

1. Description

BLP12N10GL, 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

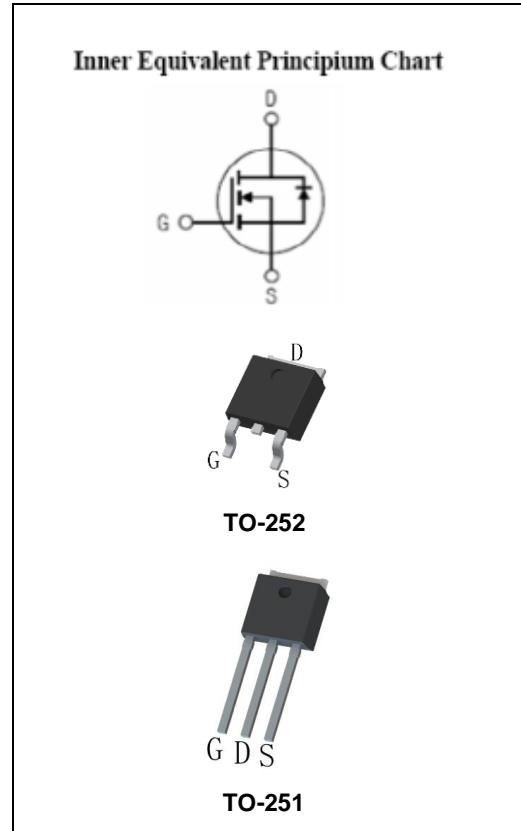
Parameter	Value	Unit
V _{DSS}	100	V
I _D	56	A
R _{DS(on).typ}	9.5	mΩ

FEATURES

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

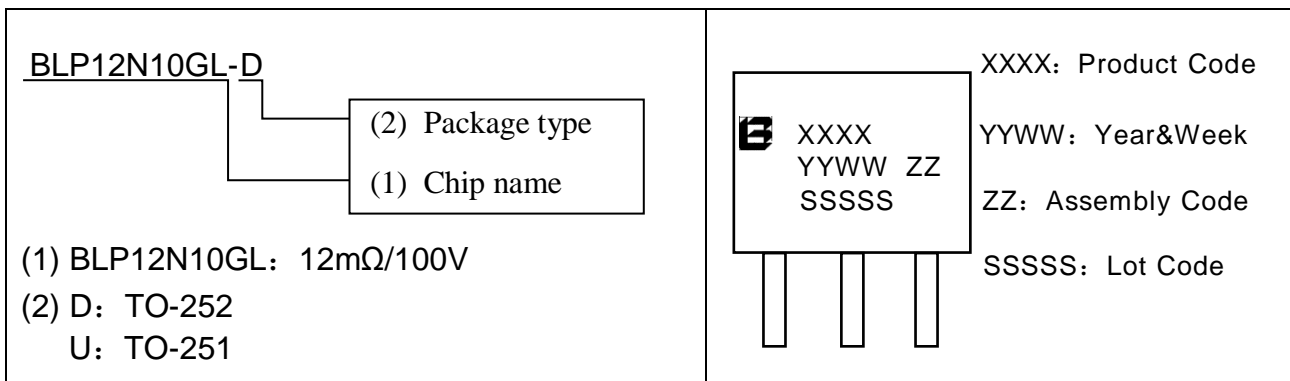
APPLICATIONS

- Synchronous rectifiers
- High speed switching applications



ORDERING INFORMATION

Ordering Codes	Package	Product Code	Packing
BLP12N10GL-D	TO-252	P12N10GL	Reel
BLP12N10GL-U	TO-251	P12N10GL	Tube



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	56	A
	Continuous Drain Current, Package Limited	60	A
	Continuous Drain Current @ $T_C=100^\circ\text{C}$, Silicon Limited	36	A
I_{DM} ^{Note1}	Pulsed Drain Current	224	A
V_{GS}	Gate-Source Voltage	± 20	V
E_{AS} ^{Note2}	Avalanche Energy	56.2	mJ
P_D	Power Dissipation	55.9	W
	Derating Factor above 25°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	μA
		$V_{DS}=80\text{V}, V_{GS}=0\text{V}$ @ $T_C=125^\circ\text{C}$	--	--	100	μA
$I_{GSS(F)}$	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	$V_{GS}=4.5V, I_D=20A$		13	15	$m\Omega$
		$V_{GS}=10V, I_D=20A$	--	9.5	12	$m\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	1	1.8	2.5	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	$V_{DS}=50V,$ $V_{GS}=0,$ $f=1MHz$	--	2158	--	pF
C_{oss}	Output Capacitance		--	274	--	
C_{rss}	Reverse Transfer Capacitance		--	11	--	
Q_g	Total Gate Charge	$V_{DD}=50V,$ $I_D=20A,$ $V_{GS}=10V$	--	49	--	nC
Q_{gs}	Gate-Source charge		--	8.2	--	
Q_{gd}	Gate-Drain charge		--	13	--	

