

9A 900V N-Channel Power MOSFET

General Description

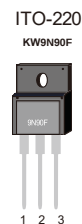
These are N-channel enhancement mode power field effect transistors. It optimized stripe cell structure design improves the EAS capability of the device. Which accords with the RoHS standard.

Features

- Low on-resistance
- Low reverse transfer capacitance
- 100% avalanche tested

Mechanical Data

- Case: ITO-220 Package



Application

- LED power switch circuit
- Electronic ballast
- Switch mode power supply
- Electronic transformer

Ordering Information

Part No.	Package Type	Package	Quality(box)
KW9N90F	ITO-220	Tube	1000

Product Summary			
VDS	RDS(on) (Ω) Max	ID (A)	Qg (Typ)
900V	1.5 @ 10V, 4.5A	9	65nc

Pin Definition:

1. Gate
2. Drain
3. Source

Block Diagram

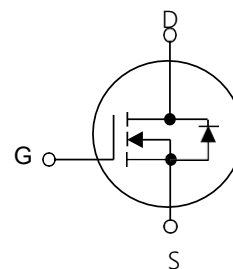


Table1 Absolute Maximum Ratings (Tc=25°C, unless otherwise specified)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	VDS	900	V
Gate-Source Voltage	VGS	±30	V
Continuous Drain Current	ID	9 *	A
		5.7 *	
Pulsed Drain Current (Note 1)	IDM	36	A
Single Pulse Avalanche Energy (Note 2)	EAS	245	mJ
Power Dissipation Tc=25°C	PD	41	W
Operating Junction and Storage Temperature	TJ/TSTG	-55~+150	°C

※ limited by maximum junction temperature

Table 2. Thermal Characteristics

Parameters	Symbol	Value	Unit
Thermal resistance Junction to Ambient	$R_{\theta JA}$	62.5	$^{\circ}\text{C/W}$
Thermal resistance Junction to Case	$R_{\theta JC}$	3.02	$^{\circ}\text{C/W}$

Table 3. Electrical Characteristics ($T_J=25^{\circ}\text{C}$, unless otherwise specified)

Parameter		Symbol	Test Conditions	Min	Typ	Max	Unit
Off Characteristics							
Drain-Source Breakdown Voltage		BV _{DSS}	V _{GS} =0V,I _D =250μA	900	-	-	V
Drain-Source Leakage Current		I _{DSS}	V _{DS} =900V,V _{GS} =0V	-	-	1	μA
Gate- Source Leakage Current	Forward	I _{GSS}	V _{GS} =30V,V _{DS} =0V	-	-	100	nA
	Reverse		V _{GS} =-30V,V _{DS} =0V	-	-	-100	nA
On Characteristics(Note 3)							
Gate Threshold Voltage		V _{GS} (TH)	V _{DS} =V _{GS} ,I _D =250μA	2.0	-	4.0	V
Static Drain-Source On-State Resistance		R _{DS} (ON)	V _{GS} =10V,I _D =4.5A	-	-	1.50	Ω
Dynamic Characteristics(Note 4)							
Input Capacitance		C _{ISS}	V _{DS} =25V,V _{GS} =0V,f=1MHz	-	2212	-	pF
Output Capacitance		C _{OSS}		-	133	-	pF
Reverse Transfer Capacitance		C _{RSS}		-	13	-	pF
Switching Characteristics (Note 4)							
Turn-On Delay Time		t _d (on)	V _{DD} =450V,I _D =4A R _G =4.7Ω,V _{GS} =10V	-	22	-	ns
Turn-On Rise Time		t _r		-	9	-	ns
Turn-Off Delay Time		t _d (off)		-	62	-	ns
Turn-Off Fall Time		t _f		-	23	-	ns
Total Gate Charge		Q _G	V _{DS} =450V,I _D =9A, V _{GS} =10V	-	48	-	nC
Gate-Source Charge		Q _{GS}		-	12	-	nC
Gate-Drain Charge		Q _{GD}		-	20	-	nC
Drain-Source Diode Characteristics and Maximum Ratings							
Drain-Source Diode Forward Voltage		V _{SD}	V _{GS} =0V, I _S =9A	-	-	1.5	V
Maximum Continuous Drain-Source Diode Forward Current		I _S		-	-	9	A
Reverse Recovery Time		t _{rr}	V _{GS} =0V, I _F =9A	-	1.2	-	μs
Reverse Recovery Charge		Q _{RR}	dI _F /dt=100A/μs (Note 1)	-	9.4	-	μC

