

650V 6A N-Channel Enhancement Mode Power MOSFET

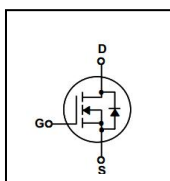
General Description

BXP6N65 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

- $R_{DS(on)} \leq 2 \Omega$ @ $V_{GS}=10V$, $I_D=3A$
- Excellent $R_{DS(on)}$ and Low Gate Charge
- Fast switching capability
- Lead free product is acquired

SYMBOL



TO-220F

ASSEMBLY MESSAGE

Product Name	Package	Packaging
BXP6N65F	TO-220F	Tube

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

Parameter		Symbol	Rating	Unit
			BXP6N65F	
Drain-Source Voltage		V_{DSS}	650	V
Drain Current	Continuous ($T_C = 25^\circ\text{C}$)	I_D	6	A
	Continuous ($T_C = 100^\circ\text{C}$)		4	A
Drain Current	Pulsed (Note1)	I_{DM}	24	A
Gate-Source Voltage		V_{GSS}	± 30	V
Avalanche Energy	Single Pulse (Note2)	E_{AS}	360	mJ
Avalanche Current (Note1)		I_{AR}	6	A
Peak Diode Recovery dv/dt (Note3)		dv/dt	5	V/ns
Power Dissipation (Note 2)	$T_C = 25^\circ\text{C}$	P_D	40	W
	Derate above 25°C		0.32	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. $I_{SD} \leq 6.0\text{A}$, $di/dt \leq 100\text{A}/\mu\text{s}$, $V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^\circ\text{C}$

THERMAL CHARACTERISTICS

Parameter	Symbol	Max.	Unit
		BXP6N65F	
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	3.125	$^{\circ}\text{C} / \text{W}$
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	62.5	$^{\circ}\text{C} / \text{W}$

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}	VGS=0V, ID=250μA	650			V
Zero Gate Voltage Drain Current	IDSS	VDS=650V, VGS=0V			1	uA
		VDS=520V, TC = 125°C			100	uA
Gate-Body Leakage Current, Forward	IGSS	VGS=30V			100	nA
Gate-Body Leakage Current, Reverse		VGS=-30V			-100	nA
Breakdown Voltage Temperature Coefficient	△BVDSS/ △TJ	ID = 250 μA		0.53		V/°C
ON CHARACTERISTICS						
Gate Threshold Voltage	VGS(TH)	VDS=VGS, ID=250μA	2		4	V
Drain-Source On-State Resistance	RDS(ON)	VGS=10V, ID=3A		1.75	2	Ω
Forward Transconductance (Note4)	gFS	VDS =50V, ID=3A		8		S
DYNAMIC PARAMETERS						
Input Capacitance	CISS	VDS=25V, VGS=0V, f=1.0MHz		900		pF
Output Capacitance	COSS			85		pF
Reverse Transfer Capacitance	CRSS			18		pF
SWITCHING PARAMETERS						
Turn-ON Delay Time	tD(ON)	VDD=325V, ID=6A, VGS = 10V ,RG=10Ω (Note4,5)		38		ns
Turn-ON Rise Time	tR			90		ns
Turn-OFF Delay Time	tD(OFF)			180		ns
Turn-OFF Fall-Time	tF			100		ns
Total Gate Charge(Note5)	QG	VDS =520V, VGS =10V, ID =6A (Note4,5)		88		nC
Gate Source Charge	QGS			21		nC
Gate Drain Charge	QGD			29		nC
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Drain-Source Diode Forward Voltage	VSD	IS=6A, VGS=0V			1.4	V
Diode Continuous Forward Current	IS				6	A
Pulsed Drain-Source Current	ISM				24	A
Reverse Recovery Time	tRR	VGS = 0 V, ISD = 6A		280		ns
Reverse Recovery Charge	QRR	di/dt=100 A/μs (Note4,5)		2.3		uC

