

20V N-Channel Enhancement Mode MOSFET

Description

The NP2060G uses advanced trench technology to provide excellent $R_{DS(ON)}$ and low gate charge. It can be used in a wide variety of applications.

General Features

- ◆ $V_{DS} = 20V$, $I_D = 60A$
 $R_{DS(ON)}(Typ.) = 4.8m\Omega @V_{GS} = 4.5V$
 $R_{DS(ON)}(Typ.) = 6.2m\Omega @V_{GS} = 2.5V$
- ◆ High density cell design for ultra low R_{dson}
- ◆ Fully characterized avalanche voltage and current
- ◆ Good stability and uniformity with high E_{AS}
- ◆ Excellent package for good heat dissipation
- ◆ Special process technology for high ESD capability

Application

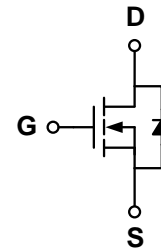
- ◆ Automotive applications
- ◆ Hard switched and high frequency circuits
- ◆ Uninterruptible power supply

Package

- ◆ TO-252-2L



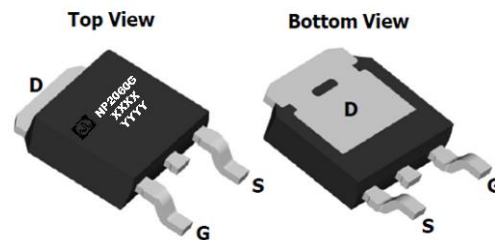
Schematic diagram



Marking and pin assignment

TO-252-2L

(Top View)



XXXX—Wafer Information

YYYY—Quality Code

Ordering Information

Part Number	Storage Temperature	Package	Devices Per Reel
NP2060G	-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}	20	V	
Gate-source voltage	V_{GS}	±12	V	
Continuous Drain Current	I_D	TC=25°C	60	A
		TC=100°C	42	
Pulsed Drain Current	I_{DP}	210	A	
Avalanche energy(L=0.5mH) ^(note1)	E_{AS}	200	mJ	
Maximum power dissipation	P_D	60	W	
Operating junction Temperature range	T_j	-55—150	°C	

Electrical Characteristics (TA=25°C unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit	
Static Characteristics							
Drain-source breakdown voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	20	-	-	V	
Zero gate voltage drain current	I_{DSS}	$V_{DS}=20V, V_{GS}=0V$	$T_J=25^\circ C$	-	-	1	μA
			$T_J=85^\circ C$	-	-	5	
Gate Leakage Current	I_{GSS}	$V_{DS}=0V, V_{GS}=\pm 12V$	-	-	± 100	nA	
Gate threshold voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	0.5	0.75	1.2	V	
Drain-source on-state resistance ¹	$R_{DS(ON)}$	$V_{GS}=4.5V, I_D=60A$	-	4.8	6	m Ω	
		$V_{GS}=2.5V, I_D=40A$	-	6.2	9		
On Status Drain Current	$I_{D(ON)}$	$V_{DS}=20V, V_{GS}=4.5V$	60	-	-	A	
Gate resistance	R_G		-	1.2	-	Ω	
Diode Characteristics							
Diode Continuous Forward Current	I_S		-	-	12	A	
Reverse Recovery Time	t_{rr}	$I_F=20A,$	-	25	-	ns	
Reverse Recovery Charge	Q_{rr}	$dI/dt=20A/us$	-	24	-	nC	
Dynamic Characteristics²							
Input capacitance	C_{ISS}	$V_{GS}=0V, V_{DS}=10V$ $f=1.0MHz$	-	3415	-	pF	
Output capacitance	C_{OSS}		-	482	-		
Reverse transfer capacitance	C_{RSS}		-	78	-		
Turn-on delay time	$t_{D(ON)}$	$V_{GS}=4.5V, V_{DS}=10V, I_D=2A$	-	6.5	-	ns	
Turn-on Rise time	t_r		-	17	-		
Turn-off delay time	$t_{D(OFF)}$		-	29.5	-		
Turn-off Fall time	t_f		-	17	-		
Total gate charge	Q_g	$V_{GS}=10V, I_D=60A$ $V_{DS}=10V$	-	82	-	nC	
Gate-source charge	Q_{gs}		-	4.7	-		
Gate-drain charge	Q_{gd}		-	10.7	-		
Drain-Source Diode Characteristics							
Diode forward voltage	V_{SD}	$I_{SD}=10A, V_{GS}=0V$	-	0.8	1.2	V	

Note: 1: Eas test: $V_{DD}=10V, R_G=25ohm, L=500uH$

2: Pulse test; pulse width $\leq 300ns$, duty cycle $\leq 2\%$.

