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ON Semiconductor®

# FDP6030BL/FDB6030BL

## N-Channel Logic Level PowerTrench® MOSFET

FDP6030BL/FDB6030BL

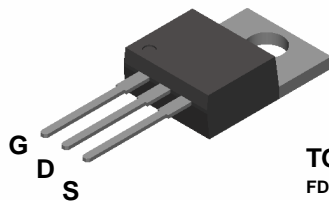
### General Description

This N-Channel Logic Level MOSFET has been designed specifically to improve the overall efficiency of DC/DC converters using either synchronous or conventional switching PWM controllers.

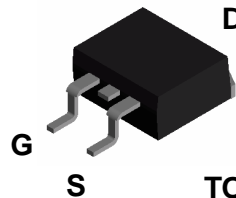
These MOSFETs feature faster switching and lower gate charge than other MOSFETs with comparable  $R_{DS(ON)}$  specifications resulting in DC/DC power supply designs with higher overall efficiency.

### Features

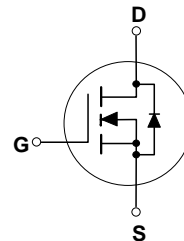
- 40 A, 30 V.  $R_{DS(ON)} = 0.018 \Omega @ V_{GS} = 10 \text{ V}$   
 $R_{DS(ON)} = 0.024 \Omega @ V_{GS} = 4.5 \text{ V}$ .
- Critical DC electrical parameters specified at elevated temperature.
- Rugged internal source-drain diode can eliminate the need for an external Zener diode transient suppressor.
- High performance trench technology for extremely low  $R_{DS(ON)}$ .
- 175°C maximum junction temperature rating.



**TO-220**  
FDP Series



**TO-263AB**  
FDB Series



### Absolute Maximum Ratings T<sub>C</sub> = 25°C unless otherwise noted

Symbol	Parameter	FDP6030BL	FDB6030BL	Units
$V_{DSS}$	Drain-Source Voltage	30		V
$V_{GSS}$	Gate-Source Voltage	±20		V
$I_D$	Maximum Drain Current - Continuous (Note 1)	40		A
		120		
$P_D$	Total Power Dissipation @ $T_C = 25^\circ\text{C}$	60		W
	Derate above $25^\circ\text{C}$	0.36		
$T_J, T_{STG}$	Operating and Storage Junction Temperature Range	-65 to +175		°C

### Thermal Characteristics

$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	2.5	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	62.5	°C/W

### Package Marking and Ordering Information

Device Marking	Device	Reel Size	Tape Width	Quantity
FDB6030BL	FDB6030BL	13"	24mm	800
FDP6030BL	FDP6030BL	Tube	N/A	45

**Electrical Characteristics**T<sub>C</sub> = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
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**DRAIN-SOURCE AVALANCHE RATINGS** (Note 1)

W <sub>DSS</sub>	Single Pulse Drain-Source Avalanche Energy	V <sub>DD</sub> = 15 V, I <sub>D</sub> = 40 A			150	mJ
I <sub>AR</sub>	Maximum Drain-Source Avalanche Current				40	A

**Off Characteristics**

BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> = 0 V, I <sub>D</sub> = 250 μA	30			V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	I <sub>D</sub> = 250 μA, Referenced to 25°C		23		mV/°C
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> = 24 V, V <sub>GS</sub> = 0 V			1	μA
I <sub>GSSF</sub>	Gate-Body Leakage Current, Forward	V <sub>GS</sub> = 20 V, V <sub>DS</sub> = 0 V			100	nA
I <sub>GSSR</sub>	Gate-Body Leakage Current, Reverse	V <sub>GS</sub> = -20 V, V <sub>DS</sub> = 0 V			-100	nA

**On Characteristics** (Note 1)

V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250 μA	1	1.6	3	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate Threshold Voltage Temperature Coefficient	I <sub>D</sub> = 250 μA, Referenced to 25°C		-4.5		mV/°C
R <sub>DS(on)</sub>	Static Drain-Source On-Resistance	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 20 A, V <sub>GS</sub> = 10 V, I <sub>D</sub> = 20 A, T <sub>J</sub> = 125°C V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 17 A		0.015 0.021 0.019	0.018 0.030 0.024	Ω
I <sub>D(on)</sub>	On-State Drain Current	V <sub>GS</sub> = 10 V, V <sub>DS</sub> = 10 V	40			A
g <sub>FS</sub>	Forward Transconductance	V <sub>DS</sub> = 5 V, I <sub>D</sub> = 20 A		30		S

**Dynamic Characteristics**

C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> = 15 V, V <sub>GS</sub> = 0 V, f = 1.0 MHz		1160		pF
C <sub>oss</sub>	Output Capacitance			250		pF
C <sub>rss</sub>	Reverse Transfer Capacitance			100		pF

