

BST10N1R5SX1

N-Channel Power MOSFET

100 V, 330 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 $R_{DS(on)}$, fast switching speed.

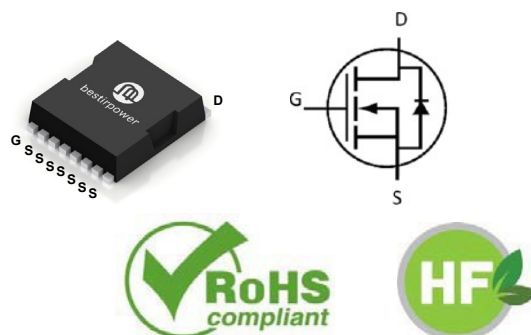
Applications

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

Features

BV_{DSS}	I_D	$R_{DS(on),max}$	$Q_{g,typ}$
100V	330A	1.5 mΩ	180 nC

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



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⁾		330	A
	Continuous Drain Current, Silicon Limited ($T_C = 100^\circ\text{C}$) ⁽¹⁾		246	
I_{DM}	Drain Current ⁽²⁾	Pulsed	1320	A
E_{AS}	Single Pulsed Avalanche Energy ⁽³⁾		405	mJ
P_D	Power Dissipation	($T_C = 25^\circ\text{C}$)	431	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	0.29	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	40	

(1) Rated according to $R_{\theta JC}$

(2) Limited by maximum T_J

(3) Starting $T_J = 25^\circ\text{C}$, $L = 0.1\text{ mH}$, $V_{DD} = 50\text{ V}$, $V_{GS} = 10\text{ V}$

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	$V_{GS} = 0\text{ V}, I_D = 1\text{ mA}$	100	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 100\text{ V}, V_{GS} = 0\text{ V}$	-	-	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	$V_{GS} = V_{DS}, I_D = 250\text{ }\mu\text{A}$	2.2	3.0	3.8	V
$R_{DS(on)}$	Static Drain to Source On Resistance	$V_{GS} = 10\text{ V}, I_D = 100\text{ A}$	-	1.2	1.5	mΩ

Dynamic Characteristics

C_{iss}	Input Capacitance	$V_{GS} = 0\text{ V}, V_{DS} = 50\text{ V}, f = 1\text{ MHz}$	-	15000	-	pF
C_{oss}	Output Capacitance		-	3400	-	pF
C_{rss}	Reverse transfer capacitance		-	50	-	pF
$Q_{g(tot)}$	Total Gate Charge	$V_{GS} = 10\text{ V}, V_{DS} = 50\text{ V}, I_D = 100\text{ A}$	-	180	-	nC
Q_{gs}	Gate to Source Charge		-	74	-	nC
Q_{gd}	Gate to Drain Charge		-	22	-	nC
R_G	Gate Resistance	$f = 1\text{ MHz}$	-	1.7	-	Ω

