

# FDP8030L/FDB8030L

## N-Channel Logic Level PowerTrench® MOSFET

### General Description

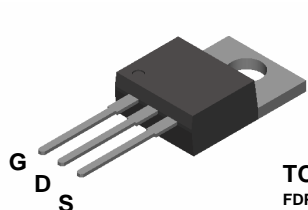
This N-Channel Logic level MOSFET has been designed specifically to improve the overall efficiency of DC/DC converters using either synchronous or conventional switching PWM controllers.

These MOSFETS feature faster switching and lower gate charge than other MOSFETS with comparable  $R_{DS(ON)}$  specifications.

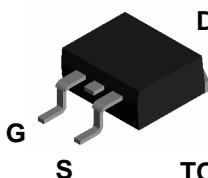
The result is a MOSFET that is easy and safer to drive (even at very high frequencies), and DC/DC power supply designs with higher overall efficiency.

### Features

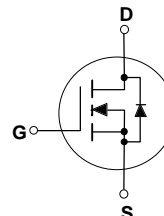
- 80 A, 30 V.  $R_{DS(ON)} = 0.0035 \Omega @ V_{GS} = 10 \text{ V}$   
 $R_{DS(ON)} = 0.0045 \Omega @ V_{GS} = 4.5 \text{ V}$
- Critical DC electrical parameters specified at elevated temperature
- Rugged internal source-drain diode can eliminate the need for an external Zener diode transient suppressor
- 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 $T_A=25^\circ\text{C}$ unless otherwise noted

| Symbol         | Parameter   | Ratings     | Units |
|----------------|---|-------------|-------|
| $V_{DSS}$      | Drain-Source Voltage  | 30          | V     |
| $V_{GSS}$      | Gate-Source Voltage   | $\pm 20$    | V     |
| $I_D$          | Drain Current – Continuous (Note 1)   | 80          | A     |
|                | – Pulsed (Note 1)   | 300         |       |
| $P_D$          | Total Power Dissipation @# $T_C = 25^\circ\text{C}$                           | 187         | W     |
|                | Derate above $25^\circ\text{C}$   | 1.25        | W/°C  |
| $T_J, T_{STG}$ | Operating and Storage Junction Temperature Range                              | -65 to +175 | °C    |
| $T_L$          | Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds | 275         | °C    |

### Thermal Characteristics

|                 |   |      |      |
|-----------------|---|------|------|
| $R_{\theta JC}$ | Thermal Resistance, Junction-to-Case    | 0.8  | °C/W |
| $R_{\theta JA}$ | Thermal Resistance, Junction-to-Ambient | 62.5 | °C/W |

## Electrical Characteristics

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

| Symbol | Parameter | Test Conditions | Min | Typ | Max | Units |
|--------|-----------|-----------------|-----|-----|-----|-------|
|--------|-----------|-----------------|-----|-----|-----|-------|

### Drain-Source Avalanche Ratings (Note 1)

|           |  |   |  |  |      |    |
|-----------|--|---|--|--|------|----|
| $W_{DSS}$ | Single Pulse Drain-Source Avalanche Energy | $V_{DD} = 20\text{ V}, I_D = 80\text{ A}$ |  |  | 1500 | mJ |
| $I_{AR}$  | Maximum Drain-Source Avalanche Current     |   |  |  | 80   | A  |

### Off Characteristics

|                                      |   |   |    |    |      |                      |
|--------------------------------------|---|---|----|----|------|----------------------|
| $BV_{DSS}$                           | Drain-Source Breakdown Voltage            | $V_{GS} = 0\text{ V}, I_D = 250\ \mu\text{A}$               | 30 |    |      | V                    |
| $\frac{\Delta BV_{DSS}}{\Delta T_J}$ | Breakdown Voltage Temperature Coefficient | $I_D = 250\ \mu\text{A}$ , Referenced to $25^\circ\text{C}$ |    | 23 |      | mV/ $^\circ\text{C}$ |
| $I_{DSS}$                            | Zero Gate Voltage Drain Current           | $V_{DS} = 24\text{ V}, V_{GS} = 0\text{ V}$                 |    |    | 10   | $\mu\text{A}$        |
| $I_{GSSF}$                           | Gate-Body Leakage, Forward                | $V_{GS} = 20\text{ V}, V_{DS} = 0\text{ V}$                 |    |    | 100  | nA                   |
| $I_{GSSR}$                           | Gate-Body Leakage, Reverse                | $V_{GS} = -20\text{ V}, V_{DS} = 0\text{ V}$                |    |    | -100 | nA                   |

