

BST04NH010SK1

N-Channel Power MOSFET

40 V, 340 A, 1 mΩ

Description

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

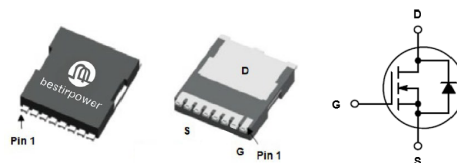
Features

BV_{DSS}	I_D	$R_{DS(on),max}$	$Q_{rr,typ}$
40 V	340 A	1 mΩ	120 nC

- $R_{DS(on),MAX}=1m\Omega@V_{gs}=10V$
- Low gate Charge (typical 96nC)
- Low C_{rss} (typical 99pF)
- Low On-Resistance
- Excellent FoM(figure of merit)
- 100% UIS and Rg tested

Applications

- Motor Driver
- DC/DC Converter
- Battery Management System



Absolute Maximum Ratings ($T_J = 25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter		Value	Unit
V_{DS}	Drain to Source Voltage		40	V
V_{GS}	Gate to Source Voltage		± 20	V
I_D	Continuous Drain Current, Silicon Limited ($T_C = 25^\circ\text{C}$) ⁽¹⁾		340	A
	Continuous Drain Current, Silicon Limited ($T_C = 100^\circ\text{C}$) ⁽¹⁾		238	
I_{DM}	Drain Current (2)	Pulsed	1360	A
E_{AS}	Single Pulsed Avalanche Energy (3)		628	mJ
P_D	Power Dissipation	($T_C = 25^\circ\text{C}$)	208	W
T_J, T_{STG}	Operating and Storage Temperature Range		-55 to 150	$^\circ\text{C}$

Thermal Characteristics

Symbol	Parameter	Value	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case, Max.	0.6	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient, Max.	45	
T_L	Soldering temperature, wave soldering only allowed at leads	260	$^\circ\text{C}$

Electrical Characteristics (T_J = 25°C unless otherwise noted)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
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Off Characteristics

BV _{DSS}	Drain to Source Breakdown Voltage	V _{GS} = 0 V, I _D = 250uA	40	-	-	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = 40 V, V _{GS} = 0 V	-	-	1	μA
I _{GSS}	Gate-Source Leakage Current	V _{GS} = ±20 V, V _{DS} = 0 V	-	-	±100	nA

On Characteristics

V _{GS(th)}	Gate Threshold Voltage	V _{GS} = V _{DS} , I _D = 250 μA	2	-	4	V
R _{DS(on)}	Static Drain to Source On Resistance	V _{GS} = 10 V, I _D = 70A	-	0.94	1	mΩ
R _G	Gate resistance	f = 1 MHz open drain	-	2.8	-	Ω

Dynamic Characteristics

C _{iss}	Input Capacitance	V _{GS} = 0 V, V _{DS} = 20 V f = 1 MHz	-	7317	-	pF
C _{oss}	Output Capacitance		-	3453	-	pF
C _{rss}	Reverse Transfer Capacitance		-	99	-	pF
Q _{g(tot)}	Gate Charge Total	V _{GS} = 10V V _{DD} = 20V, I _D = 70A,	-	96	-	nC
Q _{gs}	Gate to Source Charge		-	40	-	nC
Q _{gd}	Gate to Drain Charge		-	15	-	nC

Switching Characteristics

t _{d(on)}	Turn-On Delay Time	V _{GS} = 10V, V _{DD} = 20V I _D = 70A, R _G = 3Ω	-	32	-	ns
t _r	Turn-On Rise Time		-	65	-	ns
t _{d(off)}	Turn-Off Delay Time		-	75	-	ns
t _f	Turn-Off Fall Time		-	40	-	ns

Source-Drain Diode Characteristics

V _{SD}	Diode Forward Voltage	V _{GS} = 0 V, I _F = 70A	-	0.8	1.4	V
t _{rr}	Reverse Recovery Time	I _F = 70 A, di _F /dt = 100 A/μs	-	68	-	ns
Q _{rr}	Reverse Recovery Charge		-	120	-	nC

- 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}=20V, Start T_J=25°C.