Switching Characteristics

Symbol	Parameter	Test Conditions	Values			Units
			Min	Typ	Max	
$t_{d(on)}$	Turn-On Delay Time	$V_{DD}=50V,$ $I_D=10A,$ $V_{GS}=10V,$ $R_G=5\Omega,$ 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		--	--	56	A
I_{SM}	Maximum Pulsed Current		--	--	224	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

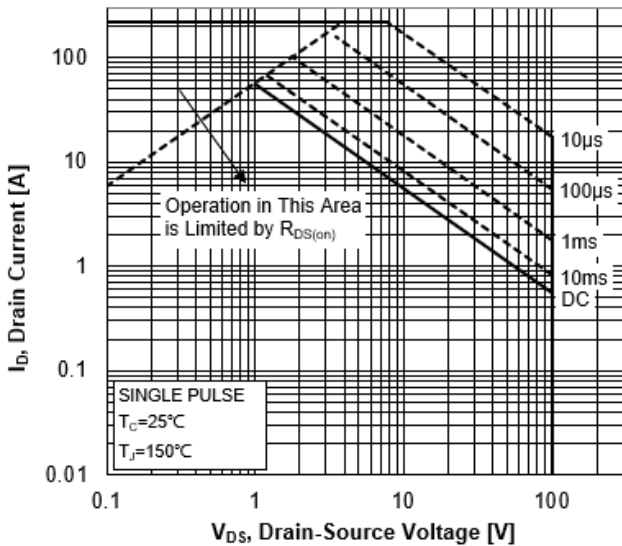


