

## 200V 5A N-Channel Enhancement Mode Power MOSFET

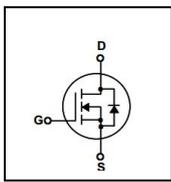
### General Description

BXP5N20 is Bridgelux high voltage MOSFET family based on advanced planar DMOS technology. This advanced MOSFET family has optimized on-state resistance, and also provides superior switching performance and higher avalanche energy strength. This device family is suitable for high efficiency switch mode power supplies.

### FEATURES

- $R_{DS(ON)} \leq 0.65 \Omega$  @  $V_{GS}=10V, I_D=2.5A$
- Excellent  $R_{DS(ON)}$  and Low Gate Charge
- Fast switching capability
- Lead free product is acquired

### SYMBOL


**TO-251L**

**TO-252**

### ASSEMBLY MESSAGE

Product Name	Package	Packaging
BXP5N20U	TO-251L	Tube
BXP5N20D	TO-252	Tube/Reel

### ABSOLUTE MAXIMUM RATINGS ( $T_C=25^\circ\text{C}$ unless otherwise noted)

Parameter		Symbol	Rating	Unit
Drain-Source Voltage		$V_{DSS}$	200	V
Drain Current	Continuous ( $T_C = 25^\circ\text{C}$ )	$I_D$	5	A
	Continuous ( $T_C = 100^\circ\text{C}$ )		3.2	A
Drain Current	Pulsed (Note1)	$I_{DM}$	20	A
Gate-Source Voltage		$V_{GSS}$	$\pm 20$	V
Avalanche Energy	Single Pulse (Note2)	$E_{AS}$	125	mJ
Avalanche Current (Note1)		$I_{AR}$	5	A
Peak Diode Recovery $dv/dt$ (Note3)		$dv/dt$	5	V/ns
Power Dissipation (Note 2)	$T_C = 25^\circ\text{C}$	$P_D$	41	W
	Derate above $25^\circ\text{C}$		0.328	W/ $^\circ\text{C}$
Maximum Junction Temperature		$T_J$	150	$^\circ\text{C}$
Storage Temperature Range		$T_{STG}$	-55 to 150	$^\circ\text{C}$

- Note:**
1. Repetitive Rating: Pulse width limited by maximum junction temperature
  2.  $L=10\text{mH}$ ,  $V_{DD}=50\text{V}$ ,  $R_G=25 \Omega$ , Starting  $T_J = 25^\circ\text{C}$
  3.  $I_{SD} \leq 5\text{A}$ ,  $di/dt \leq 200\text{A}/\mu\text{s}$ ,  $V_{DD} \leq BV_{DSS}$ , Starting  $T_J = 25^\circ\text{C}$

**THERMAL CHARACTERISTICS**

Parameter	Symbol	Max.	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	3.05	°C / W

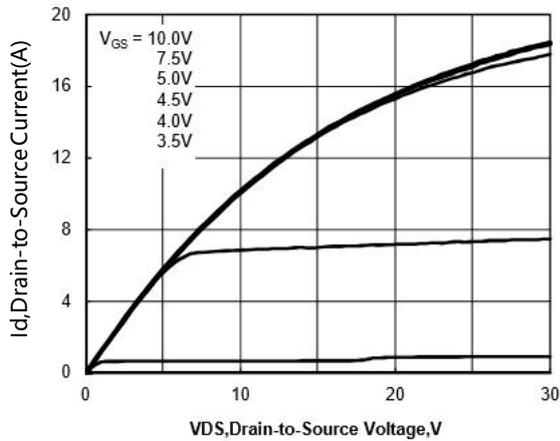
**ELECTRICAL CHARACTERISTICS** ( $T_J=25^{\circ}\text{C}$ , unless otherwise Noted)

