

## 650V 11A N-Channel Super Junction Power MOSFET

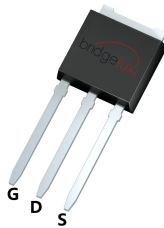
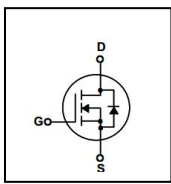
### FEATURES

- $R_{DS(ON)} \leq 0.38 \Omega$  @ $V_{GS}=10V, I_D=5.5A$
- 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-251**

**TO-252**

**TO-220F**

### ASSEMBLY MESSAGE

Product Name	Package	Packaging
BXC65R380U	TO-251	Tube
BXC65R380D	TO-252	Tube/Reel
BXC65R380F	TO-220F	Tube

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

Parameter		Symbol	Rating		Unit
			BXC65R380U/D	BXC65R380F	
Drain-Source Voltage		$V_{DSS}$	650		V
Drain Current	Continuous ( $T_C = 25^\circ\text{C}$ )	$I_D$	11		A
	Continuous ( $T_C = 100^\circ\text{C}$ )		7.9		A
Drain Current	Pulsed (Note1)	$I_{DM}$	44		A
Gate-Source Voltage		$V_{GSS}$	$\pm 30$		V
Avalanche Energy	Single Pulse (Note2)	$E_{AS}$	210		mJ
Avalanche Current (Note1)		$I_{AR}$	1.6		A
Peak Diode Recovery $dv/dt$		$dv/dt$	5		V/ns
Power Dissipation (Note 2)	$T_C = 25^\circ\text{C}$	$P_D$	118	33	W
	Derate above $25^\circ\text{C}$		0.944	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.  $L=3\text{mH}$ ,  $V_{DD}=50\text{V}$ ,  $R_G=25 \Omega$ , Starting  $T_J = 25^\circ\text{C}$

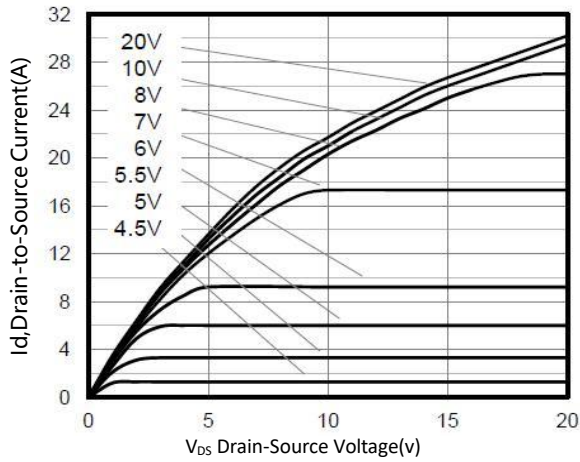
**THERMAL CHARACTERISTICS**

Parameter	Symbol	Max.		Unit
		BXC65R380U/D	BXC65R380F	
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	1.06	3.8	°C / W
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	87	62	°C / W

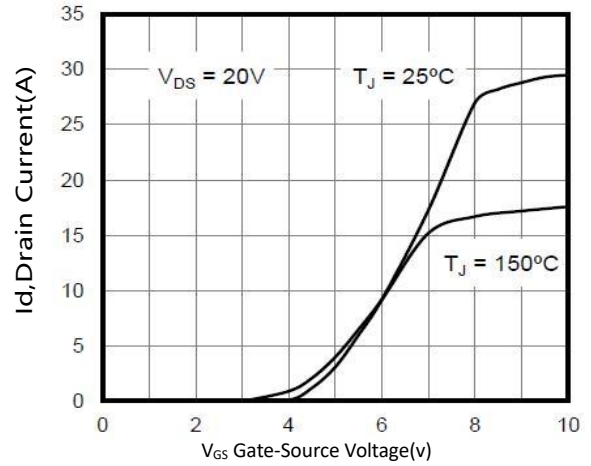
**ELECTRICAL CHARACTERISTICS** ( $T_J=25^{\circ}\text{C}$ , unless otherwise Noted)

