



Description

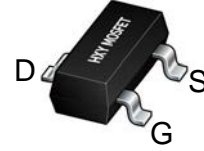
The NTR4101PT1G uses advanced trench technology to provide excellent $R_{DS(ON)}$. This device is suitable for use as a load switch or in PWM applications.

General Features

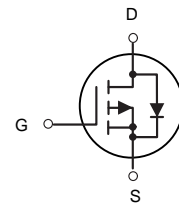
$V_{DS} = -20V, I_D = -3A$
 $R_{DS(ON)} < 80m\Omega @ V_{GS} = -4.5V$

Application

Battery protection
Load switch
Uninterruptible power supply



SOT-23



P-Channel MOSFET

Package Marking and Ordering Information

| Product ID | Pack | Marking | Qty(PCS) |
|-------------|--------|---------|----------|
| NTR4101PT1G | SOT-23 | A1SHB | 3000 |

Absolute Maximum Ratings (TA=25°C unless otherwise noted)

| Symbol | Parameter | Limit | Unit |
|-----------------|--|------------|------|
| V_{DS} | Drain-Source Voltage | -20 | V |
| V_{GS} | Gate-Source Voltage | ± 12 | V |
| I_D | Drain Current-Continuous | -3 | A |
| I_{DM} | Drain Current-Pulsed (Note 1) | -10 | A |
| P_D | Maximum Power Dissipation | 1 | W |
| T_J, T_{STG} | Operating Junction and Storage Temperature Range | -55 To 150 | °C |
| $R_{\theta JA}$ | Thermal Resistance, Junction-to-Ambient (Note 2) | 125 | °C/W |



Electrical Characteristics (T_A=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 =-250μA | -20 | -24 | - | V |
| Zero Gate Voltage Drain Current | I _{DSS} | V _{DS} =-20V, V _{GS} =0V | - | - | -1 | μA |
| Parameter | Symbol | Condition | Min | Typ | Max | Unit |
| Gate-Body Leakage Current | I _{GSS} | V _{GS} =±12V, V _{DS} =0V | - | - | ±100 | nA |
| On Characteristics (Note 3) | | | | | | |
| Gate Threshold Voltage | V _{GS(th)} | V _{DS} =V _{GS} , I _D =-250μA | -0.4 | -0.7 | -1 | V |
| Drain-Source On-State Resistance | R _{DS(ON)} | V _{GS} =-4.5V, I _D =-3A | - | 60 | 80 | mΩ |
| | | V _{GS} =-2.5V, I _D =-2A | - | 85 | 103 | mΩ |
| Forward Transconductance | g _{FS} | V _{DS} =-5V, I _D =-2A | 5 | - | - | S |
| Dynamic Characteristics (Note4) | | | | | | |
| Input Capacitance | C _{ISS} | V _{DS} =-10V, V _{GS} =0V, F=1.0MHz | - | 405 | - | PF |
| Output Capacitance | C _{OSS} | | - | 75 | - | PF |
| Reverse Transfer Capacitance | C _{RSS} | | - | 55 | - | PF |
| Switching Characteristics (Note 4) | | | | | | |
| Turn-on Delay Time | t _{d(on)} | V _{DD} =-10V, I _D =-1A V _{GS} =- 4.5V, R _{GEN} =10Ω | - | 11 | - | nS |
| Turn-on Rise Time | t _r | | - | 35 | - | nS |
| Turn-Off Delay Time | t _{d(off)} | | - | 30 | - | nS |
| Turn-Off Fall Time | t _f | | - | 10 | - | nS |
| Total Gate Charge | Q _g | V _{DS} =-10V, I _D =-3A, V _{GS} =-2.5V | - | 3.3 | 12 | nC |
| Gate-Source Charge | Q _{gs} | | - | 0.7 | - | nC |
| Gate-Drain Charge | Q _{gd} | | - | 1.3 | - | nC |
| Drain-Source Diode Characteristics | | | | | | |
| Diode Forward Voltage (Note 3) | V _{SD} | V _{GS} =0V, I _S =1.3A | - | - | -1.2 | V |
| Diode Forward Current (Note 2) | I _S | | - | - | -3 | A |

Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, t ≤ 10 sec.
3. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
4. Guaranteed by design, not subject to production



Typical Electrical and Thermal Characteristics

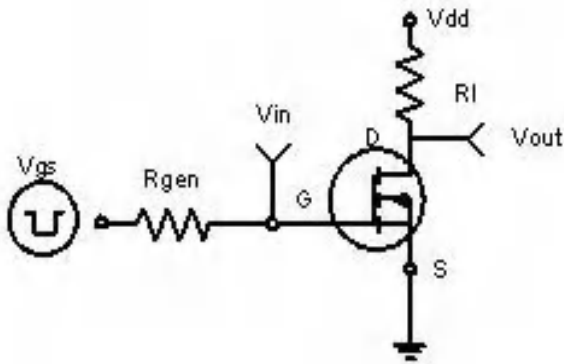


Figure 1: Switching Test Circuit

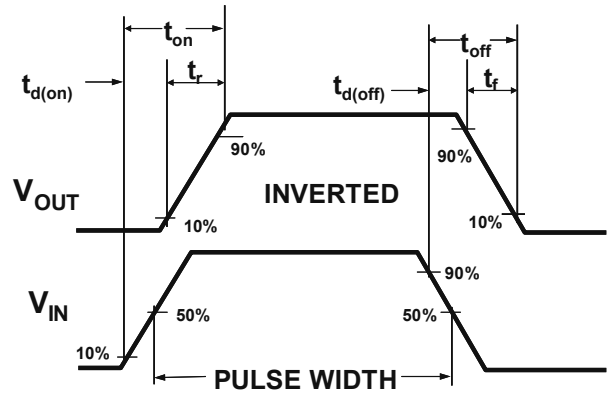
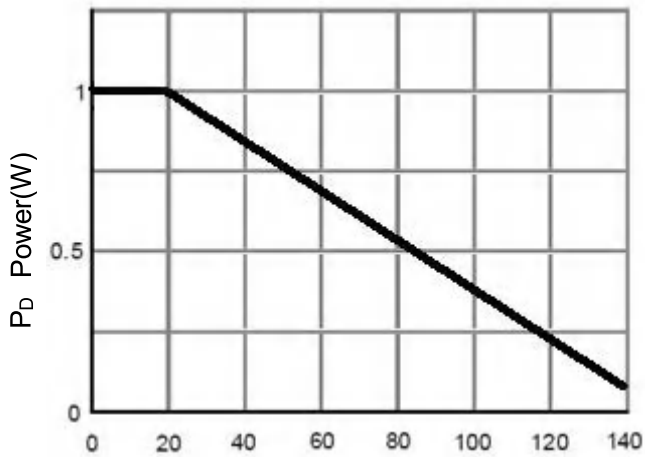
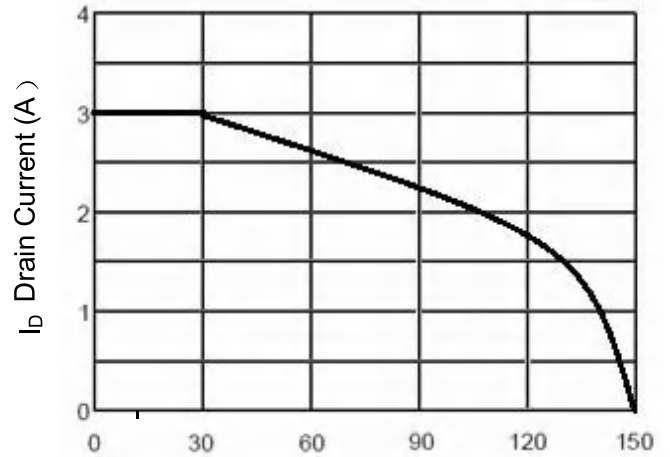


Figure 2: Switching Waveforms



T_J-Junction Temperature(°C)

Figure 3 Power Dissipation



T_J-Junction Temperature(°C)

