

650V 15A N-Channel Super Junction Power MOSFET

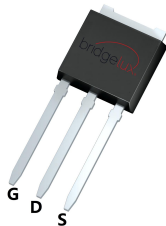
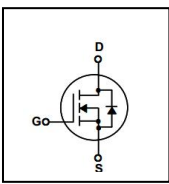
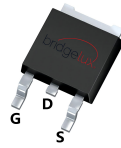
FEATURES

- $R_{DS(ON)} \leq 0.28 \Omega$ @ $V_{GS}=10V, I_D=7.5A$
- 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
BXC65R280U	TO-251	Tube
BXC65R280D	TO-252	Tube/Reel
BXC65R280F	TO-220F	Tube

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

Parameter		Symbol	Rating		Unit
			BXC65R280U/D	BXC65R280F	
Drain-Source Voltage		V_{DSS}	650		V
Drain Current	Continuous ($T_C = 25^\circ\text{C}$)	I_D	15		A
	Continuous ($T_C = 100^\circ\text{C}$)		10		A
Drain Current	Pulsed (Note1)	I_{DM}	60		A
Gate-Source Voltage		V_{GSS}	± 30		V
Avalanche Energy	Single Pulse (Note2)	E_{AS}	320		mJ
Avalanche Current (Note1)		I_{AR}	2.2		A
Peak Diode Recovery dv/dt		dv/dt	5		V/ns
Power Dissipation (Note 2)	$T_C = 25^\circ\text{C}$	P_D	134	37	W
	Derate above 25°C		1.07	0.296	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. $L=2.5\text{mH}$, $V_{DD}=50\text{V}$, $R_G=25 \Omega$, Starting $T_J = 25^\circ\text{C}$

THERMAL CHARACTERISTICS

Parameter	Symbol	Max.		Unit
		BXC65R280U/D	BXC65R280F	
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	0.93	3.4	°C / W
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	106	58	°C / W

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

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
OFF CHARACTERISTICS						
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	μA
		$V_{DS}=520V, T_C = 125^{\circ}\text{C}$		10		μA
Gate-Body Leakage Current, Forward	I_{GSS}	$V_{GS}=30V$			100	nA
Gate-Body Leakage Current, Reverse		$V_{GS}=-30V$			-100	nA
ON CHARACTERISTICS						
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	$R_{DS(ON)}$	$V_{GS}=10V, I_D=7.5A$		0.24	0.28	Ω
DYNAMIC PARAMETERS						
Input Capacitance	C_{ISS}	$V_{DS}=100V, V_{GS}=0V,$ $f=1.0\text{MHz}$		1095		pF
Output Capacitance	C_{OSS}			40		pF
Reverse Transfer Capacitance	C_{RSS}			2.3		pF
SWITCHING PARAMETERS						
Turn-ON Delay Time	$t_{D(ON)}$	$V_{DD}=400V, I_D=7.5A, V_{GS}$ $= 10V, R_G=25\Omega$		19		ns
Turn-ON Rise Time	t_R			41		ns
Turn-OFF Delay Time	$t_{D(OFF)}$			93		ns
Turn-OFF Fall-Time	t_F			42		ns
Total Gate Charge(Note5)	Q_G	$V_{DS} = 520V, V_{GS} = 10V, I_D$ $= 7.5A$		26		nC
Gate Source Charge	Q_{GS}			3.5		nC
Gate Drain Charge	Q_{GD}			10		nC
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Drain-Source Diode Forward Voltage	V_{SD}	$I_F=7.5A, V_{GS}=0V$		0.85		V
Diode Continuous Forward Current	I_S				15	A
Pulsed Drain-Source Current	I_{SM}				60	A
Reverse Recovery Time	t_{RR}	$V_R = 400 V, I_F = 7.5A$ $di/dt=100 A/\mu s$		401		ns
Reverse Recovery Charge	Q_{RR}			4		μC