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
<b>OFF CHARACTERISTICS</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=250\mu A$	650			V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=650V, V_{GS}=0V$			1	$\mu A$
		$V_{DS}=520V, T_C = 125^{\circ}\text{C}$		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
<b>ON CHARACTERISTICS</b>						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	2.5		4.0	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=5.5A$		0.34	0.38	$\Omega$
<b>DYNAMIC PARAMETERS</b>						
Input Capacitance	$C_{ISS}$	$V_{DS}=100V, V_{GS}=0V,$ $f=1.0\text{MHz}$		830		pF
Output Capacitance	$C_{OSS}$			37		pF
Reverse Transfer Capacitance	$C_{RSS}$			0.65		pF
<b>SWITCHING PARAMETERS</b>						
Turn-ON Delay Time	$t_{D(ON)}$	$V_{DD}=400V, I_D=5.5A, V_{GS}$ $= 10V, R_G=25\Omega$		16		ns
Turn-ON Rise Time	$t_R$			35		ns
Turn-OFF Delay Time	$t_{D(OFF)}$			75		ns
Turn-OFF Fall-Time	$t_F$			38		ns
Total Gate Charge(Note5)	$Q_G$	$V_{DS} = 520V, V_{GS} = 10V, I_D$ $= 5.5A$		19		nC
Gate Source Charge	$Q_{GS}$			3.2		nC
Gate Drain Charge	$Q_{GD}$			8.5		nC
<b>SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS</b>						
Drain-Source Diode Forward Voltage	$V_{SD}$	$I_F=5.5A, V_{GS}=0V$		0.85		V
Diode Continuous Forward Current	$I_S$				11	A
Pulsed Drain-Source Current	$I_{SM}$				44	A
Reverse Recovery Time	$t_{RR}$	$V_R = 400 V, I_F = 5.5A$ $di/dt=100 A/\mu s$		312		ns
Reverse Recovery Charge	$Q_{RR}$			2.9		$\mu C$

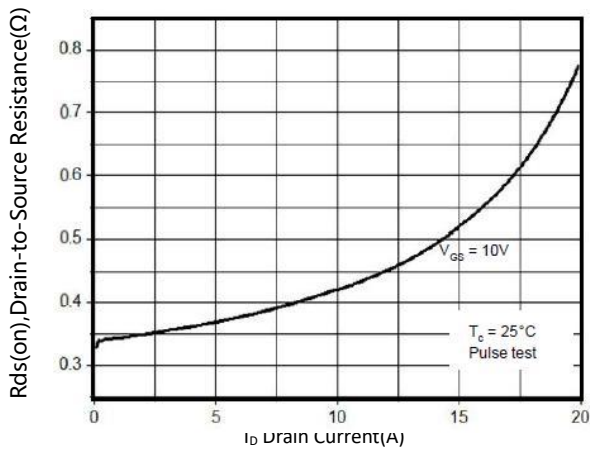
**TYPICAL CHARACTERISTICS**



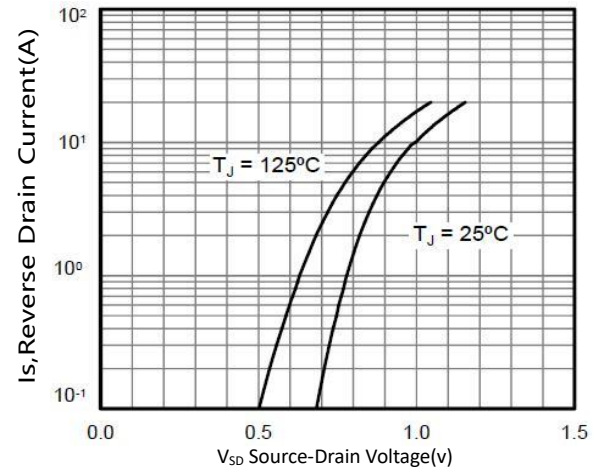
**Figure1. Typical Output Characteristics**



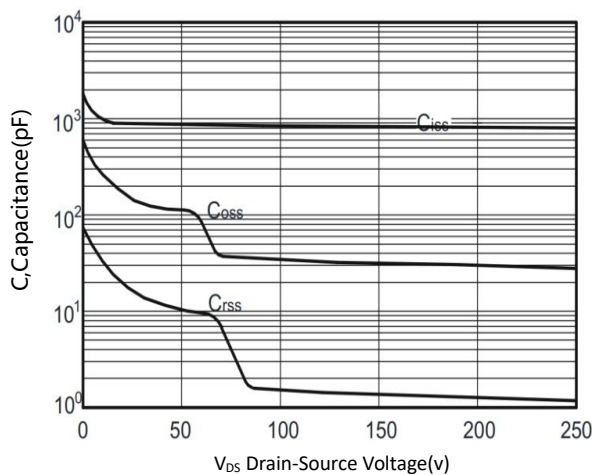
**Figure2. Typical Transfer Characteristics**



