

BST10NH054SK1

N-Channel Power MOSFET

100 V, 130 A, 5.4 mΩ



Features

BV_{DSS}	I_D	$R_{DS(on),max}$	$Q_{rr,typ}$
100 V	130 A	5.4 mΩ	126 nC

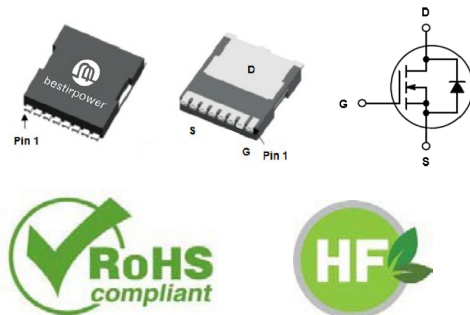
Description

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.

- 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 ($T_J = 25^\circ\text{C}$ 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 ($T_C = 25^\circ\text{C}$) ¹⁾		130	A
	Continuous Drain Current, Silicon Limited ($T_C = 100^\circ\text{C}$) ¹⁾		91	
I_{DM}	Drain Current (2)	Pulsed	520	A
E_{AS}	Single Pulsed Avalanche Energy (3)		225	mJ
P_D	Power Dissipation	($T_C = 25^\circ\text{C}$)	176	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.	0.71	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient, Max.	60	

Notes

- 1) Limited by maximum junction temperature.
- 2) Repetitive Rating: Pulse width limited by maximum junction temperature.
- 3) $L=0.5\text{mH}$, $R_G=25\Omega$, $V_{GS}=10\text{V}$, $V_{DD}=50\text{V}$, Start $T_J=25^\circ\text{C}$.

Electrical Characteristics ($T_J = 25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
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Off Characteristics

BV_{DSS}	Drain to Source Breakdown Voltage	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	100	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 100\text{ V}, V_{GS} = 0\text{ V}, T_J = 25^\circ\text{C}$	-	-	1	μA
		$V_{DS} = 100\text{ V}, V_{GS} = 0\text{ V}, T_J = 150^\circ\text{C}$	-	-	100	
I_{GSS}	Gate-Source Leakage Current	$V_{GS} = \pm 20\text{ V}$	-	-	± 100	nA

On Characteristics

$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS} = V_{DS}, I_D = 250\text{ }\mu\text{A}$	2.0	-	4.0	V
$R_{DS(on)}$	Static Drain to Source On Resistance	$V_{GS} = 10\text{ V}, I_D = 65\text{ A}$	-	4.3	5.4	mΩ

Dynamic Characteristics

C_{iss}	Input Capacitance	$V_{GS} = 0\text{ V}, V_{DS} = 50\text{ V},$ $f = 1.0\text{ MHz}$	-	3600	-	pF
C_{oss}	Output Capacitance		-	560	-	pF
C_{rss}	Reverse transfer capacitance		-	20	-	pF
$Q_{g(tot)}$	Total Gate Charge at 10 V	$V_{GS} = 10\text{ V}, V_{DD} = 50\text{ V}$ $I_D = 65\text{ A}$	-	64.4	-	nC
Q_{gs}	Gate to Source Charge		-	25.8	-	nC
Q_{gd}	Gate to Drain "Miller" Charge		-	16.2	-	nC
R_G	Gate Resistance	$f = 1\text{ MHz}$	-	2.5	-	Ω

Switching Characteristics

$t_{d(on)}$	Turn-On Delay Time	$V_{GS} = 10\text{ V}, V_{DD} = 50\text{ V}$ $R_G = 3\text{ }\Omega, I_D = 20\text{ A}$	-	18	-	ns
t_r	Turn-On Rise Time		-	23	-	ns
$t_{d(off)}$	Turn-Off Delay Time		-	37	-	ns
t_f	Turn-Off Fall Time		-	15.7	-	ns

