BST10N015SK1

N-Channel Power MOSFET

100 V, 420 A, 1.5 mΩ

Description

This N-Channel MOSFET has been designed specifically to improve the overall efficiency. It has been optimized for low gate charge, low R_{DSon}, fast switching speed.

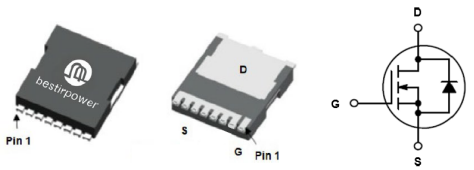
Features

BV_{DSS}	I_D	$R_{DS(on),max}$	$Q_{rr,typ}$
100 V	420A	1.5 mΩ	300 nC

- Shielded-gate technology
- Low on-resistance and low gate-charge
- RoHS compliant
- 100% avalanche tested

Applications

- High-frequency DC-to-DC convertors
- Motor controllers
- Battery management and protection
- Server power



Absolute Maximum Ratings (T_J = 25℃ unless otherwise noted)

Symbol	Parameter		Value	Unit
V_{DSS}	Drain to Source Voltage		100	V
V_{GSS}	Gate to Source Voltage		±20	V
I_D	Continuous Drain Current, Silicon Limited (TC = 25 °C)[1]		420	A
	Continuous Drain Current, Silicon Limited (TC = 100 °C)[1]		294	
I_{DM}	Drain Current (2)	Pulsed	1680	A
E_{AS}	Single Pulsed Avalanche Energy (3)		2494	mJ
P_D	Power Dissipation	(T_C = 25℃)	481	W
T_J , T_{STG}	Operating and Storage Temperature Range		-55 to +150	℃

Thermal Characteristics

Symbol	Parameter	Value	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case, Max.	0.26	℃/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient, Max(5).	25	

Notes

1) Limited by maximum junction temperature.

2) Repetitive Rating: Pulse width limited by maximum junction temperature.

3) L=0.5mH, R_G=25Ω, V_{GS}=10V, V_{DD}=50V, Start T_J=25℃.

Electrical Characteristics (T_J = 25℃ unless otherwise noted)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
Off Characteristics						
BV_{DSS}	Drain to Source Breakdown Voltage	V_{GS} = 0 V, I_D = 250 μA	100	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 100V,V_{GS} = 0V, T_J = 25ºC	-	-	1	μA
		V_{DS} = 100V,V_{GS} = 0V, T_J = 150ºC	-	-	100	
I_{GSS}	Gate-Source Leakage Current	V_{GS} = ±20 V	-	-	±100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS} = V_{DS} , I_D = 250 μA	2.0	-	4.0	V
$R_{DS(on)}$	Static Drain to Source On Resistance	V_{GS} = 10 V, I_D = 40 A	-	1.2	1.5	mΩ
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{GS} = 0V, V_{DS} = 50V, f = 1.0MHz	-	15995	-	pF
C_{oss}	Output Capacitance		-	2202	-	pF
C_{rss}	Reverse transfer capacitance		-	73	-	pF
$Q_{g(tot)}$	Total Gate Charge at 10 V	V_{GS} = 10V, V_{DD} = 50V I_D = 40A	-	262	-	nC
Q_{gs}	Gate to Source Charge		-	74.6	-	nC
Q_{gd}	Gate to Drain “Miller” Charge		-	72	-	nC
R_G	Gate Resistance	f = 1 MHz	-	0.7	-	Ω
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{GS} = 10V, V_{DD} = 50V R_G = 1.6Ω, I_D = 20A	-	40	-	ns
t_r	Turn-On Rise Time		-	32	-	ns
$t_{d(off)}$	Turn-Off Delay Time		-	100	-	ns
t_f	Turn-Off Fall Time		-	36	-	ns
Source-Drain Diode Characteristics						
V_{SD}	Diode Forward Voltage	T_J = 25ºC, I_S = 40A, V_{GS} = 0V	-	0.8	1.2	V
t_{rr}	Reverse Recovery Time	I_F = 20A, diF/dt = 100A/us	-	110	-	ns
Q_{rr}	Reverse Recovery Charge		-	300	-	nC