Notes : 1 Repetitive Rating:Pulse width limited by maximum junction temperature

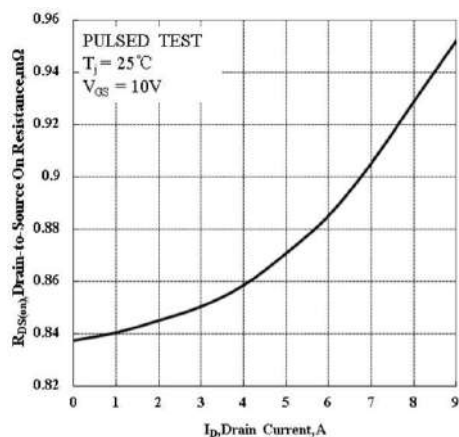
2 $L=10\text{mH}, I_D=7A, V_{DD}=50V$, Starting $T_J=25^{\circ}\text{C}$

3 Pulse Test: Pulse width $\leq 300\mu s$, Duty cycles $\leq 2\%$

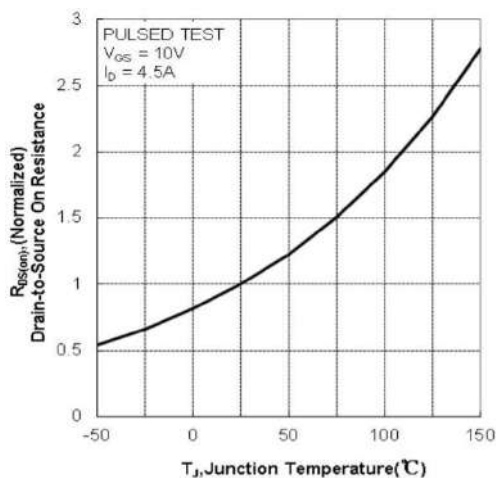
4Guaranteed by design,not subject to production

Typical Characteristics Diagrams

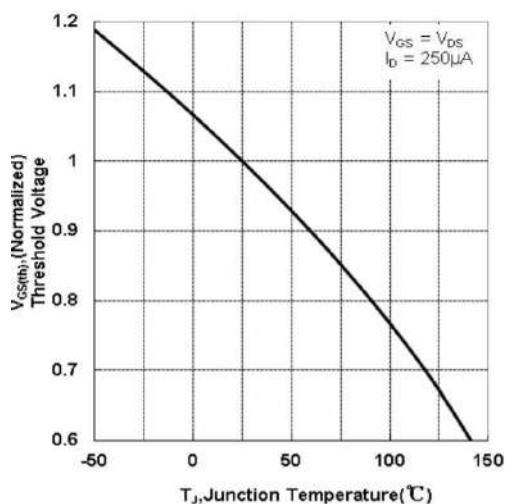
Typical Drain to Source ON Resistance vs Drain Current



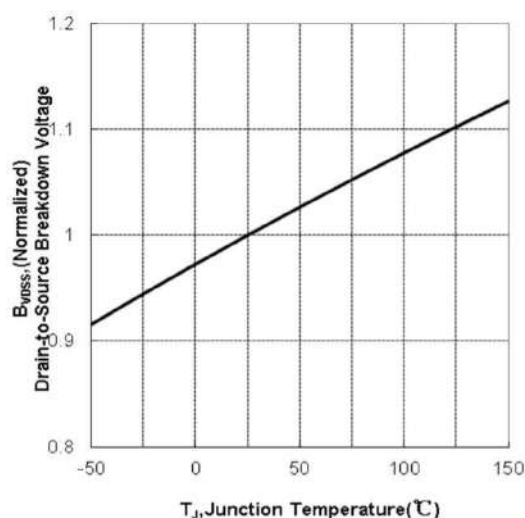
Typical Drain to Source on Resistance vs Junction Temperature



