**FAIRCHILD**

SEMICONDUCTOR ™

NDP6020P / NDB6020P
P-Channel Logic Level Enhancement Mode Field Effect Transistor

General Description

These logic level P-Channel enhancement mode power field effect transistors are produced using Fairchild's proprietary, high cell density, DMOS technology. This very high density process has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulses in the avalanche and commutation modes. These devices are particularly suited for low voltage applications such as automotive, DC/DC converters, PWM motor controls, and other battery powered circuits where fast switching, low in-line power loss, and resistance to transients are needed.

Features

- -24 A, -20 V. $R_{DS(ON)}$ = 0.05 Ω @ V_{GS}= -4.5 V.
  $R_{DS(ON)}$ = 0.07Ω @ V_{GS}= -2.7 V.
  $R_{DS(ON)}$ = 0.075 Ω @ V_{GS}= -2.5 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.

- 175°C maximum junction temperature rating.

- High density cell design for extremely low $R_{DS(ON)}$.

- TO-220 and TO-263 (D^{2}PAK) package for both through hole and surface mount applications.

TO-220
NDP Series

TO-263AB
NDB Series
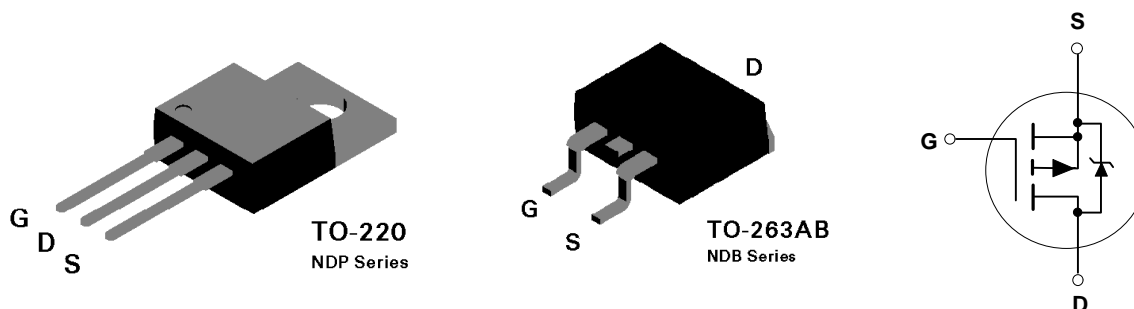
Absolute Maximum Ratings T_C = 25°C unless otherwise noted

Symbol	Parameter	NDP6020P	NDB6020P	Units
V_{DSS}	Drain-Source Voltage	-20		V
V_{GSS}	Gate-Source Voltage - Continuous	±8		V
I_D	Drain Current - Continuous	-24		A
	- Pulsed	-70		
P_D	Total Power Dissipation @ T_C = 25°C	60		W
	Derate above 25°C	0.4		W/°C
T_J,T_{STG}	Operating and Storage Temperature Range	-65 to 175		°C

Electrical Characteristics (T_C = 25°C unless otherwise noted)

