

60V N-Channel Power MOSFET

DESCRIPTION

The BLM04N06 uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge. It can be used in a wide variety of applications.

Application

- Power switching application
- Hard switched and High frequency circuits
- Uninterruptible power supply

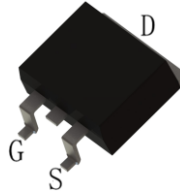
KEY CHARACTERISTICS

- $V_{DS} = 60V, I_D = 150A$
 $R_{DS(ON)} < 4.2m\Omega @ V_{GS}=10V$
- High density cell design for lower R_{dson}
- Fully characterized avalanche voltage and current
- Good stability and uniformity with high EAS
- Excellent package for good heat dissipation

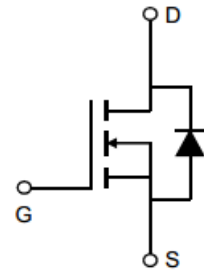
100% UIS TESTED!
100% DVDS TESTED!



TO-220 Top View



TO-263 Top View



Schematic diagram

Package Marking And Ordering Information

Device Marking	Ordering Codes	Package	Product Code	Packing
M04N06	BLM04N06-P	TO-220	BLM04N06	Tube
M04N06	BLM04N06-B	TO-263	BLM04N06	Reel

Absolute Maximum Ratings ($T_A=25^\circ C$ unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	60	V
Gate-Source Voltage	V_{GS}	± 20	V
Drain Current-Continuous	I_D	150	A
Drain Current-Pulsed (Note 1)	I_{DM}	600	A
Maximum Power Dissipation ($T_C=25^\circ C$)	P_D	210	W
Single pulse avalanche energy (Note 2)	E_{AS}	1000	mJ
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 175	$^\circ C$

Thermal Characteristic

Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	0.7	$^\circ C/W$
--------------------------------------	-----------------	-----	--------------

Electrical Characteristics (TA=25°C unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	60	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=60V, V_{GS}=0V$	-	-	1	μA
Gate-Body Leakage Current	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	± 100	nA
On Characteristics						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	2	3	4	V
Drain-Source On-State Resistance ^(Note 3)	$R_{DS(ON)}$	$V_{GS}=10V, I_D=50A$	-	3.5	4.2	m Ω
Forward Transconductance	g_{FS}	$V_{DS}=50V, I_D=75A$	-	180	-	S
Dynamic Characteristics						
Input Capacitance	C_{iss}	$V_{DS}=25V, V_{GS}=0V,$ $f=1.0MHz$	-	8200	-	pF
Output Capacitance	C_{oss}		-	760	-	pF
Reverse Transfer Capacitance	C_{riss}		-	680	-	pF
Switching Characteristics ^(Note 4)						
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=30V, I_D=40A,$ $V_{GS}=10V, R_{GEN}=3\Omega$	-	27	-	nS
Turn-on Rise Time	t_r		-	25	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	90	-	nS
Turn-Off Fall Time	t_f		-	40	-	nS
Total Gate Charge	Q_g	$V_{DS}=60V, I_D=40A$ $V_{GS}=10V$	-	186	-	nC
Gate-Source Charge	Q_{gs}		-	46	-	nC
Gate-Drain Charge	Q_{gd}		-	70	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage	V_{SD}	$V_{GS}=0V, I_S=150A$	-	-	1.2	V

Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. EAS condition : $T_j=25^\circ C, V_{DD}=50V, V_G=10V, L=0.5mH, R_g=25\Omega$
3. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$.
4. Guaranteed by design, not subject to production.

