

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

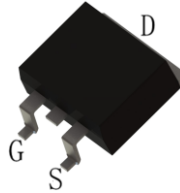
KEY CHARACTERISTICS

- $V_{DS} = 60V, I_D = 150A$
 $R_{DS(ON)} < 4.2m\Omega @ V_{GS}=10V$
- 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

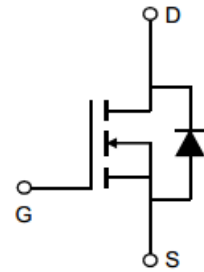
100% UIS TESTED!
100% DVDS TESTED!



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	$^\circ C/W$
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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.

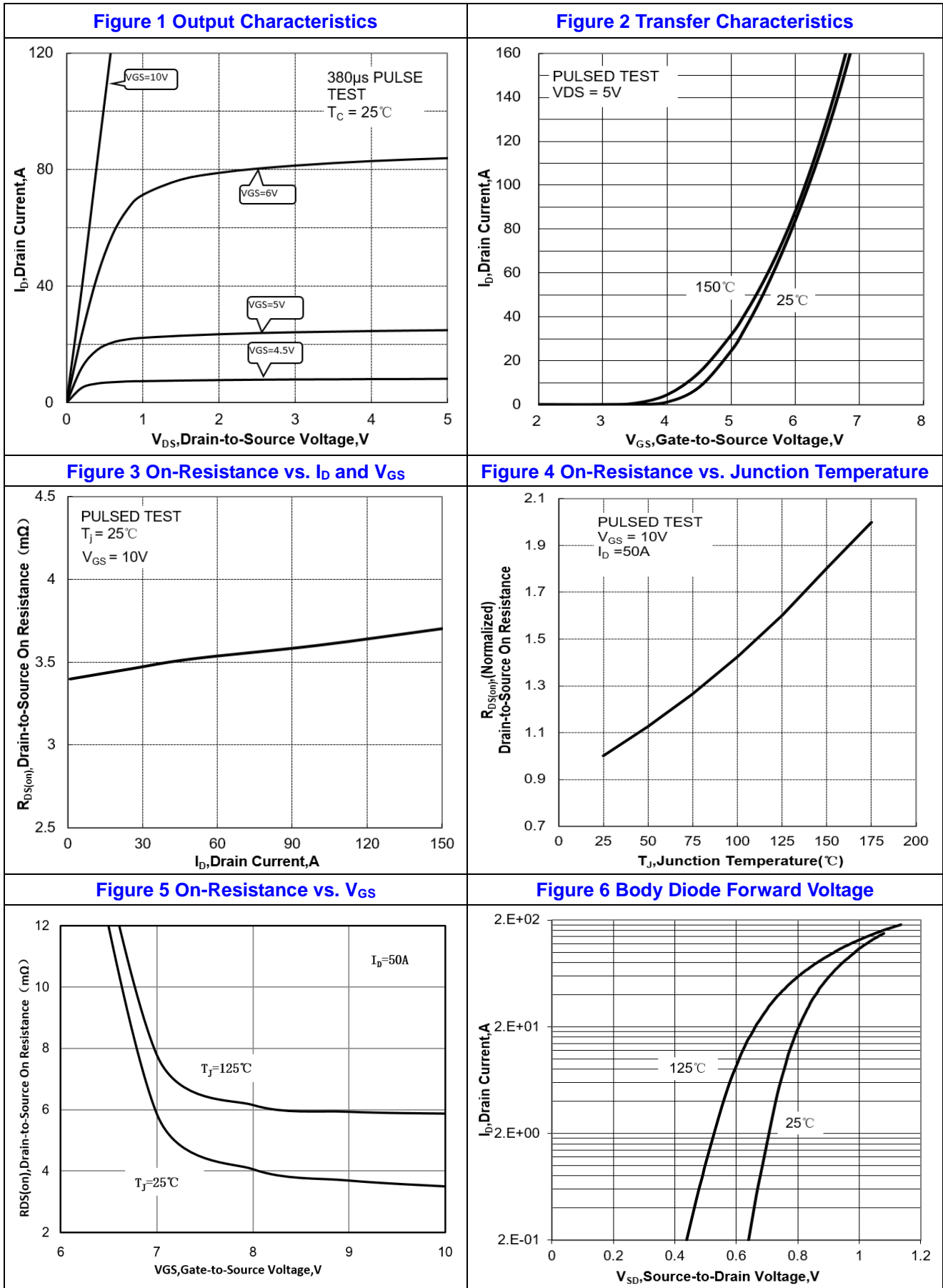
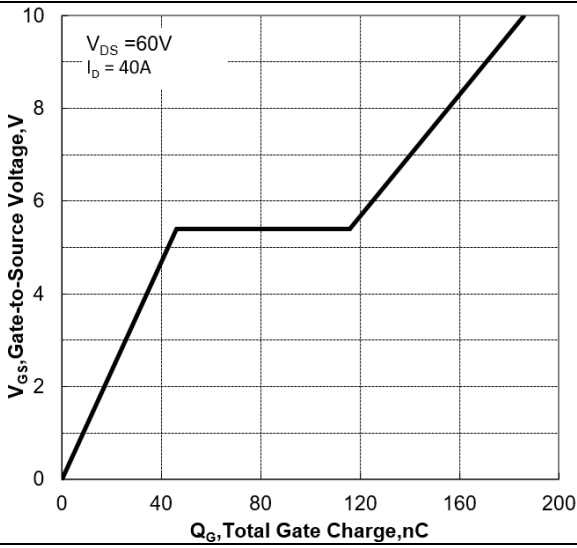
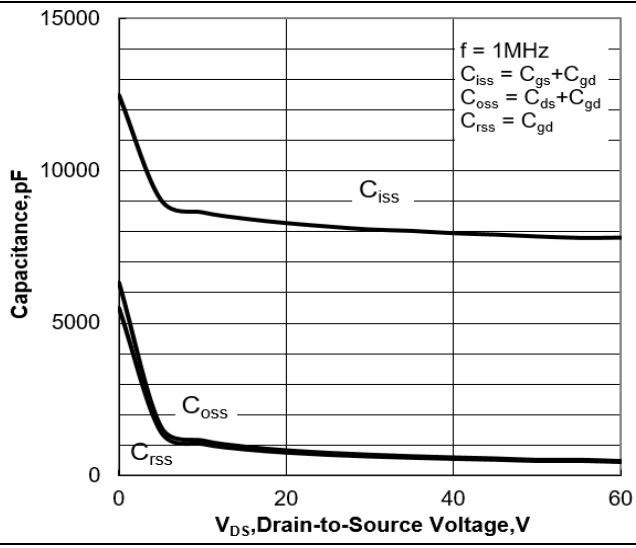
