

## FDP6030L / FDB6030L

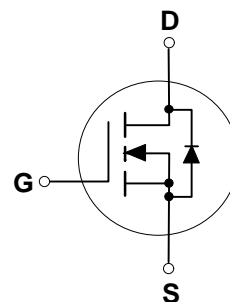
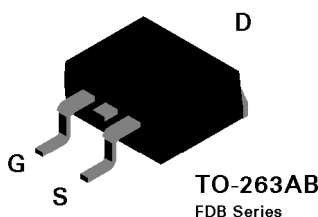
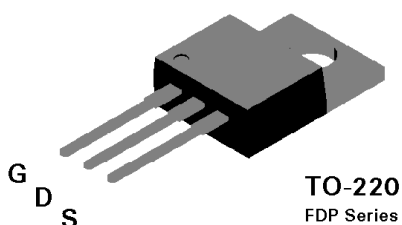
### N-Channel Logic Level Enhancement Mode Field Effect Transistor

#### General Description

These N-Channel logic level enhancement mode power field effect transistors are produced using Fairchild's proprietary, high cell density, DMOS technology. This very high density process is especially tailored to minimize on-state resistance. These devices are particularly suited for low voltage applications such as DC/DC converters and high efficiency switching circuits where fast switching, low in-line power loss, and resistance to transients are needed.

#### Features

- 52 A, 30 V.  $R_{DS(ON)} = 0.0135 \Omega @ V_{GS}=10 \text{ V}$   
 $R_{DS(ON)} = 0.020 \Omega @ V_{GS}=4.5 \text{ V}$ .
- Improved replacement for **NDP6030L/NDP6030L**.
- Low gate charge (typical 34 nC).
- Low  $C_{rss}$  (typical 175 pF).
- Fast switching speed.



#### Absolute Maximum Ratings $T_c = 25^\circ\text{C}$ unless otherwise note

Symbol	Parameter	FDP6030L	FDB6030L	Units
$V_{DSS}$	Drain-Source Voltage	30		V
$V_{GSS}$	Gate-Source Voltage - Continuous	$\pm 20$		V
$I_D$	Drain Current - Continuous	52		A
	- Pulsed	156		
$P_D$	Maximum Power Dissipation @ $T_c = 25^\circ\text{C}$	75		W
	Derate above $25^\circ\text{C}$	0.5		W/ $^\circ\text{C}$
$T_J, T_{STG}$	Operating and Storage Temperature Range	-65 to 175		$^\circ\text{C}$

#### THERMAL CHARACTERISTICS

$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	2	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	62.5	$^\circ\text{C/W}$

**Electrical Characteristics**  $T_c = 25^\circ\text{C}$  unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
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> = 21 A			150	mJ
I <sub>AR</sub>	Maximum Drain-Source Avalanche Current				21	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
ΔBV <sub>DSS</sub> /ΔT <sub>J</sub>	Breakdown Voltage Temp. Coefficient	I <sub>D</sub> = 250 μA, Referenced to 25 °C		37		mV/°C
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> = 24 V, V <sub>GS</sub> = 0 V			10	μA
I <sub>GSSF</sub>	Gate - Body Leakage, Forward	V <sub>GS</sub> = 20 V, V <sub>DS</sub> = 0 V			100	nA
I <sub>GSSR</sub>	Gate - Body Leakage, 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
ΔV <sub>GS(th)</sub> /ΔT <sub>J</sub>	Gate Threshold Voltage Temp.Coefficient	I <sub>D</sub> = 250 μA, Referenced to 25 °C		-4		mV/°C
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 26 A		0.0095	0.0135	Ω
		T <sub>J</sub> = 125°C		0.014	0.023	
		V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 21 A		0.015	0.02	
I <sub>D(on)</sub>	On-State Drain Current	V <sub>GS</sub> = 10 V, V <sub>DS</sub> = 10 V	60			A
I <sub>D(on)</sub>	On-State Drain Current	V <sub>GS</sub> = 4.5 V, V <sub>DS</sub> = 10 V	15			A
g <sub>FS</sub>	Forward Transconductance	V <sub>DS</sub> = 10 V, I <sub>D</sub> = 26 A		37		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		1230		pF
C <sub>oss</sub>	Output Capacitance			640		pF
C <sub>rss</sub>	Reverse Transfer Capacitance			175		pF
SWITCHING CHARACTERISTICS (Note 1)						
t <sub>D(on)</sub>	Turn - On Delay Time	V <sub>DD</sub> = 15 V, I <sub>D</sub> = 52 A  V <sub>GS</sub> = 10 V, R <sub>GEN</sub> = 24 Ω		7.6	15	nS
t <sub>r</sub>	Turn - On Rise Time			150	210	nS
t <sub>D(off)</sub>	Turn - Off Delay Time			29	46	nS
t <sub>f</sub>	Turn - Off Fall Time			17	27	nS
Q <sub>g</sub>	Total Gate Charge	V <sub>DS</sub> = 12 V I <sub>D</sub> = 26 A, V <sub>GS</sub> = 10 V		34	46	nC
Q <sub>gs</sub>	Gate-Source Charge			6		nC
Q <sub>gd</sub>	Gate-Drain Charge			8		nC
DRAIN-SOURCE DIODE CHARACTERISTICS						
I <sub>S</sub>	Maximum Continuous Drain-Source Diode Forward Current				52	A
V <sub>SD</sub>	Drain-Source Diode Forward Voltage	V <sub>GS</sub> = 0 V, I <sub>S</sub> = 26 A (Note 1)  T <sub>J</sub> = 125°C		0.91	1.3	V
				0.8	1.2	