Symbol	Parameter	Conditions		Min	Typ	Max	Units
OFF CHARACTERISTICS							
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS} = 0 V, I_D = -250 μA		-20			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = -16 V, V_{GS} = 0 V				-1	μA
			T_J = 55°C			-10	μA
I_{GSSF}	Gate - Body Leakage, Forward	V_{GS} = 8 V, V_{DS} = 0 V				100	nA
I_{GSSR}	Gate - Body Leakage, Reverse	V_{GS} = -8 V, V_{DS} = 0 V				-100	nA
ON CHARACTERISTICS (Note 1)							
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = -250 μA		-0.4	-0.7	-1	V
			T_J = 125°C	-0.3	-0.56	-0.7	
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS} = -4.5 V, I_D = -12 A			0.041	0.05	Ω
			T_J = 125°C		0.06	0.08	
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS} = -2.7 V, I_D = -10 A			0.059	0.07	
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS} = -2.5 V, I_D = -10 A			0.064	0.075	
$I_{D(on)}$	On-State Drain Current	V_{GS} = -4.5 V, V_{DS} = -5 V		-24			A
g_{FS}	Forward Transconductance	V_{DS} = -5 V, I_D = -12 A			14		S
DYNAMIC CHARACTERISTICS							
C_{iss}	Input Capacitance	V_{DS} = -10 V, V_{GS} = 0 V, f = 1.0 MHz			1590		pF
C_{oss}	Output Capacitance				725		pF
C_{rss}	Reverse Transfer Capacitance				215		pF
SWITCHING CHARACTERISTICS (Note 1)							
$t_{D(on)}$	Turn - On Delay Time	V_{DD} = -20 V, I_D = -3 A, V_{GS} = -5 V, R_{GEN} = 6 Ω			15	30	nS
t_r	Turn - On Rise Time				27	60	nS
$t_{D(off)}$	Turn - Off Delay Time				120	250	nS
t_f	Turn - Off Fall Time				70	150	nS
Q_g	Total Gate Charge	V_{DS} = -10 V, I_D = -24 A, V_{GS} = -5 V			25	35	nC
Q_{gs}	Gate-Source Charge				5		nC
Q_{gd}	Gate-Drain Charge				10		nC

Electrical Characteristics (T_C = 25°C unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
DRAIN-SOURCE DIODE CHARACTERISTICS						
I_S	Maximum Continuous Drain-Source Diode Forward Current				-24	A
I_{SM}	Maximum Pulsed Drain-Source Diode Forward Current				-80	A
V_{SD}	Drain-Source Diode Forward Voltage	V_{GS} = 0 V, I_S = -12 A (Note 1)		-1.1	-1.3	V
t_{rr}	Reverse Recovery Time	V_{GS} = 0 V, I_F = -24 A, dI_F/dt = 100 A/µs		60		ns
I_{rr}	Reverse Recovery Current			-1.7		A
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

Note:

