

BSP13NH046SK1

N-Channel Power MOSFET

135 V, 230 A, 4.6 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.

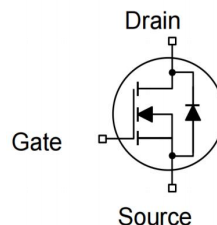
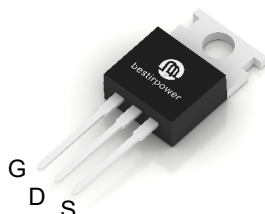
Applications

- Motor Driver
- DC/DC Converter
- Uninterruptible Power Supplies

Features

$BV_{DSS} @ T_{J,max}$	I_D	$R_{DS(on),max}$	$Q_{g,typ}$
135 V	230 A	4.6 mΩ	135.6 nC

- $R_{DS(on)}_{MAX}=4.6m\Omega@V_{GS}=10V$
- Low gate Charge (typical 135.6nC)
- Low C_{rss} (typical 31pF)
- Low On-Resistance
- Excellent FoM(figure of merit)
- 100% UIS and Rg tested



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

Symbol	Parameter		Value	Unit
V_{DSS}	Drain to Source Voltage		135	V
V_{GSS}	Gate to Source Voltage		± 20	V
I_D	Continuous Drain Current, Silicon Limited ($T_C = 25^\circ\text{C}$) ⁽¹⁾		230	A
	Continuous Drain Current, Silicon Limited ($T_C = 100^\circ\text{C}$) ⁽¹⁾		161	
I_{DM}	Drain Current (2)	Pulsed	920	A
E_{AS}	Single Pulsed Avalanche Energy (3)		388	mJ
P_D	Power Dissipation	($T_C = 25^\circ\text{C}$)	446	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.	0.28	$^\circ\text{C}/\text{W}$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient, Max	25	
T_L	Soldering temperature, wave soldering only allowed at leads	260	$^\circ\text{C}$

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

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
--------	-----------	-----------------	-----	-----	-----	------

Off Characteristics

BV_{DSS}	Drain to Source Breakdown Voltage	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	135	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 135\text{ V}, V_{GS} = 0\text{ V}$	-	-	1	μA
I_{GSS}	Gate-Source Leakage Current	$V_{GS} = \pm 20\text{ V}, V_{DS} = 0\text{ V}$	-	-	± 100	nA

On Characteristics

$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS} = V_{DS}, I_D = 250\text{ }\mu\text{A}$	2	-	4	V
$R_{DS(on)}$	Static Drain to Source On Resistance	$V_{GS} = 10\text{ V}, I_D = 40\text{ A}, T_J = 25^\circ\text{C}$	-	3.5	4.6	mΩ

Dynamic Characteristics

C_{iss}	Input Capacitance	$V_{GS} = 0\text{ V}, V_{DS} = 70\text{ V}, f = 1\text{ MHz}$	-	10194	-	pF
C_{oss}	Output Capacitance		-	856	-	pF
C_{rss}	Reverse transfer capacitance		-	31	-	pF
$Q_{g(tot)}$	Total Gate Charge at 10 V	$V_{GS} = 10\text{ V}, V_{DD} = 70\text{ V}, I_D = 40\text{ A}$	-	135.6	-	nC
Q_{gs}	Gate to Source Charge		-	52.5	-	nC
Q_{gd}	Gate to Drain "Miller" Charge		-	24.7	-	nC
R_G	Gate Resistance	$f = 1\text{ MHz open drain}$	-	2.6	-	Ω

Switching Characteristics

$t_{d(on)}$	Turn-On Delay Time	$V_{GS} = 10\text{ V}, I_D = 40\text{ A}, V_{DD} = 70\text{ V}, R_G = 3\text{ }\Omega$	-	25	-	ns
t_r	Turn-On Rise Time		-	80	-	ns
$t_{d(off)}$	Turn-Off Delay Time		-	52	-	ns
t_f	Turn-Off Fall Time		-	17	-	ns

Source-Drain Diode Characteristics

V_{SD}	Diode Forward Voltage	$V_{GS} = 0\text{ V}, I_S = 40\text{ A}, T_J = 25^\circ\text{C}$	-	0.83	1.4	V
t_{rr}	Reverse Recovery Time	$I_S = 40\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$	-	75	-	ns
Q_{rr}	Reverse Recovery Charge		-	168	-	nC

Notes

- 1) Limited by maximum junction temperature.
- 2) Repetitive Rating: Pulse width limited by maximum junction temperature.
- 3) $L = 0.5\text{ mH}, R_G = 25\text{ }\Omega, V_{GS} = 10\text{ V}, V_{DD} = 70\text{ V}, \text{Start } T_J = 25^\circ\text{C}$.

