

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

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

Application

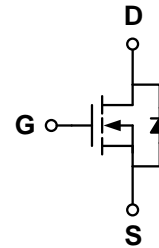
- ◆ Power switching application.
- ◆ Hard switched and high frequency circuits.
- ◆ Uninterruptible power supply.

Package

- ◆ SOT-23-3L

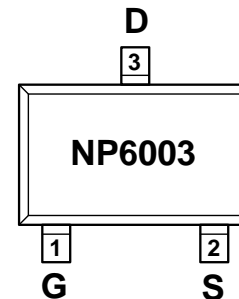


Schematic diagram



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°C unless otherwise noted)

parameter	symbol	limit	unit	
Drain-source voltage	V_{DS}	60	V	
Gate-source voltage	V_{GS}	±20	V	
Continuous Drain Current	I_D	TC=25°C	3	A
		TC=70°C	2	
Pulsed Drain Current	I_{DP}	12	A	
Maximum power dissipation	P_D	TC=25°C	2	W
Power Dissipation – Derate above 25°C		TC=75°C	1.4	
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 =250μA	60	-	-	V
BVDSS Temperature Coefficient	ΔBV _{DSS} /ΔT _J	Reference to 25°C, I _D =1mA		33		mV/°C
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,	-	15	-	ns
Reverse Recovery Charge	Q _{rr}	dI/dt=100A/us	-	12	-	nC
Dynamic Characteristics²						
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	t _r		-	16	-	
Turn-off delay time	t _{D(OFF)}		-	10	-	
Turn-off Fall time	t _f		-	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	-	

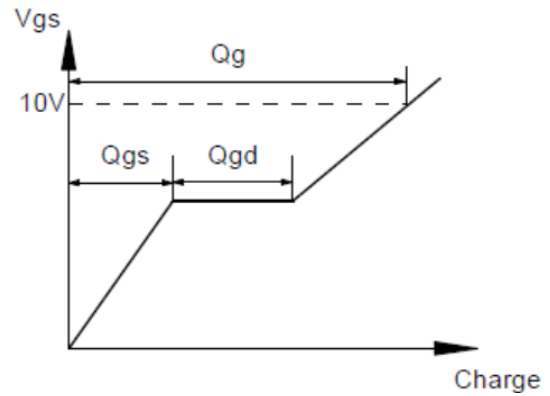
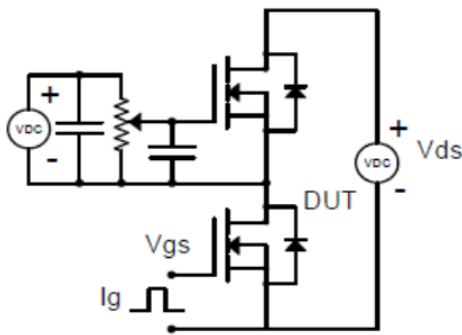
Note: 1: Pulse test; pulse width ≤ 300ns, duty cycle ≤ 2%.

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

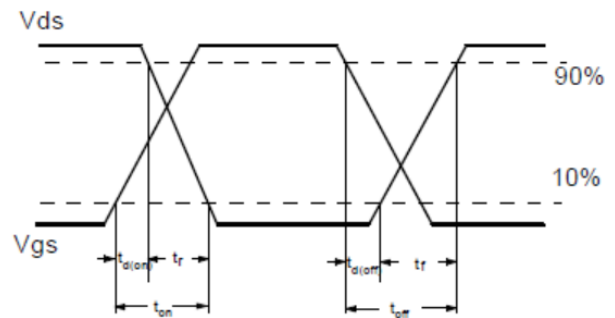
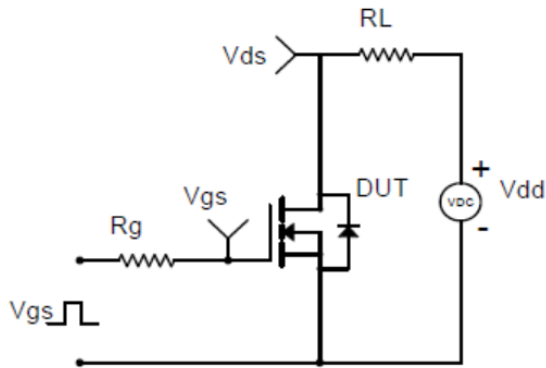
Thermal Characteristics