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

5. Essentially independent of operating temperature

TYPICAL CHARACTERISTICS

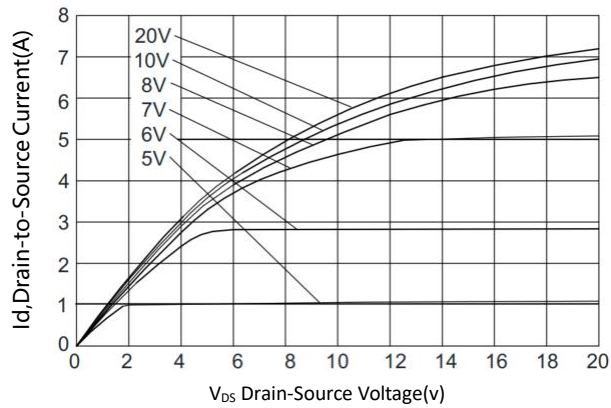


Figure1. Typical Output Characteristics

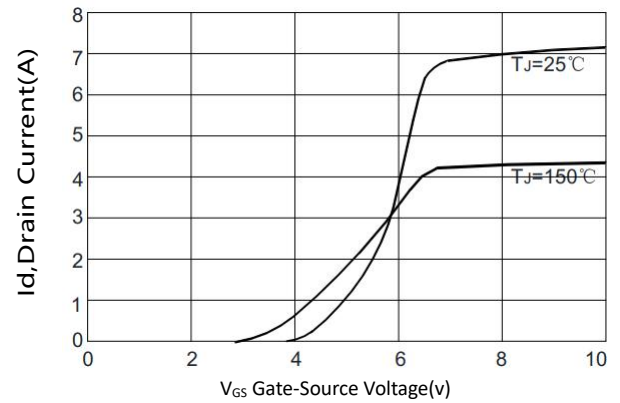


Figure2. Typical Transfer Characteristics

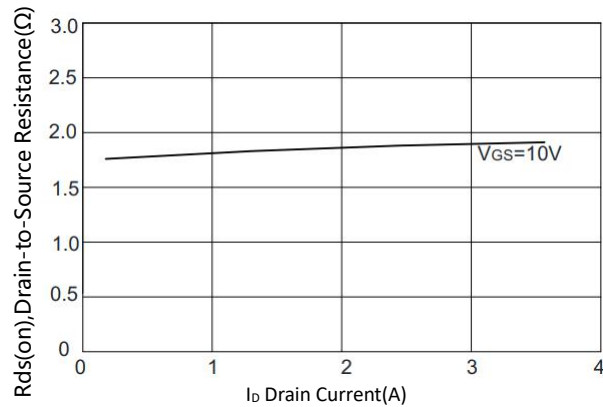


Figure3. On-Resistance versus Drain Current

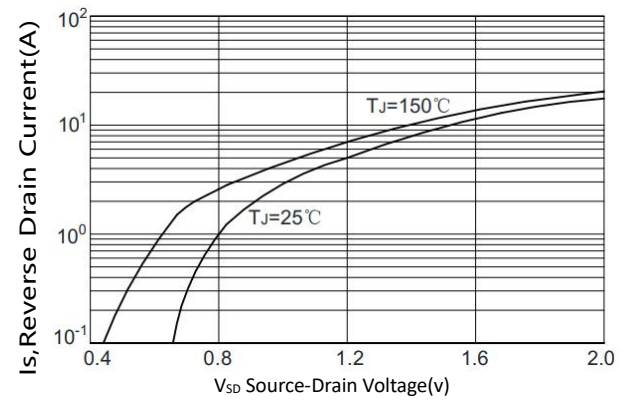