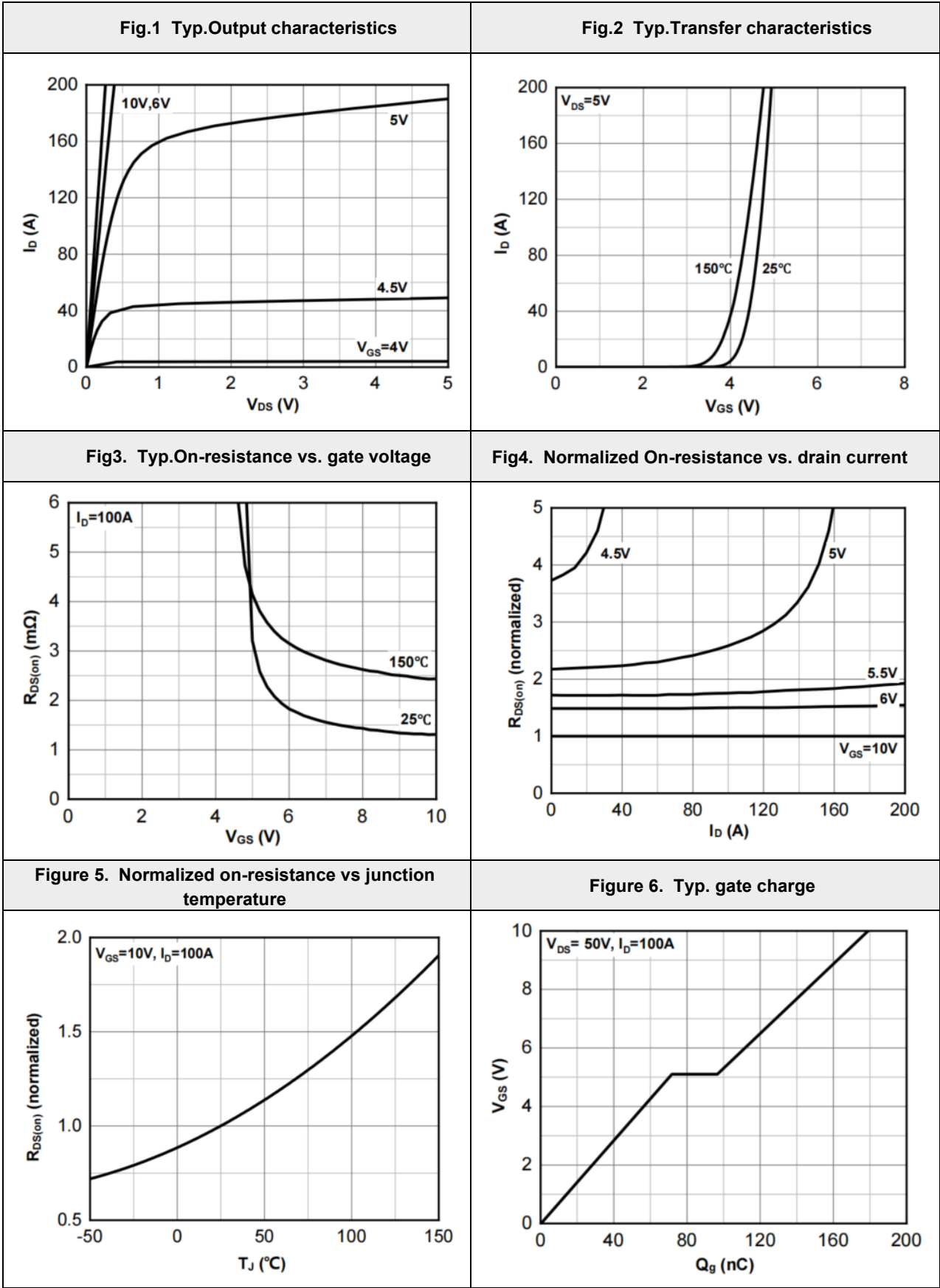
Switching Characteristics

$t_{d(on)}$	Turn-On Delay Time	$V_{GS} = 10\text{ V}, I_D = 100\text{ A}, V_{DS} = 50\text{ V}, R_G = 6\Omega$	-	141	-	ns
t_r	Turn-On Rise Time		-	72	-	ns
$t_{d(off)}$	Turn-Off Delay Time		-	112	-	ns
t_f	Turn-Off Fall Time		-	50	-	ns