Typical Performance Characteristics

Figure 1. Transient Thermal Impedance

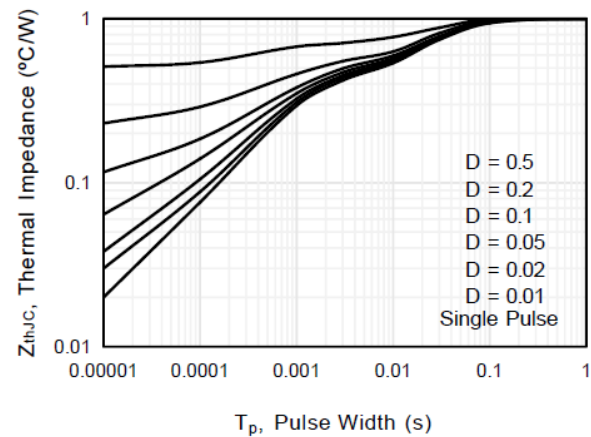


Figure 2 . Safe Operation Area

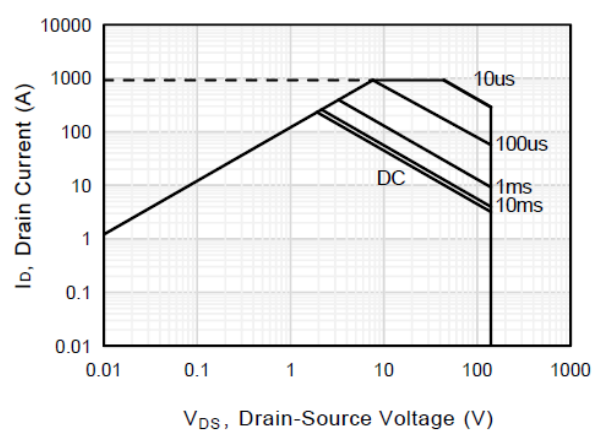


Figure 3 . Output Characteristics

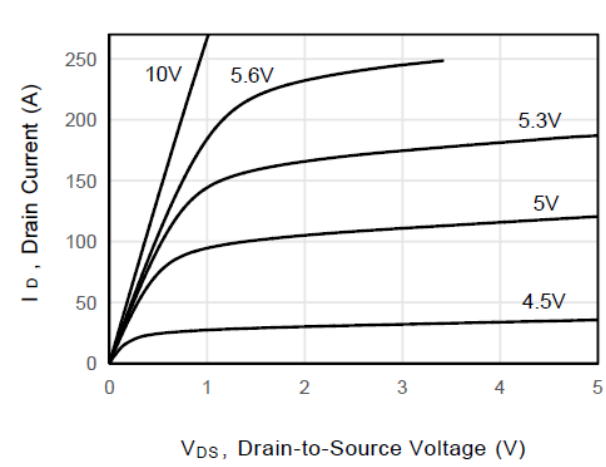


Figure 4 . Transfer Characteristics

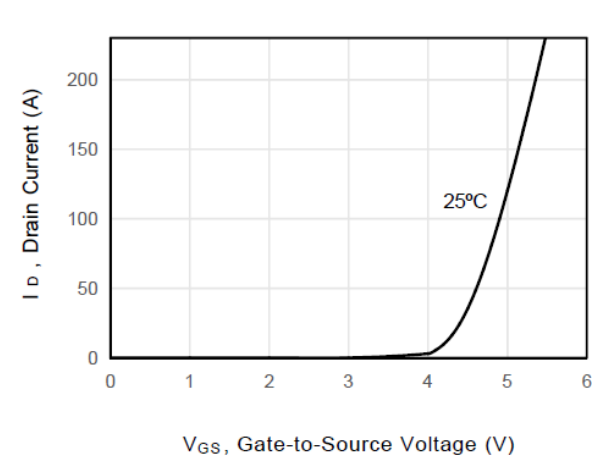


Figure 5 . On-Resistance vs Drain Current

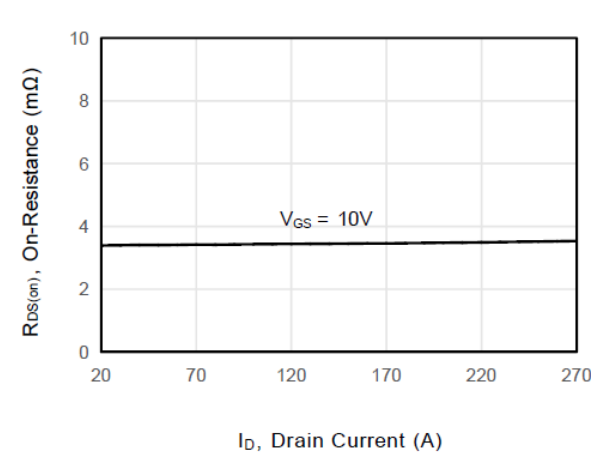
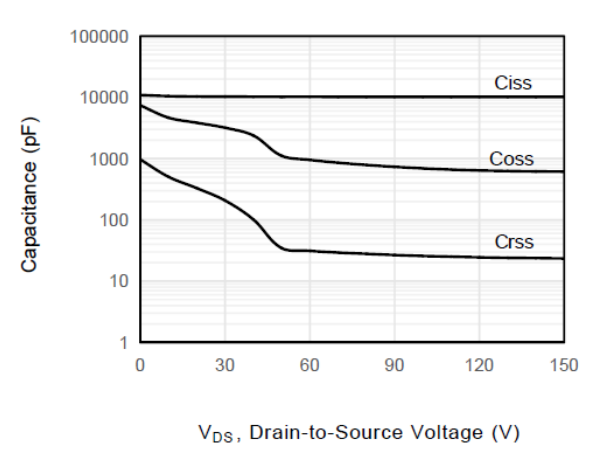


