

### General Description:

The LW09N90SK uses advanced VDMOS technology and design to provide excellent  $R_{DS(ON)}$  with low gate charge. It can be used in a wide variety of applications. The package form is TO-247, which accords with the ROHS standard.

### Features:

- Fast Switching
- Low Gate Charge and  $R_{dson}$
- Low Reverse transfer capacitances

### Applications:

- Power switching application
- Hard switched and high frequency circuits

**100% DVDS Tested**

**100% Avalanche Tested**



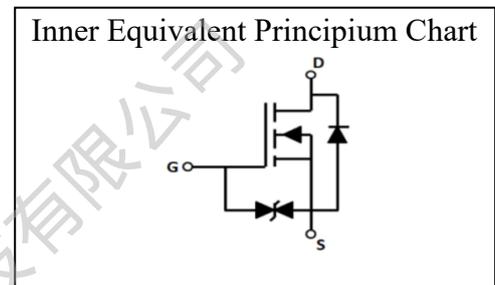
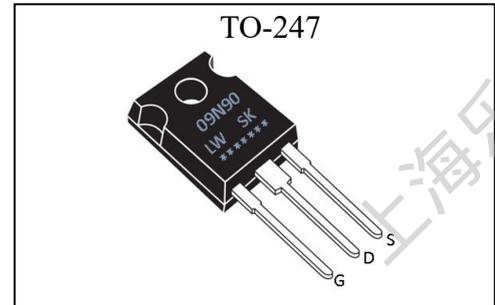
### Package Marking and Ordering Information:

Marking	Part #	Package	Packing	Qty.
09N90	LW09N90SK	TO-247	Tube	25 units

### Absolute Maximum Ratings ( $T_A = 25^\circ\text{C}$ unless otherwise specified):

Symbol	Parameter	Rating	Units
$V_{DSS}$	Drain-to-Source Voltage	900	V
$I_D$	Continuous Drain Current	9	A
	Continuous Drain Current $T_C = 100^\circ\text{C}$	5.7	A
$I_{DM}^{a1}$	Pulsed Drain Current	36	A
$V_{GS}$	Gate-to-Source Voltage	$\pm 30$	V
$E_{AS}^{a2}$	Single Pulse Avalanche Energy	557	mJ
$P_D$	Power Dissipation	277	W
$T_J, T_{STG}$	Operating Junction and Storage Temperature Range	150, -55 to 150	$^\circ\text{C}$
$T_L$	Maximum Temperature for Soldering	260	$^\circ\text{C}$

$V_{DSS}$	900	V
$I_D$	9	A
$P_D (T_C=25^\circ\text{C})$	277	W
$R_{DS(ON)}$ TYPE	0.9	$\Omega$



**Electrical Characteristics** (Tc= 25°C unless otherwise specified) :

<b>OFF Characteristics</b>						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
V <sub>DSS</sub>	Drain to Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA	900	--	--	V
I <sub>DSS</sub>	Drain to Source Leakage Current	V <sub>DS</sub> = 900V, V <sub>GS</sub> = 0V, T <sub>a</sub> = 25°C	--	--	25	μA
		V <sub>DS</sub> =720V, V <sub>GS</sub> = 0V, T <sub>a</sub> = 125°C	--	--	250	
I <sub>GSS(F)</sub>	Gate to Source Forward Leakage	V <sub>GS</sub> =+30V	--	--	10	μA
I <sub>GSS(R)</sub>	Gate to Source Reverse Leakage	V <sub>GS</sub> =-30V	--	--	-10	μA

<b>ON Characteristics</b>						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
R <sub>DS(ON)</sub>	Drain-to-Source On-Resistance	V <sub>GS</sub> =10V, I <sub>D</sub> =4.5A	--	0.9	1.3	Ω
V <sub>GS(TH)</sub>	Gate Threshold Voltage	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA	3		5	V
Pulse width tp≤380μs, δ≤2%						

<b>Dynamic Characteristics</b>						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
g <sub>fs</sub>	Forward Transconductance	V <sub>DS</sub> =40V, I <sub>D</sub> =4.5A	--	11	--	S
C <sub>iss</sub>	Input Capacitance	V <sub>GS</sub> = 0V V <sub>DS</sub> = 25V f = 1.0MHz	--	2620	--	pF
C <sub>oss</sub>	Output Capacitance		--	180	--	
C <sub>rss</sub>	Reverse Transfer Capacitance		--	20	--	