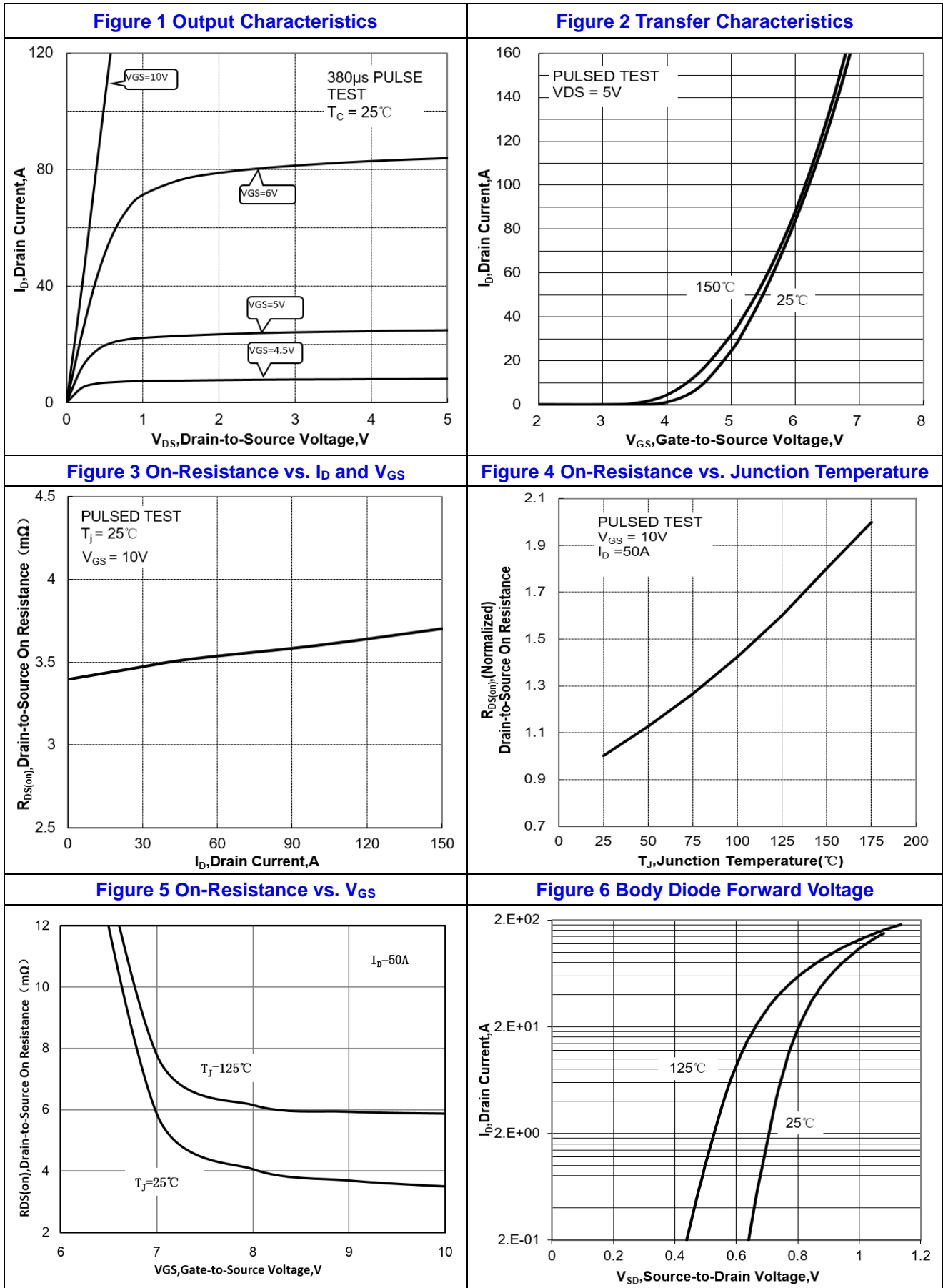
Characteristics Curves


Figure 7 Gate-Charge Characteristics

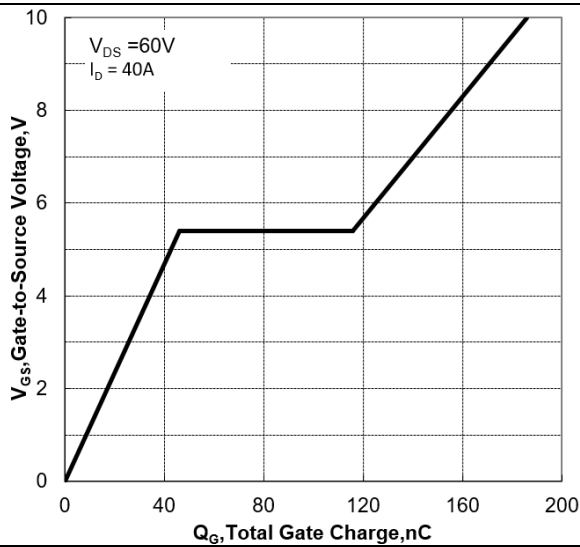


Figure 8 Capacitance Characteristics

