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ON Semiconductor®

FDPC4044

Common Drain N-Channel PowerTrench® MOSFET

30 V, 27 A, 4.3 mΩ

Features

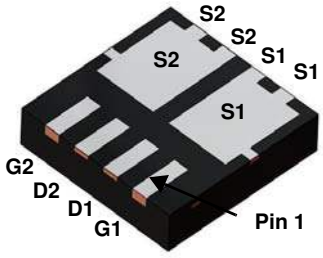
- Max $r_{S1S2(on)}$ = 4.3 mΩ at V_{GS} = 10 V, I_{S1S2} = 27 A
- Max $r_{S1S2(on)}$ = 6.4 mΩ at V_{GS} = 4.5 V, I_{S1S2} = 23 A
- Pakage size/height: 3.3 x 3.3 x 0.8 mm
- Low inductance packaging shortens rise/fall times, resulting in lower switching losses
- MOSFET integration enables optimum layout for lower circuit inductance and reduced switch node ringing
- RoHS Compliant

General Description

This device is designed specifically as a single package solution for Li-Ion battery pack protection circuit and other ultra-portable applications. It features two common drain N-channel MOSFETs, which enables bidirectional current flow. FDPC4044 combines ON Semiconductor's advanced PowerTrench® process with state of the art packaging process to minimize the on-state resistance.

Applications

- Battery management
- Load switch
- Battery protection



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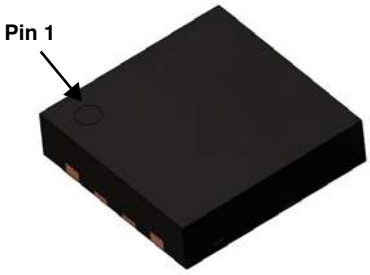

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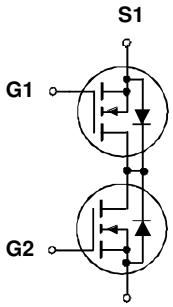

Power Clip 33

MOSFET Maximum Ratings T_A = 25 °C unless otherwise noted

Symbol	Parameter			Ratings	Units
V_{S1S2}	Source1 to Source2 Voltage			30	V
V_{GS}	Gate to Source Voltage		(Note 3)	±20	V
I_{S1S2}	Source1 to Source2 Current -Continuous	T_A = 25 °C	(Note 1a)	27	A
	-Pulsed		(Note 2)	120	
P_D	Power Dissipation	T_A = 25 °C	(Note 1a)	2.7	W
	Power Dissipation	T_A = 25 °C	(Note 1b)	1	
T_J, T_{STG}	Operating and Storage Junction Temperature Range			-55 to +150	°C

Thermal Characteristics

$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	(Note 1a)	47	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	(Note 1b)	127	

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
40CF	FDPC4044	Power Clip 33	13 ”	12 mm	3000 units

