

20V 4.5A N-Channel Enhancement Mode Power MOSFET

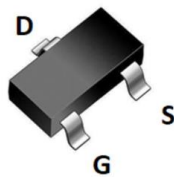
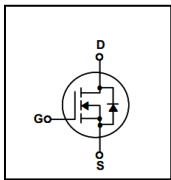
General Description

This Power MOSFET has been developed using advanced trench process, which is specifically designed to minimize input capacitance and gate charge. This renders the device suitable for use as primary switch in advanced high-efficiency isolated DC-DC converters for telecom and computer applications, and applications with low gate charge driving requirements.

FEATURES

- $R_{DS(ON)} \leq 27m\Omega$ @ $V_{GS}=4.5V, I_D=4A$
- Excellent $R_{DS(ON)}$ and Low Gate Charge
- Lead free product is acquired

SYMBOL



SOT-23 top view

ASSEMBLY MESSAGE

Product Name	Marking	Package	Packaging
BXT270N02M	2302C	SOT-23	Reel

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

Parameter		Symbol	Rating	Unit
			SOT-23	
Drain-Source Voltage		V_{DSS}	20	V
Drain Current	Continuous ($T_C = 25^\circ\text{C}$)	I_D	4.5	A
	Continuous ($T_C = 100^\circ\text{C}$)		3.6	A
Drain Current	Pulsed (Note1)	I_{DM}	18	A
Gate-Source Voltage		V_{GSS}	± 12	V
Power Dissipation	$T_C = 25^\circ\text{C}$	P_D	1.0	W
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

THERMAL CHARACTERISTICS

Parameter	Symbol	Max.	Unit
		SOT-23	
Thermal Resistance, Junction-to- Ambient	$R_{\theta JA}$	125	°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}	$V_{GS}=0V, I_D=250\mu A$	20			V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=20V, V_{GS}=0V$			1	μA
Gate-Body Leakage Current, Forward	I_{GSS}	$V_{GS}=12V$			100	nA
Gate-Body Leakage Current, Reverse		$V_{GS}=-12V$			-100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	0.5	0.7	1.2	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=4.5V, I_D=4A$		22	27	m Ω
		$V_{GS}=2.5V, I_D=3A$		29	44	m Ω
DYNAMIC PARAMETERS						
Input Capacitance	C_{ISS}	$V_{DS}=10V, V_{GS}=0V,$ $f=1.0MHz$		610		pF
Output Capacitance	C_{OSS}			110		pF
Reverse Transfer Capacitance	C_{RSS}			58		pF
SWITCHING PARAMETERS						
Turn-ON Delay Time	$t_{D(ON)}$	$V_{DD}=10V, I_D=4.5A, V_{GS} =$ $4.5V, R_G=3\Omega$		13		ns
Turn-ON Rise Time	t_R			54		ns
Turn-OFF Delay Time	$t_{D(OFF)}$			20		ns
Turn-OFF Fall-Time	t_F			18		ns
Total Gate Charge(Note2)	Q_G	$V_{DS} =10V, V_{GS} =4.5V, I_D$ $=4.5A$		5.8		nC
Gate Source Charge	Q_{GS}			0.9		nC
Gate Drain Charge	Q_{GD}			1		nC
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Drain-Source Diode Forward Voltage	V_{SD}	$I_S=4.5A, V_{GS}=0V$			1.2	V
Diode Continuous Forward Current	I_S				4.5	A

