

## 1. Description

BLP12N10G, the N-channel Enhanced Power MOSFETs, is obtained by advanced double trench technology which reduce the conduction loss, and improve switching performance. This is suitable device for synchronous rectifiers and high speed switching applications.

### KEY CHARACTERISTICS

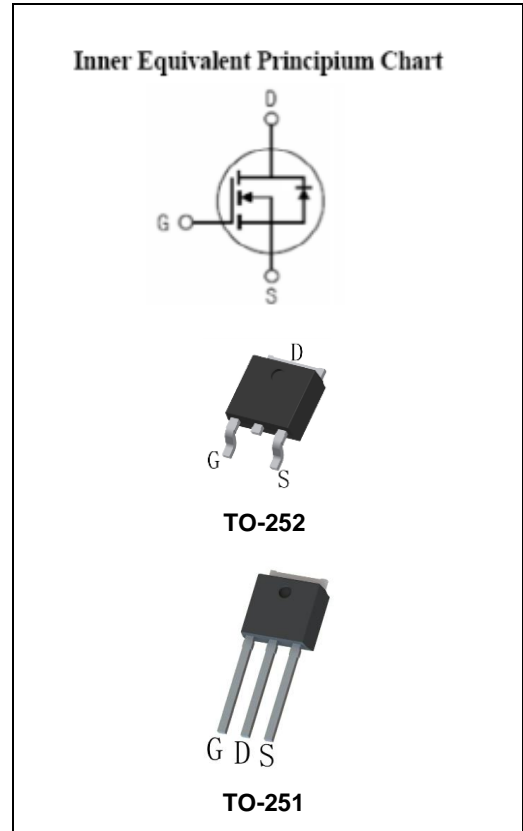
Parameter	Value	Unit
V <sub>DSS</sub>	100	V
I <sub>D</sub>	49	A
R <sub>DS(on).typ</sub>	10.5	mΩ

### FEATURES

- Fast Switching
- Low On-Resistance (  $R_{DS(on)} \leq 12m\Omega$  )
- Low Gate Charge
- Low Reverse transfer capacitances
- High avalanche ruggedness
- RoHS product

### APPLICATIONS

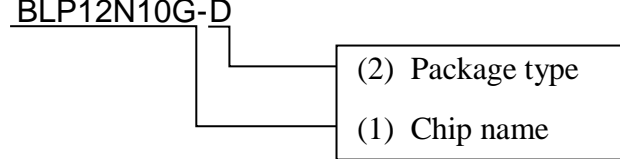
- Synchronous rectifiers
- High speed switching applications



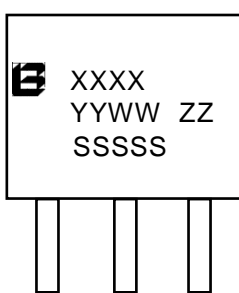
## ORDERING INFORMATION

Ordering Codes	Package	Product Code	Packing
BLP12N10G-D	TO-252	P12N10G	Reel
BLP12N10G-U	TO-251	P12N10G	Tube

**BLP12N10G-D**



(1) BLP12N10G: 12mΩ/100V  
 (2) D: TO-252  
 U: TO-251



XXXX: Product Code  
 YYWW: Year&Week  
 ZZ: Assembly Code  
 SSSSS: Lot Code

## 2. ABSOLUTE RATINGS

at  $T_C=25^\circ\text{C}$ , unless otherwise specified

Symbol	Parameter	Rating	Units
$V_{DSS}$	Drain-Source Voltage	100	V
$I_D$	Continuous Drain Current, Silicon Limited	49	A
	Continuous Drain Current, Package Limited	60	A
	Continuous Drain Current @ $T_C=100^\circ\text{C}$ , Silicon Limited	31.5	A
$I_{DM}$ <sup>Note1</sup>	Pulsed Drain Current	196	A
$V_{GS}$	Gate-Source Voltage	$\pm 20$	V
$E_{AS}$ <sup>Note2</sup>	Avalanche Energy	56.2	mJ
$P_D$	Power Dissipation	55.9	W
	Derating Factor above $25^\circ\text{C}$	0.447	W/ $^\circ\text{C}$
$T_J, T_{stg}$	Operating Junction and Storage Temperature Range	150, $-55$ to $150$	$^\circ\text{C}$
$T_L$	Maximum Temperature for Soldering	260	$^\circ\text{C}$

Note1: Repetitive Rating: Pulse width limited by maximum junction temperature

Note2:  $L=0.5\text{mH}$ ,  $I_{as}=15\text{A}$ , Start  $T_J=25^\circ\text{C}$

## 3. Thermal characteristics

Symbol	Parameter	Max	Units
$R_{\theta JC}$	thermal resistance, Junction-Case	2.24	$^\circ\text{C}/\text{W}$
$R_{\theta JA}$	thermal resistance, Junction-Ambient	75	$^\circ\text{C}/\text{W}$