**Switching Characteristics** (Note 1)

t <sub>d(on)</sub>	Turn-On Delay Time	V <sub>DD</sub> = 15 V, I <sub>D</sub> = 1 A, V <sub>GS</sub> = 10 V, R <sub>GEN</sub> = 6 Ω		9	17	ns
t <sub>r</sub>	Turn-On Rise Time			11	20	ns
t <sub>d(off)</sub>	Turn-Off Delay Time			23	37	ns
t <sub>f</sub>	Turn-Off Fall Time			8	16	ns
Q <sub>g</sub>	Total Gate Charge	V <sub>DS</sub> = 15 V, I <sub>D</sub> = 20 A, V <sub>GS</sub> = 5 V		12	17	nC
Q <sub>gs</sub>	Gate-Source Charge			3.2		nC
Q <sub>gd</sub>	Gate-Drain Charge			3.7		nC

**Drain-Source Diode Characteristics and Maximum Ratings**

I <sub>S</sub>	Maximum Continuous Drain-Source Diode Forward Current (Note 1)				40	A
V <sub>SD</sub>	Drain-Source Diode Forward Voltage	V <sub>GS</sub> = 0 V, I <sub>S</sub> = 20 A (Note 1)		0.95	1.2	V

**Note:**

1. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2.0%

## Typical Characteristics

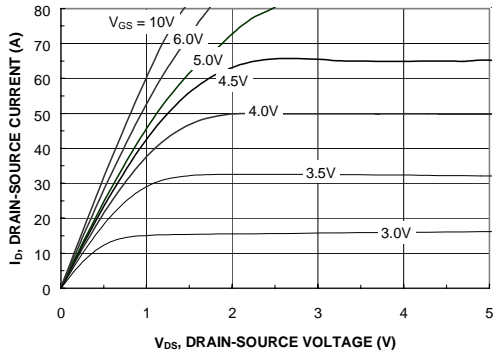


Figure 1. On-Region Characteristics.

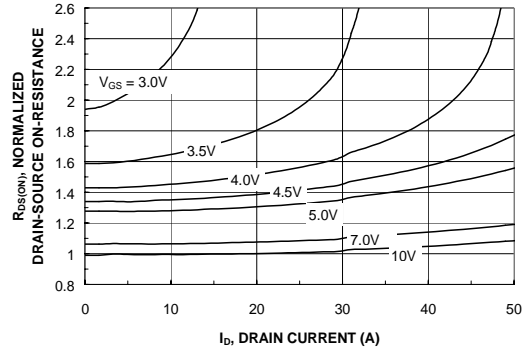


Figure 2. On-Resistance Variation with Drain Current and Gate Voltage.

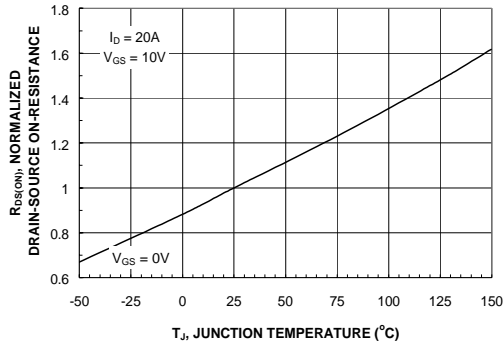


Figure 3. On-Resistance Variation with Temperature.

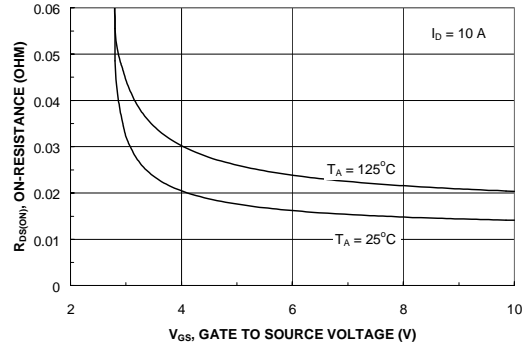


Figure 4. On-Resistance Variation with Gate-to-Source Voltage.

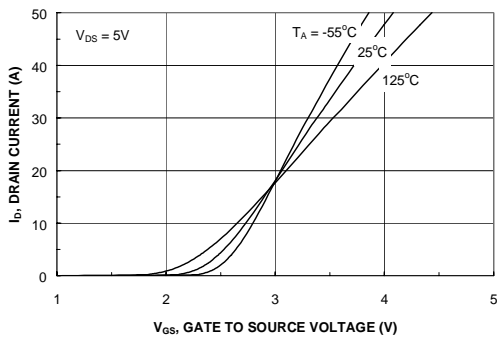


Figure 5. Transfer Characteristics.

