



DONGGUAN NANJING ELECTRONICS LTD.,
TO-220-3L Plastic-Encapsulate MOSFETS

NJ120N60 N-Channel MOSFET

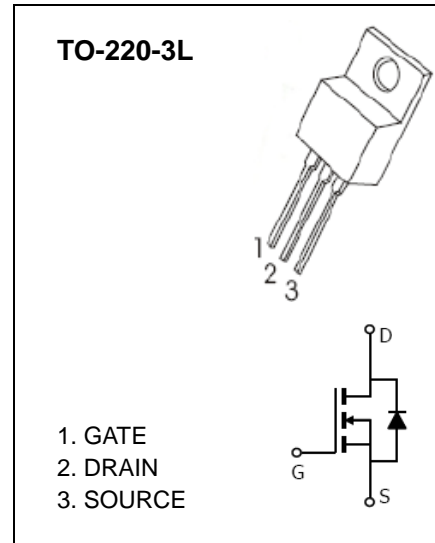
V_{DSS}	$R_{DS(ON)}(Typ.)$	I_D (Silicon limited current)
60V	4.5mΩ	120A

Applications:

- Adaptor
- Charger
- SMPS

Features:

- RoHS Compliant
- Low ON Resistance
- Low Gate Charge
- Peak Current vs Pulse Width Curve
- Inductive Switching Curves



MARKING



Absolute Maximum Ratings $T_C=25^{\circ}C$ unless otherwise specified

Symbol	Parameter	NJ120N06	Units
V_{DSS}	Drain-to-Source Voltage	60	V
I_D	Continuous Drain Current	120	A
	Continuous Drain Current $T_C = 100^{\circ}C$	76	A
I_{DM}	Pulsed Drain Current (NOTE *1)	480	A
V_{GS}	Gate-to-Source Voltage	± 20	V
E_{AS}	Single Pulse Avalanche Energy(NOTE *2)	822	mJ
T_L	Maximum Temperature for Soldering	300	$^{\circ}C$
T_J and T_{STG}	Operating Junction and Storage Temperature Range	150, -55 to 150	

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OFF Characteristics $T_C=25^\circ\text{C}$ unless otherwise specified

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-to-Source Breakdown Voltage	60	--	--	V	$V_{GS}=0V, I_D=250\mu A$
I_{DSS}	Drain-to-Source Leakage Current	--	--	1	μA	$V_{DS}=60V, V_{GS}=0V$ $T_a=25^\circ\text{C}$
		--	--	500		$V_{DS}=48V, V_{GS}=0V$ $T_a=125^\circ\text{C}$
I_{GSS}	Gate-to-Source Forward Leakage	--	--	+100	nA	$V_{GS}=+20V$
	Gate-to-Source Reverse Leakage	--	--	-100		$V_{GS}=-20V$

ON Characteristics $T_J=25^\circ\text{C}$ unless otherwise specified

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
$R_{DS(ON)}$	Static Drain-to-Source On-Resistance	--	4.5	6	m Ω	$V_{GS}=10V, I_D=40A$
$V_{GS(TH)}$	Gate Threshold Voltage	2	3	4	V	$V_{DS}=V_{GS}, I_D=250\mu A$
Pulse width $\leq 300\mu s$; duty cycle $\leq 2\%$						

Dynamic Characteristics Essentially independent of operating temperature

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
R_g	Gate Resistance	--	1.0	--	Ω	$f=1\text{MHz}, V_{GS}=0V,$ $V_{DS}=0V$
C_{iss}	Input Capacitance	--	3238	--	pF	$V_{GS}=0V, V_{DS}=25V$ $f=1.0\text{MHz}$
C_{oss}	Output Capacitance	--	580	--		
C_{rss}	Reverse Transfer Capacitance	--	411	--		
Q_g	Total Gate Charge	--	76.7	--	nC	$I_D=60A, V_{DD}=48V$ $V_{GS}=10V$
Q_{gs}	Gate-to-Source Charge	--	14.1	--		
Q_{gd}	Gate-to-Drain ("Miller") Charge	--	34.3	--		

Resistive Switching Characteristics Essentially independent of operating temperature