## 4. Electrical Characteristics

at  $T_C=25^\circ\text{C}$ , unless otherwise specified

OFF Characteristics						
Symbol	Parameter	Test Conditions	Values			Units
			Min	Typ	Max	
$V_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0\text{V}$ , $I_D=250\mu\text{A}$	100	110	--	V
$I_{DSS}$	Drain-Source Leakage Current	$V_{DS}=100\text{V}$ , $V_{GS}=0\text{V}$	--	--	1	$\mu\text{A}$
		$V_{DS}=80\text{V}$ , $V_{GS}=0\text{V}$ @ $T_C=125^\circ\text{C}$	--	--	100	$\mu\text{A}$
$I_{GSS(F)}$	Gate-Source Forward Leakage	$V_{GS}=+20\text{V}$	--	--	100	nA
$I_{GSS(R)}$	Gate-Source Reverse Leakage	$V_{GS}=-20\text{V}$	--	--	-100	nA

## ON Characteristics

Symbol	Parameter	Test Conditions	Values			Unit s
			Min	Typ	Max	
$R_{DS(on)}$	Drain-Source On-Resistance	$V_{GS}=10V, I_D=20A$	--	10.5	12	m $\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	2	3	4	V

Pulse width  $t_p \leq 300\mu s, \delta \leq 2\%$

## Dynamic Characteristics

Symbol	Parameter	Test Conditions	Values			Units
			Min	Typ	Max	
$C_{iss}$	Input Capacitance	$V_{DS}=50V, V_{GS}=0, f=1MHz$	--	1680	--	pF
$C_{oss}$	Output Capacitance		--	271	--	
$C_{rss}$	Reverse Transfer Capacitance		--	10	--	
$Q_g$	Total Gate Charge	$V_{DD}=50V, I_D=20A, V_{GS}=10V$	--	37	--	nC
$Q_{gs}$	Gate-Source charge		--	10.2	--	
$Q_{gd}$	Gate-Drain charge		--	11.3	--	
$R_G$	Gate resistance	$V_{GS}=0, V_{DS}=0$		1.3		$\Omega$

## Switching Characteristics

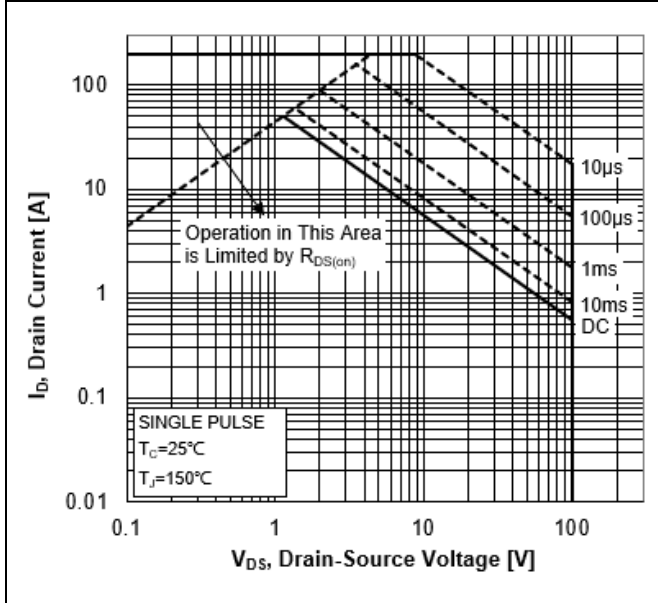
Symbol	Parameter	Test Conditions	Values			Units
			Min	Typ	Max	
$t_{d(on)}$	Turn-On Delay Time	$V_{DD}=50V, I_D=10A, V_{GS}=10V, R_G=5\Omega, \text{Resistive Load}$	--	14.4	--	ns
$t_r$	Rise Time		--	13	--	
$t_{d(off)}$	Turn-Off Delay Time		--	28.8	--	
$t_f$	Fall Time		--	15.2	--	

## Source-Drain Diode Characteristics

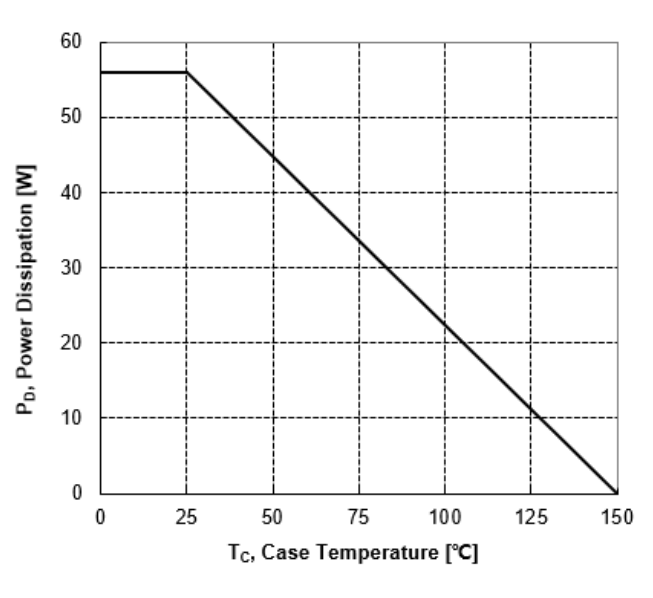
Symbol	Parameter	Test Conditions	Values			Units
			Min	Typ	Max	
$I_S$	Continuous Source Current		--	--	49	A
$I_{SM}$	Maximum Pulsed Current		--	--	196	A
$V_{SD}$	Diode Forward Voltage	$V_{GS}=0V, I_S=20A$	--	--	1.2	V
$T_{rr}$	Reverse Recovery Time	$I_S=10A, V_{GS}=0, di/dt=250A/us$	--	168	--	ns
$Q_{rr}$	Reverse Recovery Charge		--	335.8	--	nC