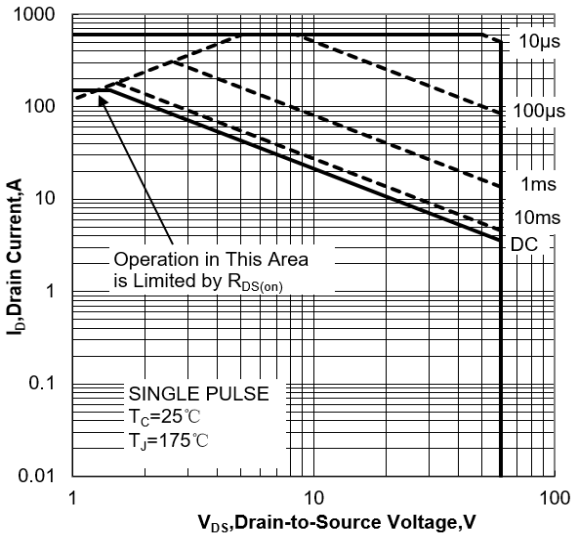
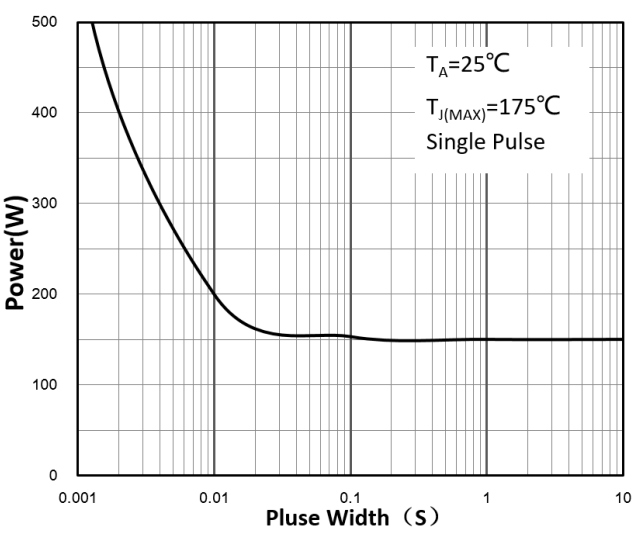
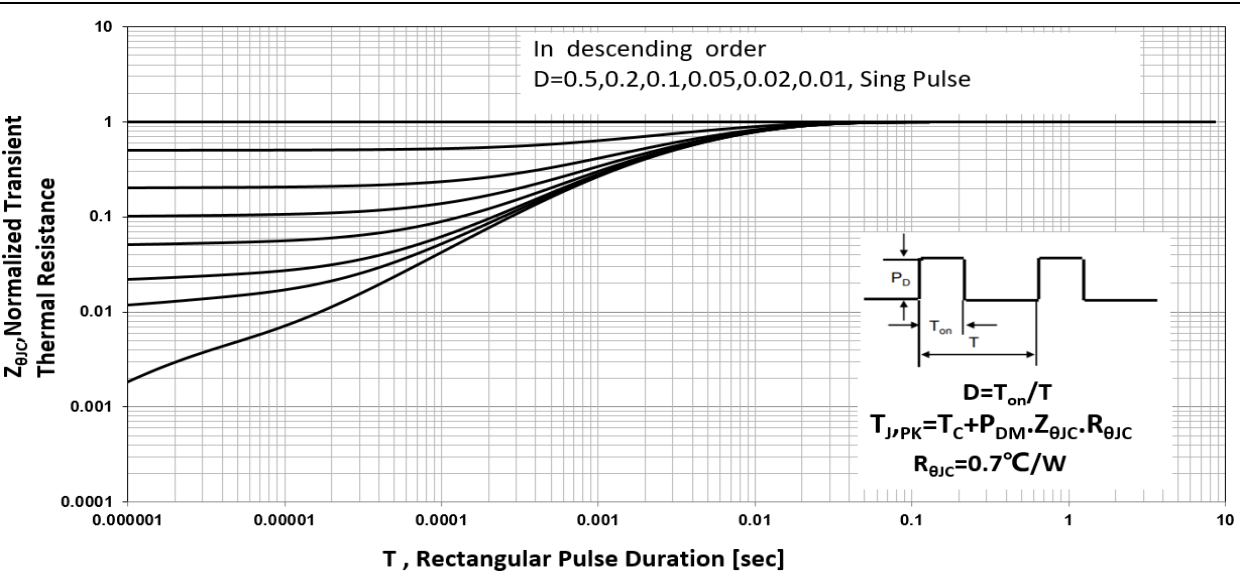
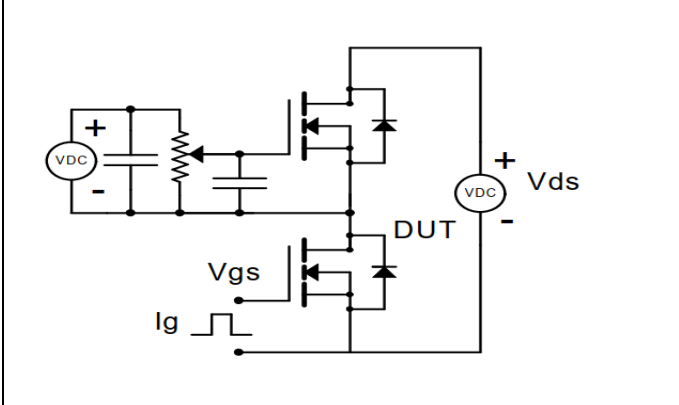
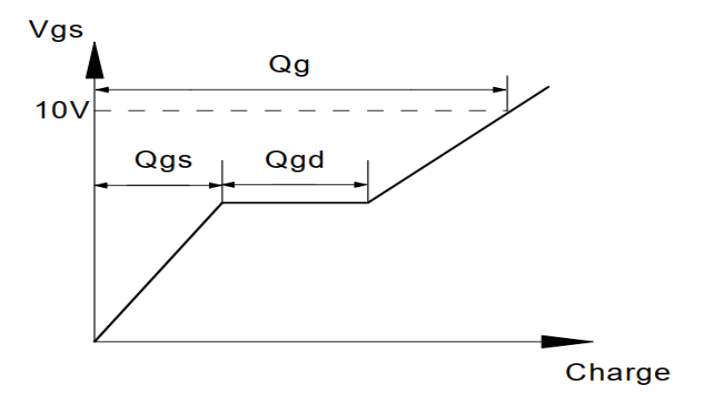
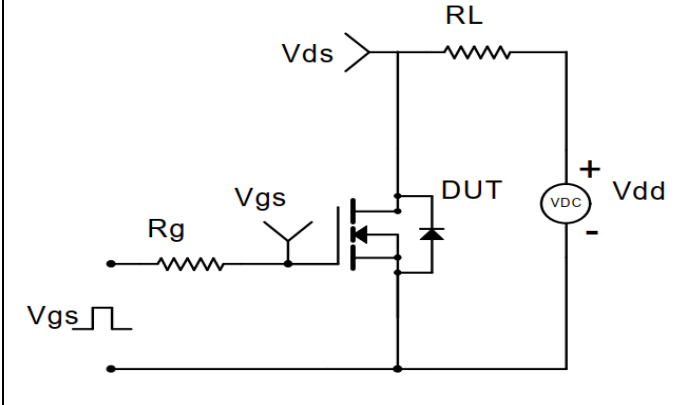
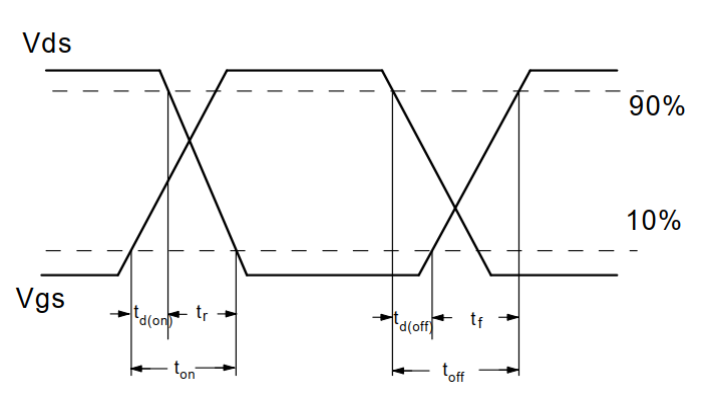
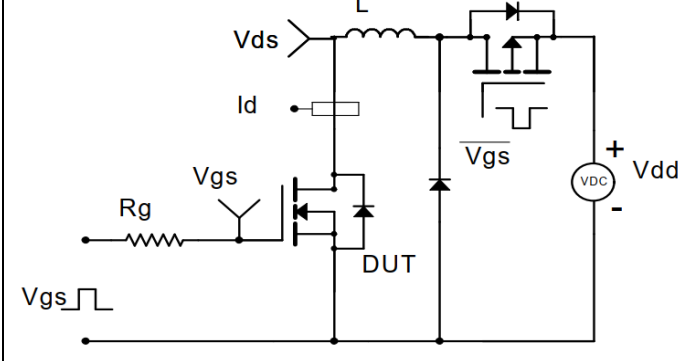
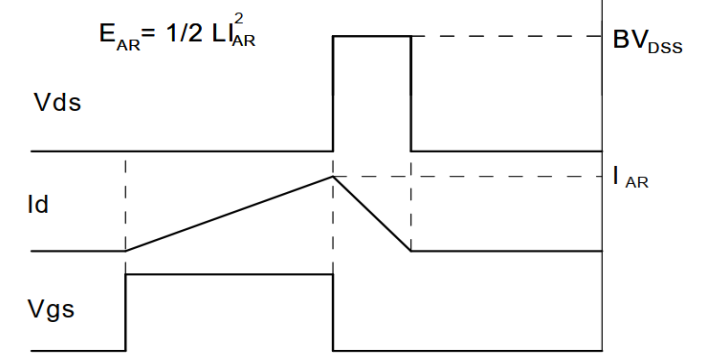
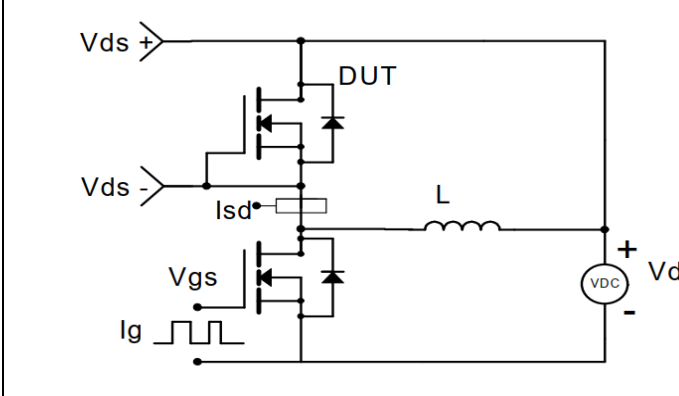
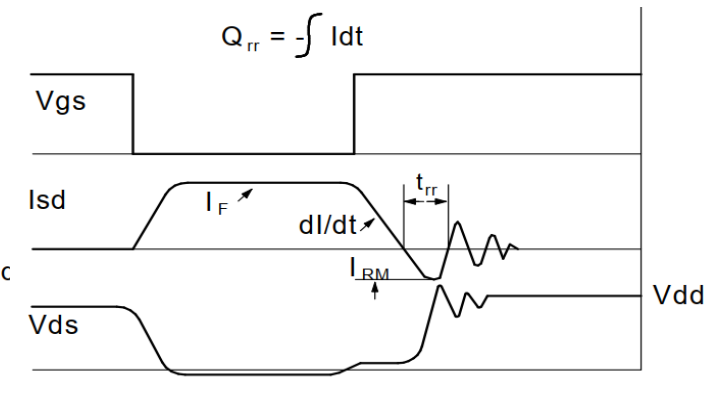
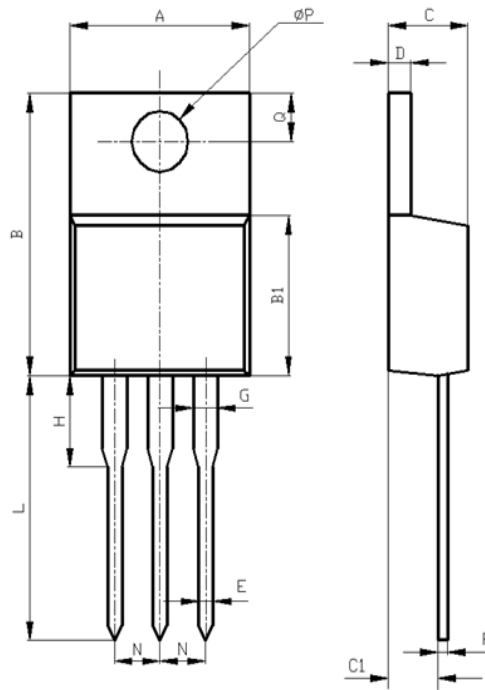
Characteristics Curves


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


