

## -20V -4.1A P-Channel Enhancement Mode Power MOSFET

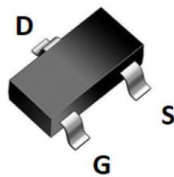
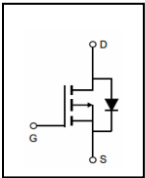
### General Description

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

- $R_{DS(ON)} \leq 52 \text{ m}\Omega$  @  $V_{GS} = -4.5\text{V}$ ,  $I_D = -4.1\text{A}$
- Excellent  $R_{DS(ON)}$  and Low Gate Charge
- Lead free product is acquired

### SYMBOL



SOT-23 top view

### ASSEMBLY MESSAGE

Product Name	Package	Packaging
BXT520P02M	SOT-23	Reel

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

Parameter		Symbol	Rating	Unit
			SOT-23	
Drain-Source Voltage		$V_{DS}$	-20	V
Drain Current	Continuous ( $T_C = 25^\circ\text{C}$ )	$I_D$	-4.1	A
	Continuous ( $T_C = 100^\circ\text{C}$ )		-3.2	A
Drain Current	Pulsed (Note1)	$I_{DM}$	-15	A
Gate-Source Voltage		$V_{GS}$	$\pm 12$	V
Power Dissipation	$T_C = 25^\circ\text{C}$	$P_D$	1.25	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**

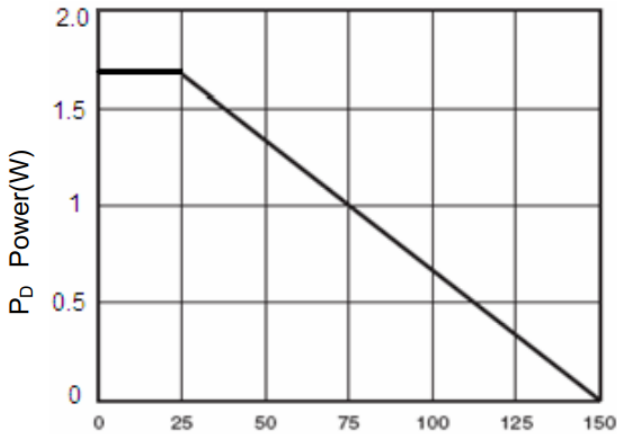
Parameter	Symbol	Max.	Unit
		SOT-23	
Thermal Resistance, Junction-to- Ambient	$R_{\theta JA}$	100	°C / W

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

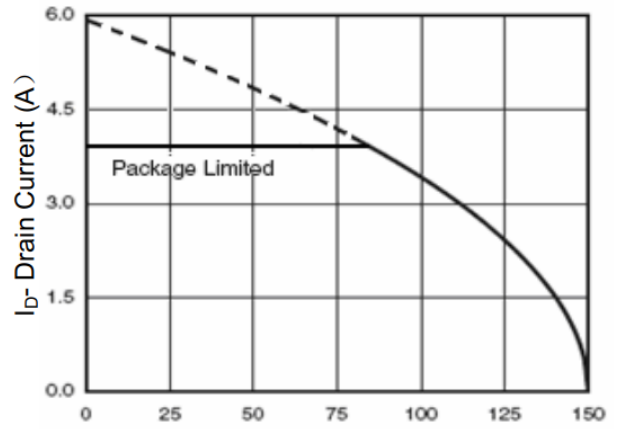
Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
<b>OFF CHARACTERISTICS</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_{D}=-250\mu A$	-20			V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=-20V, V_{GS}=0V$			-1	$\mu A$
Gate-Body Leakage Current, Forward	$I_{GSS}$	$V_{GS}=12V$			100	nA
Gate-Body Leakage Current, Reverse		$V_{GS}=-12V$			-100	nA
<b>ON CHARACTERISTICS</b>						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS}=V_{GS}, I_{D}=-250\mu A$	0.4	-	1	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=-4.5V, I_{D}=-4.1A$		46	52	m $\Omega$
		$V_{GS}=-2.5V, I_{D}=-3A$		60	75	m $\Omega$
<b>DYNAMIC PARAMETERS</b>						
Input Capacitance	$C_{ISS}$	$V_{DS}=-6V, V_{GS}=0V,$ $f=1.0MHz$		412		pF
Output Capacitance	$C_{OSS}$			221		pF
Reverse Transfer Capacitance	$C_{RSS}$			86		pF
<b>SWITCHING PARAMETERS</b>						
Turn-ON Delay Time	$t_{D(ON)}$	$V_{DD}=-6V, I_{D}=-1A, V_{GS} =$ $-4.5V, R_G=1\Omega$		12		ns
Turn-ON Rise Time	$t_R$			35		ns
Turn-OFF Delay Time	$t_{D(OFF)}$			40		ns
Turn-OFF Fall-Time	$t_F$			30		ns
<b>SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS</b>						
Drain-Source Diode Forward Voltage	$V_{SD}$	$I_S=-4.1A, V_{GS}=0V$			-1.2	V
Diode Continuous Forward Current	$I_S$				-4.1	A