### On Characteristics (Note 2)

|  |  |  |    |     |     |                      |
|--|--|--|----|-----|-----|----------------------|
| $V_{GS(th)}$                           | Gate Threshold Voltage                         | $V_{DS} = V_{GS}, I_D = 250\ \mu\text{A}$                          | 1  | 1.5 | 2   | V                    |
| $\frac{\Delta V_{GS(th)}}{\Delta T_J}$ | Gate Threshold Voltage Temperature Coefficient | $I_D = 250\ \mu\text{A}$ , Referenced to $25^\circ\text{C}$        |    | -5  |     | mV/ $^\circ\text{C}$ |
| $R_{DS(on)}$                           | Static Drain-Source On-Resistance              | $V_{GS} = 10\text{ V}, I_D = 80\text{ A}, T_J = 125^\circ\text{C}$ |    | 3.1 | 3.5 | m $\Omega$           |
|  |  | $V_{GS} = 4.5\text{ V}, I_D = 70\text{ A}$                         |    | 4.0 | 5.6 |                      |
|  |  |  |    | 3.6 | 4.5 |                      |
| $I_{D(on)}$                            | On-State Drain Current                         | $V_{GS} = 10\text{ V}, V_{DS} = 10\text{ V}$                       | 60 |     |     | A                    |
| $g_{FS}$                               | Forward Transconductance                       | $V_{DS} = 10\text{ V}, I_D = 80\text{ A}$                          |    | 170 |     | S                    |

### Dynamic Characteristics

|            |                              |   |  |       |  |    |
|------------|------------------------------|---|--|-------|--|----|
| $C_{iss}$  | Input Capacitance            | $V_{DS} = 15\text{ V}, V_{GS} = 0\text{ V}$ |  | 10500 |  | pF |
| $C_{oss}$  | Output Capacitance           | $f = 1.0\text{ MHz}$                        |  | 2700  |  | pF |
| $C_{riss}$ | Reverse Transfer Capacitance |   |  | 1650  |  | pF |

### Switching Characteristics (Note 2)

|              |                     |   |  |     |     |    |
|--------------|---------------------|---|--|-----|-----|----|
| $t_{D(on)}$  | Turn-On Delay Time  | $V_{DD} = 15\text{ V}, I_D = 50\text{ A},$    |  | 20  | 35  | ns |
| $t_r$        | Turn-On Rise Time   | $V_{GS} = 4.5\text{ V}, R_{GEN} = 10\ \Omega$ |  | 185 | 225 | ns |
| $t_{D(off)}$ | Turn-Off Delay Time | $R_{GS} = 10\ \Omega$                         |  | 160 | 200 | ns |
| $t_f$        | Turn-Off Fall Time  |   |  | 200 | 240 | ns |
| $Q_g$        | Total Gate Charge   | $V_{DS} = 15\text{ V},$                       |  | 120 | 170 | nC |
| $Q_{gs}$     | Gate-Source Charge  | $I_D = 80\text{ A}, V_{GS} = 5\text{ V}$      |  | 27  |     | nC |
| $Q_{gd}$     | Gate-Drain Charge   |   |  | 48  |     | nC |

### Drain-Source Diode Characteristics and Maximum Ratings

|          |  |   |  |   |     |   |
|----------|--|---|--|---|-----|---|
| $I_S$    | Maximum Continuous Drain-Source Diode Forward Current (Note 1) |   |  |   | 80  | A |
| $I_{SM}$ | Maximum Pulsed Drain-Source Diode Forward Current (Note 1)     |   |  |   | 300 | A |
| $V_{SD}$ | Drain-Source Diode Forward Voltage                             | $V_{GS} = 0\text{ V}, I_S = 80\text{ A}$ (Note 1) |  | 1 | 1.3 | V |