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

Typical Performance Characteristics

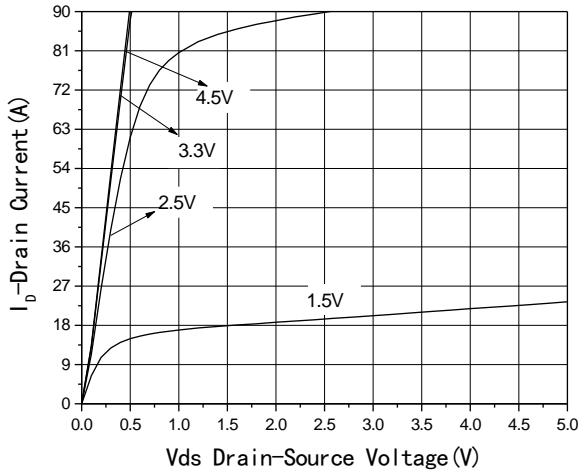


Fig1 Output Characteristics

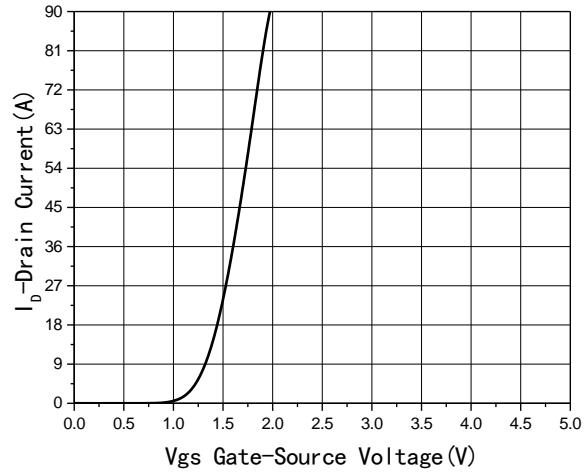


Fig2 Transfer Characteristics

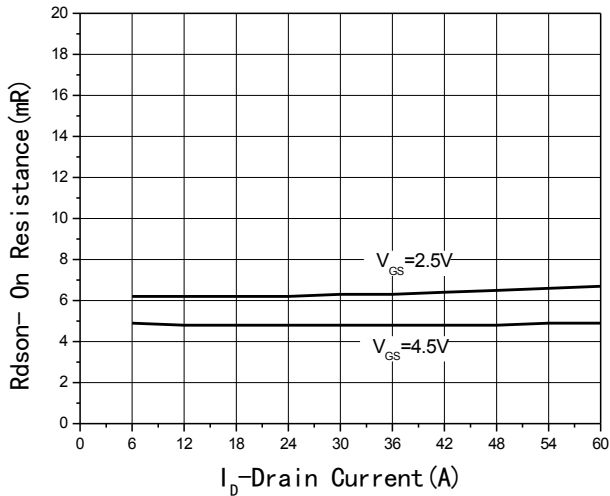


Fig3 $R_{DS(on)}$ -Drain current