Figure 2. Maximum Power Dissipation vs Case Temperature

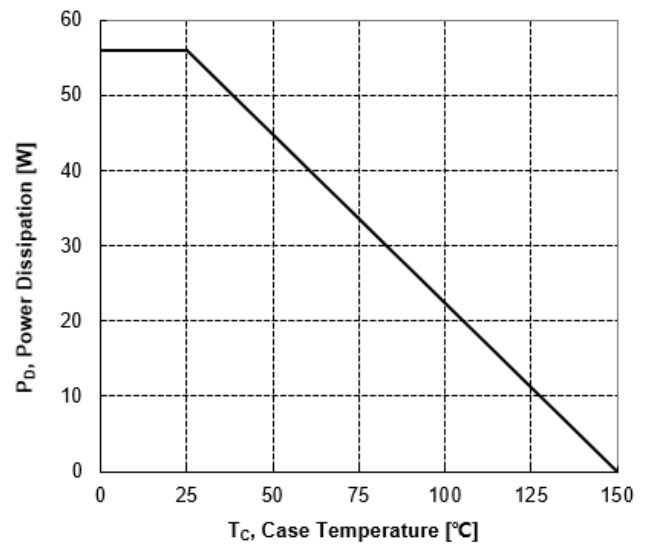


Figure 3. Maximum Continuous Drain Current vs Case Temperature

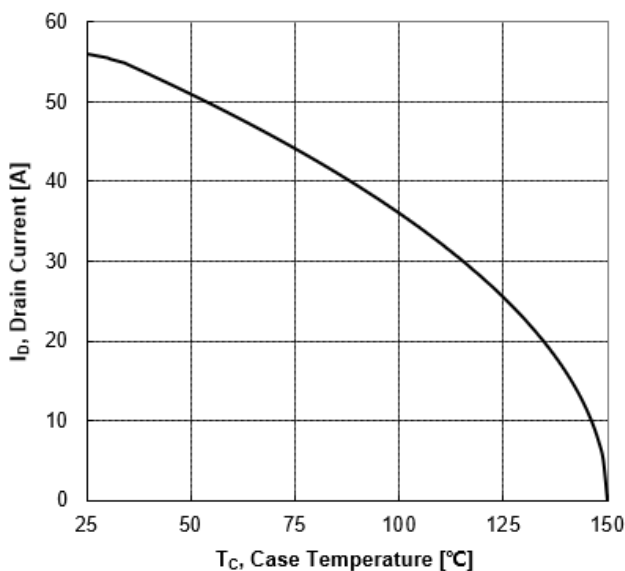


Figure 4. Typical Output Characteristics

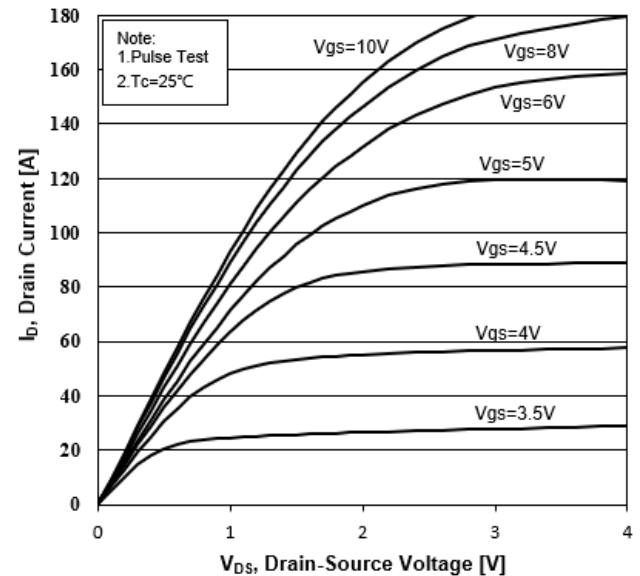


Figure 5. Transient Thermal Impedance

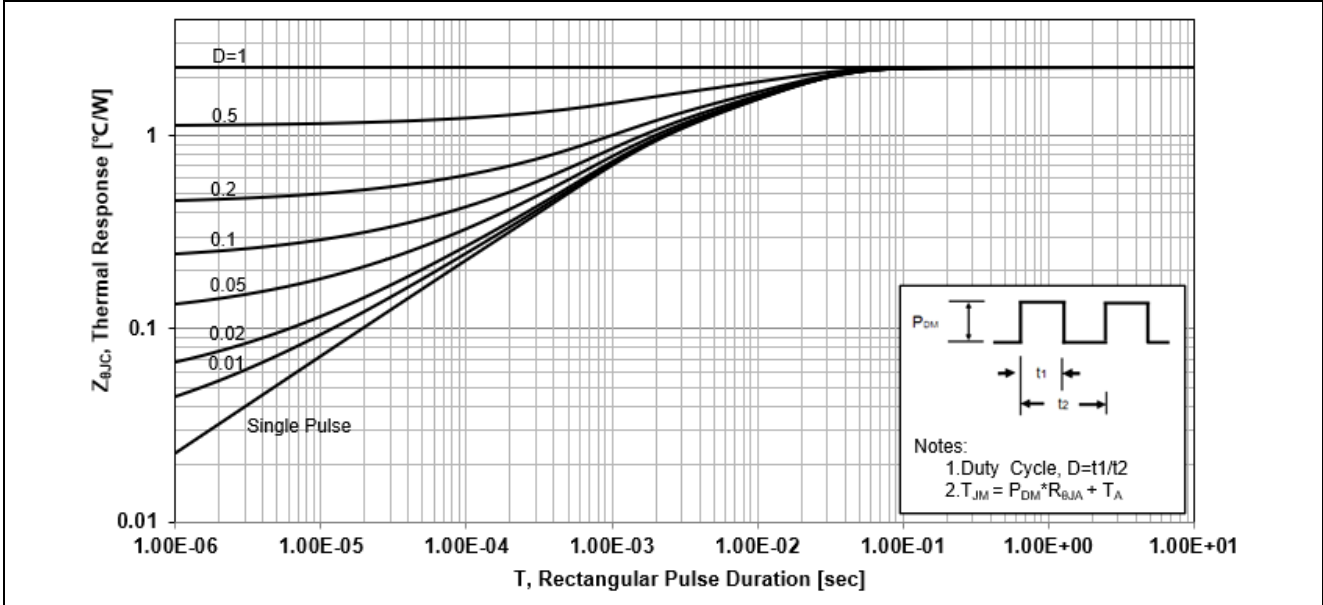


