

July 2013

FDMC8030

Dual N-Channel Power Trench $^{\! B}$ MOSFET 40 V, 12 A, 10 $m\Omega$

Features

- Max $r_{DS(on)}$ = 10 m Ω at V_{GS} = 10 V, I_D = 12 A
- Max $r_{DS(on)}$ = 14 m Ω at V_{GS} = 4.5 V, I_D = 10 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

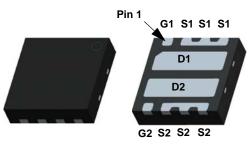
General Description

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.

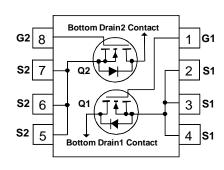
Applications

- Battery Protection
- Load Switching
- Point of Load









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

Symbol	Parame	ter		Ratings	Units
V_{DS}	Drain to Source Voltage			40	V
V_{GS}	Gate to Source Voltage		(Note 4)	±12	V
	Drain Current -Continuous	T _A = 25 °C	(Note 1a)	12	^
ID .	-Pulsed			50	Α
E _{AS}	Single Pulse Avalanche Energy		(Note 3)	21	mJ
Ъ	Power Dissipation	T _A = 25 °C	(Note 1a)	1.9	W
P _D Power Dissipation		T _A = 25 °C	(Note 1b)	0.8	VV
T _J , T _{STG}	Operating and Storage Junction Temperat	ure Range		-55 to +150	°C

Thermal Characteristics

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

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 Char	Off Characteristics						
BV_{DSS}	Drain to Source Breakdown Voltage	I _D = 250 μA, V _{GS} = 0 V	40			V	
$\frac{\Delta BV_{DSS}}{\Delta T_{J}}$	Breakdown Voltage Temperature Coefficient	I _D = 250 μA, referenced to 25 °C		19		mV/°C	
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = 32 V, V _{GS} = 0 V			1	μΑ	
I _{GSS}	Gate to Source Leakage Current, Forward	$V_{GS} = 12 \text{ V}, V_{DS} = 0 \text{ V}$			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 _D = 250 μA, referenced to 25 °C		-5		mV/°C
	V _{GS} = 10 V, I _D = 12 A		8	10		
		$V_{GS} = 4.5 \text{ V}, I_D = 10 \text{ A}$		10	14	
r _{DS(on)}	r _{DS(on)} Static Drain to Source On Resistance	$V_{GS} = 3.2 \text{ V}, I_D = 4 \text{ A}$		19	28	mΩ
	$V_{GS} = 10 \text{ V}, I_D = 12 \text{ A}$ $T_J = 125 ^{\circ}\text{C}$		13	16		
9 _{FS}	Forward Transconductance	V _{DD} = 5 V, I _D = 12 A		57		S

Dynamic Characteristics

C _{iss}	Input Capacitance	V 20 V V 0 V	1462	1975	pF
Coss	Output Capacitance	$V_{DS} = 20 \text{ V}, V_{GS} = 0 \text{ V}$ f = 1MHz	321	430	pF
C _{rss}	Reverse Transfer Capacitance	1 - 11/11/2	20	30	pF
R_g	Gate Resistance		0.9	2.5	Ω

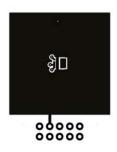
Switching Characteristics

	•					
t _{d(on)}	Turn-On Delay Time			7	13	ns
t _r	Rise Time	V _{DD} = 20 V, I _D = 12 A		3	10	ns
t _{d(off)}	Turn-Off Delay Time	$V_{GS} = 10 \text{ V}, R_{GEN} = 6$	Ω	19	33	ns
t _f	Fall Time			3	10	ns
0	Total Gate Charge	V _{GS} = 0 V to 10 V		21	30	nC
$Q_{g(TOT)}$	Total Gate Charge	$V_{GS} = 0 \text{ V to 5 V}$ V_{DI}	_D = 20 V	12	17	nC
Q_{gs}	Gate to Source Charge	I _D :	= 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 _{rr}	Reverse Recovery Time	I _F = 12 A, di/dt = 100 A/μs		25	40	ns
Q _{rr}	Reverse Recovery Charge			9	18	nC

^{1.} $R_{\theta,IA}$ 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 in² pad of 2 oz copper