TYPICAL CHARACTERISTICS

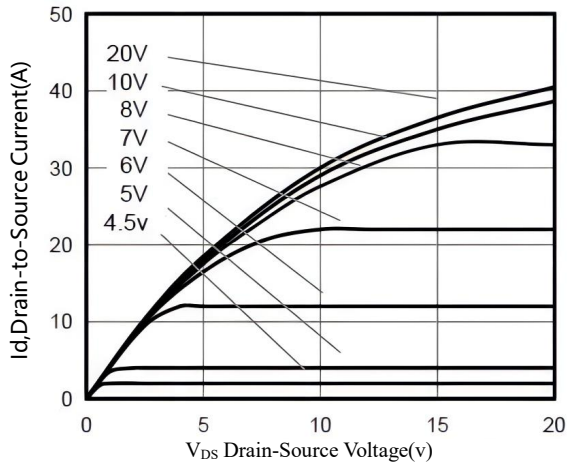


Figure1. Typical Output Characteristics

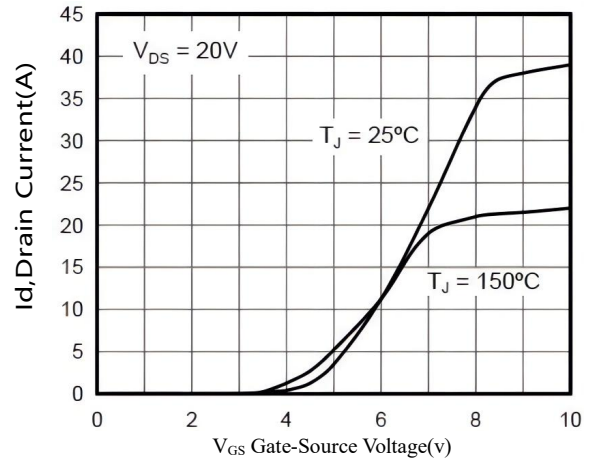


Figure2. Typical Transfer Characteristics

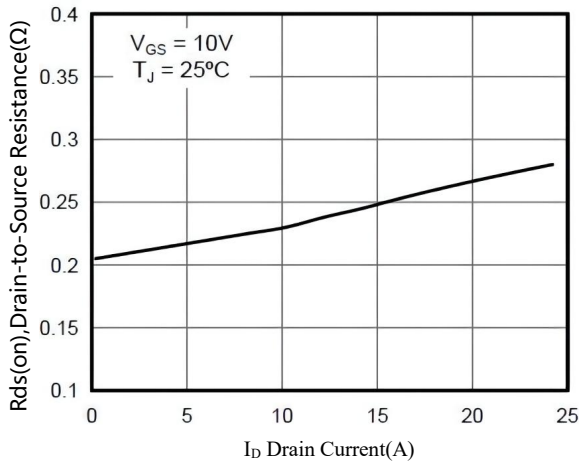


Figure3. On-Resistance versus Drain Current

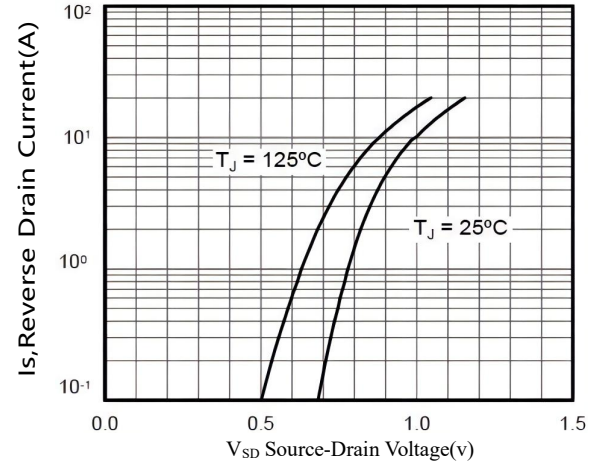


Figure4. Diode forward voltage versus Current

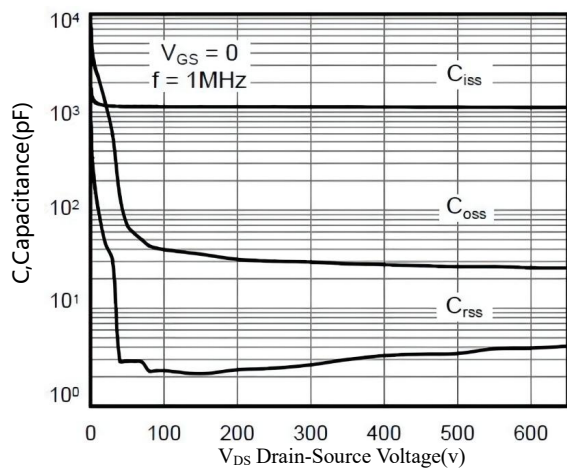


Figure5. Typical Capacitance versus VDS

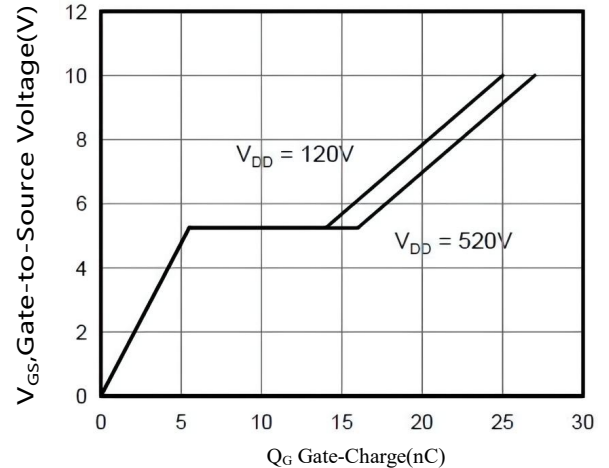


Figure6. Typical Gate Charge versus VGS

TYPICAL CHARACTERISTICS(Cont.)