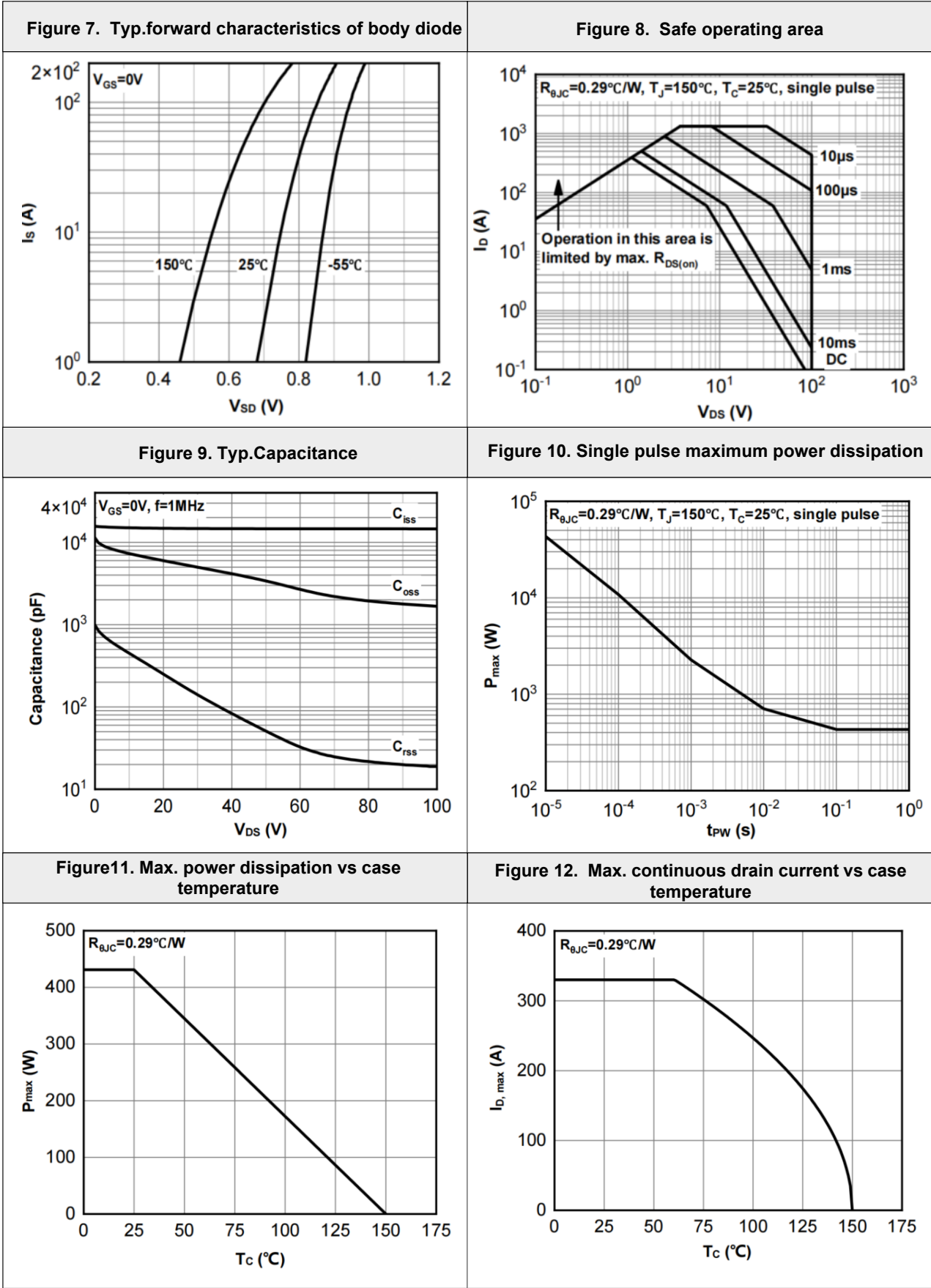
Source-Drain Diode Characteristics

V_{SD}	Diode Forward Voltage	$V_{GS} = 0\text{ V}, I_S = 100\text{ A}, T_J = 25^\circ\text{C}$	-	0.85	1.1	V
t_{rr}	Reverse Recovery Time	$V_{DS} = 50\text{ V}, I_S = 50\text{ A}, dI_F/dt = 100\text{ A}/\mu\text{s}$	-	104	-	ns
Q_{rr}	Reverse Recovery Charge		-	270	-	nC

