FDMD8630

MOSFET – N-Channel, POWERTRENCH®, Dual

30 V, 167 A, 1.0 mΩ

General Description

This package integrates two N−Channel devices connected internally in common−source configuration. This enables very low package parasitics and optimized thermal path to the common source pad on the bottom. Provides a very small footprint (5 x 6 mm) for higher power density.

Features

- Common Source Configuration to Eliminate PCB Routing
- Large Source Pad on Bottom of Package for Enhanced Thermals
- Max $r_{DS(on)}$ = 1.0 mΩ at V_{GS} = 10 V, I_D = 38 A
- Max $r_{DS(on)}$ = 1.3 mΩ at V_{GS} = 4.5 V, I_D = 33 A
- Ideal for Flexible Layout in Secondary Side Synchronous Rectification
- 100% UIL Tested
- This Device is Pb−Free and is RoHS Compliant

Applications

- Isolated DC−DC Synchronous Rectifiers
- Common Ground Load Switches

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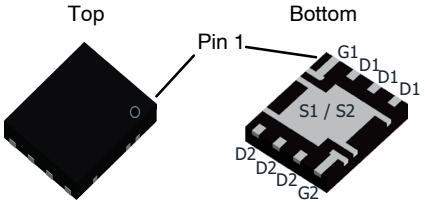

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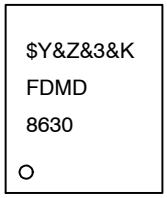
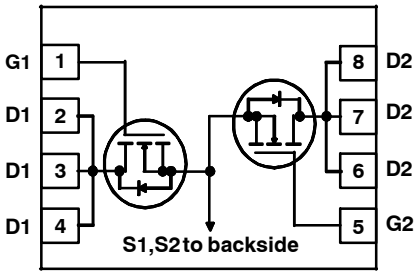
CASE 483AS

MARKING DIAGRAM



&Y	= ON Semiconductor Logo
&Z	= Assembly Plant Code
&3	= Numeric Date Code
&K	= Lot Code
FDMD8630	= Specific Device Code

PIN CONFIGURATION



ORDERING INFORMATION

See detailed ordering and shipping information on page 2 of this data sheet.

MOSFET MAXIMUM RATINGS T_A = 25°C Unless Otherwise Noted

Symbol	Parameter	Ratings	Units
V_{DS}	Drain to Source Voltage	30	V
V_{GS}	Gate to Source Voltage	±20	V
I_D	Drain Current –Continuous – T_C = 25°C (Note 5)	167	A
	–Continuous – T_C =100°C (Note 5)	106	
	–Continuous – T_A = 25°C (Note 1a)	38	
	–Pulsed – (Note 4)	1178	
E_{AS}	Single Pulse Avalanche Energy (Note 3)	726	mJ
P_D	Power Dissipation for Single Operation T_C = 25 °C	43	W
	Power Dissipation for Single Operation T_A = 25 °C (Note 1a)	2.3	
T_J, T_{STG}	Operating and Storage Junction Temperature Range	–55 to +150	°C

THERMAL CHARACTERISTICS

Symbol	Parameter	Ratings	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case	2.9	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient (Note 1a)	55	

PACKAGE MARKING AND ORDERING INFORMATION

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDMD8630	FDMD8630	Power 5 x 6	13”	12 mm	3000 Units