Figure4. Diode forward voltage versus Current

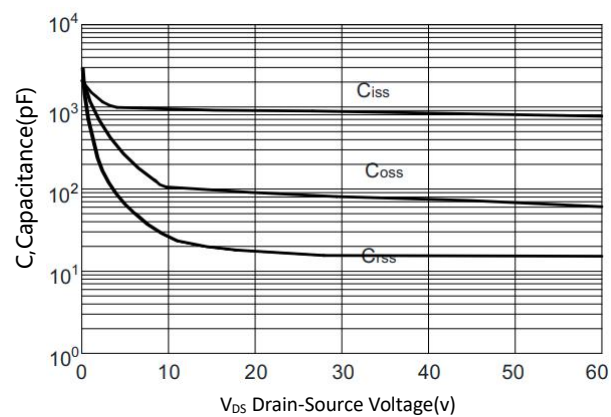


Figure5. Typical Capacitance versus V_{DS}

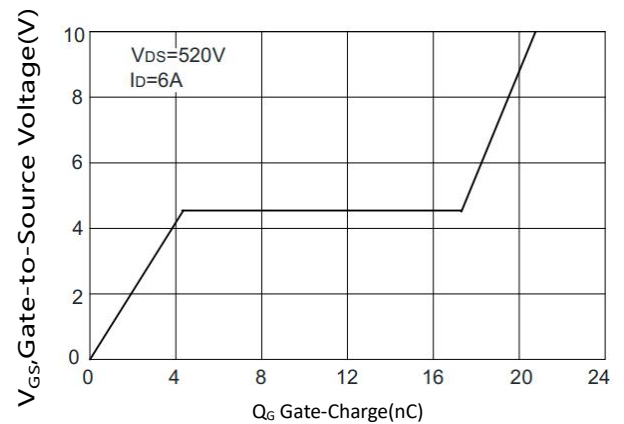


Figure6. Typical Gate Charge versus V_{GS}

TYPICAL CHARACTERISTICS(Cont.)

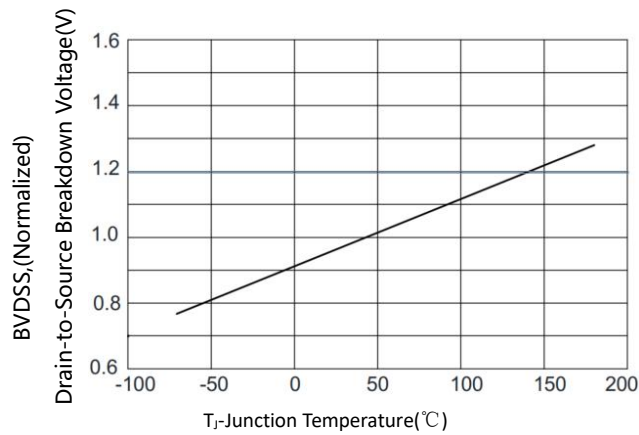


Figure7. BV_{DSS} Variation with Temperature

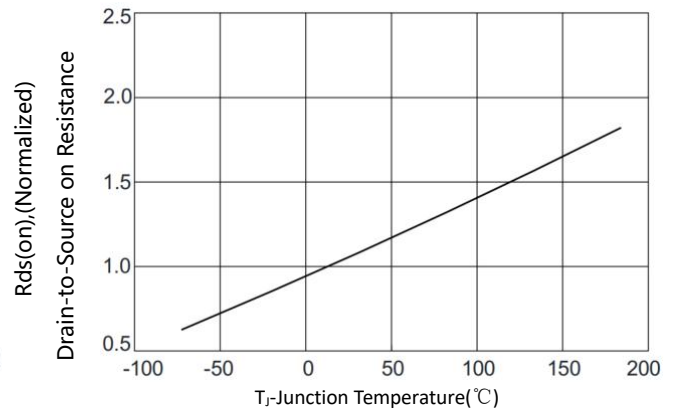
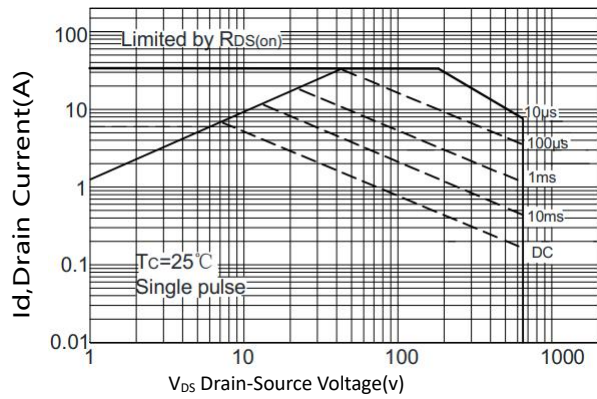
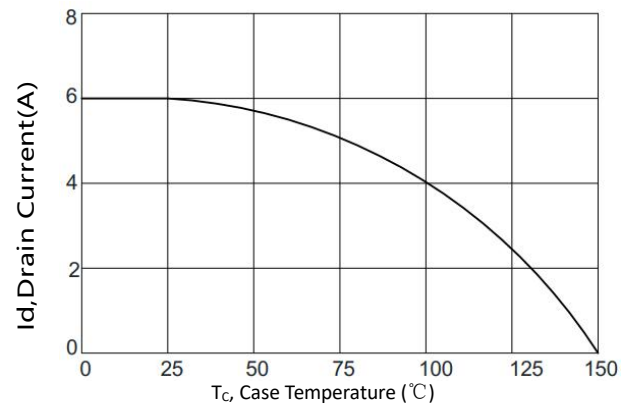