Source-Drain Diode Characteristics

V_{SD}	Diode Forward Voltage	$T_J = 25^\circ\text{C}, I_S = 65\text{ A}, V_{GS} = 0\text{ V}$	-	0.9	1.4	V
t_{rr}	Reverse Recovery Time	$I_F = 20\text{ A}, diF/dt = 100\text{ A/us}$	-	64	-	ns
Q_{rr}	Reverse Recovery Charge		-	126	-	nC

Typical Performance Characteristics

Figure 1. Transient Thermal Impedance

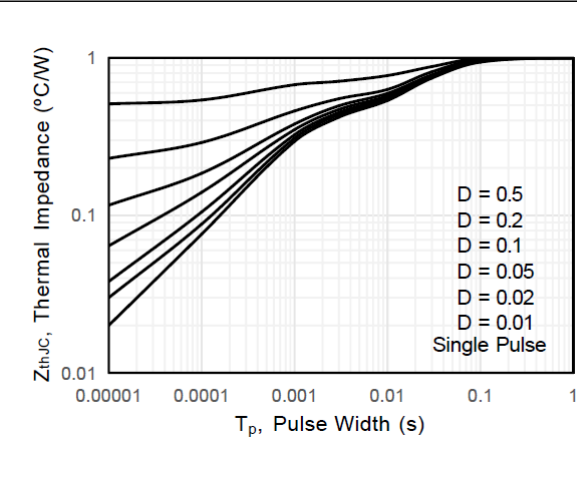