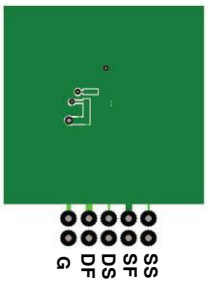
ELECTRICAL CHARACTERISTICS T_J = 25°C Unless Otherwise Noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
OFF CHARACTERISTICS						
BV_{DSS}	Drain to Source Breakdown Voltage	I_D = 250 μA, V_{GS} = 0 V	30			V
ΔBV_{DSS} / ΔT_J	Breakdown Voltage Temperature Coefficient	I_D = 250 μA, referenced to 25°C		15		mV/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 24 V, V_{GS} = 0 V			1	μA
I_{GSS}	Gate to Source Leakage Current, Forward	V_{GS} = 20 V, V_{DS}= 0 V			100	nA
ON CHARACTERISTICS						
$V_{GS(th)}$	Gate to Source Threshold Voltage	V_{GS} = V_{DS}, I_D = 250 μA	1.0	1.6	3.0	V
$\Delta V_{GS(th)}$ / ΔT_J	Gate to Source Threshold Voltage Temperature Coefficient	I_D = 250 μA, referenced to 25°C		–6		mV/°C
$r_{DS(on)}$	Static Drain to Source On Resistance	V_{GS} = 10 V, I_D = 38 A		0.6	1.0	mΩ
		V_{GS} = 4.5 V, I_D = 33 A		0.8	1.3	
		V_{GS} = 4.5 V, I_D = 33 A, T_J = 125°C		0.9	1.5	
g_{FS}	Forward Transconductance	V_{DD} = 5 V, I_D = 38 A		281		S
DYNAMIC CHARACTERISTICS						
C_{iss}	Input Capacitance	V_{DS} = 15 V, V_{GS} = 0 V, f = 1 MHz		7090	9930	pF
C_{oss}	Output Capacitance			2025	2835	pF
C_{rss}	Reverse Transfer Capacitance			212	300	pF
R_g	Gate Resistance		0.1	1.9	3.8	Ω
SWITCHING CHARACTERISTICS						

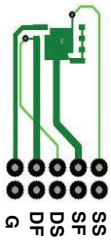
ELECTRICAL CHARACTERISTICS T_J = 25°C Unless Otherwise Noted (continued)

Symbol	Parameter	Test Conditions		Min	Typ	Max	Units
SWITCHING CHARACTERISTICS							
$t_{d(on)}$	Turn−On Delay Time	V_{DD} = 15 V, I_D = 38 A V_{GS} = 10 V, R_{GEN} = 6 Ω			14	26	ns
t_r	Rise Time				15	27	ns
$t_{d(off)}$	Turn−Off Delay Time				66	105	ns
t_f	Fall Time				24	39	ns
$Q_{g(TOT)}$	Total Gate Charge	V_{GS} = 0 V to 10 V	V_{DD} = 15 V I_D = 38 A		97	142	nC
$Q_{g(TOT)}$	Total Gate Charge	V_{GS} = 0 V to 4.5 V			46	74	nC
Q_{gs}	Gate to Source Gate Charge				17		nC
Q_{gd}	Gate to Drain “Miller” Charge				12		nC
DRAIN−SOURCE DIODE CHARACTERISTICS							
V_{SD}	Source to Drain Diode Forward Voltage	V_{GS} = 0 V, I_S = 38 A (Note 2)			0.8	1.3	V
V_{SD}	Source to Drain Diode Forward Voltage	V_{GS} = 0 V, I_S = 2 A (Note 2)			0.7	1.2	V
t_{rr}	Reverse Recovery Time	I_F = 38 A, di/dt = 100 A/μs			64	103	ns
Q_{rr}	Reverse Recovery Charge				56	90	nC

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. $R_{\theta JA}$ is guaranteed by design while $R_{\theta CA}$ is determined by the user’s board design.



a. 55°C/W when mounted on a 1 in^2 padof 2oz copper



b. 125°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 726 mJ is based on starting T_J = 25°C, L = 3 mH, I_{AS} = 22 A, V_{DD} = 30 V, V_{GS} = 10 V. 100% tested at L = 0.1 mH, I_{AS} = 70 A.
4. Pulsed Id 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°C Unless Otherwise Noted