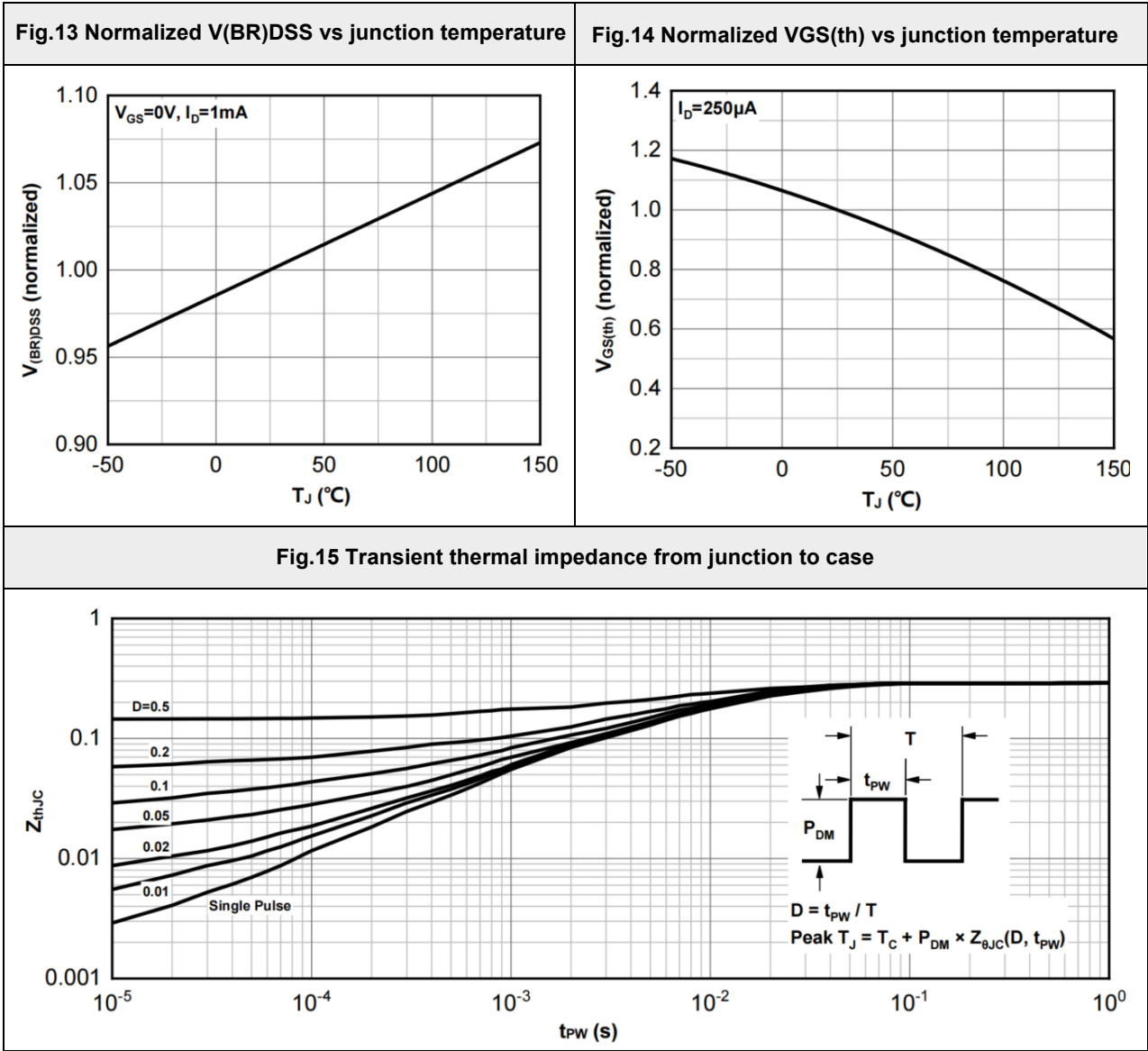
Typical Performance Characteristics



Typical Performance Characteristics



Typical Performance Characteristics



