

30V N-Channel Enhancement Mode MOSFET

Description

The NP3404AMR uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and high density cell Design for ultra low on-resistance. This device is suitable for use as a load switch or in PWM applications.

General Features

- ◆ $V_{DS} = 30V$, $I_D = 7A$
 $R_{DS(ON)}(Typ.) = 16m\Omega$ @ $V_{GS} = 10V$
 $R_{DS(ON)}(Typ.) = 20m\Omega$ @ $V_{GS} = 4.5V$
- ◆ High power and current handling capability
- ◆ Lead free product is acquired
- ◆ Surface mount package

Application

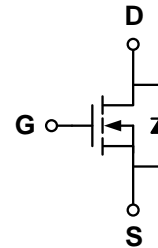
- ◆ PWM applications
- ◆ Load switch

Package

SOT-23-3L

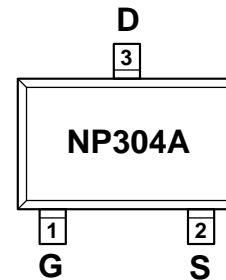


Schematic diagram



Marking and pin assignment

SOT-23-3L
(TOP VIEW)



NP—Natlinear Power
304A—NP3404AMR

Ordering Information

| Part Number | Storage Temperature | Package | Devices Per Reel |
|-------------|---------------------|-----------|------------------|
| NP3404AMR-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} | 30 | V | |
| Gate-source voltage | V_{GS} | ±20 | V | |
| Continuous Drain Current | I_D | $T_A = 25^\circ C$ | 7 | A |
| | | $T_A = 75^\circ C$ | 5 | A |
| Pulsed Drain Current | I_{DM} | 28 | A | |
| Avalanche energy(L=0.1mH) | E_{AS}, E_{AR} | 32 | mJ | |
| Maximum power dissipation | P_D | 1.4 | 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 |
|---|--------------|--|------|------|-----------|------------|
| OFF Characteristics | | | | | | |
| Drain-source breakdown voltage | BV_{DSS} | $V_{GS}=0V, I_D=250\mu A$ | 30 | - | - | V |
| Zero gate voltage drain current | I_{DSS} | $V_{DS}=30V, V_{GS}=0V$ | - | - | 1 | μA |
| Gate-body leakage | I_{GSS} | $V_{DS}=0V, V_{GS}=\pm 20V$ | - | - | ± 100 | nA |
| ON Characteristics | | | | | | |
| Gate threshold voltage | $V_{GS(th)}$ | $V_{DS}=V_{GS}, I_D=250\mu A$ | 1.05 | 1.35 | 2.5 | V |
| Drain-source on-state resistance | $R_{DS(ON)}$ | $V_{GS}=10V, I_D=6A$ | - | 16 | 20 | m Ω |
| | | $V_{GS}=4.5V, I_D=5A$ | | 20 | 26 | |
| Forward transconductance | gfs | $V_{GS}=5V, I_D=6A$ | - | 22 | - | S |
| Dynamic Characteristics | | | | | | |
| Input capacitance | C_{ISS} | $V_{DS}=15V, V_{GS}=0V$ $f=1.0MHz$ | - | 521 | - | pF |
| Output capacitance | C_{OSS} | | - | 72 | - | |
| Reverse transfer capacitance | C_{RSS} | | - | 57 | - | |
| Switching Characteristics | | | | | | |
| Turn-on delay time | $t_{D(ON)}$ | $V_{DS}=15V$ $V_{GS}=10V$ $R_L=2.6\ ohm$ $R_{GEN}=3ohm$ | - | 4.5 | - | ns |
| Rise time | tr | | - | 2.5 | - | |
| Turn-off delay time | $t_{D(OFF)}$ | | - | 14.5 | - | |
| Fall time | tf | | - | 2.5 | - | |
| Total gate charge | Qg | $V_{DS}=15V, I_D=6A$ $V_{GS}=10V$ | - | 7.1 | - | nC |
| Gate-source charge | Qgs | | - | 2.1 | - | |
| Gate-drain charge | Qgd | | - | 2.6 | - | |
| DRAIN-SOURCE DIODE CHARACTERISTICS | | | | | | |
| Diode forward voltage | V_{SD} | $V_{GS}=0V, I_S=1A$ | - | 0.82 | 1.16 | V |

