

## 30V N-Channel Enhancement Mode MOSFET

### Description

The NP3090G uses advanced trench technology and design to provide excellent  $R_{DS(ON)}$  with low gate charge. It can be used in a wide variety of applications.

### General Features

- ◆  $V_{DS} = 30V$ ,  $I_D = 90A$   
 $R_{DS(ON)}(Typ.) = 3.8m\Omega @ V_{GS} = 10V$   
 $R_{DS(ON)}(Typ.) = 6m\Omega @ V_{GS} = 4.5V$   
 High power and current handling capability
- ◆ Lead free product is acquired
- ◆ Surface mount package

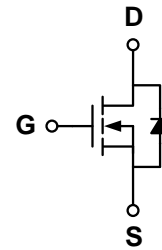
### Application

- ◆ Load switch

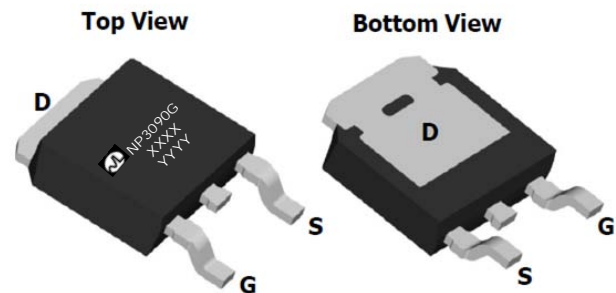
### Package

- ◆ TO-252-2L

### Schematic diagram



### Marking and pin assignment



XXXX—Wafer Information  
 YYYY—Quality Code

### Ordering Information

Part Number	Storage Temperature	Package	Devices Per Reel
NP3090G	-55°C to +150°C	TO-252-2L	2500

### Absolute Maximum Ratings (TA=25°C unless otherwise noted)

parameter	symbol	limit	unit	
Drain-source voltage	$V_{DS}$	30	V	
Gate-source voltage	$V_{GS}$	±20	V	
Continuous Drain Current	$I_D$	TC=25°C	90	A
		TC=100°C	70	
Pulsed Drain Current	$I_{DP}$	200	A	
Avalanche Current	$I_{AS}$	30	A	
Avalanche energy( L=0.5mH) <sup>(note1)</sup>	EAS	112	mJ	
Maximum power dissipation	$P_D$	TC=25°C	85	W
		TC=100°C	44	

Operating junction Temperature range	T <sub>j</sub>	-55—150	°C
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**Electrical Characteristics** (TA=25°C unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
<b>Static Characteristics</b>						
Drain-source breakdown voltage	BV <sub>DSS</sub>	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA	30	-	-	V
Zero gate voltage drain current	I <sub>DSS</sub>	V <sub>DS</sub> =30V, V <sub>GS</sub> =0V	-	-	1	μA
		T <sub>J</sub> =85°C	-	-	30	
Gate Leakage Current	I <sub>GSS</sub>	V <sub>DS</sub> =0V, V <sub>GS</sub> =±20V	-	-	±100	nA
Gate threshold voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	1.2	2	2.8	V
Drain-source on-state resistance <sup>1</sup>	R <sub>DS(ON)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =20A	-	3.8	5.2	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =20A	-	6	7.2	
On Status Drain Current	I <sub>D(ON)</sub>	V <sub>DS</sub> =10V, V <sub>GS</sub> =10V	90	-	-	A
<b>Diode Characteristics</b>						
Diode Forward Voltage <sup>1</sup>	V <sub>SD</sub>	I <sub>SD</sub> =50A, V <sub>GS</sub> =0V	-	0.8	1.1	V
Diode Continuous Forward Current	I <sub>S</sub>		-	90	-	A
Reverse Recovery Time	t <sub>rr</sub>	I <sub>F</sub> =20A, dI/dt=100A/us	-	34	-	ns
Reverse Recovery Charge	Q <sub>rr</sub>		-	30	-	nC
<b>Dynamic Characteristics<sup>2</sup></b>						
Gate Resistance	R <sub>G</sub>	V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, f=1MHz	-	0.65	-	Ω
Input capacitance	C <sub>ISS</sub>	V <sub>GS</sub> =0V, V <sub>DS</sub> =15V f=1.0MHz	-	1631	-	pF
Output capacitance	C <sub>OSS</sub>		-	240	-	
Reverse transfer capacitance	C <sub>RSS</sub>		-	212	-	
Turn-on delay time	t <sub>D(ON)</sub>	V <sub>GS</sub> =10V, V <sub>DS</sub> =15V, R <sub>L</sub> =20Ω, I <sub>D</sub> =1A, R <sub>G</sub> =6Ω	-	12	-	ns
Turn-on Rise time	t <sub>r</sub>		-	14.5	-	
Turn-off delay time	t <sub>D(OFF)</sub>		-	40	-	
Turn-off Fall time	t <sub>f</sub>		-	15	-	
Total gate charge	Q <sub>g</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =20A V <sub>DS</sub> =15V	-	34	-	nC
Gate-source charge	Q <sub>gs</sub>		-	4.8	-	
Gate-drain charge	Q <sub>gd</sub>		-	7.5	-	
<b>Drain-Source Diode Characteristics</b>						
Diode forward voltage	V <sub>SD</sub>	I <sub>SD</sub> =90A, V <sub>GS</sub> =0V	-	0.8	1.2	V

