Range	-55 to +150	$^\circ\text{C}$

Thermal Characteristics

$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient (Note 1a)	44	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient (Note 1b)	115	

Package Marking and Ordering Information

Device Marking	Device	Reel Size	Tape width	Quantity
FDMS2572	FDMS2572	7"	12mm	3000 units

Electrical Characteristics

$T_A = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
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Drain-Source Avalanche Ratings (Note 1)

W_{DSS}	Single Pulse Drain-Source Avalanche Energy	$V_{DD} = 75\text{ V}, I_D = 15\text{ A}, L = 1\text{ mH}$			112	mJ
I_{AR}	Drain-Source Avalanche Current				15	A

Off Characteristics

BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	150			V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	$I_D = 250\text{ }\mu\text{A}$, Referenced to 25°C		180		mV/ $^\circ\text{C}$
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 120\text{ V}, V_{GS} = 0\text{ V}$			1	μA
I_{GSS}	Gate-Body Leakage	$V_{GS} = \pm 20\text{ V}, V_{DS} = 0\text{ V}$			± 100	nA

On Characteristics (Note 2)

$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	2	3.0	4	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate Threshold Voltage Temperature Coefficient	$I_D = 250\text{ }\mu\text{A}$, Referenced to 25°C		-9.8		mV/ $^\circ\text{C}$
$r_{DS(on)}$	Static Drain-Source On-Resistance	$V_{GS} = 10\text{ V}, I_D = 4.5\text{ A}$ $V_{GS} = 6\text{ V}, I_D = 4.5\text{ A}$ $V_{GS} = 10\text{ V}, I_D = 4.5\text{ A}, T_J = 125^\circ\text{C}$		36 39 69	47 53 103	m Ω
g_{FS}	Forward Transconductance	$V_{DS} = 10\text{ V}, I_D = 4.5\text{ A}$		14		S

Dynamic Characteristics

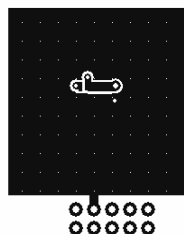
C_{iss}	Input Capacitance	$V_{DS} = 75\text{ V}, V_{GS} = 0\text{ V}$		1960		pF
C_{oss}	Output Capacitance	$f = 1.0\text{ MHz}$		130		pF
C_{rss}	Reverse Transfer Capacitance			30		pF
R_G	Gate Resistance	$f = 1.0\text{ MHz}$		1.3		Ω
$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 75\text{ V}, I_D = 1\text{ A}, V_{GS} = 10\text{ V}, R_{GEN} = 6\text{ }\Omega$		11	20	ns
t_r	Turn-On Rise Time			8	16	ns
$t_{d(off)}$	Turn-Off Delay Time			38	61	ns
t_f	Turn-Off Fall Time			31	50	ns
Q_g	Total Gate Charge	$V_{DS} = 75\text{ V}, I_D = 4.5\text{ A}, V_{GS} = 10\text{ V}$		31	43	nC
Q_{gs}	Gate-Source Charge			9		nC
Q_{gd}	Gate-Drain Charge			7		nC

Drain-Source Diode Characteristics

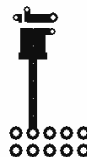
V_{SD}	Drain-Source Diode Forward Voltage	$V_{GS} = 0\text{ V}, I_S = 2.2\text{ A}$ (Note 2)		0.7	1.0	V
t_{rr}	Diode Reverse Recovery Time	$I_F = 4.5\text{ A}, dI_F/dt = 100\text{ A}/\mu\text{s}$		67		nS
Q_{rr}	Diode Reverse Recovery Charge			130		nC

Notes:

- $R_{\theta JA}$ is determined with the device mounted on a 1 in^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) 44°C/W when mounted on a 1 in^2 pad of 2 oz copper



b) 115°C/W when mounted on a minimum pad of 2 oz copper
Scale 1 : 1 on letter size paper

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

Typical Characteristics

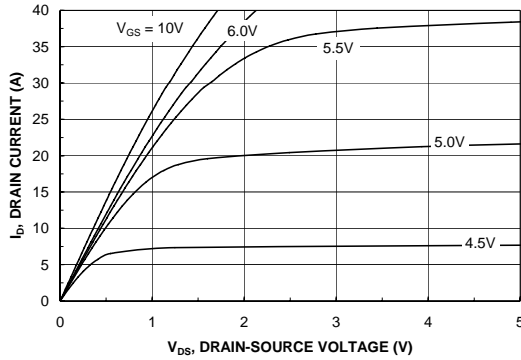


Figure 1. On-Region Characteristics.