**5. Characteristics Curves**

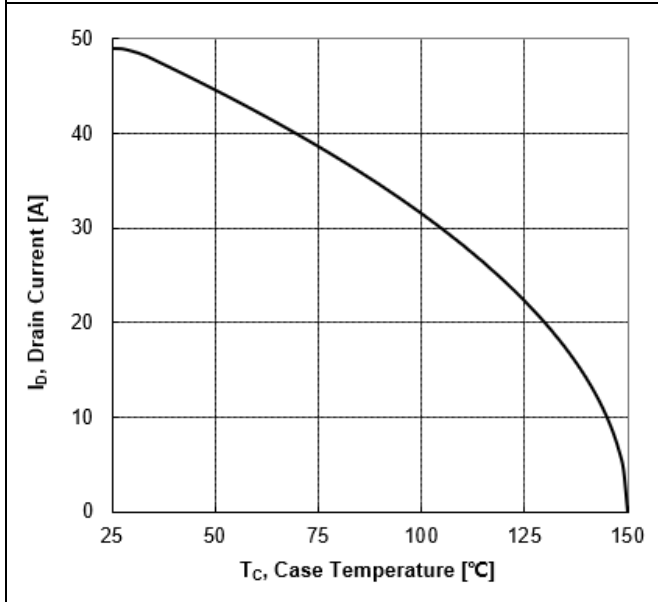
**Figure 1. Safe Operating Area**



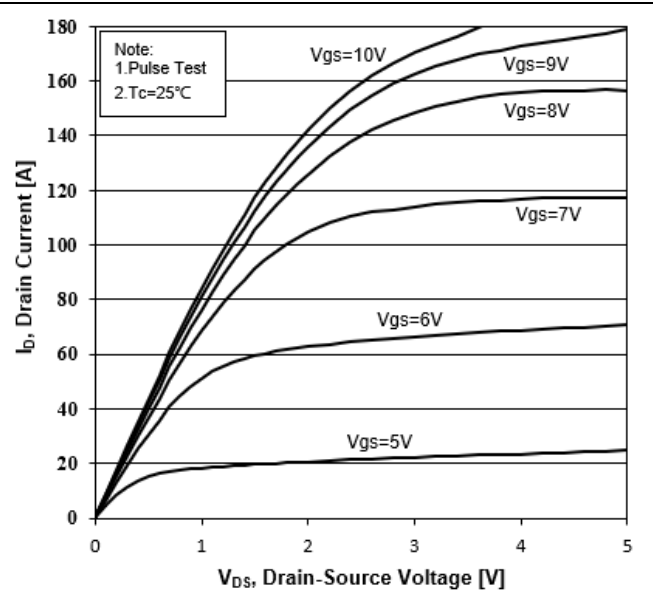
**Figure 2. Maximum Power Dissipation vs Case Temperature**



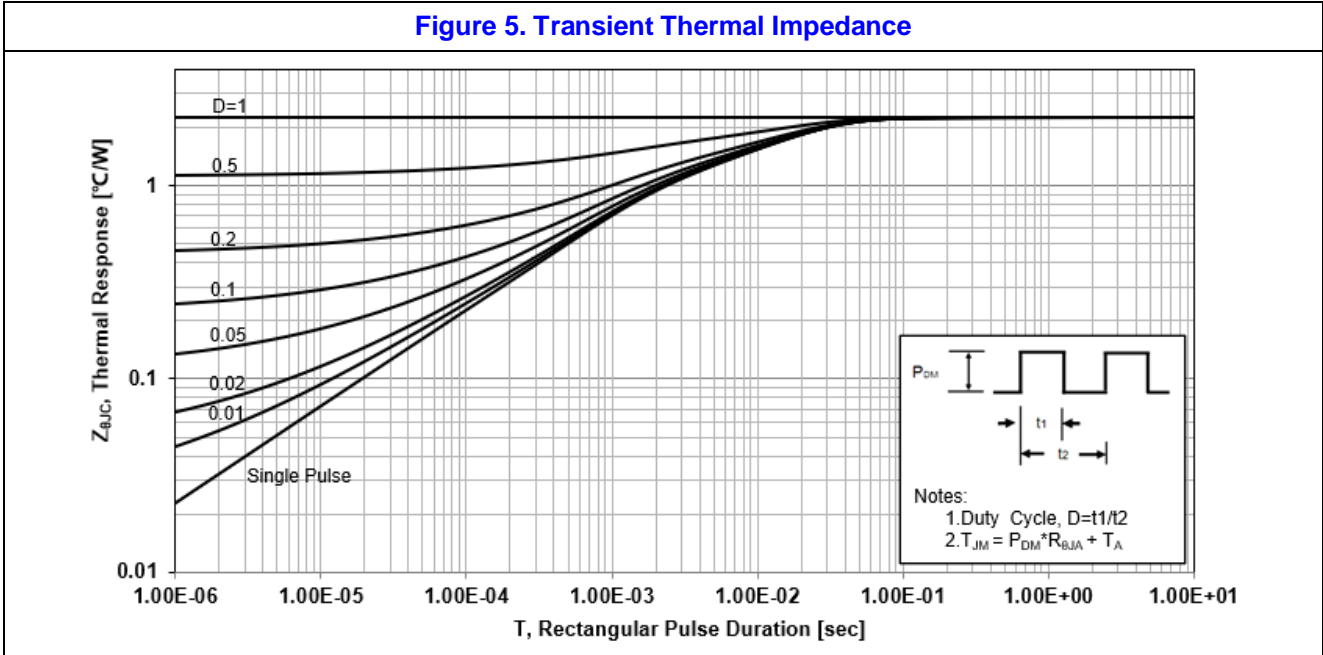
**Figure 3. Maximum Continuous Drain Current vs Case Temperature**