Typical Performance Characteristics

Figure 1. Transient Thermal Impedance

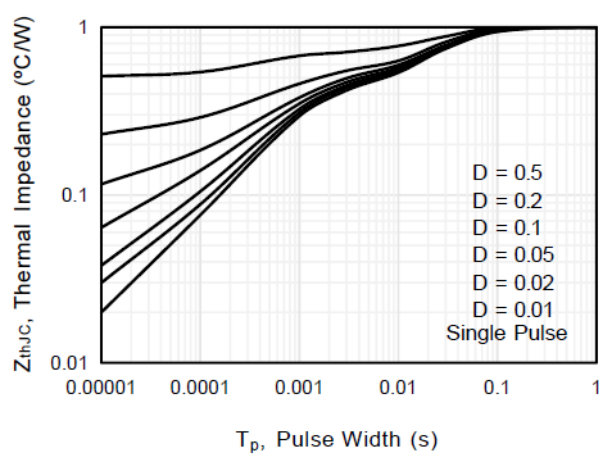


Figure 2 . Safe Operation Area

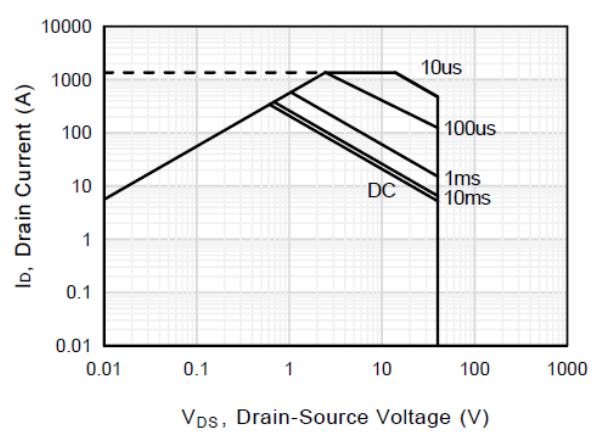


Figure 3 . Output Characteristics

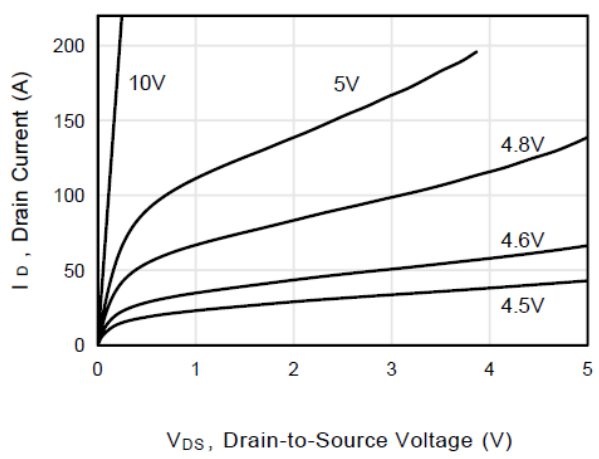


Figure 4 . Transfer Characteristics

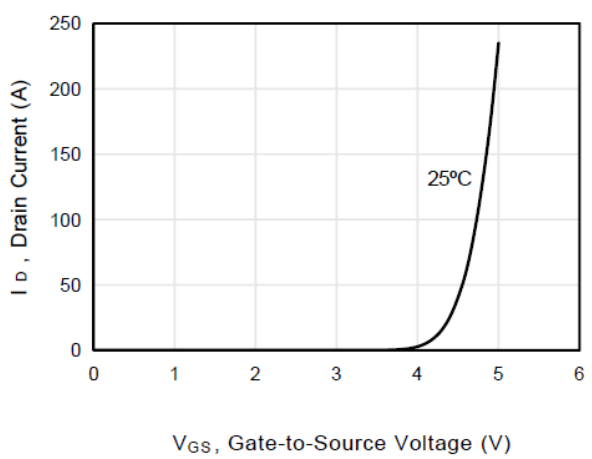


Figure 5 . On-Resistance vs Drain Current

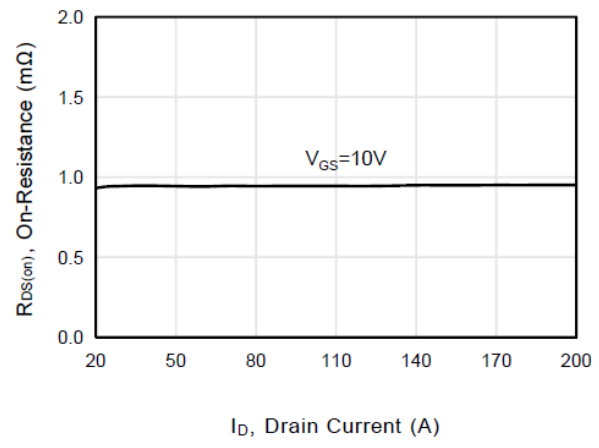
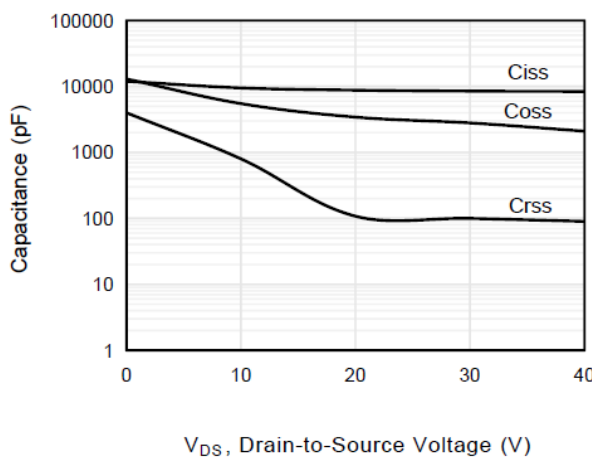


