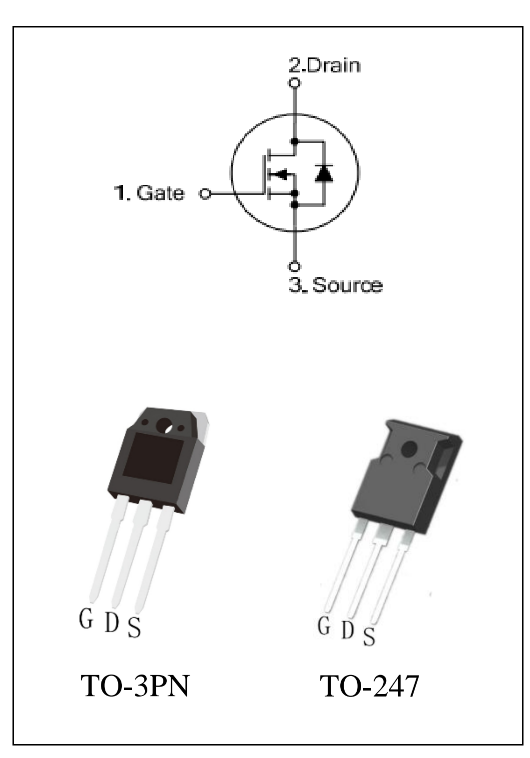
JR30N60

Power MOSFET

1. Description

JR30N60, the silicon N-channel Enhanced MOSFETs, is obtained by advanced MOSFET technology which reduce the conduction loss, improve switching performance and enhance the avalanche energy. The transistor is suitable device for SMPS, high speed switching and general purpose applications.



KEY CHARACTERISTICS

Parameter	Value	Unit
V_{DS}	600	V
I_D	30	A
$R_{DS(ON).Typ}$	0.12	Ω

FEATURES

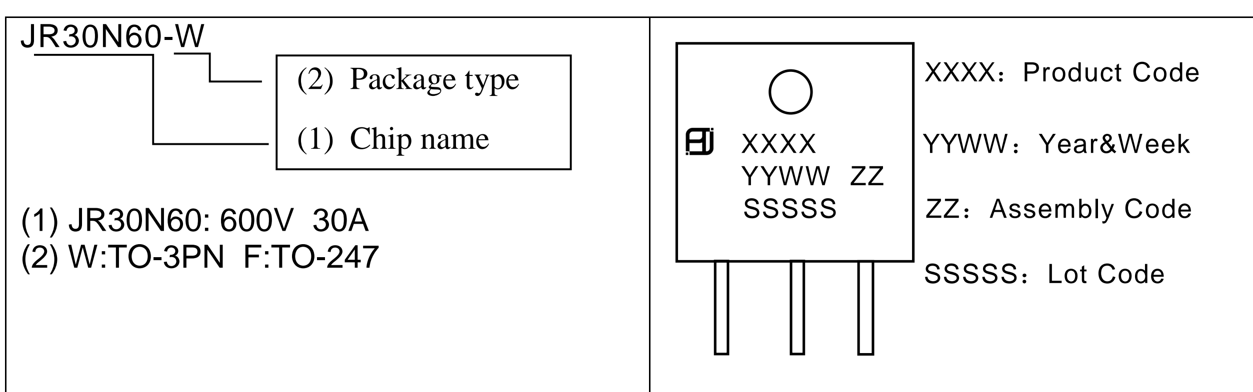
- Fast Switching
- Low Crss
- 100% avalanche tested
- Improved dv/dt capability
- RoHS product

APPLICATIONS

- High frequency switching mode power supply
- Electronic ballast

ORDERING INFORMATION

Ordering Codes	Package	Product Code	Packing
JR30N60-W	TO-3PN	30N60	Tube
JR30N60-F	TO-247	30N60	Tube



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2. ABSOLUTE RATINGS

at T_C = 25°C, unless otherwise specified

Symbol	Parameter	Rating	Units
V_{DSS}	Drain-to-Source Voltage	600	V
I_D	Continuous Drain Current	30	A
	Continuous Drain Current T_C = 100 °C	19.8	A
I_{DM}	Pulsed Drain Current(Note1)	120	A
V_{GS}	Gate-to-Source Voltage	±30	V
E_{AS}	Single Pulse Avalanche Energy(Note2)	3700	mJ
dv/dt	Peak Diode Recovery dv/dt(Note3)	5.0	V/ns
PD	Power Dissipation	365	W
	Derating Factor above 25°C	2.9	W/℃
T_J， T_{stg}	Operating Junction and Storage Temperature Range	150， –55 to 150	℃
T_L	Maximum Temperature for Soldering	300	℃