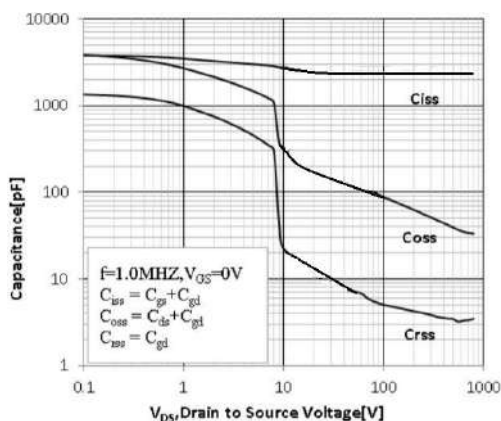
Typical Threshold Voltage vs Junction Temperature



Typical Breakdown Voltage vs Junction Temperature



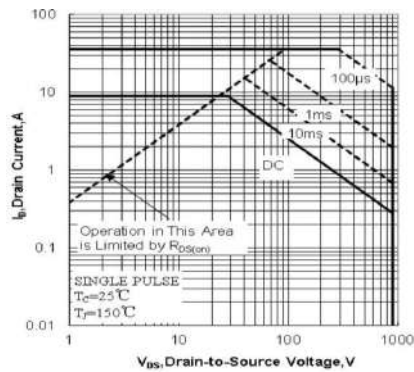
Typical Capacitance vs Drain to Source Voltage



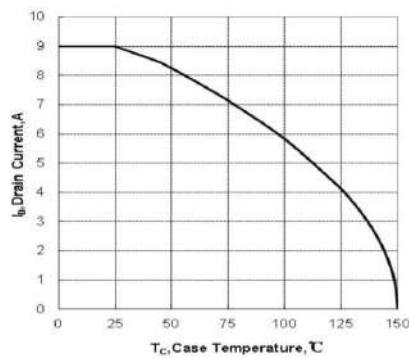
Typical Gate Charge vs Gate to Source Voltage



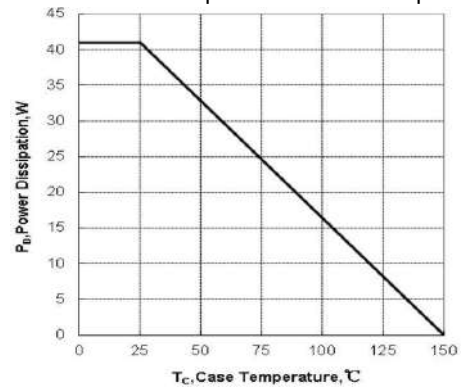
Maximum Forward Bias Safe Operating Area



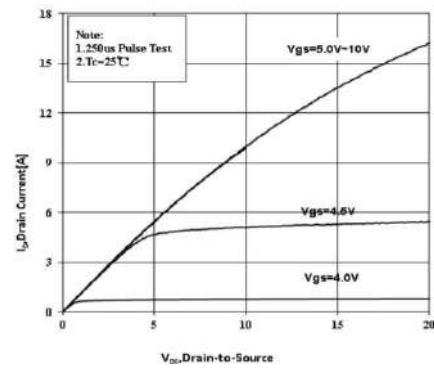
Maximum Continuous Drain Current vs Case Temperature



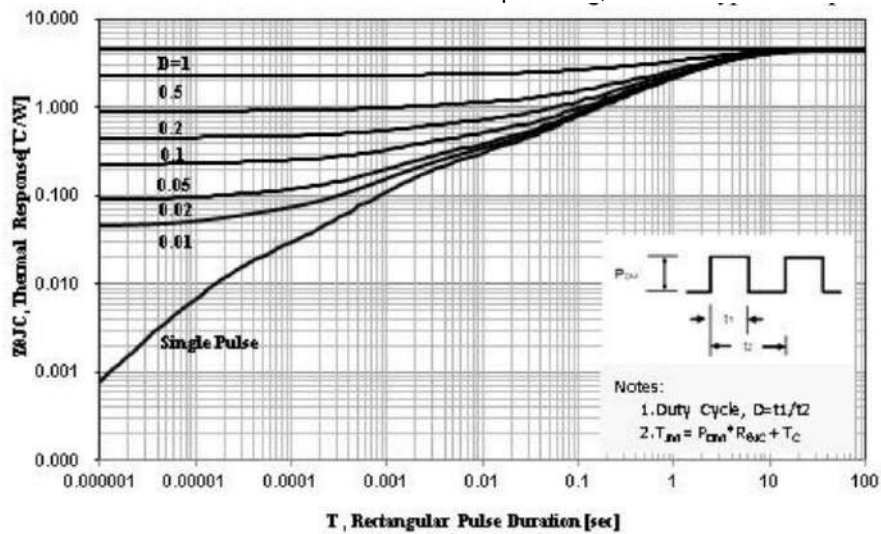
Maximum Power dissipation vs Case Temperature