Typical Performance Characteristics

Figure 1. Transient Thermal Impedance

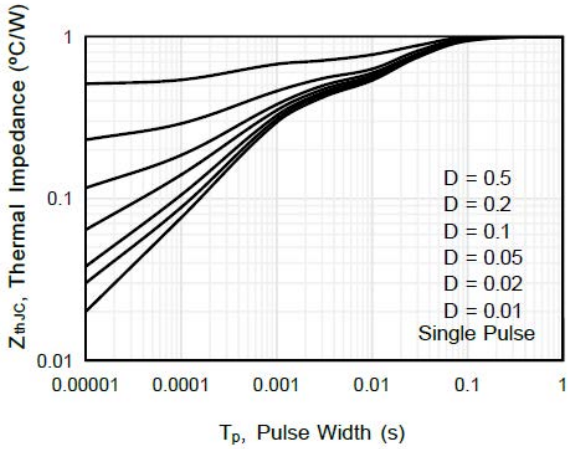


Figure 2 . Safe Operation Area

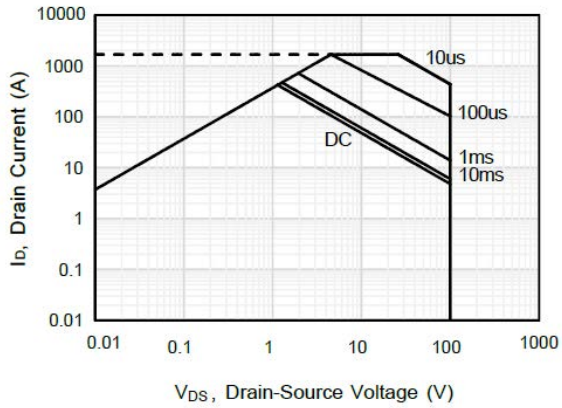


Figure 3 . Output Characteristics

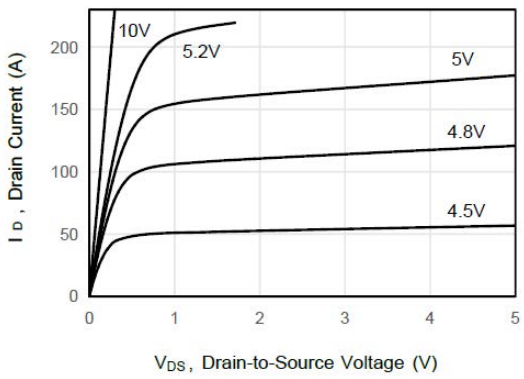


Figure 4 . Transfer Characteristics

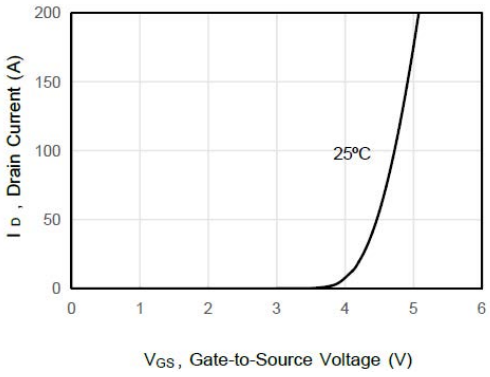


Figure 5 . On-Resistance vs Drain Current

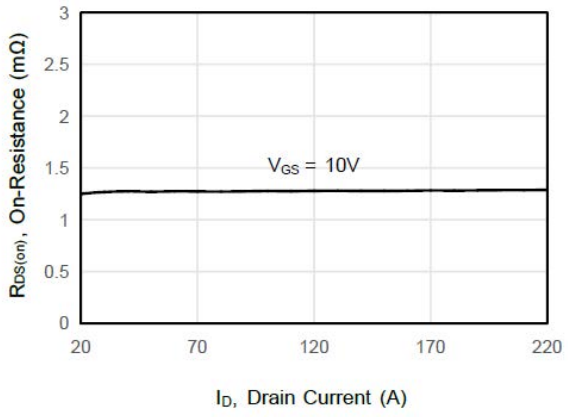
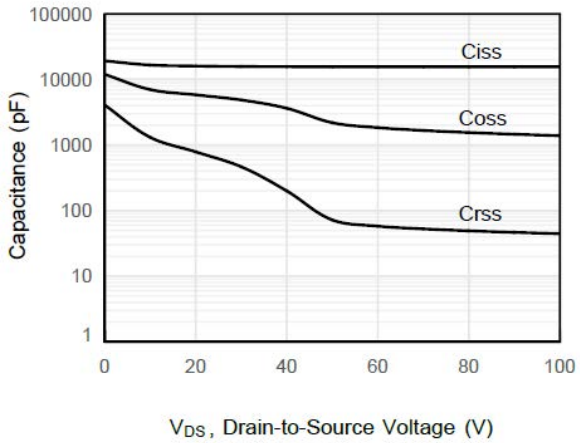