Figure 4 Drain Current

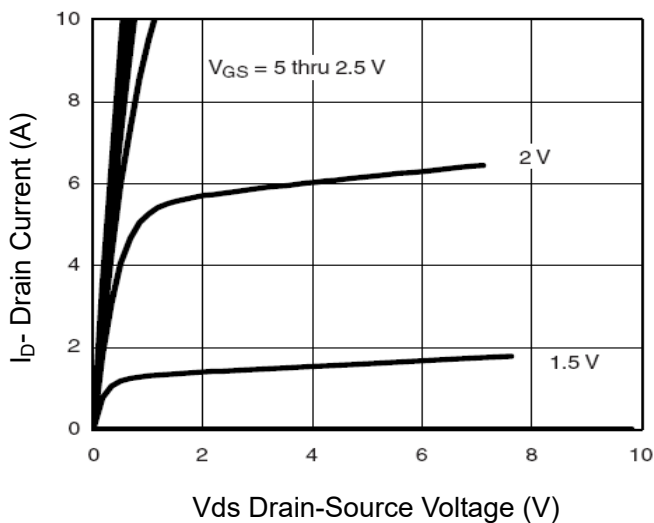


Figure 5 Output Characteristics

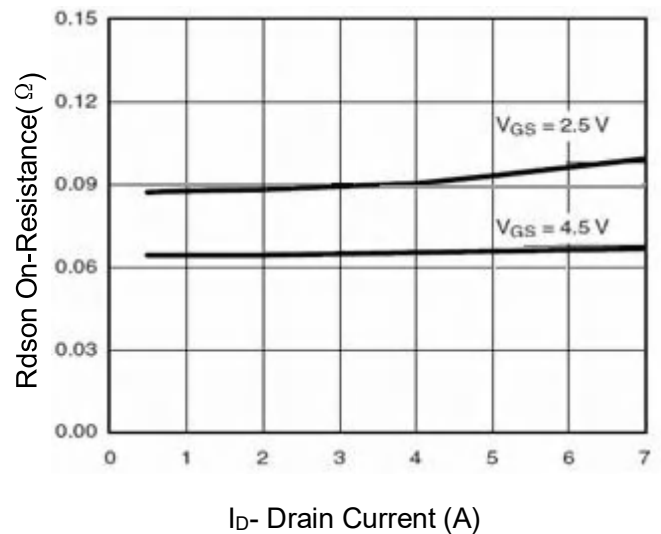
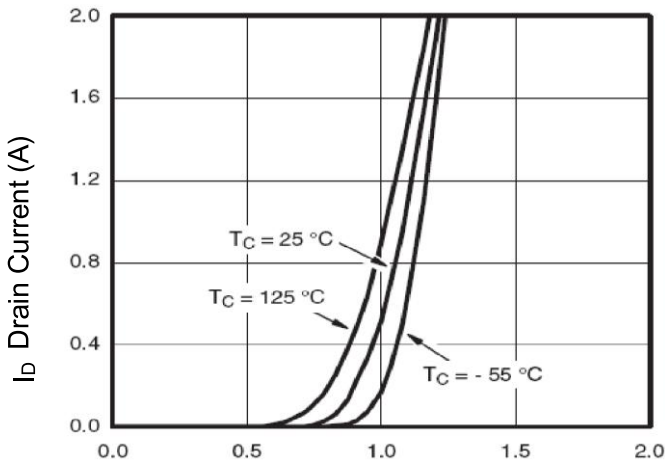
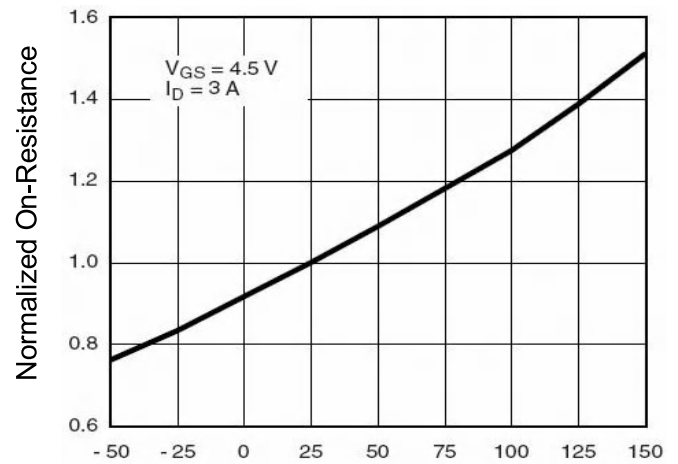