3. Thermal characteristics

Thermal characteristics TO-3PN/TO-247

Symbol	Parameter	RATINGS	Units
$R_{\theta JC}$	Junction-to-Case	0.34	℃/W
$R_{\theta JA}$	Junction-to-Ambient	62.5	℃/W

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4. Electrical Characteristics

at T_C = 25°C, unless otherwise specified

OFF Characteristics

Symbol	Parameter	Test Conditions	Values			Units
			Min.	Typ.	Max.	
V_{DSS}	Drain to Source Breakdown Voltage	V_{GS}=0V, I_D=250μA	600	--	--	V
$\Delta BV_{DSS}/\Delta T_J$	Bvdss Temperature Coefficient	ID=250uA, Reference25℃	--	0.67	--	V/℃
I_{DSS}	Drain to Source Leakage Current	V_{DS} =600V, V_{GS}= 0V, Tj = 25℃	--	--	1	μA
		V_{DS} =480V, V_{GS}= 0V, Tj = 125℃	--	--	10	μA
$I_{GSS(F)}$	Gate to Source Forward Leakage	V_{GS} =+30V	--	--	100	nA
$I_{GSS(R)}$	Gate to Source Reverse Leakage	V_{GS} =-30V	--	--	-100	nA

ON Characteristics

Symbol	Parameter	Test Conditions	Values			Units
			Min.	Typ.	Max.	
$R_{DS(ON)}$	Drain-to-Source On-Resistance	VGS=10V, ID=15A(Note4)	--	0.12	0.15	Ω
$V_{GS(TH)}$	Gate Threshold Voltage	VDS = VGS, ID = 250μA(Note4)	2	3	4	V
g_{fs}	Forward Transconductance	VDS=15V, ID =15A(Note4)	--	52.0	--	S

Dynamic Characteristics

Symbol	Parameter	Test Conditions	Values			Units
			Min.	Typ.	Max.	
R_g	Gate resistance	f = 1.0MHz	--	1.1	--	Ω
C_{iss}	Input Capacitance	VGS = 0V, VDS = 25V, f = 1.0MHz	--	10000	--	PF
C_{oss}	Output Capacitance		--	640	--	
C_{rss}	Reverse Transfer Capacitance		--	28	--	

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Switching Characteristics

Symbol	Parameter	Test Conditions	Values			Units
			Min.	Typ.	Max.	
$t_{d(ON)}$	Turn-on Delay Time	ID =30A VDD = 300V VGS = 10V RG =10Ω	--	160	--	ns
t_r	Rise Time		--	550	--	
$t_{d(OFF)}$	Turn-Off Delay Time		--	125	--	
t_f	Fall Time		--	200	--	
Q_g	Total Gate Charge	ID =30A VDD =480V VGS = 10V	--	146	--	nC
Q_{gs}	Gate to Source Charge		--	50	--	
Q_{gd}	Gate to Drain (“Miller”)Charge		--	32	--	

Source-Drain Diode Characteristics

Symbol	Parameter	Test Conditions	Values			Units
			Min.	Typ.	Max.	
I_S	Continuous Source Current (Body Diode)	TC=25 °C	--	--	30	A
I_{SM}	Maximum Pulsed Current (Body Diode)		--	--	120	A
V_{SD}	Diode Forward Voltage	IS=30A, VGS=0V(Note4)	--	--	1.2	V
T_{rr}	Reverse Recovery Time	IS=30A, Tj = 25°C dIF/dt=100A/us, VGS=0V	--	240	--	ns
Q_{rr}	Reverse Recovery Charge		--	6880	--	nC

Note1: Pulse width limited by maximum junction temperature
Note2: L=10mH, V_{DS}=200V, Rg=25Ω， Start TJ=25℃
Note3: ISD =30A,di/dt ≤100A/us,VDD≤BVDS, Start TJ=25℃
Note4: Pulse width tp≤300μs, δ≤2%

