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FDMC8030

Dual N-Channel Power Trench[®] MOSFET

40 V, 12 A, 10 mΩ

Features

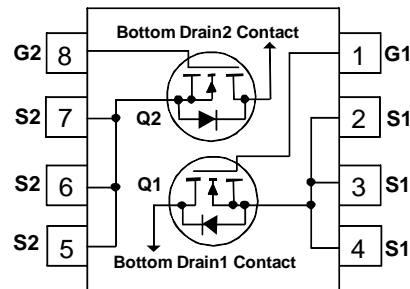
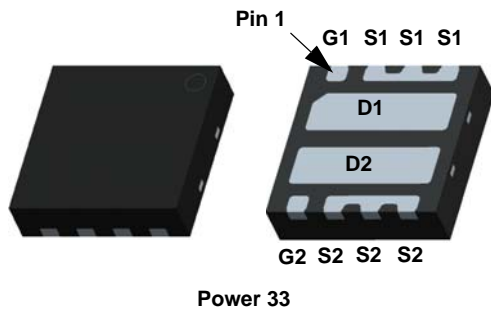
- Max $r_{DS(on)}$ = 10 mΩ at $V_{GS} = 10\text{ V}$, $I_D = 12\text{ A}$
- Max $r_{DS(on)}$ = 14 mΩ at $V_{GS} = 4.5\text{ V}$, $I_D = 10\text{ A}$
- Max $r_{DS(on)}$ = 28 mΩ at $V_{GS} = 3.2\text{ V}$, $I_D = 4\text{ A}$
- Termination is Lead-free and RoHS Compliant

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 $T_A = 25\text{ °C}$ unless otherwise noted.

Symbol	Parameter	Ratings	Units
V_{DS}	Drain to Source Voltage	40	V
V_{GS}	Gate to Source Voltage	±12 (Note 4)	V
I_D	Drain Current -Continuous	12 (Note 1a)	A
	-Pulsed	50	
E_{AS}	Single Pulse Avalanche Energy	21 (Note 3)	mJ
P_D	Power Dissipation	14 ($T_C = 25\text{ °C}$)	W
	Power Dissipation	1.9 ($T_A = 25\text{ °C}$) (Note 1a)	
T_J, T_{STG}	Operating and Storage Junction Temperature Range	-55 to +150	°C

Thermal Characteristics

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

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 $T_J = 25\text{ }^\circ\text{C}$ 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 $25\text{ }^\circ\text{C}$		19		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, Forward	$V_{GS} = 12\text{ V}, V_{DS} = 0\text{ V}$			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	1.5	2.8	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 $25\text{ }^\circ\text{C}$		-5		mV/ $^\circ\text{C}$
$r_{DS(on)}$	Static Drain to Source On Resistance	$V_{GS} = 10\text{ V}, I_D = 12\text{ A}$		8	10	m Ω
		$V_{GS} = 4.5\text{ V}, I_D = 10\text{ A}$		10	14	
		$V_{GS} = 3.2\text{ V}, I_D = 4\text{ A}$		19	28	
		$V_{GS} = 10\text{ V}, I_D = 12\text{ A}$ $T_J = 125\text{ }^\circ\text{C}$		13	16	
g_{FS}	Forward Transconductance	$V_{DD} = 5\text{ V}, I_D = 12\text{ A}$		57		S

Dynamic Characteristics

C_{iss}	Input Capacitance	$V_{DS} = 20\text{ V}, V_{GS} = 0\text{ V}$ $f = 1\text{ MHz}$		1462	1975	pF
C_{oss}	Output Capacitance			321	430	pF
C_{rss}	Reverse Transfer Capacitance			20	30	pF
R_g	Gate Resistance			0.9	2.5	Ω