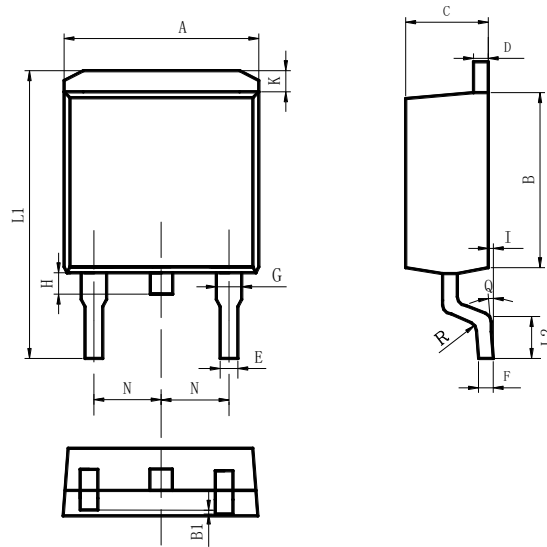
Test Circuit and Waveform

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 of the MOSFET (DUT) through a resistor. The gate is driven by a pulse source (Ig) through a resistor (Rg). The source is connected to ground. The MOSFET is shown in its standard symbol with a diode in parallel.</p>	 <p>The waveform shows the gate-source voltage (Vgs) over time. The voltage rises linearly to 10V, remains constant for a duration Qgs, then falls linearly to 0V for a duration Qgd. The total gate charge is labeled as Qg.</p>
Resistive Switching Test Circuit	Resistive Switching Test Waveforms
