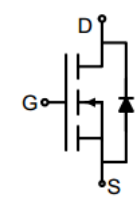



## N-Channel Enhancement Mode Power MOSFET

<p><b>Description</b></p> <p>This is a high voltage power MOSFET and is designed to have better characteristics, such as fast switching time, low gate charge, low on-state resistance and have a high rugged avalanche characteristics. This power MOSFET is usually used at high speed switching applications in power supplies and adaptors.</p> <p><b>General Features</b></p> <ul style="list-style-type: none"> <li>● <math>V_{DS}</math> 400V</li> <li>● <math>I_D</math> (at <math>V_{GS} = 10V</math>) 9A</li> <li>● <math>R_{DS(ON)}</math> (at <math>V_{GS} = 10V</math>) <math>&lt; 0.6\Omega</math></li> <li>● 100% Avalanche Tested</li> <li>● RoHS Compliant</li> </ul> <p><b>Application</b></p> <ul style="list-style-type: none"> <li>● Power switch</li> <li>● DC/DC converters</li> </ul>		 <p>Schematic Diagram</p>  <p>TO-220F</p>	
<b>Device</b>	<b>Package</b>	<b>Marking</b>	<b>Packaging</b>
G9N40F-A	TO-220F	G9N40	50pcs/Tube

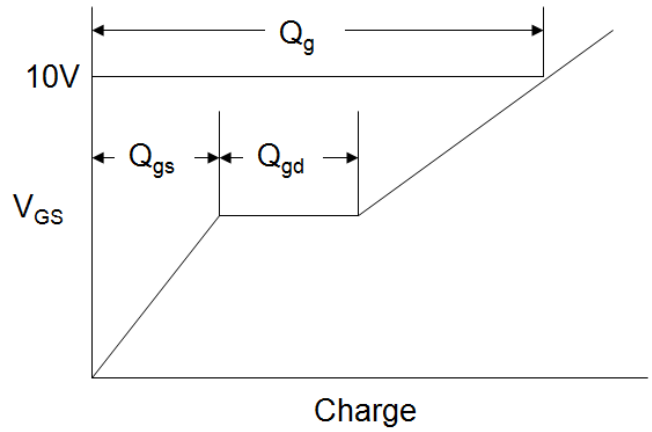
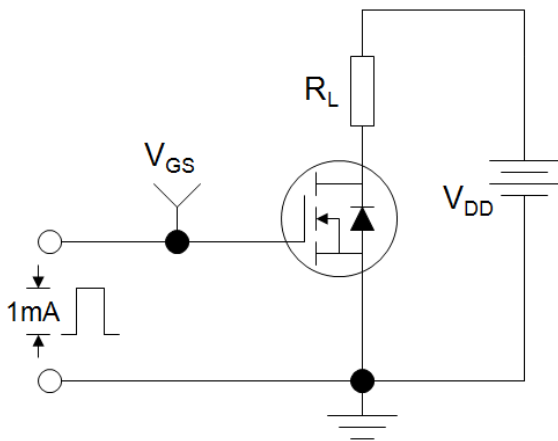
Absolute Maximum Ratings $T_C = 25^\circ C$ , unless otherwise noted			
Parameter	Symbol	Value	Unit
Drain-Source Voltage	$V_{DS}$	400	V
Continuous Drain Current	$I_D$	9	A
Pulsed Drain Current (note1)	$I_{DM}$	36	A
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Power Dissipation	$P_D$	134	W
Single Pulse Avalanche Energy (note3)	$E_{AS}$	120	mJ
Operating Junction and Storage Temperature Range	$T_J, T_{stg}$	-55 To 150	$^\circ C$
Thermal Resistance			
Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-Case	$R_{thJC}$	0.93	$^\circ C/W$
Thermal Resistance, Junction-to-Ambient	$R_{thJA}$	62.5	$^\circ C/W$