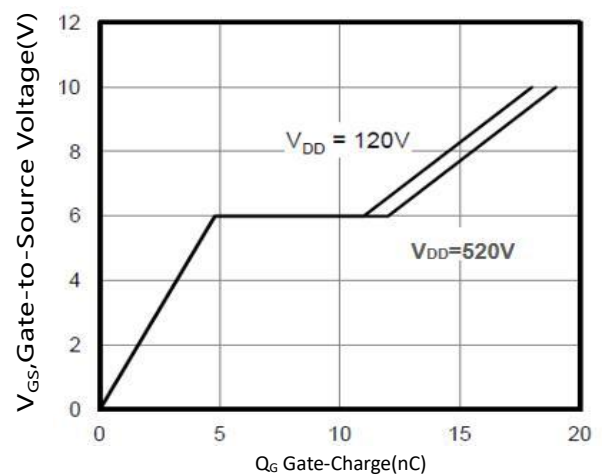
**Figure3. On-Resistance versus Drain Current**



**Figure4. Diode forward voltage versus Current**

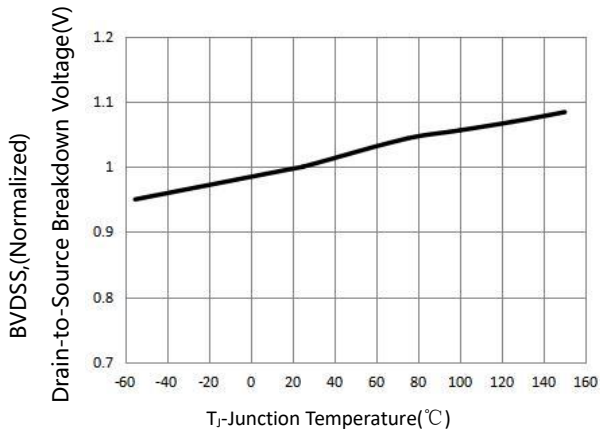


**Figure5. Typical Capacitance versus VDS**

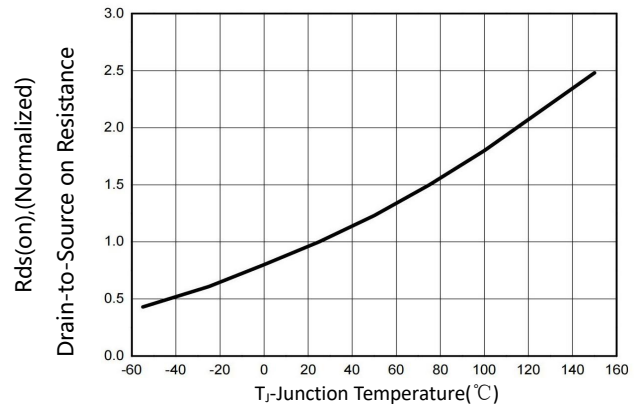


**Figure6. Typical Gate Charge versus VGS**

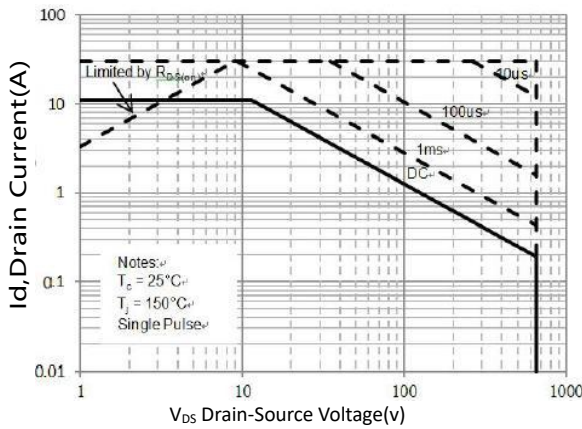
**TYPICAL CHARACTERISTICS(Cont.)**



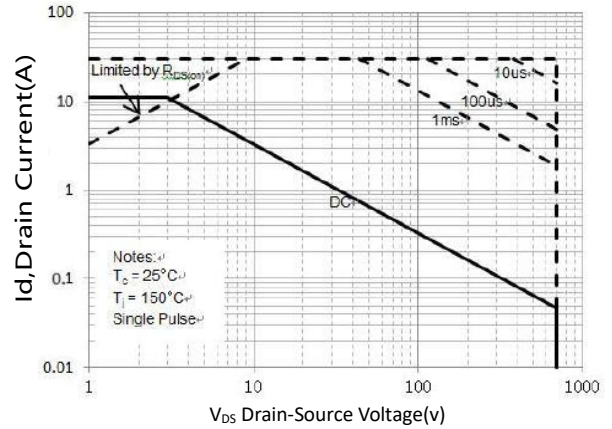
**Figure7.  $BV_{DSS}$  Variation with Temperature**