1. Pulse Test: Pulse Width $\leq$ 300 µs, Duty Cycle $\leq$ 2.0%.

Typical Electrical Characteristics
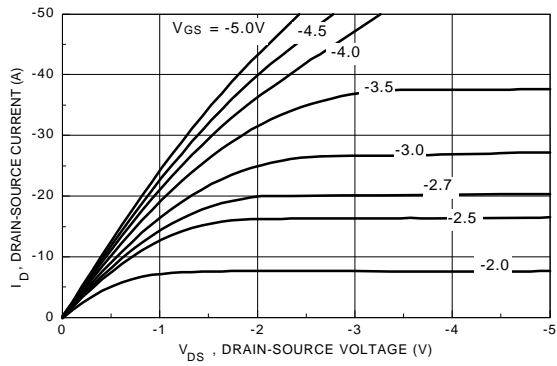
Figure 1. On-Region Characteristics.
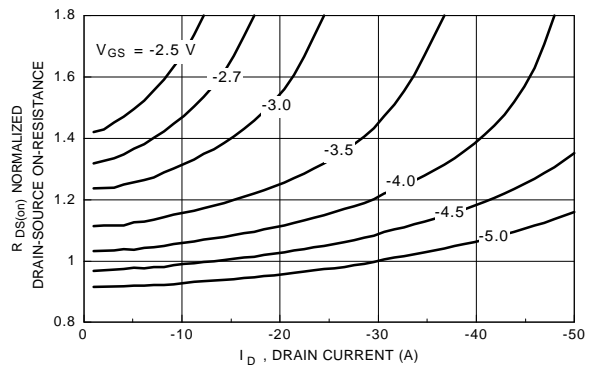
Figure 2. On-Resistance Variation with Gate Voltage and Drain Current.
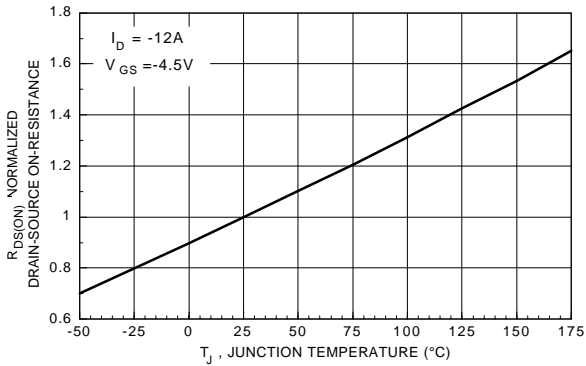
Figure 3. On-Resistance Variation with Temperature.
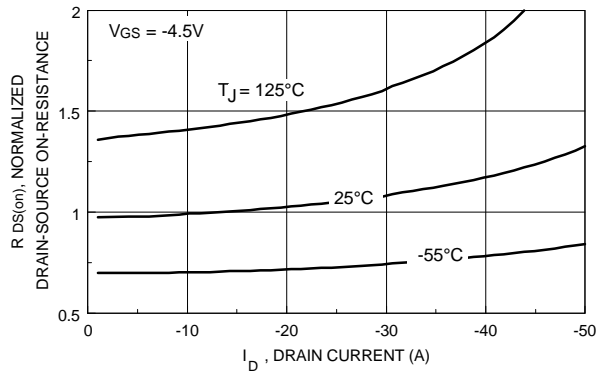
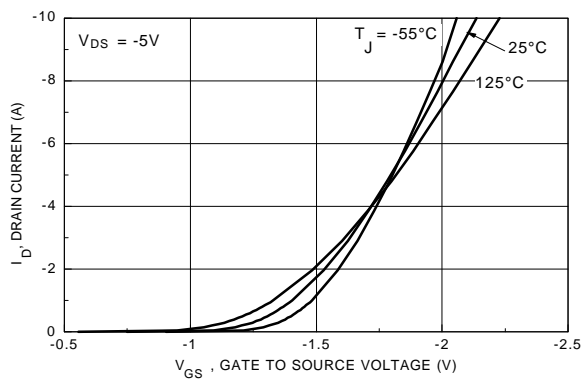Figure 4. On-Resistance Variation with Drain Current and Temperature.
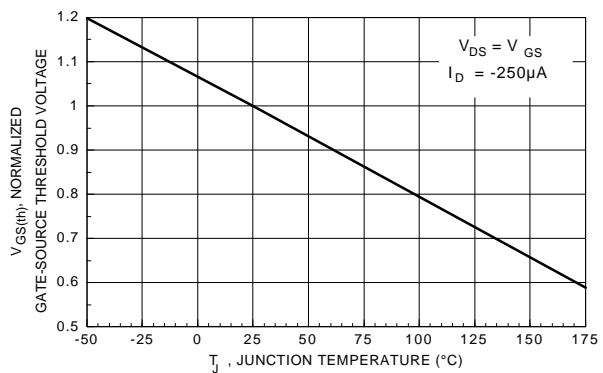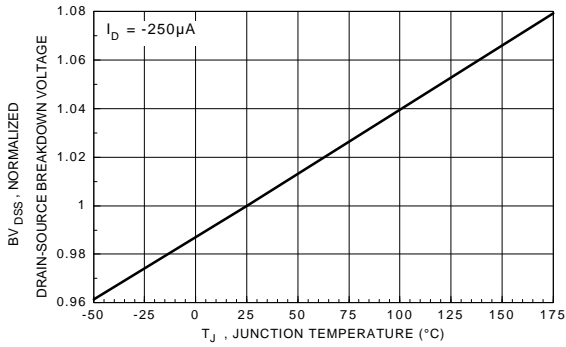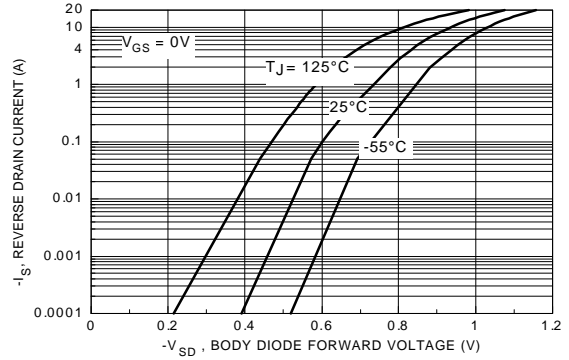

Figure 5. Transfer Characteristics.