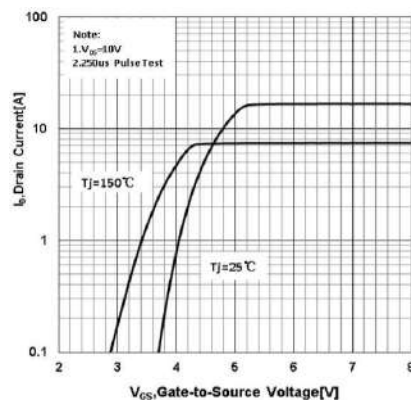
Typical Output Characteristics



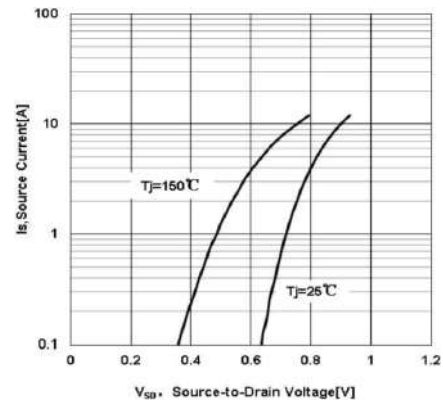
Maximum Effective Thermal Impedance, Junction to Case



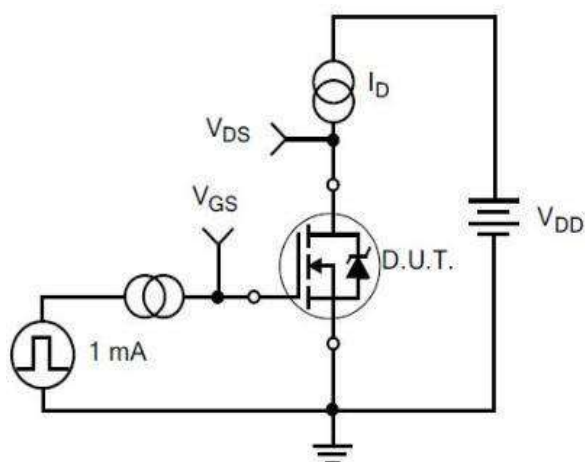
Typical Transfer Characteristics



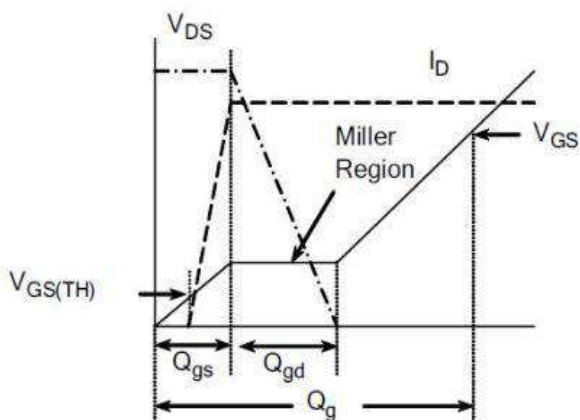
Typical Body Diode Transfer Characteristics



