

100V P-Channel Power MOSFET

Description

The IRF9530NPBF, uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge. It can be used in a wide variety of applications.

General Features

- ① $V_{DS}=-100V, I_D=-15A$
 $R_{DS(ON)} < 80m\Omega @ V_{GS}=-10V$
 $R_{DS(ON)} < 90m\Omega @ V_{GS}=-4.5V$
- ② High density cell design for lower R_{dson}
- ③ Fully characterized avalanche voltage and current
- ④ Good stability and uniformity with high EAS
- ⑤ Excellent package for good heat dissipation

Application

- ① Power switching application
- ② Hard switched and High frequency circuits
- ③ Uninterruptible power supply

Package Marking And Ordering Information

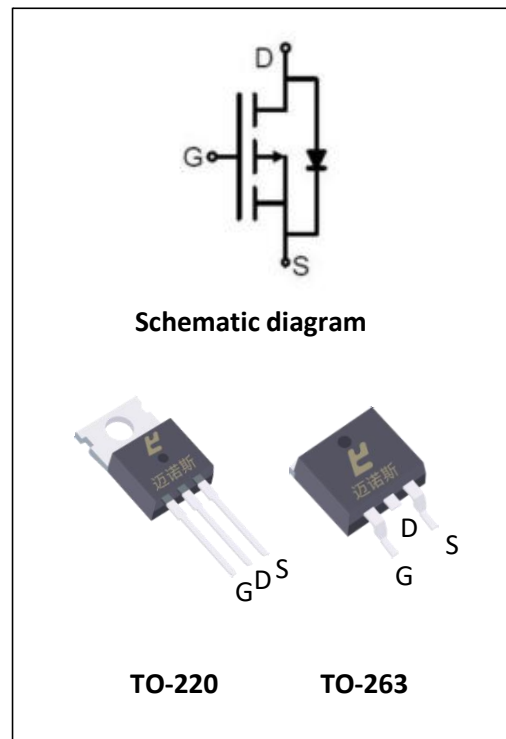
Ordering Codes	Package	Product Code	Packing
IRF9530NS	TO-263	IRF9530NS	Reel
IRF9530NPBF	TO-220	IRF9530N	Tube

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

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	-100	V
V_{GS}	Gate-Source Voltage	± 20	V
I_D	Drain Current-Continuous	-15	A
I_{DM}	Drain Current-Pulsed (Note 1)	-20	A
P_D	Maximum Power Dissipation($T_A=25^{\circ}C$)	72	W
E_{AS}	Single pulse avalanche energy(Note 2)	80	mJ
T_J, T_{STG}	Operating Junction and Storage Temperature Range	-55 To 175	$^{\circ}C$

Thermal Characteristic

Symbol	Parameter	Rating	Units
$R_{\theta JC}$	Thermal Resistance,Junction-to-Case	2.12	$^{\circ}C/W$



Electrical Characteristics ($T_A=25^{\circ}\text{C}$ unless otherwise noted)

Symbol	Parameter	Condition	Min.	Typ.	Max.	Units
Off Characteristics						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V I _D =-250μA	-100	-	-	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =-100V, V _{GS} =0V	-	-	-1	μA
I _{GSS}	Gate-Body Leakage Current	V _{GS} =±20V, V _{DS} =0V	-	-	±100	nA
On Characteristics						
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =-250μA	-1.0	-1.7	-2.4	V
R _{DS(ON)}	Drain-Source On-State Resistance ^(Note 3)	V _{GS} =-10V, I _D =-10A	-	70	80	mΩ
		V _{GS} =-4.5V, I _D =-10A	-	80	90	
g _{FS}	Forward Transconductance	V _{DS} =-50V, I _D =-10A	-	7.2	-	S
Dynamic Characteristics						
C _{ISS}	Input Capacitance	V _{DS} =-50V, V _{GS} =0V, f=1.0MHz	-	2360	-	pF
C _{OSS}	Output Capacitance		-	81	-	pF
C _{RSS}	Reverse Transfer Capacitance		-	67	-	pF
Switching Characteristics (Note 4)						
t _{d(on)}	Turn-on Delay Time	V _{DD} =-50V, I _D =-15A, V _{GS} =-10V, R _{GEN} =10Ω	-	20	-	nS
t _r	Turn-on Rise Time		-	11	-	nS
t _{d(off)}	Turn-Off Delay Time		-	100	-	nS
t _f	Turn-Off Fall Time			38	-	nS
Q _g	Total Gate Charge	V _{DS} =-50V, I _D =-15A V _{GS} =-10V	-	71	-	nC
Q _{gs}	Gate-Source Charge		-	13	-	nC
Q _{gd}	Gate-Drain Charge		-	13	-	nC
Drain-Source Diode Characteristics						
V _{SD}	Diode Forward Voltage	V _{GS} =0V, I _S =-15A	-	-	-1.2	V

