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September 2015

FDMS8350LET40

N-Channel PowerTrench® MOSFET

40 V, 300 A, 0.85 mΩ

Features

- Max $r_{DS(on)}$ = 0.85 mΩ at $V_{GS} = 10$ V, $I_D = 47$ A
- Max $r_{DS(on)}$ = 1.2 mΩ at $V_{GS} = 4.5$ V, $I_D = 38$ A
- Advanced Package and Silicon Combination for Low $r_{DS(on)}$ and High Efficiency
- MSL1 Robust Package Design
- 100% UIL Tested
- RoHS Compliant

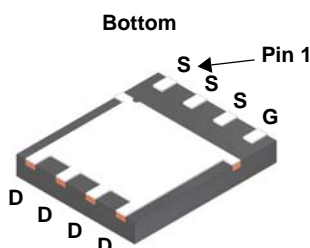
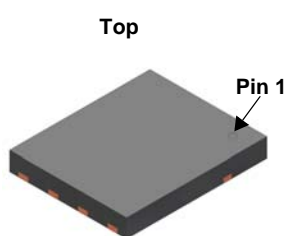


General Description

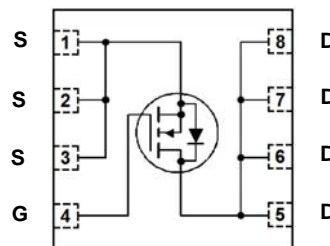
This N-Channel MOSFET is produced using Fairchild Semiconductor's advanced PowerTrench® process that has been especially tailored to minimize the on-state resistance and yet maintain superior switching performance.

Applications

- Primary DC-DC MOSFET
- Secondary Synchronous Rectifier
- Load Switch



Power 56



MOSFET Maximum Ratings $T_A = 25$ °C unless otherwise noted.

Symbol	Parameter	Ratings	Units
V_{DS}	Drain to Source Voltage	40	V
V_{GS}	Gate to Source Voltage	±20	V
I_D	Drain Current -Continuous $T_C = 25$ °C (Note 5)	300	A
	-Continuous $T_C = 100$ °C (Note 5)	212	
	-Continuous $T_A = 25$ °C (Note 1a)	49	
	-Pulsed (Note 4)	1464	
E_{AS}	Single Pulse Avalanche Energy (Note 3)	1176	mJ
P_D	Power Dissipation $T_C = 25$ °C	125	W
	Power Dissipation $T_A = 25$ °C (Note 1a)	3.33	
T_J, T_{STG}	Operating and Storage Junction Temperature Range	-55 to + 175	°C

Thermal Characteristics

$R_{\theta JC}$	Thermal Resistance, Junction to Case	1.2	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient (Note 1a)	45	

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDMS8350L	FDMS8350LET40	Power 56	13 "	12 mm	3000 units

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

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

BV_{DSS}	Drain to Source Breakdown Voltage	$I_D = 250\text{ }\mu\text{A}$, $V_{GS} = 0\text{ V}$	40			V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	$I_D = 250\text{ }\mu\text{A}$, referenced to $25\text{ }^{\circ}\text{C}$		17		mV/ $^{\circ}\text{C}$
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 32\text{ V}$, $V_{GS} = 0\text{ V}$			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	$V_{GS} = V_{DS}$, $I_D = 250\text{ }\mu\text{A}$	1.0	1.8	3.0	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate to Source Threshold Voltage Temperature Coefficient	$I_D = 250\text{ }\mu\text{A}$, referenced to $25\text{ }^{\circ}\text{C}$		-6		mV/ $^{\circ}\text{C}$
$r_{DS(on)}$	Static Drain to Source On Resistance	$V_{GS} = 10\text{ V}$, $I_D = 47\text{ A}$		0.68	0.85	m Ω
		$V_{GS} = 4.5\text{ V}$, $I_D = 38\text{ A}$		0.96	1.2	
		$V_{GS} = 10\text{ V}$, $I_D = 47\text{ A}$, $T_J = 150\text{ }^{\circ}\text{C}$		1.1	1.4	
g_{FS}	Forward Transconductance	$V_{DS} = 5\text{ V}$, $I_D = 47\text{ A}$		247		S

Dynamic Characteristics

C_{iss}	Input Capacitance	$V_{DS} = 20\text{ V}$, $V_{GS} = 0\text{ V}$, $f = 1\text{ MHz}$		11850	16590	pF
C_{oss}	Output Capacitance			3430	4805	pF
C_{rss}	Reverse Transfer Capacitance			69	100	pF
R_g	Gate Resistance		0.1	1.2	2.4	Ω

