60V N-Channel Enhancement Mode MOSFET

Description

The NP6003MR 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} =60V I_D =3A
  $R_{DS(ON)}$=75mΩ @ V_{GS}=10V (Typ:80m Ω)
  $R_{DS(ON)}$=83mΩ @ V_{GS}=4.5V (Typ:90m Ω)
- High density cell design for ultra low Rdson.
- Fully characterized avalanche voltage and current.
- Low gate to drain charge to reduce switching losses.

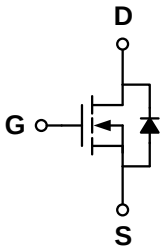
Application

- Power switching application.
- Hard switched and high frequency circuits.
- Uninterruptible power supply.

Package

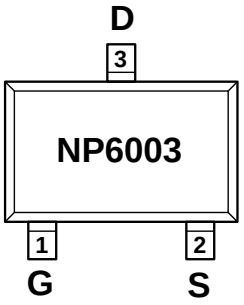
- SOT-23-3L

Schematic diagram



Marking and pin assignment

SOT-23-3L
(TOP VIEW)



Ordering Information

Part Number	Storage Temperature	Package	Devices Per Reel
NP6003MR-G	-55°C to +150°C	SOT-23-3L	3000

Absolute Maximum Ratings (TA=25℃ unless otherwise noted)

parameter		symbol	limit	unit
Drain-source voltage		V_{DS}	60	V
Gate-source voltage		V_{GS}	±20	V
Continuous Drain Current	TC=25°C	I_D	3	A
	TC=70°C		2	
Pulsed Drain Current		I_{DP}	12	A
Maximum power dissipation	TC=25°C	P_D	2	W
Power Dissipation – Derate above 25℃	TC=75°C		1.4	
Operating junction Temperature range		Tj	-55—150	℃

Electrical Characteristics (TA=25℃ unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Static Characteristics						
Drain-source breakdown voltage	BV_{DSS}	V_{GS}=0V, I_D=250μA	60	-	-	V
BVDSS Temperature Coefficient	$\triangle BV_{DSS}/\triangle T_J$	Reference to 25℃,ID=1mA		33		mV/℃
Zero gate voltage drain current	I_{DSS}	V_{DS}=60V, V_{GS}=0V	-	-	1	μA
		T_J=85°C	-	-	30	
Gate Leakage Current	I_{GSS}	V_{DS}=0V, V_{GS}=±20V	-	-	±100	nA
Gate threshold voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=250μA	1.2	1.9	2.5	V
Drain-source on-state resistance[1]	$R_{DS(ON)}$	V_{GS}=10V, I_D=3A	-	75	90	mΩ
		V_{GS}=4.5V, I_D=2A		86	100	
On Status Drain Current	$I_{D(ON)}$	V_{DS}=10V, V_{GS}=10V	3	-	-	A
Diode Characteristics						
Diode Forward Voltage	V_{SD}	I_{SD}=1A,V_{GS}=0V	-	0.75	1.1	V
Diode Continuous Forward Current	I_S		-	-	3	A
Reverse Recovery Time	t_{rr}	I_F=1.5A, dI/dt=100A/us	-	15	-	ns
Reverse Recovery Charge	Q_{rr}		-	12	-	nC
Dynamic Characteristics[2]						
Gate Resistance	R_G	V_{GS}=0V, V_{DS}=0V,f=1MHz	-	2.0	-	Ω
Input capacitance	C_{ISS}	V_{GS}=0V ,V_{DS}=25V f=1.0MHz	-	175	-	pF
Output capacitance	C_{OSS}		-	21	-	
Reverse transfer capacitance	C_{RSS}		-	13	-	
Turn-on delay time	$t_{D(ON)}$	V_{GS}=10V, V_{DD}=30V, R_L=4.7Ω, I_D=1.5A, R_G=3.3Ω	-	15	-	ns
Turn-on Rise time	tr		-	16	-	
Turn-off delay time	$t_{D(OFF)}$		-	10	-	
Turn-off Fall time	tf		-	10	-	
Total gate charge	Q_g	V_{GS}=10V,I_D=2A V_{DS}=30V	-	4.1		nC
Gate-source charge	Q_{gs}			0.8		
Gate-drain charge	Q_{gd}		-	1	-	

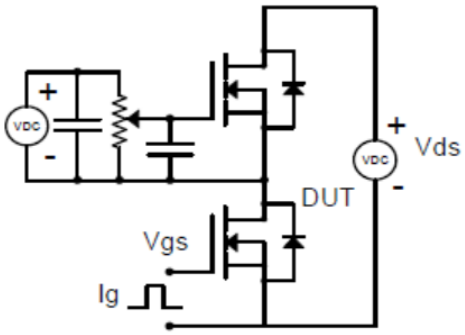
Note: 1：Pulse test; pulse width ≦ 300ns, duty cycle ≦ 2%.