Figure 2 . Safe Operation Area

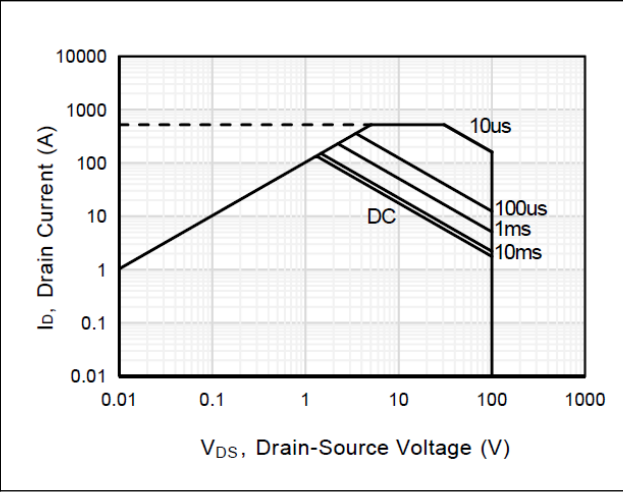


Figure 3 . Output Characteristics

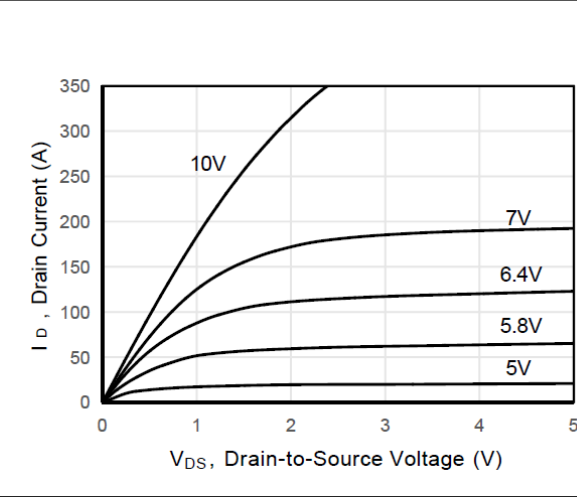


Figure 4 . Transfer Characteristics

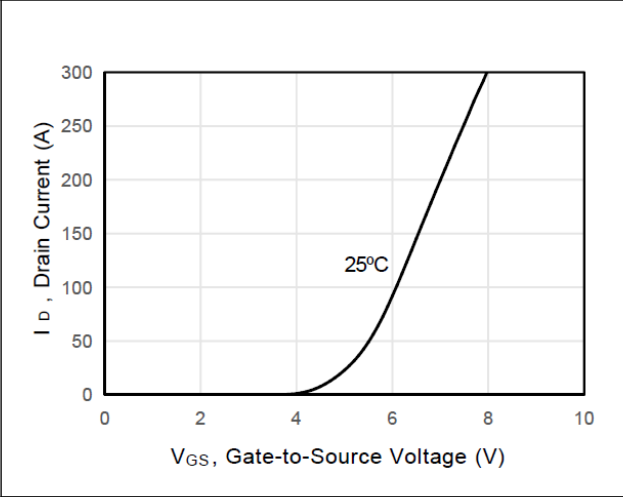


Figure 5 . On-Resistance vs Drain Current

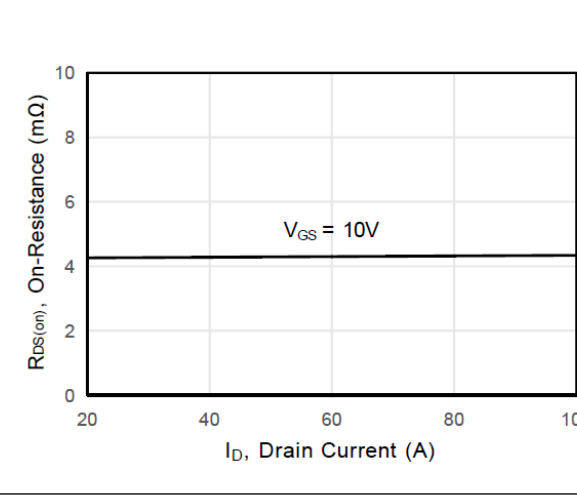
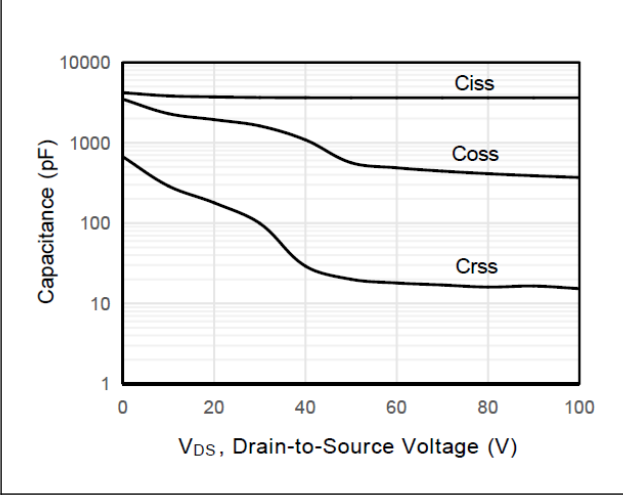