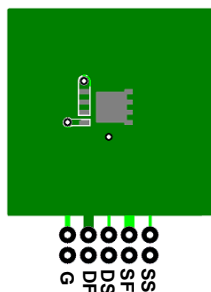
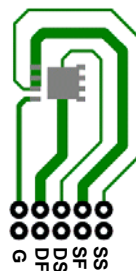
Switching Characteristics

$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 20\text{ V}$, $I_D = 47\text{ A}$, $V_{GS} = 10\text{ V}$, $R_{GEN} = 6\text{ }\Omega$		32	51	ns
t_r	Rise Time			19	34	ns
$t_{d(off)}$	Turn-Off Delay Time			74	118	ns
t_f	Fall Time			15	27	ns
Q_g	Total Gate Charge	$V_{GS} = 0\text{ V}$ to 10 V	$V_{DD} = 20\text{ V}$, $I_D = 47\text{ A}$	156	219	nC
Q_g	Total Gate Charge	$V_{GS} = 0\text{ V}$ to 4.5 V		73	102	nC
Q_{gs}	Gate to Source Charge			33		nC
Q_{gd}	Gate to Drain "Miller" Charge			16		nC

Drain-Source Diode Characteristics

V_{SD}	Source to Drain Diode Forward Voltage	$V_{GS} = 0\text{ V}$, $I_S = 2.1\text{ A}$ (Note 2)		0.7	1.2	V
		$V_{GS} = 0\text{ V}$, $I_S = 47\text{ A}$ (Note 2)		0.8	1.3	
t_{rr}	Reverse Recovery Time	$I_F = 47\text{ A}$, $di/dt = 100\text{ A}/\mu\text{s}$		81	129	ns
Q_{rr}	Reverse Recovery Charge			82	131	nC

Notes:

1. $R_{\theta JA}$ is determined with the device mounted on a 1 in² pad 2 oz copper pad on a 1.5 x 1.5 in. board of FR-4 material. $R_{\theta JC}$ is guaranteed by design while $R_{\theta CA}$ is determined by the user's board design.a. $45\text{ }^{\circ}\text{C/W}$ when mounted on a
1 in² pad of 2 oz copper.b. $115\text{ }^{\circ}\text{C/W}$ when mounted on a
minimum pad of 2 oz copper.2. Pulse Test: Pulse Width < 300 μs , Duty cycle < 2.0%.3. E_{AS} of 1176 mJ is based on starting $T_J = 25\text{ }^{\circ}\text{C}$, $L = 3\text{ mH}$, $I_{AS} = 28\text{ A}$, $V_{DD} = 40\text{ V}$, $V_{GS} = 10\text{ V}$. 100% test at $L = 0.1\text{ mH}$, $I_{AS} = 87\text{ A}$.4. Pulsed I_d please refer to Fig 11 SOA graph for more details.

5. Computed continuous current limited to Max Junction Temperature only, actual continuous current will be limited by thermal & electro-mechanical application board design.