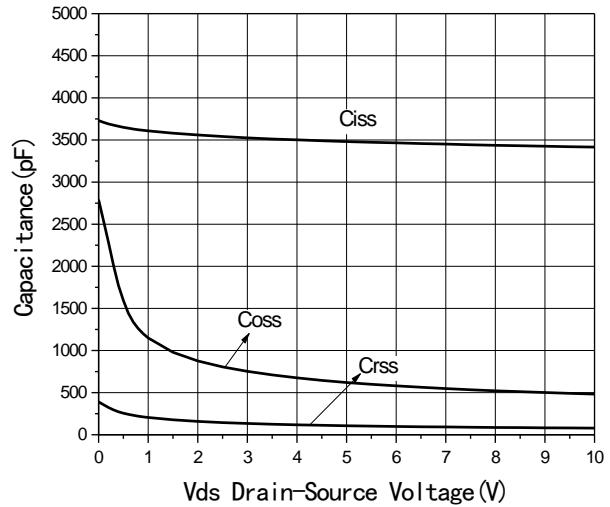


Fig4 Capacitance vs V_{DS}

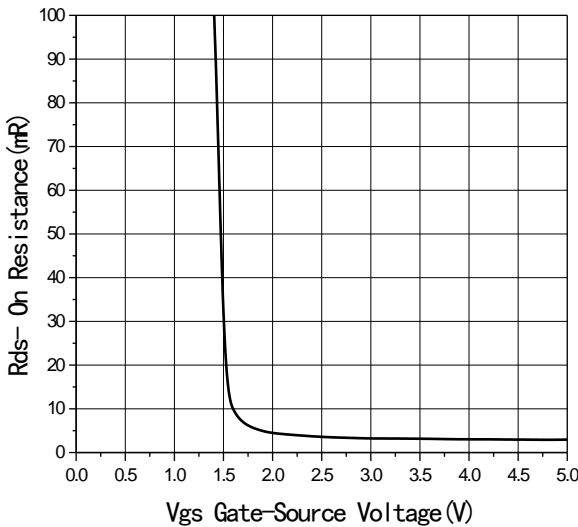


Fig5 $R_{DS(on)}$ -Gate Drain voltage

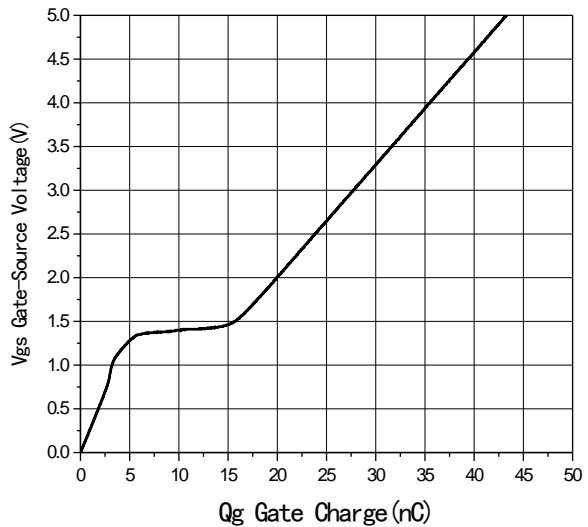


Fig6 Gate Charge

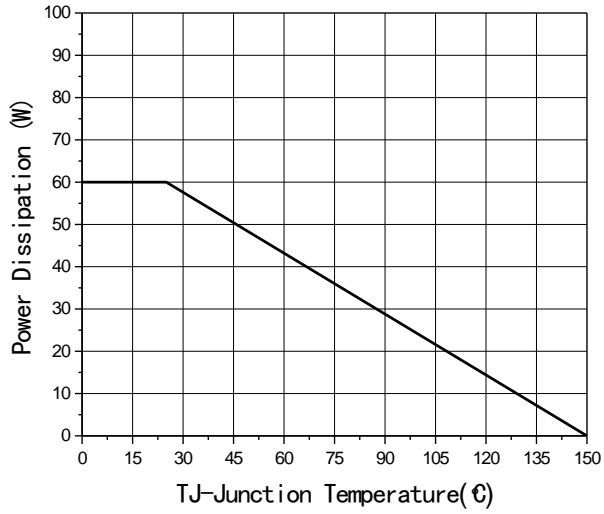


Fig7 Power De-rating

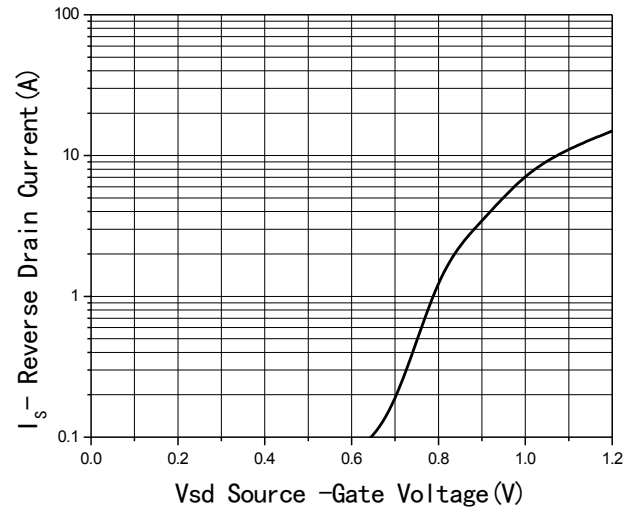
