

## 20V 2.3A N-Channel Enhancement Mode Power MOSFET

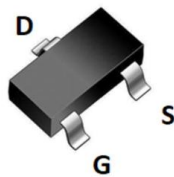
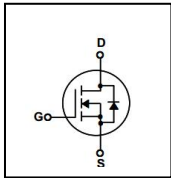
### General Description

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

- $R_{DS(ON)} \leq 50m\Omega$  @ $V_{GS}=4.5V, I_D=2A$
- Excellent  $R_{DS(ON)}$  and Low Gate Charge
- Lead free product is acquired

### SYMBOL



SOT-23 top view

### ASSEMBLY MESSAGE

Product Name	Package	Packaging
BXT500N02M	SOT-23	Reel

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

Parameter	Symbol	Rating	Unit
		SOT-23	
Drain-Source Voltage	$V_{DSS}$	20	V
Drain Current	Continuous ( $T_C = 25^\circ C$ )	2.3	A
	Continuous ( $T_C = 100^\circ C$ )	1.4	A
Drain Current	Pulsed (Note1)	8	A
Gate-Source Voltage	$V_{GSS}$	$\pm 12$	V
Power Dissipation	$T_C = 25^\circ C$	0.77	W
Maximum Junction Temperature	$T_J$	150	$^\circ C$
Storage Temperature Range	$T_{STG}$	-55 to 150	$^\circ C$

Note: 1. Repetitive Rating: Pulse width limited by maximum junction temperature

**THERMAL CHARACTERISTICS**

Parameter	Symbol	Max.	Unit
		SOT-23	
Thermal Resistance, Junction-to- Ambient	$R_{\theta JA}$	162	°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	$BV_{DSS}$	$V_{GS}=0V, I_D=250\mu A$	20			V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=20V, V_{GS}=0V$			1	$\mu A$
Gate-Body Leakage Current, Forward	$I_{GSS}$	$V_{GS}=12V$			100	nA
Gate-Body Leakage Current, Reverse		$V_{GS}=-12V$			-100	nA
<b>ON CHARACTERISTICS</b>						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	0.6	0.76	1.1	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=4.5V, I_D=2A$		41	50	$m\Omega$
		$V_{GS}=2.5V, I_D=1A$		56	80	$m\Omega$
<b>DYNAMIC PARAMETERS</b>						
Input Capacitance	$C_{ISS}$	$V_{DS}=10V, V_{GS}=0V,$ $f=1.0MHz$		340		pF
Output Capacitance	$C_{OSS}$			115		pF
Reverse Transfer Capacitance	$C_{RSS}$			33		pF
<b>SWITCHING PARAMETERS</b>						
Turn-ON Delay Time	$t_{D(ON)}$	$V_{DD}=10V, I_D=2.3A, V_{GS} =$ $4.5V, R_G=3\Omega$		12		ns
Turn-ON Rise Time	$t_R$			36		ns
Turn-OFF Delay Time	$t_{D(OFF)}$			34		ns
Turn-OFF Fall-Time	$t_F$			10		ns
Total Gate Charge(Note2)	$Q_G$	$V_{DS} =10V, V_{GS} =4.5V, I_D$ $=2.3A$		5.4		nC
Gate Source Charge	$Q_{GS}$			0.65		nC
Gate Drain Charge	$Q_{GD}$			1.6		nC
<b>SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS</b>						
Drain-Source Diode Forward Voltage	$V_{SD}$	$I_S=2.3A, V_{GS}=0V$			1.2	V
Diode Continuous Forward Current	$I_S$				2.3	A