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

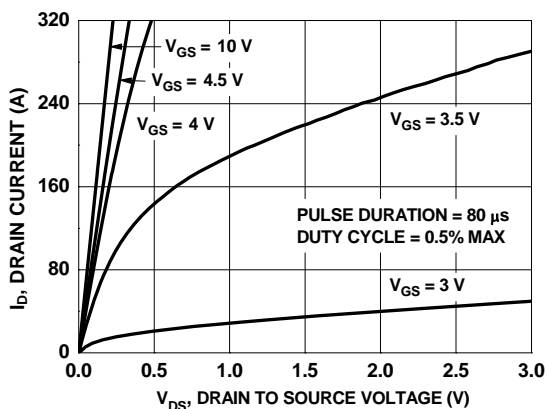


Figure 1. On Region Characteristics

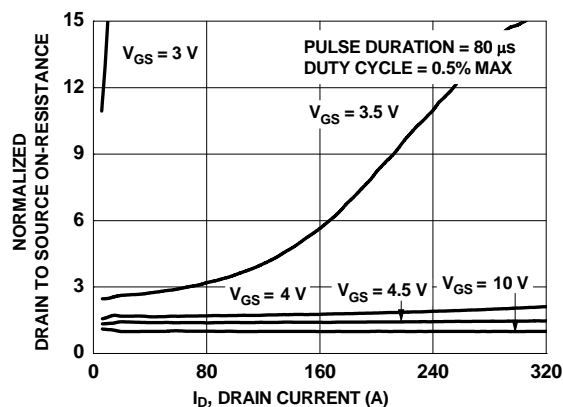


Figure 2. Normalized On-Resistance vs. Drain Current and Gate Voltage

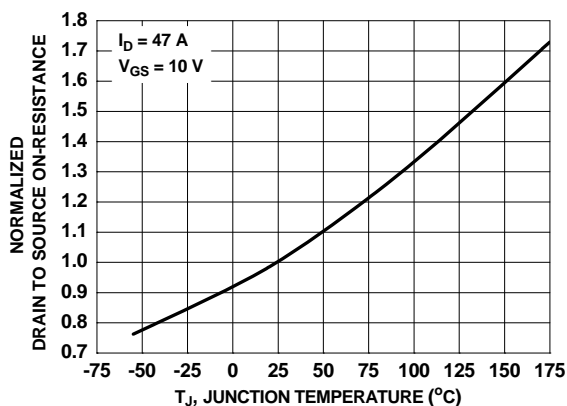


Figure 3. Normalized On Resistance vs. Junction Temperature

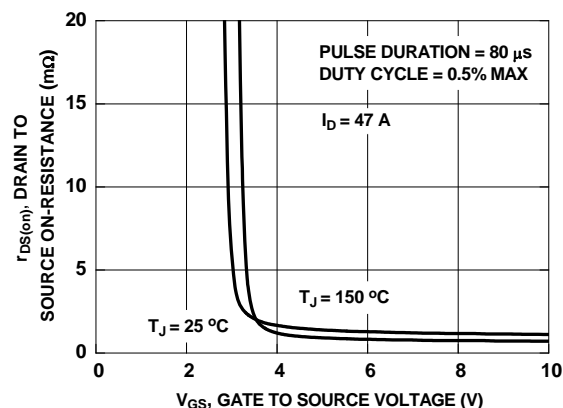


Figure 4. On-Resistance vs. Gate to Source Voltage

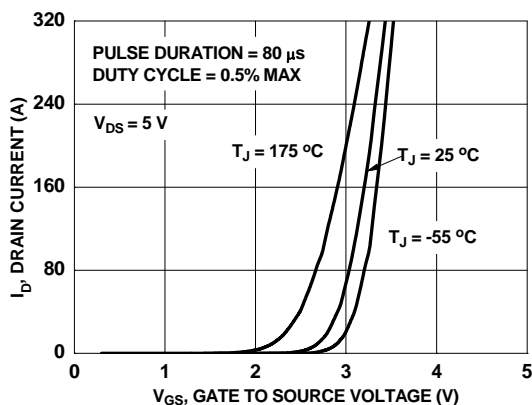


Figure 5. Transfer Characteristics

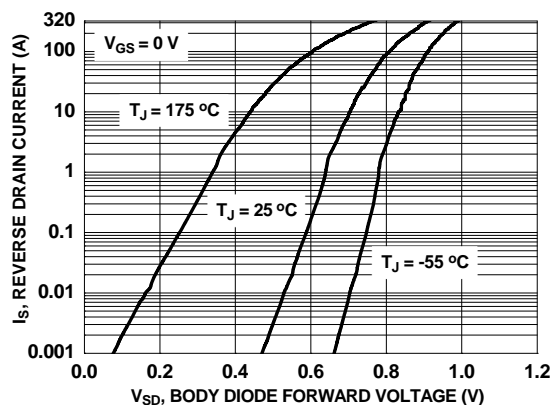


Figure 6. Source to Drain Diode Forward Voltage vs. Source Current