Switching Characteristics

$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 20\text{ V}, I_D = 12\text{ A}$ $V_{GS} = 10\text{ V}, R_{GEN} = 6\text{ }\Omega$		7	13	ns
t_r	Rise Time			3	10	ns
$t_{d(off)}$	Turn-Off Delay Time			19	33	ns
t_f	Fall Time			3	10	ns
$Q_{g(TOT)}$	Total Gate Charge		$V_{GS} = 0\text{ V to }10\text{ V}$		21	30
	Total Gate Charge	$V_{GS} = 0\text{ V to }5\text{ V}$	$V_{DD} = 20\text{ V}$ $I_D = 12\text{ A}$	12	17	nC
Q_{gs}	Gate to Source Charge			2.8		nC
Q_{gd}	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	$I_F = 12\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$		25	40	ns
Q_{rr}	Reverse Recovery Charge			9	18	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. 65 $^\circ\text{C}/\text{W}$ when mounted on a 1 in² pad of 2 oz copper



b. 155 $^\circ\text{C}/\text{W}$ 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 21 mJ is based on starting $T_J = 25\text{ }^\circ\text{C}$, $L = 0.3\text{ mH}$, $I_{AS} = 12\text{ A}$, $V_{DD} = 36\text{ V}$, $V_{GS} = 10\text{ V}$. 100% tested at $L = 3\text{ mH}$, $I_{AS} = 5\text{ A}$.