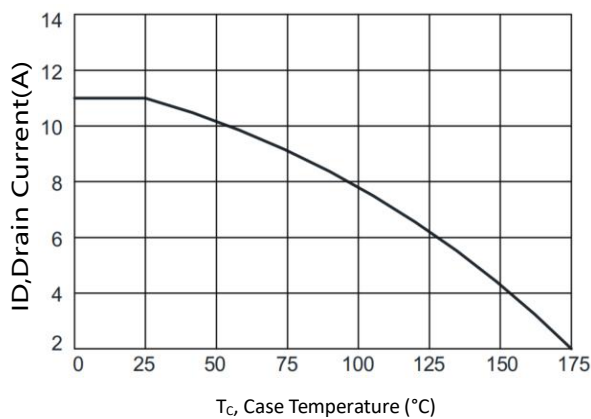
**Figure8. On-Resistance Variation with Temperature**



**Figure9. Maximum Safe Operating Area  
BXC65R380U/D**

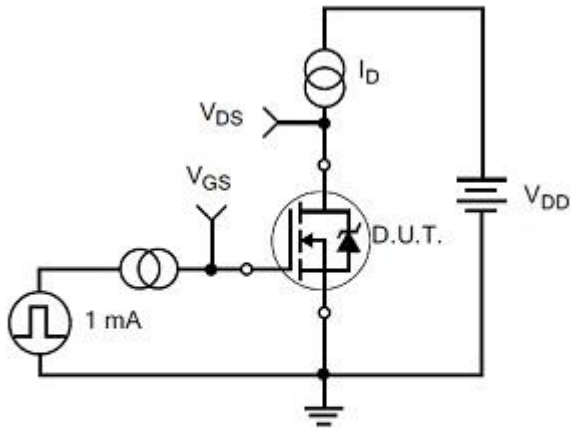


**Figure9. Maximum Safe Operating Area  
BXC65R380F**

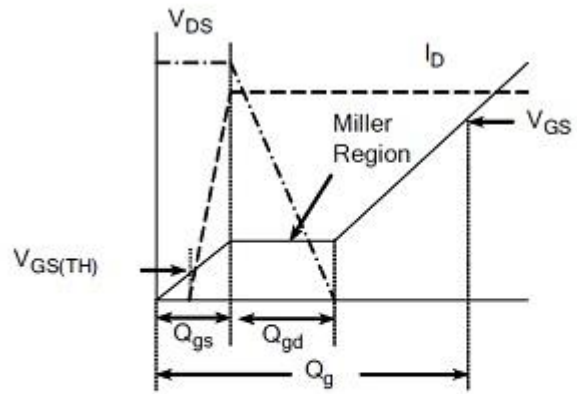


**Figure10. Maximum Continuous Drain Current  
versus Case Temperature**

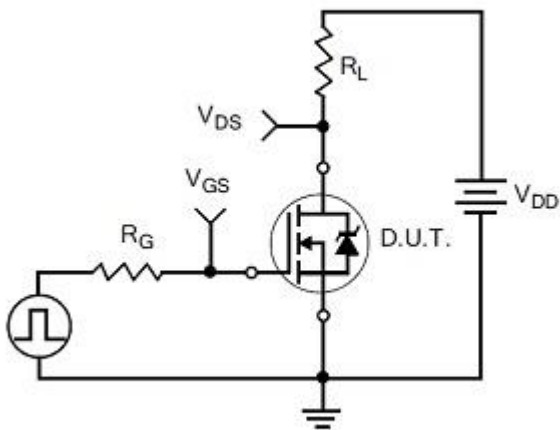
**TEST CIRCUITS AND WAVEFORMS**



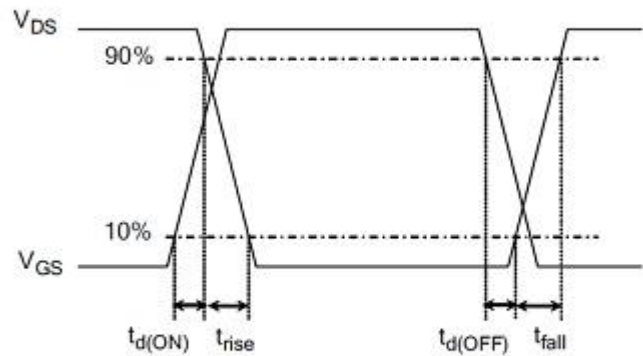
Gate Charge Test Circuit



Gate Charge Waveform

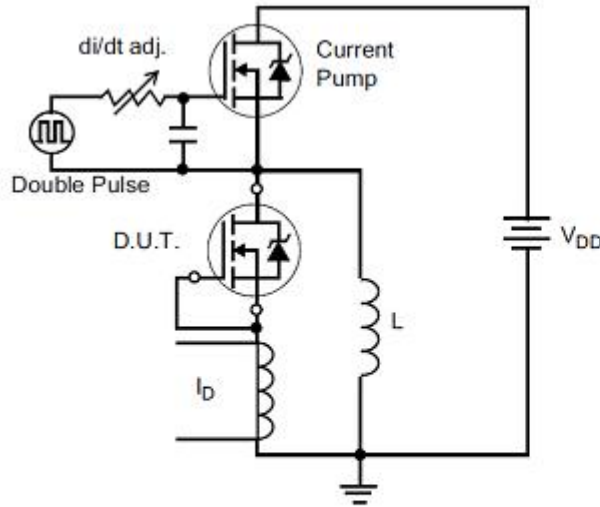