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

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

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

Typical Characteristics T_J = 25°C unless otherwise noted

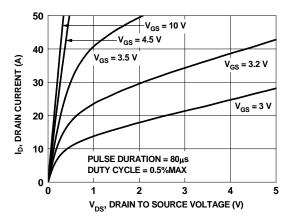


Figure 1. On-Region Characteristics

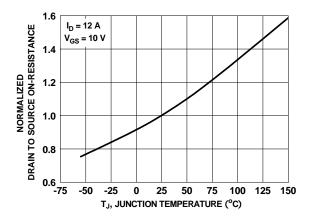


Figure 3. Normalized On-Resistance vs Junction Temperature

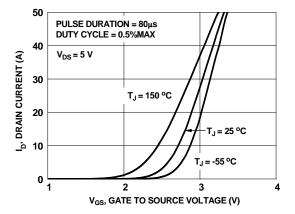


Figure 5. Transfer Characteristics

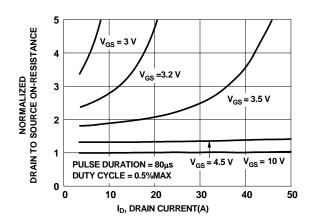


Figure 2. Normalized On-Resistance vs Drain Current and Gate Voltage

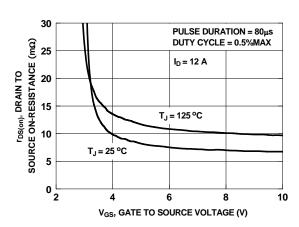


Figure 4. On-Resistance vs Gate to Source Voltage

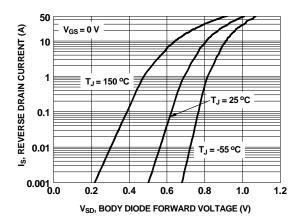


Figure 6. Source to Drain Diode Forward Voltage vs Source Current

Typical Characteristics T_J = 25°C unless otherwise noted

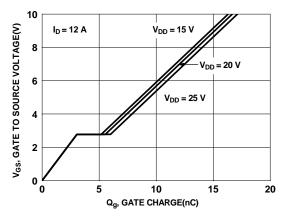


Figure 7. Gate Charge Characteristics

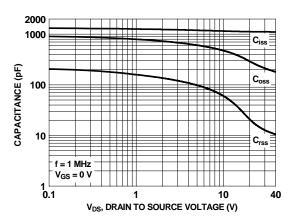


Figure 8. Capacitance vs Drain to Source Voltage

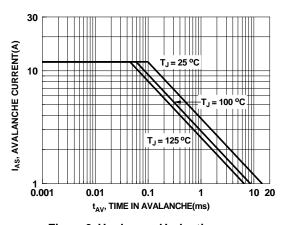


Figure 9. Unclamped Inductive Switching Capability

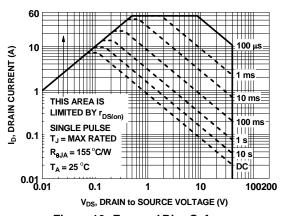


Figure 10. Forward Bias Safe Operating Area

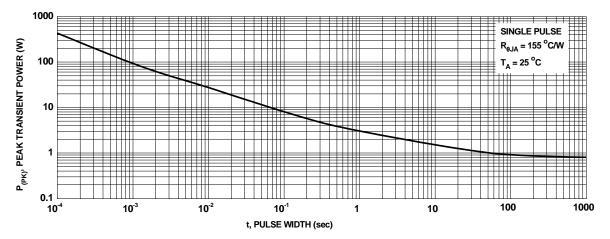


Figure 11. Single Pulse Maximum Power Dissipation

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

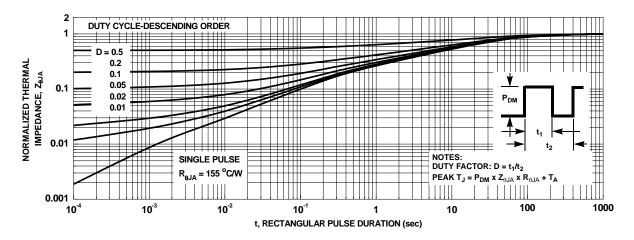
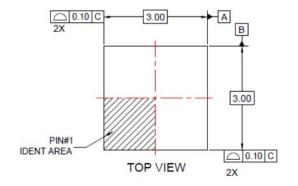
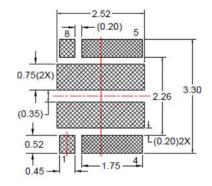
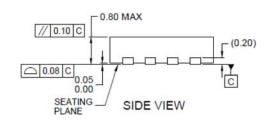


Figure 12. Junction-to-Ambient Transient Thermal Response Curve

Dimensional Outline and Pad Layout



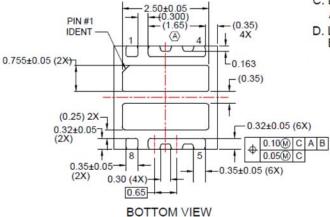




RECOMMENDED LAND PATTERN

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
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