Figure 6. Typical Transfer Characteristics

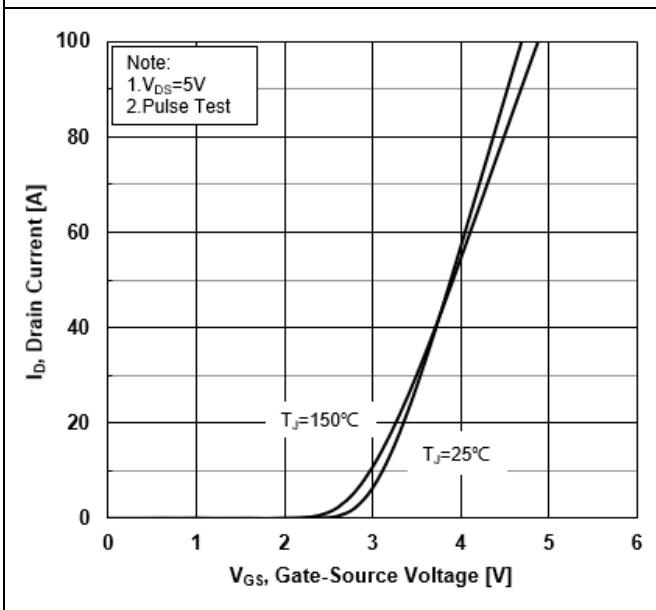


Figure 7. Source-Drain Diode Forward Characteristics

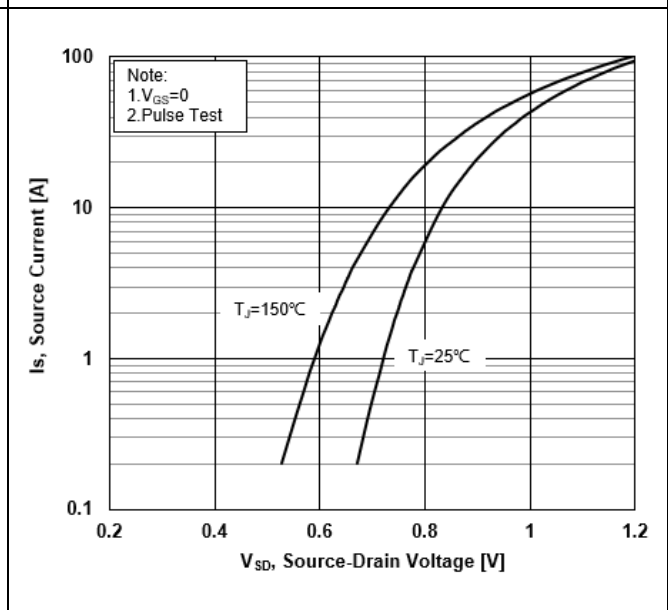


Figure 8. Drain-Source On-Resistance vs Drain Current

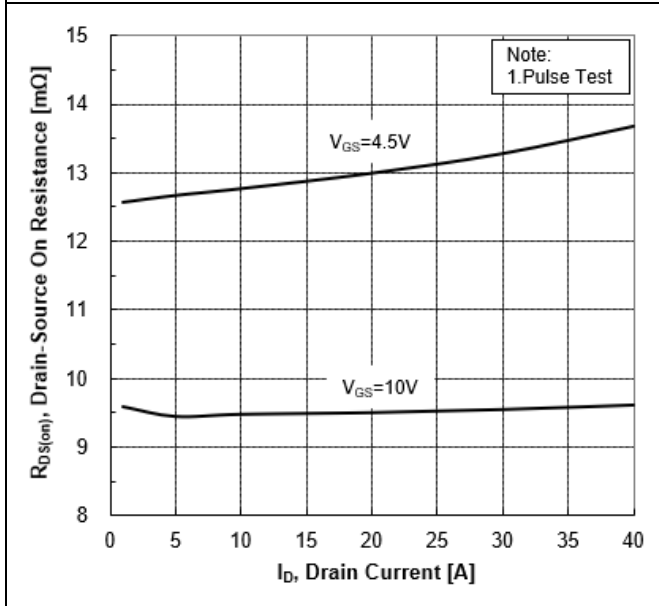


Figure 9. Normalized On-Resistance vs Junction Temperature