Figure 6 . Capacitance



Typical Performance Characteristics

Figure 7 . Gate Charge

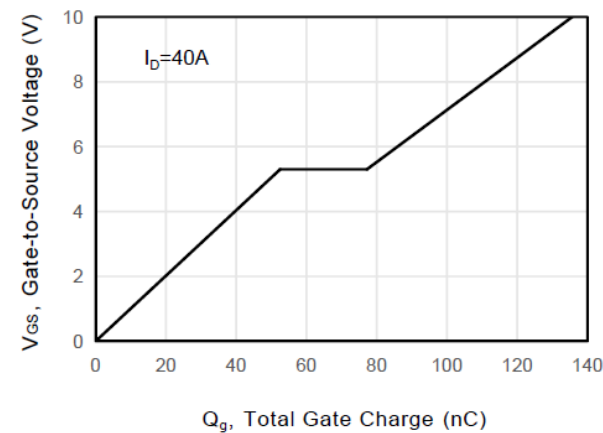


Figure 8. Body Diode Forward Voltage

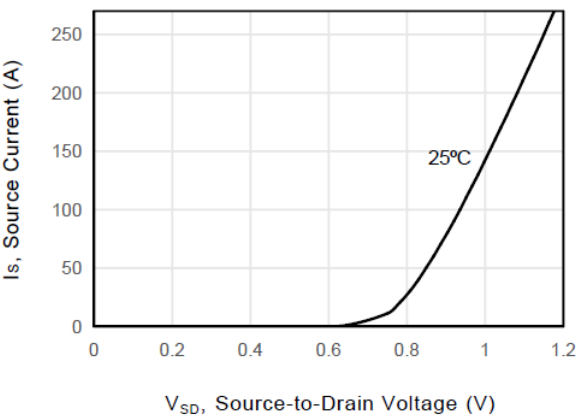


Figure 9. Breakdown Voltage vs Junction Temperature

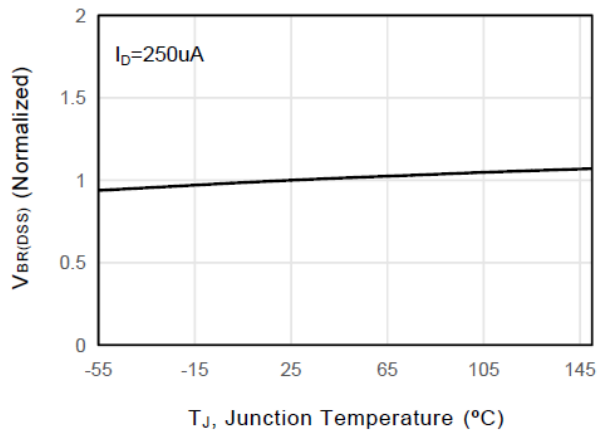


Figure 10. On-Resistance vs Temperature

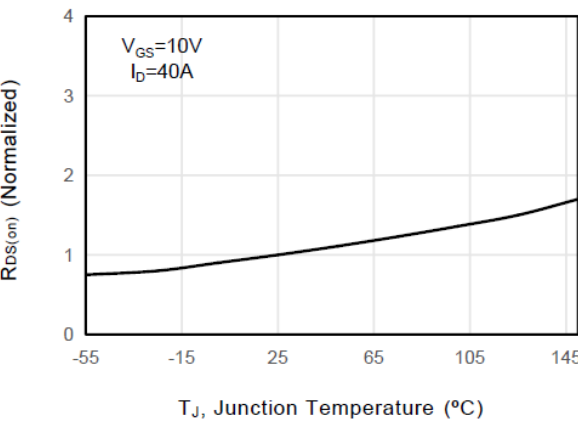
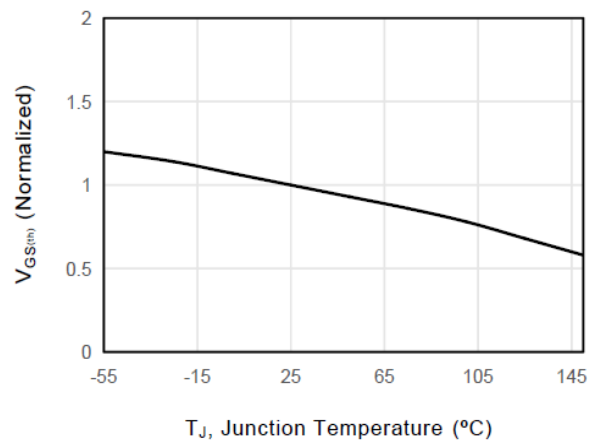