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5. Characteristics Curves

Figure 1 Safe Operating Area

I_D,Drain Current,A
1000
100
10
1
0.1
0.01
10μs
100μs
1ms
10ms
DC
Operation in This Area
is Limited by $R_{DS(on)}$
SINGLE PULSE
T_C=25℃
T_J=150℃
1 10 100 1000
V_{DS},Drain-to-Source Voltage,V

Figure 2 Power Dissipation

P_D,Power Dissipation,W
400 350 300 250 200 150 100 50 0
0 25 50 75 100 125 150
T_C,Case Temperature,℃

Figure 3 Max Thermal Impendance

$Z_{\theta JC}$,Thermal Response[℃/W]
1
0.1
0.01
0.001
0.0001
D=1
0.5
0.2
0.1
0.05
0.02
0.01
Single Pulse
P_D
T_{on}
T
$D=T_{on}/T$
$T_{J,PK}=T_C+P_{DM}\cdot Z_{\theta JC}\cdot R_{\theta JC}$
$R_{\theta JC}$=0.34℃/W
0.000001 0.00001 0.0001 0.001 0.01 0.1 1 10
T , Rectangular Pulse Duration [sec]

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Figure 4 Typical Output Characteristics

250μs PULSE TEST
T_C = 25℃
VGS=10V
VGS=6V
VGS=5V
VGS=4V
I_D,Drain Current,A
V_{DS},Drain-to-Source Voltage,V

Figure 5 Typical Transfer Characteristics

PULSED TEST
VDS = 20V
150℃
25℃
I_D,Drain Current,A
V_{GS},Gate-to-Source Voltage,V

Figure 6 Typical Drain to Source ON Resistance vs Drain Current

PULSED TEST
T_j = 25℃
V_{GS} = 10V
$R_{DS(on)}$,Drain-to-Source On Resistance,Ω
I_D,Drain Current,A

Figure 7 Typical Drian to Source on Resistance vs Junction Temperature

PULSED TEST
V_{GS} = 10V
I_D = 15A
$R_{DS(on)}$,(Normalized) Drain-to-Source On Resistance
T_J,Junction Temperature(℃)

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Figure 8 Typical Theshold Voltage vs Junction Temperature

$V_{GS} = V_{DS}$
$I_D = 250μA$

$V_{GS(th)}$,(Normalized) Threshold Voltage

T_J,Junction Temperature(℃)

Figure 9 Typical Breakdown Voltage vs Junction Temperature

B_{VDSS},(Normalized) Drain-to-Source Breakdown Voltage

T_J,Junction Temperature(℃)