Note

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

## Typical Electrical Characteristics

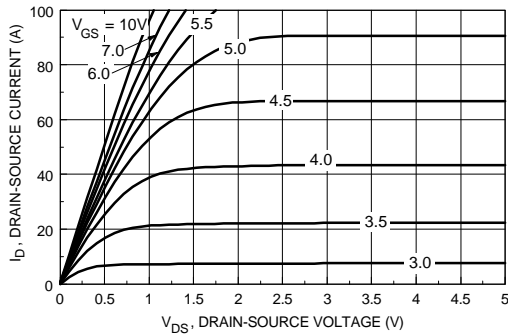


Figure 1. On-Region Characteristics.

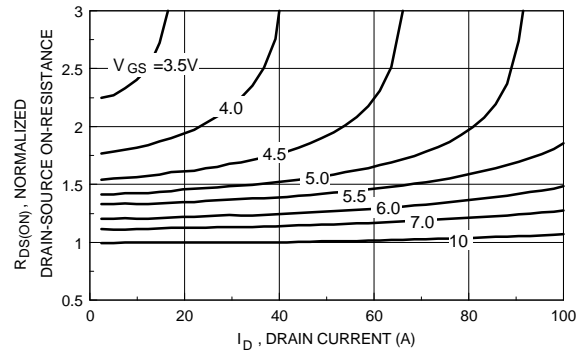


Figure 2. On-Resistance Variation with Drain Current and Gate Voltage.

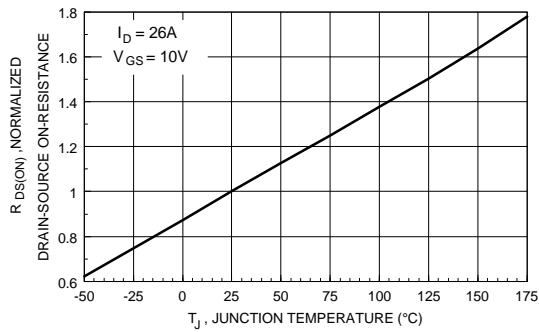


Figure 3. On-Resistance Variation with Temperature.

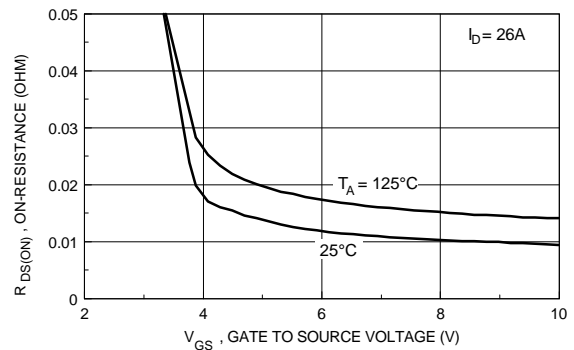


Figure 4. On-Resistance Variation with Gate-to-Source Voltage.

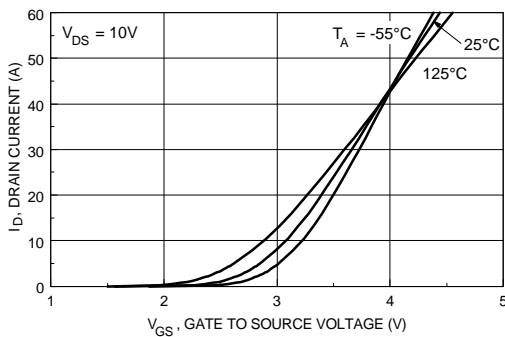


Figure 5. Transfer Characteristics.

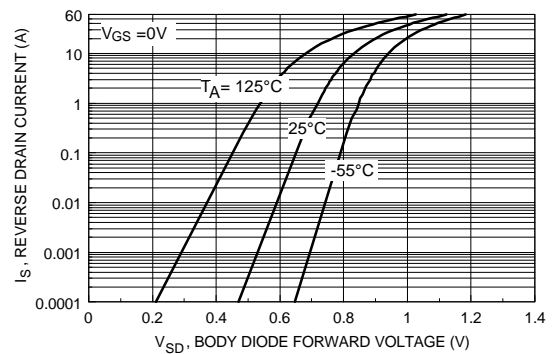


Figure 6 . Body Diode Forward Voltage Variation with Source Current and Temperature.