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August-2017, Rev.3

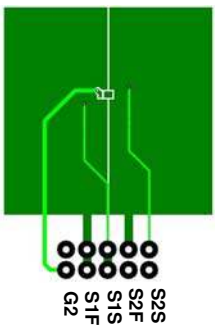
Publication Order Number:
FDPC4044/D

Electrical Characteristics T_J = 25 °C unless otherwise noted

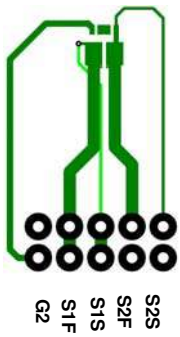
Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Off Characteristics						
I_{S1S2}	Zero Gate Voltage Source1 to Source2 Current	V_{S1S2} = 24 V, V_{GS} = 0 V			1	μA
I_{GSS}	Gate to Source Leakage Current	V_{GS} = 20 V, V_{S1S2} = 0 V			100	nA
On Characteristics						
$V_{GS(th)}$	Gate to Source Threshold Voltage	V_{GS} = V_{S1S2}, I_{S1S2} = 250 μA	1.2	1.5	3	V
$r_{S1S2(on)}$	Static Source1 to Source2 On Resistance	V_{GS} =10 V, I_{S1S2} = 27 A		3.2	4.3	mΩ
		V_{GS} = 4.5 V, I_{S1S2} = 23 A		4.6	6.4	
		V_{GS} = 10 V, I_{S1S2} = 27 A, T_J = 125 °C		4.5	7	
g_{FS}	Forward Transconductance	V_{S1S2} = 10 V, I_{S1S2} = 27 A		150		S
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{S1S2} = 15 V, V_{GS} = 0 V, f = 1 MHz		2295	3215	pF
C_{oss}	Output Capacitance			627	880	pF
C_{rss}	Reverse Transfer Capacitance			66	95	pF
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{S1S2} = 15 V, I_{S1S2} = 27 A, V_{GS} = 10 V, R_{GEN} = 6 Ω		8.5	17	ns
t_r	Rise Time			4.8	10	ns
$t_{d(off)}$	Turn-Off Delay Time			32	52	ns
t_f	Fall Time			5.2	10	ns
Q_g	Total Gate Charge	V_{S1S2} = 15 V, I_{S1S2} = 27 A, V_{G1S1} = 10 V, V_{G2S2} = 0 V		35	49	nC
Q_{gs}	Gate to Source1 Gate Charge			5.7		nC
Q_{gd}	Gate to Source2 “Miller” Charge			4.7		nC
Source1 to Source2 Diode Characteristics						
I_{fss}	Maximum Continuous Source1 to Source2 Diode Forward Current				1	A
V_{fss}	Source1 to Source2 Diode Forward Voltage	V_{G1S1} = 0 V, V_{G2S2} = 4.5 V, I_{fss} = 27 A (Note 2)		0.8	1.2	V

Notes:

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



a. 47 °C/W when mounted on a 1 in^2 pad of 2 oz copper.



b.127 °C/W when mounted on a minimum pad of 2 oz copper.

2. Pulse Test: Pulse Width < 300 us, Duty cycle < 2.0%.

3. As an N-ch device, the negative Vgs rating is for low duty cycle pulse ocurrence only. No continuous rating is implied.

Typical Characteristics T_J = 25 °C unless otherwise noted

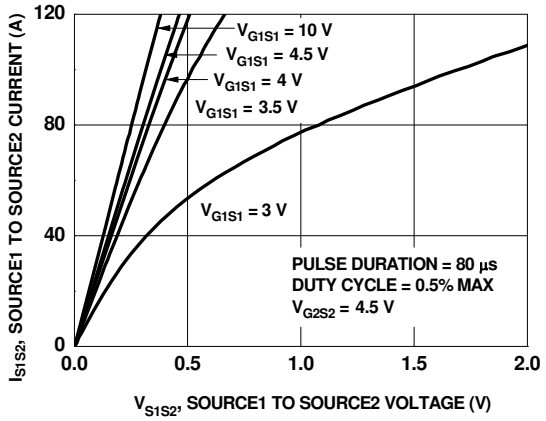


Figure 1. On-Region Characteristics

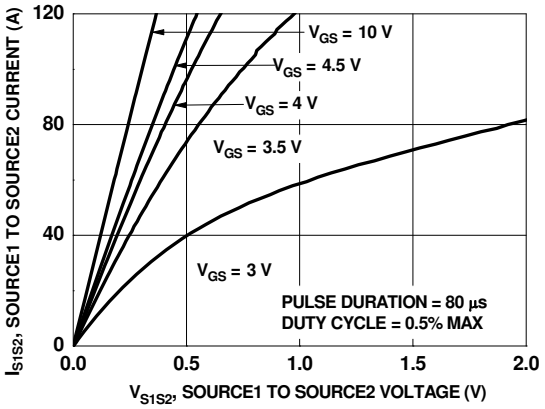


Figure 2. On-Region Characteristics

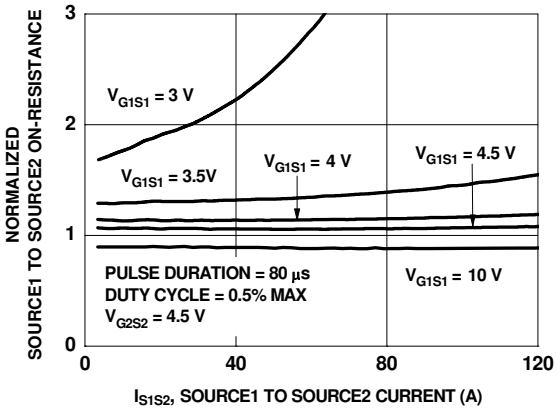


Figure 3. Normalized On-Resistance vs Source1 to Source2 Current and Gate Voltage