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
<b>OFF CHARACTERISTICS</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=250\mu A$	200			V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=200V, V_{GS}=0V$			1	$\mu A$
		$V_{DS}=160V, T_C = 125^{\circ}\text{C}$			10	$\mu A$
Gate-Body Leakage Current, Forward	$I_{GSS}$	$V_{GS}=30V$			100	nA
Gate-Body Leakage Current, Reverse		$V_{GS}=-30V$			-100	nA
Breakdown Voltage Temperature Coefficient	$\Delta BV_{DSS}/\Delta T_J$	$I_D = 250 \mu A$		0.21		$V/^{\circ}\text{C}$
<b>ON CHARACTERISTICS</b>						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	0.7		2	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=2.5A$		0.5	0.65	$\Omega$
Forward Trans conductance (Note4)	$g_{FS}$	$V_{DS} = 30V, I_D=2.5A$		2		S
<b>DYNAMIC PARAMETERS</b>						
Input Capacitance	$C_{ISS}$	$V_{DS}=25V, V_{GS}=0V,$ $f=1.0\text{MHz}$		261		pF
Output Capacitance	$C_{OSS}$			31		pF
Reverse Transfer Capacitance	$C_{RSS}$			2.5		pF
<b>SWITCHING PARAMETERS</b>						
Turn-ON Delay Time	$t_{D(ON)}$	$V_{DD}=100V, I_D=5A, V_{GS} =$ $10V, R_G=10\Omega$ (Note4,5)		7		ns
Turn-ON Rise Time	$t_R$			10		ns
Turn-OFF Delay Time	$t_{D(OFF)}$			25		ns
Turn-OFF Fall-Time	$t_F$			12		ns
Total Gate Charge(Note5)	$Q_G$	$V_{DS} = 160V, V_{GS} = 10V, I_D$ $=5A$ (Note4,5)		9		nC
Gate Source Charge	$Q_{GS}$			3		nC
Gate Drain Charge	$Q_{GD}$			4		nC
<b>SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS</b>						
Drain-Source Diode Forward Voltage	$V_{SD}$	$I_S=5A, V_{GS}=0V$			1.5	V
Diode Continuous Forward Current	$I_S$				5	A
Pulsed Drain-Source Current	$I_{SM}$				20	A
Reverse Recovery Time	$t_{RR}$	$V_{GS} = 0 V, I_{SD} = 5A$		103		ns
Reverse Recovery Charge	$Q_{RR}$	$di/dt=100 A/\mu s$ (Note4,5)		370		$\mu C$

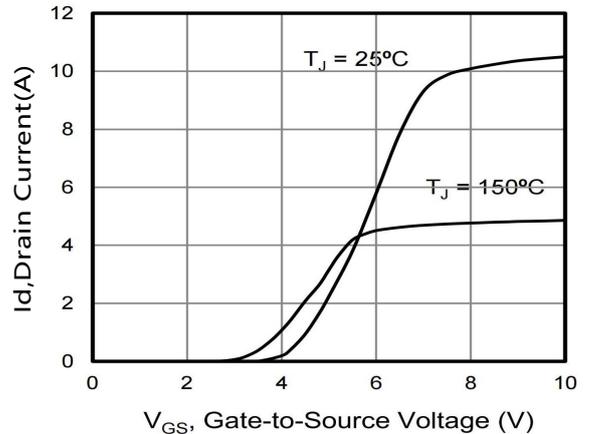
Note: 4. Pulse Test : Pulse width  $\leq 300\mu s$ , Duty cycle  $\leq 2\%$

5. Essentially independent of operating temperature

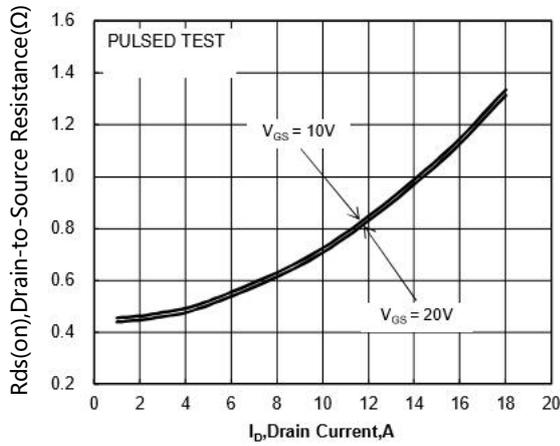
**TYPICAL CHARACTERISTICS**



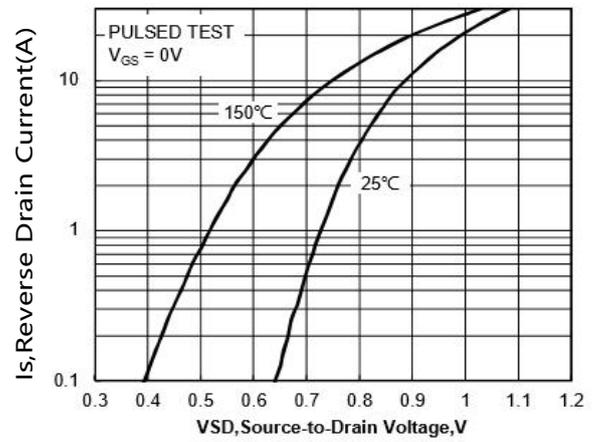
**Figure1. Typical Output Characteristics**