Note: 2. Essentially independent of operating temperature

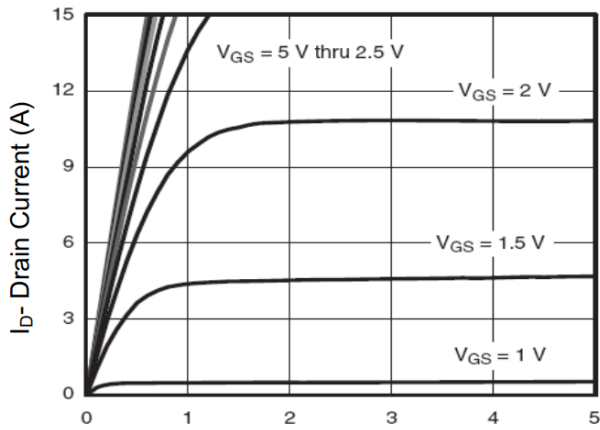
**TYPICAL CHARACTERISTICS**



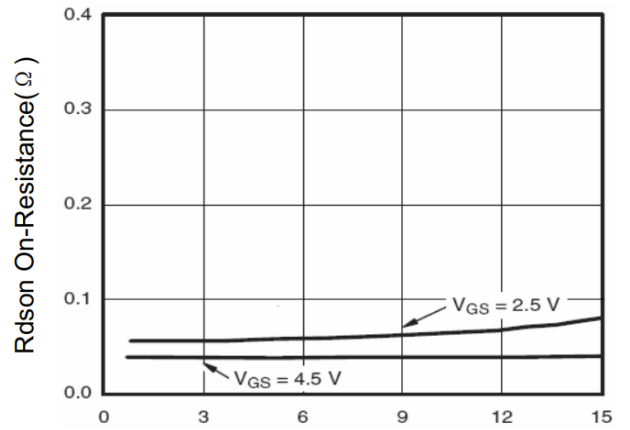
T<sub>J</sub>-Junction Temperature(°C)  
**Figure 1. Power Dissipation**



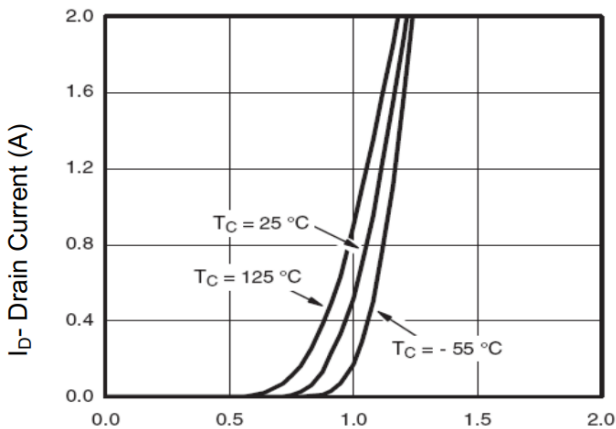
T<sub>J</sub>-Junction Temperature(°C)  
**Figure 2. Drain Current**



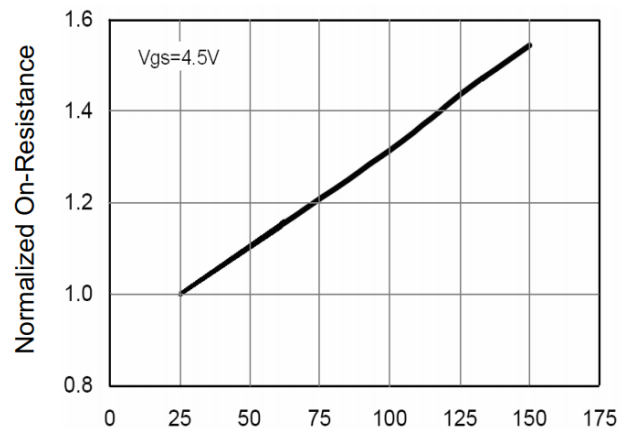
V<sub>ds</sub> Drain-Source Voltage (V)  
**Figure 3. Output Characteristics**