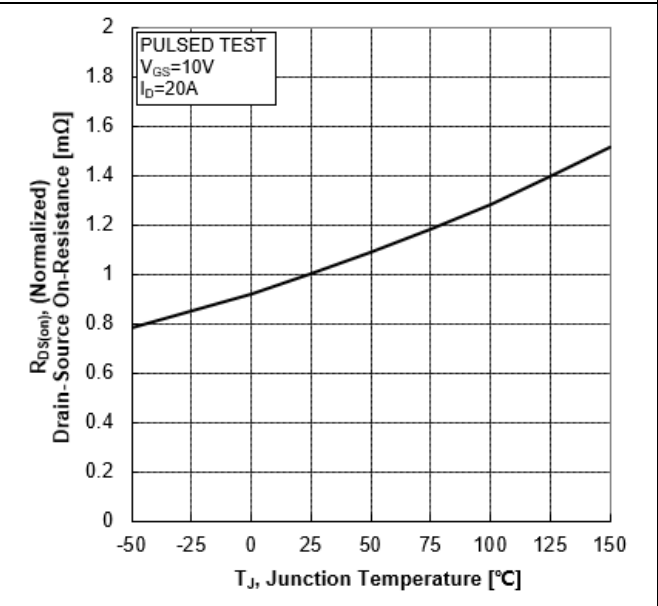


Figure 10. Normalized Threshold Voltage vs Junction Temperature

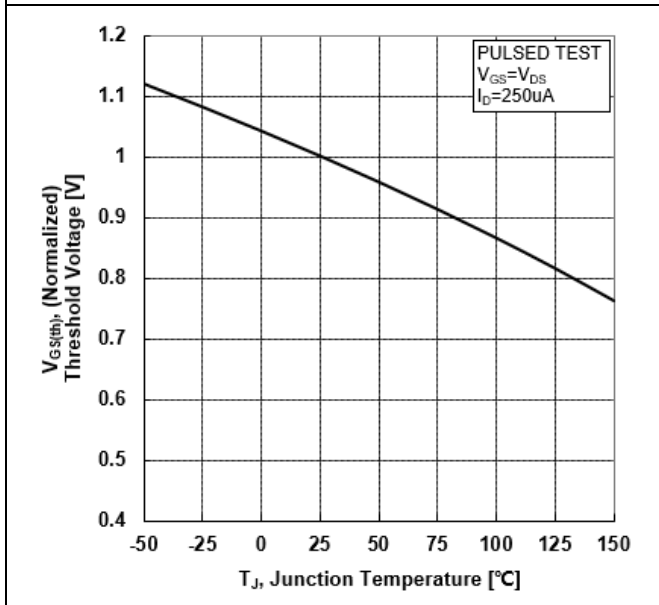


Figure 11. Normalized Breakdown Voltage vs Junction Temperature

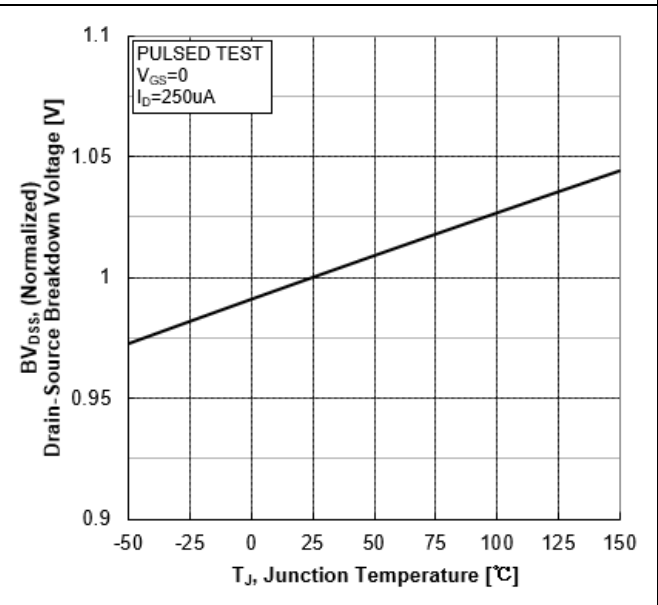


Figure 12. Capacitance Characteristics

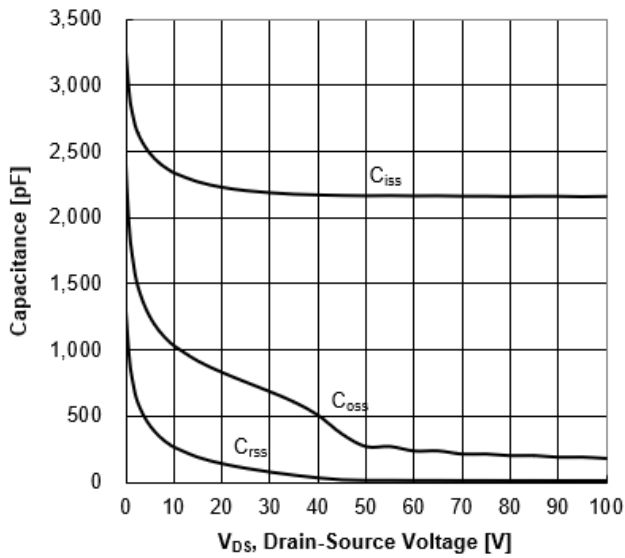
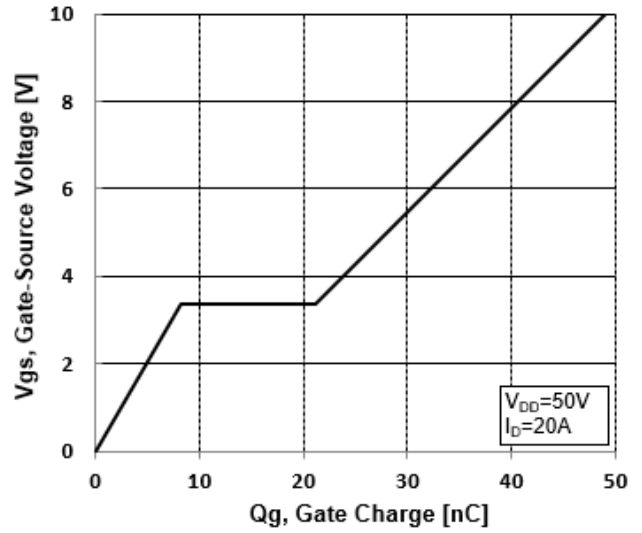