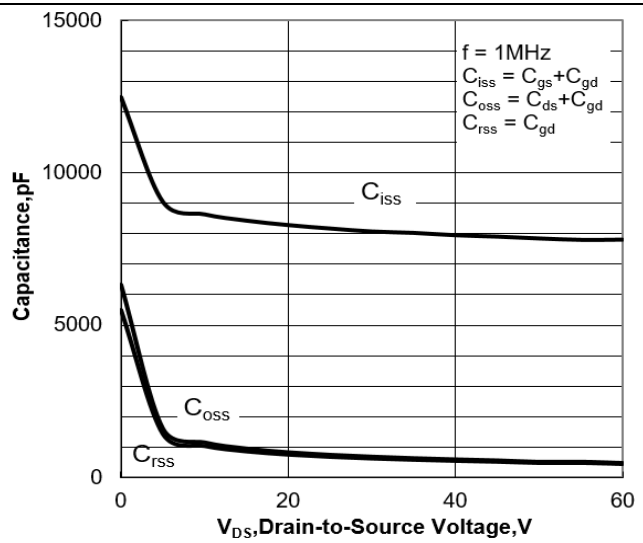


Figure 9 Maximum Forward Biased Safe Operation Area

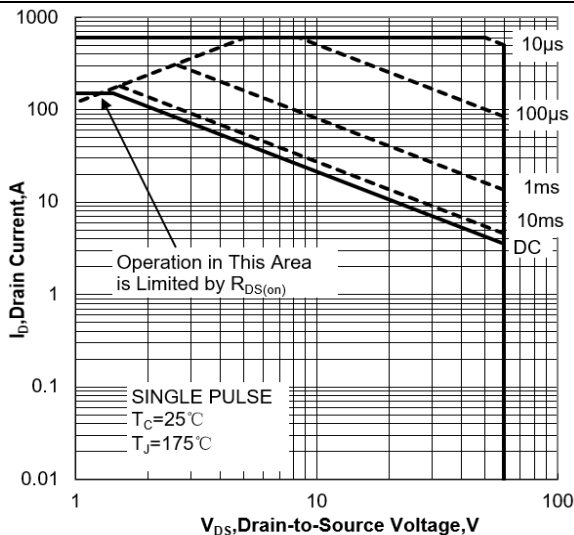