Thermal Characteristics

| Parameter | Symbol | Typ | Max | Unit |
|--|-----------------|--------------|-----|------|
| Maximum Junction-to-Ambient ^A | $R_{\theta JA}$ | 65 | 90 | °C/W |
| Maximum Junction-to-Ambient ^A | | Steady-State | 85 | |
| Maximum Junction-to-Lead ^B | $R_{\theta JC}$ | 63 | 80 | |

A: The value of $R_{\theta JA}$ is measured with the device mounted on 1 in 2 FR-4 board with 2oz. Copper, in a still air environment with $T_A=25^\circ C$. The value in any given application depends on the user's specific board design. The current rating is based on the $t \leq 10s$ thermal resistance rating.

B: The $R_{\theta JA}$ is the sum of the thermal impedance from junction to lead $R_{\theta JL}$ and lead to ambient.

Typical Performance Characteristics

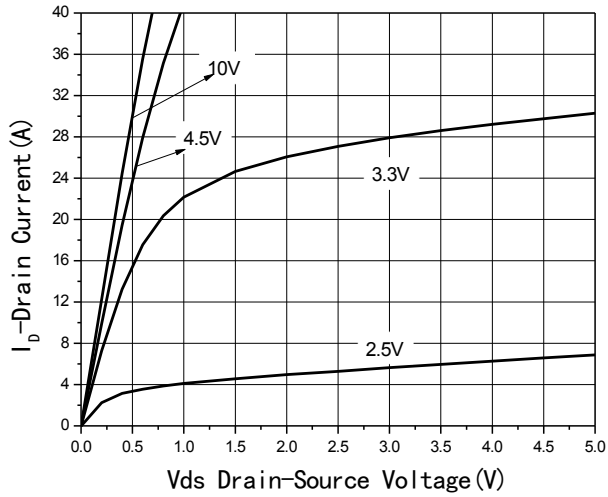


Fig1 Output Characteristics

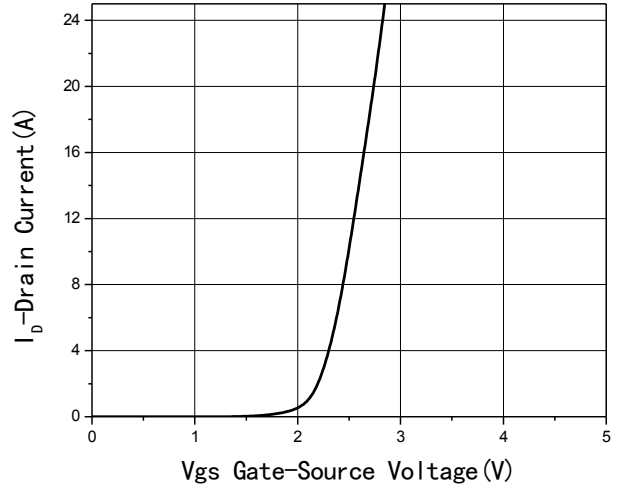


Fig2 Transfer Characteristics

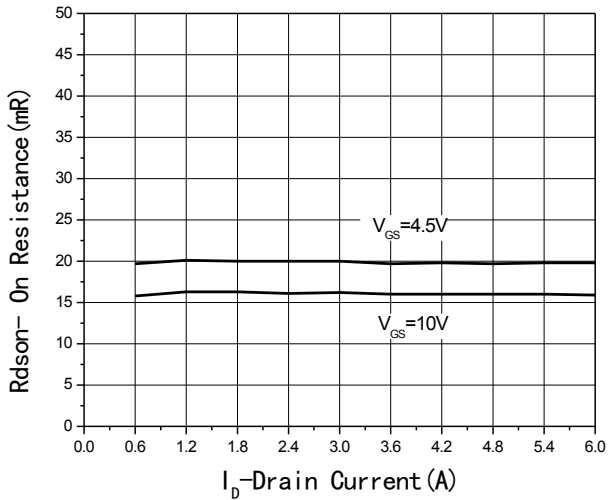