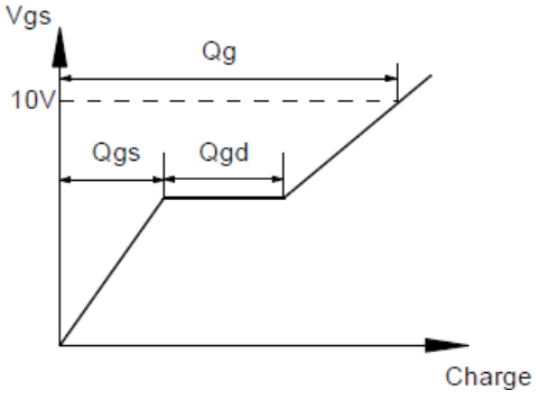
2：Guaranteed by design, not subject to production testing.

Thermal Characteristics

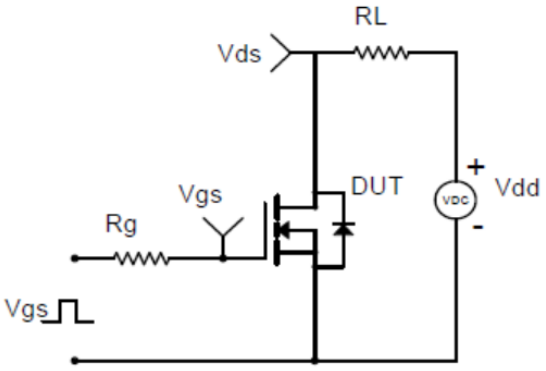
Parameter	Symbol	Typical	Unit
Thermal Resistance-Junction to Case	Rθjc	60	℃/W
Thermal Resistance junction-to ambient	Rθja	90	

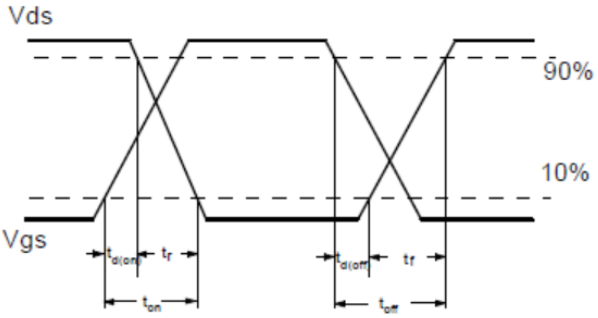
Gate Charge Test Circuit & Waveform



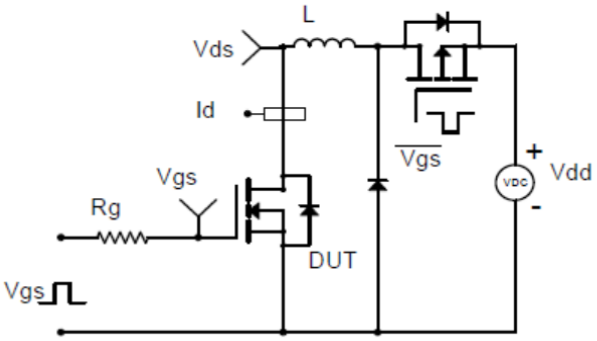


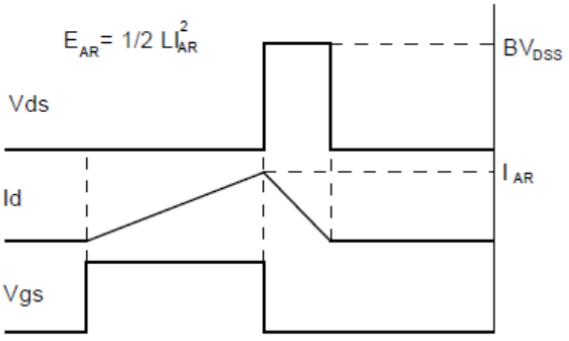
Resistive Switching Test Circuit & Waveforms