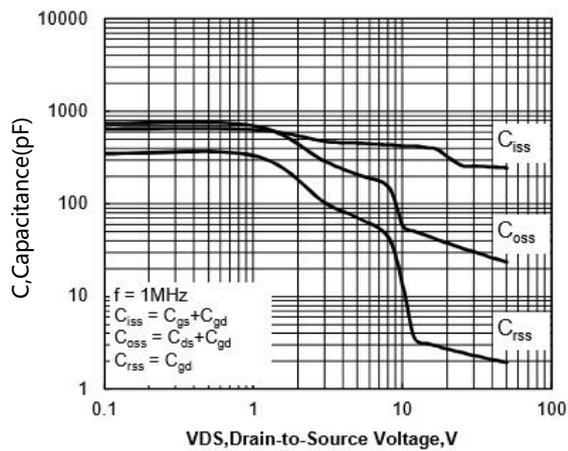
**Figure2. Typical Transfer Characteristics**



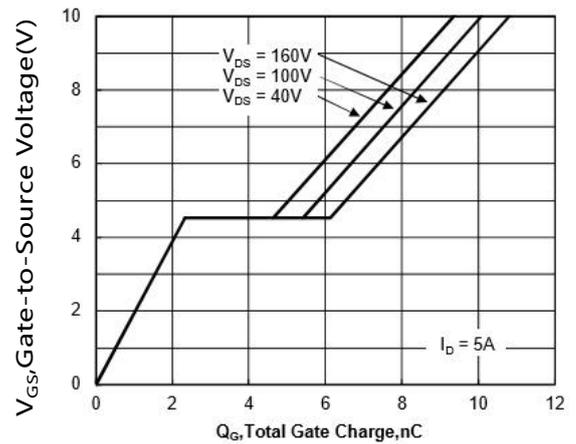
**Figure3. On-Resistance versus Drain Current**