Notes:

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

Characteristics Curves

Figure 1 Output Characteristics

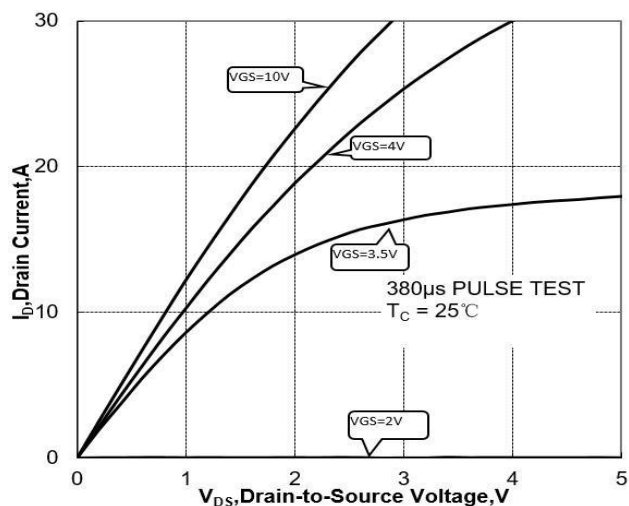


Figure 2 Transfer Characteristics

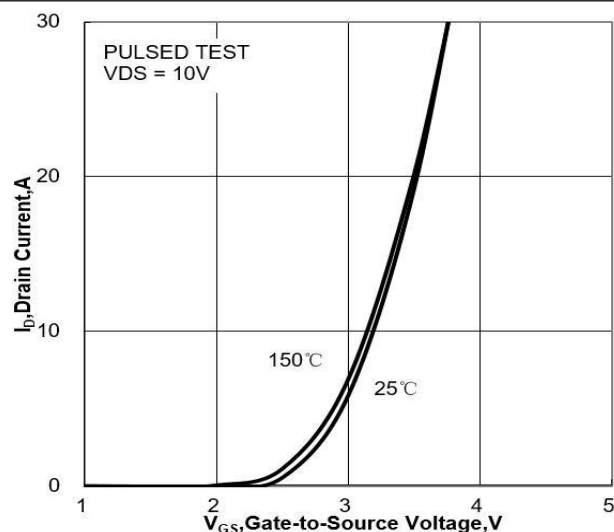