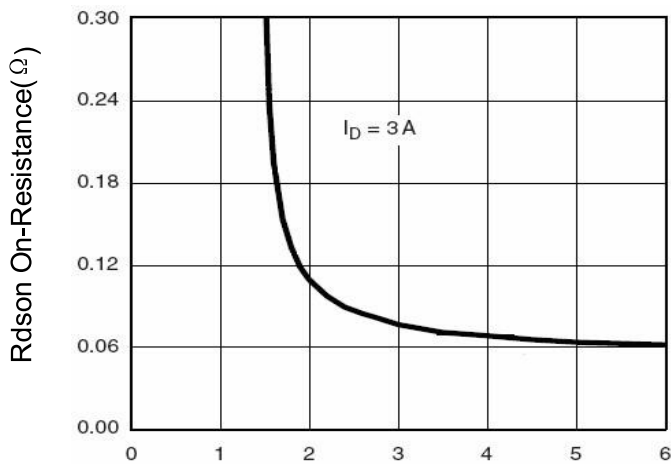
Figure 6 Drain-Source On-Resistance



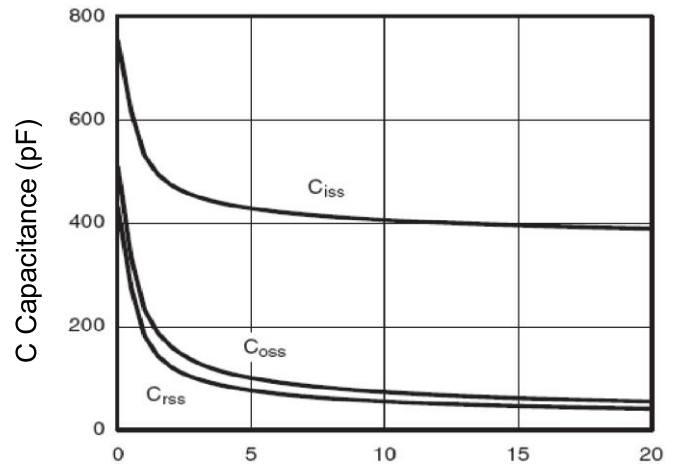
V_{GS} Gate-Source Voltage (V)
Figure 7 Transfer Characteristics



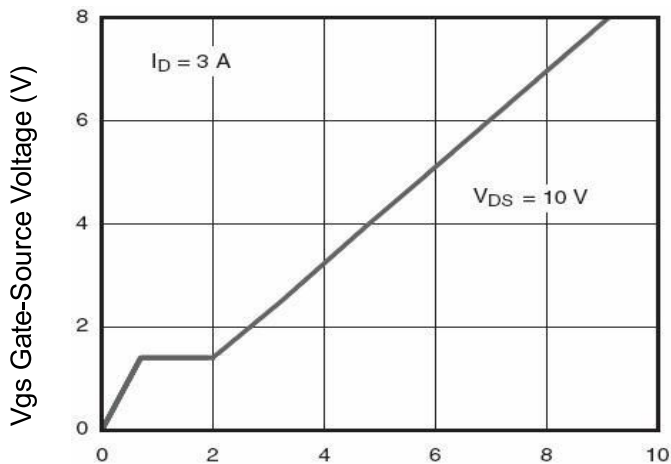
T_J -Junction Temperature($^\circ\text{C}$)
Figure 8 Drain-Source On-Resistance