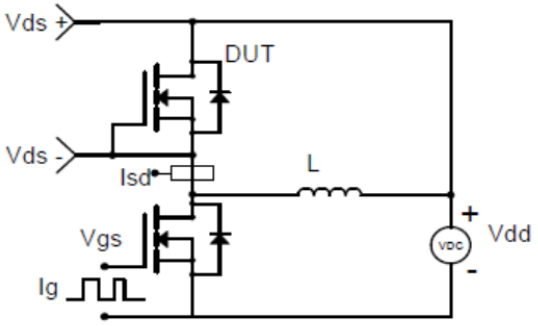


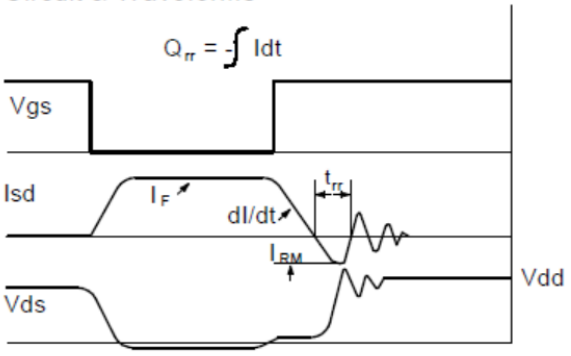
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms





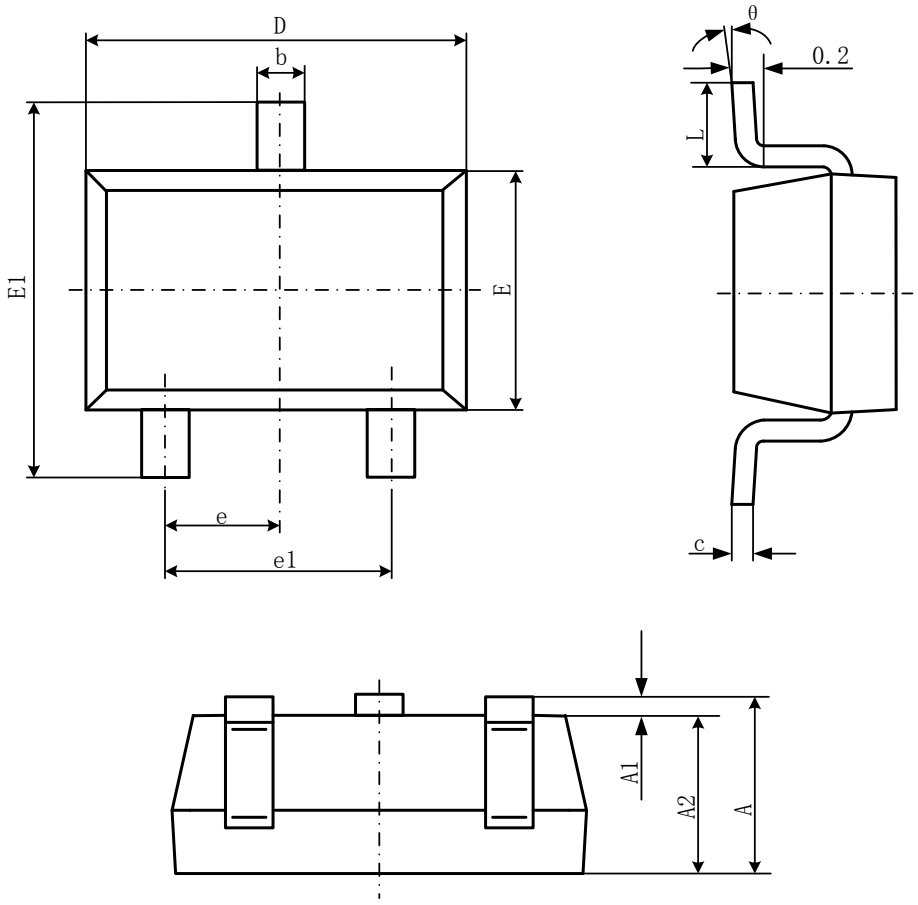
Diode Recovery Test Circuit & Waveforms





Package Information

- **SOT-23-3L**



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°

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