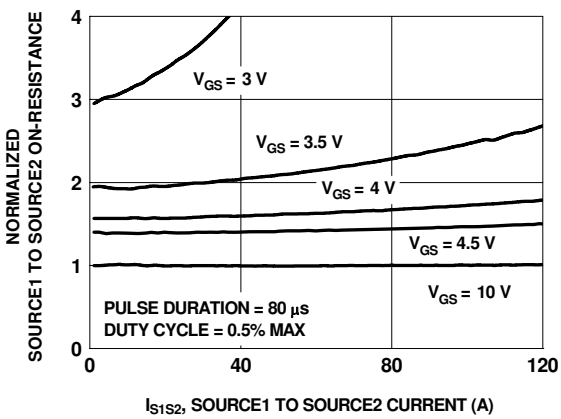


Figure 4. Normalized On-Resistance vs Source1 to Source2 Current and Gate Voltage

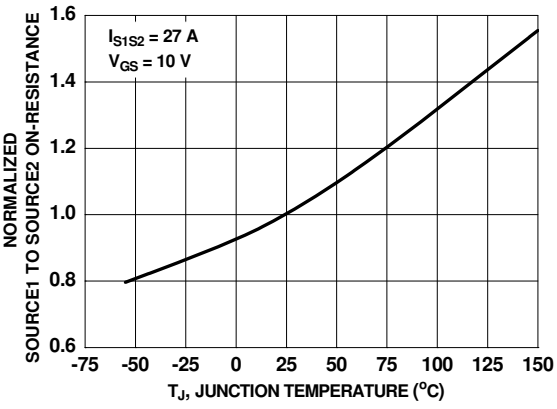


Figure 5. Normalized On- Resistance vs Junction Temperature

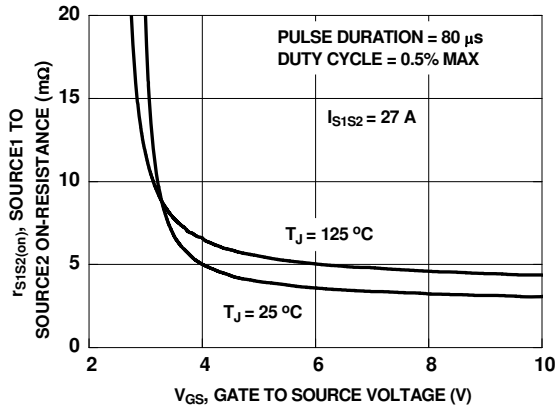


Figure 6. On-Resistance vs Gate to Source Voltage

Typical Characteristics T_J = 25 °C unless otherwise noted

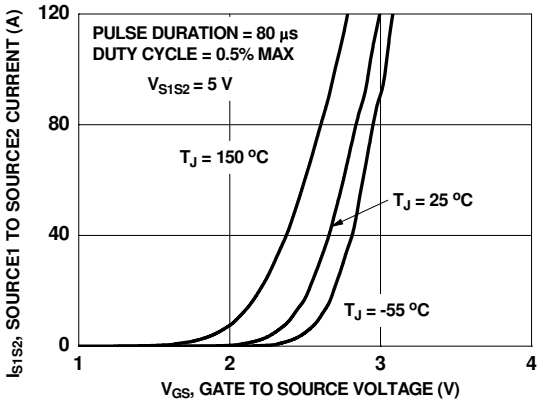


Figure 7. Transfer Characteristics

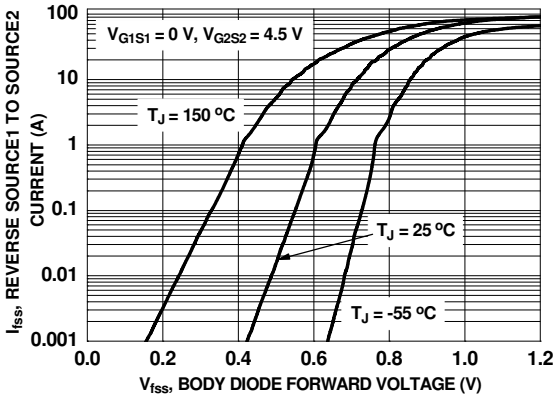