Resistive Switching Test Circuit

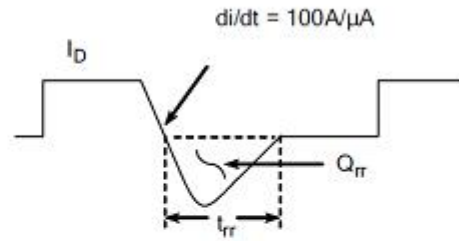


Resistive Switching Waveforms

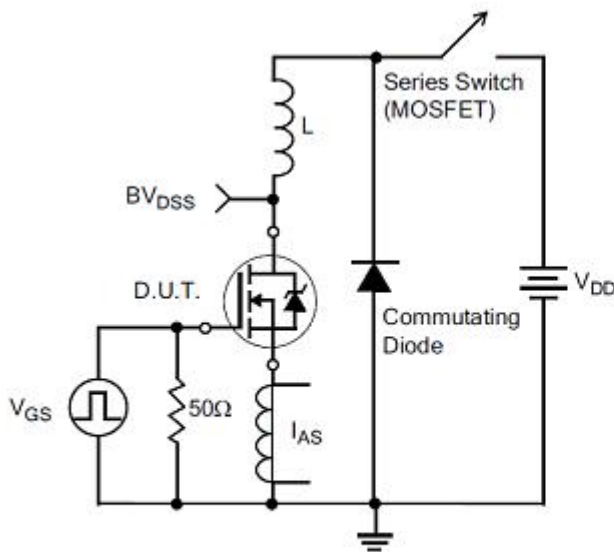
**TEST CIRCUITS AND WAVEFORMS(Cont.)**



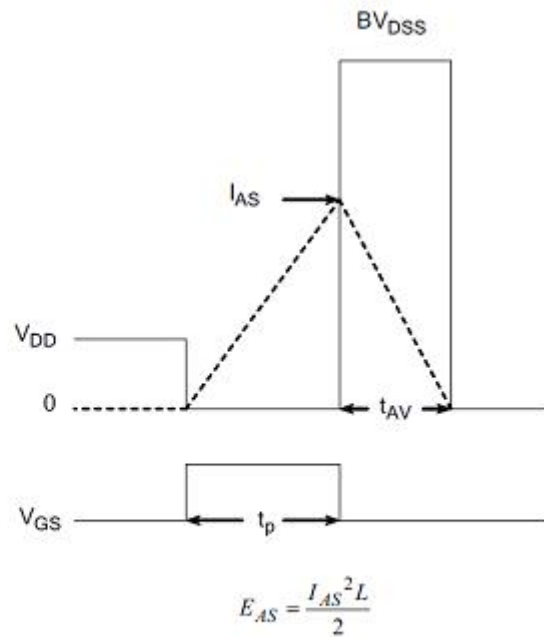
Diode Reverse Recovery Test Circuit



Diode Reverse Recovery Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

## Revision history

### Document revision history

Date	Revision	Changes
10-Sep-2021	1.0	First release
6-Dec-2021	1.1	Update parameter

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