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

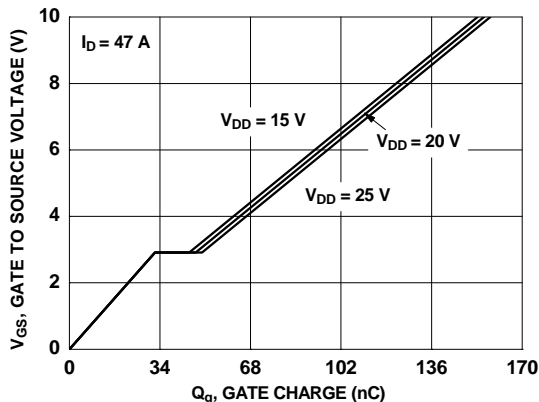


Figure 7. Gate Charge Characteristics

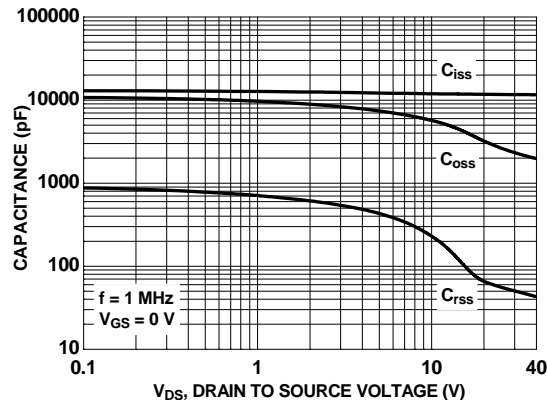


Figure 8. Capacitance vs. Drain to Source Voltage

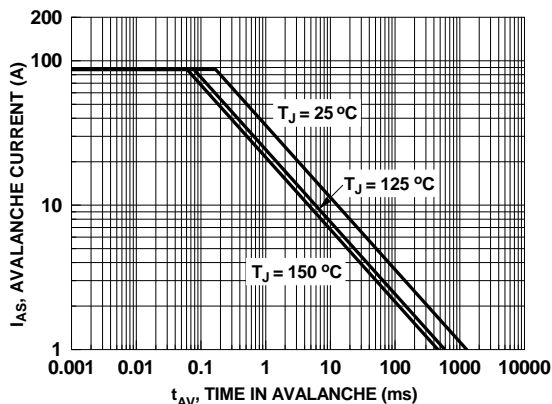


Figure 9. Unclamped Inductive Switching Capability

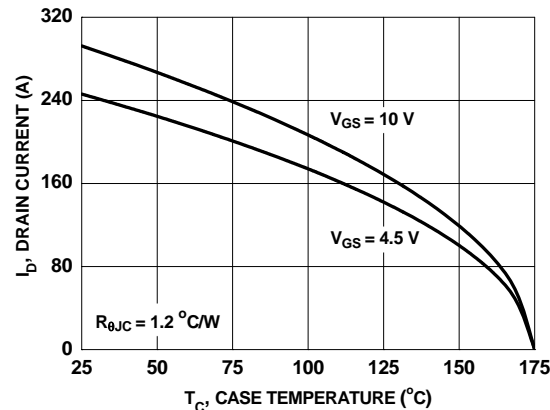


Figure 10. Maximum Continuous Drain Current vs. Case Temperature

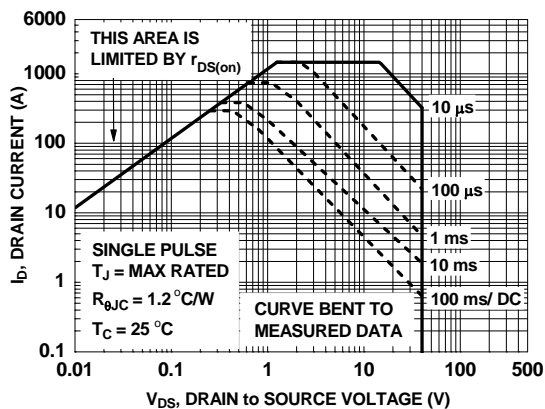


Figure 11. Forward Bias Safe Operating Area

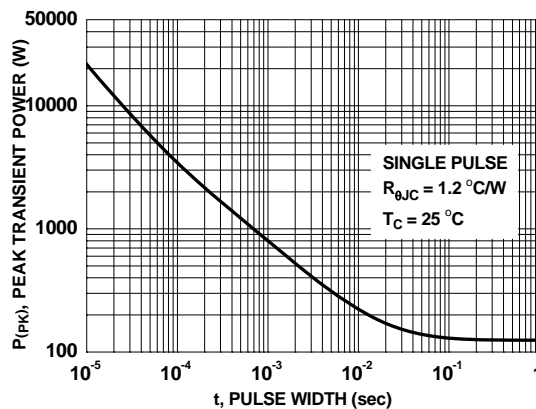


