

## 700V 11A N-Channel Super Junction Power MOSFET

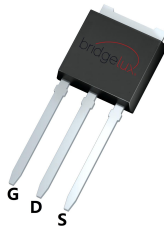
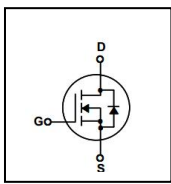
### FEATURES

- $R_{DS(ON)} \leq 0.38 \Omega$  @ $V_{GS}=10V, I_D=5.5A$
- Excellent  $R_{DS(ON)}$  and Low Gate Charge
- Fast switching capability
- Lead free product is acquired

### Applications

- Switch Mode Power Supply (SMPS)
- Uninterruptible Power Supply (UPS)
- Power Factor Correction (PFC)

### SYMBOL


**TO-251L**

**TO-252**

**TO-220F**

### ASSEMBLY MESSAGE

Product Name	Package	Packaging
BXC70R380U	TO-251L	Tube
BXC70R380D	TO-252	Tube/Reel
BXC70R380F	TO-220F	Tube

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

Parameter	Symbol	Rating		Unit	
		BXC70R380U/D	BXC70R380F		
Drain-Source Voltage	$V_{DSS}$	700		V	
Drain Current	Continuous ( $T_C = 25^\circ\text{C}$ )	11		A	
		7.8		A	
Drain Current	Pulsed (Note1)	$I_{DM}$	44	A	
Gate-Source Voltage	$V_{GSS}$	$\pm 30$		V	
Avalanche Energy	Single Pulse (Note2)	$E_{AS}$	180	mJ	
Avalanche Current (Note1)	$I_{AR}$	5		A	
Peak Diode Recovery dv/dt	dv/dt	15		V/ns	
Power Dissipation (Note 2)	$T_C = 25^\circ\text{C}$	$P_D$	115	33	W
	Derate above $25^\circ\text{C}$		0.92	0.264	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. Limited by maximum junction temperature, maximum duty cycle is 0.75  
 2. L=2.5mH, VDD=50V,  $R_G=25 \Omega$ , Starting  $T_J = 25^\circ\text{C}$

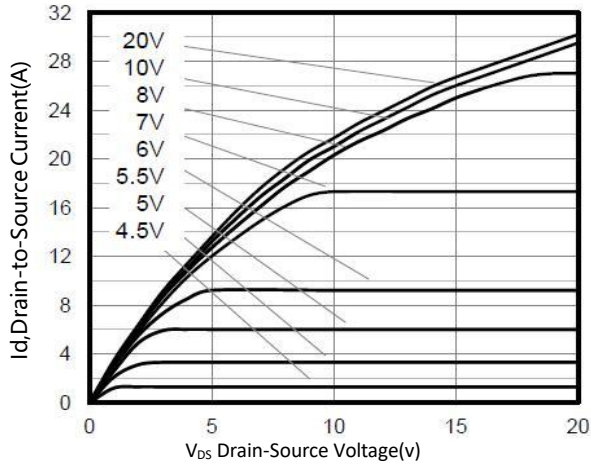
**THERMAL CHARACTERISTICS**

Parameter	Symbol	Max.		Unit
		BXC70R380U/D	BXC70R380F	
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	1.09	3.8	°C / W
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	87	62	°C / W

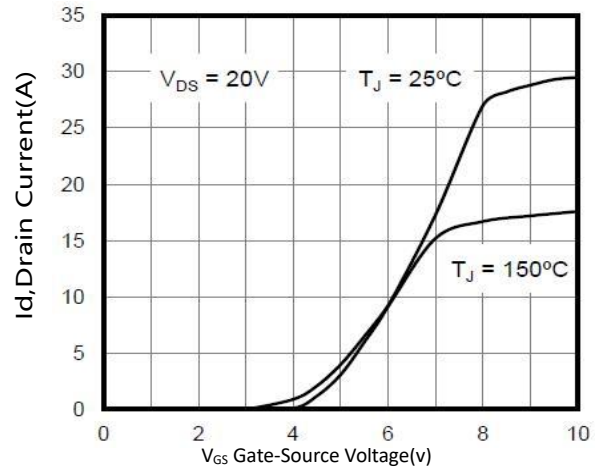
**ELECTRICAL CHARACTERISTICS** ( $T_J=25^{\circ}\text{C}$ , unless otherwise Noted)