Figure8. On-Resistance Variation with Temperature

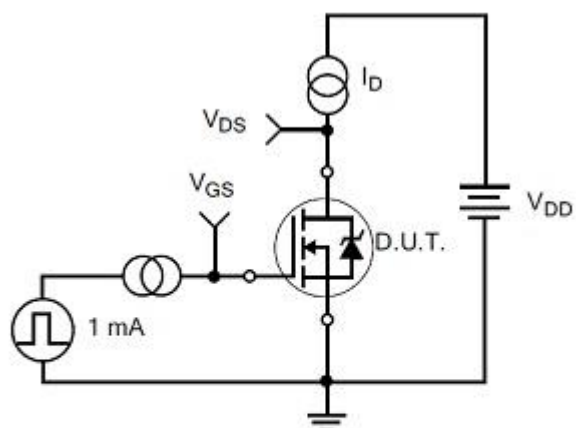


**Figure9. Maximum Safe Operating Area
BXP6N65F**

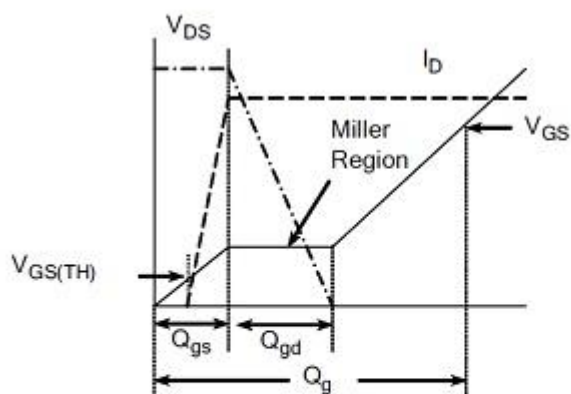


**Figure10. Maximum Continuous Drain Current
versus Case Temperature**

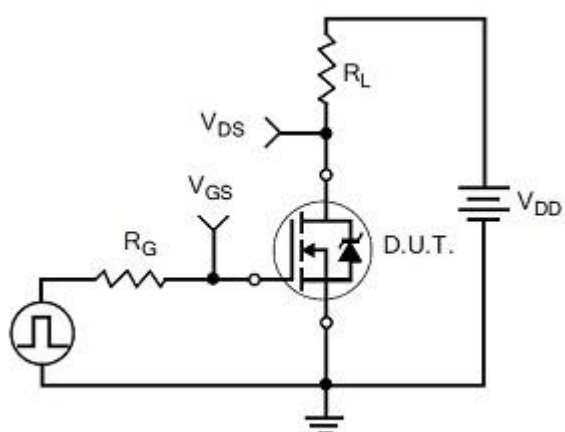
TEST CIRCUITS AND WAVEFORMS



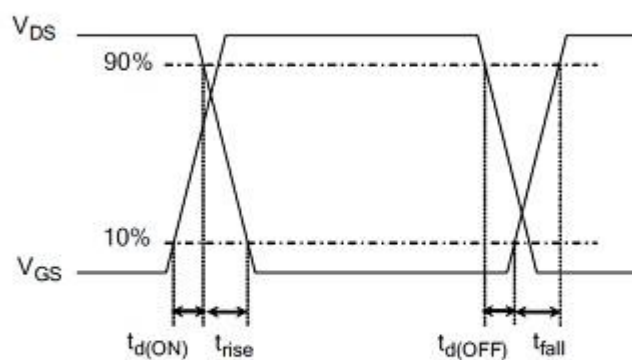
Gate Charge Test Circuit



Gate Charge Waveform

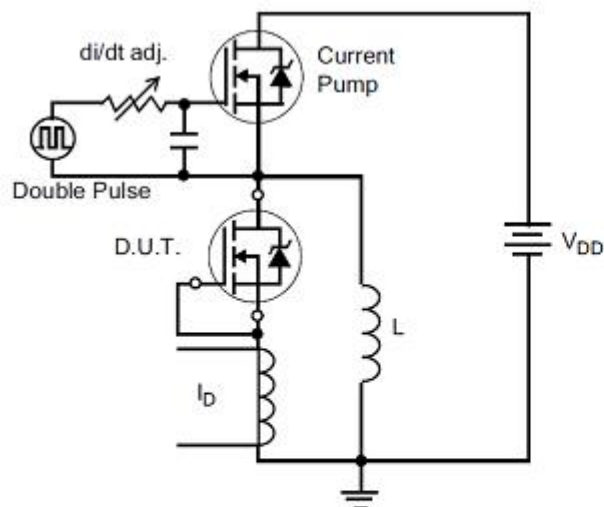


Resistive Switching Test Circuit