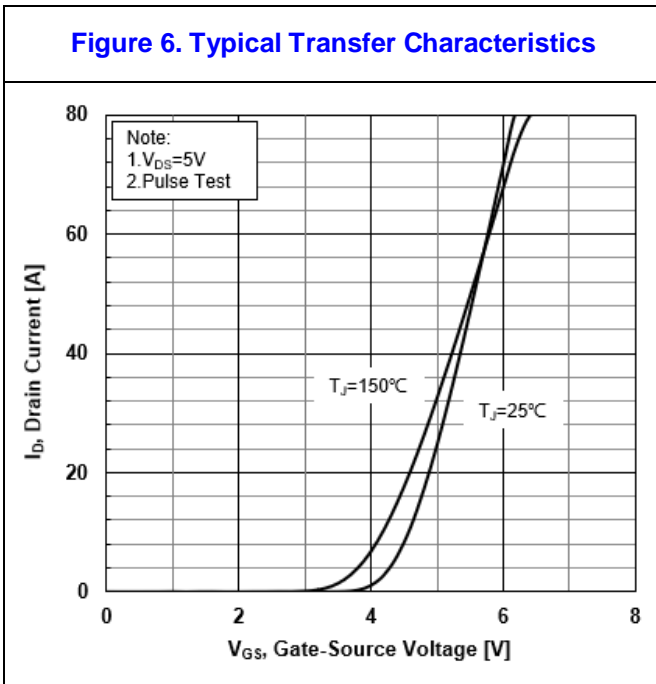
**Figure 4. Typical Output Characteristics**



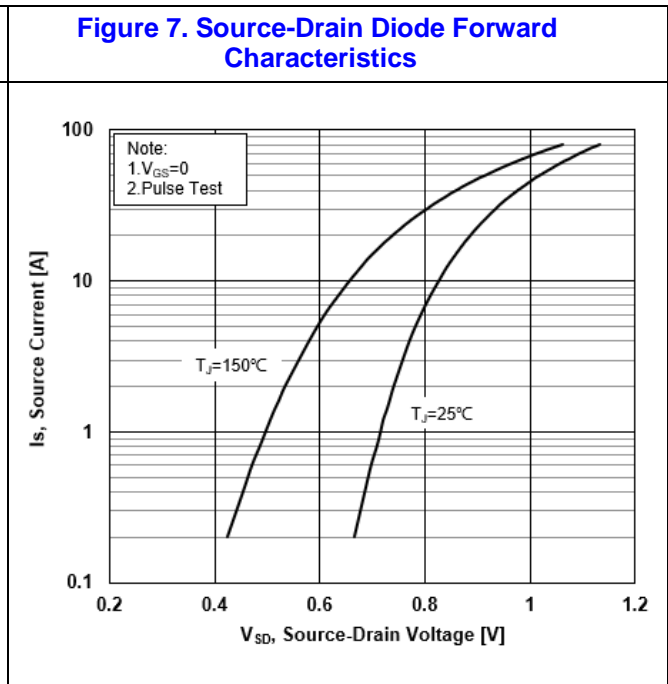
**Figure 5. Transient Thermal Impedance**



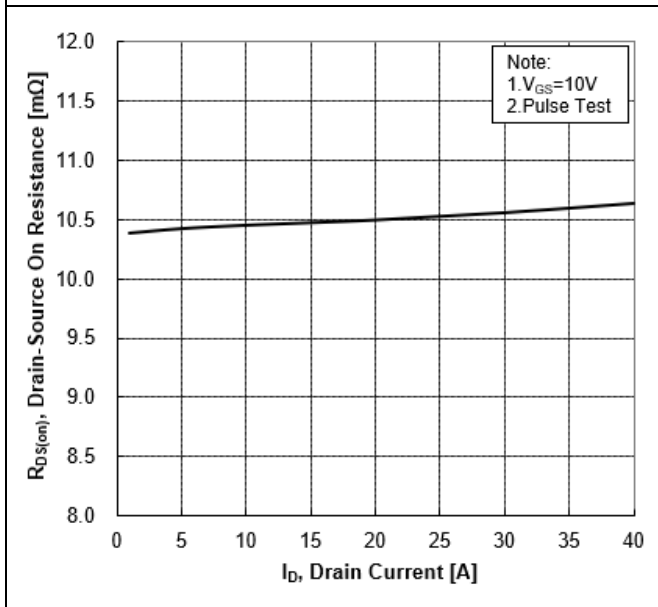
**Figure 6. Typical Transfer Characteristics**