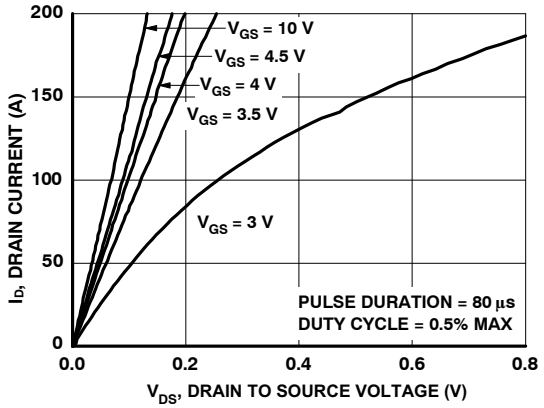


Figure 1. On−Region Characteristics

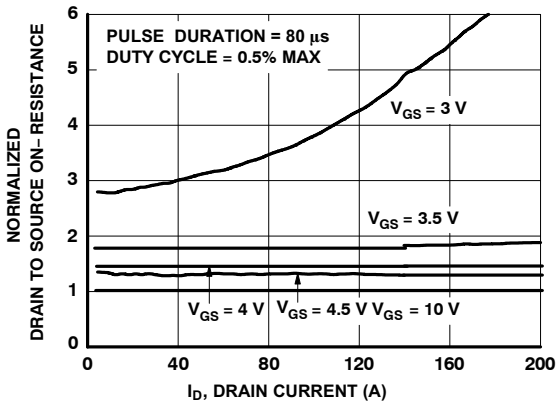


Figure 2. Normalized On−Resistance vs Drain Current and Gate Voltage

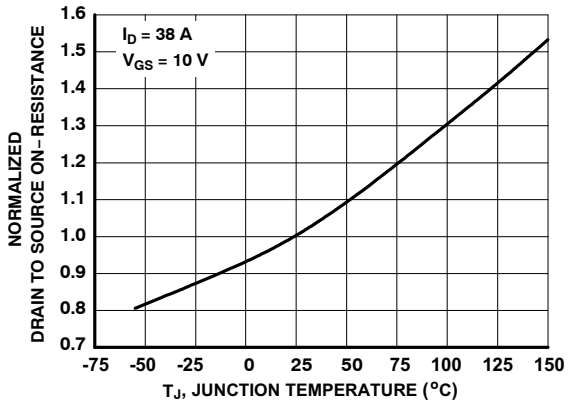


Figure 3. Normalized On Resistance vs Junction Temperature

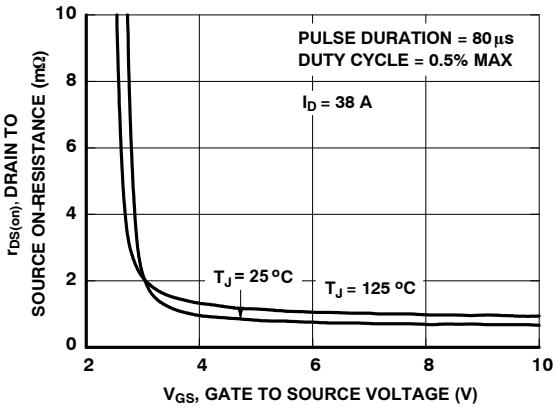


Figure 4. On−Resistance vs Gate to Source Voltage

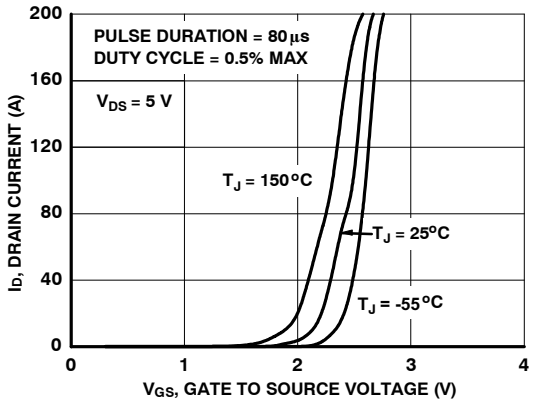


Figure 5. Transfer Characteristics

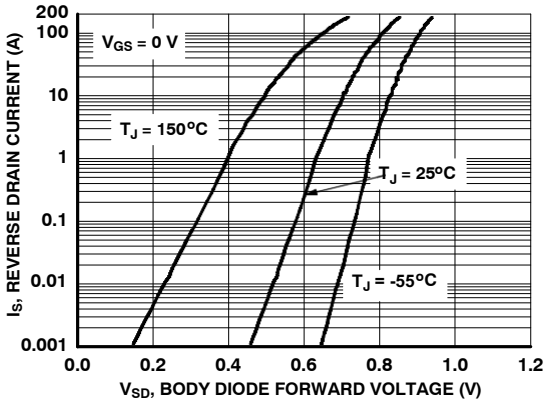


Figure 6. Source to Drain Diode Forward Voltage vs Source Current

TYPICAL CHARACTERISTICS

T_J = 25°C Unless Otherwise Noted (continued)