Note: 2. Essentially independent of operating temperature

**TYPICAL CHARACTERISTICS**

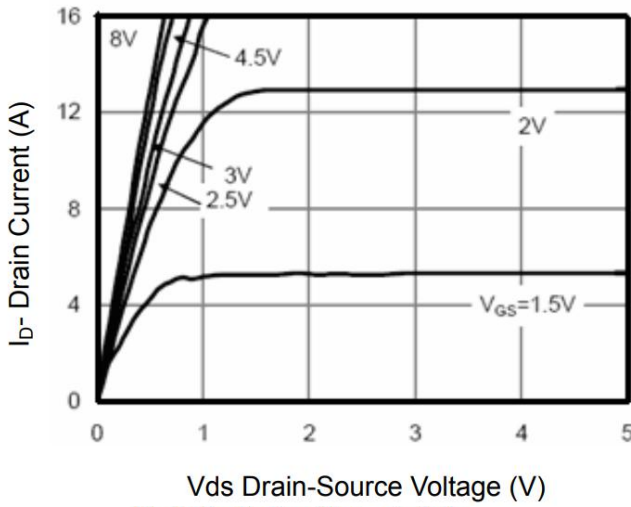


Fig 1: On-Region Characteristics

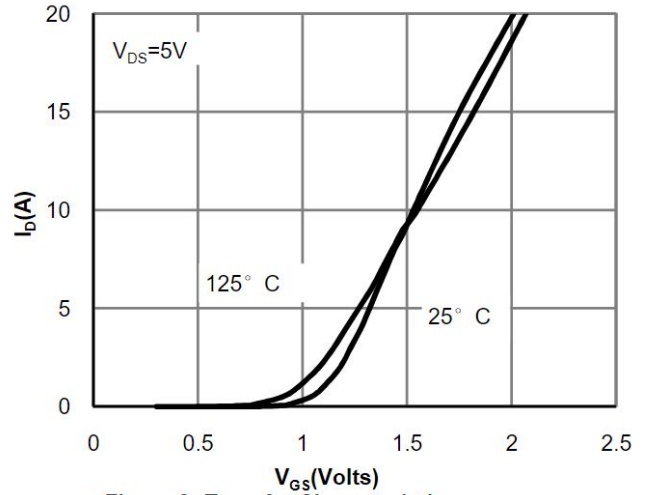


Figure 2: Transfer Characteristics

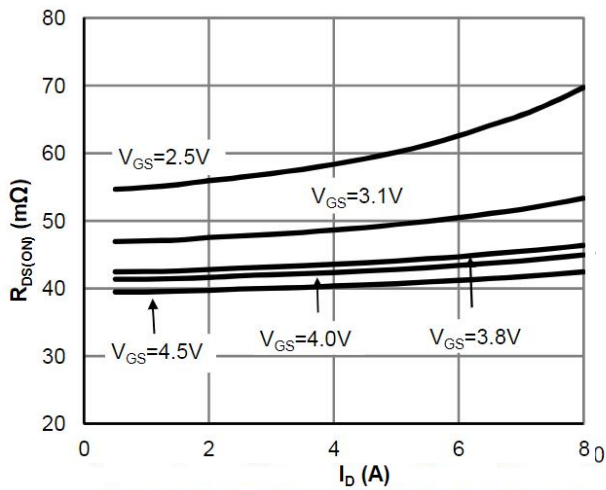


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

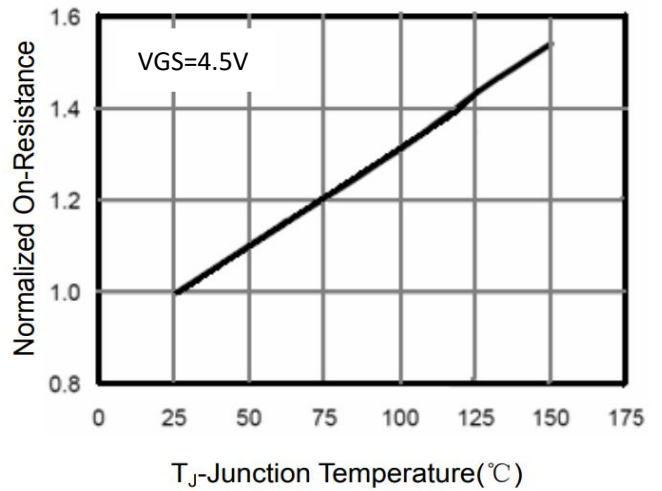


Figure 4: On-Resistance vs. Junction Temperature