Specifications $T_J = 25^\circ\text{C}$ , unless otherwise noted						
Parameter	Symbol	Test Conditions	Value			Unit
			Min.	Typ.	Max.	
<b>Static Parameters</b>						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = 250\mu A$	400	--	--	V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 400V, V_{GS} = 0V$	--	--	1	$\mu A$
Gate-Source Leakage	$I_{GSS}$	$V_{GS} = \pm 20V$	--	--	$\pm 100$	nA
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\mu A$	0.5	1.5	2.5	V
Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS} = 10V, I_D = 5A$	--	0.47	0.6	$\Omega$
<b>Dynamic Parameters</b>						
Input Capacitance	$C_{iss}$	$V_{GS} = 0V,$ $V_{DS} = 25V,$ $f = 1.0\text{MHz}$	--	893	--	pF
Output Capacitance	$C_{oss}$		--	116	--	
Reverse Transfer Capacitance	$C_{rss}$		--	14	--	
Total Gate Charge	$Q_g$	$V_{DS} = 320V,$ $I_D = 5A,$ $V_{GS} = 10V$	--	25	--	nC
Gate-Source Charge	$Q_{gs}$		--	2	--	
Gate-Drain Charge	$Q_{gd}$		--	11	--	
Turn-on Delay Time	$t_{d(on)}$	$V_{DD} = 200V,$ $I_D = 5A,$ $R_G = 25\Omega$	--	39	--	ns
Turn-on Rise Time	$t_r$		--	21	--	
Turn-off Delay Time	$t_{d(off)}$		--	125	--	
Turn-off Fall Time	$t_f$		--	38	--	
<b>Drain-Source Body Diode Characteristics</b>						
Continuous Body Diode Current	$I_S$	$T_C = 25^\circ\text{C}$	--	--	9	A
Body Diode Voltage	$V_{SD}$	$T_J = 25^\circ\text{C}, I_{SD} = 1A, V_{GS} = 0V$	--	--	1.2	V

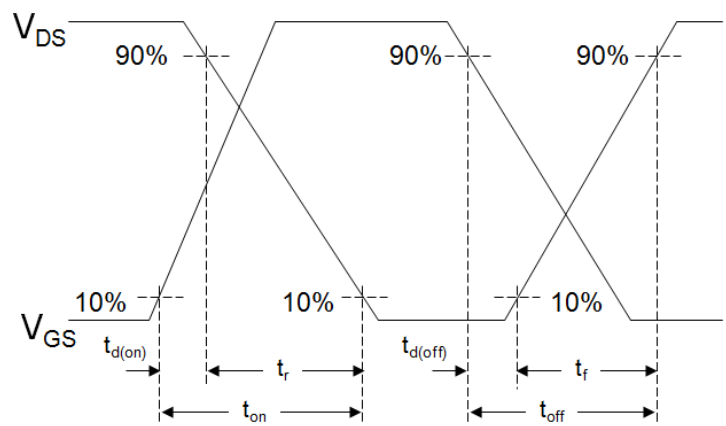
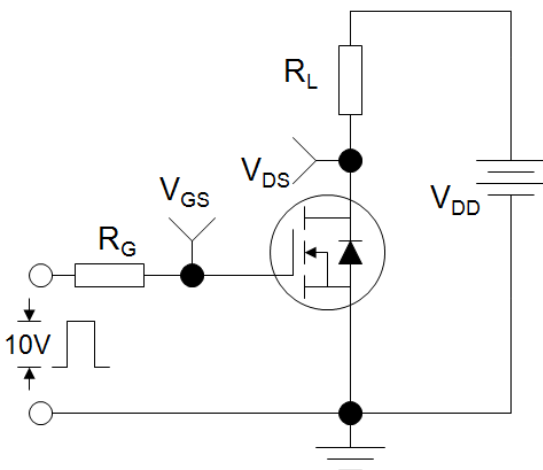
**Notes**

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. Identical low side and high side switch with identical  $R_G$
3. EAS condition :  $T_J=25, V_{DD}=50V, V_G=10V, L=0.5mH, R_G=25\Omega$

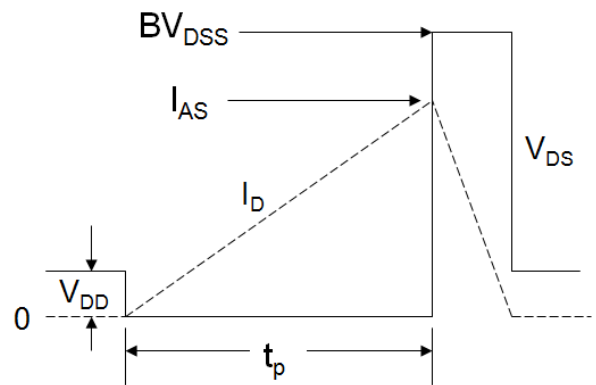
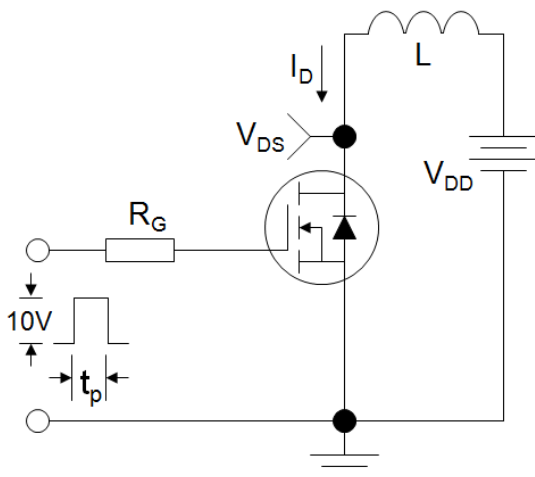
Gate Charge Test Circuit