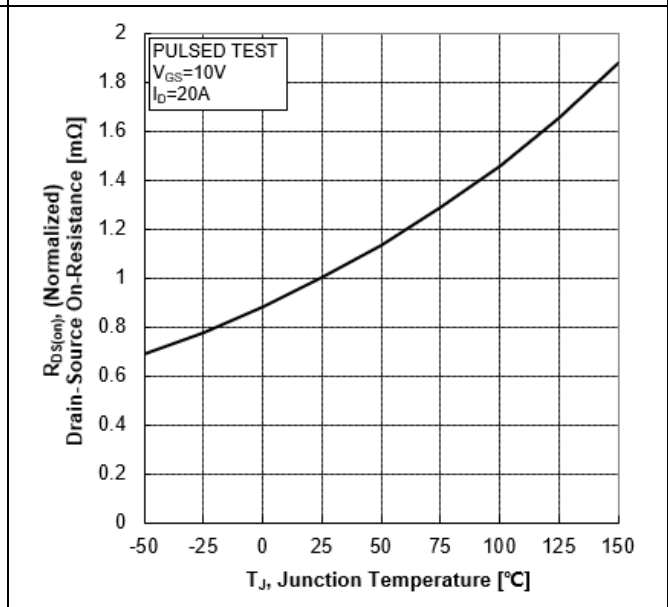
**Figure 7. Source-Drain Diode Forward Characteristics**



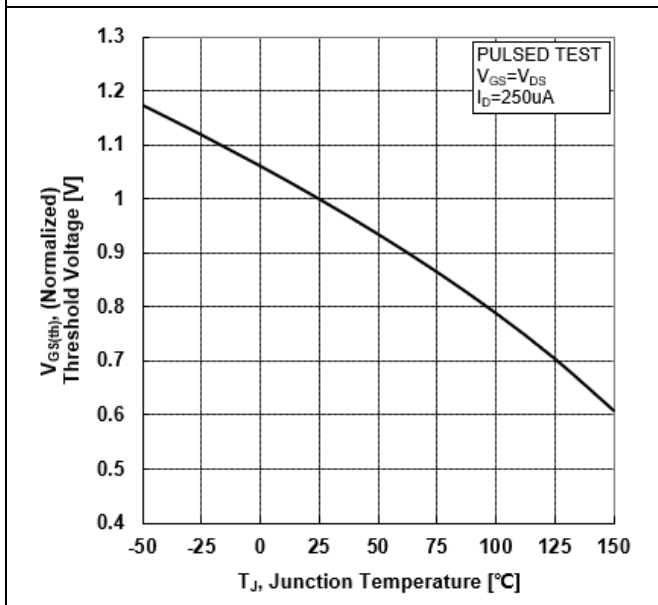
**Figure 8. Drain-Source On-Resistance vs Drain Current**