Test Circuits and Waveforms

Figure 16. Resistive switching time test circuit & waveforms

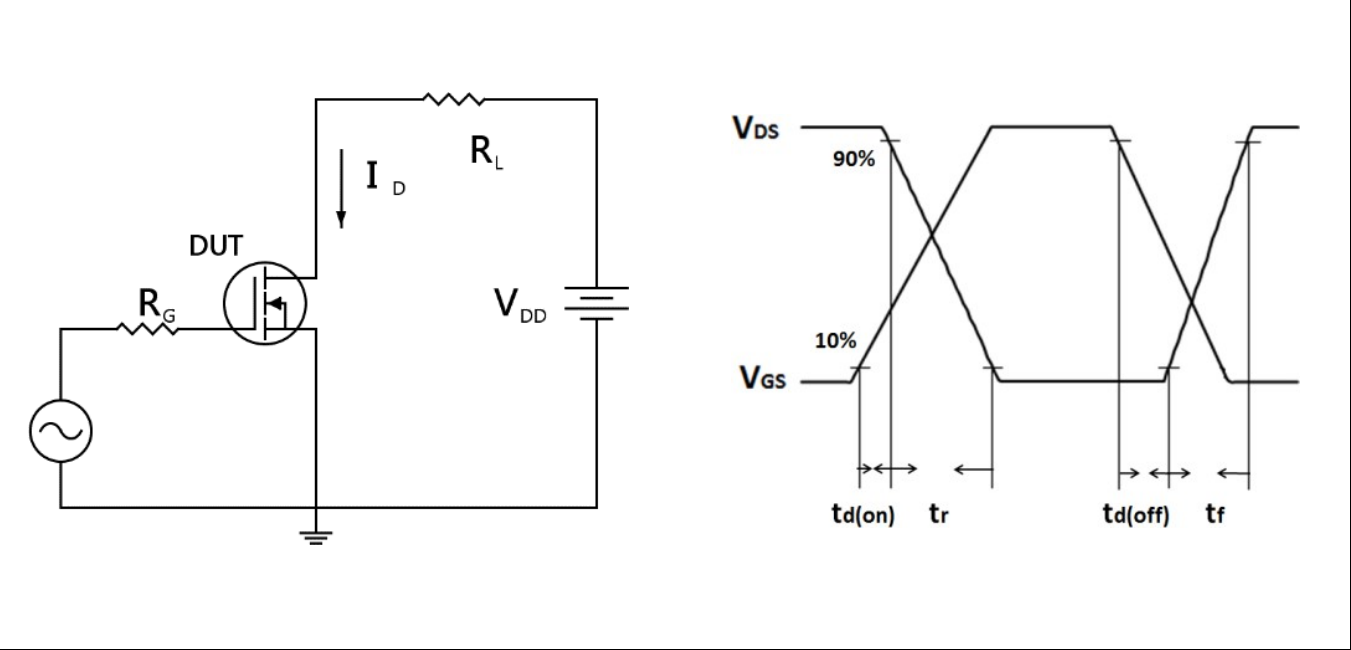
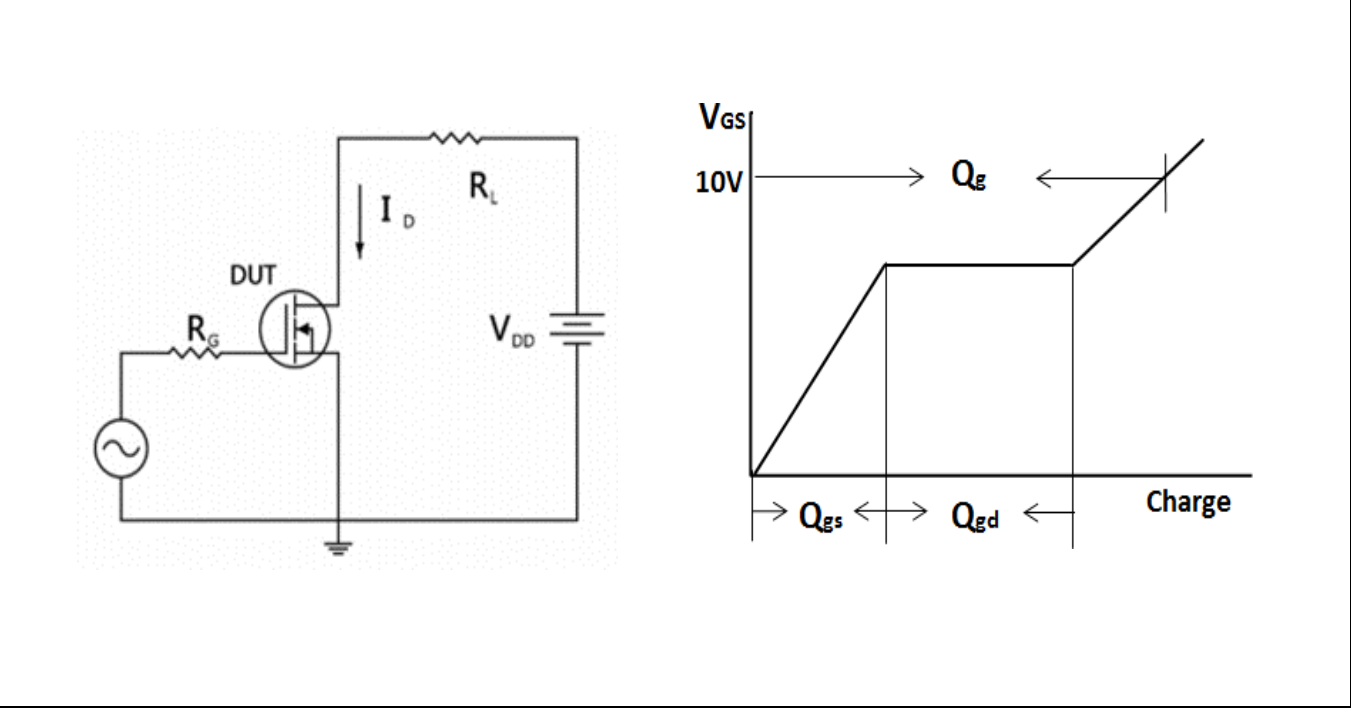