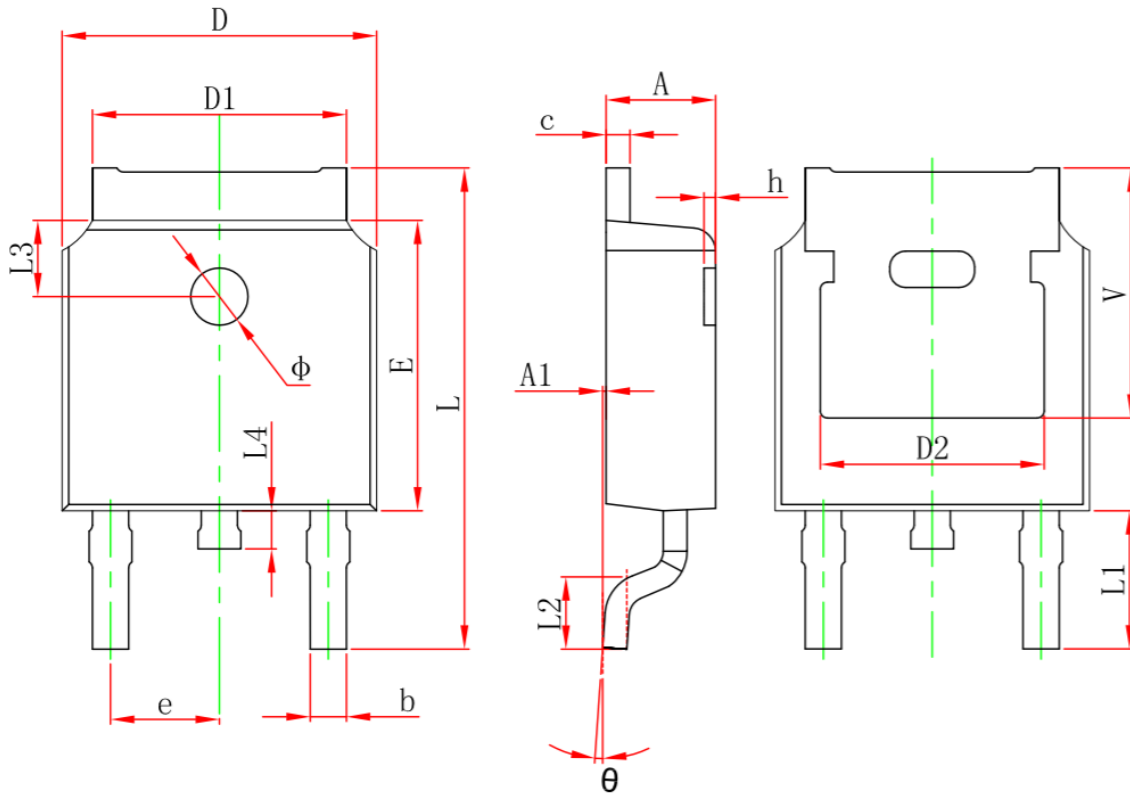


Fig8 Source-Drain Diode Forward

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 REF.		0.190 REF.	
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 REF.		0.114 REF.	
L2	1.400	1.700	0.055	0.067
L3	1.600 REF.		0.063 REF.	
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 REF.		0.211 REF.	