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
<b>OFF CHARACTERISTICS</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	VGS=0V, ID=250 $\mu$ A	700			V
Zero Gate Voltage Drain Current	$I_{DSS}$	VDS=700V, VGS=0V			1	$\mu$ A
		VDS=560V, TC = 125°C		10		$\mu$ A
Gate-Body Leakage Current, Forward	$I_{GSS}$	VGS=30V			100	nA
Gate-Body Leakage Current, Reverse		VGS=-30V			-100	nA
<b>ON CHARACTERISTICS</b>						
Gate Threshold Voltage	$V_{GS(TH)}$	VDS=VGS, ID=250 $\mu$ A	2.5		4.0	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	VGS=10V, ID=5.5A		0.34	0.38	$\Omega$
<b>DYNAMIC PARAMETERS</b>						
Input Capacitance	$C_{ISS}$	VDS=100V, VGS=0V, f=1.0MHz		890		pF
Output Capacitance	$C_{OSS}$			36.5		pF
Reverse Transfer Capacitance	$C_{RSS}$			1.6		pF
<b>SWITCHING PARAMETERS</b>						
Turn-ON Delay Time	$t_{D(ON)}$	VDD=400V, ID=5.5A, VGS = 10V, RG=25 $\Omega$		15.5		ns
Turn-ON Rise Time	$t_R$			32		ns
Turn-OFF Delay Time	$t_{D(OFF)}$			74		ns
Turn-OFF Fall-Time	$t_F$			39		ns
Total Gate Charge(Note5)	$Q_G$	VDS =560V, VGS =10V, ID =5.5A		19		nC
Gate Source Charge	$Q_{GS}$			3		nC
Gate Drain Charge	$Q_{GD}$			8.3		nC
<b>SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS</b>						
Drain-Source Diode Forward Voltage	$V_{SD}$	IF=5.5A, VGS=0V		0.85		V
Diode Continuous Forward Current	$I_S$				11	A
Pulsed Drain-Source Current	$I_{SM}$				44	A
Reverse Recovery Time	$t_{RR}$	VR = 400 V, IF = 5.5A di/dt=100 A/ $\mu$ s		311		ns
Reverse Recovery Charge	$Q_{RR}$			2.8		$\mu$ C

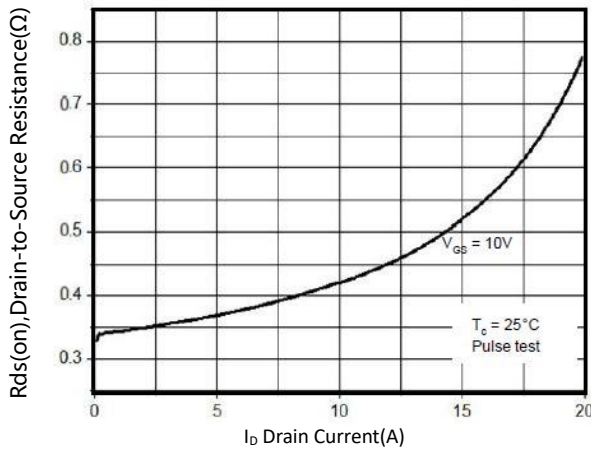
**TYPICAL CHARACTERISTICS**



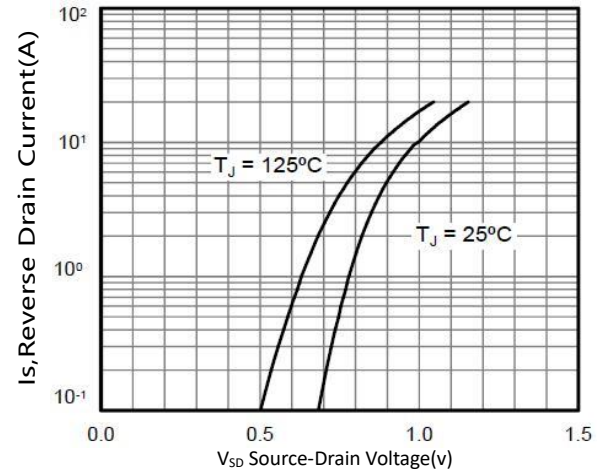
**Figure1. Typical Output Characteristics**



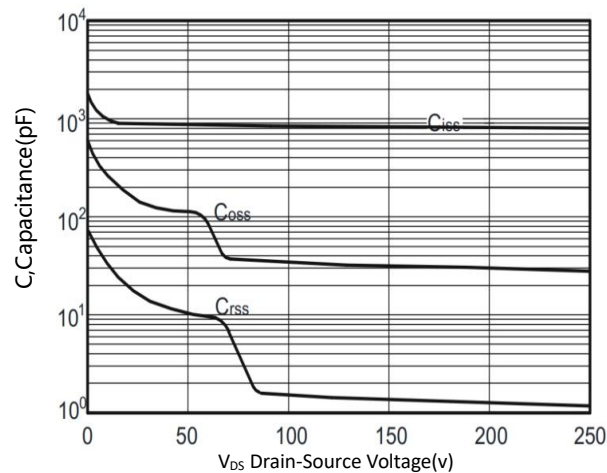
**Figure2. Typical Transfer Characteristics**