Figure 12. Single Pulse Maximum Power Dissipation

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

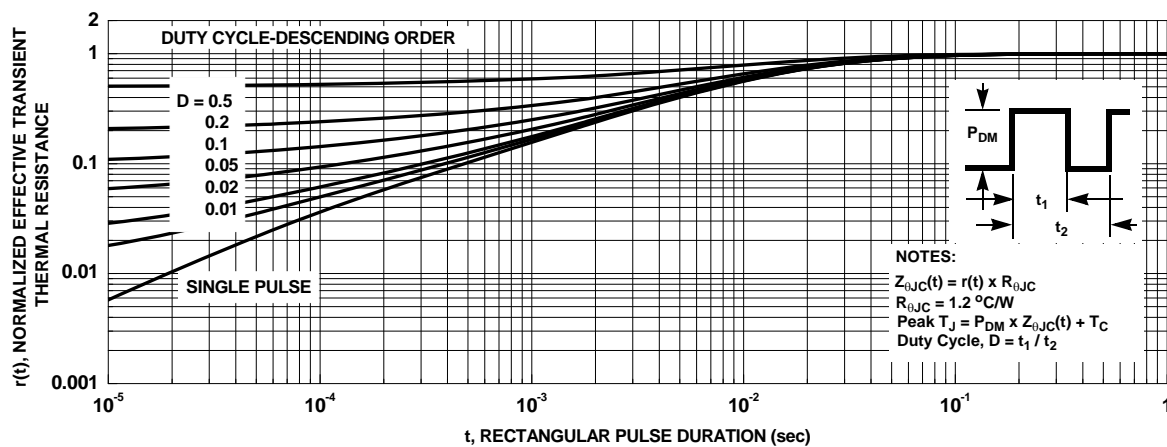
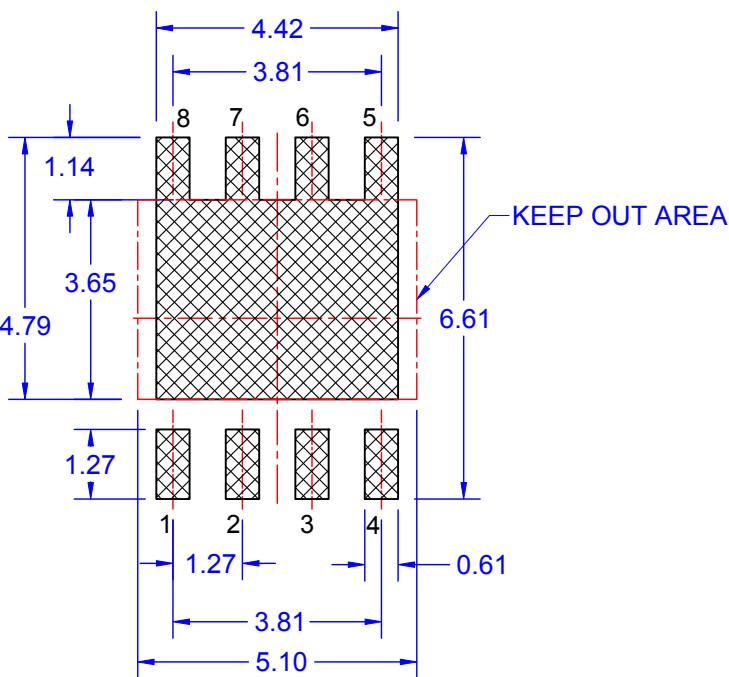
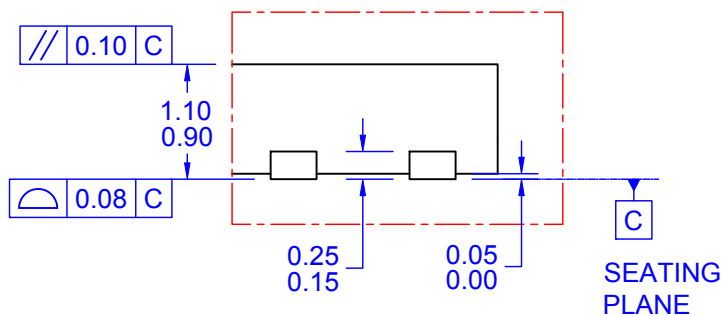
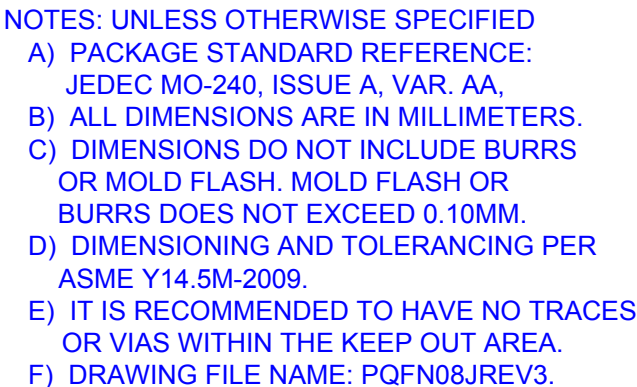


Figure 13. Junction-to-Case Transient Thermal Response Curve



LAND PATTERN RECOMMENDATION



DETAIL A

SCALE: 2:1



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Наши контакты:

Телефон: +7 812 627 14 35

Электронная почта: sales@st-electron.ru

Адрес: 198099, Санкт-Петербург,
Промышленная ул, дом № 19, литера Н,
помещение 100-Н Офис 331