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
$t_{d(ON)}$	Turn-on Delay Time	--	24.4	--	ns	$V_{DD}=30V, I_D=60A,$ $V_G=10V R_G=6\Omega$
t_{rise}	Rise Time	--	20	--		
$t_{d(OFF)}$	Turn-Off Delay Time	--	57.8	--		
t_{fall}	Fall Time	--	26	--		

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Source-Drain Diode Characteristics $T_c=25^\circ\text{C}$ unless otherwise specified

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	--	--	120	A	$T_c=25^\circ\text{C}$
I_{SM}	Maximum Pulsed Current (Body Diode)	--	--	480	A	
V_{SD}	Diode Forward Voltage	--	--	1.2	V	$I_{SD}=30\text{A}, V_{GS}=0\text{V}$
t_{rr}	Reverse Recovery Time	--	35.9	--	ns	$I_F=20\text{A}$ $di/dt=100\text{A}/\mu\text{s}$
Q_{rr}	Reverse Recovery Charge	--	40.4	--	nC	
Pulse width $\leq 300\mu\text{s}$; duty cycle $\leq 2\%$						

Notes:

*1. Repetitive rating; pulse width limited by maximum junction temperature.

*2. $L=0.5\text{mH}$, $I_D=57.3\text{A}$, Start $T_J=25^\circ\text{C}$

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Test Circuits and Waveforms

Figure 14. Gate Charge Test Circuit

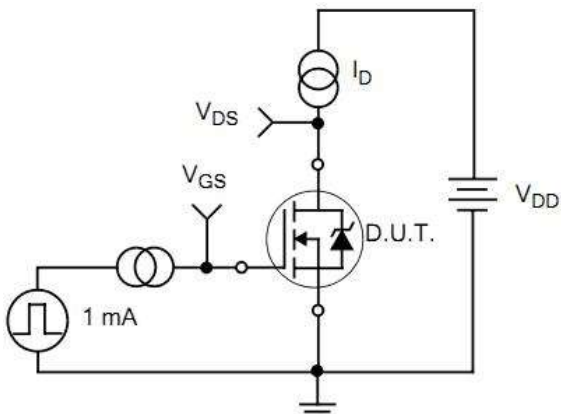


Figure 15. Gate Charge Waveforms

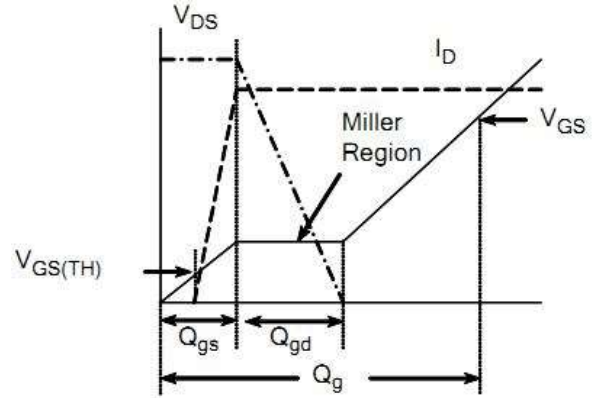


Figure 16. Resistive Switching Test Circuit

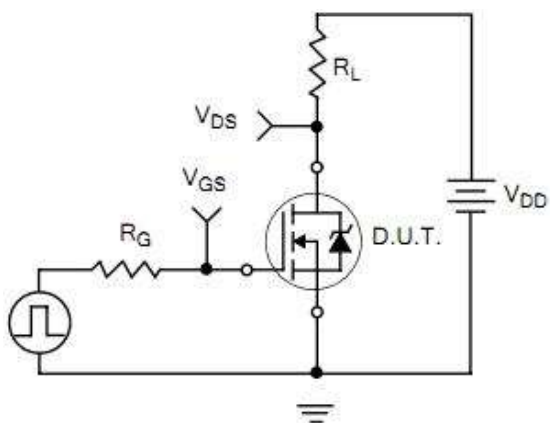
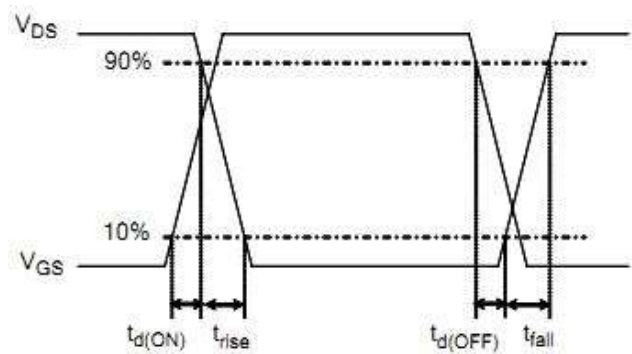