**Figure4. Diode forward voltage versus Current**

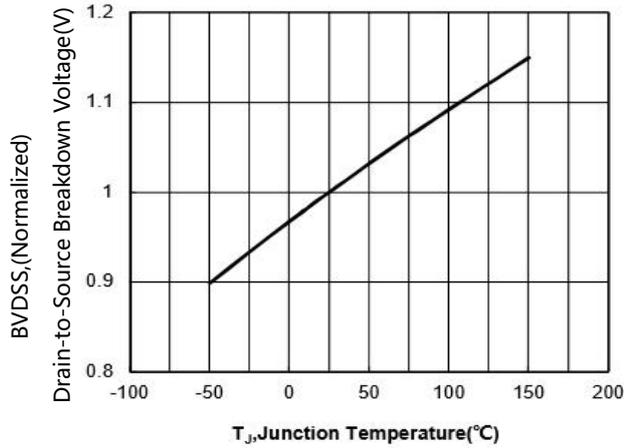


**Figure5. Typical Capacitance versus VDS**

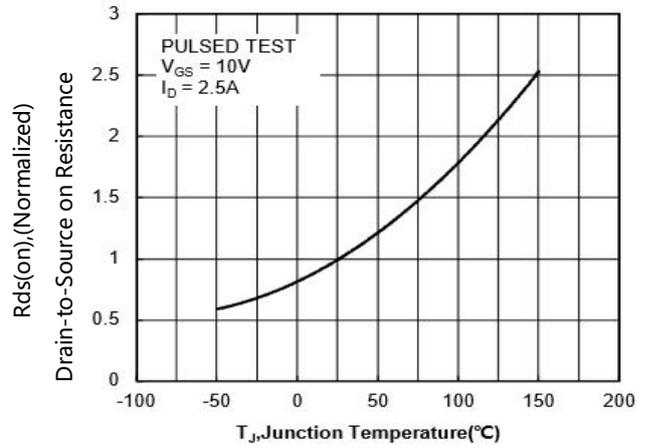


**Figure6. Typical Gate Charge versus VGS**

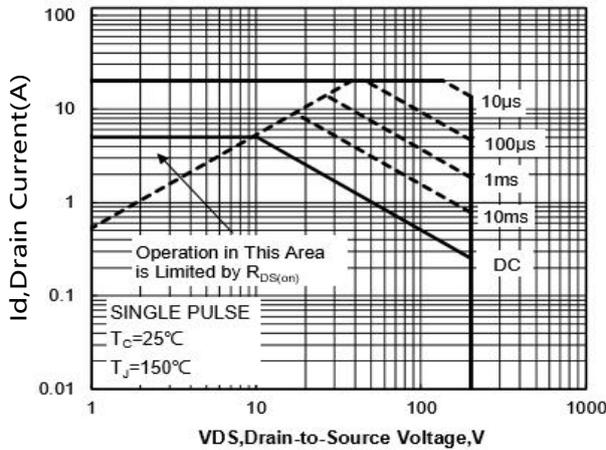
**TYPICAL CHARACTERISTICS(Cont.)**



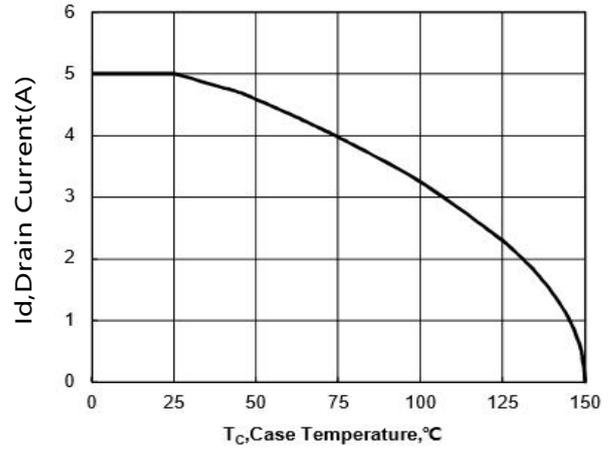
**Figure7.  $BV_{DSS}$  Variation with Temperature**