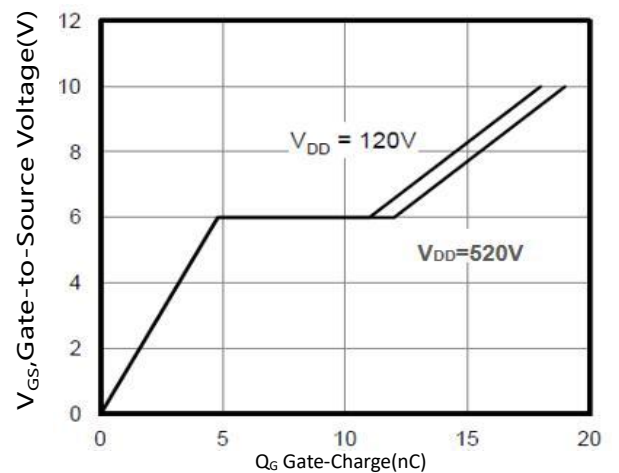
**Figure3. On-Resistance versus Drain Current**



**Figure4. Diode forward voltage versus Current**

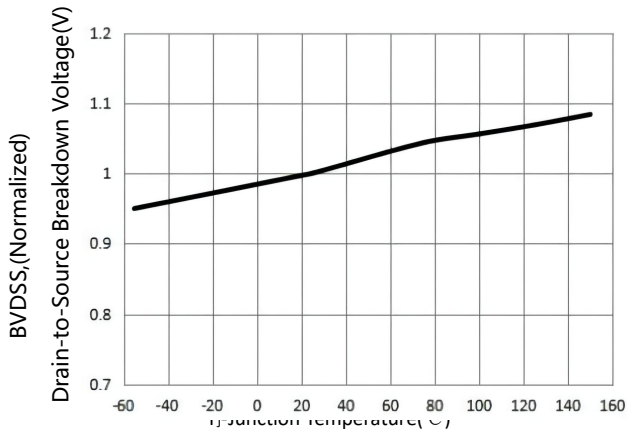


**Figure5. Typical Capacitance versus VDS**

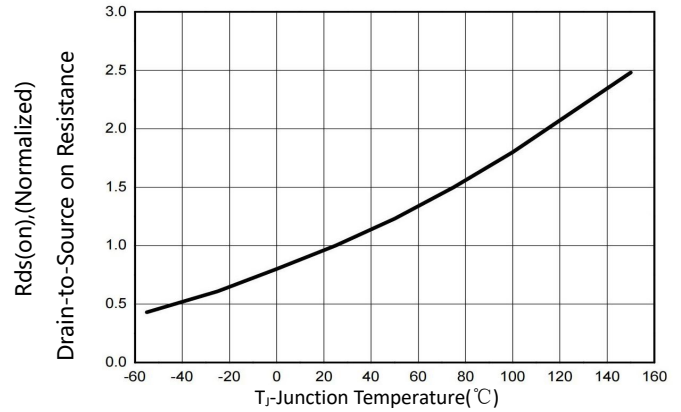


**Figure6. Typical Gate Charge versus VGS**

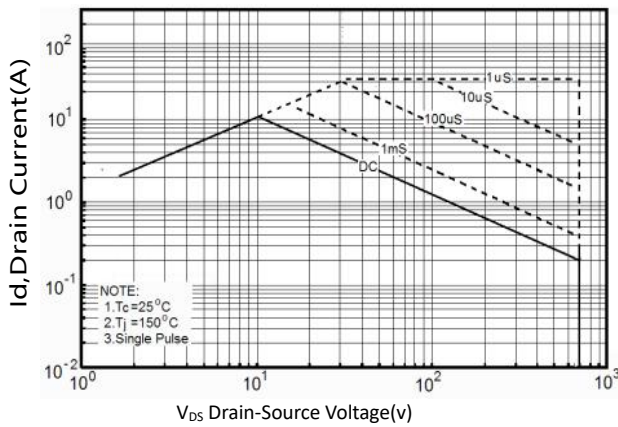
**TYPICAL CHARACTERISTICS(Cont.)**



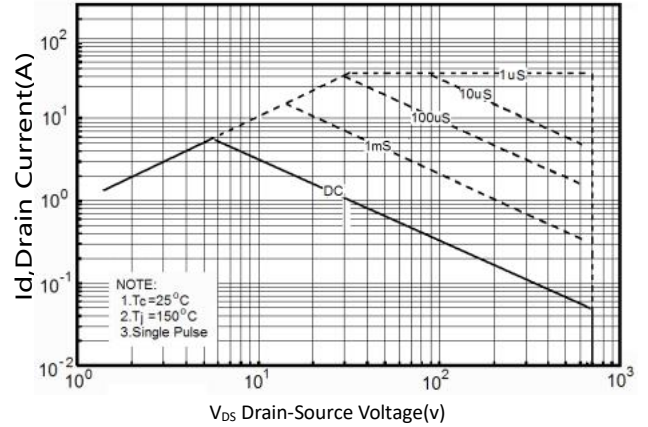
**Figure7. BV<sub>DSS</sub> Variation with Temperature**



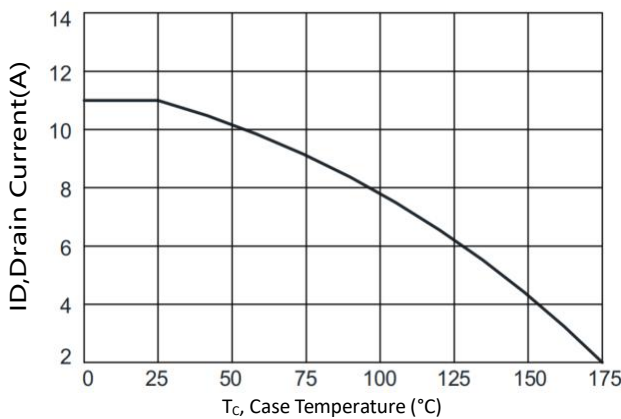
**Figure8. On-Resistance Variation with Temperature**