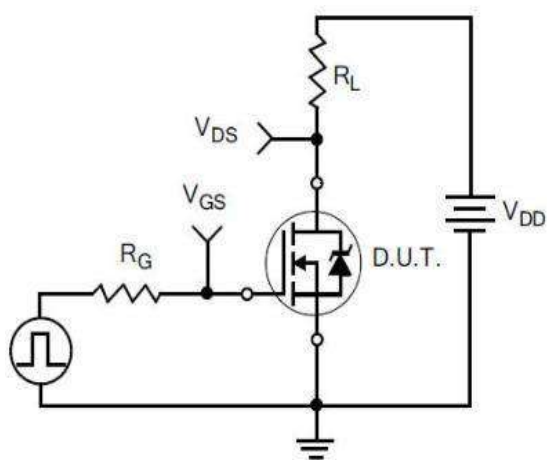
Typical Test Circuit



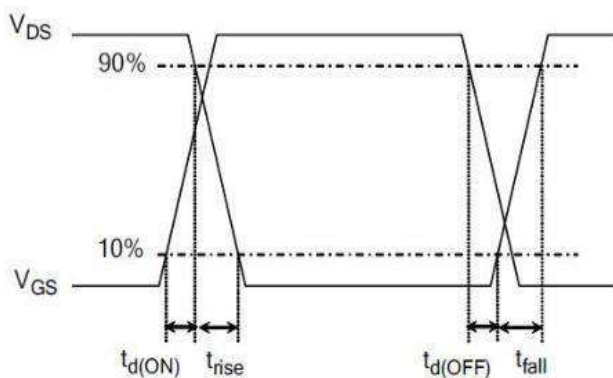
1) Gate Charge Test Circuit



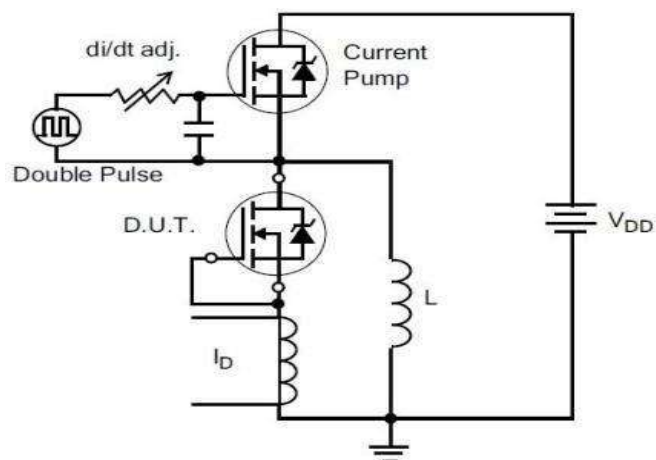
2) Gate Charge Waveform



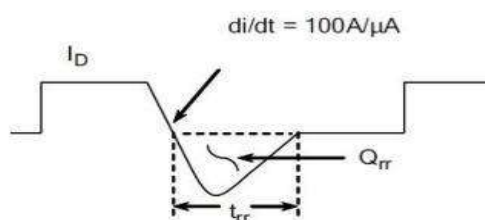
3) Resistive Switching Test Circuit



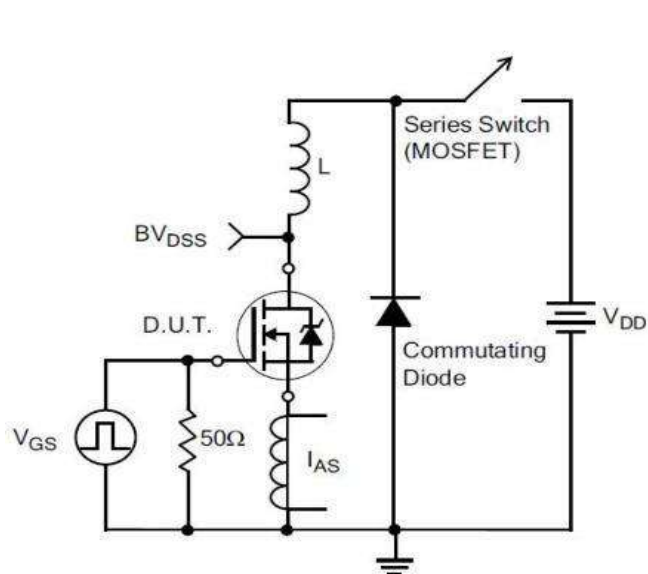
4) Resistive Switching Waveforms



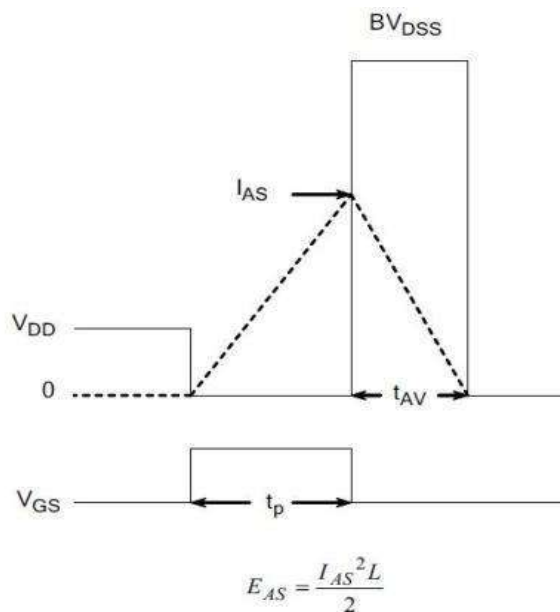
5) Diode Reverse Recovery Test Circuit



6) Diode Reverse Recovery Waveform



7) . Unclamped Inductive Switching Test Circuit



8) Unclamped Inductive Switching Waveforms

Product Names Rules

X X X N E X X X-X X X

Process Type:
 VDMOS:default
 Super junction:SJ
 Low Voltage trench:D

Rdson Code
 2 Ω :2D0
 9.5m Ω :9M5

Rated Current Code
 With 1-2 Digital,