I<sub>D</sub>- Drain Current (A)  
**Figure 4. Drain-Source On-Resistance**

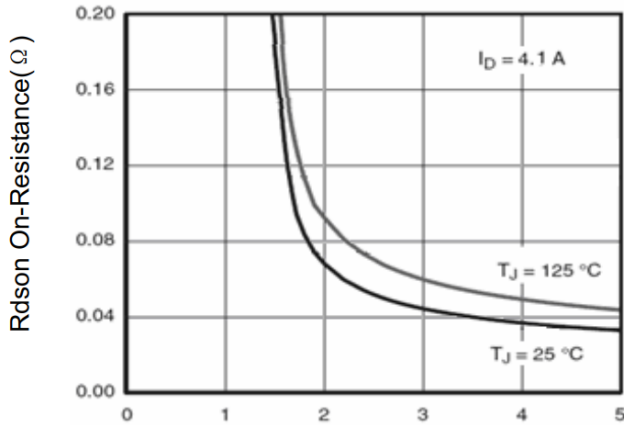


V<sub>gs</sub> Gate-Source Voltage (V)  
**Figure 5. Transfer Characteristics**

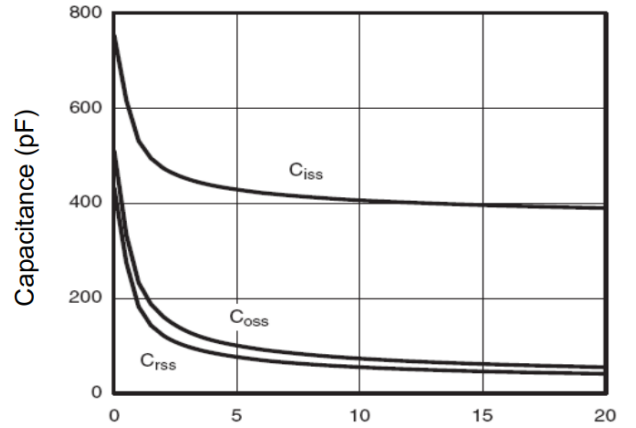


T<sub>J</sub>-Junction Temperature(°C)  
**Figure 6. Drain-Source On-Resistance**

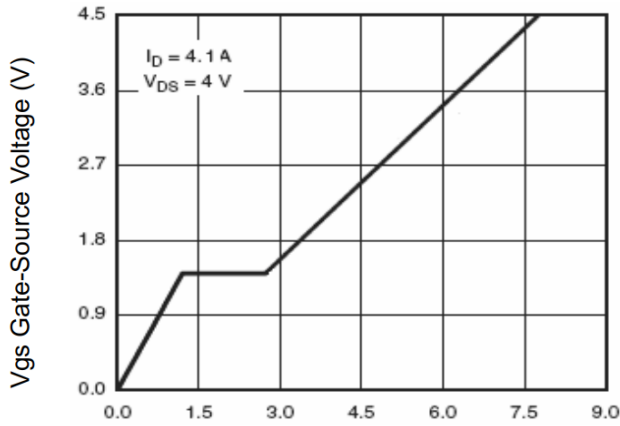
**TYPICAL CHARACTERISTICS(Cont.)**



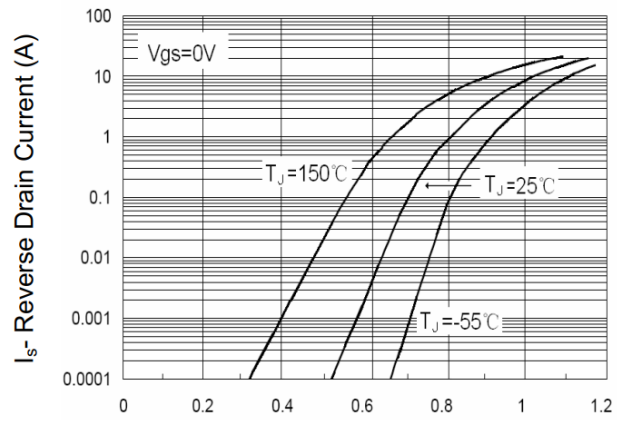
Vgs Gate-Source Voltage (V)  
**Figure 7. Rdson vs Vgs**