Figure 10 Single Pulse Power Rating Junction-to-Ambient

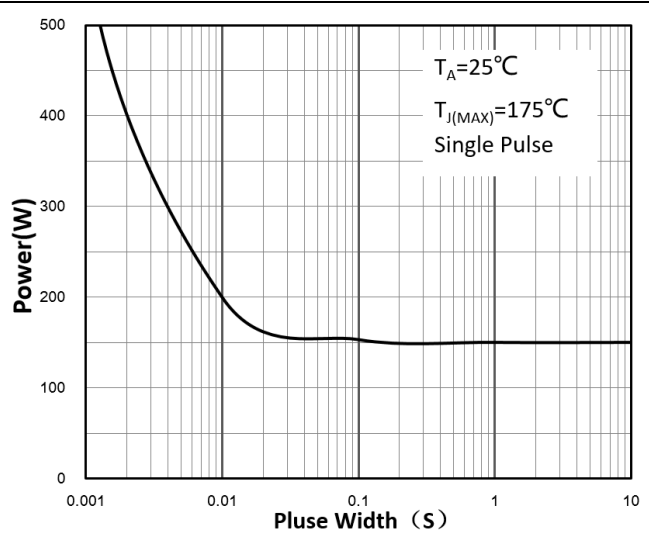
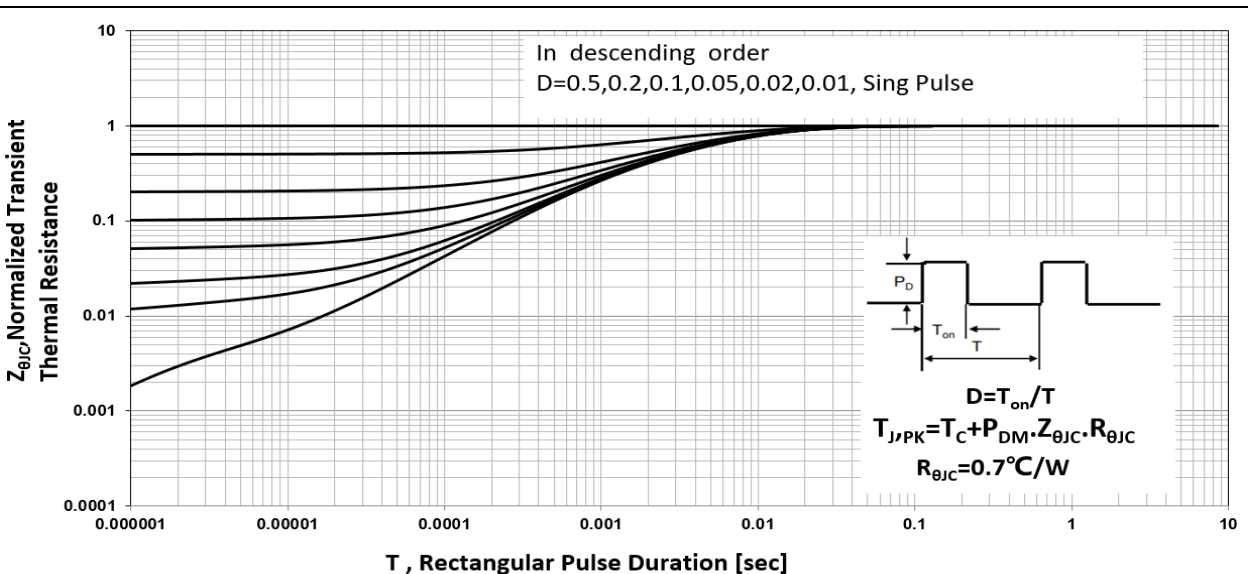
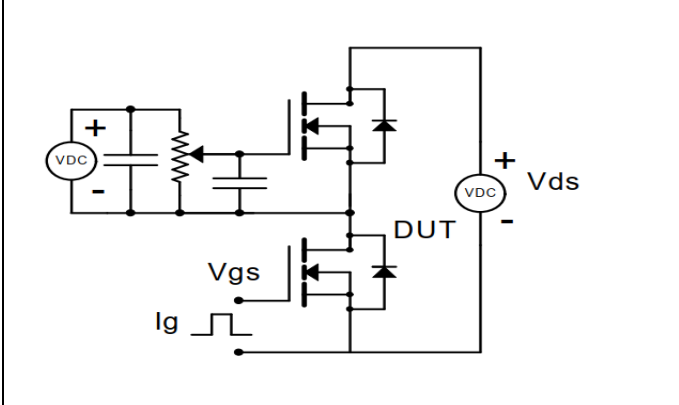
