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August 2016

# **FDMC8030**

# Dual N-Channel Power Trench<sup>®</sup> MOSFET 40 V, 12 A, 10 m $\Omega$

#### **Features**

- Max  $r_{DS(on)} = 10 \text{ m}\Omega$  at  $V_{GS} = 10 \text{ V}$ ,  $I_D = 12 \text{ A}$
- Max  $r_{DS(on)} = 14 \text{ m}\Omega$  at  $V_{GS} = 4.5 \text{ V}$ ,  $I_D = 10 \text{ A}$
- Max  $r_{DS(on)} = 28 \text{ m}\Omega$  at  $V_{GS} = 3.2 \text{ V}$ ,  $I_D = 4 \text{ A}$
- Termination is Lead-free and RoHS Compliant

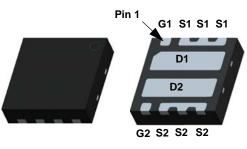
#### **General Description**

This device includes two 40V N-Channel MOSFETs in a dual Power 33 (3 mm X 3 mm MLP) package. The package is enhanced for exceptional thermal performance.

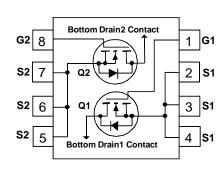
#### **Applications**

- Battery Protection
- Load Switching
- Point of Load









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

Symbol	Parame	eter		Ratings	Units
$V_{DS}$	Drain to Source Voltage			40	V
$V_{GS}$	Gate to Source Voltage		(Note 4)	±12	V
	Drain Current -Continuous	T <sub>A</sub> = 25 °C	(Note 1a)	12	Λ
ID	-Pulsed			50	A
E <sub>AS</sub>	Single Pulse Avalanche Energy		(Note 3)	21	mJ
D	Power Dissipation	T <sub>C</sub> = 25 °C		14	W
$P_{D}$	Power Dissipation	T <sub>A</sub> = 25 °C	(Note 1a)	1.9	VV
T <sub>J</sub> , T <sub>STG</sub>	Operating and Storage Junction Tempera	ture Range		-55 to +150	°C

#### **Thermal Characteristics**

$R_{\theta JC}$	Thermal Resistance, Junction to Case		9.0	
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	(Note 1a)	65	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	(Note 1b)	155	

#### **Package Marking and Ordering Information**

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDMC8030	FDMC8030	Power 33	13 "	12 mm	3000 units

### **Electrical Characteristics** $T_J = 25$ °C unless otherwise noted.

Parameter

Off Characteristics								
BV <sub>DSS</sub>	Drain to Source Breakdown Voltage	$I_D = 250 \mu A, V_{GS} = 0 V$	40			V		
$\frac{\Delta BV_{DSS}}{\Delta T_{J}}$	Breakdown Voltage Temperature Coefficient	I <sub>D</sub> = 250 μA, referenced to 25 °C		19		mV/°C		
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> = 32 V, V <sub>GS</sub> = 0 V			1	μА		
I <sub>GSS</sub>	Gate to Source Leakage Current, Forward	V <sub>GS</sub> = 12 V, V <sub>DS</sub> = 0 V			100	nA		

**Test Conditions** 

Min.

Тур.

Max.

Units

#### **On Characteristics**

Symbol

$V_{GS(th)}$	Gate to Source Threshold Voltage	$V_{GS} = V_{DS}, I_D = 250 \mu A$	1.0	1.5	2.8	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate to Source Threshold Voltage Temperature Coefficient	I <sub>D</sub> = 250 μA, referenced to 25 °C		-5		mV/°C
r <sub>DS(on)</sub>	Static Drain to Source On Resistance	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 12 A		8	10	
		$V_{GS} = 4.5 \text{ V}, I_D = 10 \text{ A}$		10	14	
		$V_{GS} = 3.2 \text{ V}, I_D = 4 \text{ A}$		19	28	mΩ
		$V_{GS} = 10 \text{ V}, I_D = 12 \text{ A}$ $T_J = 125 ^{\circ}\text{C}$		13	16	
9 <sub>FS</sub>	Forward Transconductance	V <sub>DD</sub> = 5 V, I <sub>D</sub> = 12 A		57		S