Figure 6 . Capacitance



Typical Performance Characteristic

Figure 7 . Gate Charge

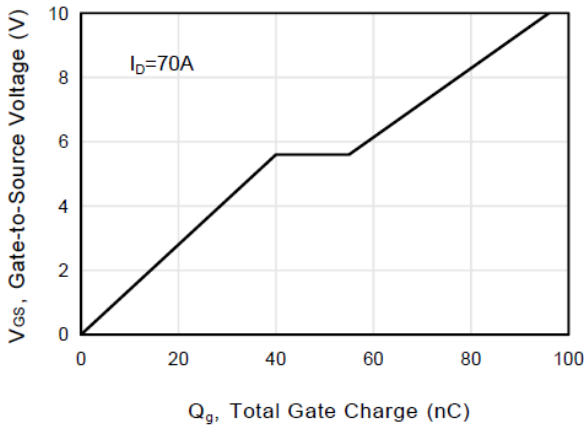


Figure 8 . Body Diode Forward Voltage

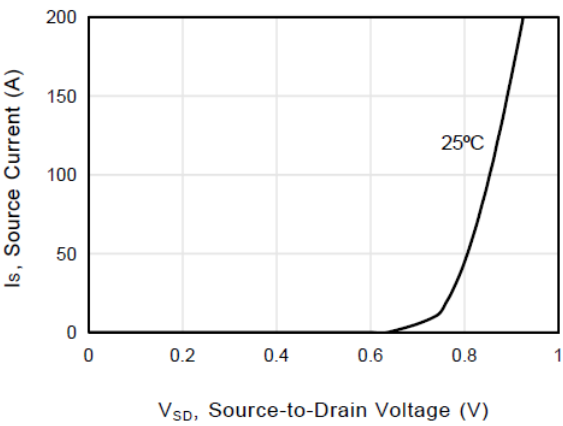


Figure 9. Breakdown Voltage vs Junction Temperature

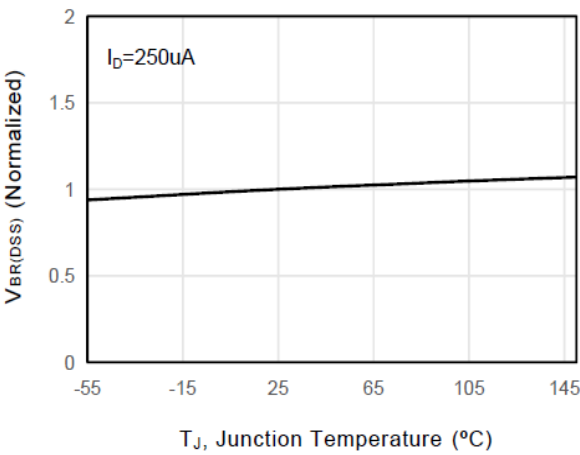


Figure 10. On-Resistance vs Temperature

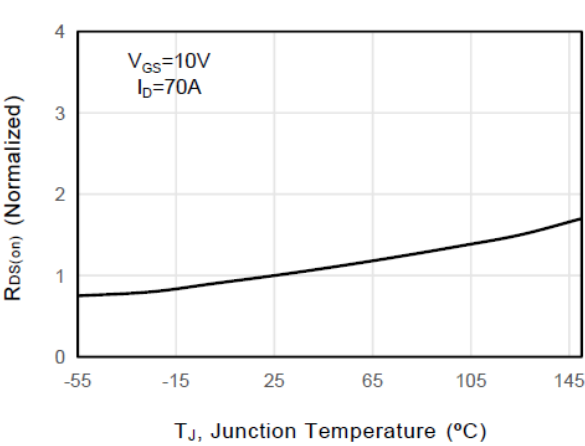


Figure 11. $V_{GS(th)}$ vs Junction Temperature

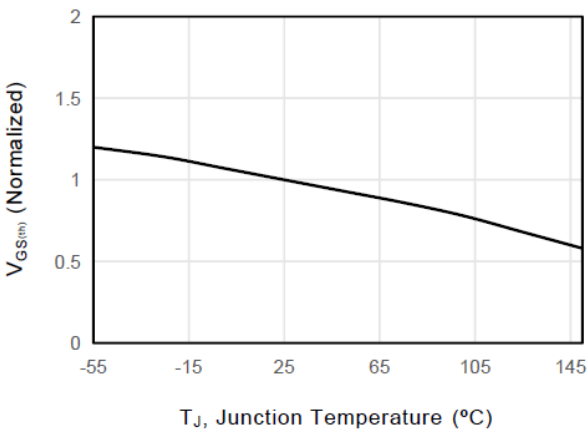


Figure 12: Gate Charge Test Circuit and Waveform