Figure 6 . Capaticance



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Typical Performance Characteristics

Figure 7 . Gate Charge

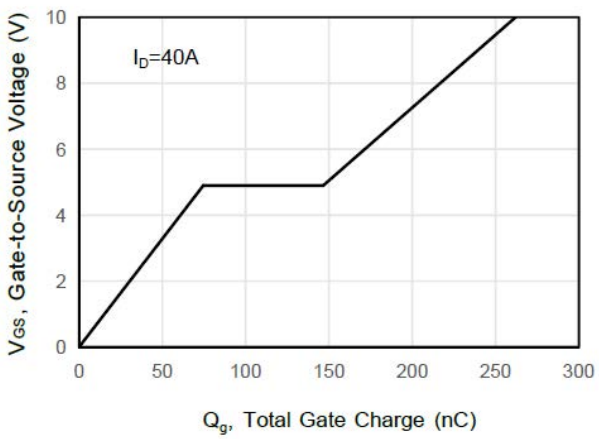


Figure 8 . Body Diode Forward Voltage

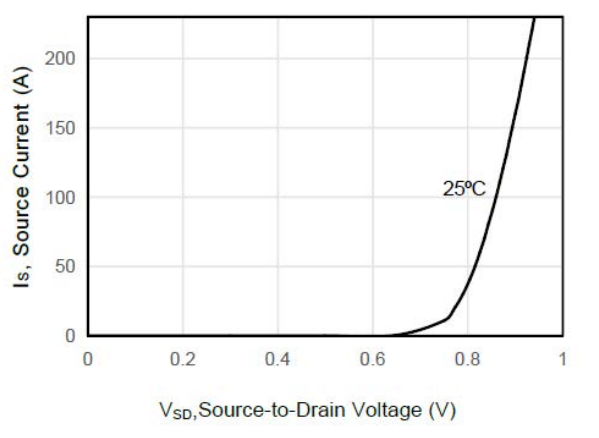


Figure 9. Breakdown Voltage vs Junction Temperature

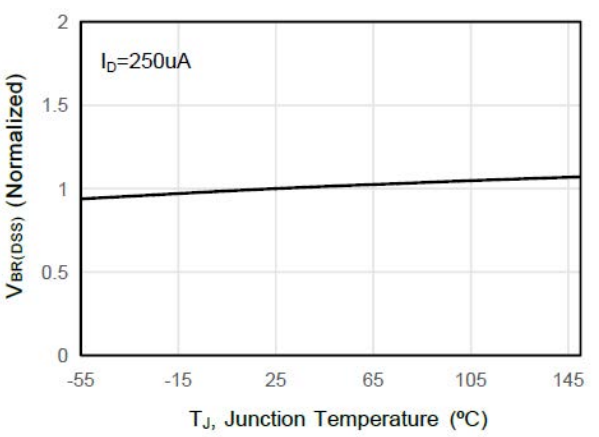


Figure 10. On-Resistance vs Temperature

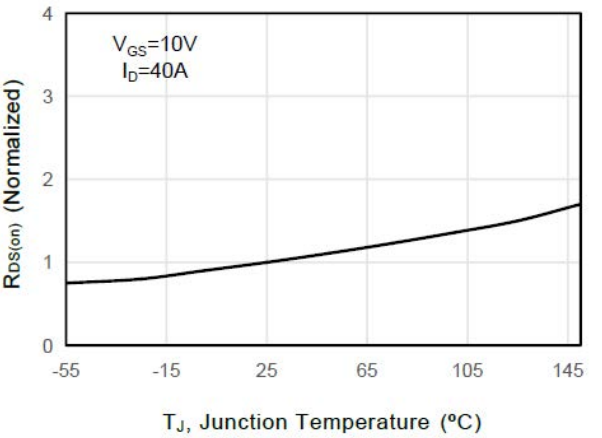
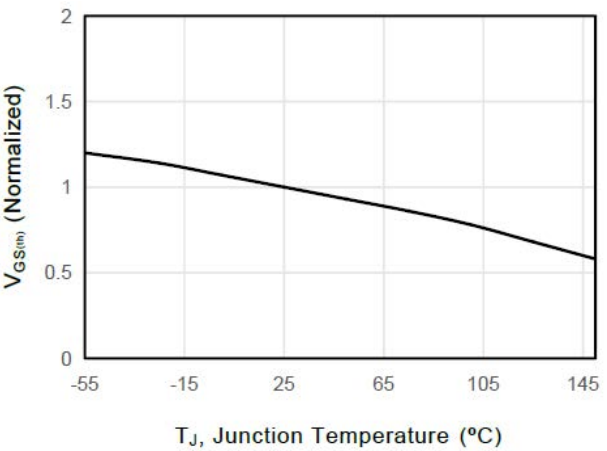