Figure 17. Gate charge test circuit & waveform



Test Circuits and Waveforms

Figure 18. Peak diode recovery dv/dt test circuit & waveforms

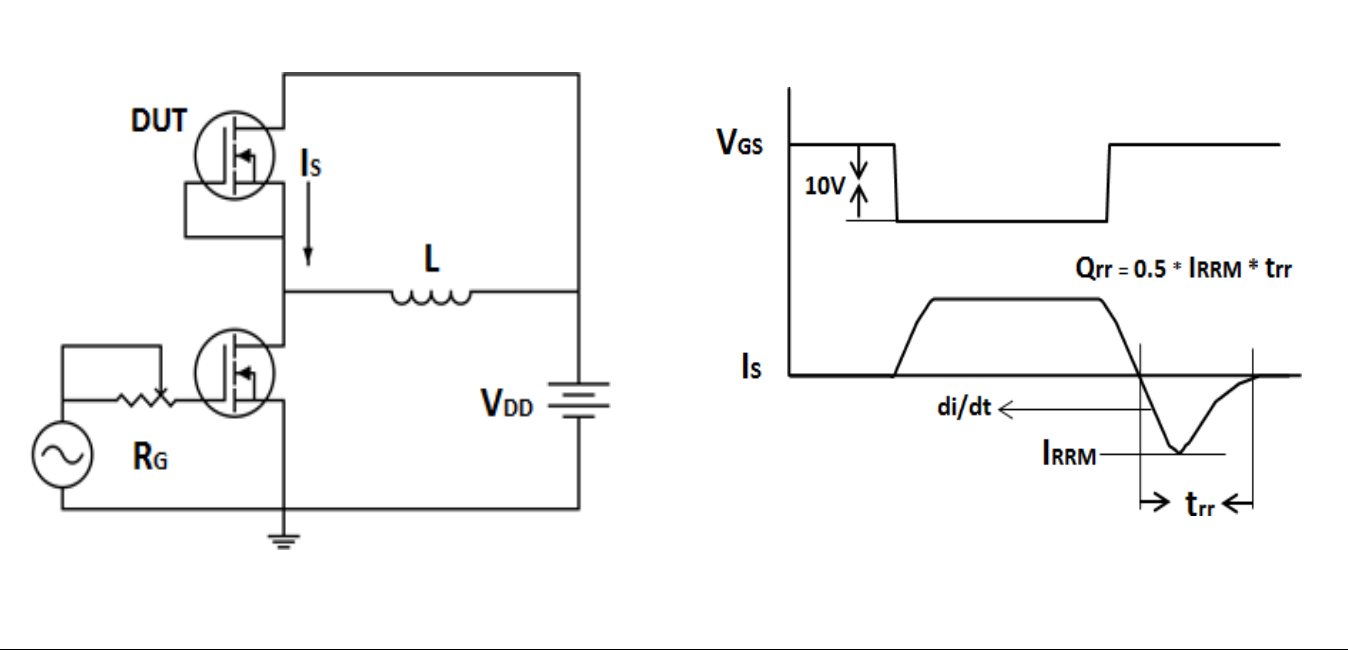
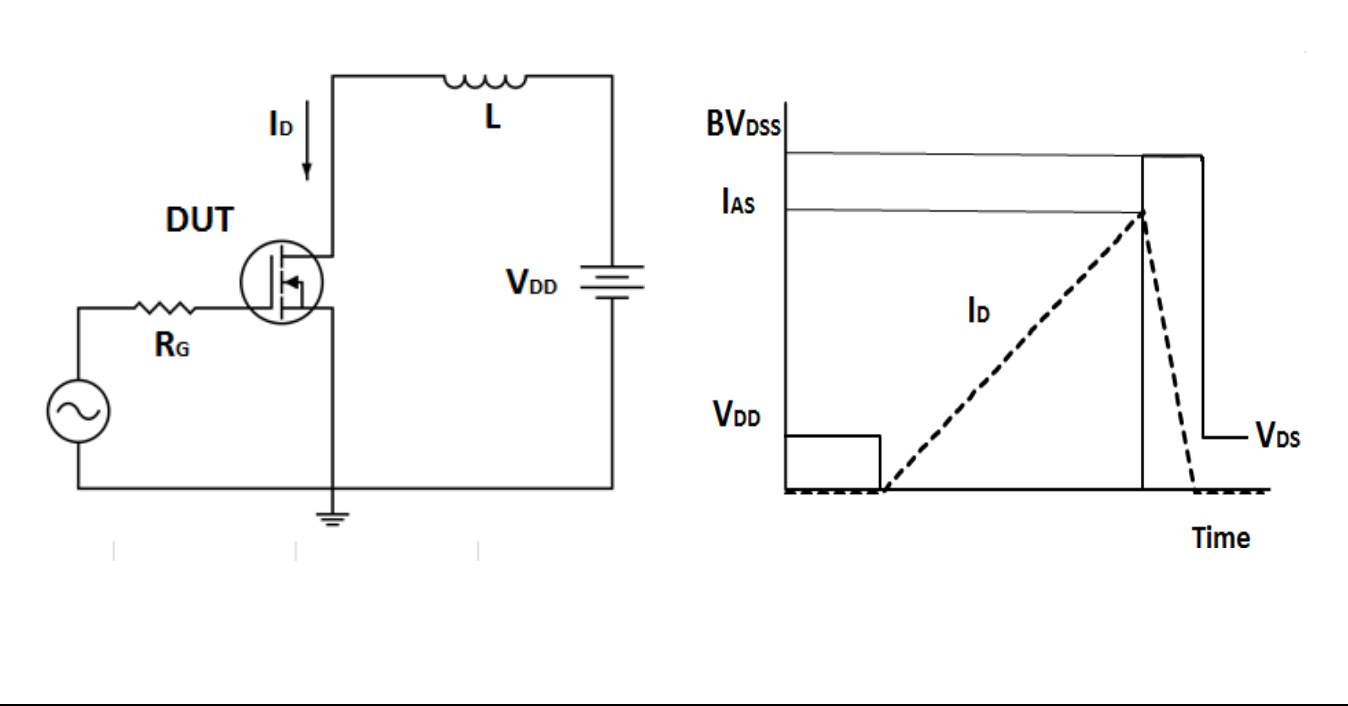