Figure 11. VGS(th) vs Junction Temperature



Test Circuits

Figure 12: Gate Charge Test Circuit and Waveform

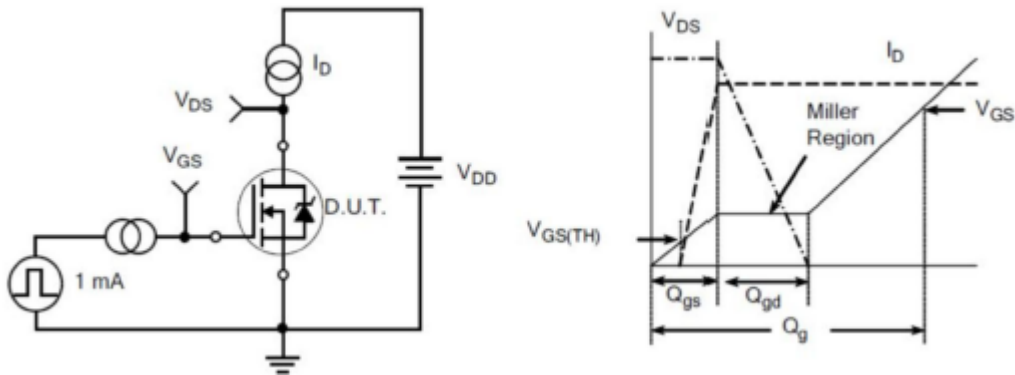


Figure 13: Resistive Switching Test Circuit and Waveform

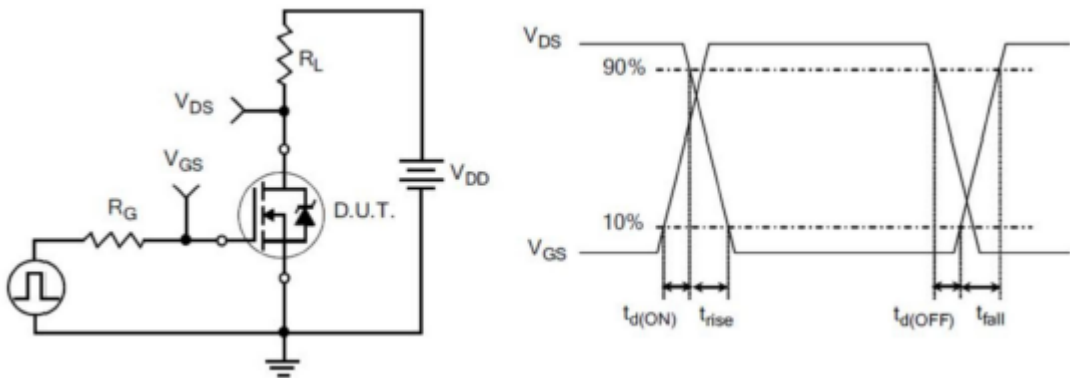
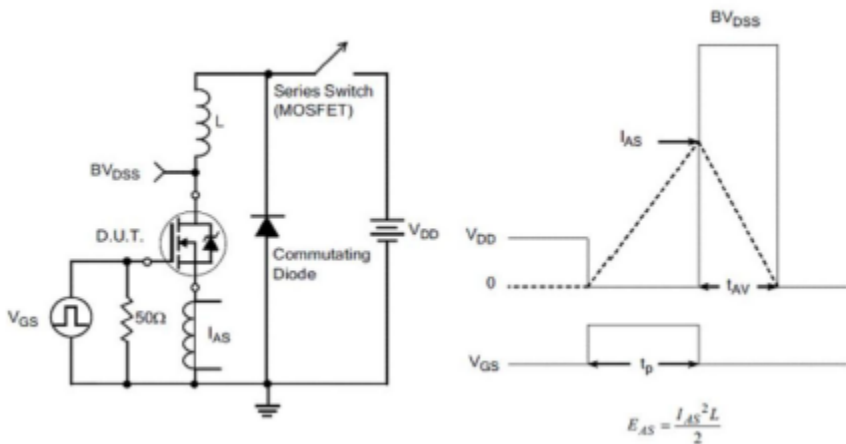
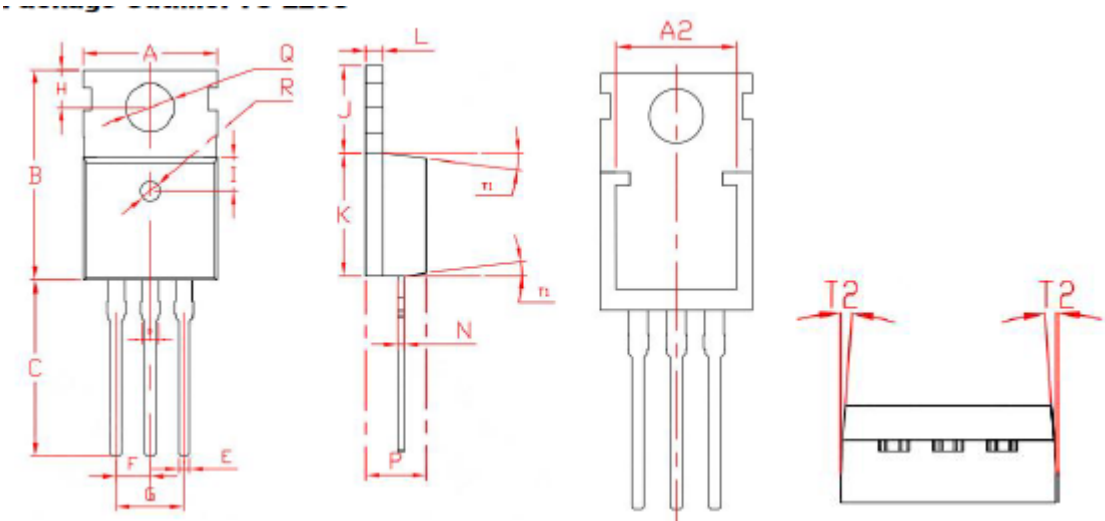


Figure 14: Unclamped Inductive Switching Test Circuit and Waveform



Package Outlines

TO220-3



SYMBOL	MIN	NON	MAX
A	9.80	10.00	10.20
A2		8	
B	15.55	15.70	15.85
C	12.75	13.10	13.17
D		1.27	
E		0.80	
F		2.54	
G		5.08	
H	2.73	2.80	2.87
I		2.5	
J	6.40	6.50	6.60
K	9.10	9.20	9.25
L	1.29	1.30	1.32
N	0.48	0.50	0.56
O	2.35	2.4	2.5
P	4.4	4.5	4.7
Q	3.5	3.6	3.63
R	1.4	1.5	1.6
T1	6°	7°	8°
T2	2°	3°	4°

* Dimensions in millimeters

Package Marking and Ordering Information

Part Number	Top Marking	Package	Packing Method	Quantity
BSP13NH046SK1	BSP13NH046SK1	TO-220-3	Tube	50 units

Disclaimer

Bestirpower reserve the right to make changes, corrections, enhancements, modifications, and improvements to Bestirpower products and/or to this document at any time without notice.

The information given in this document shall in no event be regarded as a guarantee of conditions or characteristics. Bestirpower does not assume any liability for infringement of patents, copyrights, or other intellectual property rights of third parties by or arising from the use of Products or technical information described in this document.

This document is the property of Bestirpower Co., LTD., and not allowed to copy or transformed to other format if not under the authority approval.

© 2026 bestirpower – All rights Reserved