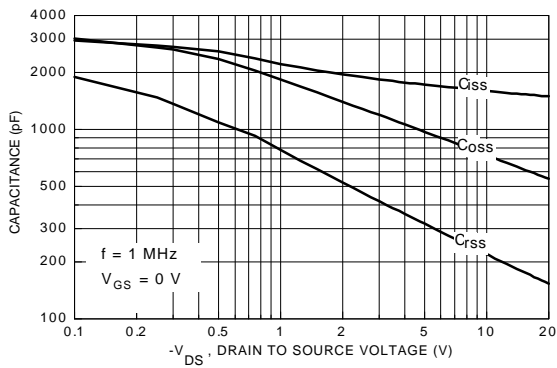Figure 6. Gate Threshold Variation with Temperature.

Typical Electrical Characteristics (continued)

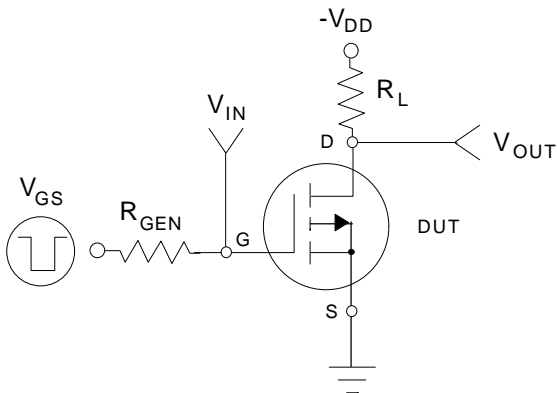**Figure 7. Breakdown Voltage Variation with Temperature.**

Figure 8. Body Diode Forward Voltage Variation with Current and Temperature.
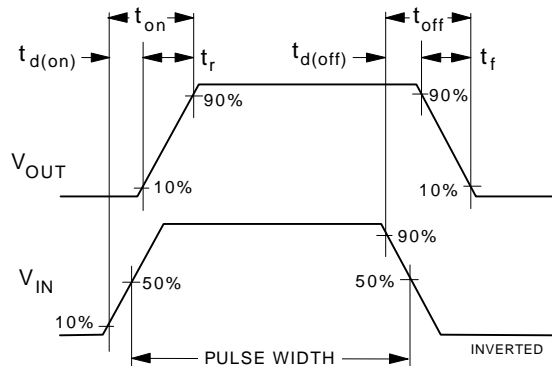

Figure 9. Capacitance Characteristics.
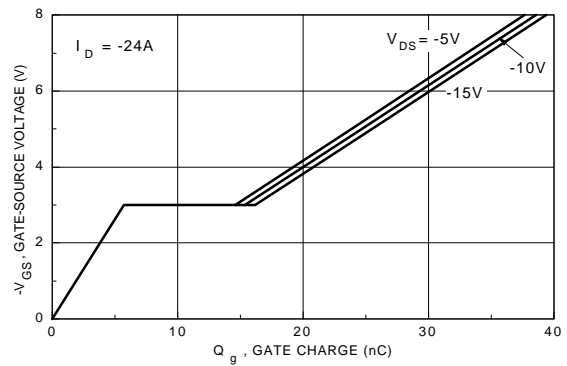
Figure 10. Gate Charge Characteristics.

Figure 11. Switching Test Circuit.

Figure 12. Switching Waveforms.