<b>Resistive Switching Characteristics</b>						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
t <sub>d(OFF)</sub>	Turn-Off Delay Time	I <sub>D</sub> =9.0A V <sub>DS</sub> =450V V <sub>GS</sub> = 10V R <sub>G</sub> = 25Ω	--	100	--	ns
Q <sub>g</sub>	Total Gate Charge	I <sub>D</sub> =9A V <sub>DD</sub> =720V V <sub>GS</sub> = 10V	--	55	--	nC
Q <sub>gs</sub>	Gate to Source Charge		--	15	--	
Q <sub>gd</sub>	Gate to Drain ("Miller") Charge		--	20	--	

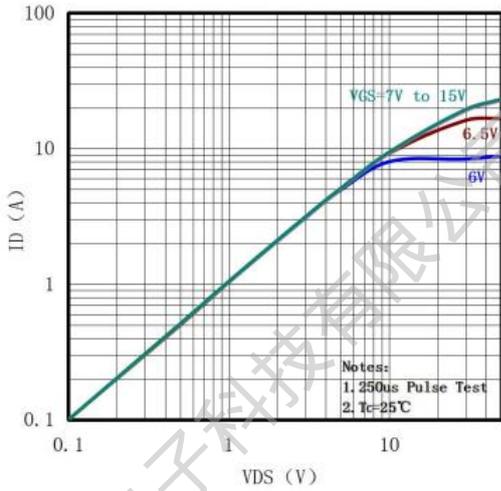
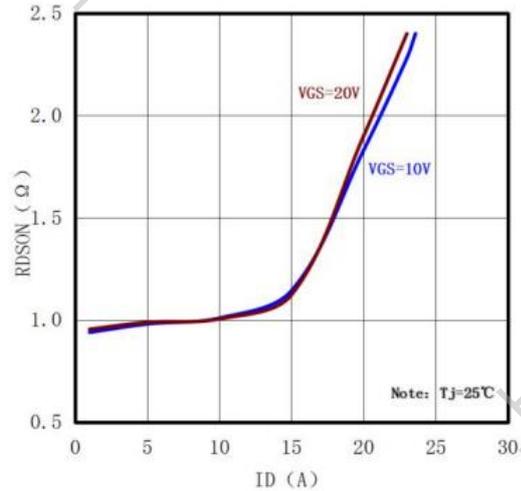
Source-Drain Diode Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
I <sub>S</sub>	Continuous Source Current (Body Diode)		--	--	9	A
V <sub>SD</sub>	Diode Forward Voltage	T <sub>j</sub> = 25° , I <sub>S</sub> =9.0A, V <sub>GS</sub> =0V	--	--	1.4	V
trr	Reverse Recovery Time	I <sub>S</sub> =9.0A, T <sub>j</sub> = 25°	--	550	--	ns
Q <sub>rr</sub>	Reverse Recovery Charge	dI <sub>F</sub> /dt=100A/us, V <sub>GS</sub> =0V	--	6.5	--	uC
Pulse width tp≤380μs, δ≤2%						

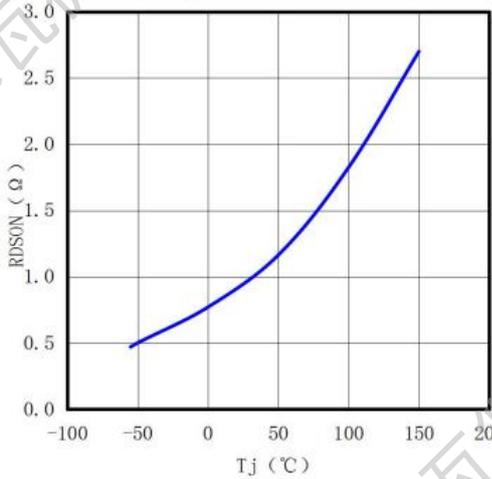
**Thermal Characteristics**

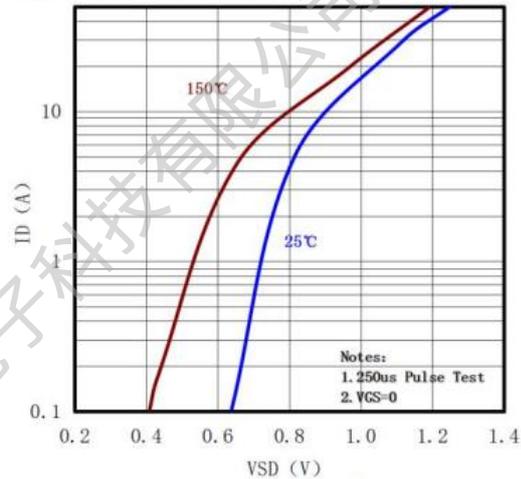
Symbol	Parameter	Typ.	Units
R <sub>θJC</sub>	Junction-to-Case	0.45	°C/W
R <sub>θJA</sub>	Junction-to-Ambient	40	°C/W