Figure 6 . Capacitance



Typical Performance Characteristics

Figure 7 . Gate Charge

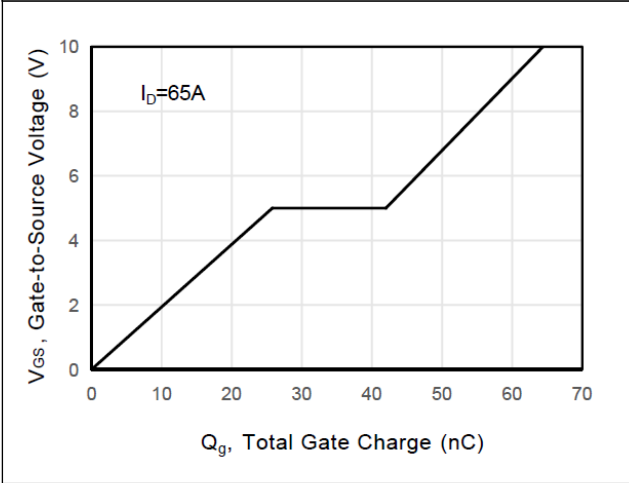


Figure 8 . Body Diode Forward Voltage

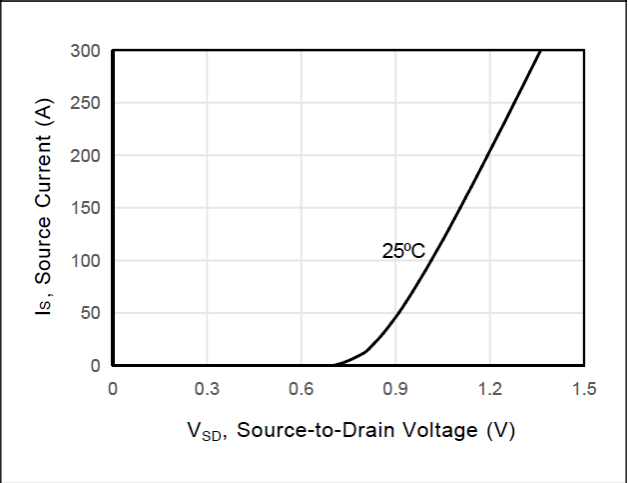


Figure 9. Breakdown Voltage vs Junction Temperature

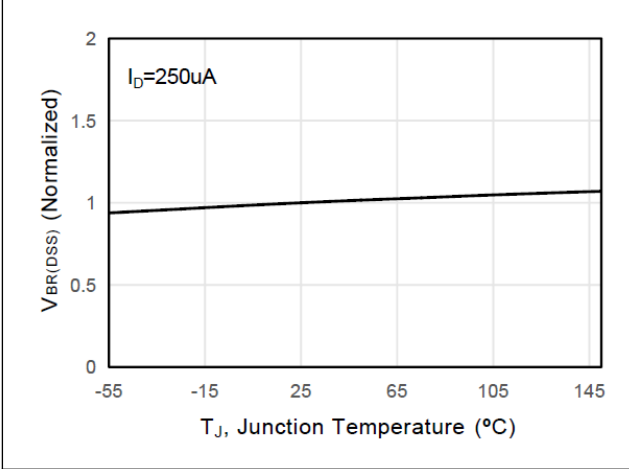


Figure 10. On-Resistance vs Temperature

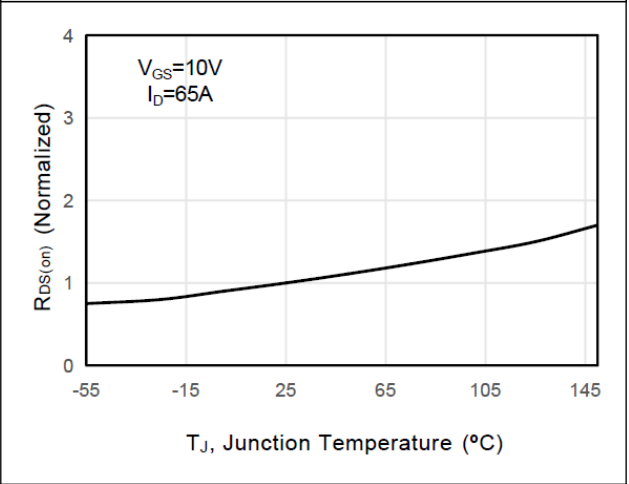
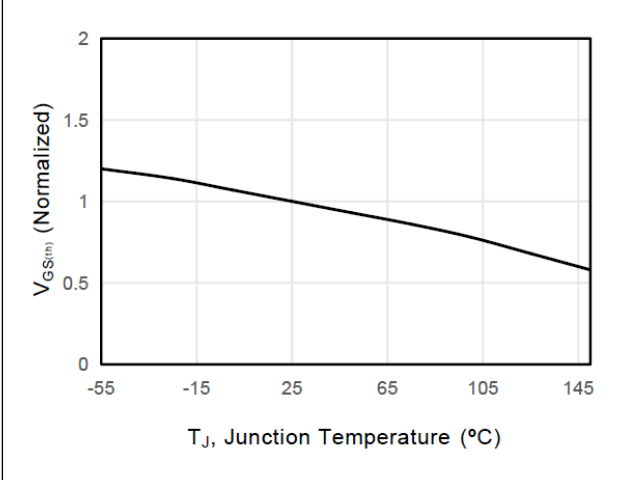