Note: 2. Essentially independent of operating temperature

TYPICAL CHARACTERISTICS

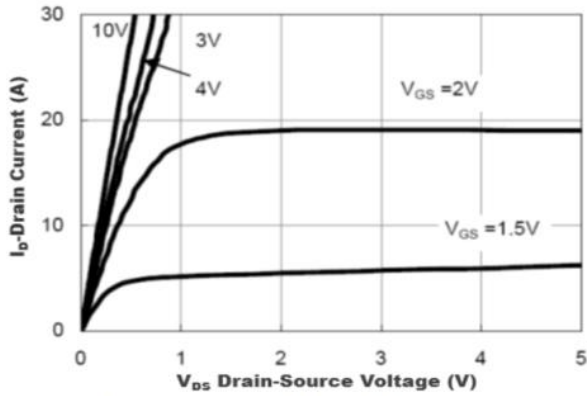


Figure1. Output Characteristics

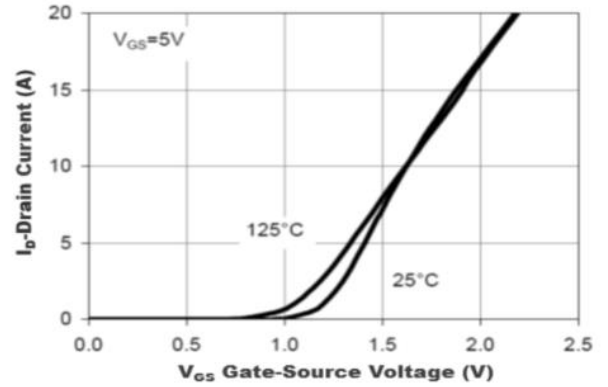


Figure2. Transfer Characteristics

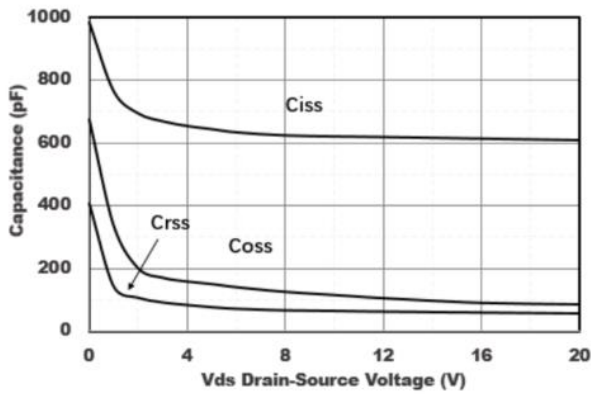


Figure3. Capacitance Characteristics

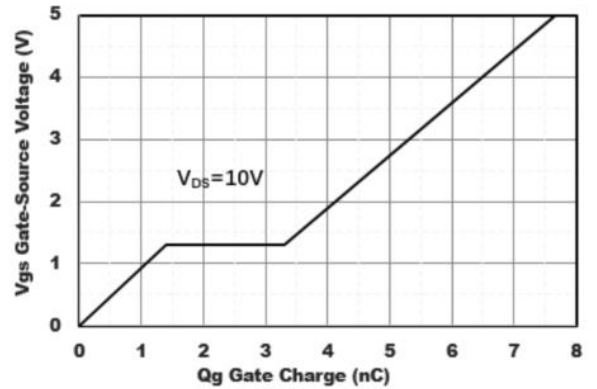