**Figure8. On-Resistance Variation with Temperature**

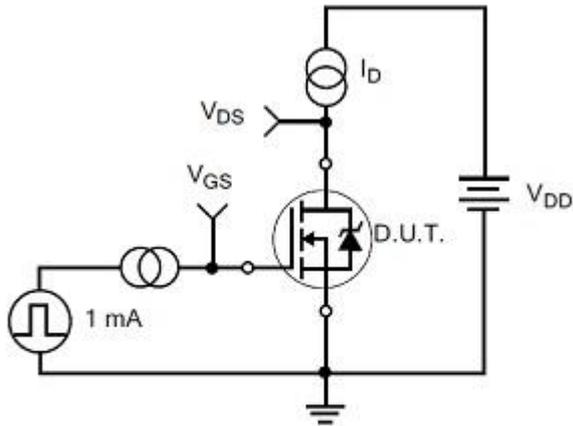


**Figure9. Maximum Safe Operating Area  
BXP5N20U/D**

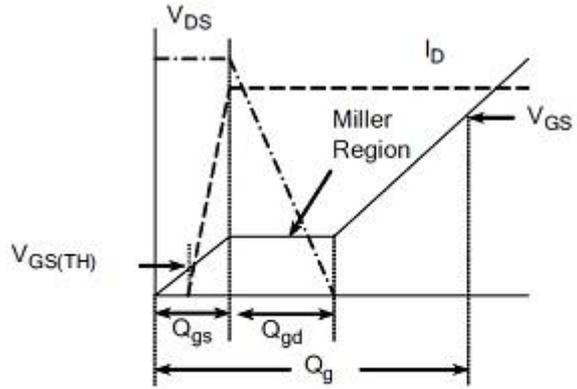


**Figure10. Maximum Continuous Drain Current  
versus Case Temperature**

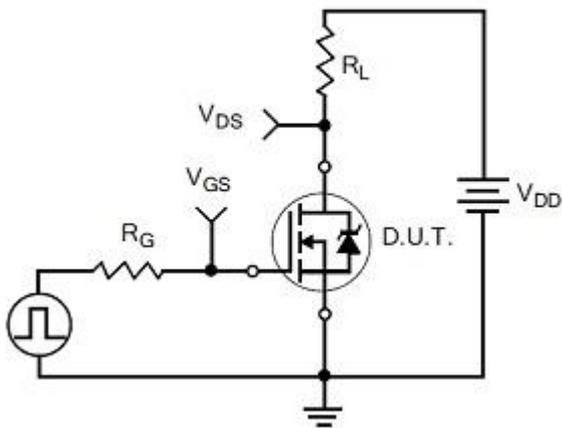
TEST CIRCUITS AND WAVEFORMS



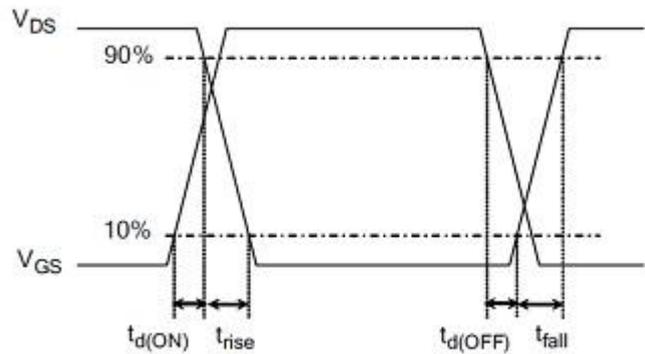
Gate Charge Test Circuit



Gate Charge Waveform

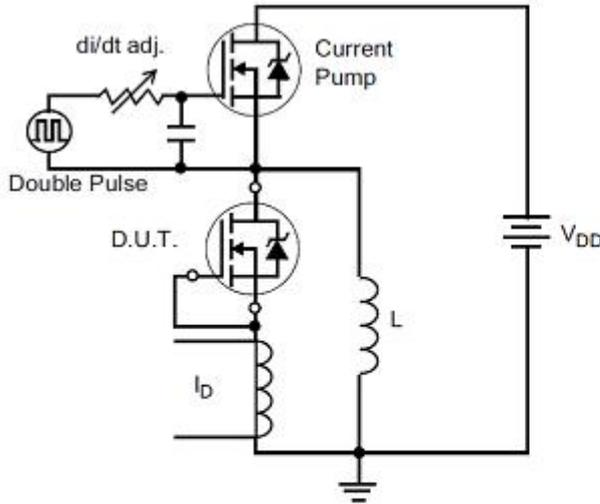


Resistive Switching Test Circuit

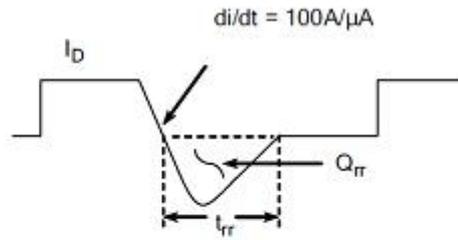


Resistive Switching Waveforms

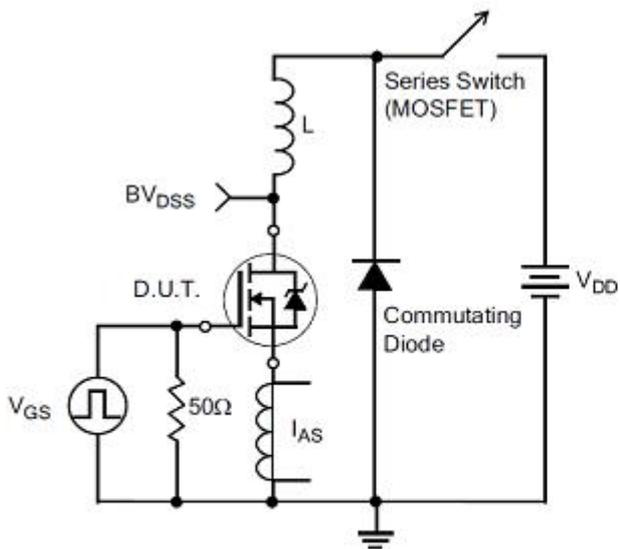
TEST CIRCUITS AND WAVEFORMS(Cont.)



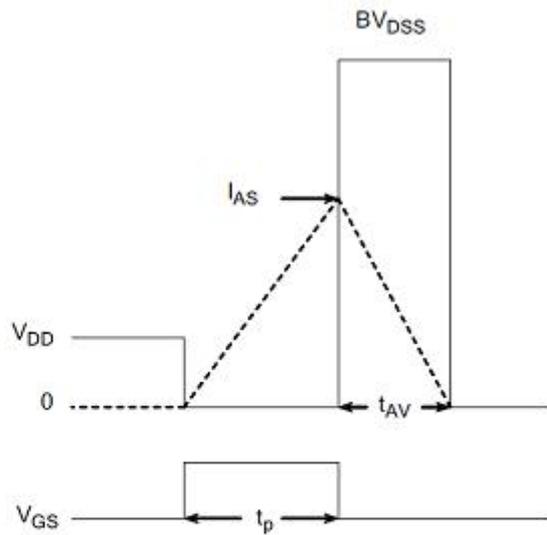
Diode Reverse Recovery Test Circuit



Diode Reverse Recovery Waveform



Unclamped Inductive Switching Test Circuit



$$E_{AS} = \frac{I_{AS}^2 L}{2}$$

Unclamped Inductive Switching Waveforms

## Revision history

### Document revision history

Date	Revision	Changes
15-Oct-2021	1.0	First release
10-Feb-2022	1.1	Update parameter

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