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

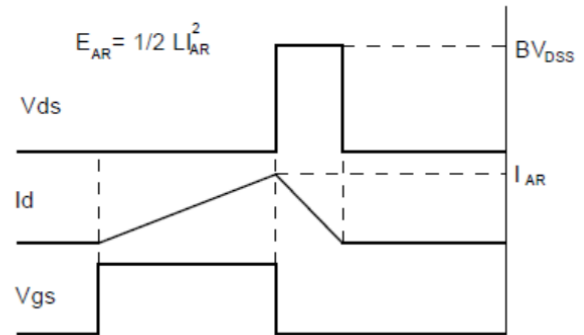
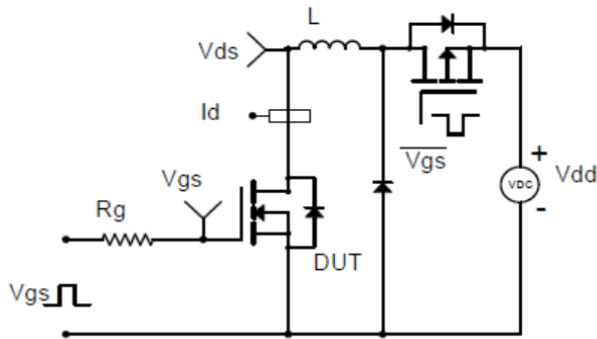
Gate Charge Test Circuit & Waveform



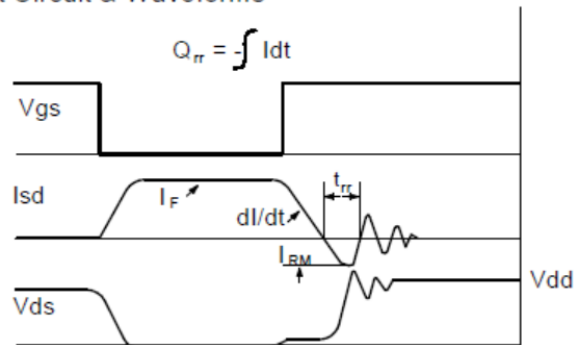
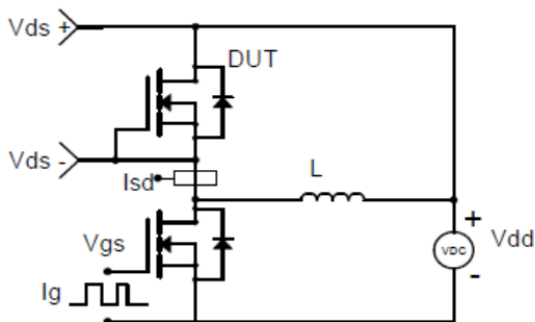
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

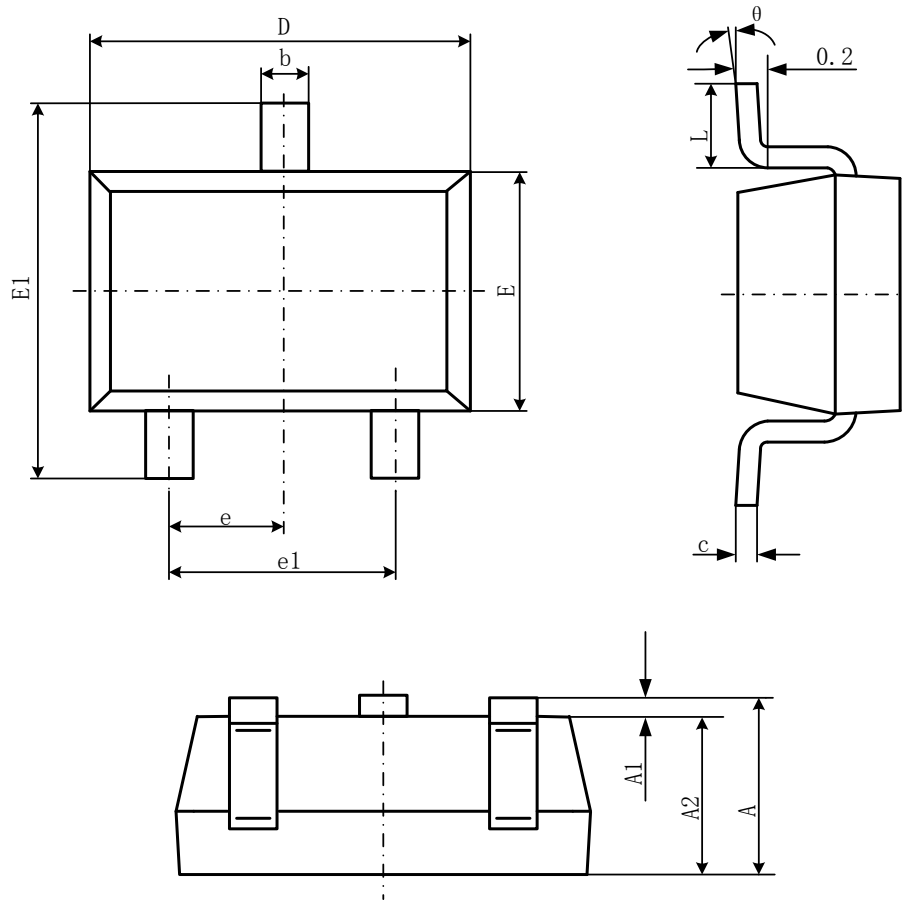


Diode Recovery Test Circuit & Waveforms



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°