Figure 17. Resistive Switching Waveforms



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Figure 18. Diode Reverse Recovery Test Circuit

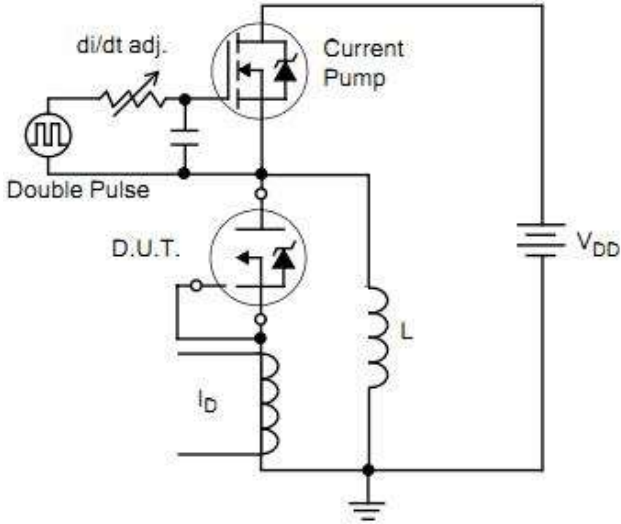


Figure 19. Diode Reverse Recovery Waveform

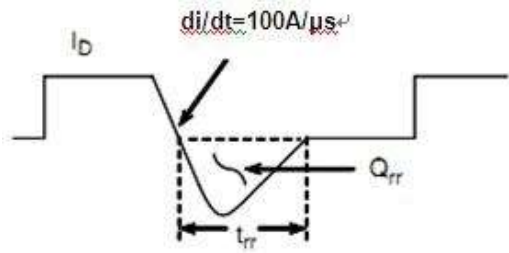


Figure20.Unclamped Inductive Switching Test Circuit

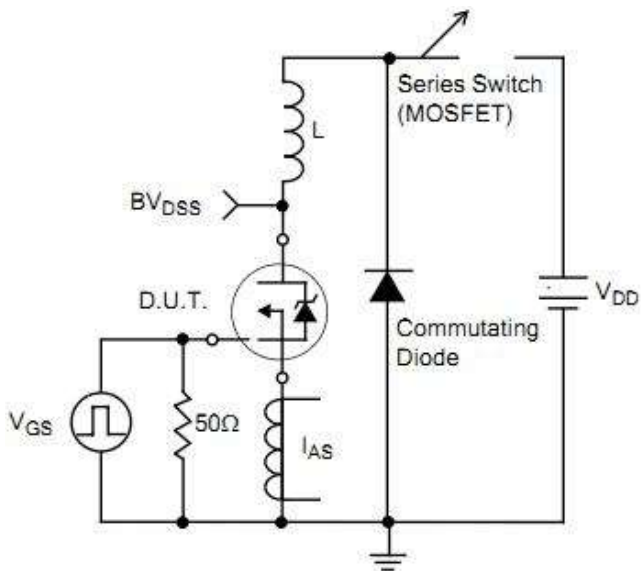
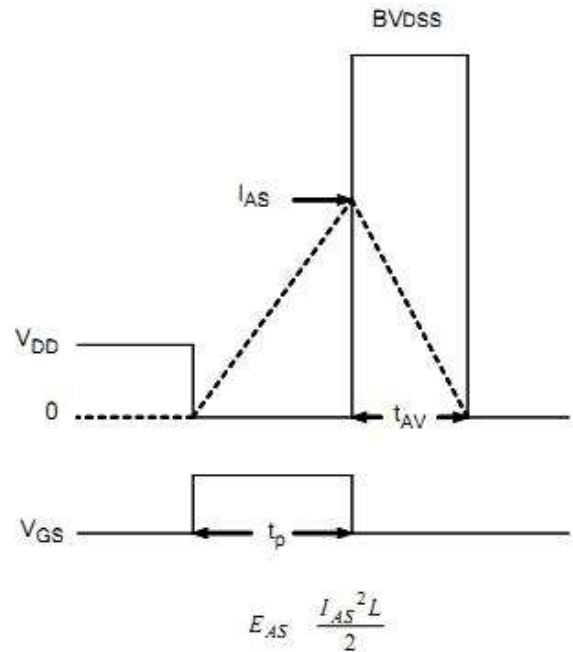
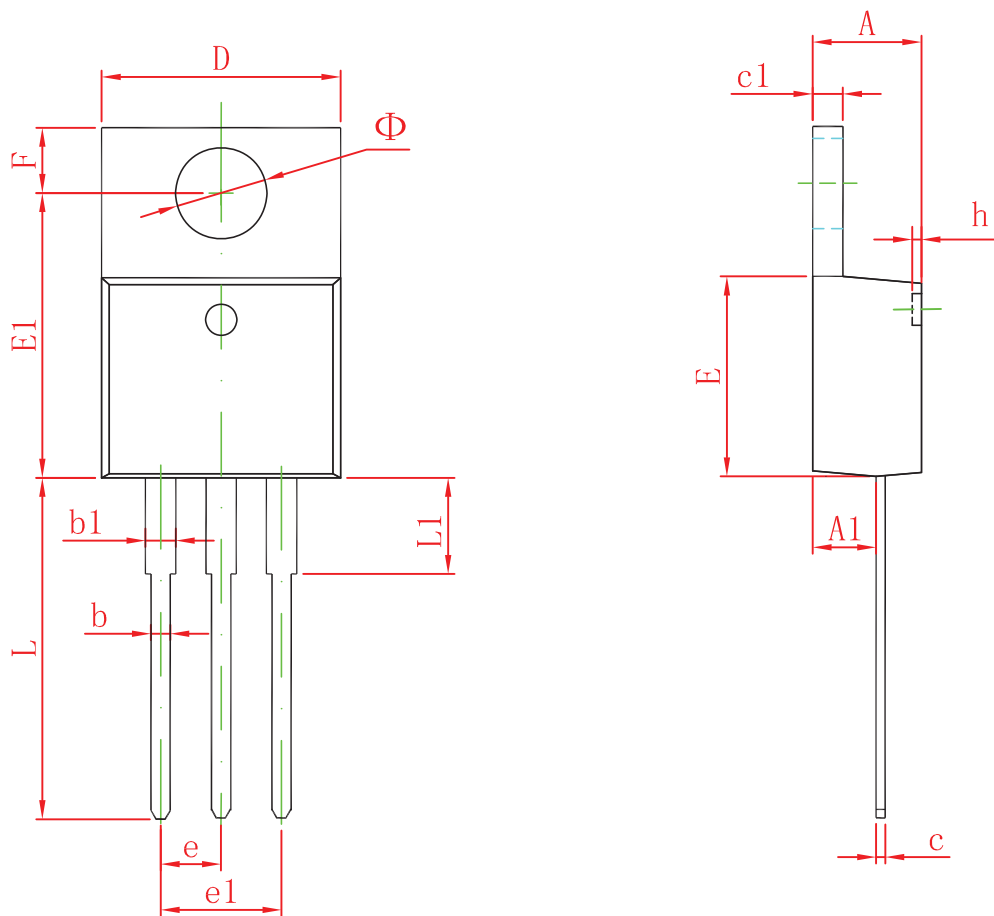


Figure21.Unclamped Inductive Switching Waveform



TO-220 Package Outline Dimensions



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	4.450	4.750	0.175	0.187
A1	2.520	2.820	0.099	0.111
b	0.710	0.910	0.028	0.036
b1	1.170	1.370	0.046	0.054
c	0.300	0.500	0.012	0.020
c1	1.170	1.370	0.046	0.054
D	9.830	10.330	0.387	0.407
E	8.500	8.900	0.335	0.350
E1	12.050	12.650	0.474	0.498
e	2.540 TYP		0.100 TYP	
e1	4.900	5.200	0.192	0.205
F	2.540	2.940	0.100	0.116
h	0.100 TYP		0.004 TYP	
L	13.300	13.800	0.523	0.543
L1	3.540	3.940	0.139	0.155
Φ	3.735	3.935	0.147	0.155