Figure 3 On-Resistance vs. I_D and V_{GS}

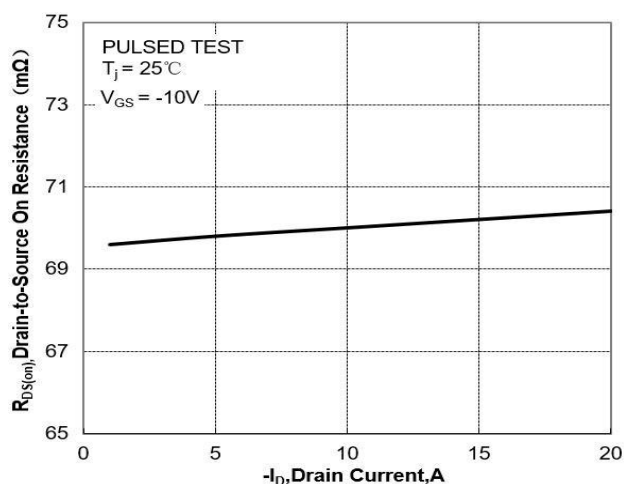


Figure 4 On-Resistance vs. Junction Temperature

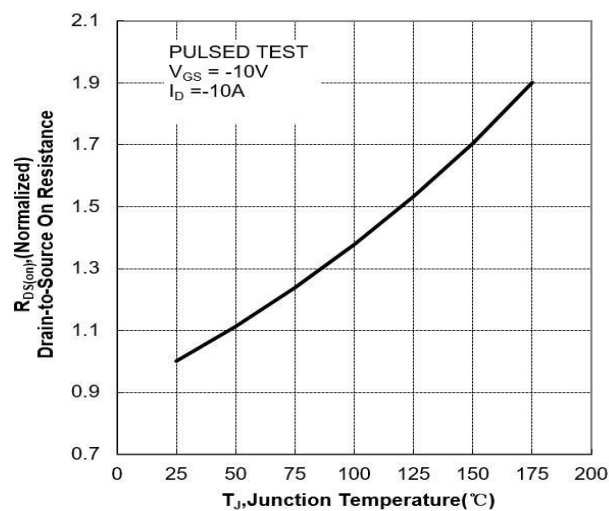


Figure 5 On-Resistance vs. V_{GS}

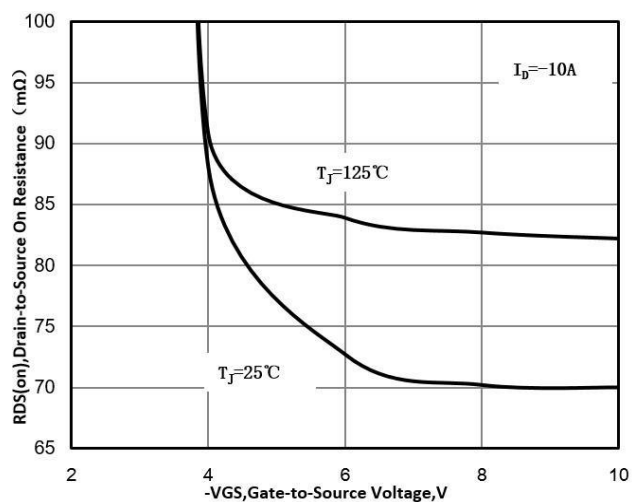