Figure 11. $V_{GS(th)}$ vs Junction Temperature



Test Circuits

Figure 12: Gate Charge Test Circuit and Waveform

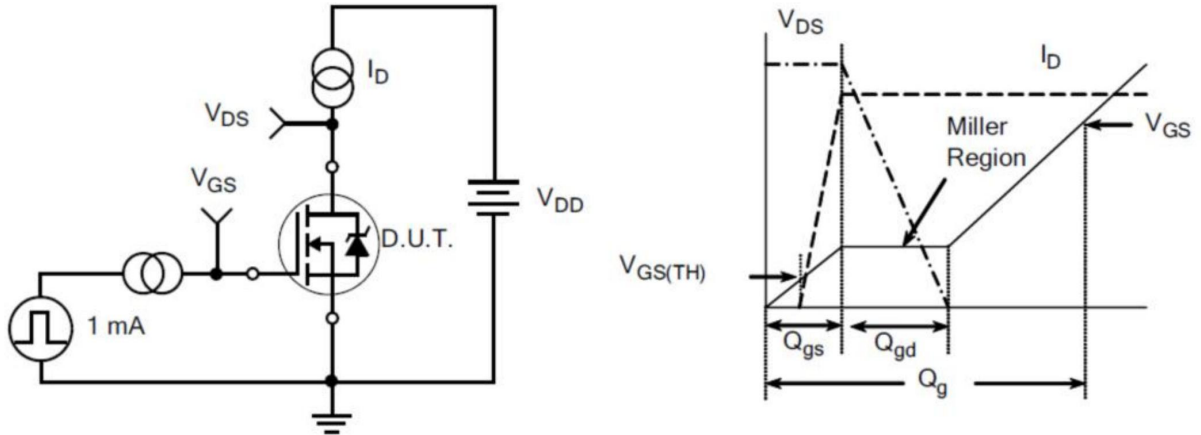


Figure 13: Resistive Switching Test Circuit and Waveform

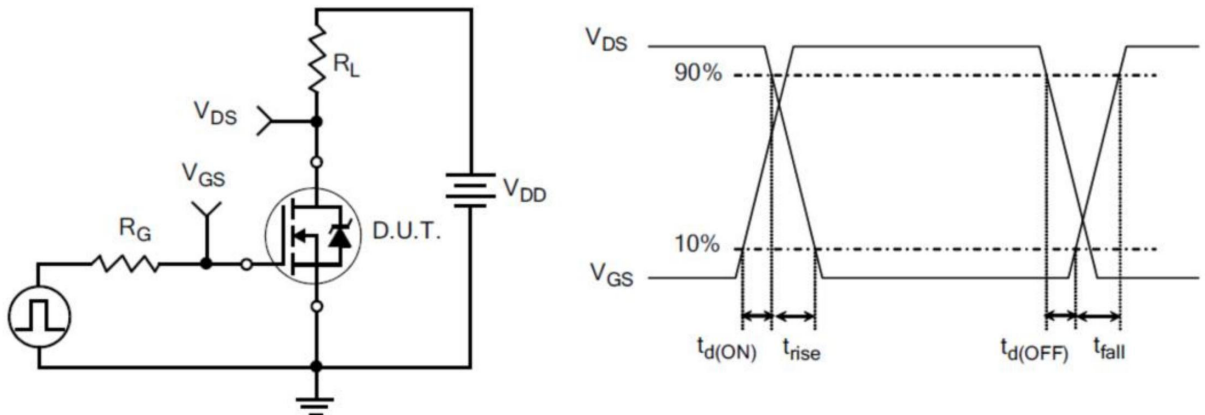
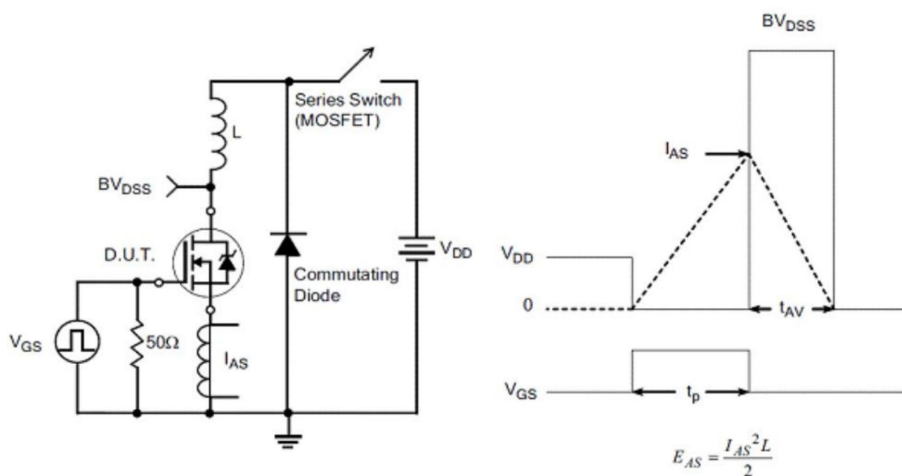