Figure 13. Typical Gate Charge vs Gate-Source Voltage



6. Test Circuit and Waveform

Figure 14. Resistive Switching Test Circuit

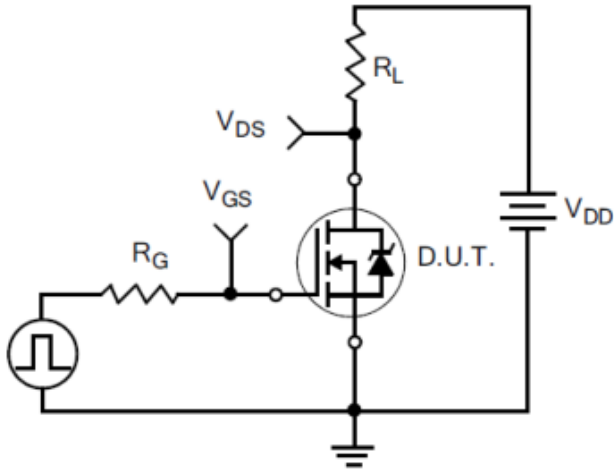


Figure 15. Resistive Switching Waveforms



Figure 16. Gate Charge Test Circuit

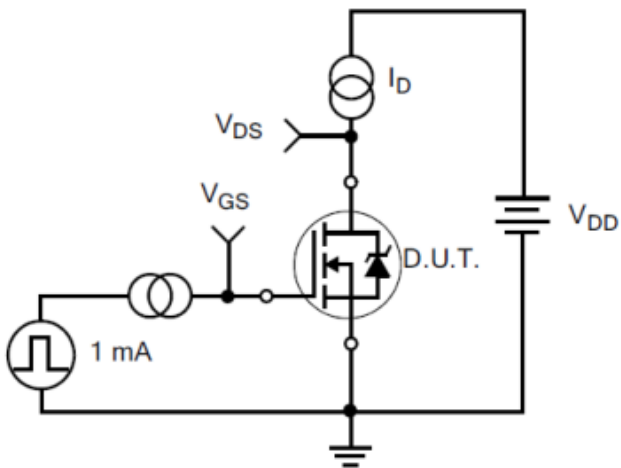


Figure 17. Gate Charge Waveforms