**Figure 9. Normalized On-Resistance vs Junction Temperature**



**Figure 10. Normalized Threshold Voltage vs Junction Temperature**



**Figure 11. Normalized Breakdown Voltage vs Junction Temperature**

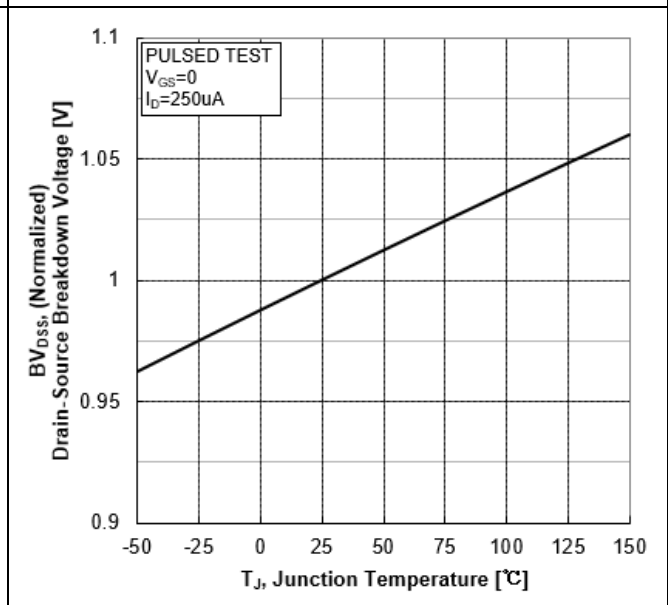


Figure 12. Capacitance Characteristics

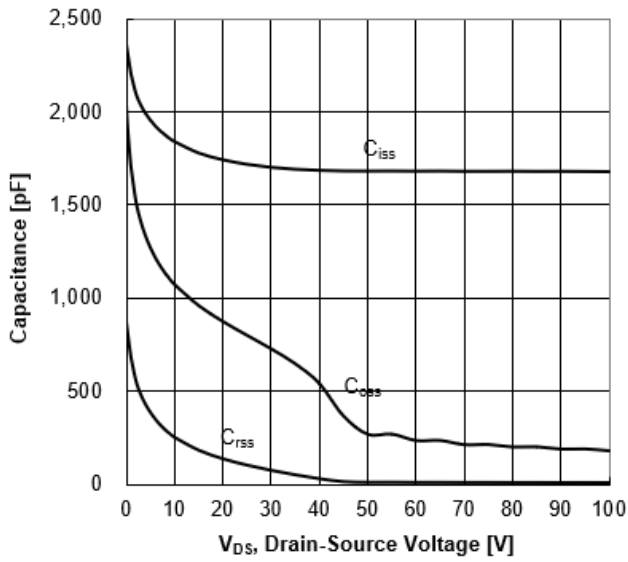
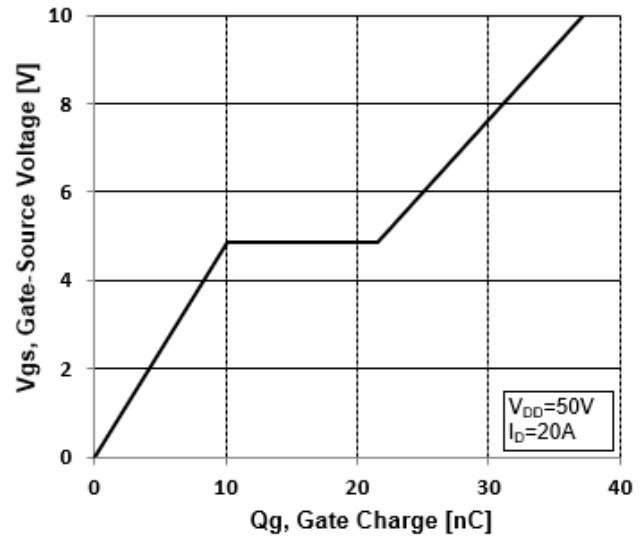
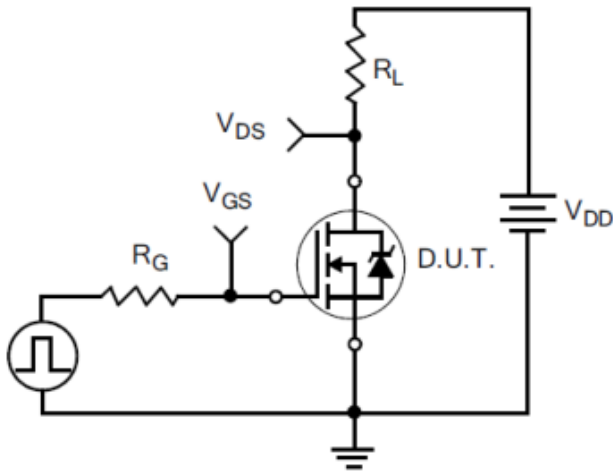


Figure 13. Typical Gate Charge vs Gate-Source Voltage

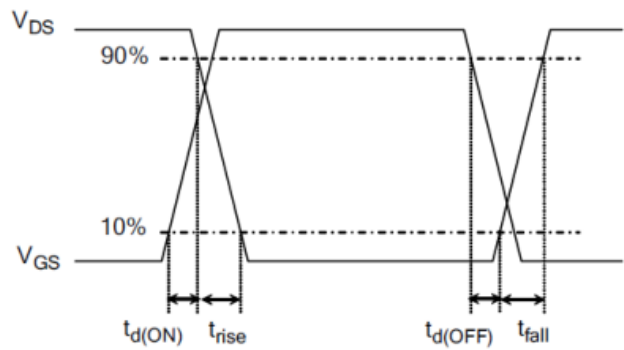


**6. Test Circuit and Waveform**

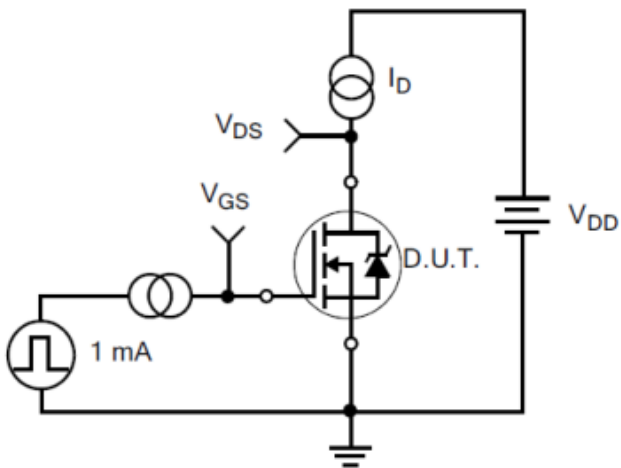
**Figure 14. Resistive Switching Test Circuit**



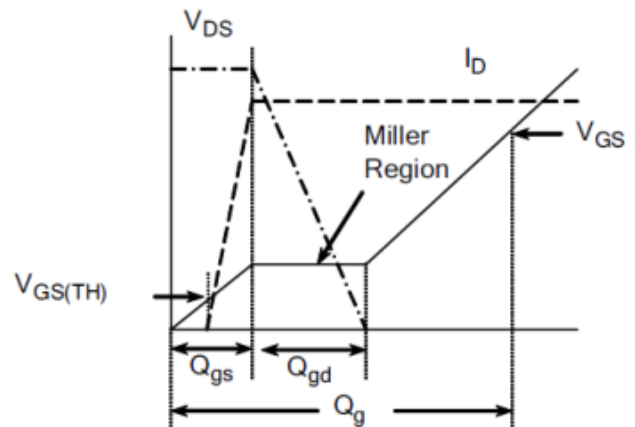
**Figure 15. Resistive Switching Waveforms**