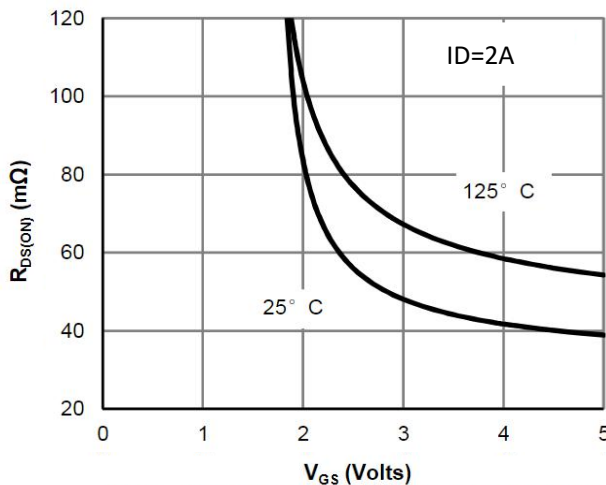


Figure 5: On-Resistance vs. Gate-Source Voltage

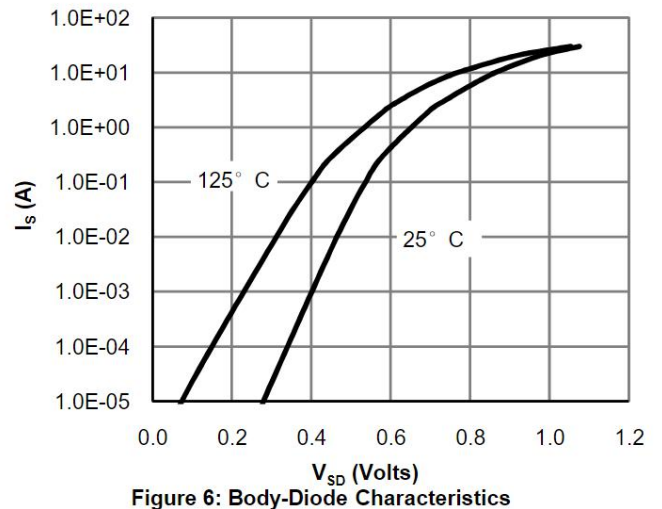


Figure 6: Body-Diode Characteristics

**TYPICAL CHARACTERISTICS(Cont.)**

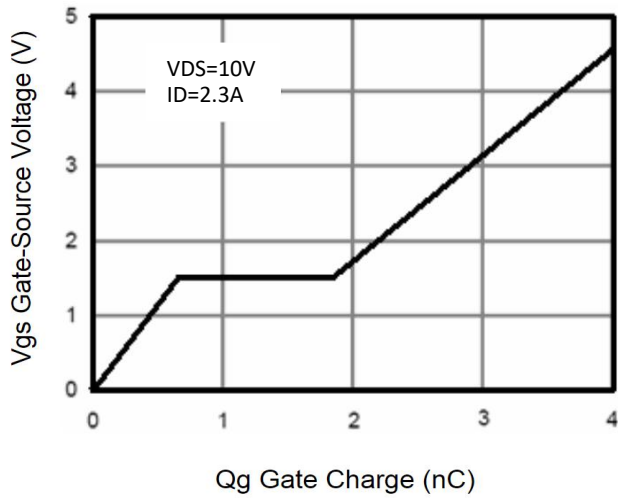


Figure 7: Gate-Charge Characteristics

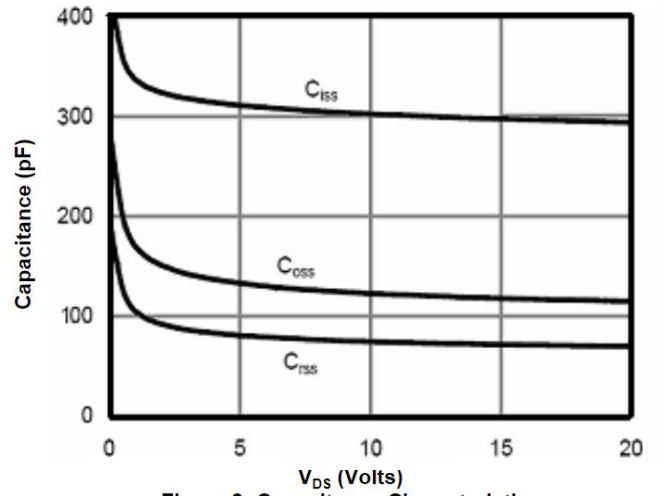
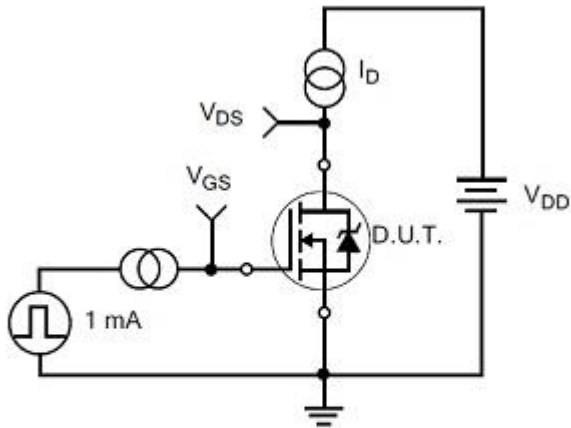
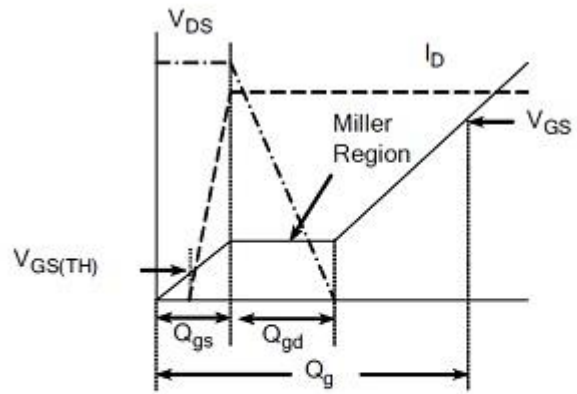


