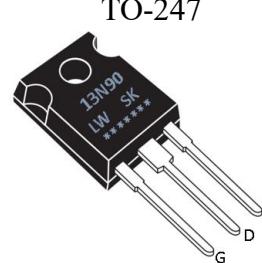


## General Description:

The LW13N90SK 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.

$V_{DSS}$	900	V
$I_D$	13	A
$P_D$ ( $T_C=25^\circ\text{C}$ )	297	W
$R_{DS(ON)}$ TYPE	0.6	$\Omega$



## Features:

- Fast Switching
- Low Gate Charge and Rdson
- Low Reverse transfer capacitances

## Applications:

- Power switching application
- Hard switched and high frequency circuits

**100% DVDS Tested**

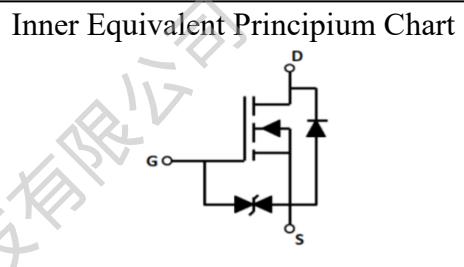
**100% Avalanche Tested**



H F

## Package Marking and Ordering Information:

Marking	Part #	Package	Packing	Qty.
13N90/LW SK/****	LW13N90SK	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	13.0	A
	Continuous Drain Current $T_C = 100^\circ\text{C}$	7	A
$I_{DM}^{a1}$	Pulsed Drain Current	52	A
$V_{GS}$	Gate-to-Source Voltage	$\pm 30$	V
$E_{AS}^{a2}$	Single Pulse Avalanche Energy	268	mJ
$P_D$	Power Dissipation	297	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	$^\circ\text{C}$

**Electrical Characteristics (T<sub>c</sub>= 25°C unless otherwise specified):**

OFF Characteristics						
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

ON Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
R <sub>D(S)</sub> (ON)	Drain-to-Source On-Resistance	V <sub>GS</sub> =10V, I <sub>D</sub> =6.5A	--	0.6	0.8	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%						

Dynamic Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
g <sub>fs</sub>	Forward Transconductance	V <sub>DS</sub> =40V, I <sub>D</sub> =6.5A	--	11	--	S
C <sub>iss</sub>	Input Capacitance		--	3450	--	pF
C <sub>oss</sub>	Output Capacitance	V <sub>GS</sub> = 0V V <sub>DS</sub> = 25V f = 1.0MHz	--	370	--	
C <sub>rss</sub>	Reverse Transfer Capacitance		--	40	--	

Resistive Switching Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
t <sub>d(OFF)</sub>	Turn-Off Delay Time	I <sub>D</sub> =13.0A V <sub>DS</sub> =450V V <sub>GS</sub> = 10V R <sub>G</sub> = 25Ω	--	140	--	ns
Q <sub>g</sub>	Total Gate Charge	I <sub>D</sub> =13A V <sub>DD</sub> =720V V <sub>GS</sub> = 10V	--	76	--	nC
	Gate to Source Charge		--	20	--	
	Gate to Drain ("Miller") Charge		--	27	--	

**Source-Drain Diode Characteristics**

Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
I <sub>S</sub>	Continuous Source Current (Body Diode)		--	--	13	A
V <sub>SD</sub>	Diode Forward Voltage	T <sub>j</sub> = 25°, I <sub>S</sub> =13.0A, V <sub>GS</sub> =0V	--	--	1.4	V
trr	Reverse Recovery Time	I <sub>S</sub> =13.0A, T <sub>j</sub> = 25°	--	1000	--	ns
Qrr	Reverse Recovery Charge	dI <sub>F</sub> /dt=100A/us, V <sub>GS</sub> =0V	--	20	--	uC

Pulse width tp≤380μs, δ≤2%

**Thermal Characteristics**

Symbol	Parameter	Typ.	Units
R <sub>θJC</sub>	Junction-to-Case	0.42	°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=3.0mH, R<sub>G</sub>=25 Ω, Start T<sub>J</sub>=25°C

