ON Semiconductor®

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

General Description

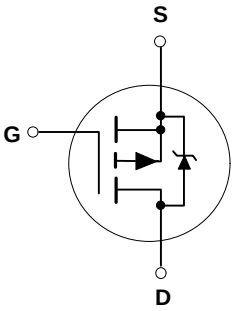
These logic level P-Channel enhancement mode power field effect transistors are produced using ON Semiconductor's proprietary, high cell density, DMOS technology. This very high density process has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand 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^2PAK) package for both through hole and surface mount applications.

OBSOLETE
THIS DEVICE IS OBSOLETE
PLEASE CONTACT
REPRESENTATIVE FOR INFORMATION
YOUR





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

© 1997 Semiconductor Components Industries, LLC.
September-2017, Rev. 3

Publication Order Number:
NDP6020P/D

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,		15	30	nS
t_r	Turn - On Rise Time	V_{GS} = -5 V, R_{GEN} = 6 Ω		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

OBSOLETE
THIS DEVICE IS OBSOLETE
PLEASE CONTACT YOUR onsemi
REPRESENTATIVE FOR INFORMATION

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 ≤ 300 µs, Duty Cycle ≤ 2.0%.

OBSOLETE
THIS DEVICE IS OBSOLETE
PLEASE CONTACT YOUR onsemi
REPRESENTATIVE FOR INFORMATION

Typical Electrical Characteristics

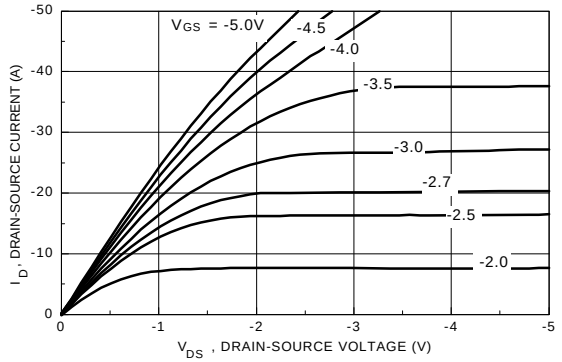


Figure 1. On-Region Characteristics.

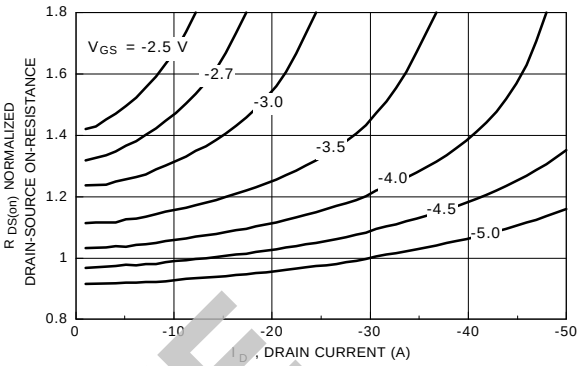


Figure 2. On-Resistance Variation with Gate Voltage and Drain Current.

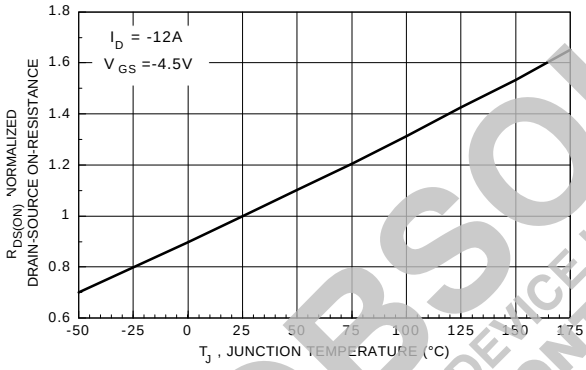


Figure 3. On-Resistance Variation with Temperature.

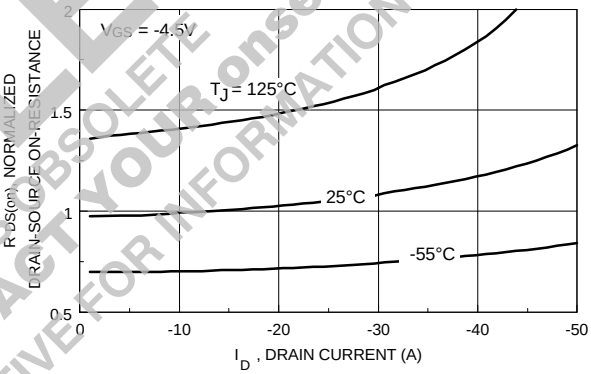


Figure 4. On-Resistance Variation with Drain Current and Temperature.