Figure 10 Typical Capacitance vs Drain to Source Voltage

f = 1MHz
$C_{iss} = C_{gs}+C_{gd}$
$C_{oss} = C_{ds}+C_{gd}$
$C_{rss} = C_{gd}$

C_{iss}, C_{oss}, C_{rss}

Capacitance,pF

V_{DS},Drain-to-Source Voltage,V

Figure 11 Typical Gate Charge vs Gate to Source Voltage

$V_{DS} = 480V$
$V_{DS} = 300V$
$V_{DS} = 120V$

$I_D = 30A$

V_{GS},Gate-to-Source Voltage,V

Q_G,Total Gate Charge,nC

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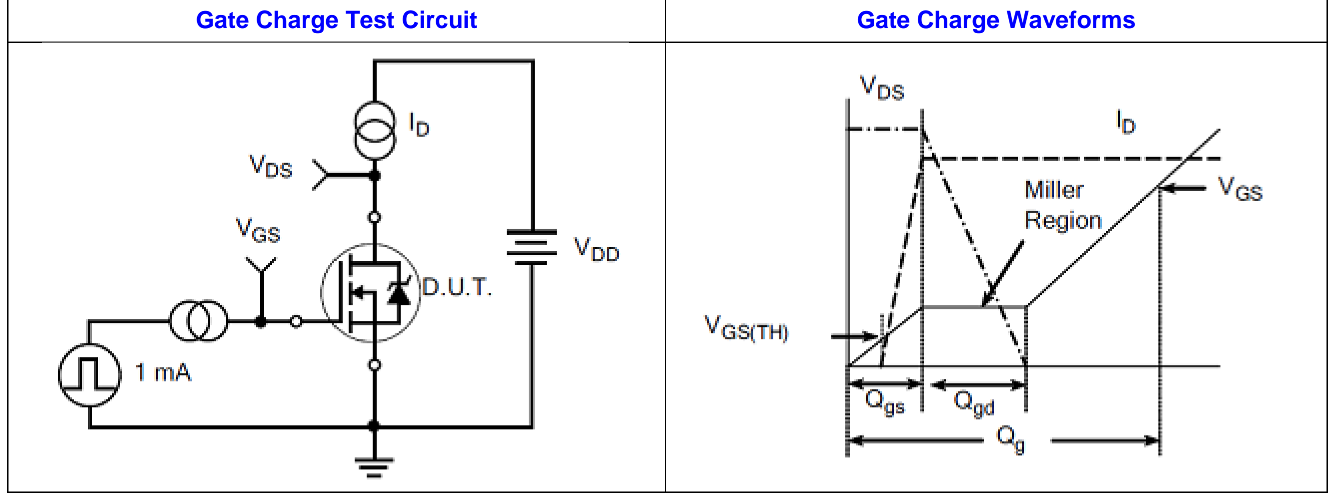
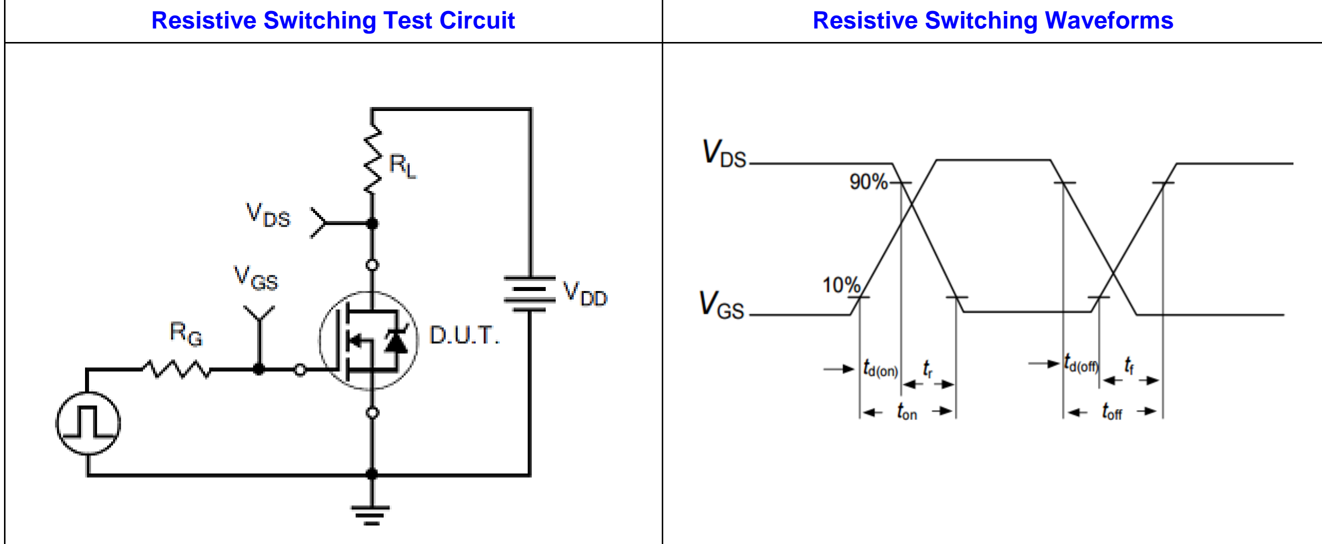
6. Test Circuit and Waveform