#### Notes:

1. Pulse Test: Pulse Width < 300 $\mu\text{s}$ , Duty Cycle < 2.0%

## Typical Characteristics

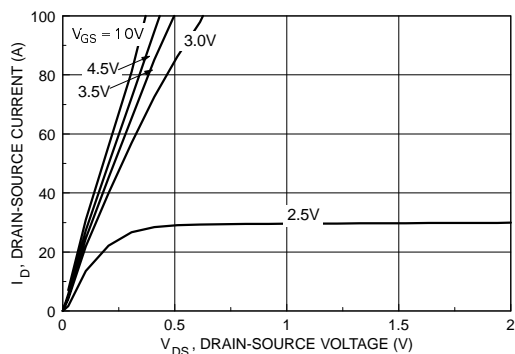


Figure 1. On-Region Characteristics.

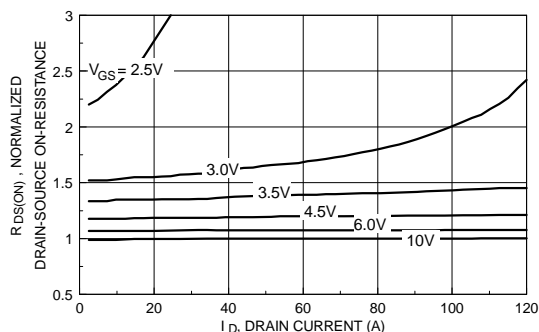


Figure 2. On-Resistance Variation with Drain Current and Gate Voltage.

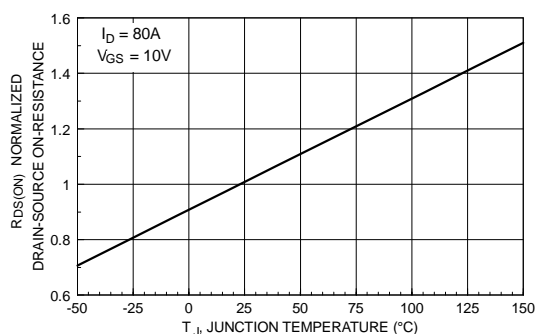


Figure 3. On-Resistance Variation with Temperature.

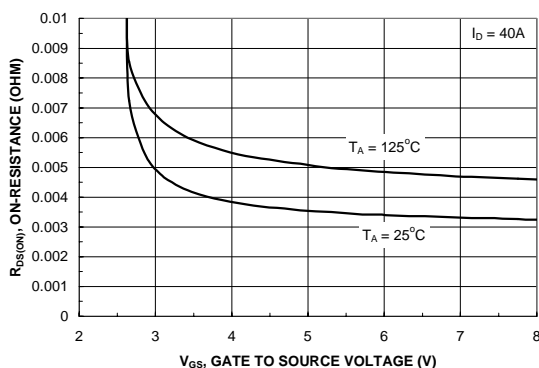


Figure 4. On-Resistance Variation with Gate-to-Source Voltage.

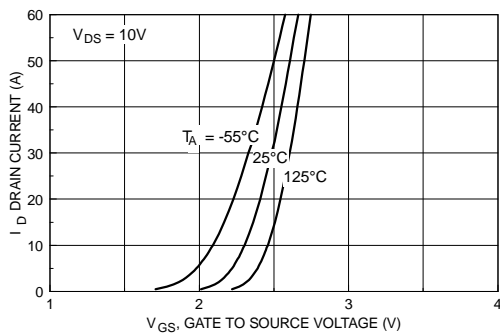


Figure 5. Transfer Characteristics.