EAS Test Circuit



Switch Time Test Circuit



Typical Characteristics  $T_J = 25^\circ\text{C}$ , unless otherwise noted

Figure 1. Output Characteristics

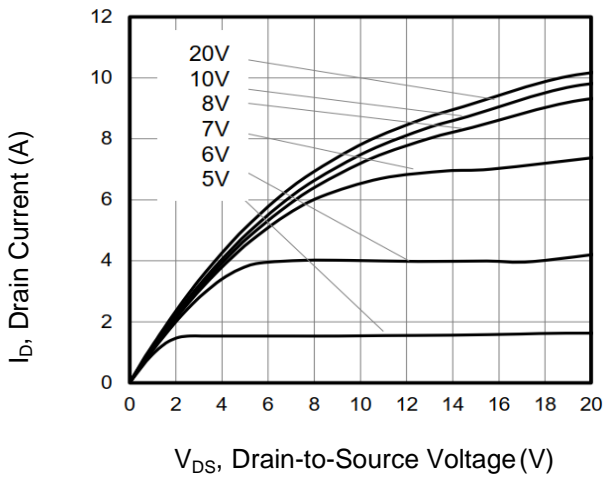


Figure 2. Transfer Characteristics

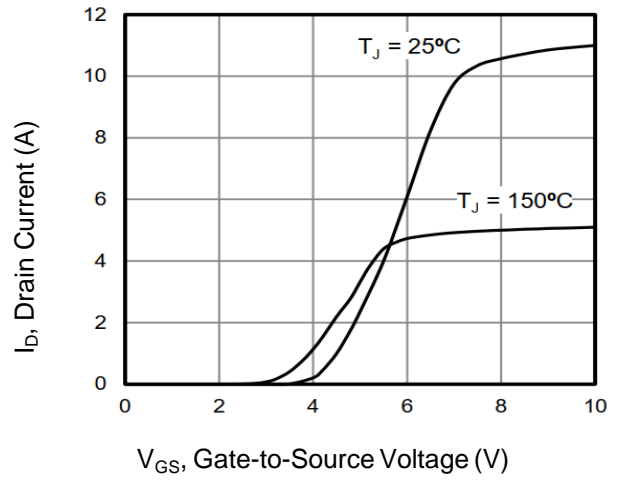


Figure 3. Gate Charge

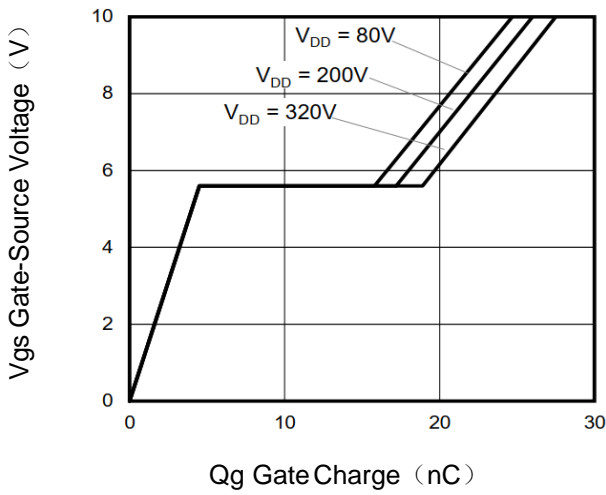


Figure 3. Drain Current vs. Temperature

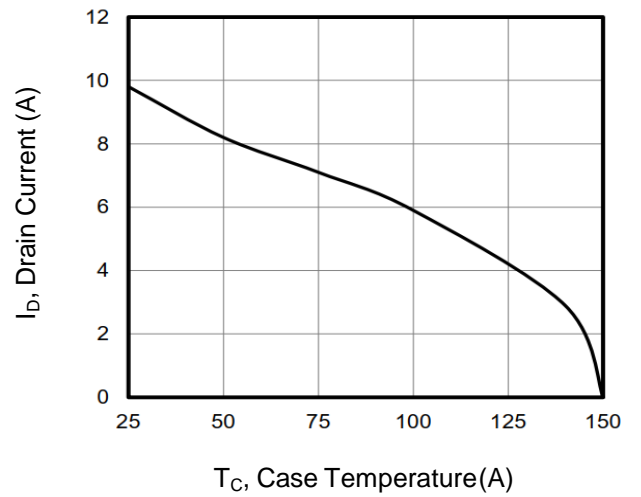


Figure 5. Capacitance vs Vds

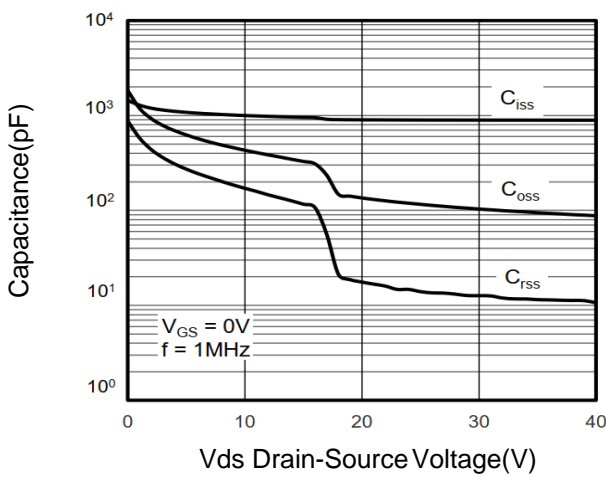
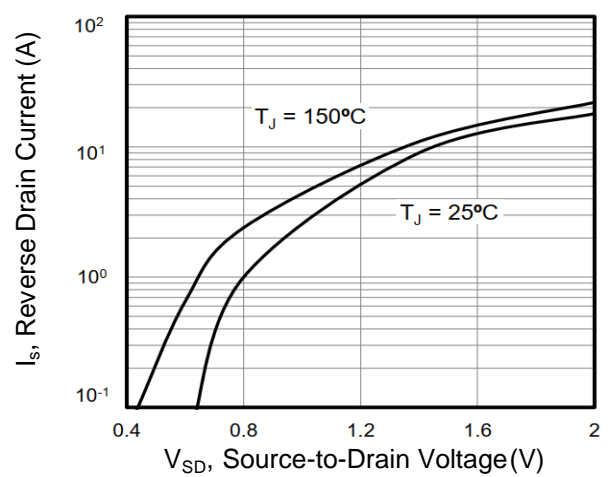