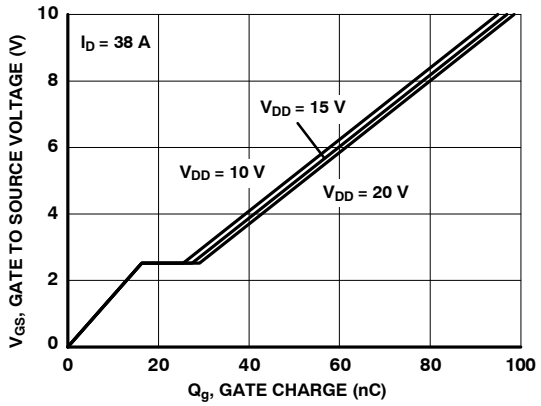


Figure 7. Gate Charge Characteristics

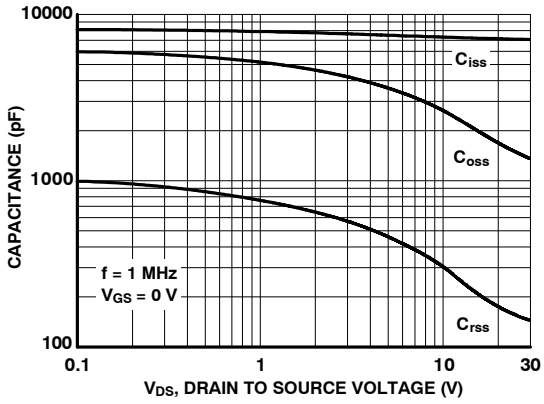


Figure 8. Capacitance vs Drain to Source Voltage

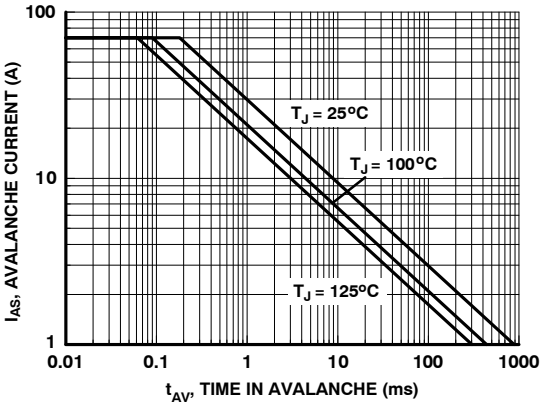


Figure 9. Unclamped Inductive Switching Capability

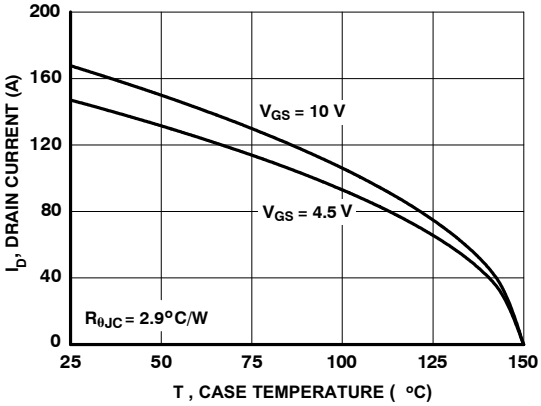


Figure 10. Maximum Continuous Drain Current vs Case Temperature

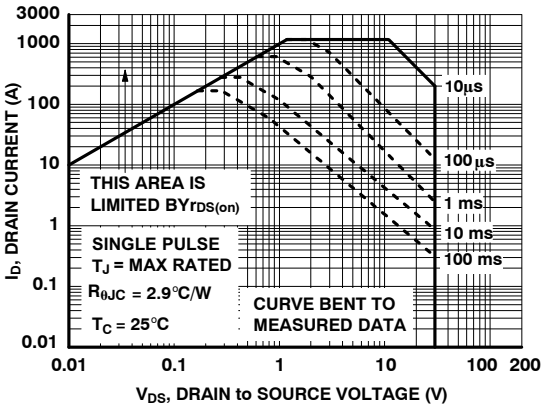