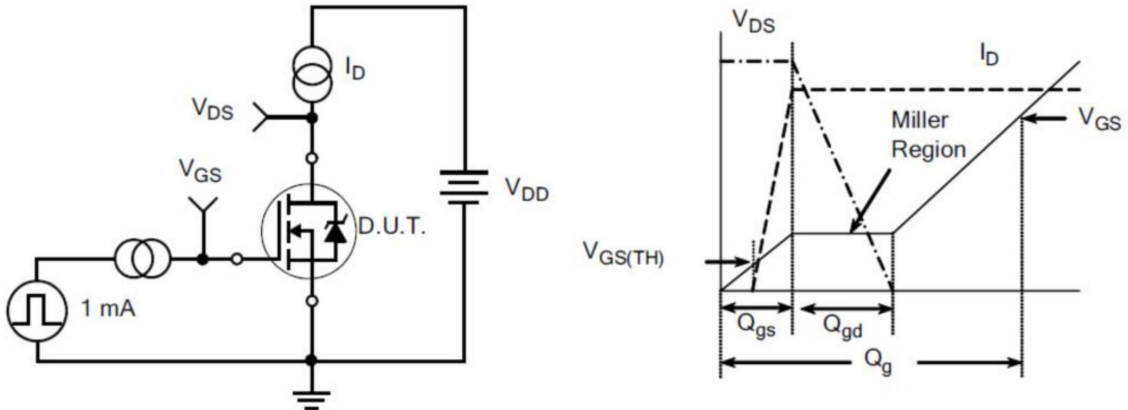


Figure 13: Resistive Switching Test Circuit and Waveform

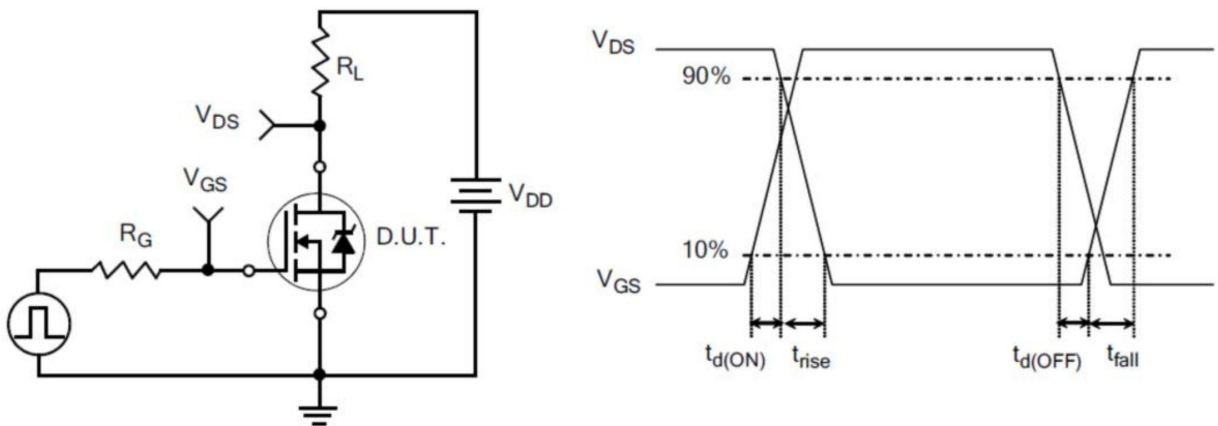
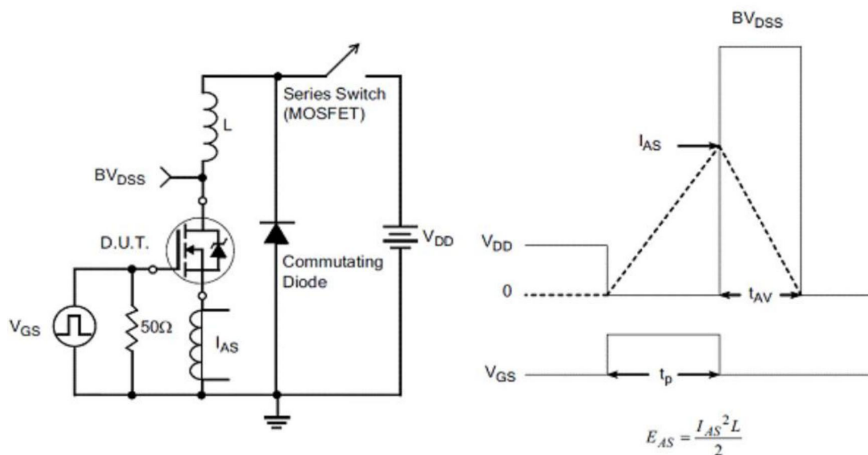
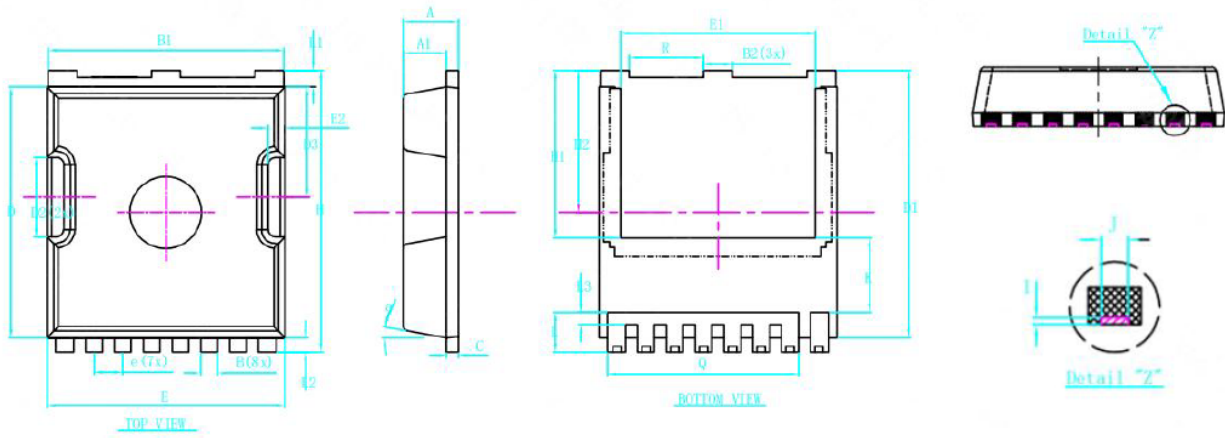


Figure 14: Unclamped Inductive Switching Test Circuit and Waveform



Package Outlines

TOLL



SYMBOL	MILLIMETER		
	MIN.	NOM.	MAX.
A	2.200	2.300	2.400
A1	1.700	1.800	1.900
B	0.700	0.800	0.900
B1	9.700	9.800	9.900
B2	1.100	1.200	1.300
C	0.400	0.500	0.600
D	10.300	10.400	10.500
D1	11.000	11.100	11.200
D2	3.200	3.300	3.400
D3	4.470	4.570	4.670
E	9.800	9.900	10.000
E1	8.000	8.100	8.200
E2	0.500	0.600	0.700
e	1.200 BSC		
H	11.600	11.700	11.800
H1	6.950 BSC		
H2	5.900 BSC		
I	0.050	0.100	0.15
J	0.350 REF.		
K	3.100 REF.		
L	1.550	1.650	1.750
L1	0.600	0.700	0.800
L2	0.500	0.600	0.700
L3	0.400	0.500	0.600
Q	8.000 REF.		
R	3.000	3.100	3.200
a	10° REF.		

Package Marking and Ordering Information

Part Number	Top Marking	Package	Packing Method	Quantity
BST04NH010SK1	BST04NH010SK1	TOLL	Tape & Reel	1200 units

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