Figure 8. Source1 to Source2 Diode Forward Voltage vs Source Current

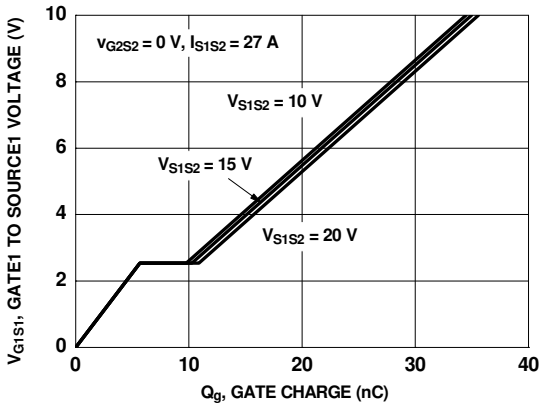


Figure 9. Gate Charge Characteristics

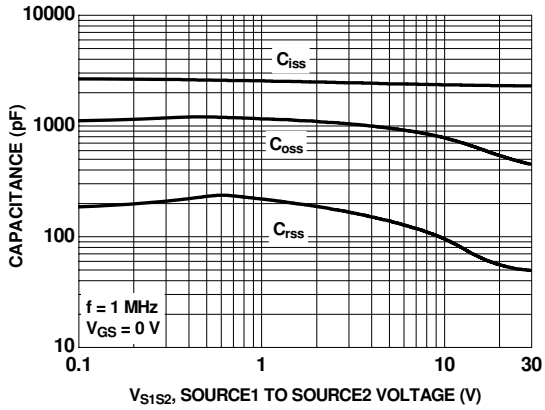


Figure 10. Capacitance vs Source1 to Source2 Voltage

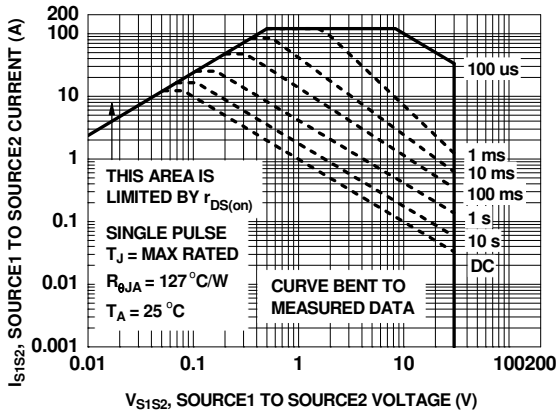


Figure 11. Forward Bias Safe Operating Area

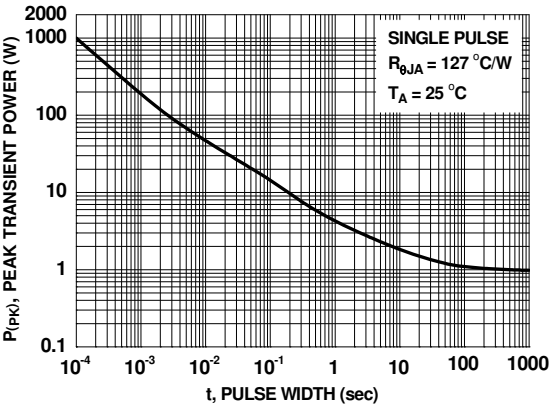


Figure 12. Single Pulse Maximum Power Dissipation

Typical Characteristics T_J = 25 °C unless otherwise noted