NDP6020P Rev.C1

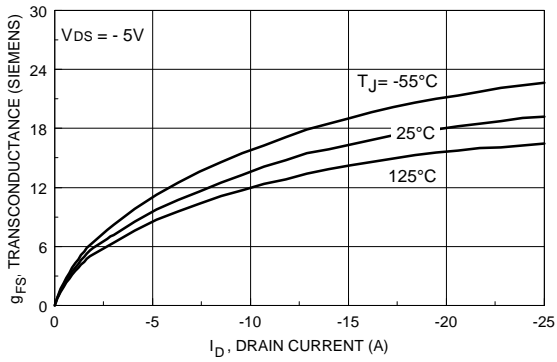## Typical Electrical Characteristics (continued)

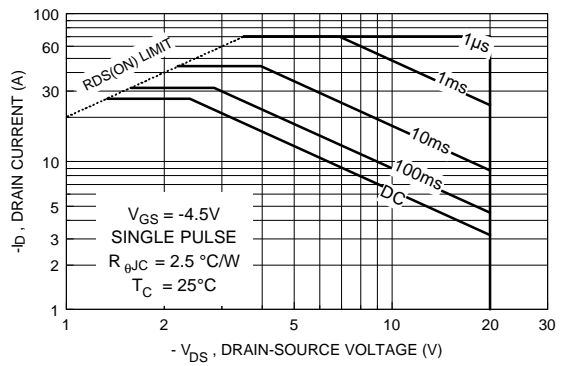Figure 13. Transconductance Variation with Drain Current and Temperature.
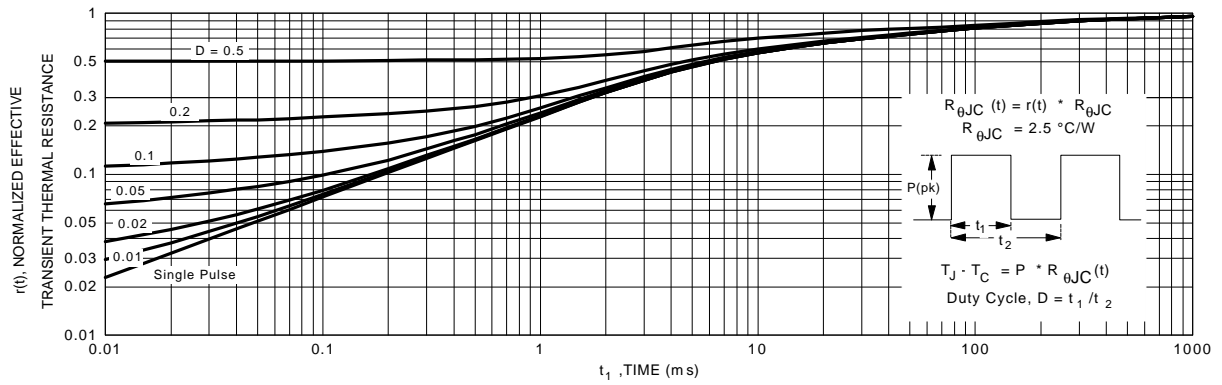

Figure 14. Maximum Safe Operating Area.

Figure 15. Transient Thermal Response Curve.

X-ON Electronics

Largest Supplier of Electrical and Electronic Components

Click to view similar products for SparkFun Accessories *category:*

Click to view products by SparkFun *manufacturer:*

Other Similar products are found below :

DEV-17119 SEN-16474 COM-11450 BOB-00495 BOB-00497 BOB-00499 DEV-13598 PRT-08619 PRT-11363 PRT-12702 SEN-13582 TOL-11468 ROB-10551 COM-12986 COM-11120 COM-14731 COM-14646 COM-11222 PRT-12845 CAB-13685 PRT-10210 PRT-14490 TOL-10603 PRT-08023 PRT-10361 PRT-10897 PRT-12619 BOB-10467 WIG-08758 KIT-13973 PRT-11541 PRT-14322 PRT-14427 PRT-13777 PRT-14429 COM-00540 COM-13015 COM-08643 PRT-08430 PRT-09740 COM-10917 TOL-10602 PRT-09914 TOL-12572 PRT-09011 COM-11020 TOL-13246 PRT-11710 DEV-10524 PRT-12693