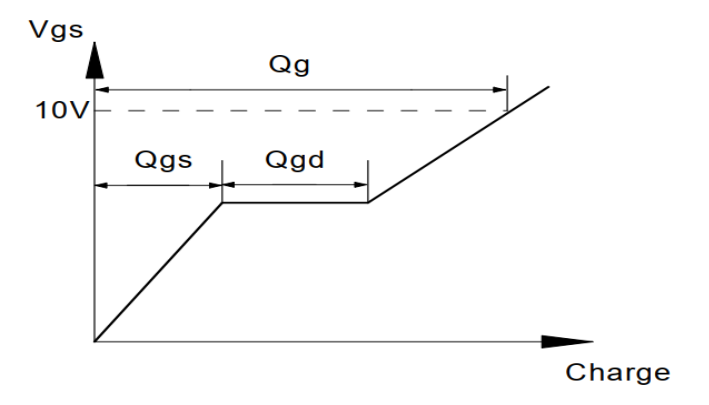
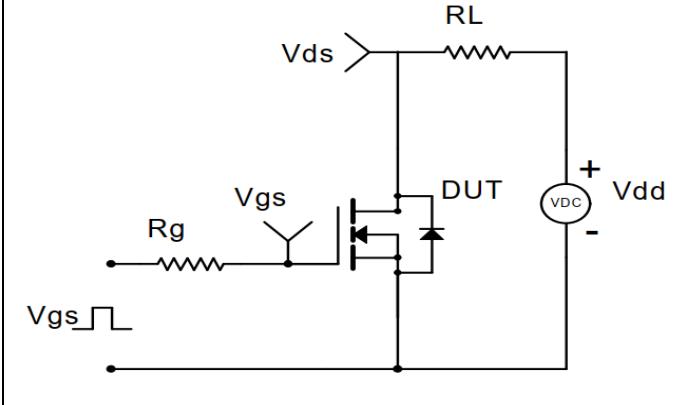
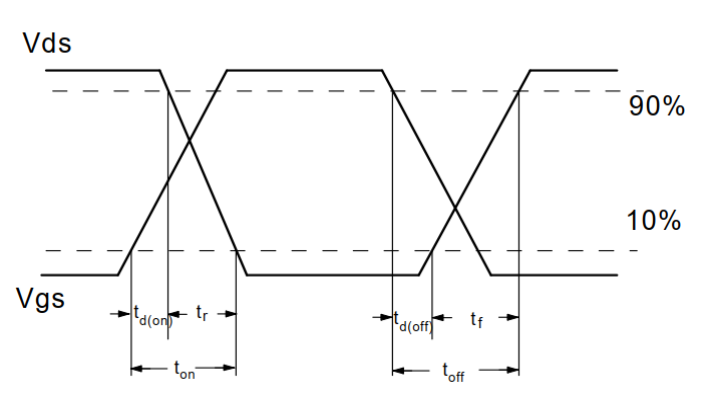
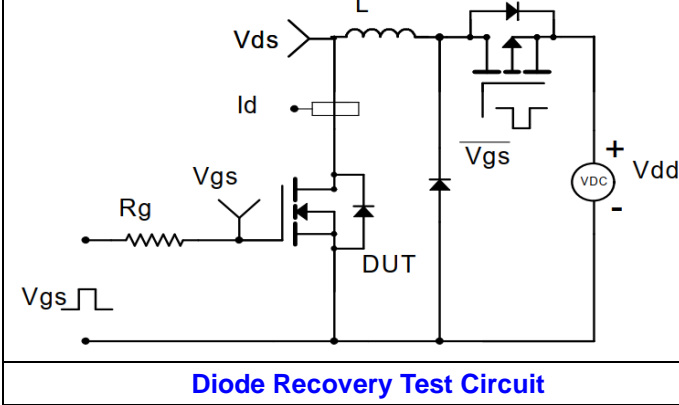