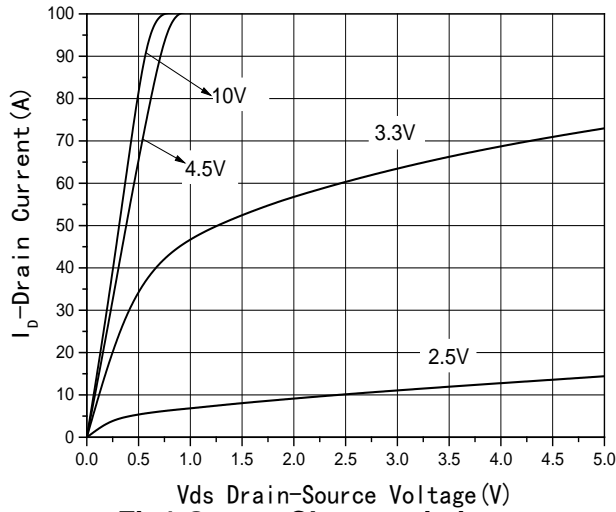
Note: 1: Pulse test; pulse width ≤ 300ns, duty cycle ≤ 2%.

2: Guaranteed by design, not subject to production testing.

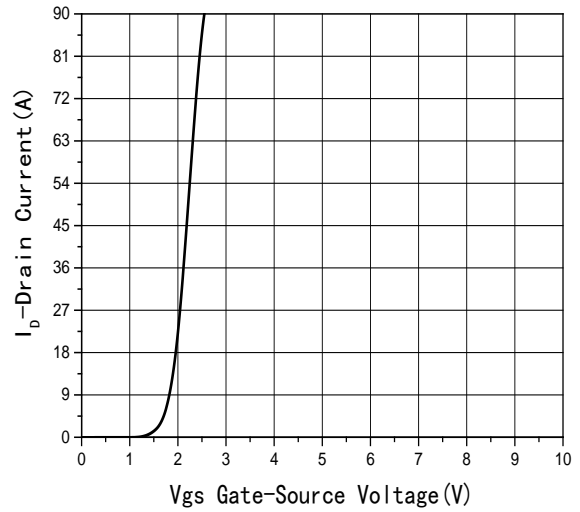
**Thermal Characteristics**

Parameter	Symbol	Typical	Unit
Thermal Resistance-Junction to Case	Rθ <sub>jc</sub>	1.7	°C/W
Thermal Resistance junction-to ambient	Rθ <sub>ja</sub>	62.5	