Figure4. Gate Charge

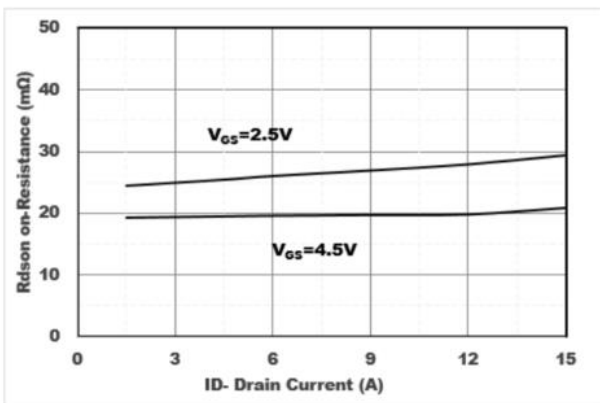


Figure5. Drain-Source on Resistance

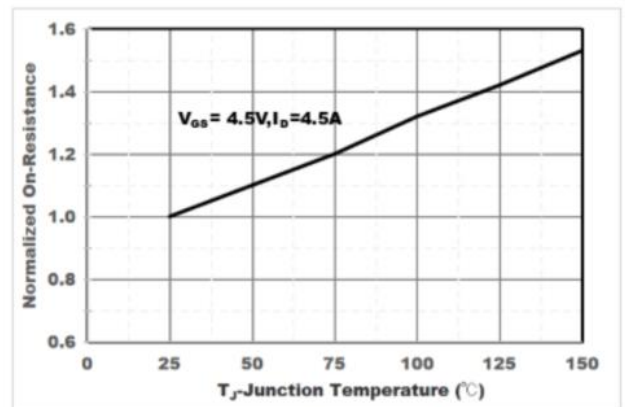


Figure6. Drain-Source on Resistance

TYPICAL CHARACTERISTICS(Cont.)

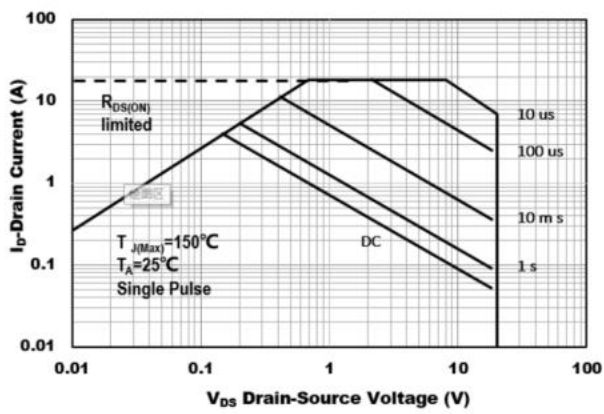
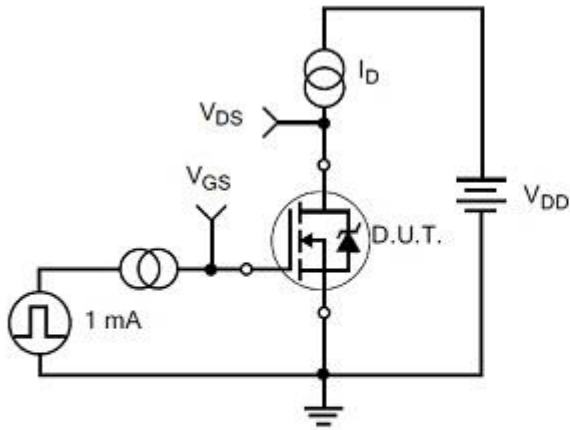
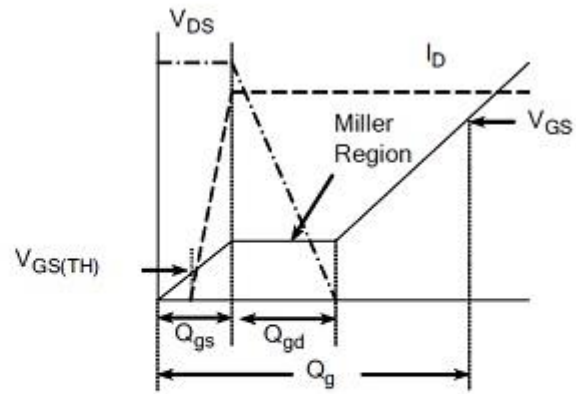