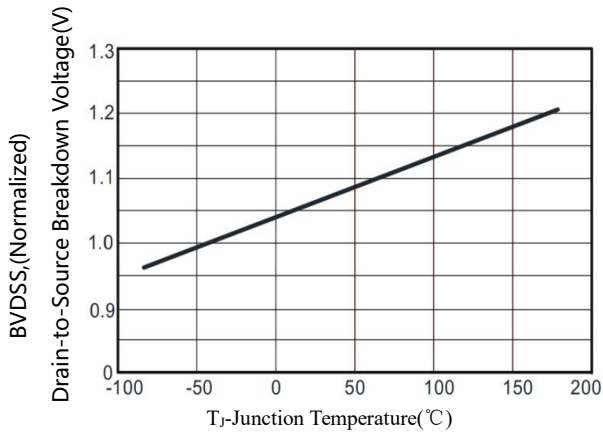


Figure 7. BV_{DSS} Variation with Temperature

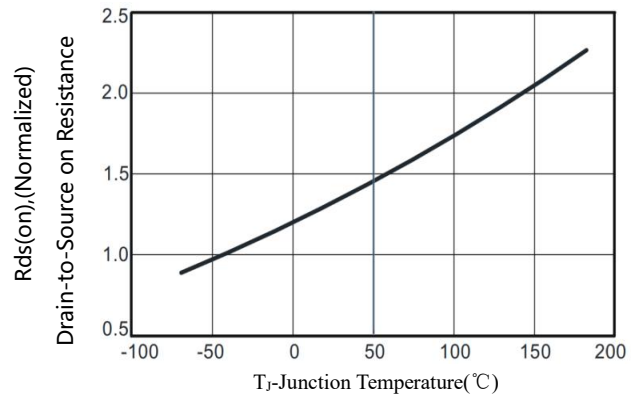


Figure 8. On-Resistance Variation with Temperature

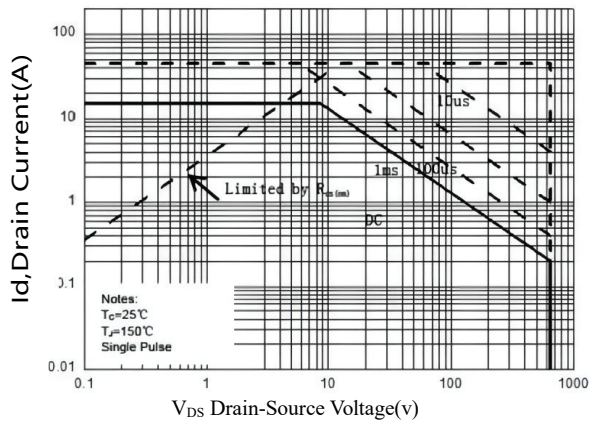


Figure 9. Maximum Safe Operating Area