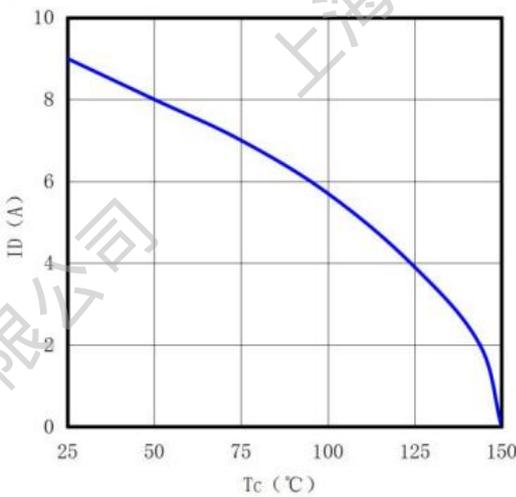
<sup>a1</sup>: Repetitive rating; pulse width limited by maximum junction temperature

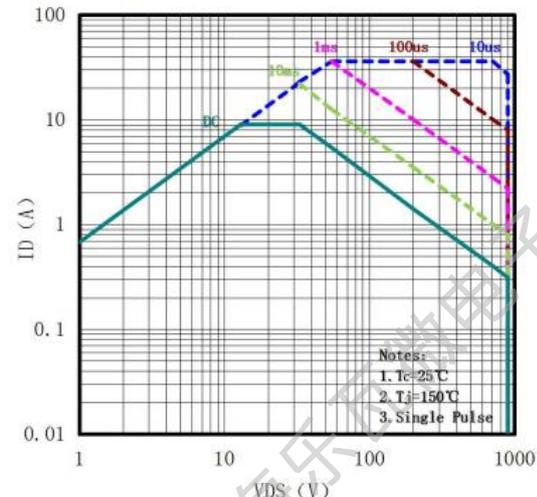
<sup>a2</sup>: V<sub>DD</sub>=50V, L=13.0mH, R<sub>G</sub>=25 Ω, I<sub>AS</sub>=9A, Start T<sub>j</sub>=25°C