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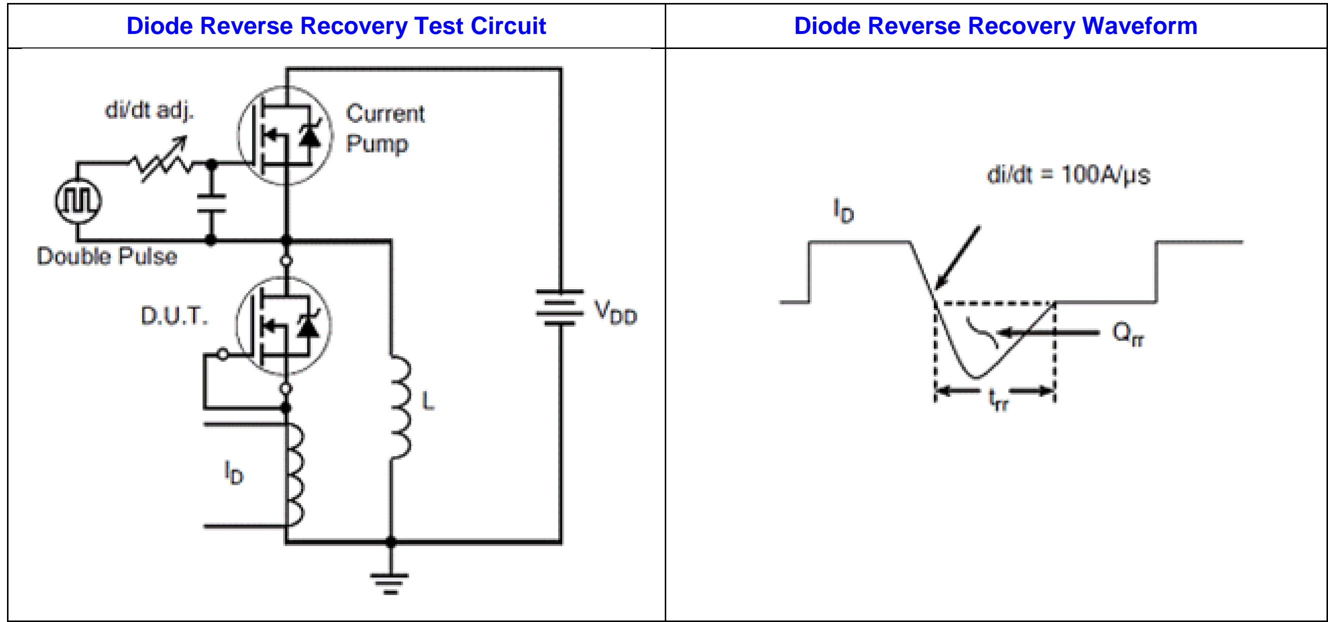