Figure 6 Body Diode Forward Voltage

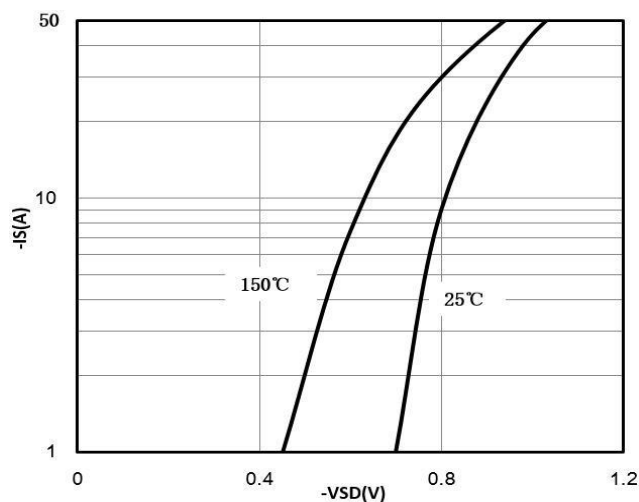


Figure 7 Gate-Charge Characteristics

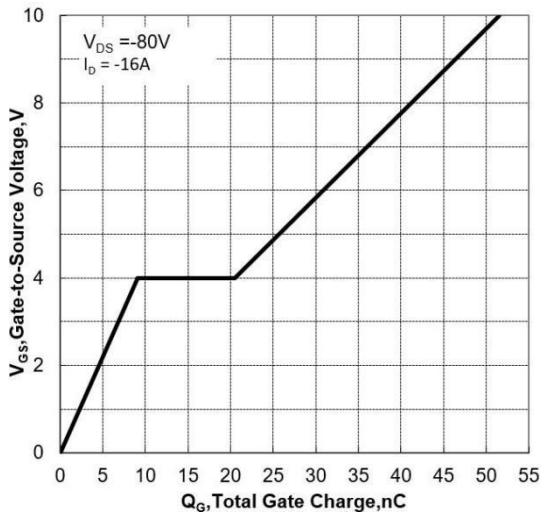


Figure 8 Capacitance Characteristics

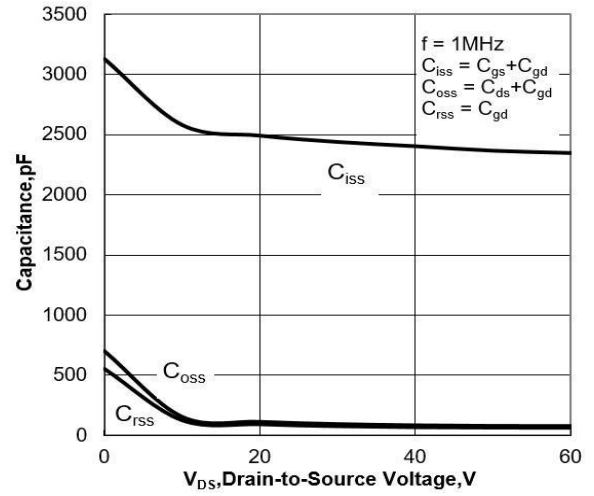