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

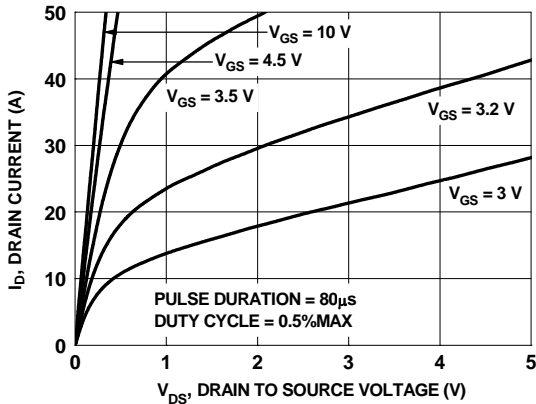


Figure 1. On-Region Characteristics

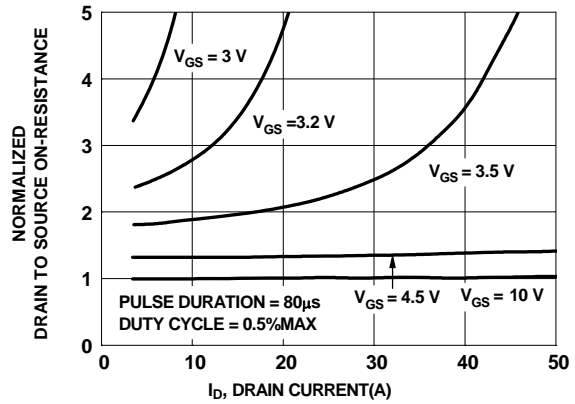


Figure 2. Normalized On-Resistance vs. Drain Current and Gate Voltage

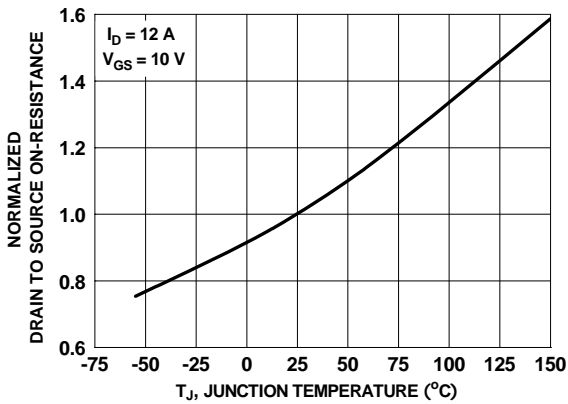


Figure 3. Normalized On-Resistance vs. Junction Temperature

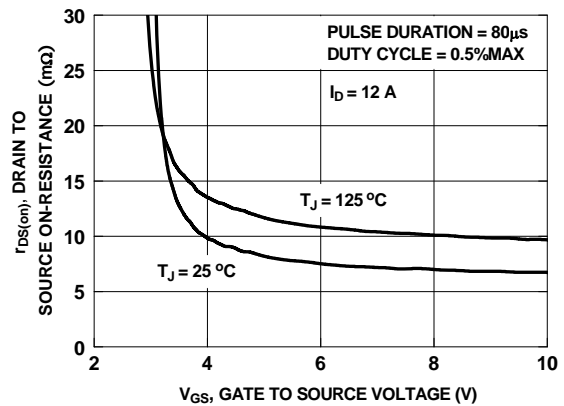


Figure 4. On-Resistance vs. Gate to Source Voltage

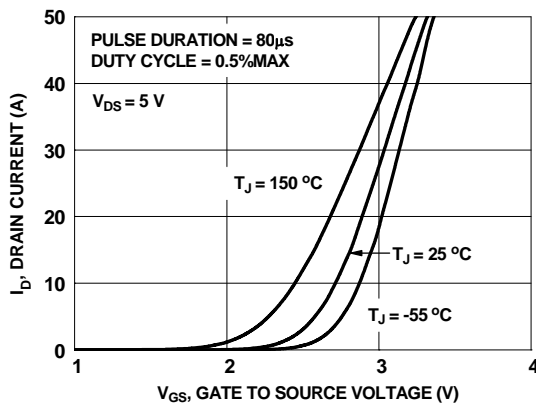


Figure 5. Transfer Characteristics

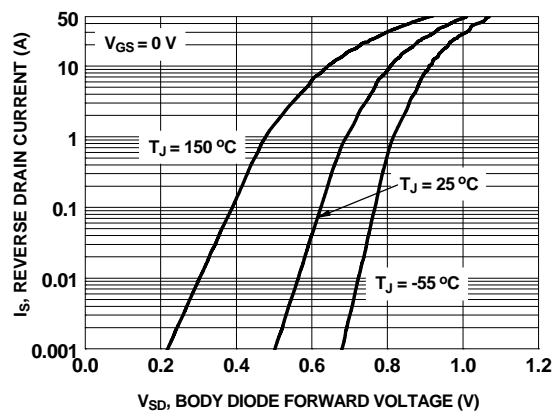