## Typical Performance Characteristics

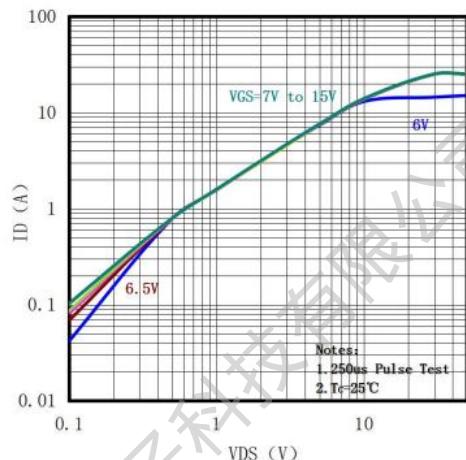


图1 输出特性曲线,  $T_c = 25^\circ\text{C}$

Fig1 Typical Output Characteristics,  $T_c = 25^\circ\text{C}$

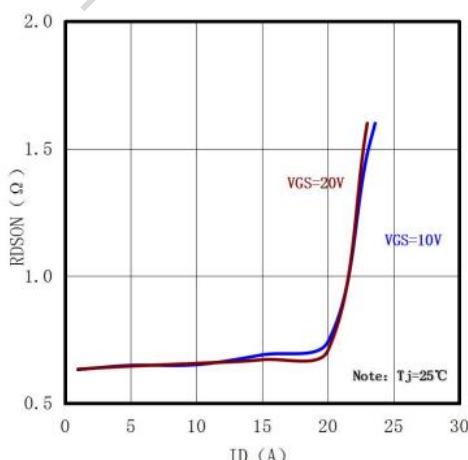


图2 导通电阻与漏极电流和栅极电压曲线

Fig2 On-Resistance Vs.Drain Current and Gate Voltage

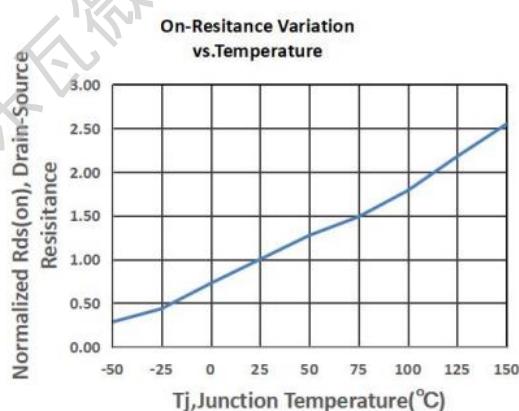


图3 导通电阻与温度曲线

Fig3 Normalized On-Resistance Vs.Temperature

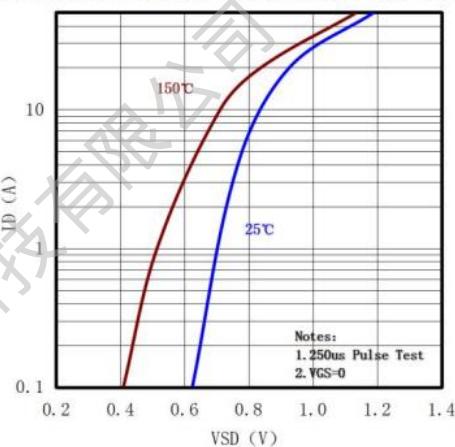


图4 二极管正向电压曲线

Fig4 Typical Source-Drain Diode Forward Voltage

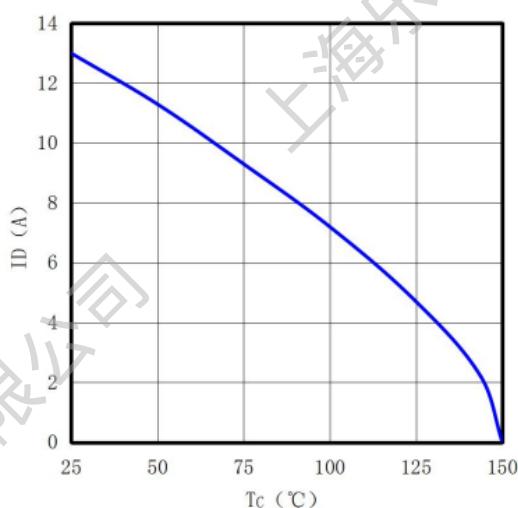


图5 最大漏极电流与壳温曲线

Fig5 Maximum Drain Current Vs.Case Temperature

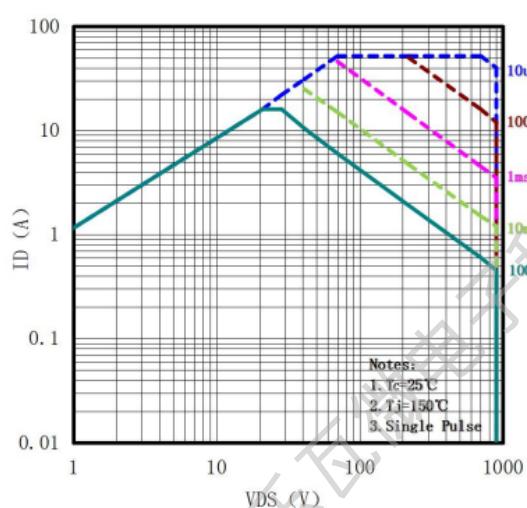
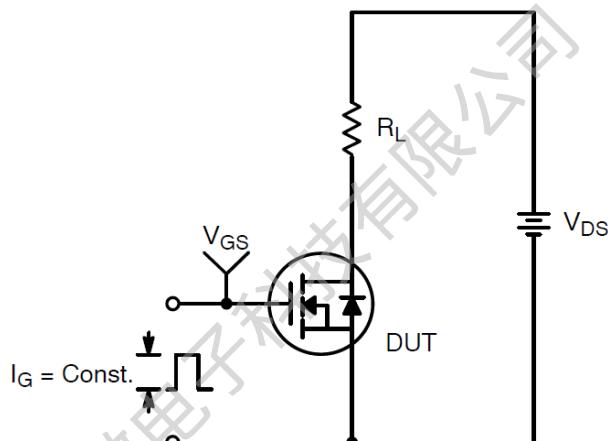