**Typical Performance Characteristics**

**图 1** 输出特性曲线,  $T_c=25^\circ\text{C}$ 
**Fig1** Typical Output Characteristics,  $T_c=25^\circ\text{C}$ 

**图 2** 导通电阻与漏极电流和栅极电压曲线

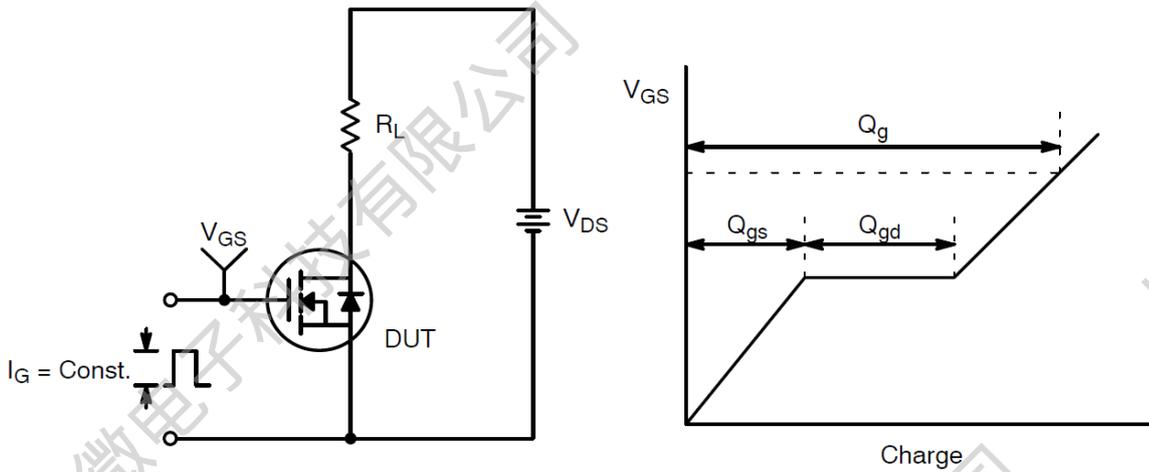
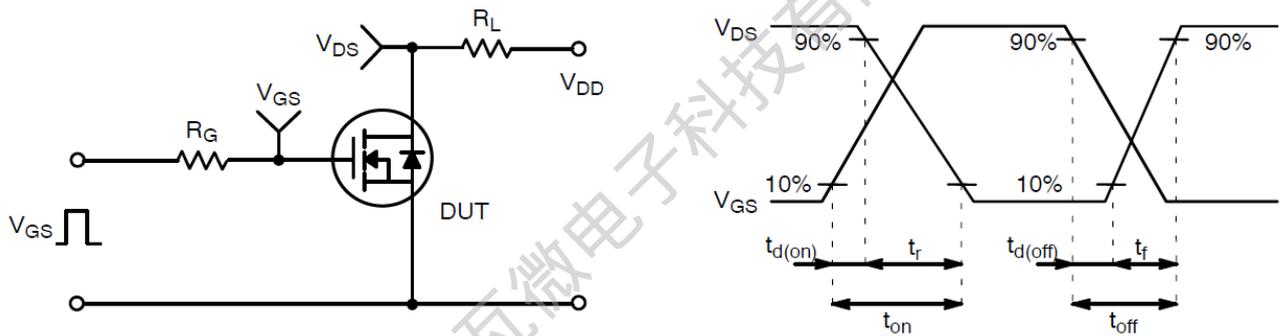
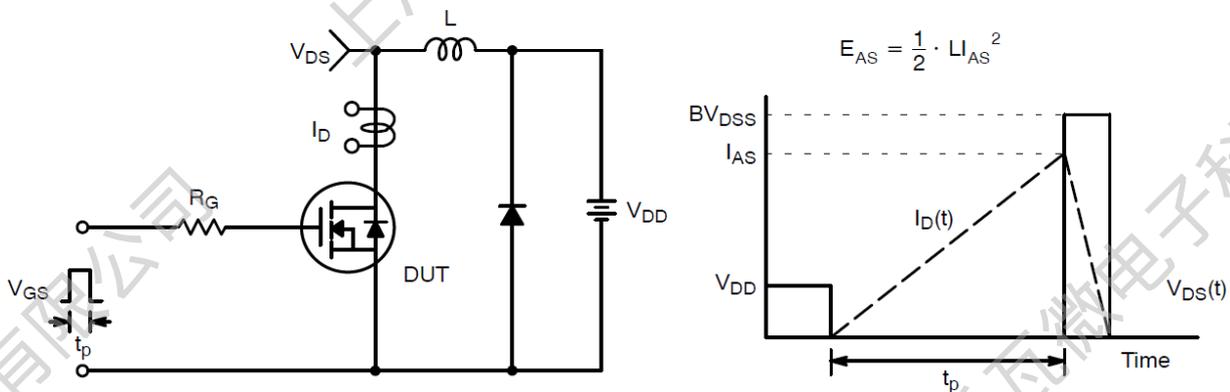
**Fig2** On-Resistance Vs. Drain Current and Gate Voltage

**图 3** 导通电阻与温度曲线

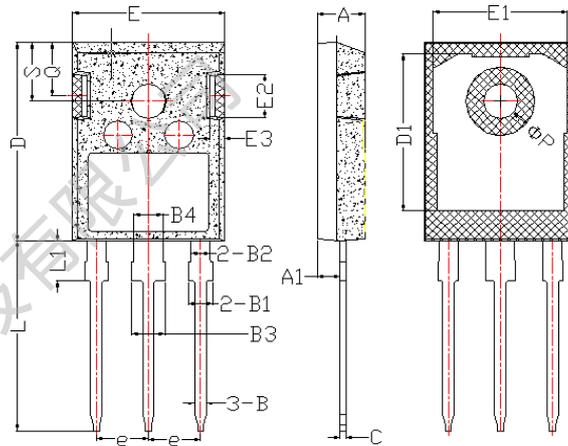
**Fig3** Normalized On-Resistance Vs. Temperature

**图 4** 二极管正向电压曲线

**Fig4** Typical Source-Drain Diode Forward Voltage

**图 5** 最大漏极电流与壳温曲线

**Fig5** Maximum Drain Current Vs. Case Temperature

**图 6** 最大安全工作区曲线

**Fig6** Maximum Safe Operating Area

**Test Circuit and Waveform:**

**Gate Charge Test Circuit & Waveform**

**Resistive Switching Test Circuit & Waveforms**

**Unclamped Inductive Switching Test Circuit & Waveforms**

**Package Information**


Items	Values(mm)	
	MIN	MAX
A	4.83	5.21
A1	2.27	2.54
B	1.07	1.33
B1	1.90	2.41
B2	1.90	2.16
B3	2.87	3.38
B4	2.87	3.13
C	0.55	0.68
D	20.80	21.10
D1	16.25	17.65
E	15.70	16.13
E1	13.10	14.15
E2	3.68	5.10
E3	1.00	2.60
e	5.44(BSC)	
L	19.80	20.32
L1	4.10	4.47
ΦP	3.50	3.70
Q	5.49	6.00
S	6.04	6.30

**Revision History**

Revision	Date	Descriptions
REV.1.1	Sep, 2019	“Add Marking Information and Package Information” Update
REV.1.0	Feb, 2019	Initial Version

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