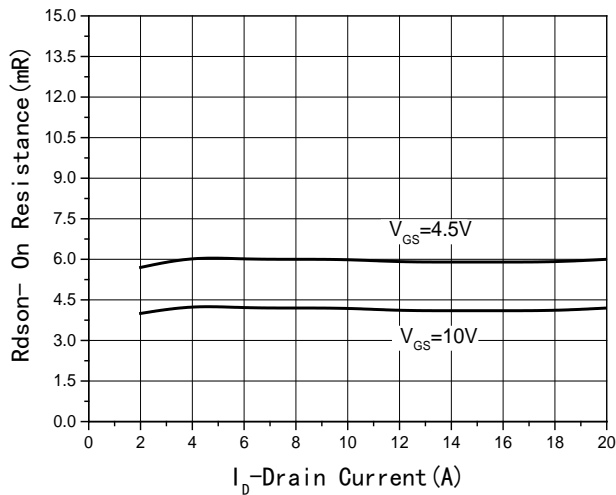
## Typical Performance Characteristics



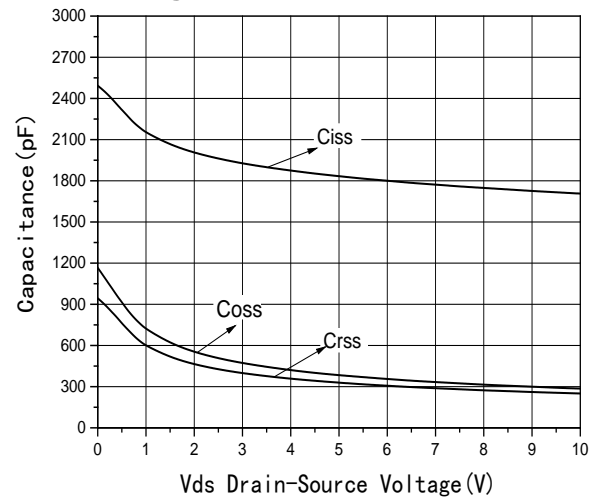
**Fig1 Output Characteristics**



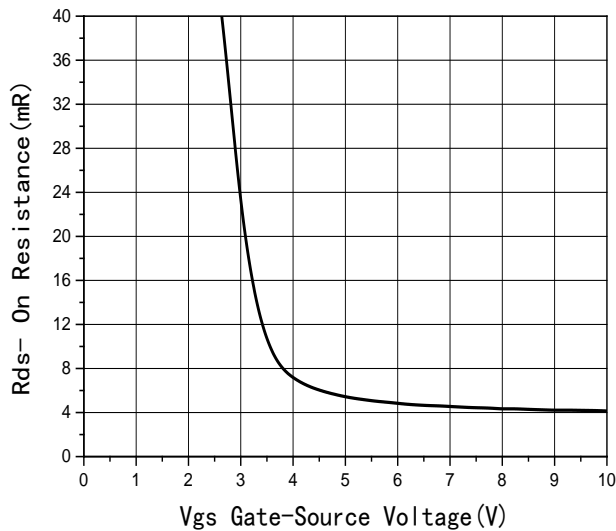
**Fig2 Transfer Characteristics**



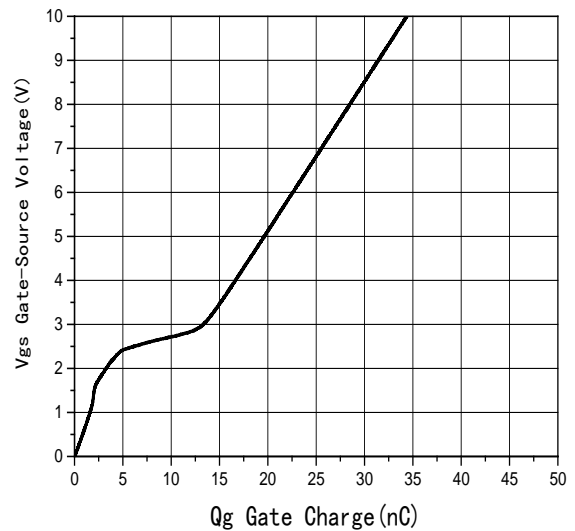
**Fig3  $R_{DS(on)}$ -Drain current**



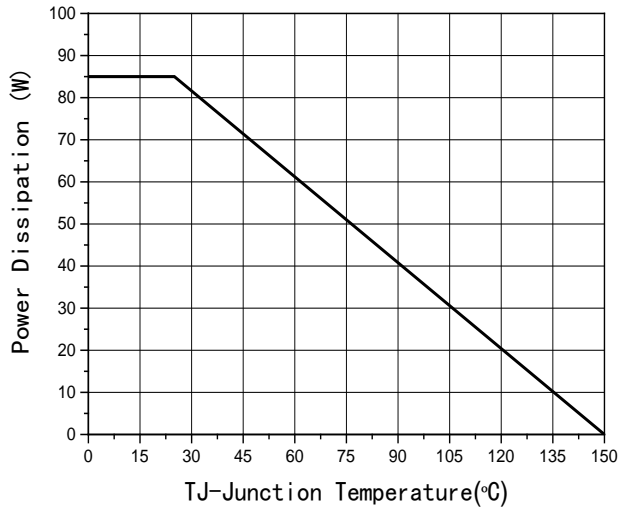
**Fig4 Capacitance vs  $V_{DS}$**



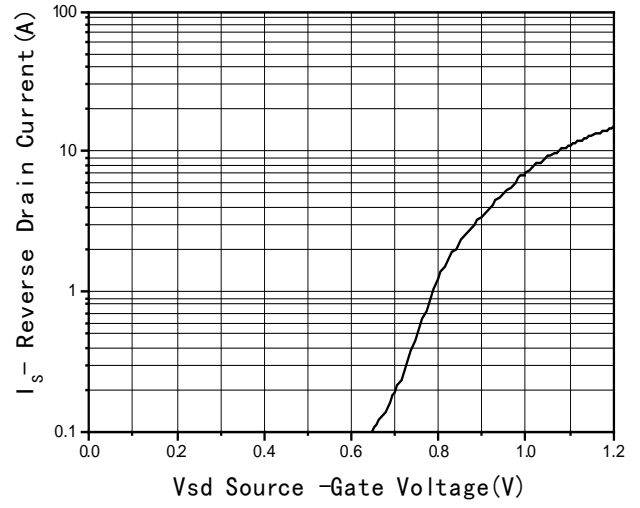
**Fig5  $R_{DS(on)}$ -Gate Drain voltage**