**Figure9. Maximum Safe Operating Area  
BXC70R380U/D**

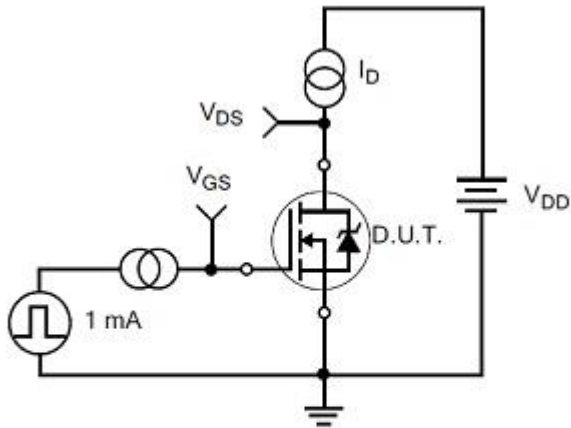


**Figure9. Maximum Safe Operating Area  
BXC70R380F**

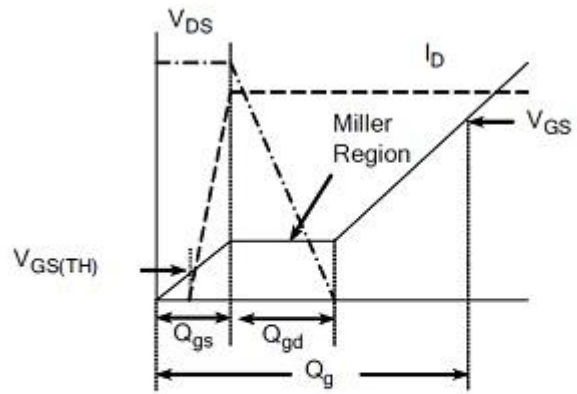


**Figure10. Maximum Continuous Drain Current  
versus Case Temperature**

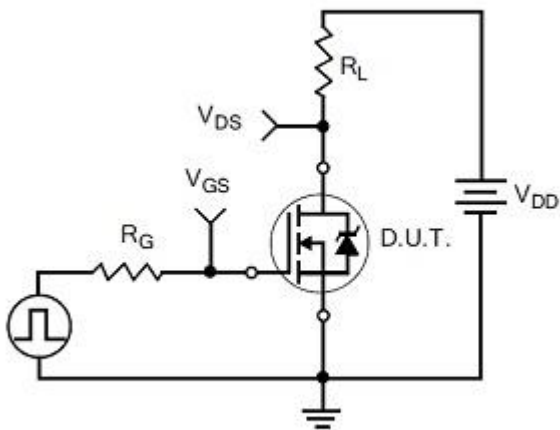
**TEST CIRCUITS AND WAVEFORMS**



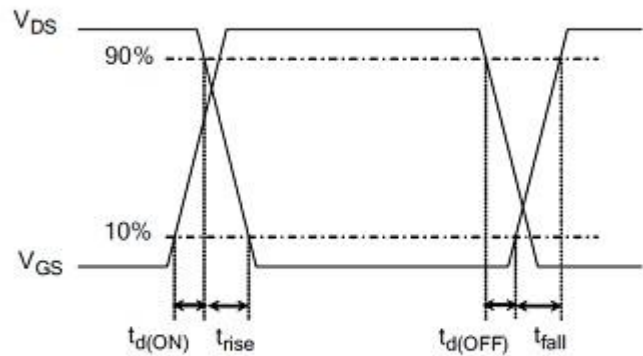
Gate Charge Test Circuit



Gate Charge Waveform