BXC65R280U/D

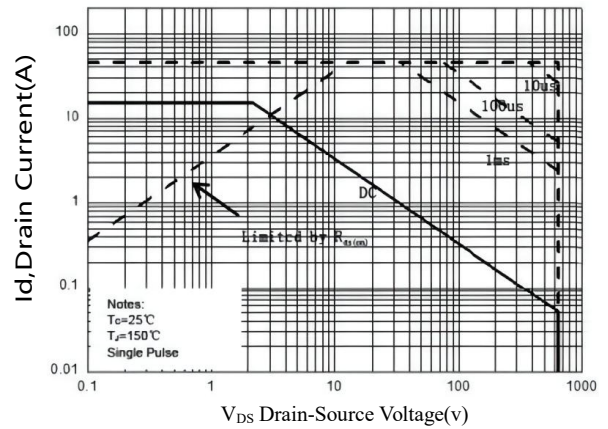


Figure 9. Maximum Safe Operating Area

BXC65R280F

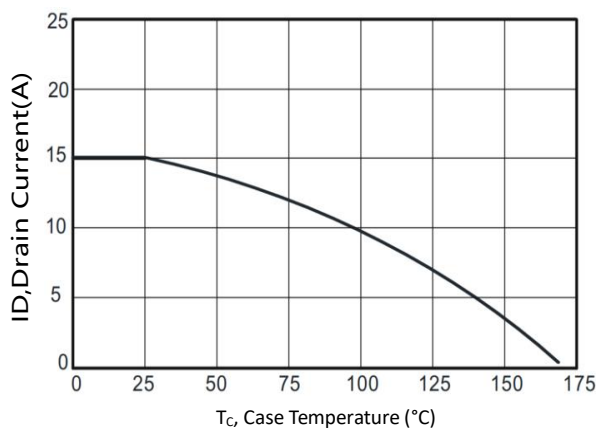
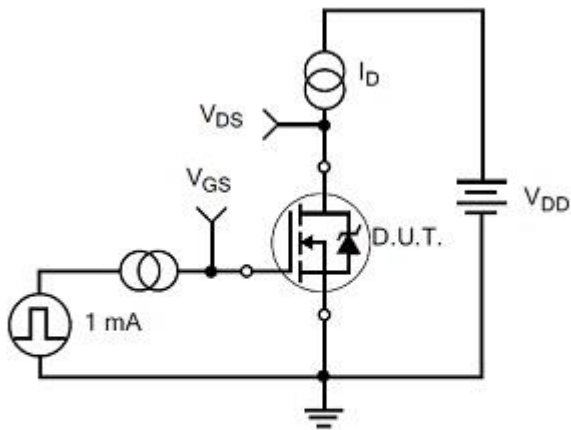
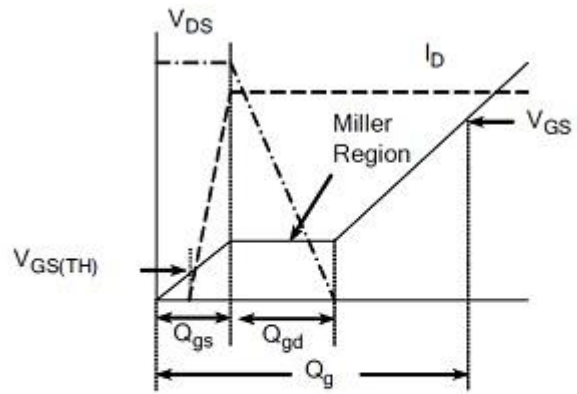