Figure 9 Maximum Forward Biased Safe Operation Area

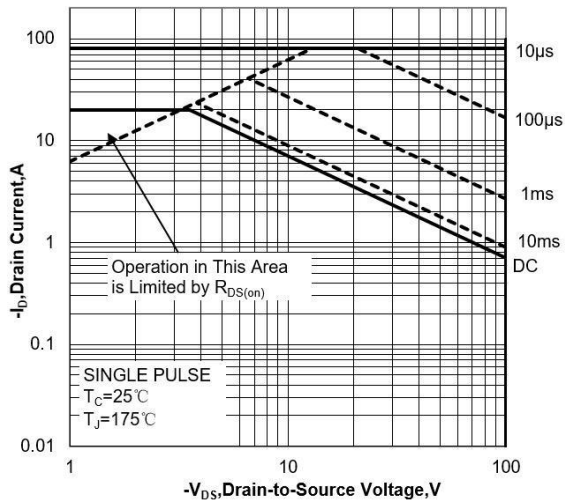


Figure 10 Single Pulse Power Rating Junction-to-Ambient

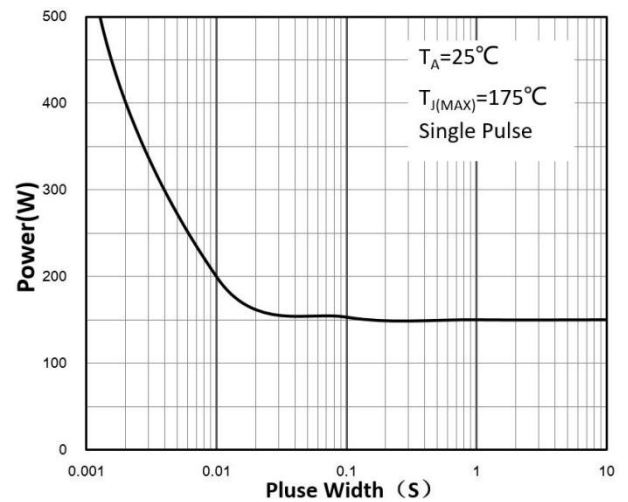
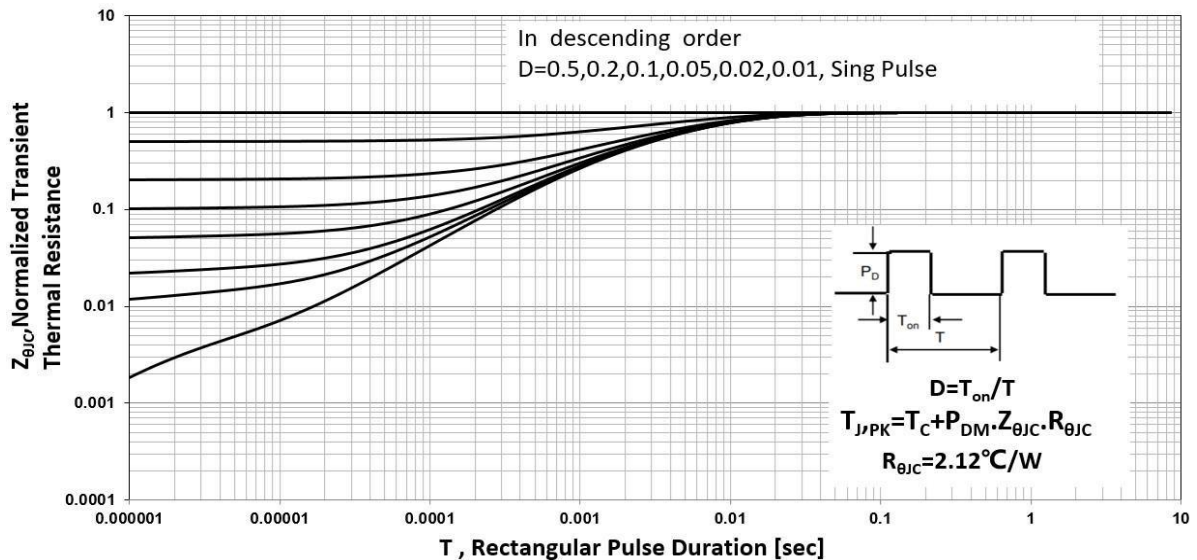