Figure7. Safe Operation Area

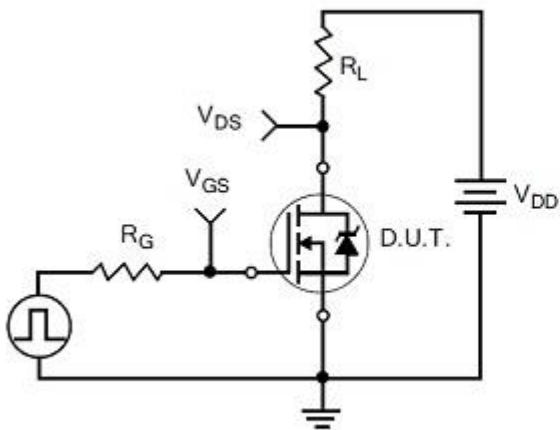
TEST CIRCUITS AND WAVEFORMS



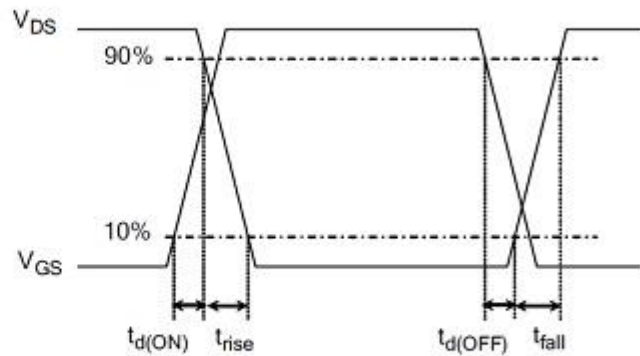
Gate Charge Test Circuit



Gate Charge Waveform

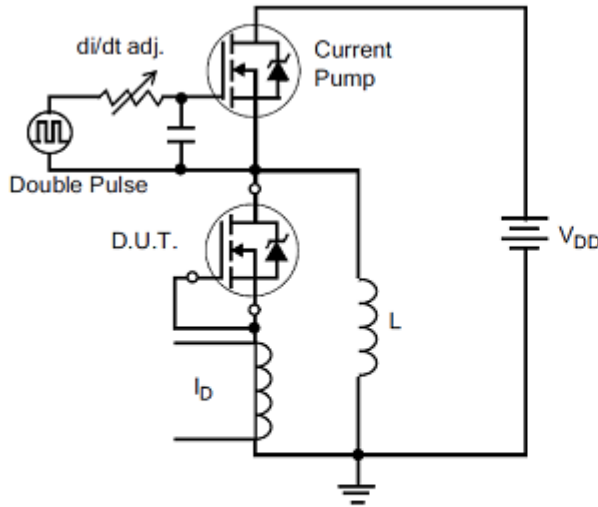


Resistive Switching Test Circuit

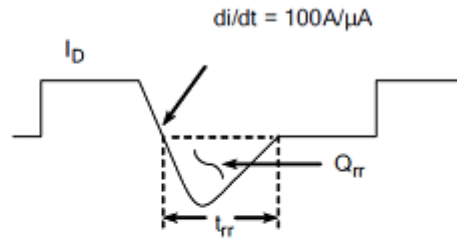


Resistive Switching Waveforms

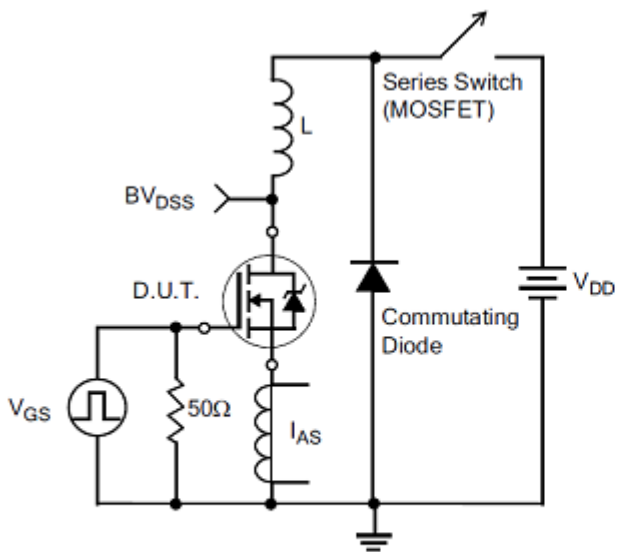
TEST CIRCUITS AND WAVEFORMS(Cont.)