 For Ex ample:
 4A:4,
 10A:10,
 0.8A:08

Package Code
 TO-220:Default
 ITO-220:F
 TO-262:E
 TO-263:D
 TO-252:M
 TO-251:N
 TO-263-7L:D7

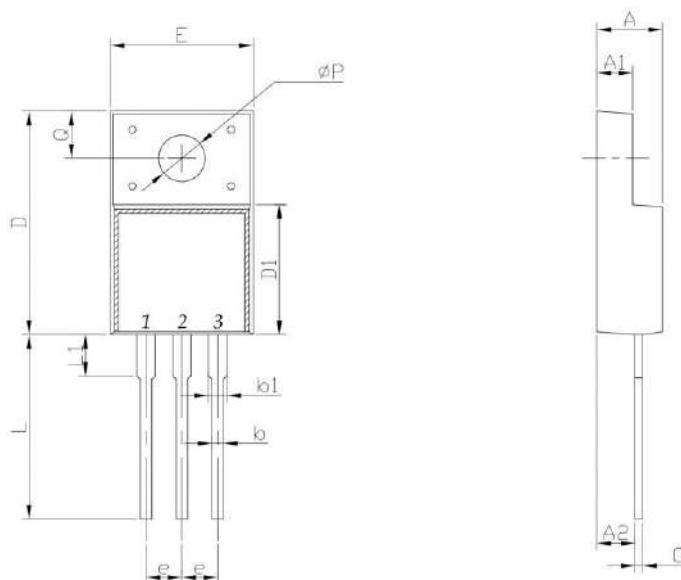
Channel Code
 N channel:N
 P channel:P

Rated Voltage Code
 With 2 Digital,For Example:
 600V:60
 60V:06

Special Function Code
 G-S ESD Protection:E
 No Protection:Default

Dimensions

ITO-220 PACKAGE OUTLINE DIMENSIONS



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	4.24	4.9	0.167	0.193
A1	2.3	2.92	0.091	0.115
A2	2.61	2.81	0.103	0.111
b	0.3	1	0.012	0.039
b1	0.9	1.55	0.035	0.061
C	0.3	0.7	0.012	0.028
D	14.5	16.36	0.571	0.644
D1	8.8	9.41	0.346	0.370
E	9.5	10.5	0.374	0.413
e	2.3	2.75	0.091	0.108
L	12.6	14	0.496	0.551
L1	2.45	4.3	0.096	0.169
P	2.9	3.8	0.114	0.150
Q	2.5	3.55	0.098	0.140