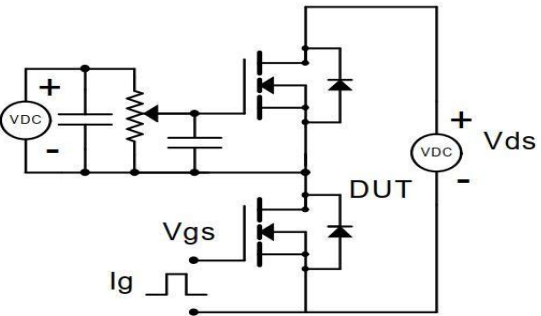
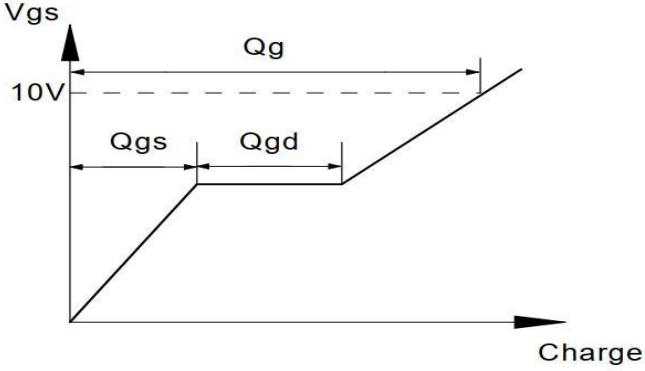
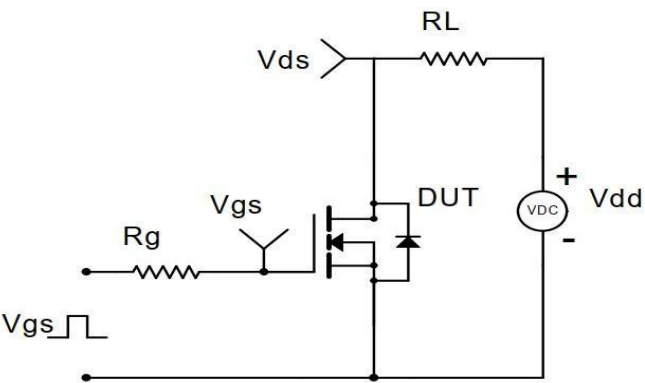
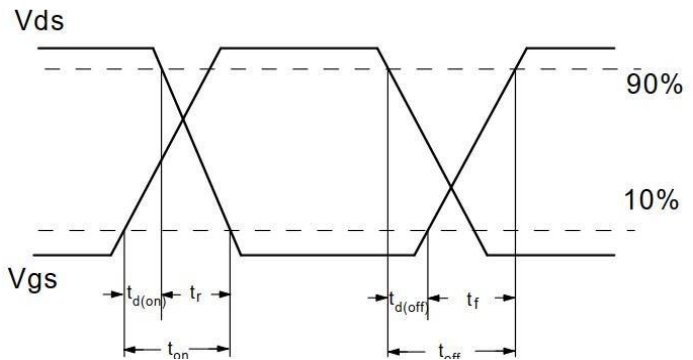
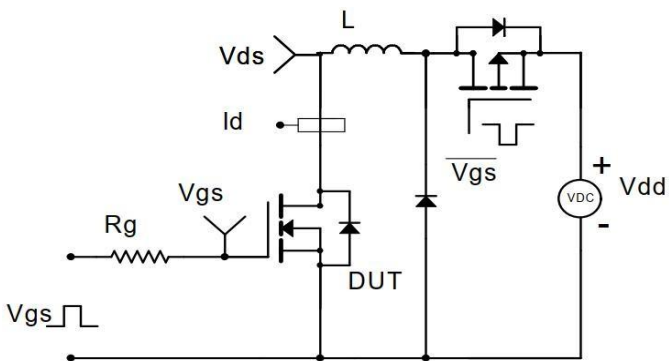
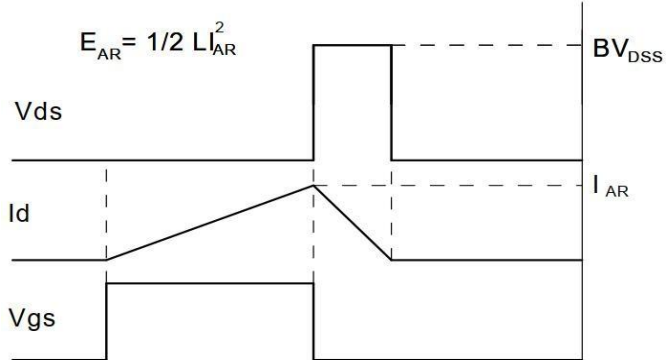