#### **Dynamic Characteristics**

C <sub>iss</sub>	Input Capacitance	V 20 V V 0 V	1462	1975	pF
C <sub>oss</sub>	Output Capacitance	V <sub>DS</sub> = 20 V, V <sub>GS</sub> = 0 V f = 1MHz	321	430	pF
C <sub>rss</sub>	Reverse Transfer Capacitance	I = IIVIDZ	20	30	pF
$R_g$	Gate Resistance		0.9	2.5	Ω

#### **Switching Characteristics**

	•					
t <sub>d(on)</sub>	Turn-On Delay Time			7	13	ns
t <sub>r</sub>	Rise Time	V <sub>DD</sub> = 20 V, I <sub>D</sub> = 12 A		3	10	ns
t <sub>d(off)</sub>	Turn-Off Delay Time	V <sub>GS</sub> = 10 V, R <sub>GEN</sub> = 6	Ω	19	33	ns
t <sub>f</sub>	Fall Time			3	10	ns
0	Total Gate Charge	V <sub>GS</sub> = 0 V to 10 V		21	30	nC
$Q_{g(TOT)}$	Total Gate Charge	$V_{GS} = 0 \text{ V to 5 V}$ $V_{DI}$	<sub>D</sub> = 20 V	12	17	nC
$Q_{gs}$	Gate to Source Charge	I <sub>D</sub> :	= 12 A	2.8		nC
$Q_{qd}$	Gate to Drain "Miller" Charge			2.5		nC

#### **Drain-Source Diode Characteristics**

$V_{SD}$	Source to Drain Diode Forward Voltage	$V_{GS} = 0 \text{ V}, I_S = 12 \text{ A}$ (Note 2)		0.83	1.2	V
t <sub>rr</sub>	Reverse Recovery Time	1 - 12 A di/dt - 100 A/vo		25	40	ns
Q <sub>rr</sub>	Reverse Recovery Charge	$I_F = 12 \text{ A}, \text{ di/dt} = 100 \text{ A/}\mu\text{s}$		9	18	nC

<sup>1.</sup>  $R_{\theta,IA}$  is determined with the device mounted on a 1 in 2 pad 2 oz copper pad on a 1.5 x 1.5 in. board of FR-4 material.  $R_{\theta,IC}$  is guaranteed by design while  $R_{\theta,CA}$  is determined by the user's board design.



a. 65 °C/W when mounted on a 1 in<sup>2</sup> pad of 2 oz copper



b.155 °C/W when mounted on a minimum pad of 2 oz copper

<sup>2.</sup> Pulse Test: Pulse Width < 300  $\mu s,$  Duty cycle < 2.0 %.

<sup>3.</sup> E<sub>AS</sub> of 21 mJ is based on starting  $T_J = 25$  °C, L = 0.3 mH, I<sub>AS</sub> = 12 A, V<sub>DD</sub> = 36 V, V<sub>GS</sub> = 10 V. 100% tested at L = 3 mH, I<sub>AS</sub> = 5 A. 4. As an N-ch device, the negative V<sub>gs</sub> rating is for low duty cycle pulse occurrence only. No continuous rating is implied.