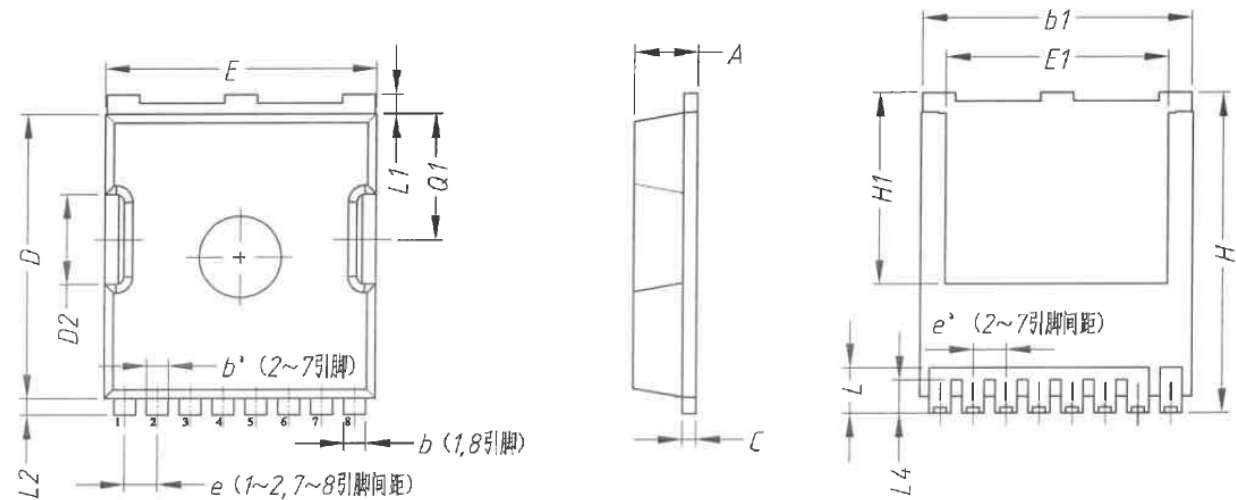


Figure 14: Unclamped Inductive Switching Test Circuit and Waveform



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
BST10NH054SK1	BST10NH054SK1	TOLL	Tape & Reel	1200 units

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