**Fig6 Gate Charge**



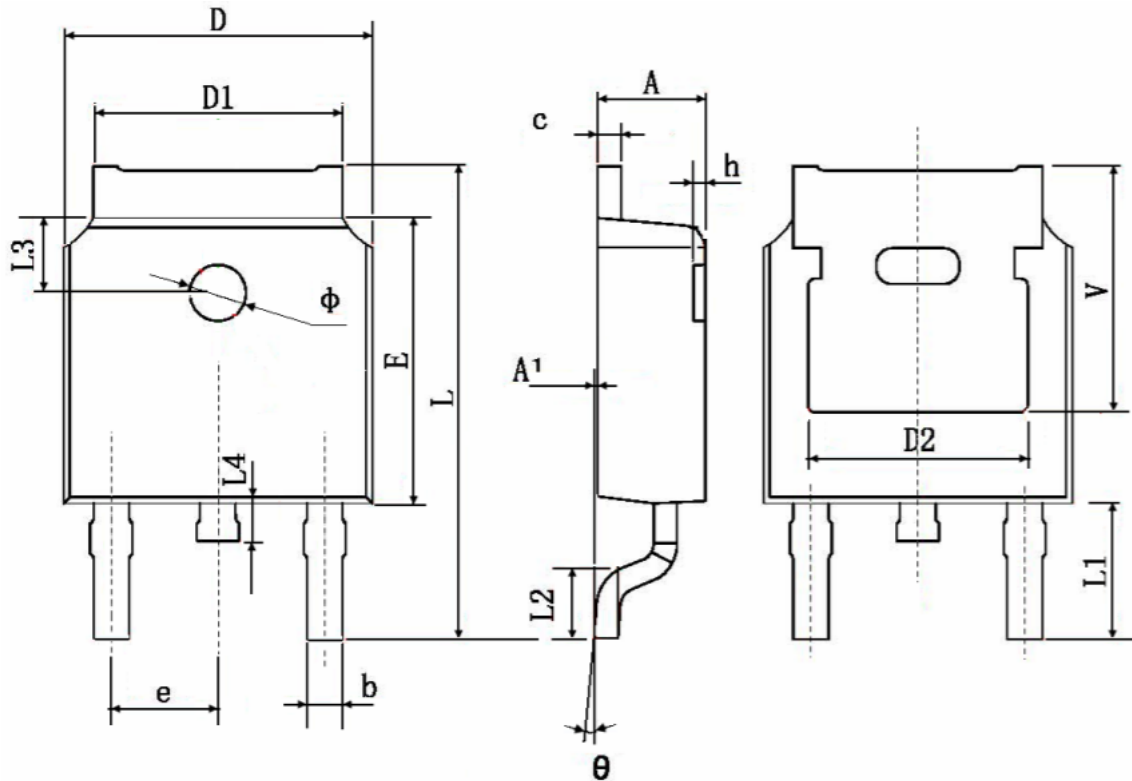
**Fig7 Power De-rating**



**Fig8 Source-Drain Diode Forward**

## Package Information

- TO-252-2L



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2.200	2.400	0.087	0.094
A1	0.000	0.127	0.000	0.005
b	0.660	0.860	0.026	0.034
c	0.460	0.580	0.018	0.023
D	6.500	6.700	0.256	0.264
D1	5.100	5.460	0.201	0.215
D2	4.830 TYP.		0.190 TYP.	
E	6.000	6.200	0.236	0.244
e	2.186	2.386	0.086	0.094
L	9.800	10.400	0.386	0.409
L1	2.900 TYP.		0.114 TYP.	
L2	1.400	1.700	0.055	0.067
L3	1.600 TYP.		0.063 TYP.	
L4	0.600	1.000	0.024	0.039
φ	1.100	1.300	0.043	0.051
θ	0°	8°	0°	8°
h	0.000	0.300	0.000	0.012
V	5.350 TYP.		0.211 TYP.	