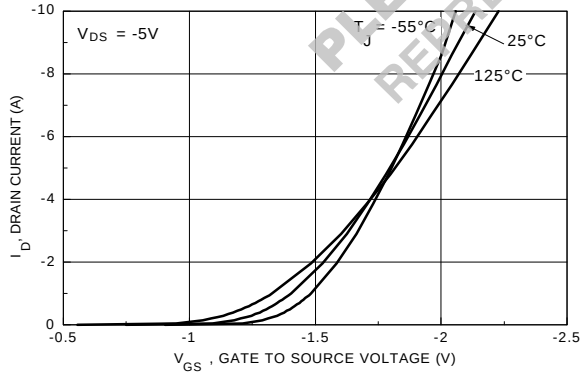


Figure 5. Transfer Characteristics.

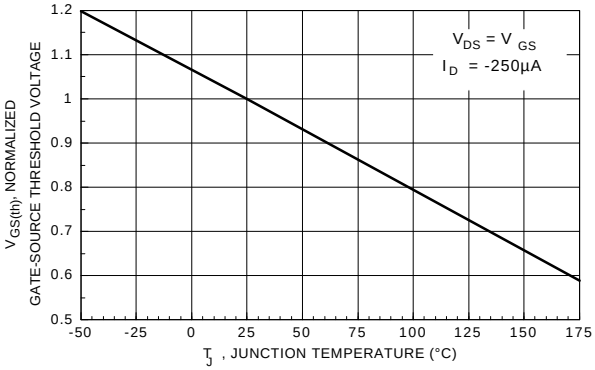


Figure 6. Gate Threshold Variation with Temperature.

OBSOLETE
THIS DEVICE IS OBSOLETE
PLEASE CONTACT YOUR onsemi
REPRESENTATIVE FOR INFORMATION

Typical Electrical Characteristics (continued)

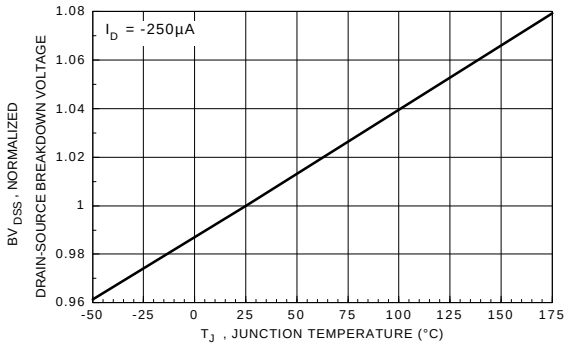


Figure 7. Breakdown Voltage Variation with Temperature.

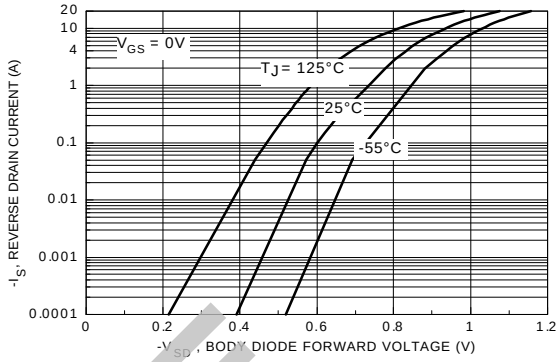


Figure 8. Body Diode Forward Voltage Variation with Current and Temperature.

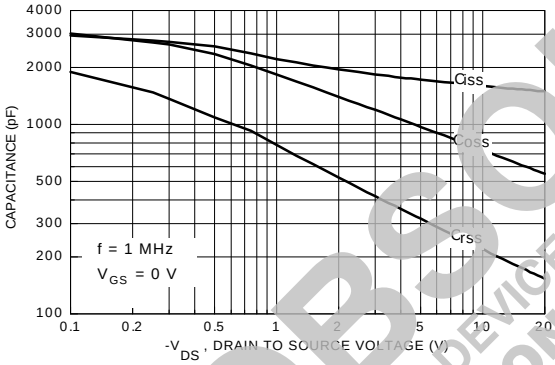


Figure 9. Capacitance Characteristics.