Figure 8: Capacitance Characteristics

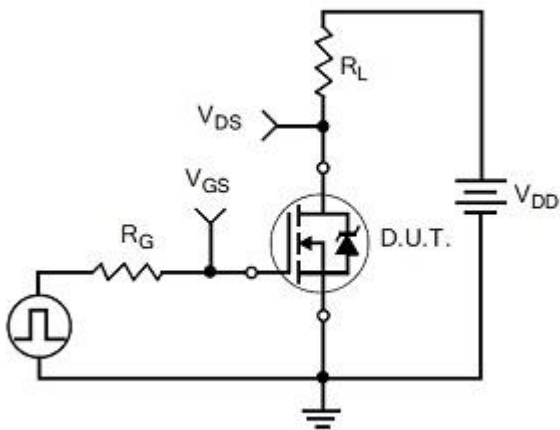
TEST CIRCUITS AND WAVEFORMS



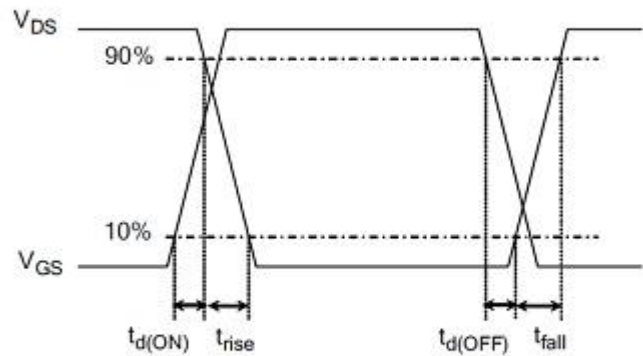
Gate Charge Test Circuit



Gate Charge Waveform

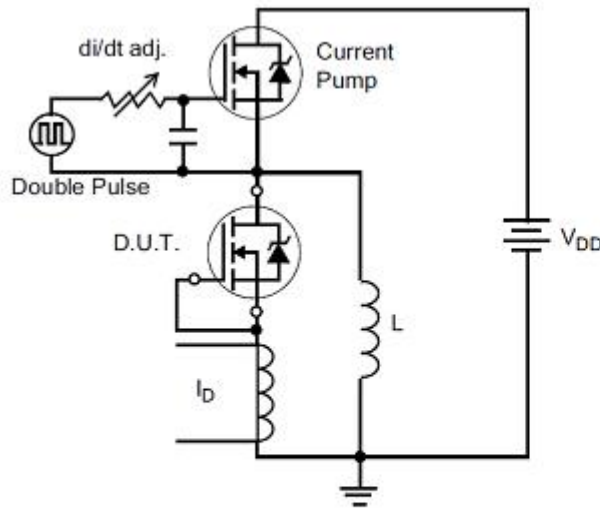


Resistive Switching Test Circuit

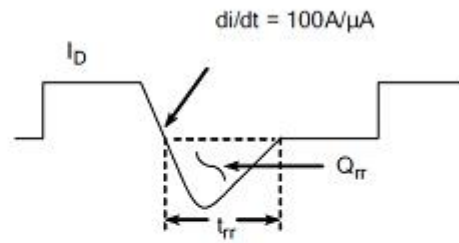


Resistive Switching Waveforms

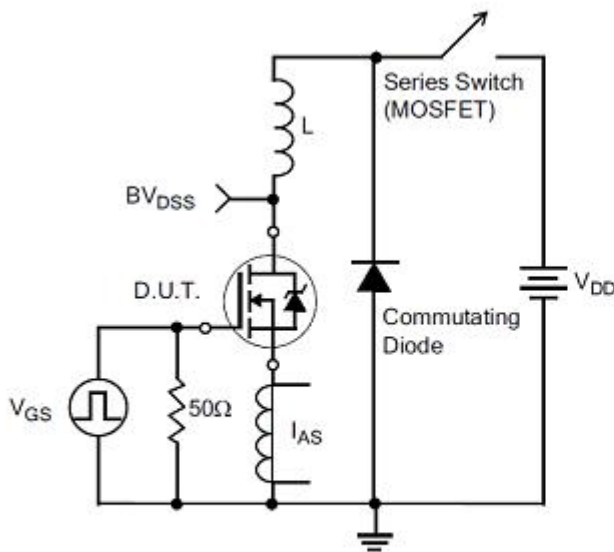