## Typical Electrical Characteristics (continued)

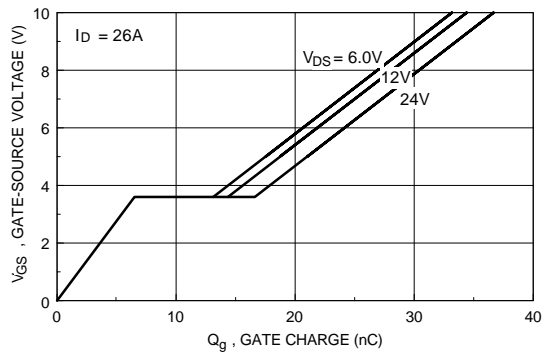


Figure 7. Gate Charge Characteristics.

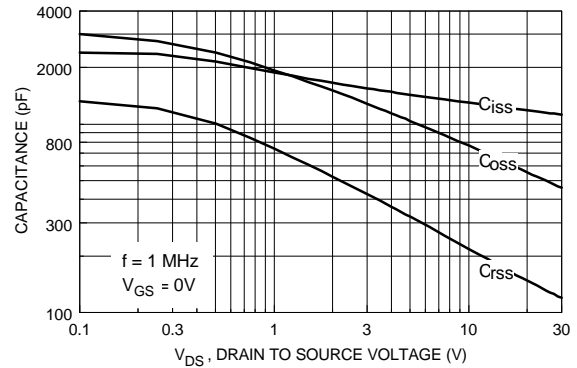


Figure 8. Capacitance Characteristics.

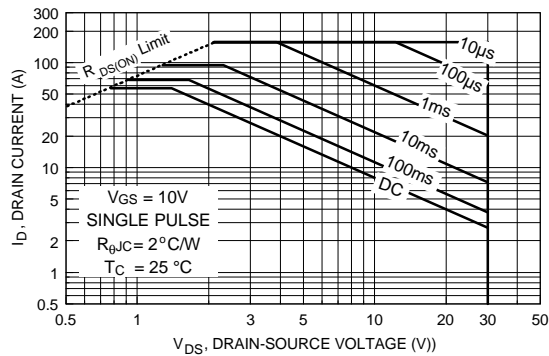


Figure 9. Maximum Safe Operating Area.

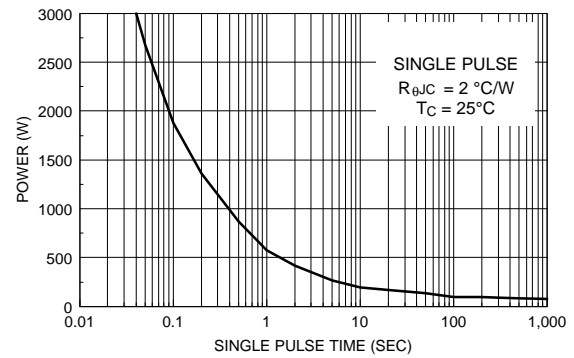


Figure 10. Single Pulse Maximum Power Dissipation.

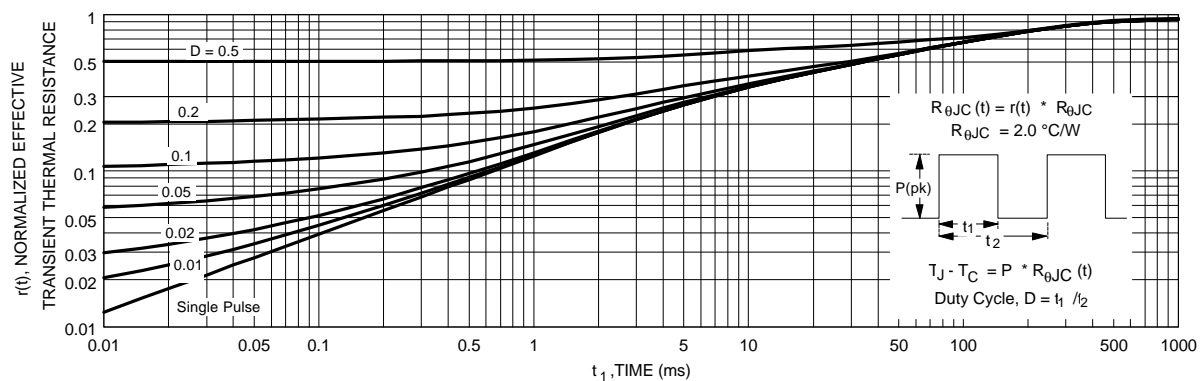


Figure 11. Transient Thermal Response Curve.