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

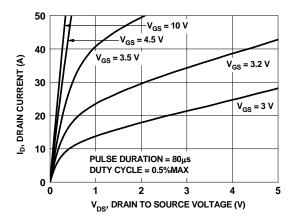


Figure 1. On-Region Characteristics

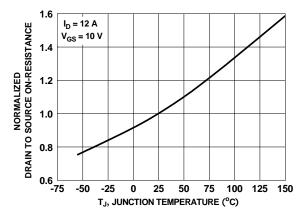


Figure 3. Normalized On-Resistance vs. Junction Temperature

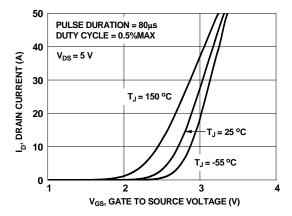


Figure 5. Transfer Characteristics

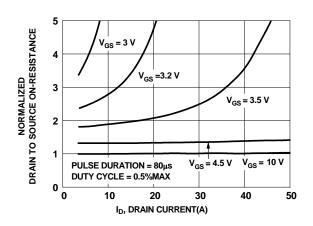


Figure 2. Normalized On-Resistance vs. Drain Current and Gate Voltage

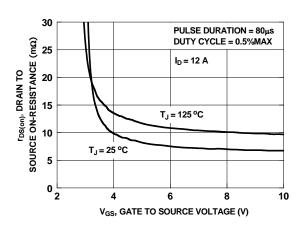


Figure 4. On-Resistance vs. Gate to Source Voltage

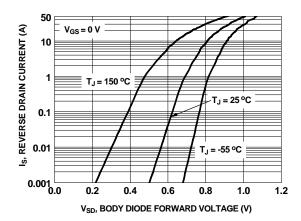


Figure 6. Source to Drain Diode Forward Voltage vs. Source Current

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

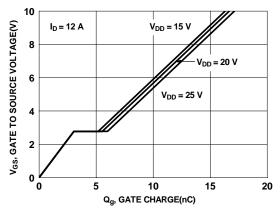


Figure 7. Gate Charge Characteristics

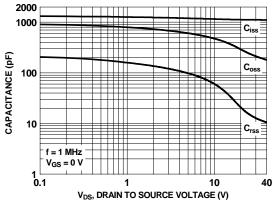


Figure 8. Capacitance vs. Drain to Source Voltage

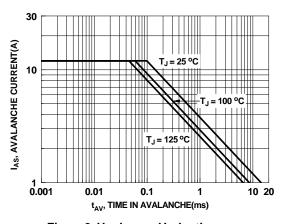


Figure 9. Unclamped Inductive Switching Capability

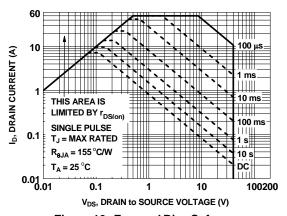


Figure 10. Forward Bias Safe Operating Area

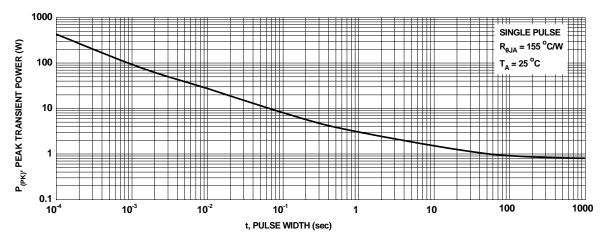


Figure 11. Single Pulse Maximum Power Dissipation

# Typical Characteristics $T_J = 25$ °C unless otherwise noted.

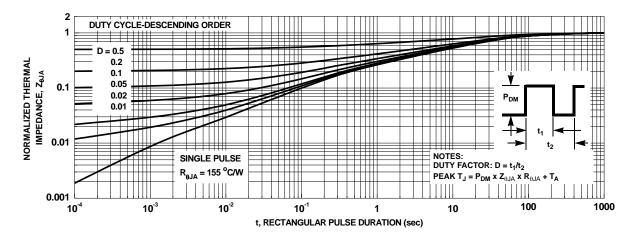
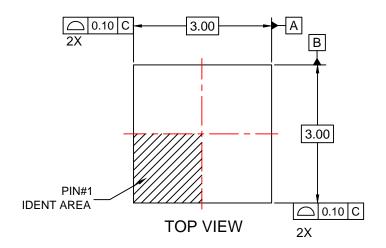
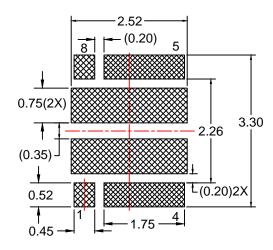
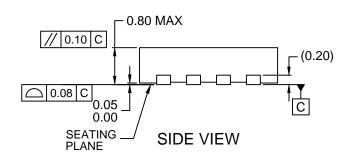


Figure 12. Junction-to-Ambient Transient Thermal Response Curve



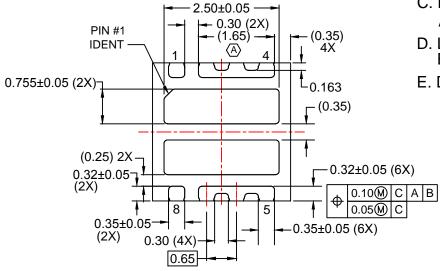


RECOMMENDED LAND PATTERN



## NOTES:

- A)DOES NOT FULLY CONFORM TO JEDEC REGISTRATION, MO-229.
  - B. DIMENSIONS ARE IN MILLIMETERS.
- C. DIMENSIONS AND TOLERANCES PER ASME Y14.5M, 1994
- D. LAND PATTERN RECOMMENDATION IS BASED ON FSC DESIGN ONLY
- E. DRAWING FILE NAME: MKT-MLP08Xrev2.



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