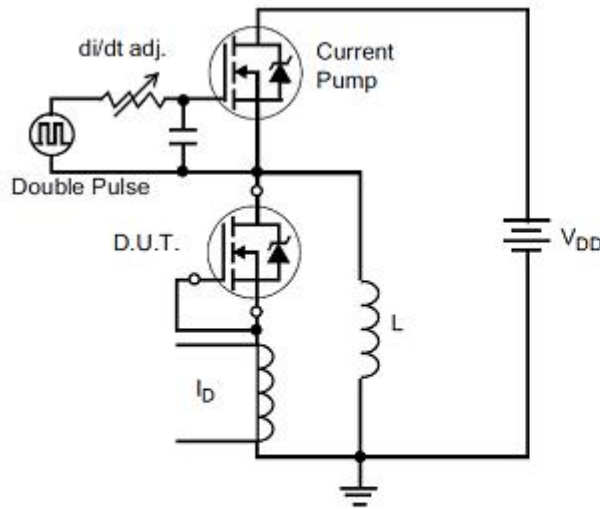


Resistive Switching Test Circuit

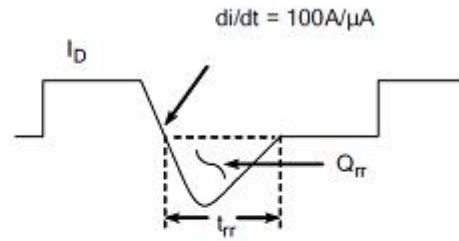


Resistive Switching Waveforms

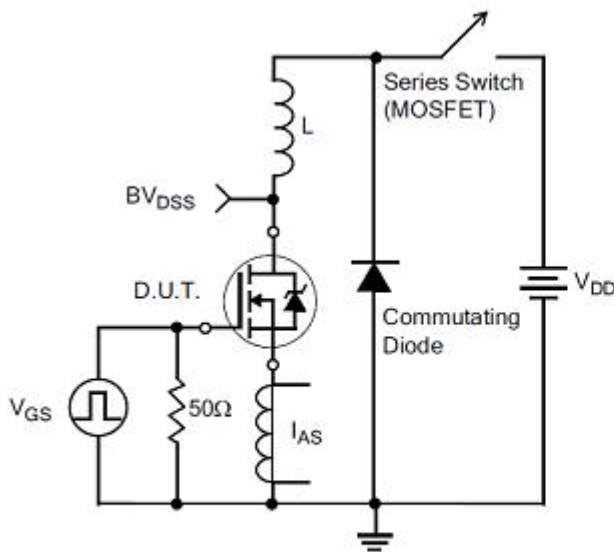
**TEST CIRCUITS AND WAVEFORMS(Cont.)**



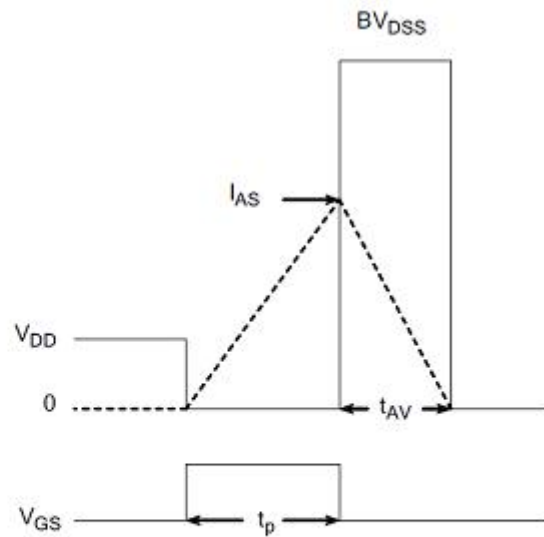
Diode Reverse Recovery Test Circuit



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
12-Sep-2021	1.0	First release

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