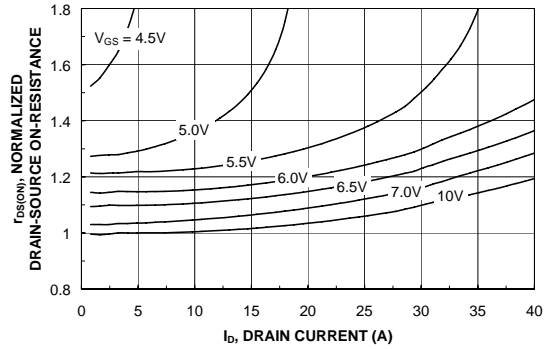


Figure 2. On-Resistance Variation with Drain Current and Gate Voltage.

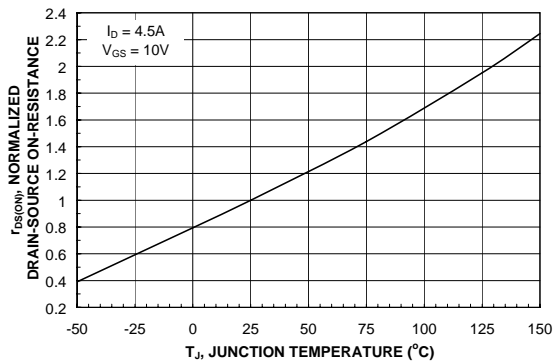


Figure 3. On-Resistance Variation with Temperature.

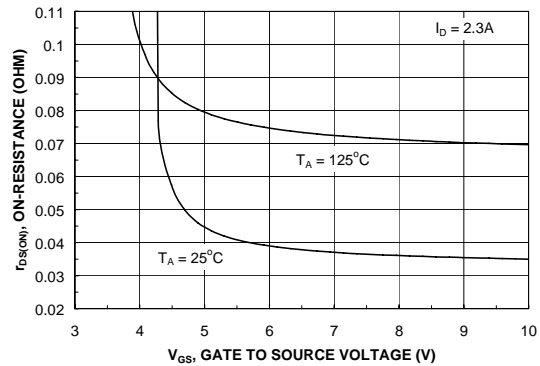


Figure 4. On-Resistance Variation with Gate-to-Source Voltage.

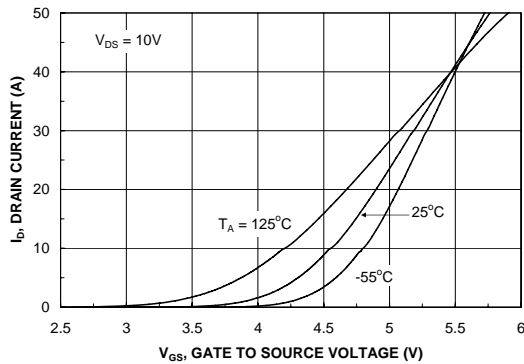


Figure 5. Transfer Characteristics.

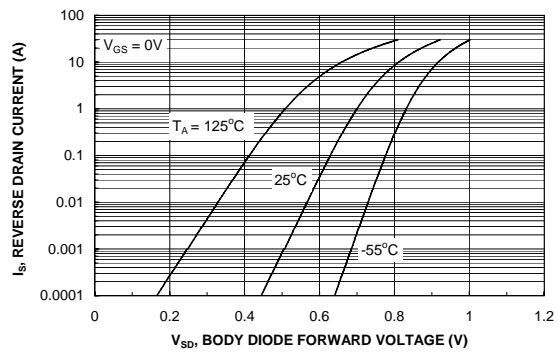


Figure 6. Body Diode Forward Voltage Variation with Source Current and Temperature.