Fig3 $R_{DS(on)}$ -Drain current

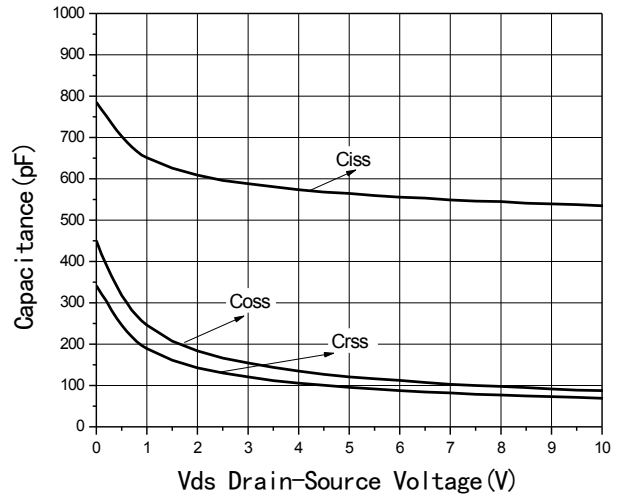


Fig4 Capacitance vs V_{DS}

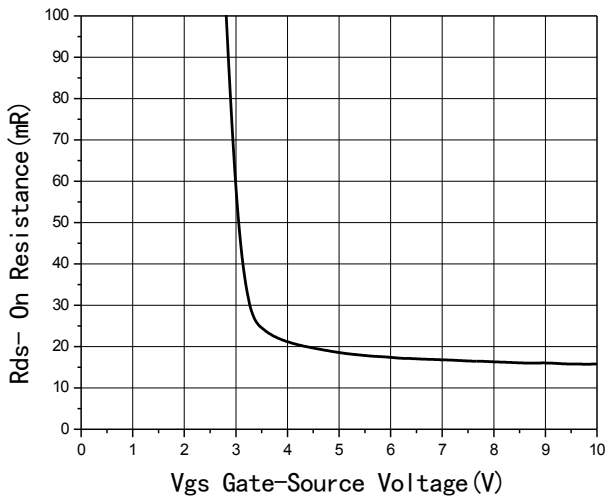


Fig5 $R_{DS(on)}$ -Gate Drain voltage

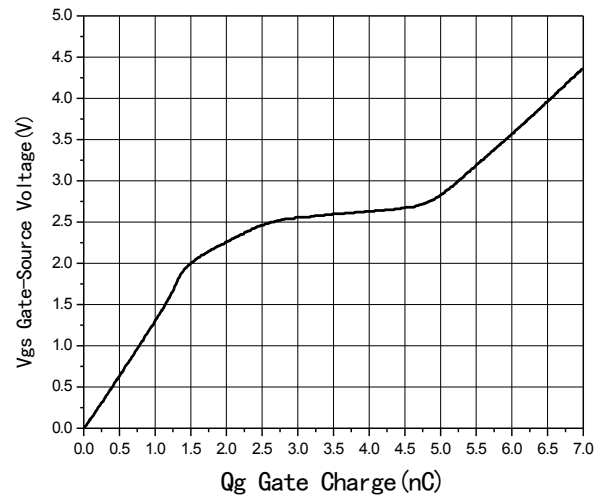


Fig6 Gate Charge

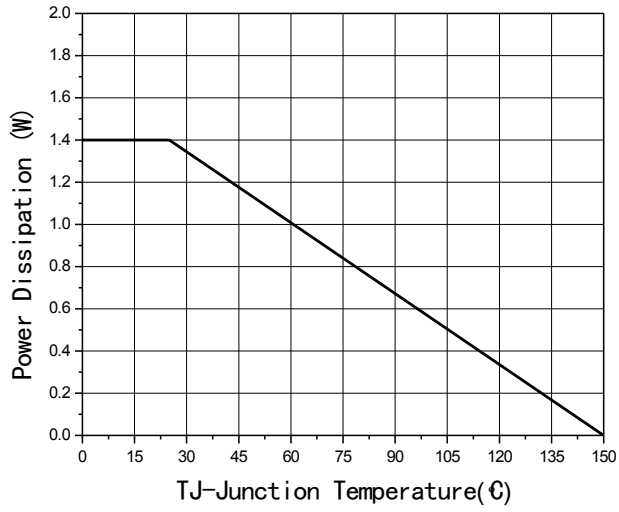


Fig7 Power De-rating

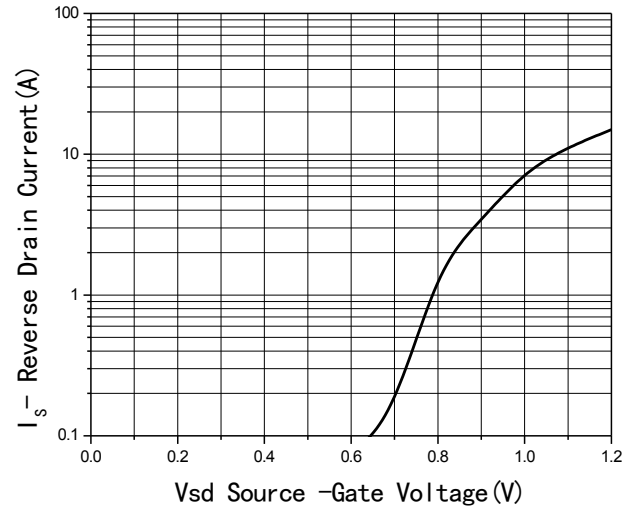
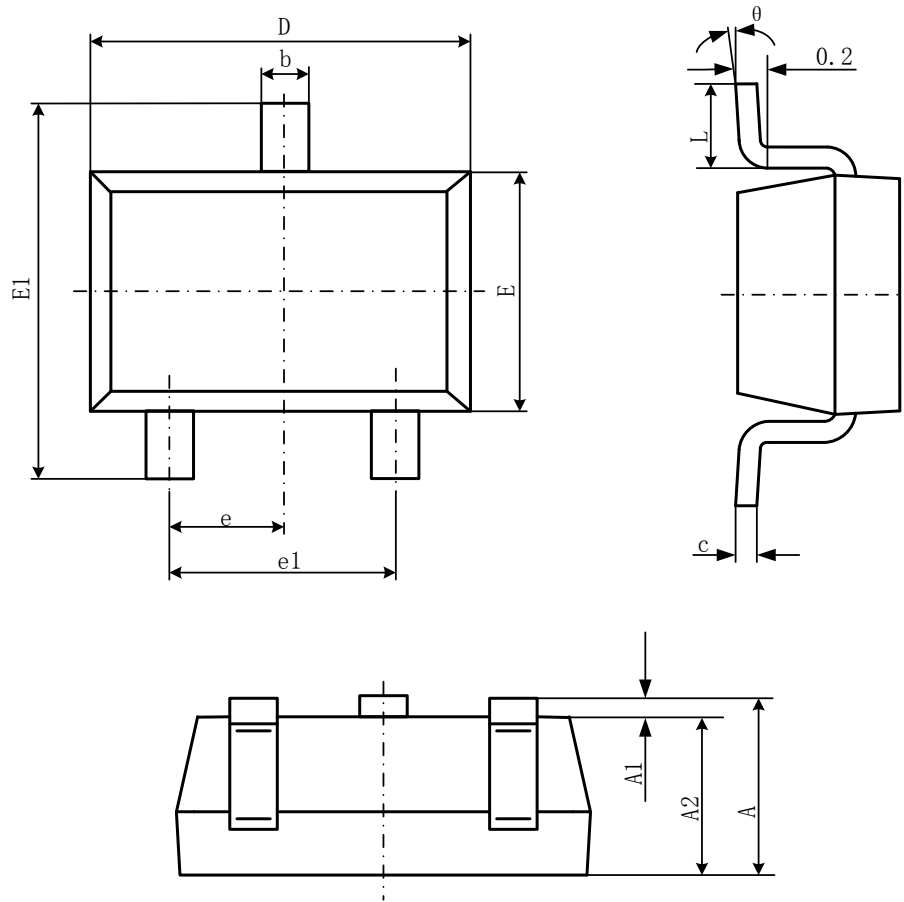


Fig8 Source-Drain Diode Forward

Package Information

- 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° |