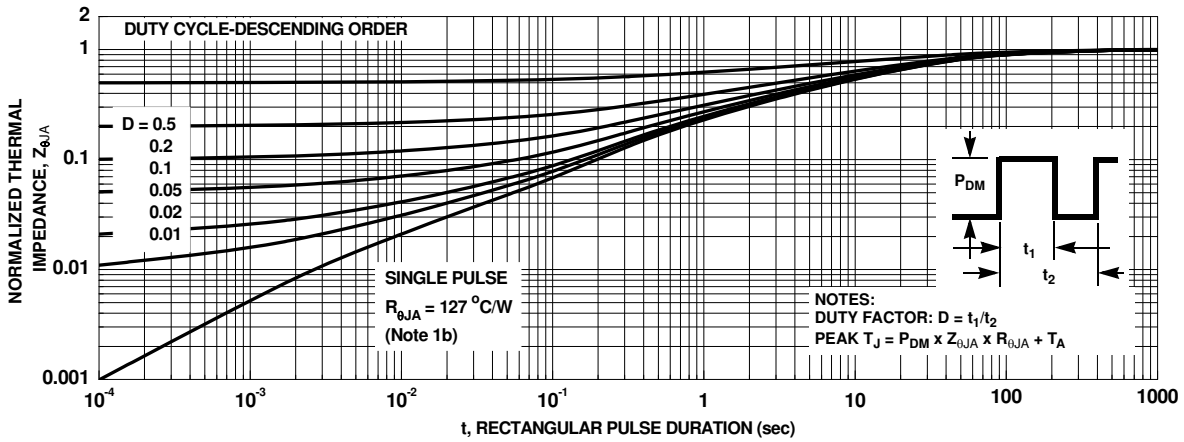
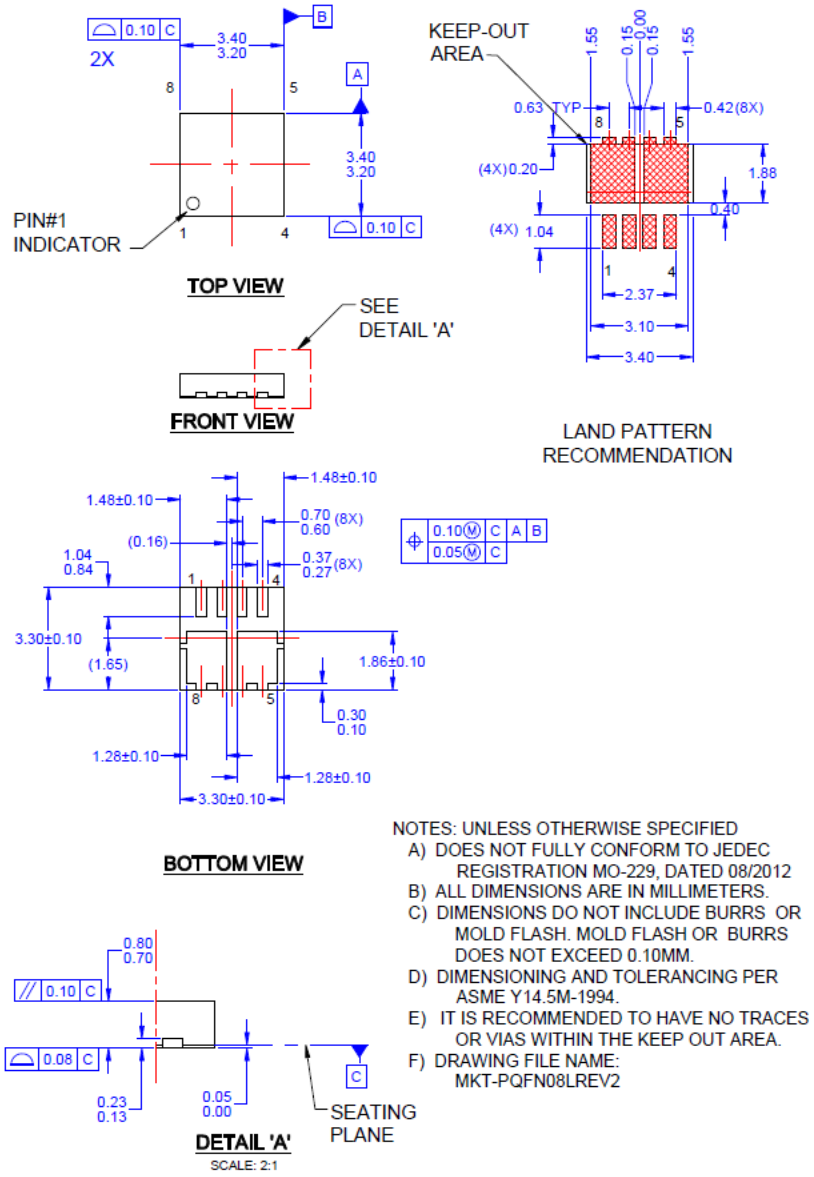


Figure 13. Junction-to-Ambient Transient Thermal Response Curve

Dimensional Outline and Pad Layout



NOTES: UNLESS OTHERWISE SPECIFIED

A) DOES NOT FULLY CONFORM TO JEDEC REGISTRATION MO-229, DATED 08/2012
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-1994.
E) IT IS RECOMMENDED TO HAVE NO TRACES OR VIAS WITHIN THE KEEP OUT AREA.
F) DRAWING FILE NAME: MKT-PQFN08LREV2

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