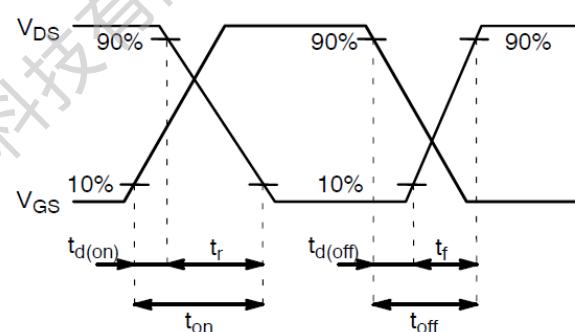
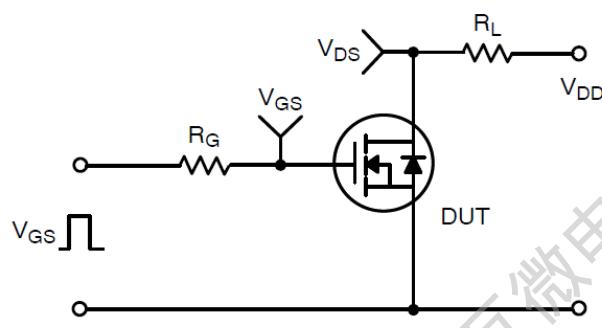
图6 最大安全工作区曲线

Fig6 Maximum Safe Operating Area

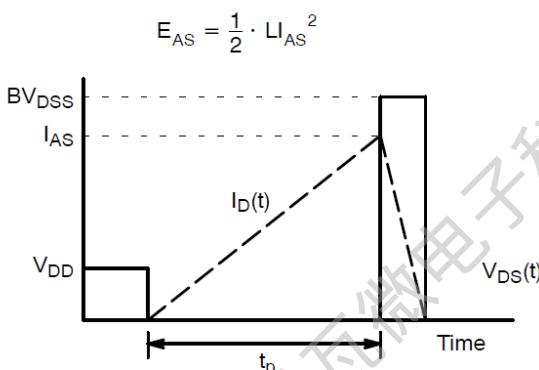
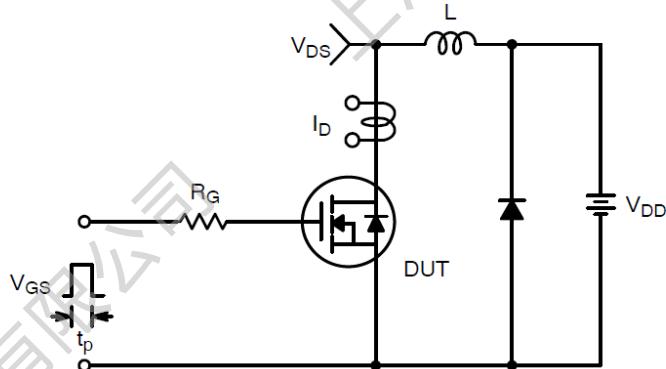
### Test Circuit and Waveform:



**Gate Charge Test Circuit & Waveform**

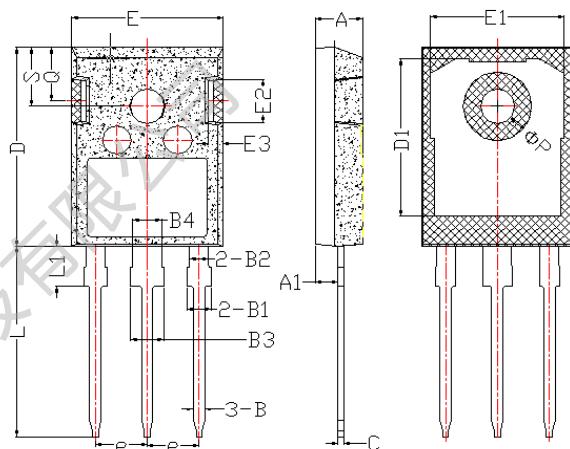


**Resistive Switching Test Circuit & Waveforms**



**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

**DISCLAIMER:**

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