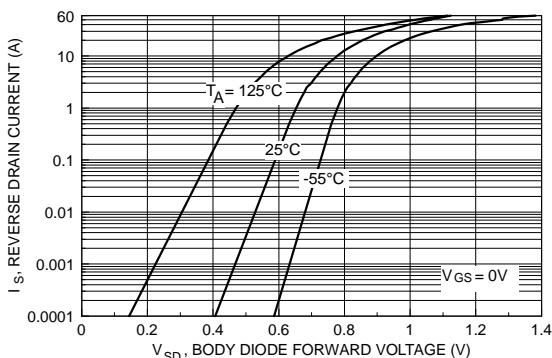
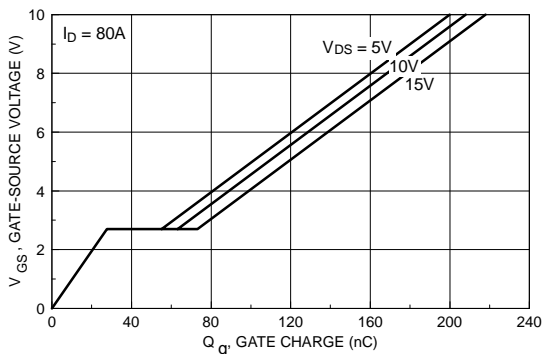
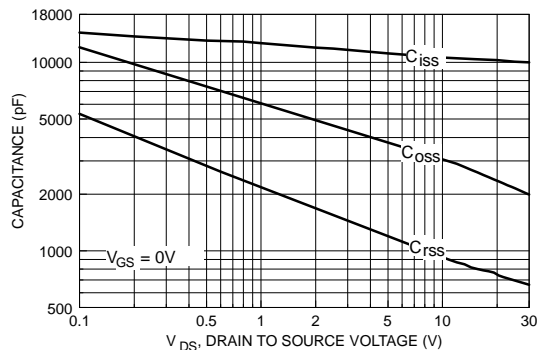


Figure 6. Body Diode Forward Voltage Variation with Source Current and Temperature.

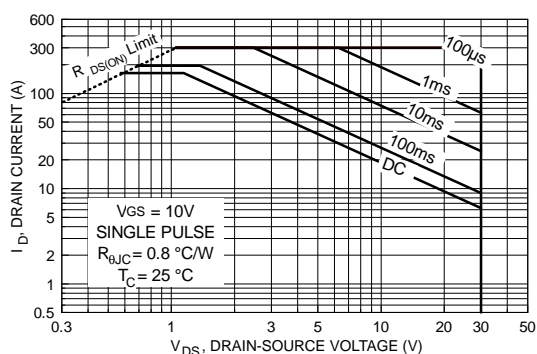
## Typical Characteristics



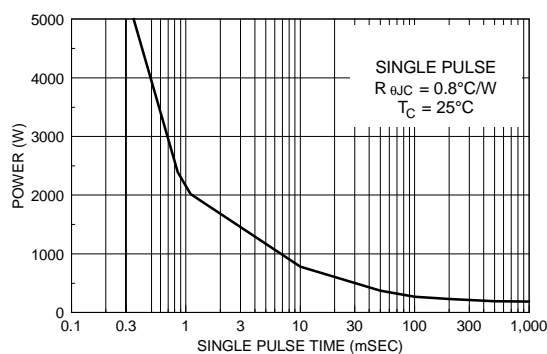
**Figure 7. Gate Charge Characteristics.**



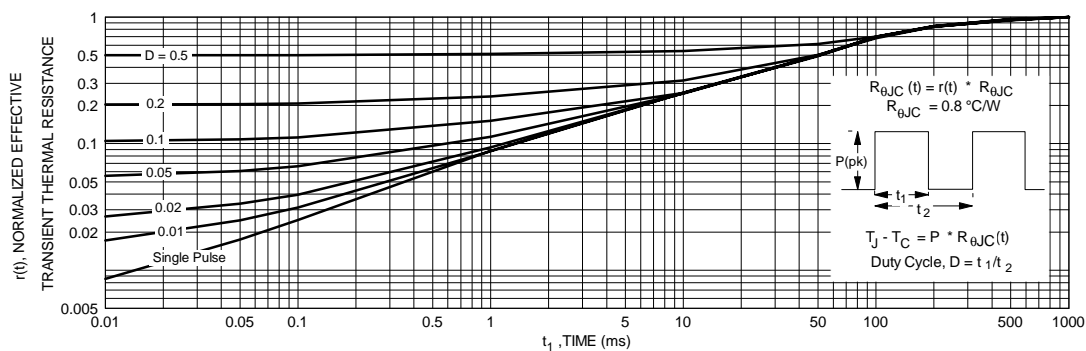
**Figure 8. Capacitance Characteristics.**



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



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



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

Thermal characterization performed using the conditions described in Note 1c.  
Transient thermal response will change depending on the circuit board design.

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