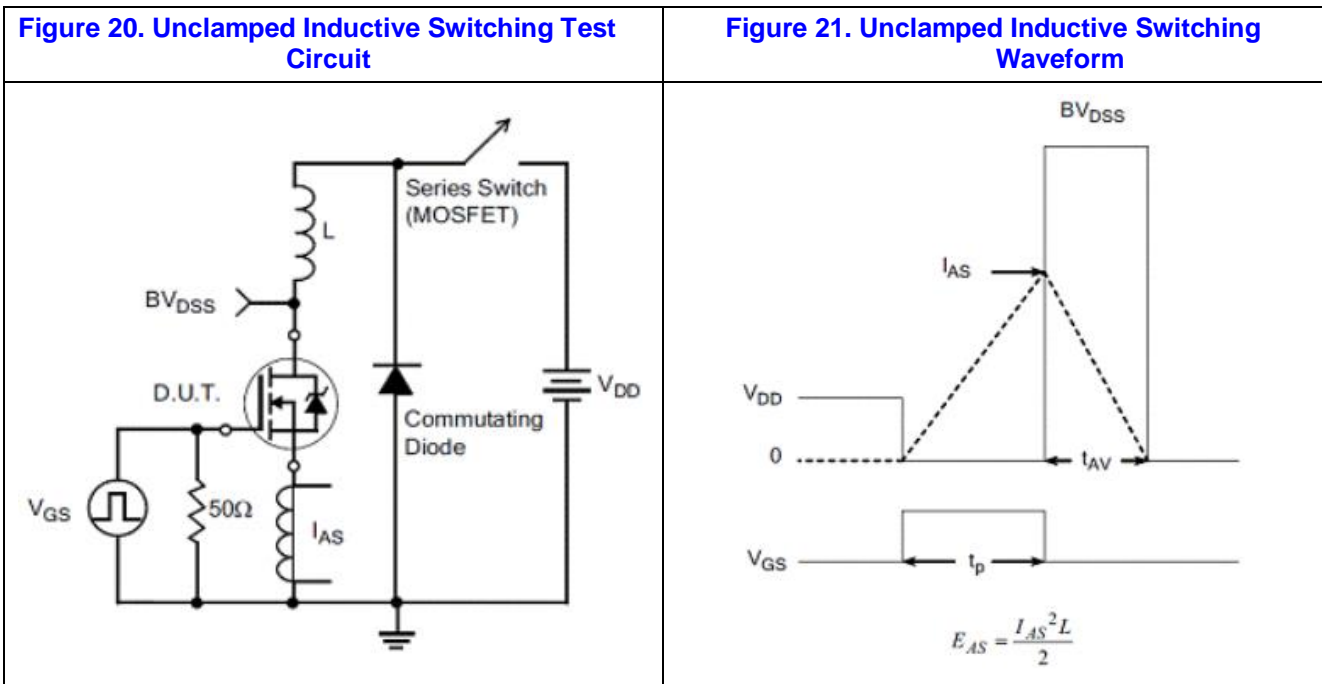
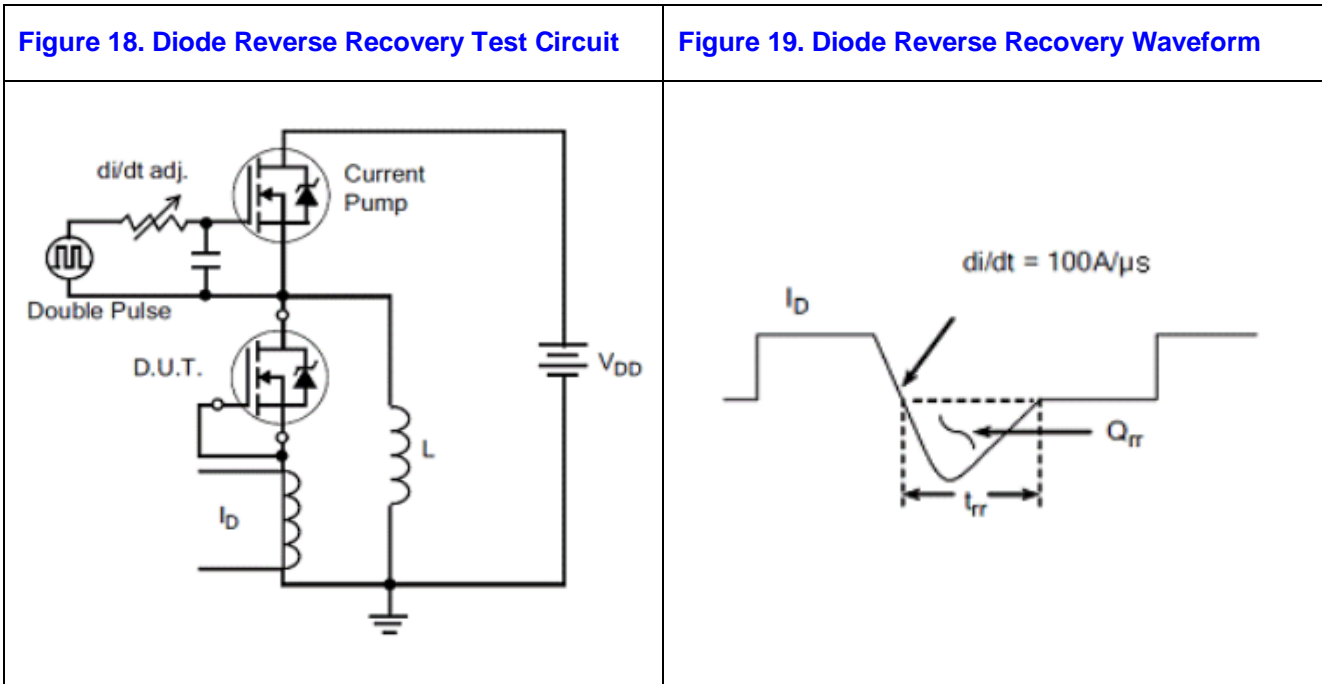
**Figure 16. Gate Charge Test Circuit**