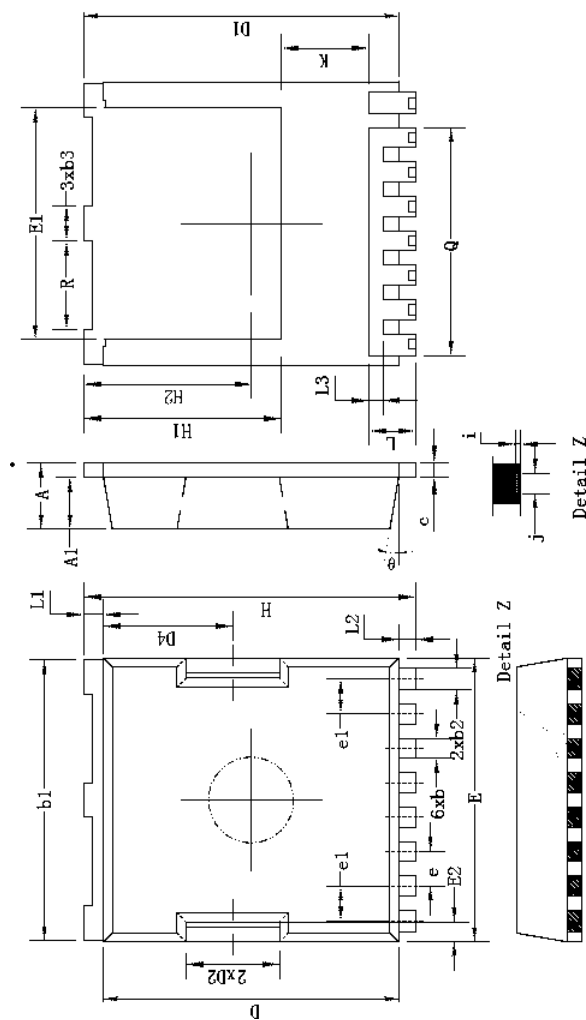
Figure 19. Unclamped inductive switching test circuit & waveforms



Package Outlines

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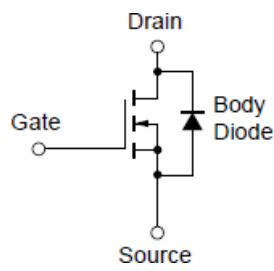
Package Drawing



DIM.	MILLIMETERS		
	MIN.	NOM.	MAX.
A	2.25	2.30	2.35
A1	1.75	1.80	1.85
b	0.65	0.70	0.75
b1	9.75	9.80	9.85
b2	0.70	0.75	0.80
b3	1.15	1.20	1.25
c	0.45	0.50	0.55
D	10.35	10.40	10.45
D1	11.00	11.10	11.20
D2	3.25	3.30	3.35
D4	4.50	4.55	4.60
e	1.20 BSC		
e1	1.225 BSC		
E	9.85	9.90	9.95
E1	8.00	8.10	8.20
E2	0.65	0.70	0.75
H	11.60	11.70	11.80
H1	6.95 BSC		
H2	5.90 BSC		
i	0.10 REF		
j	0.35 REF		
K	3.10 REF		
L	1.55	1.65	1.75
L1	0.65	0.70	0.75
L2	0.50	0.60	0.70
L3	0.40	0.50	0.60
Q	7.95 REF		
R	3.05	3.10	3.15
θ	10° REF		

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Equivalent Circuit



* Dimensions in millimeters

Package Marking and Ordering Information

Part Number	Top Marking	Package	Packing Method
BST10N1R5SX1	BST10N1R5SX1	TOLL	Tape and Reel

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