Figure 10. Maximum Continuous Drain Current versus Case Temperature

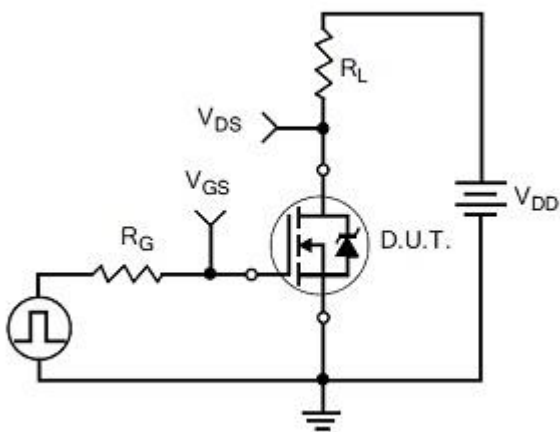
TEST CIRCUITS AND WAVEFORMS



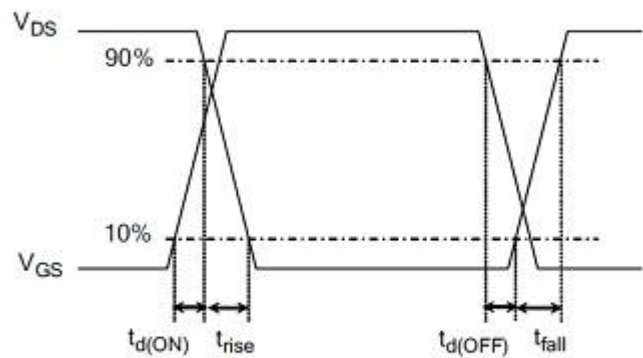
Gate Charge Test Circuit



Gate Charge Waveform

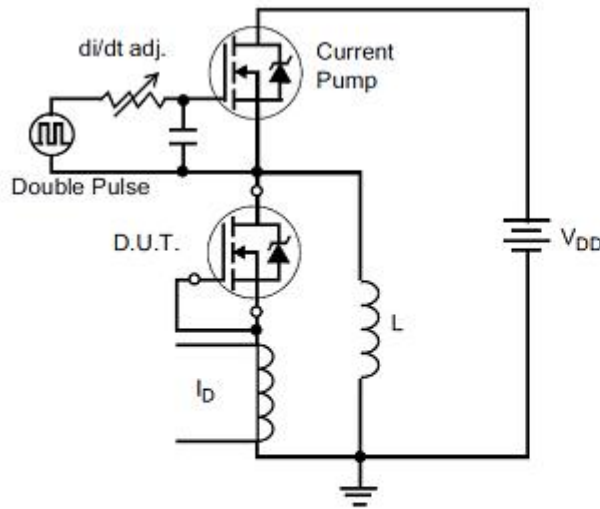


Resistive Switching Test Circuit

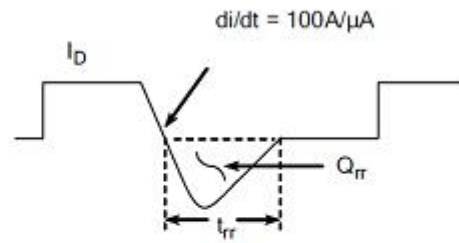


Resistive Switching Waveforms

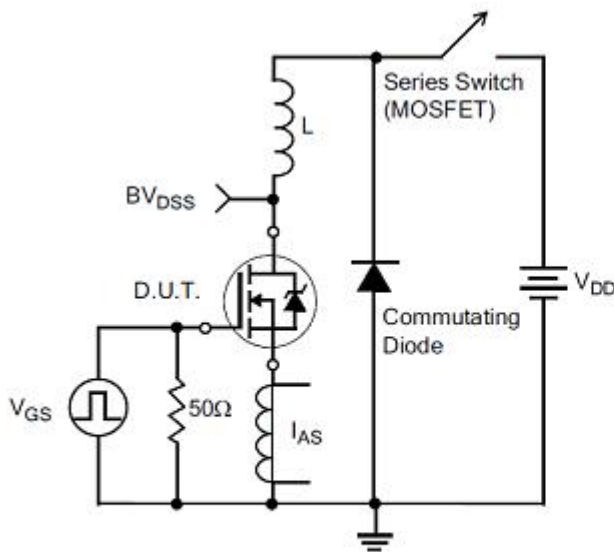
TEST CIRCUITS AND WAVEFORMS(Cont.)



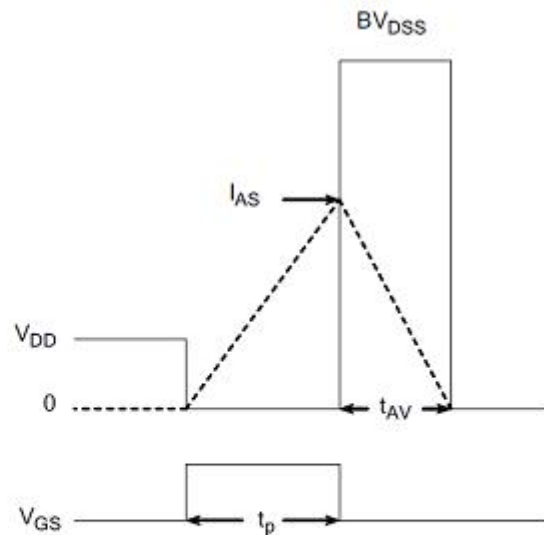
Diode Reverse Recovery Test Circuit



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
9-Nov-2021	1.0	First release

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