Figure 6. Source-Drain Diode Forward



Typical Characteristics  $T_J = 25^\circ\text{C}$ , unless otherwise noted

Figure 7. Drain-Source On-Resistance

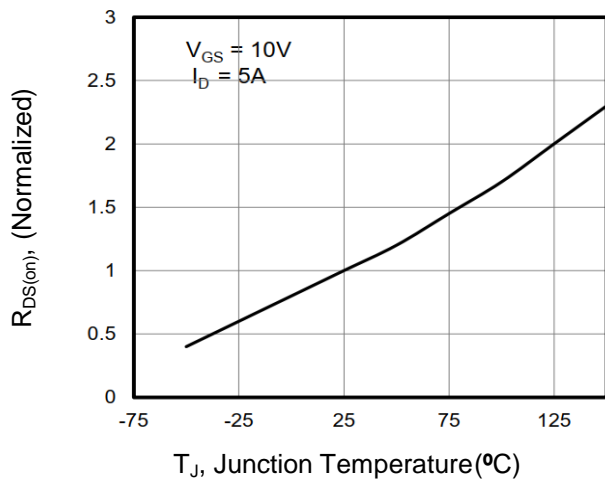
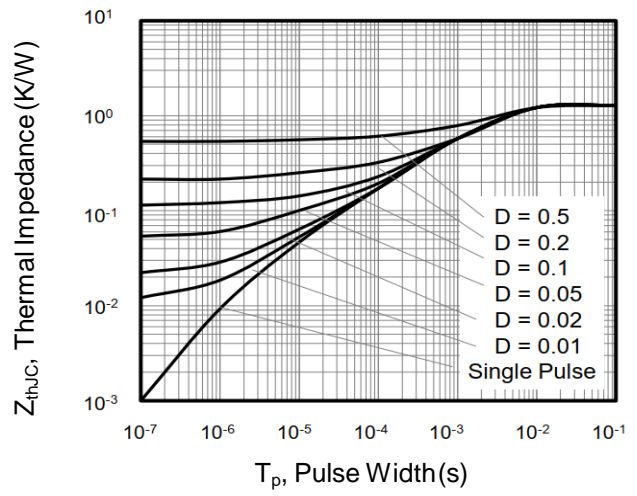
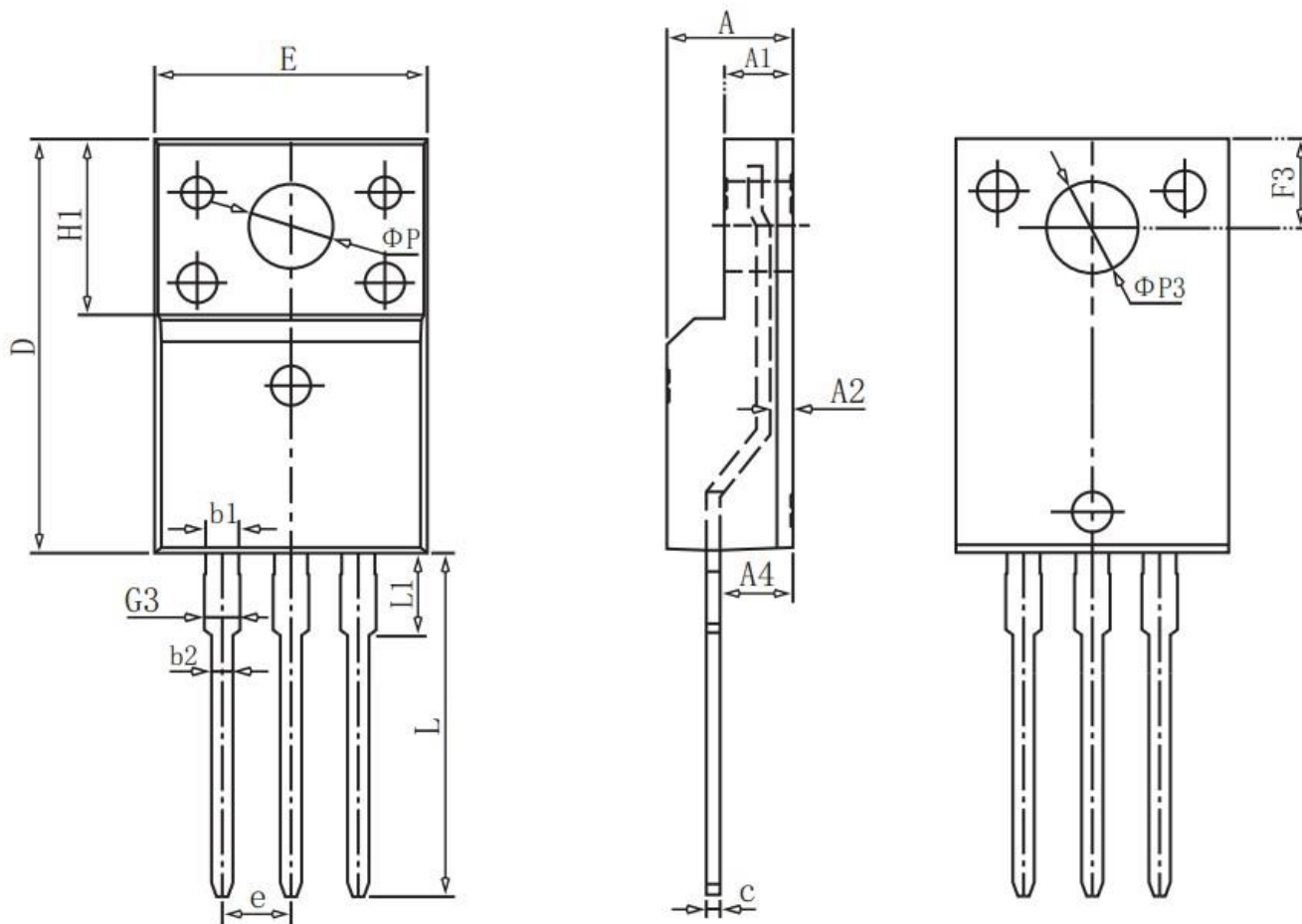


Figure 8. Transient Thermal Impedance



TO-220F Package Information



COMMON DIMENSIONS

SYMBOL	mm		
	MIN	NOM	MAX
E	10.00	10.20	10.40
A	4.50	4.70	4.90
A1	2.34	2.54	2.74
A2	0.65	0.85	1.30
A4	2.55	2.75	2.95
c	0.40	0.50	0.65
D	15.57	15.87	16.17
H1	6.70REF		
e	2.54BSC		
$\Phi P$	3.183REF		
L	12.68	12.98	13.28
L1	3.25	3.45	3.65
$\Phi P3$	3.45REF		
F3	3.10	3.30	3.50
G3	1.10	1.30	1.50
b1	1.05	1.20	1.35
b2	0.70	0.80	0.92