Typical Characteristics

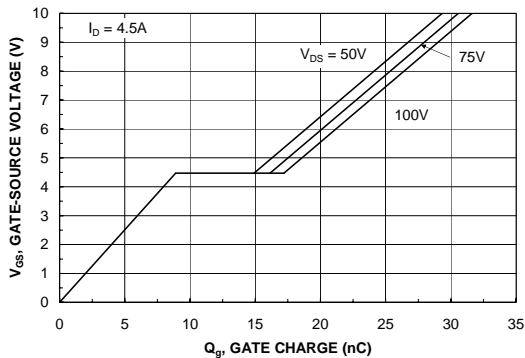


Figure 7. Gate Charge Characteristics.

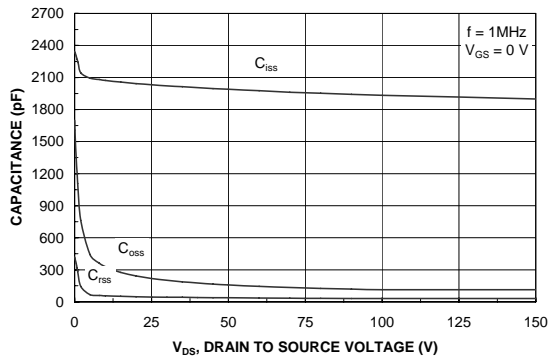


Figure 8. Capacitance Characteristics.

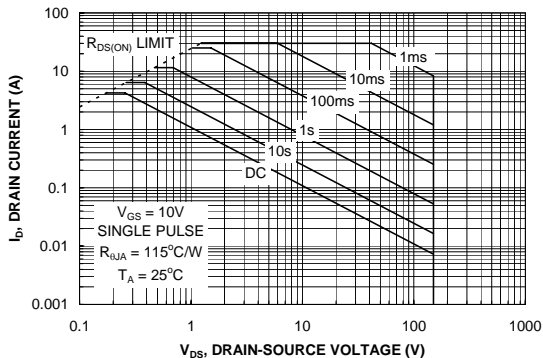


Figure 9. Maximum Safe Operating Area.

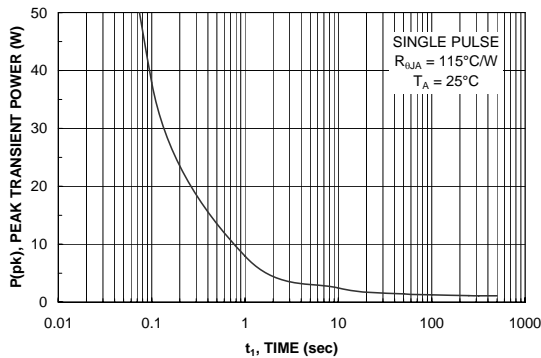


Figure 10. Single Pulse Maximum Power Dissipation.