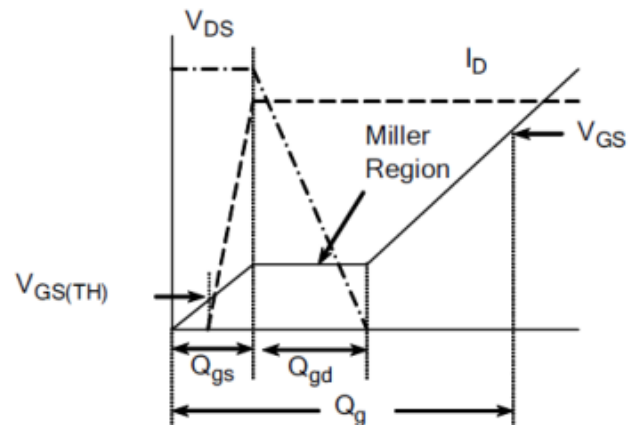


Figure 18. Diode Reverse Recovery Test Circuit

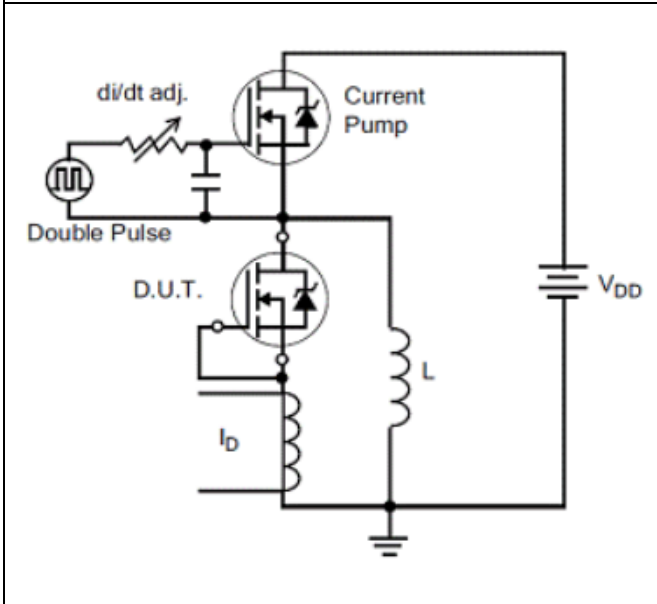


Figure 19. Diode Reverse Recovery Waveform

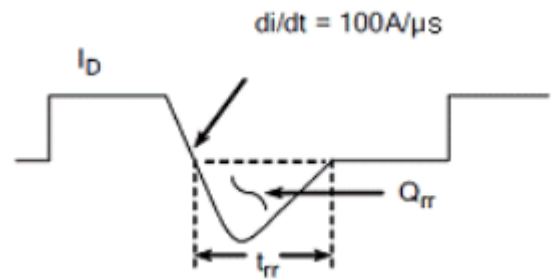


Figure 20. Unclamped Inductive Switching Test Circuit

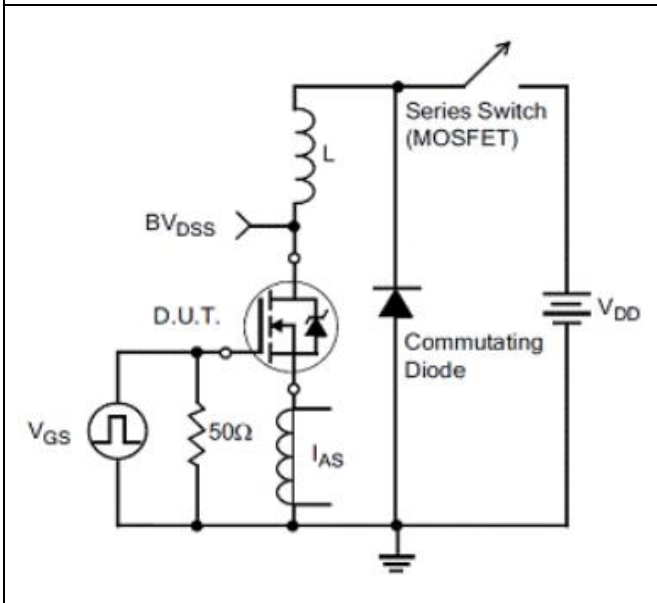