Vds Drain-Source Voltage (V)  
**Figure 8. Capacitance vs Vds**

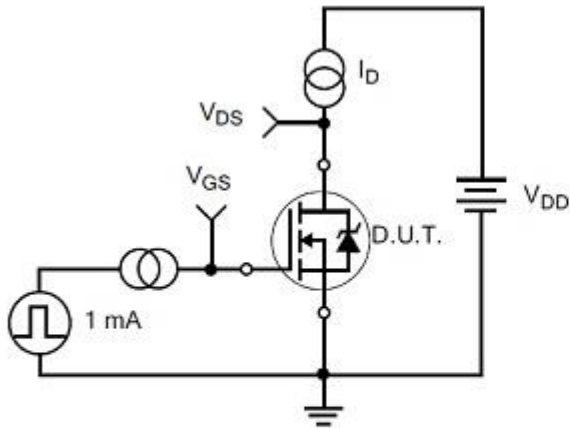


Qg Gate Charge (nC)  
**Figure 9. Gate Charge**

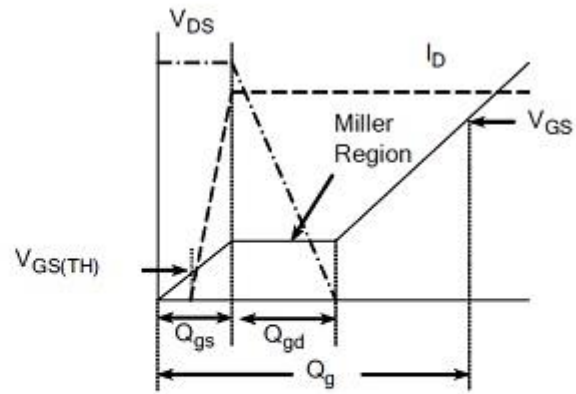


Vsd Source-Drain Voltage (V)  
**Figure 10. Source-Drain Diode Forward**

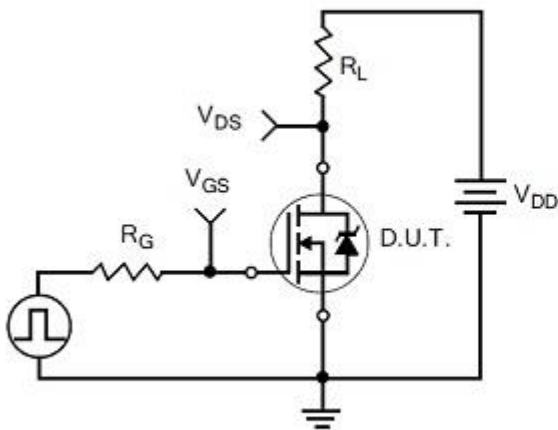
**TEST CIRCUITS AND WAVEFORMS**



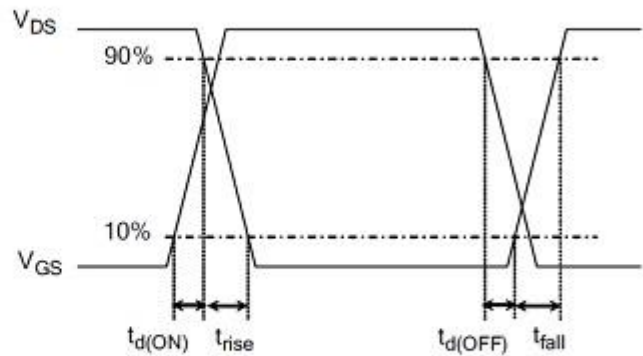
Gate Charge Test Circuit



Gate Charge Waveform

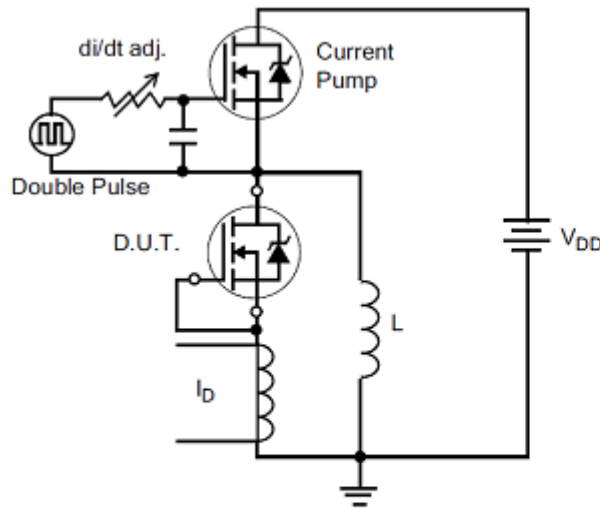


Resistive Switching Test Circuit

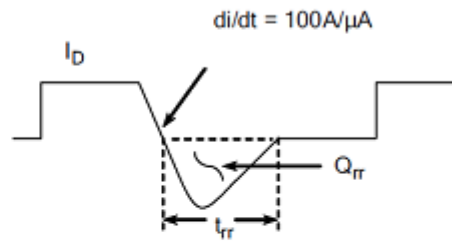