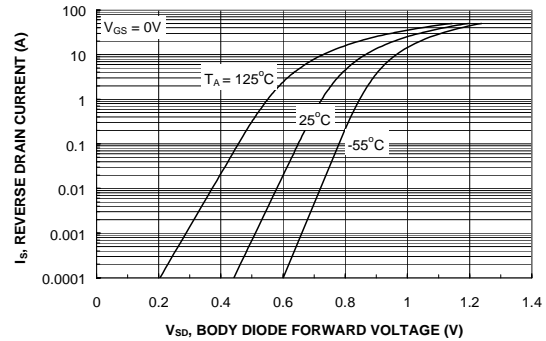
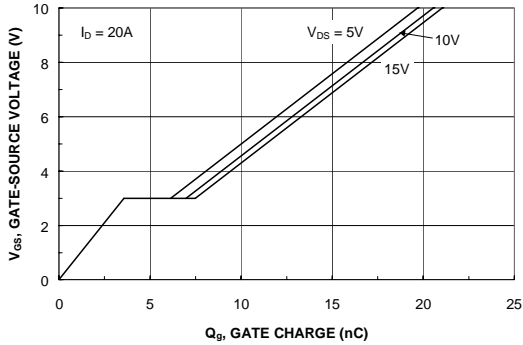
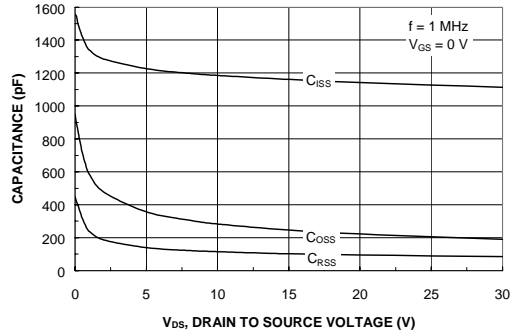


Figure 6. Body Diode Forward Voltage Variation with Source Current and Temperature.

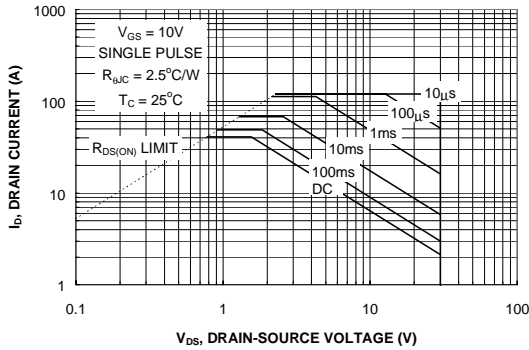
**Typical Characteristics** (continued)



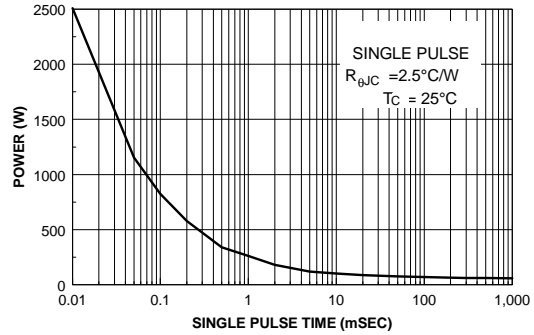
**Figure 7. Gate-Charge Characteristics.**



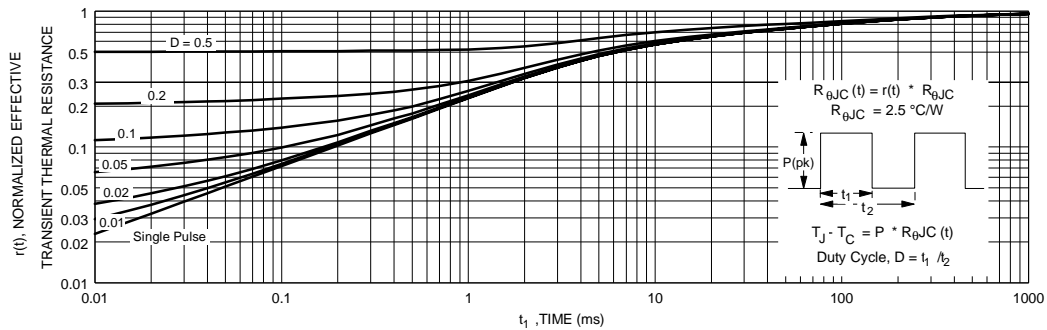
**Figure 8. Capacitance Characteristics.**



**Figure 9. Maximum Safe Operating Area.**



**Figure 10. Single Pulse Maximum Power Dissipation.**



**Figure 11. Transient Thermal Response Curve.**

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