Figure 11. Forward Bias Safe Operating Area

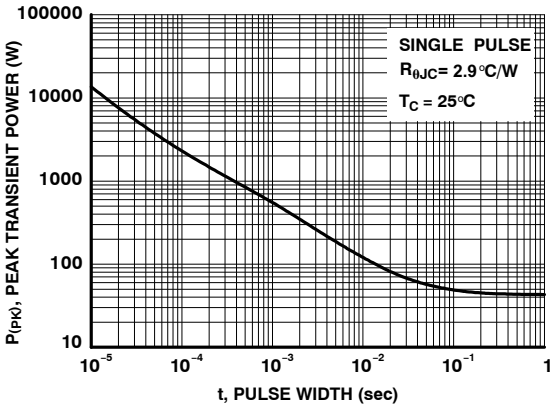


Figure 12. Single Pulse Maximum Power Dissipation

TYPICAL CHARACTERISTICS

T_J = 25°C Unless Otherwise Noted (continued)

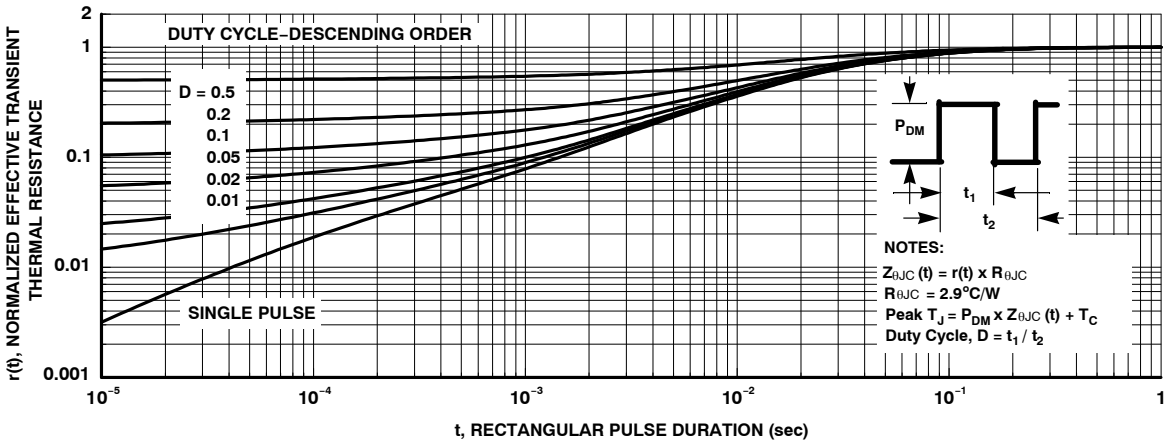


Figure 13. Junction−to−Ambient Transient Thermal Response Curve

MECHANICAL CASE OUTLINE
PACKAGE DIMENSIONS

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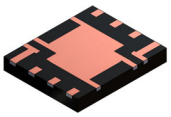