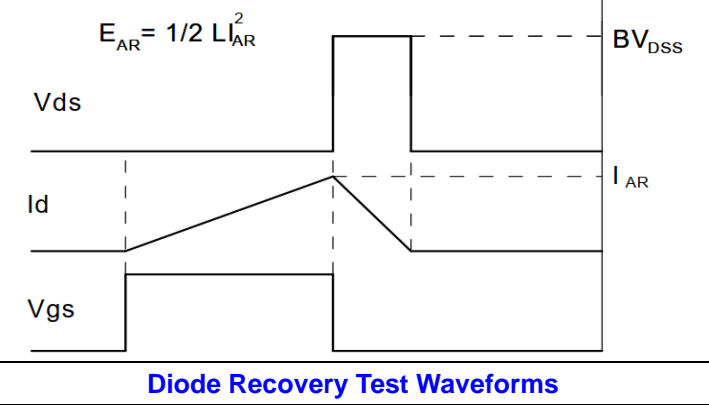
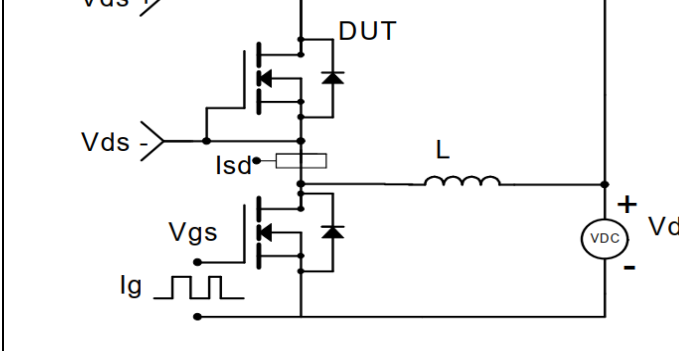
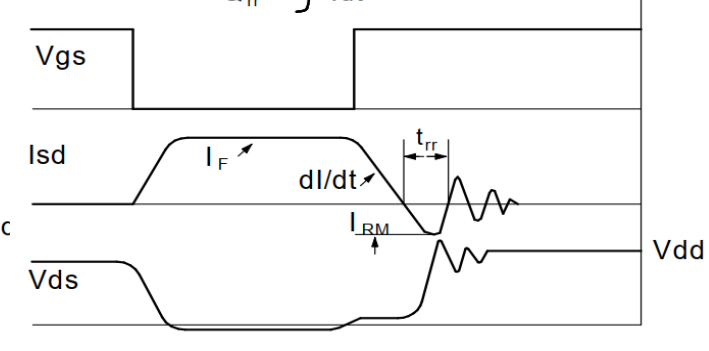
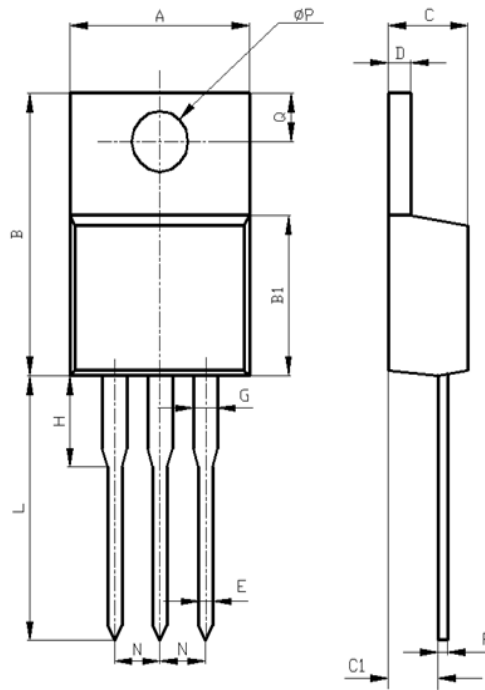