Figure 6. Source to Drain Diode Forward Voltage vs. Source Current

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

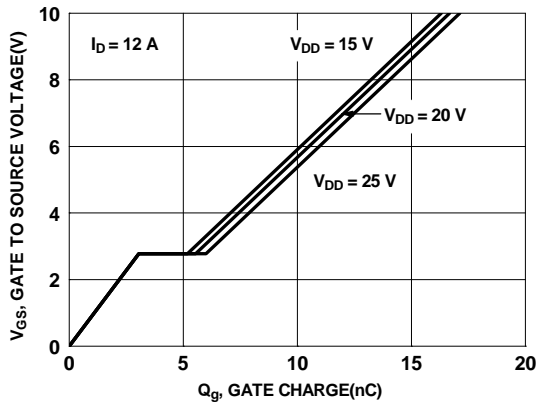


Figure 7. Gate Charge Characteristics

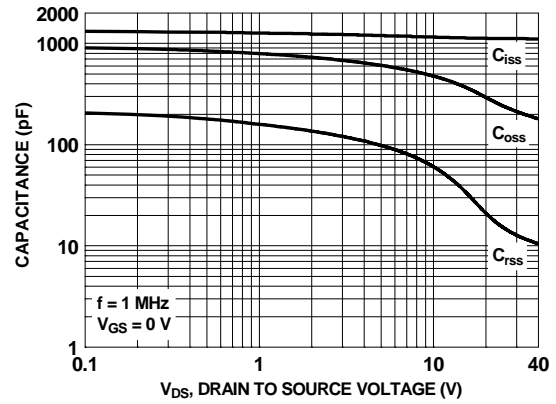


Figure 8. Capacitance vs. Drain to Source Voltage

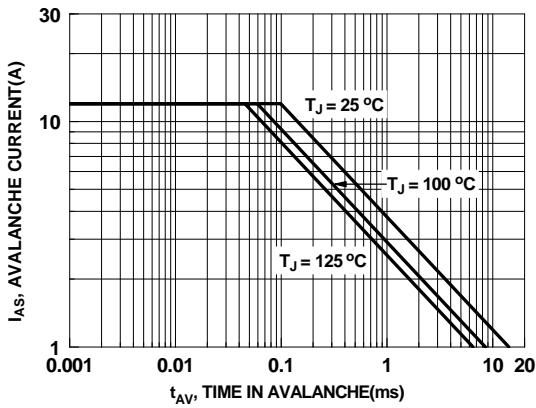


Figure 9. Unclamped Inductive Switching Capability

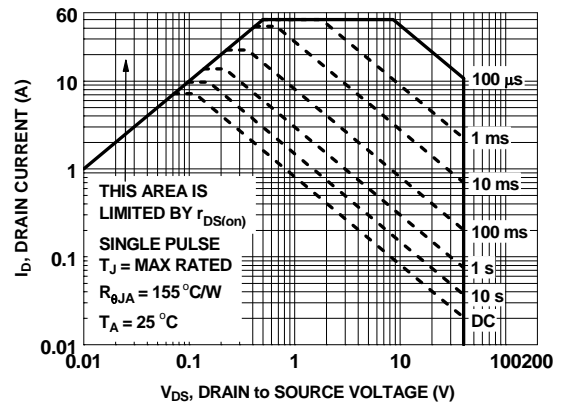


Figure 10. Forward Bias Safe Operating Area

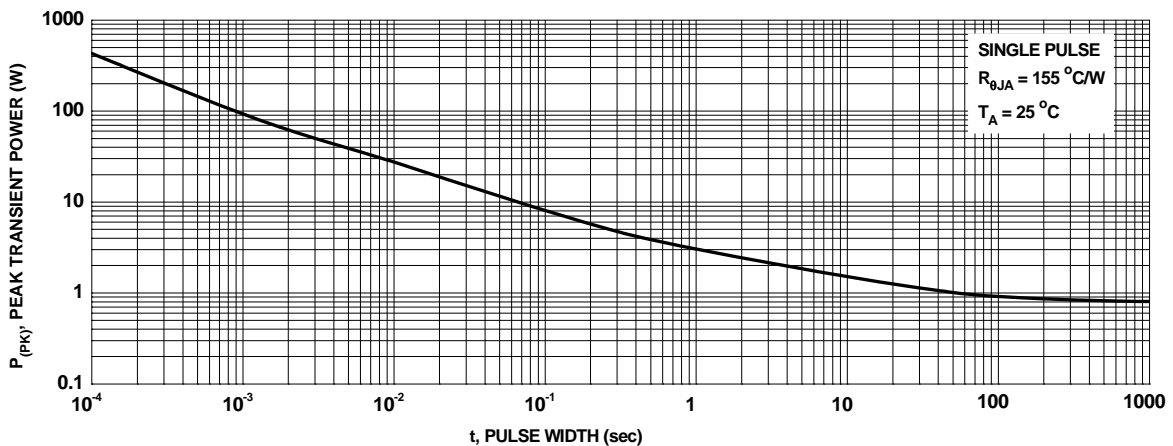


Figure 11. Single Pulse Maximum Power Dissipation

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