**Figure 17. Gate Charge Waveforms**

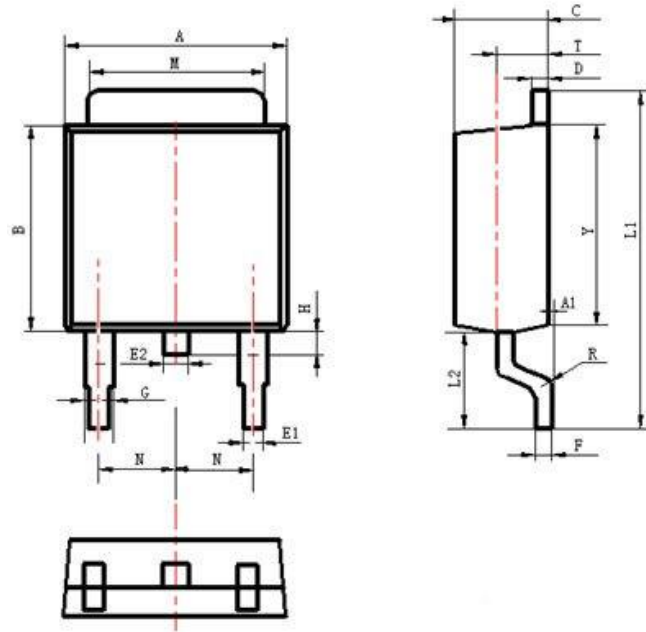






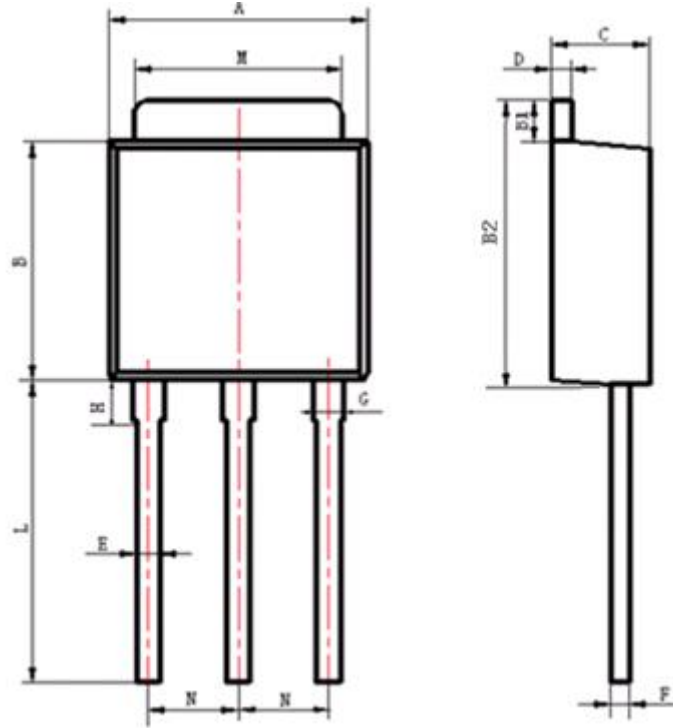
## 7. Package Description

TO-252



Items	Values(mm)	
	MIN	MAX
A	6.30	6.90
A1	0	0.13
B	5.70	6.30
C	2.10	2.50
D	0.30	0.60
E1	0.60	0.90
E2	0.70	1.00
F	0.30	0.60
G	0.70	1.20
L1	9.60	10.50
L2	2.70	3.10
H	0.60	1.00
M	5.10	5.50
N	2.09	2.49
R	0.3	0.3
T	1.40	1.60
Y	5.10	6.30

TO-251



Items	Values(mm)	
	MIN	MAX
A	6.30	6.90
B	5.70	6.30
B1	1.00	1.20
B2	6.80	7.40
C	2.10	2.50
D	0.30	0.60
E	0.50	0.70
F	0.30	0.60
G	0.70	1.00
H	1.60	2.40
L*	3.9	4.3
M	5.10	5.50
N	2.09	2.49

## NOTE:

1. Exceeding the maximum ratings of the device in performance may cause damage to the device, even the permanent failure, which may affect the dependability of the machine. Please do not exceed the absolute maximum ratings of the device when circuit designing.
2. When installing the heat sink, please pay attention to the torsional moment and the smoothness of the heat sink.
3. MOSFETs is the device which is sensitive to the static electricity, it is necessary to protect the device from being damaged by the static electricity when using it.
4. Shanghai Belling reserves the right to make changes in this specification sheet and is subject to change without prior notice.

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