Figure 11 Normalized Maximum Transient Thermal Impedance



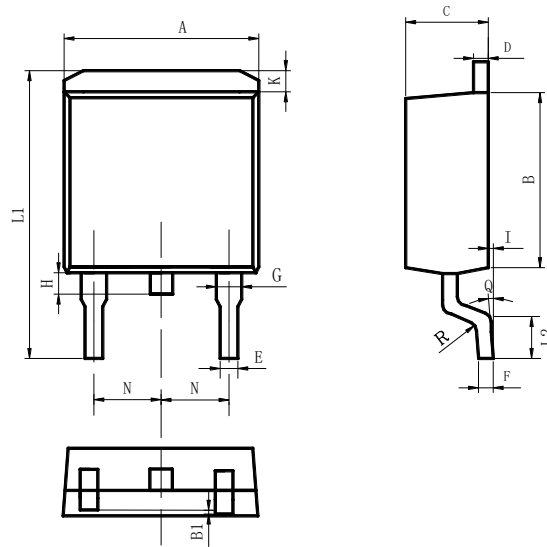
Test Circuit and Waveform

Gate Charge Test Circuit	Gate Charge Test Waveform
 <p>The diagram shows a MOSFET circuit for gate charge testing. A DC voltage source (VDC) is connected to the drain through a resistor. The gate is driven by a pulse source (Ig) through a resistor. The MOSFET is connected to a load (DUT) and a diode. The drain voltage (Vds) is measured across the load.</p>	 <p>The waveform shows the gate voltage (Vgs) over time. The total gate charge (Qg) is the area under the Vgs curve. It is divided into gate-to-source charge (Qgs) and gate-to-drain charge (Qgd). The Vgs level is indicated as 10V. The x-axis is labeled 'Charge'.</p>
Resistive Switching Test Circuit	Resistive Switching Test Waveforms
 <p>The diagram shows a MOSFET switching a resistive load (RL). A DC voltage source (VDC) is connected to the drain through RL. The gate is driven by a pulse source (Vgs) through a resistor (Rg). The drain voltage (Vds) is measured across RL.</p>	 <p>The waveforms show Vds and Vgs during switching. Vds transitions from 0V to 90% of Vdd during turn-on and from 90% of Vdd to 0V during turn-off. Vgs transitions from 0V to Vgs during turn-on and from Vgs to 0V during turn-off. Key timing parameters are labeled: td(on), tr, ton, td(off), tff, toff.</p>
Unclamped Inductive Switching (UIS) Test Circuit	Unclamped Inductive Switching (UIS) Test Waveforms
 <p>The diagram shows a MOSFET switching an inductive load (L). A DC voltage source (VDC) is connected to the drain through L. The gate is driven by a pulse source (Vgs) through a resistor (Rg). The drain current (Id) is measured.</p>	 <p>The waveforms show Vds, Id, and Vgs during UIS. Vds rises to a peak value during turn-off. The energy stored in the inductor is given by $E_{AR} = 1/2 L I_{AR}^2$. The peak drain voltage is labeled BV_{DSS} and the peak drain current is I_{AR}.</p>
Diode Recovery Test Circuit	Diode Recovery Test Waveforms
 <p>The diagram shows a MOSFET switching an inductive load (L) with a diode in parallel. A DC voltage source (VDC) is connected to the drain through L. The gate is driven by a pulse source (Ig) through a resistor. The drain current (Isd) is measured.</p>	 <p>The waveforms show Vgs, Isd, and Vds during diode recovery. The reverse recovery time (trr) is the time from the start of reverse current to the end of reverse current. The peak reverse current is I_{RM}. The formula for reverse recovery charge is $Q_{rr} = -\int Idt$.</p>

Package Description


Items	Values(mm)	
	MIN	MAX
A	9.60	10.6
B	15.0	16.0
B1	8.90	9.50
C	4.30	4.80
C1	2.30	3.10
D	1.20	1.40
E	0.70	0.90
F	0.30	0.60
G	1.17	1.37
H	2.70	3.80
L	12.6	14.8
N	2.34	2.74
Q	2.40	3.00
ϕP	3.50	3.90

TO-220 Package



Items	Values(mm)	
	MIN	MAX
A	9.80	10.40
B	8.90	9.50
B1	0	0.10
C	4.40	4.80
D	1.16	1.37
E	0.70	0.95
F	0.30	0.60
G	1.07	1.47
H	1.30	1.80
K	0.95	1.37
L1	14.50	16.50
L2	1.60	2.30
I	0	0.2
Q	0°	8°
R	0.4	
N	2.39	2.69

TO-263 Package

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.

CONTACT:

上海贝岭股份有限公司 (总部)

地址: 上海市宜山路 810 号

邮编: 200233

电话: 021-24261000

产品业务咨询及技术支持

电话: 021-24261326

传真 2: 021-64852222

邮箱 2: marketing@belling.com.cn

上海贝岭深圳分公司 (华南区)

地址: 深圳市福田区中心区民田路新华保险大厦 1510 室

邮编: 518031

电话: 0755-33336776 0755-33336770

传真: 0755-33336788

上海贝岭北京办事处 (华北区)

地址: 北京市西城区新华里 16 号院锦官苑小区 10 号楼 1 单元 1505 室

邮编: 100044

电话: 010-64179374

传真: 010-8835 9236