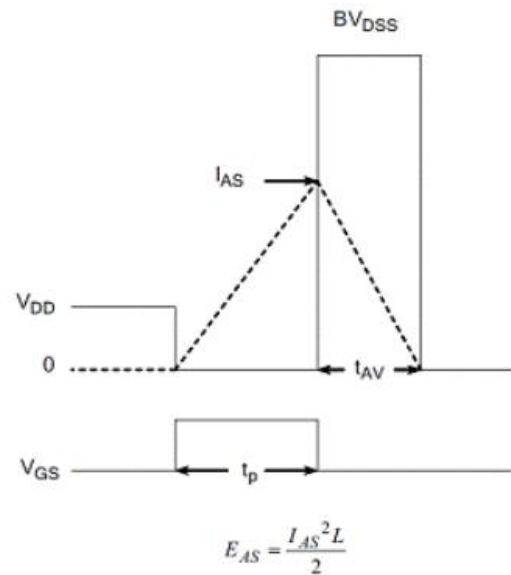
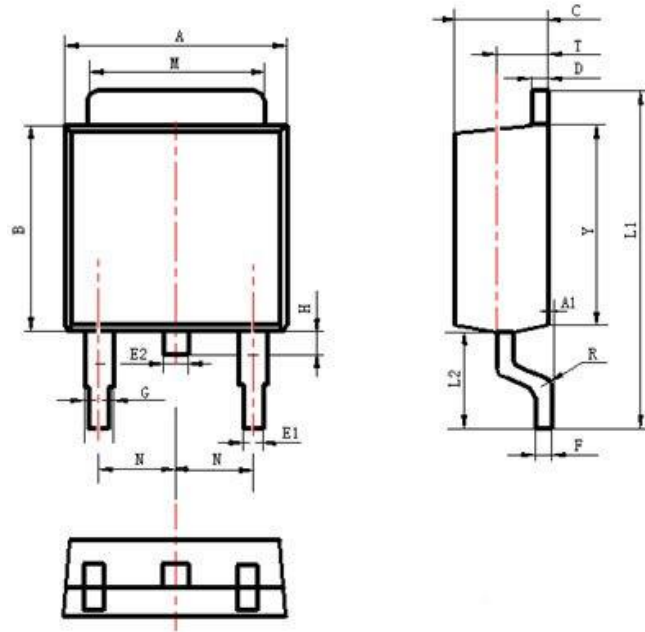


Figure 21. Unclamped Inductive Switching Waveform



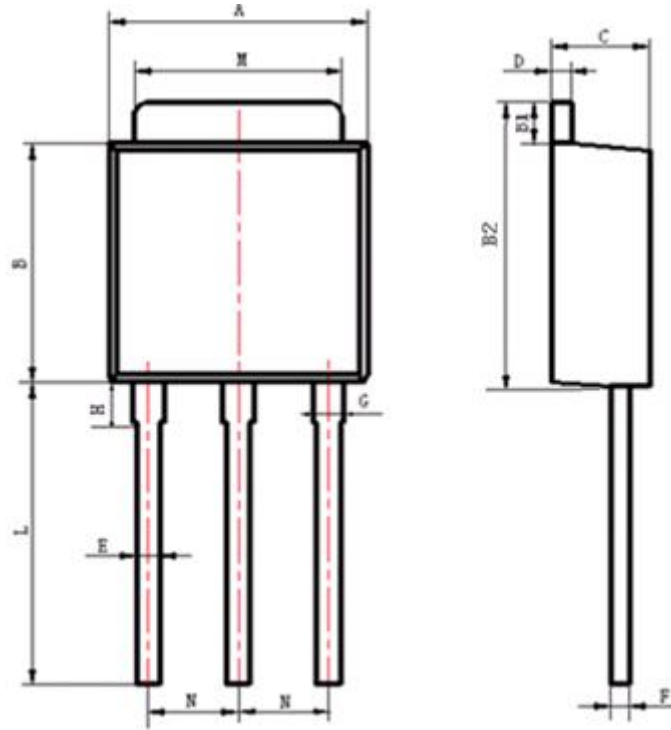
7. Package Description

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

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