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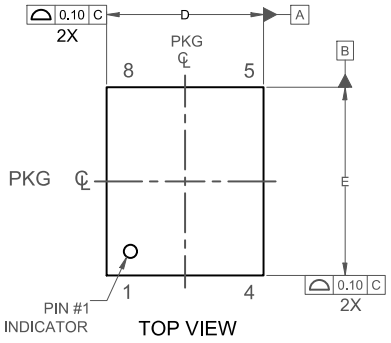
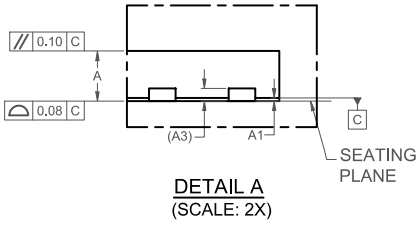
ISSUE A

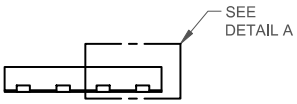
DATE 17 MAY 2021



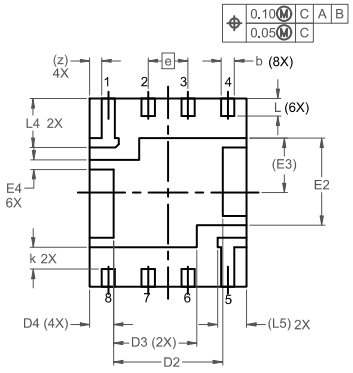
TOP VIEW



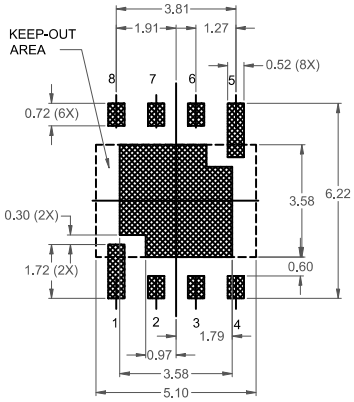
DETAIL A
(SCALE: 2X)



SIDE VIEW



BOTTOM VIEW



RECOMMENDED LAND PATTERN

*FOR ADDITIONAL INFORMATION ON OUR PB-FREE STRATEGY AND SOLDERING DETAILS, PLEASE DOWNLOAD THE ON SEMICONDUCTOR SOLDERING AND MOUNTING TECHNIQUES REFERENCE MANUAL, SOLDERRM/D.

NOTES:

A) PACKAGE REFERENCE :
TO JEDEC REGISTRATION, MO-240B, VARIATION AA.
B) ALL DIMENSIONS ARE IN MILLIMETERS.
C) DIMENSIONS DO NOT INCLUDE BURRS OR MOLD FLASH. MOLD FLASH OR BURRS DOES NOT EXCEED 0.10MM.
D) DIMENSIONING AND TOLERANCING PER ASME Y14.5M-2009
E) IT IS RECOMMENDED TO HAVE NO TRACES OR VIAS WITHIN THE KEEP-OUT AREA

DIM	MILLIMETERS		
	MIN.	NOM.	MAX.
A	0.70	0.75	0.80
A1	0.00	-	0.05
b	0.37	0.42	0.47
A3		0.20 REF	
D	4.90	5.00	5.10
D2	3.38	3.48	3.58
D3	2.55	2.65	2.75
D4	0.66	0.76	0.86
E	5.90	6.00	6.10
E2	2.68	2.78	2.88
E3		1.74 REF	
E4	0.25	0.30	0.35
e		1.27 BSC	
k	0.60	0.70	0.80
L	0.46	0.56	0.66
L4	1.46	1.56	1.66
L5	0.82	0.92	1.02
z		0.39 REF	

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DESCRIPTION:	**PQFN8 5X6, 1.27P**		**PAGE 1 OF 1**

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