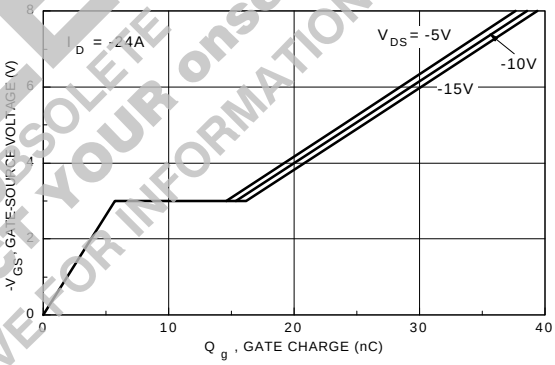


Figure 10. Gate Charge Characteristics.

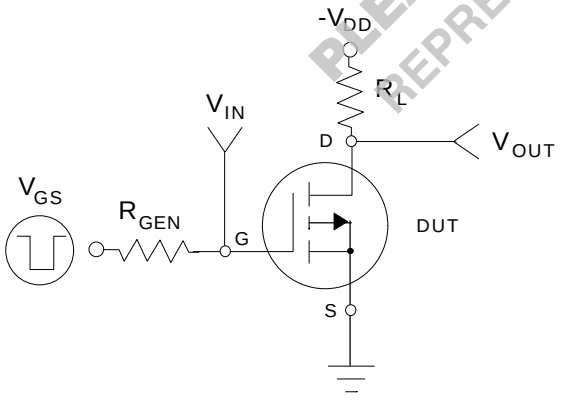


Figure 11. Switching Test Circuit.

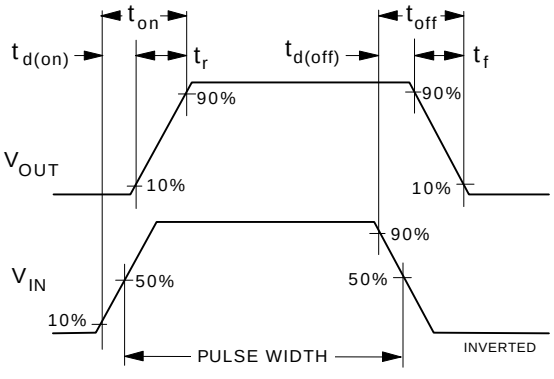


Figure 12. Switching Waveforms.

OBSOLETE
THIS DEVICE IS OBSOLETE
PLEASE CONTACT YOUR onsemi
REPRESENTATIVE FOR INFORMATION

Typical Electrical Characteristics (continued)

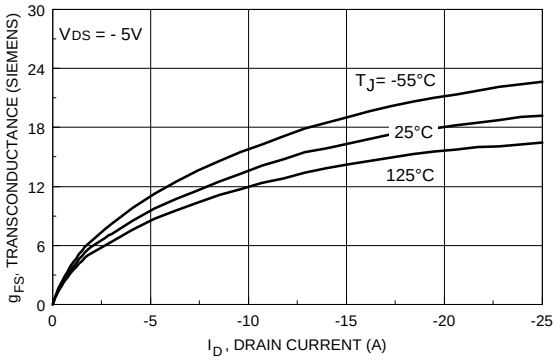


Figure 13. Transconductance Variation with Drain Current and Temperature.

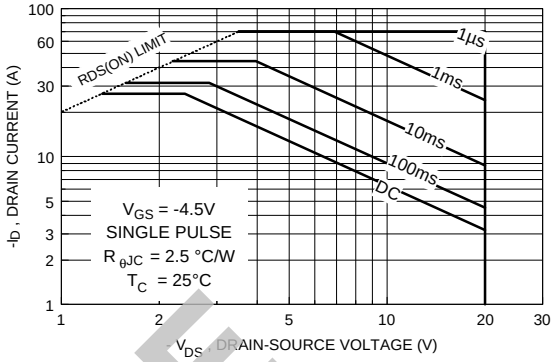


Figure 14. Maximum Safe Operating Area.