TEST CIRCUITS AND WAVEFORMS(Cont.)



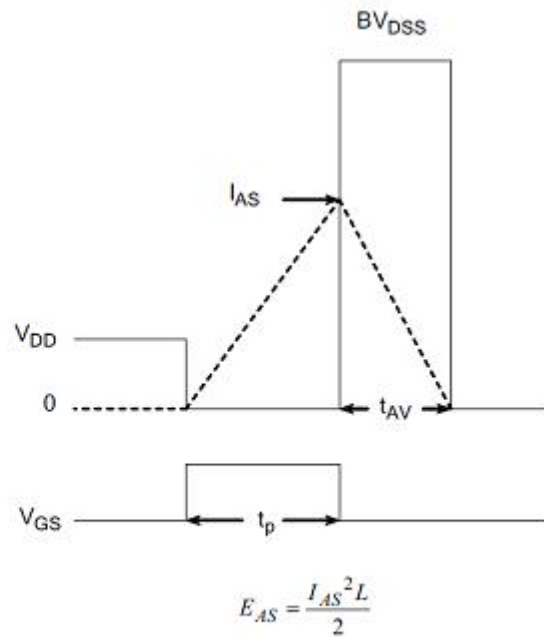
Diode Reverse Recovery Test Circuit



Diode Reverse Recovery Waveform

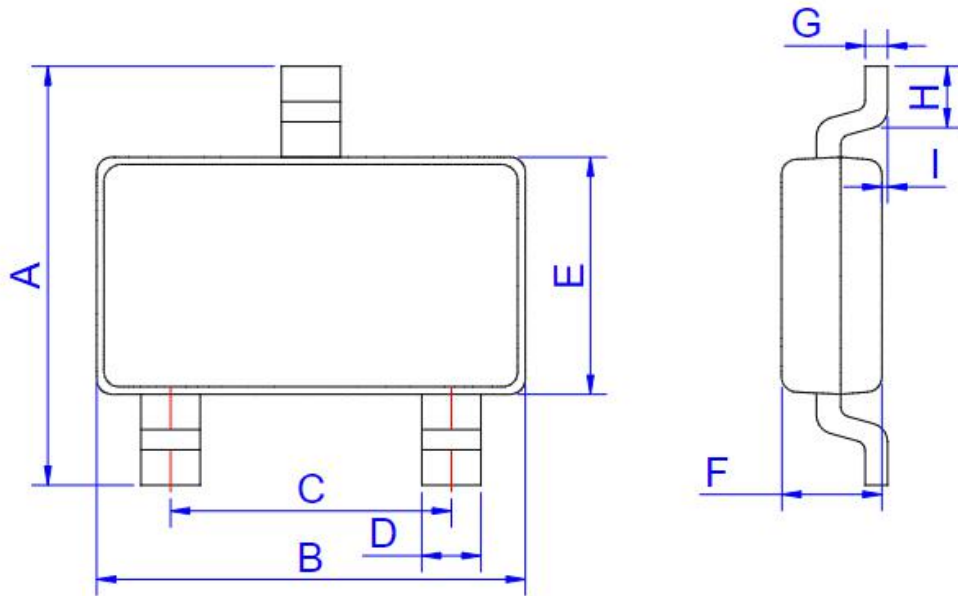


Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

**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
26-Nov-2020	1.0	First release



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