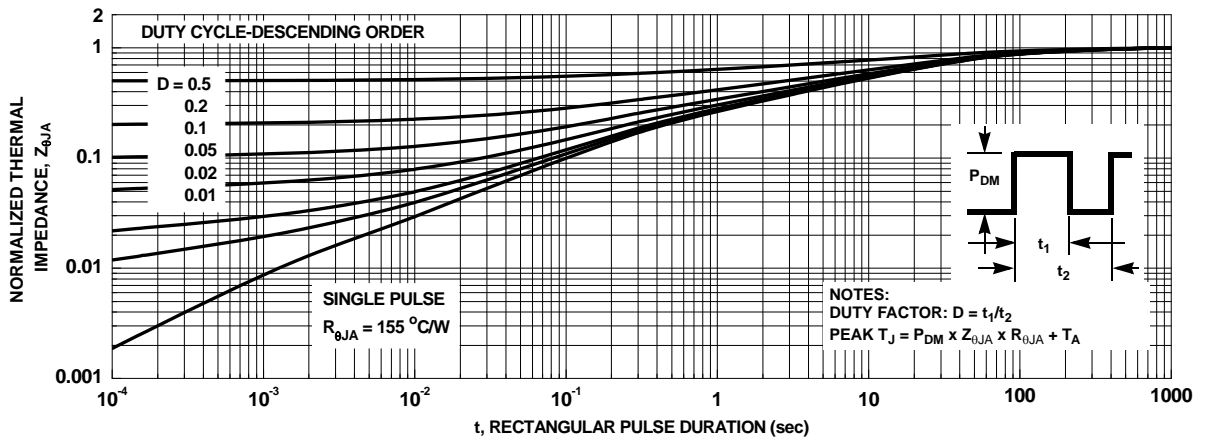
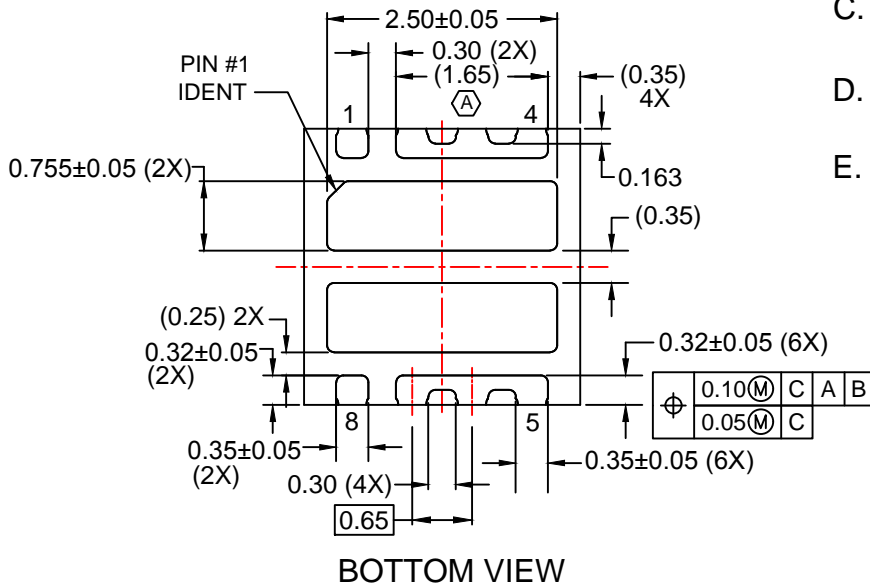
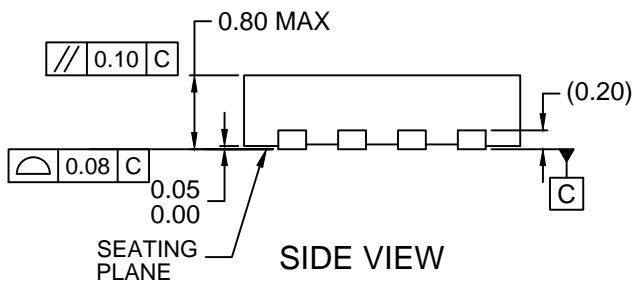
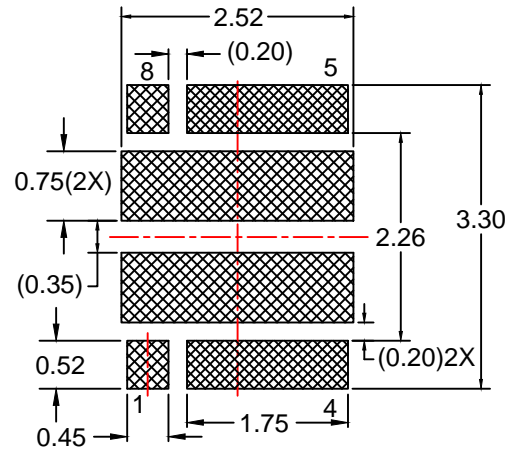
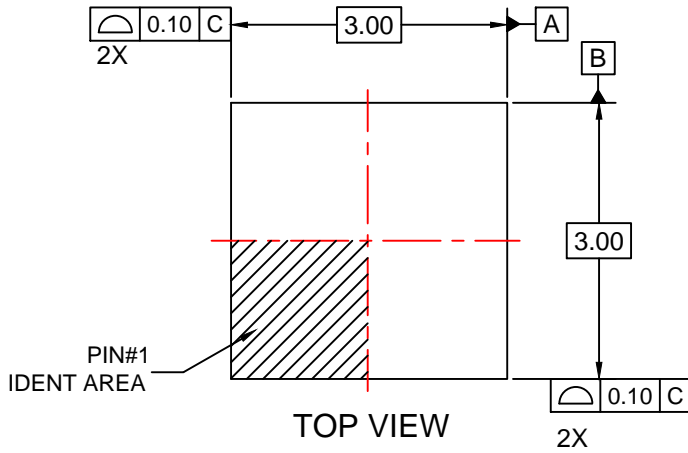


Figure 12. Junction-to-Ambient Transient Thermal Response Curve



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
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Телефон: 8 (812) 309 58 32 (многоканальный)

Факс: 8 (812) 320-02-42

Электронная почта: org@eplast1.ru

Адрес: 198099, г. Санкт-Петербург, ул. Калинина, дом 2, корпус 4, литера А.