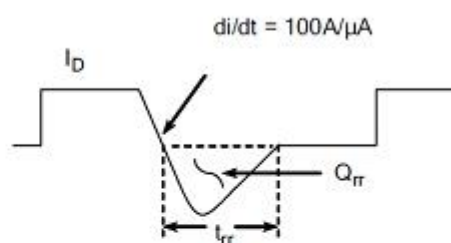


Resistive Switching Waveforms

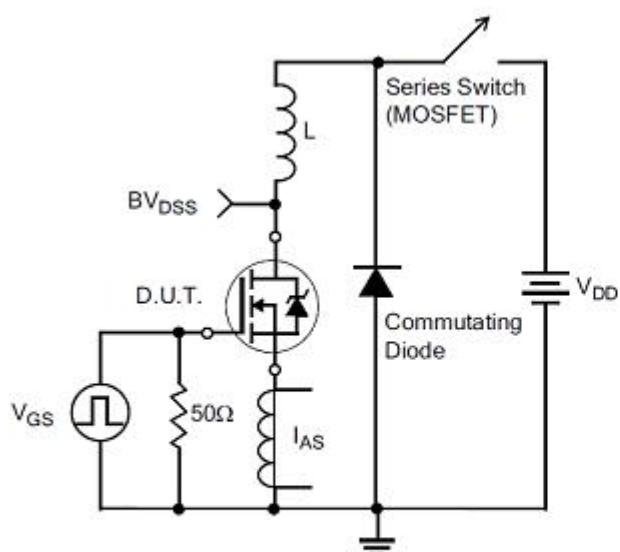
TEST CIRCUITS AND WAVEFORMS(Cont.)



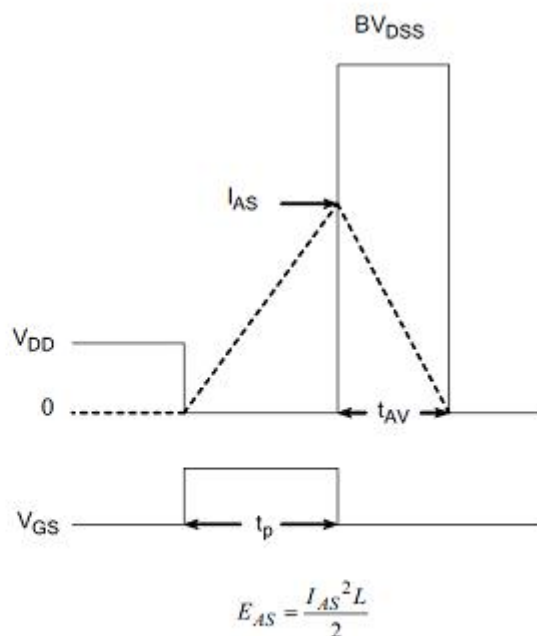
Diode Reverse Recovery Test Circuit



Diode Reverse Recovery Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

Revision history

Document revision history

Date	Revision	Changes
5-Nov-2021	1.0	First release
4-Jan-2022	1.1	Update parameter

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