Figure 11. $V_{GS(th)}$ vs Junction Temperature



Test Circuits

Figure 12：Gate Charge Test Circuit and Waveform

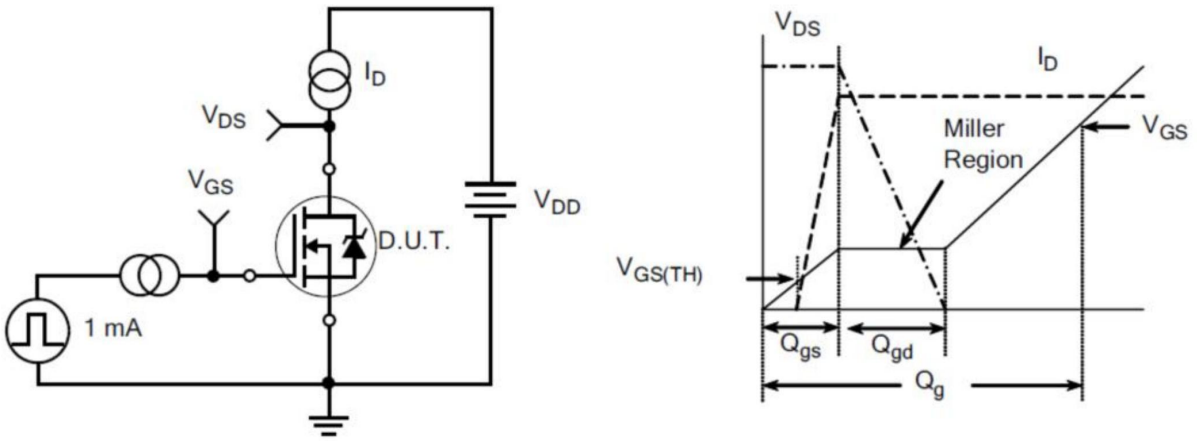


Figure 13：Resistive Switching Test Circuit and Waveform

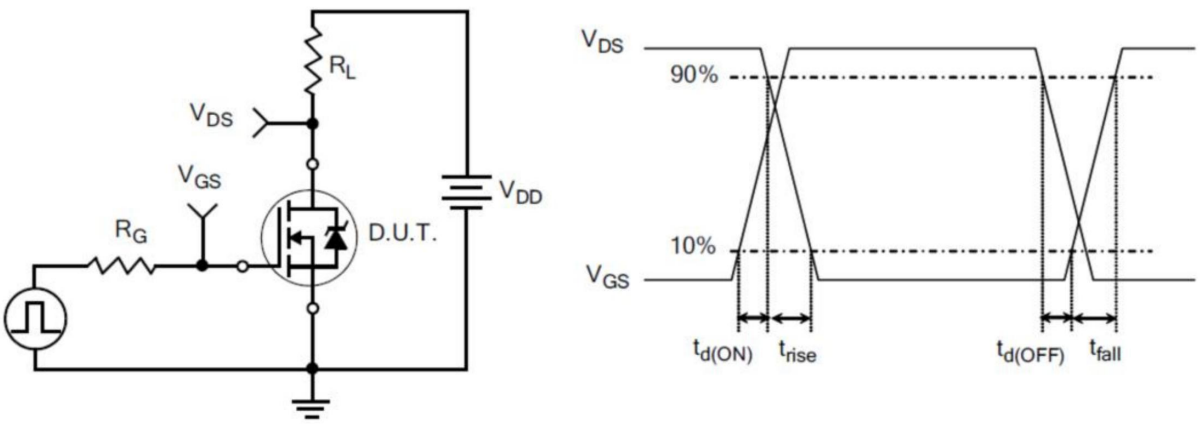
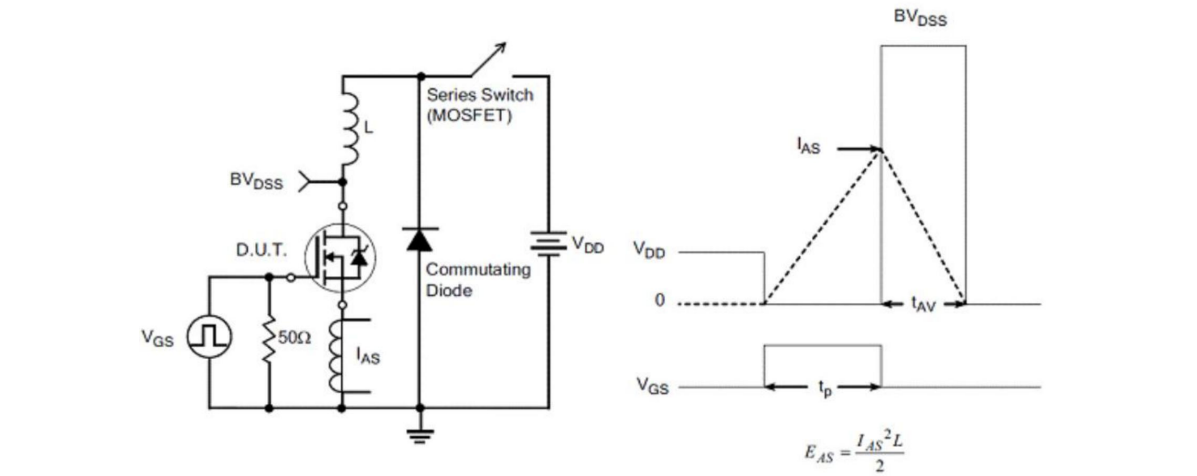
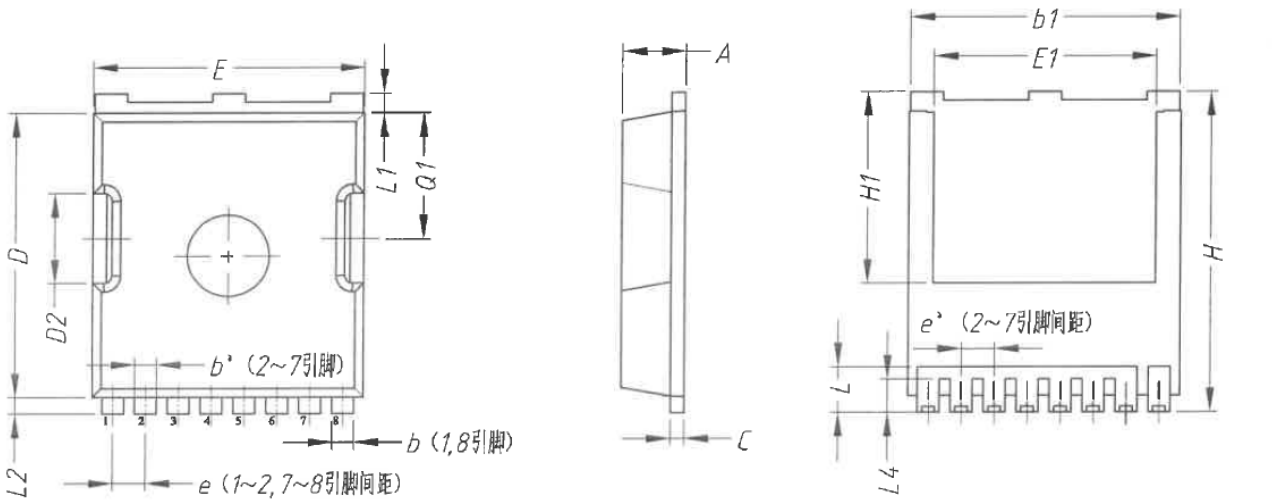


Figure 14：Unclamped Inductive Switching Test Circuit and Waveform



Package Outlines

TOLL



SYMBOL	MM		
	MIN	NOM	MAX
A	2.15	2.30	2.45
b	0.75	0.75	0.85
b'	0.70	0.70	0.80
b1	9.65	9.80	9.95
C	0.45	0.50	0.60
D	10.18	10.38	10.58
D2	3.15	3.30	3.45
E	9.70	9.90	10.10
E1	7.95	8.10	8.25
e	BSC 1.225		
e'	BSC 1.20		
Q1	4.40	4.55	4.70
H	11.48	11.68	11.88
H1	6.80	6.95	7.10
L	1.60	1.80	2.00
L1	0.50	0.70	0.90
L2	0.48	0.60	0.72
L4	1.00	1.15	1.30

* Dimensions in millimeters

Package Marking and Ordering Information

Part Number	Top Marking	Package	Packing Method	Quantity
BST10N015SK1	BST10N015SK1	TOLL	Tape & Reel	1200 units

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