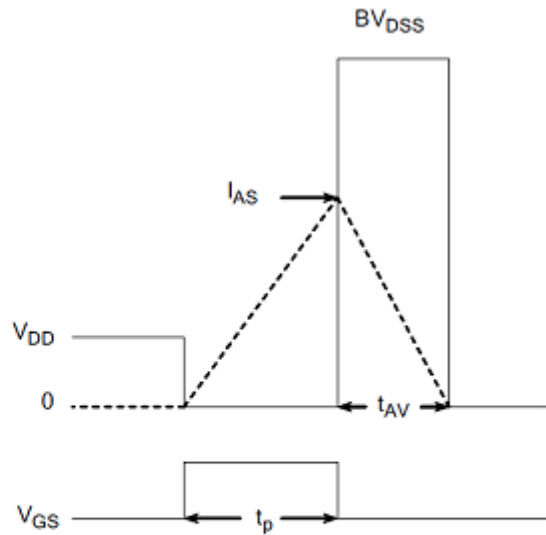
Diode Reverse Recovery Test Circuit



Diode Reverse Recovery Waveform



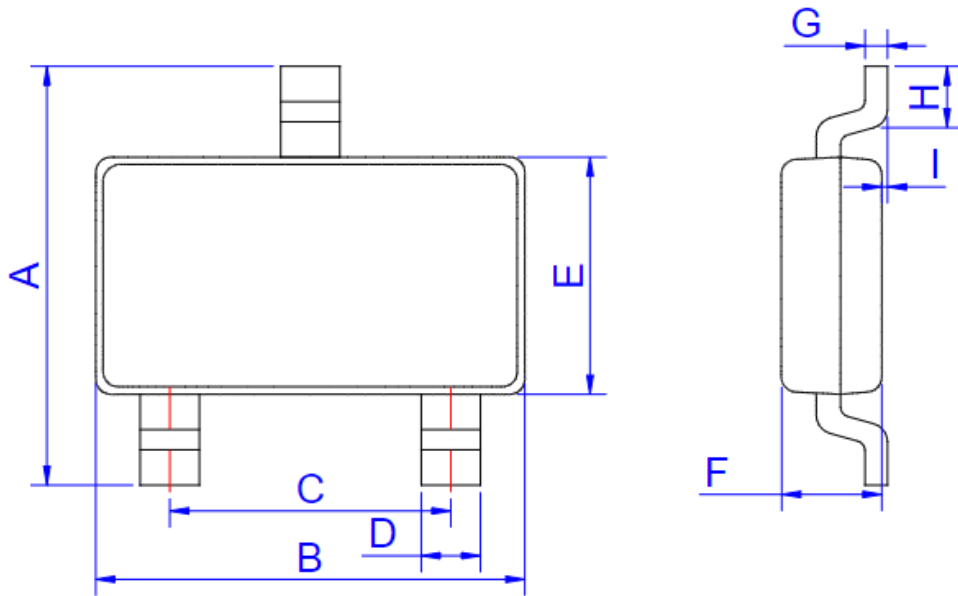
Unclamped Inductive Switching Test Circuit



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

Unclamped Inductive Switching Waveforms

SOT-23 Package



SOT-23

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	2.250	2.550	0.089	0.100
B	2.800	3.000	0.110	0.118
C	1.800	2.000	0.071	0.079
D	0.300	0.500	0.012	0.020
E	1.200	1.400	0.047	0.055
F	0.900	1.150	0.035	0.045
G		0.200		0.008
H	0.200		0.008	
I	0.000	0.150	0.000	0.006

Revision history

Document revision history

Date	Revision	Changes
15-Oct-2020	1.0	First release
5-Mar-2021	1.1	Update the VGSS of page1

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