# NTR2101P

# Small Signal MOSFET

## −8.0 V, −3.7 A, Single P−Channel, SOT−23

| $V_{(BR)DSS}$ | $R_{DS(on)}$ Typ | $I_D$ Max |
|---|---|---|
| −8.0 V | 39 mΩ @ −4.5 V | −3.7 A |
| | 52 mΩ @ −2.5 V | |
| | 79 mΩ @ −1.8 V | |

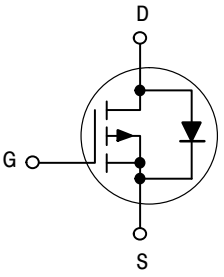
### Features

- Leading Trench Technology for Low $R_{DS(on)}$
- −1.8 V Rated for Low Voltage Gate Drive
- SOT−23 Surface Mount for Small Footprint (3 x 3 mm)
- This is a Pb−Free Device

### Applications

- High Side Load Switch
- DC−DC Conversion
- Cell Phone, Notebook, PDAs, etc.

**P−Channel**




### MAXIMUM RATINGS ($T_J$ = 25°C unless otherwise stated)

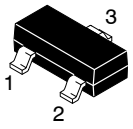
| Parameter | | | Symbol | Value | Unit |
|---|---|---|---|---|---|
| Drain−to−Source Voltage | | | $V_{DSS}$ | −8.0 | V |
| Gate−to−Source Voltage | | | $V_{GS}$ | ±8.0 | V |
| Continuous Drain Current (Note 1) | t ≤ 5 s | $T_A$ = 25°C | $I_D$ | −3.7 | A |
| | | $T_A$ = 70°C | | −3.0 | |
| Power Dissipation (Note 1) | t ≤ 5 s | | $P_D$ | 0.96 | W |
| Pulsed Drain Current | $t_p$ = 10 μs | | $I_{DM}$ | −11 | A |
| Operating Junction and Storage Temperature | | | $T_J$, $T_{STG}$ | −55 to 150 | °C |
| Source Current (Body Diode) | | | $I_S$ | −1.2 | A |
| Lead Temperature for Soldering Purposes (1/8″ from case for 10 s) | | | $T_L$ | 260 | °C |

### THERMAL RESISTANCE RATINGS

| Parameter | Symbol | Max | Unit |
|---|---|---|---|
| Junction−to−Ambient − Steady State | $R_{\theta JA}$ | 160 | °C/W |
| Junction−to−Ambient − t ≤ 5 s | $R_{\theta JA}$ | 130 | |

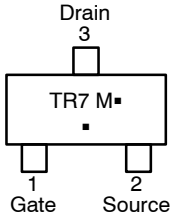
Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

1. Surface mounted on FR4 board using 1 in sq pad size (Cu area = 1.127 in sq [1 oz] including traces).




**SOT−23**
**CASE 318**
**STYLE 21**

### MARKING DIAGRAM & PIN ASSIGNMENT




TR7 = Specific Device Code
M = Date Code*
▪ = Pb−Free Package

(Note: Microdot may be in either location)

*Date Code orientation may vary depending upon manufacturing location.

### ORDERING INFORMATION

| Device | Package | Shipping† |
|---|---|---|
| NTR2101PT1G | SOT−23 (Pb−Free) | 3000/Tape & Reel |

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specification Brochure, BRD8011/D.

# NTR2101P

**ELECTRICAL CHARACTERISTICS** ($T_J$ = 25°C unless otherwise stated)

| Parameter | Symbol | Test Condition | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| **OFF CHARACTERISTICS** | | | | | | | |
| Drain−to−Source Breakdown Voltage | $V_{(BR)DSS}$ | $V_{GS}$ = 0 V, $I_D$ = −250 μA | | −8.0 | | | V |
| Drain−to−Source Breakdown Voltage Temperature Coefficient | $V_{(BR)DSS}/T_J$ | | | | 10 | | mV/°C |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{GS}$ = 0 V, $V_{DS}$ = −6.4 V | $T_J$ = 25°C | | | −1.0 | μA |
| | | | $T_J$ = 125°C | | | −100 | |
| Gate−to−Source Leakage Current | $I_{GSS}$ | $V_{DS}$ = 0 V, $V_{GS}$ = ±8.0 V | | | | ±100 | nA |
| **TY CHARACTERISTICS** (Note 2) | | | | | | | |
| Gate Threshold Voltage | $V_{GS(TH)}$ | $V_{GS}$ = $V_{DS}$, $I_D$ = −250 μA | | −0.40 | | −1.0 | V |
| Negative Threshold Temperature Coefficient | $V_{GS(TH)}/T_J$ | | | | 2.7 | | mV/°C |
| Drain−to−Source On Resistance | $R_{DS(on)}$ | $V_{GS}$ = −4.5 V, $I_D$ = −3.5 A | | | 39 | 52 | mΩ |
| | | $V_{GS}$ = −2.5 V, $I_D$ = −3.0 A | | | 52 | 72 | |
| | | $V_{GS}$ = −1.8 V, $I_D$ = −2.0 A | | | 79 | 120 | |
| Forward Transconductance | $g_{FS}$ | $V_{GS}$ = −5.0 V, $I_D$ = −3.5 A | | | 9.0 | | S |
| **CHARGES AND CAPACITANCES** | | | | | | | |
| Input Capacitance | $C_{ISS}$ | $V_{GS}$ = 0 V, f = 1.0 MHz, $V_{DS}$ = −4.0 V | | | 1173 | | pF |
| Output Capacitance | $C_{OSS}$ | | | | 289 | | |
| Reverse Transfer Capacitance | $C_{RSS}$ | | | | 218 | | |
| Total Gate Charge | $Q_{G(TOT)}$ | $V_{GS}$ = −4.5 V, $V_{DS}$ = −4.0 V, $I_D$ = −3.5 A | | | 12 | 15 | nC |
| Gate−to−Source Charge | $Q_{GS}$ | | | | 3.8 | | |
| Gate−to−Drain Charge | $Q_{GD}$ | | | | 2.5 | | |
| **SWITCHING CHARACTERISTICS** (Note 3) | | | | | | | |
| Turn−On Delay Time | $t_{d(on)}$ | $V_{GS}$ = −4.5 V, $V_{DD}$ = −4.0 V, $I_D$ = −1.2 A, $R_G$ = 6.0 Ω | | | 7.4 | 15 | ns |
| Rise Time | $t_r$ | | | | 15.75 | 25 | |
| Turn−Off Delay Time | $t_{d(off)}$ | | | | 38 | 58 | |
| Fall Time | $t_f$ | | | | 31 | 51 | |
| **DRAIN−SOURCE DIODE CHARACTERISTICS** | | | | | | | |
| Forward Diode Voltage | $V_{SD}$ | $V_{GS}$ = 0 V, $I_S$ = −1.2 A | $T_J$ = 25°C | | −0.73 | −1.2 | V |

2. Pulse Test: pulse width ≤ 300 μs, duty cycle ≤ 2%.
3. Switching characteristics are independent of operating junction temperatures.