Resistive Switching Waveforms

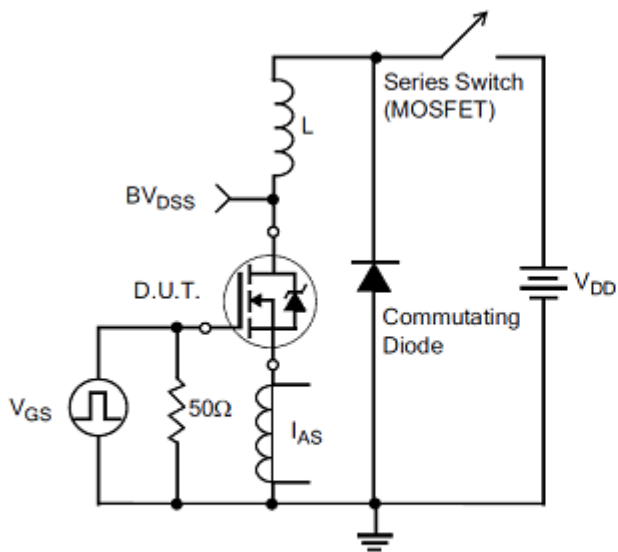
TEST CIRCUITS AND WAVEFORMS(Cont.)



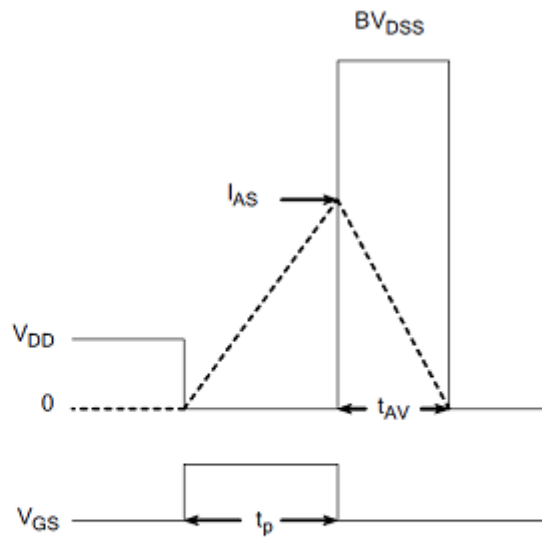
Diode Reverse Recovery Test Circuit



Diode Reverse Recovery Waveform



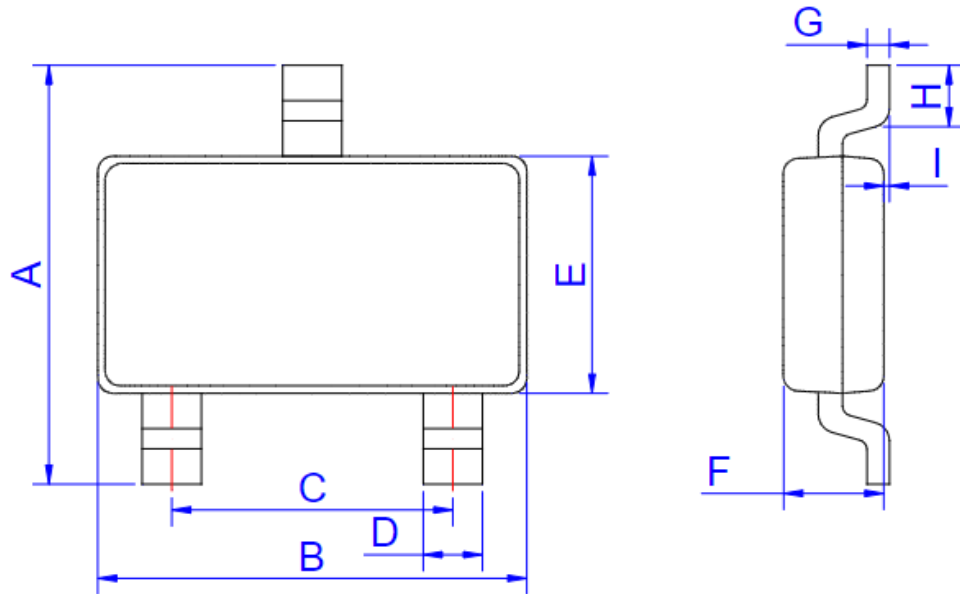
Unclamped Inductive Switching Test Circuit



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

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
20-Oct-2020	1.0	First release
22-Nov-2020	1.1	Update font



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