 <p>The diagram shows a MOSFET circuit for resistive switching. A DC voltage source (VDC) is connected to the drain of the MOSFET (DUT) through a load resistor (RL). The gate is driven by a pulse source (Vgs) through a resistor (Rg). The source is connected to ground.</p>	 <p>The waveforms show the drain-source voltage (Vds) and gate-source voltage (Vgs) over time. Vds is high when Vgs is low and vice versa. Key timing parameters are labeled: t_{d(on)}, t_r, t_{d(off)}, t_f, t_{on}, and t_{off}. The voltage levels are marked at 90% and 10%.</p>
Unclamped Inductive Switching (UIS) Test Circuit	Unclamped Inductive Switching (UIS) Test Waveforms
 <p>The diagram shows a MOSFET circuit for UIS testing. A DC voltage source (VDC) is connected to the drain of the MOSFET (DUT) through an inductor (L). The gate is driven by a pulse source (Vgs) through a resistor (Rg). The source is connected to ground.</p>	 <p>The waveforms show Vds, Id, and Vgs over time. The energy stored in the inductor is given by the equation: $E_{AR} = 1/2 L I_{AR}^2$. The peak drain-source voltage is labeled as BV_{DSS} and the peak current as I_{AR}.</p>
Diode Recovery Test Circuit	Diode Recovery Test Waveforms
 <p>The diagram shows a MOSFET circuit for diode recovery testing. A DC voltage source (VDC) is connected to the drain of the MOSFET (DUT) through an inductor (L). The gate is driven by a pulse source (Vgs) through a resistor (Rg). The source is connected to ground.</p>	 <p>The waveforms show Vgs, Id, and Vds over time. The reverse recovery time (t_{rr}) is indicated. The peak reverse current is labeled as I_{RM}. The equation for reverse recovery charge is given as: $Q_{rr} = -\int Idt$.</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.

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