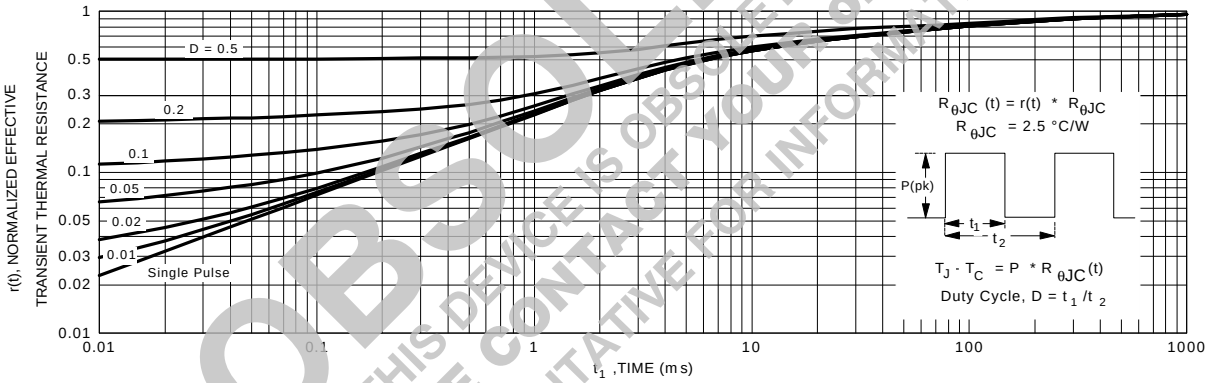


Figure 15. Transient Thermal Response Curve.

OBSOLETE
THIS DEVICE IS OBSOLETE
PLEASE CONTACT YOUR onsemi
REPRESENTATIVE FOR INFORMATION

OBSOLETE
THIS DEVICE IS OBSOLETE
PLEASE CONTACT YOUR onsemi
REPRESENTATIVE FOR INFORMATION

ON Semiconductor and ON are trademarks of Semiconductor Components Industries, LLC dba ON Semiconductor or its subsidiaries in the United States and/or other countries. ON Semiconductor owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of ON Semiconductor's product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent−Marking.pdf. ON Semiconductor reserves the right to make changes without further notice to any products herein. ON Semiconductor makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does ON Semiconductor assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using ON Semiconductor products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by ON Semiconductor. "Typical" parameters which may be provided in ON Semiconductor data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. ON Semiconductor does not convey any license under its patent rights nor the rights of others. ON Semiconductor products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use ON Semiconductor products for any such unintended or unauthorized application, Buyer shall indemnify and hold ON Semiconductor and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that ON Semiconductor was negligent regarding the design or manufacture of the part. ON Semiconductor is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:
Literature Distribution Center for ON Semiconductor
19521 E. 32nd Pkwy, Aurora, Colorado 80011 USA
Phone: 303−675−2175 or 800−344−3860 Toll Free USA/Canada
Fax: 303−675−2176 or 800−344−3867 Toll Free USA/Canada
Email: orderlit@onsemi.com

N. American Technical Support: 800−282−9855 Toll Free USA/Canada
Europe, Middle East and Africa Technical Support:
Phone: 421 33 790 2910
Japan Customer Focus Center
Phone: 81−3−5817−1050

ON Semiconductor Website: **www.onsemi.com**

Order Literature: http://www.onsemi.com/orderlit

For additional information, please contact your local Sales Representative

ENTEGRECİ

Bu belge www.entegreci.com üzerinden sunulmaktadır.

Elektronik komponent tedarikinde Entegreci

Entegreci, Eskişehir merkezli, Türkiye geneline satış yapan bir elektronik komponent mağazasıdır. Entegreler (IC), mikrodenetleyiciler, transistörler, diyotlar, pasif elemanlar, konnektörler, modüller ve geliştirme kartları tek adetten seri üretim adetlerine kadar satılır. Ürün sayfalarında güncel stok durumunu, fiyatı ve datasheet bağlantısını bulabilirsiniz.

Parça koduyla arama

Üretici parça numarasını yazın; stok ve fiyatı hemen görün.

www.entegreci.com

Ürün kategorileri

Entegreden kapasitöre tüm elektronik komponent kategorileri.

Kategorilere göz atın

Üreticiler

Aradığınız üreticinin ürünlerini tek sayfada inceleyin.

Üreticileri görün

Toplu alım ve teklif

Listede olmayan ya da yüksek adetli parçalar için teklif isteyin.

Teklif isteyin

www.entegreci.com | **destek@entegreci.com** | **0850 305 90 34**

Entegreci is an online electronic components store based in Türkiye. Search by manufacturer part number to see stock, prices and datasheets for integrated circuits, microcontrollers, transistors, passive components and connectors, or request a quote for parts that are not listed.

Bu sayfa Entegreci tarafından eklenmiştir. Belgenin önceki sayfaları asıl yayıncısına aittir ve içeriği değiştirilmemiştir; en güncel sürüm için belgenin yayıncısına başvurun.