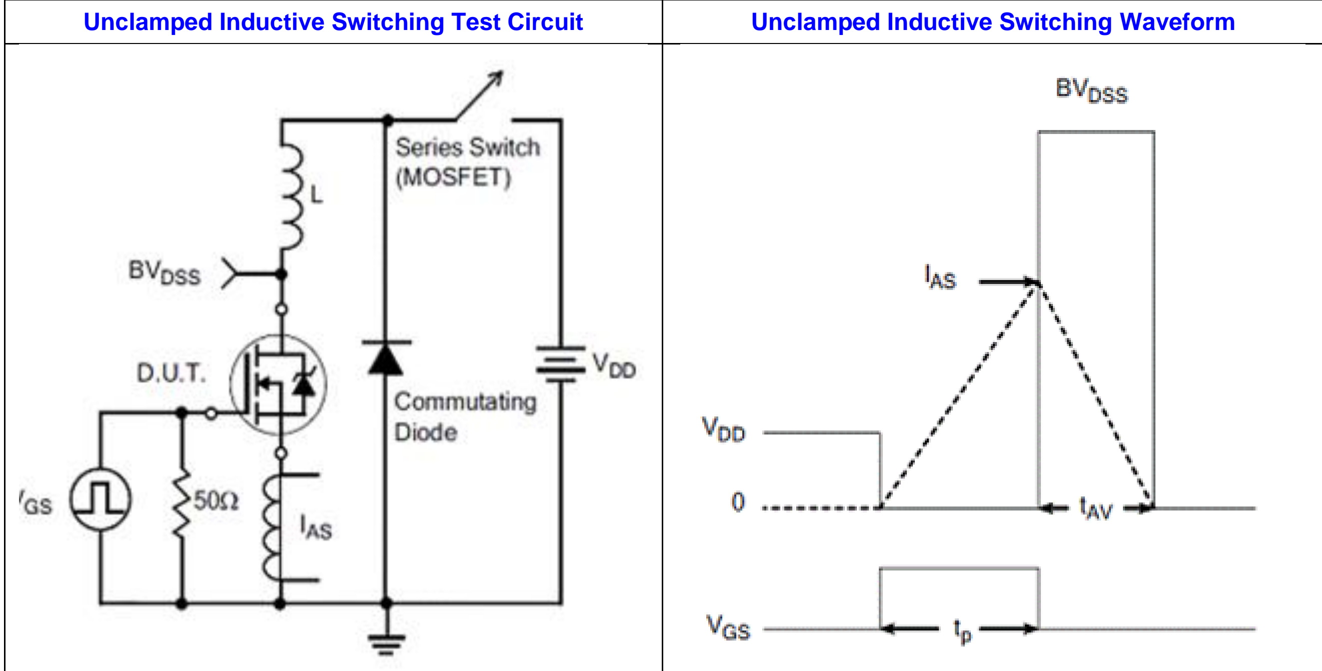

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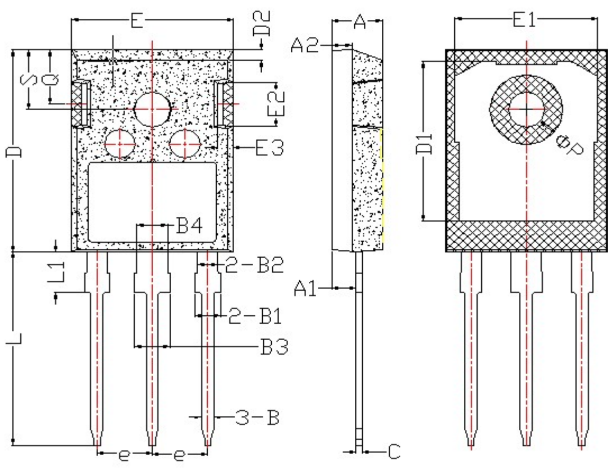
7. Package Description



Items	Values(mm)	
	MIN	MAX
A	4.6	5.2
A1	2,2	2.6
B	0.9	1.4
B1	1.75	2.35
B2	1.75	2.15
B3	2.8	3.35
B4	2.8	3.15
C	0.5	0.7
D	20.60	21.30
D1	16	18
E	15.5	16.10
E1	13	14.7
E2	3.80	5.3
E3	0.8	2.60
e	5.2	5.7
L	19	20.5
L1	3.9	4.6
Φ_P	2.5	3.70
Q	5.2	6.00
S	5.8	6.6

TO-247 Package

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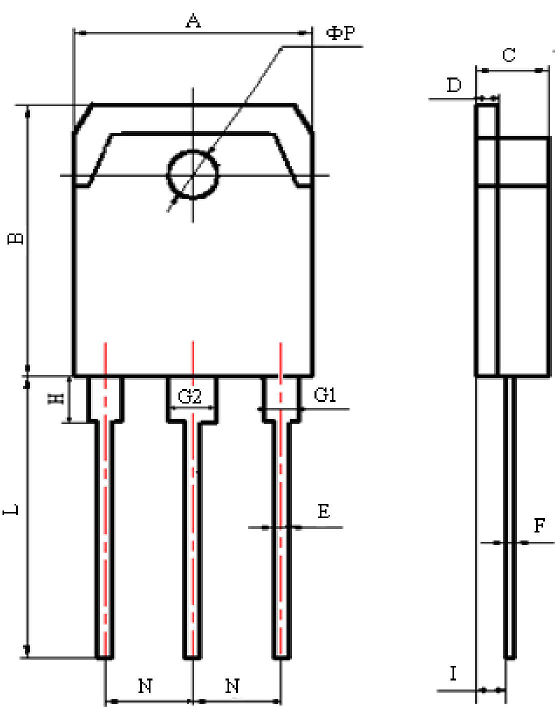

Items	Values(mm)	
	MIN	MAX
A	15.00	16.00
B	19.20	20.60
C	4.60	5.00
D	1.40	1.60
E	0.90	1.10
F	0.50	0.70
G1	2.00	2.20
G2	3.00	3.20
H	3.00	3.70
I	1.20	1.70
	2.70	2.90
L	19.00	21.00
N	5.25	5.65
ΦP	3.10	3.30

TO-3PN Package

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

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