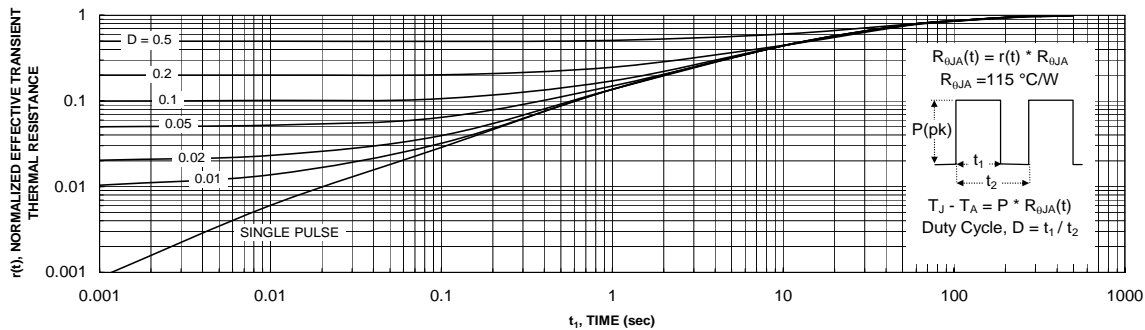
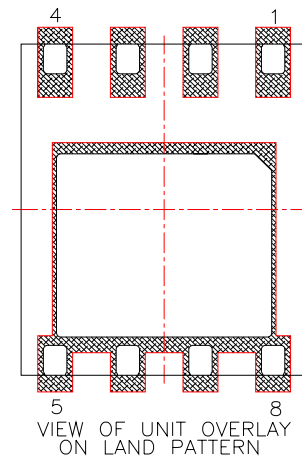
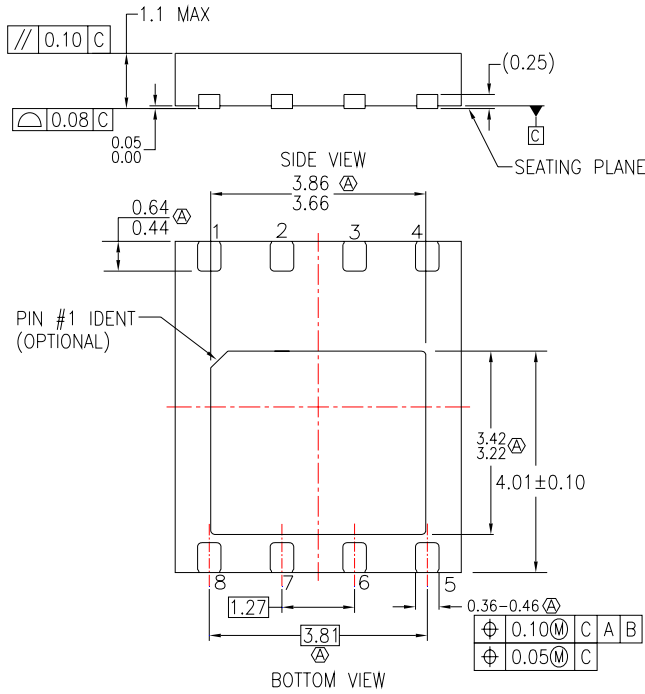
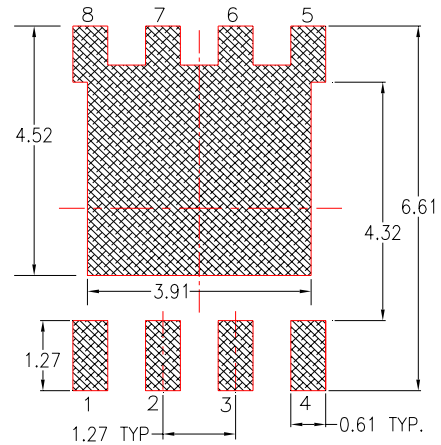
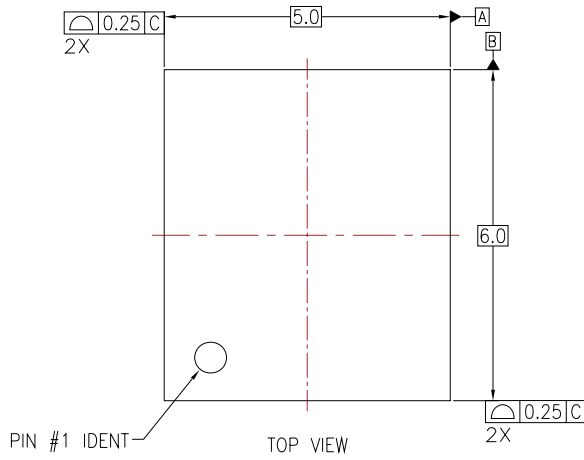


Figure 11. Transient Thermal Response Curve.

Thermal characterization performed using the conditions described in Note 1b. Transient thermal response will change depending on the circuit board design.

Dimensional Outline and Pad Lay-out



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