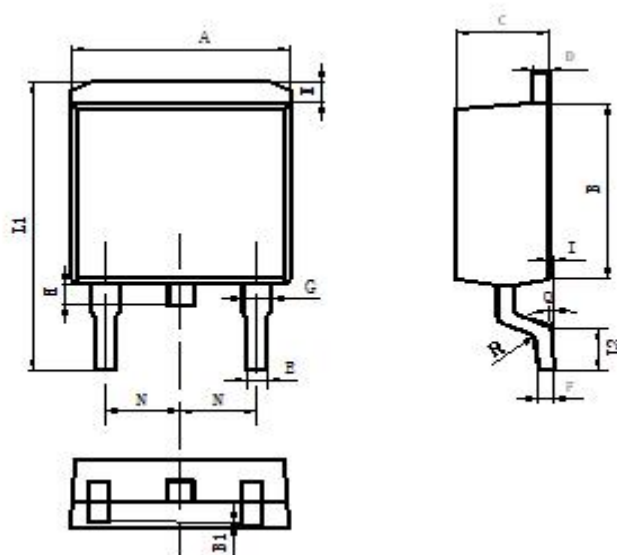
Figure 11 Normalized Maximum Transient Thermal Impedance



Test Circuit and Waveform

Gate Charge Test Circuit	Gate Charge Test Waveform
 The diagram shows a MOSFET (DUT) with its gate connected to a pulse generator (Vgs) through a resistor. A current source (Ig) is connected to the gate. The drain is connected to a load resistor and a DC voltage source (Vds).	 The graph shows Vgs on the y-axis and Charge on the x-axis. The waveform starts at 0V, rises linearly to 10V, stays constant, and then falls linearly back to 0V. The total area under the curve is labeled Qg. The area under the rising edge is labeled Qgs, and the area under the falling edge is labeled Qgd.
Resistive Switching Test Circuit	Resistive Switching Test Waveforms
 The diagram shows a MOSFET (DUT) with its gate connected to a pulse generator (Vgs) through a resistor (Rg). The drain is connected to a load resistor (RL) and a DC voltage source (Vdd). The source is connected to ground.	 The graph shows Vds and Vgs on the y-axis and time on the x-axis. Vds is a trapezoidal wave that rises from 0V to Vdd and falls back to 0V. Vgs is a square wave that switches between 0V and Vgs. The switching times are labeled: t_{d(on)} (delay), t_r (rise), t_{on} (on-time), t_{d(off)} (delay), t_f (fall), and t_{off} (off-time). The Vds levels are marked at 90% and 10%.
Unclamped Inductive Switching (UIS) Test Circuit	Unclamped Inductive Switching (UIS) Test Waveforms
 The diagram shows a MOSFET (DUT) with its gate connected to a pulse generator (Vgs) through a resistor (Rg). The drain is connected to an inductor (L) and a DC voltage source (Vdd). The source is connected to ground. A diode is connected in parallel with the inductor.	 The graph shows Vds, Id, and Vgs on the y-axis and time on the x-axis. Vds is a trapezoidal wave that rises from 0V to Vdd and falls back to 0V. Id is a triangular wave that rises from 0A to I_{AR} and falls back to 0A. Vgs is a square wave that switches between 0V and Vgs. The energy stored in the inductor is given by the equation: $E_{AR} = 1/2 L I_{AR}^2$. The Vds levels are marked at BV_{DSS} and I_{AR}.

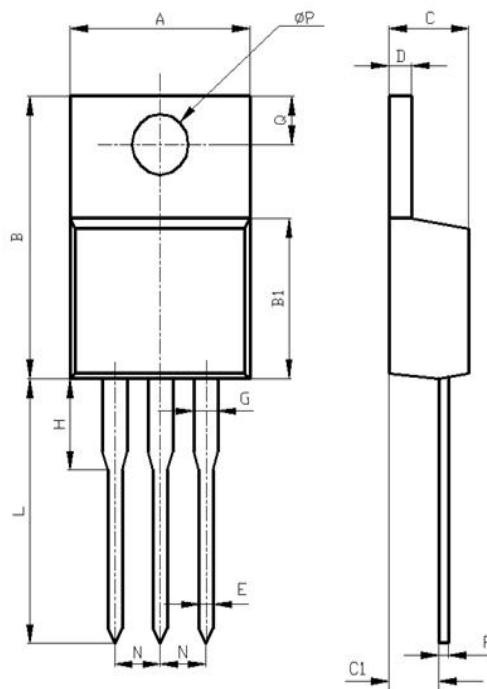
Package Information



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	0.4
N	2.39	2.69

TO-263 package

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
Ø P	3.50	3.90

TO-220 Package



迈诺斯科技

IRF9530NPBF

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. Shenzhen Minos reserves the right to make changes in this specification sheet and is subject to change without prior notice.

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