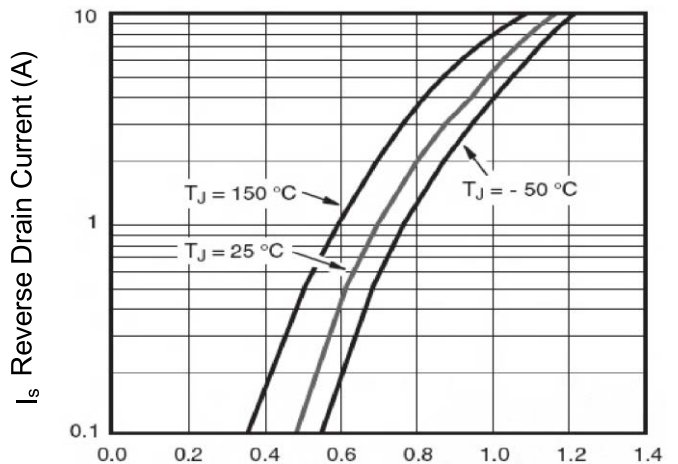
V_{GS} Gate-Source Voltage (V)
Figure 9 Rdson vs V_{GS}



V_{DS} Drain-Source Voltage (V)
Figure 10 Capacitance vs V_{DS}



Q_g Gate Charge (nC)
Figure 11 Gate Charge



V_{SD} Source-Drain Voltage (V)
Figure 12 Source- Drain Diode Forward

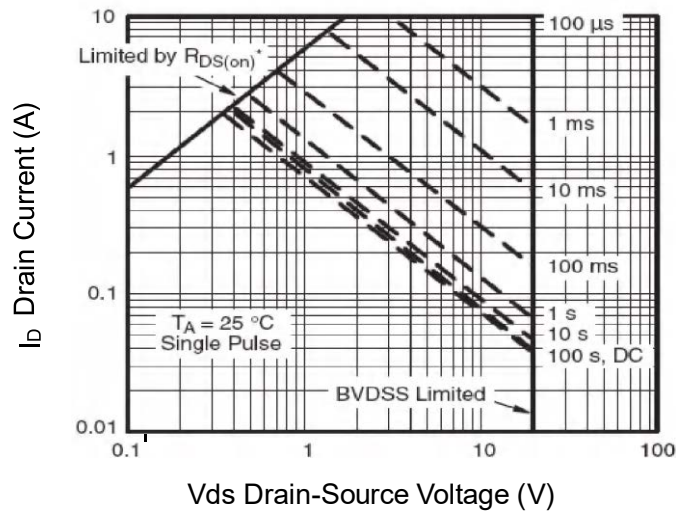


Figure 13 Safe Operation Area

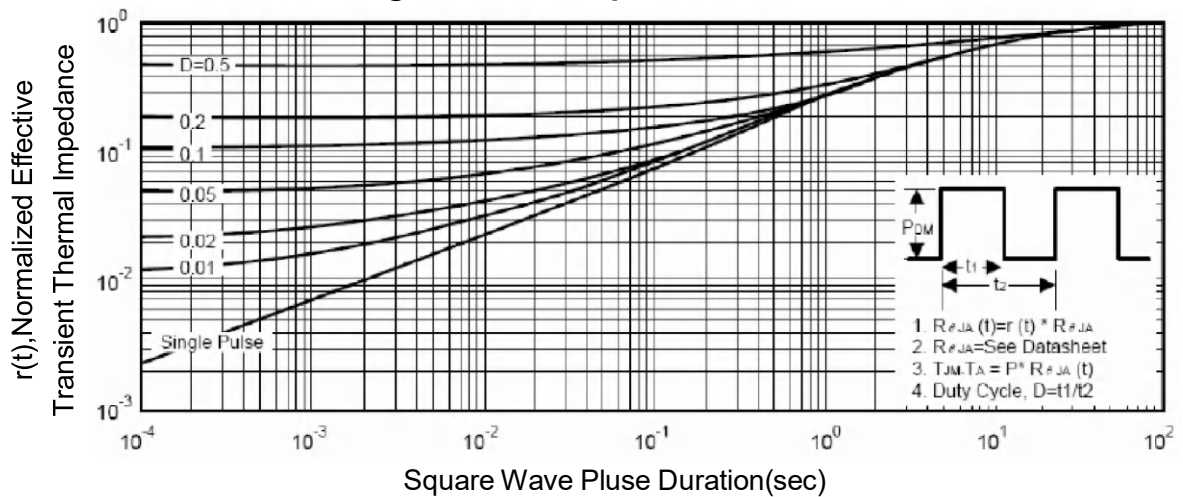
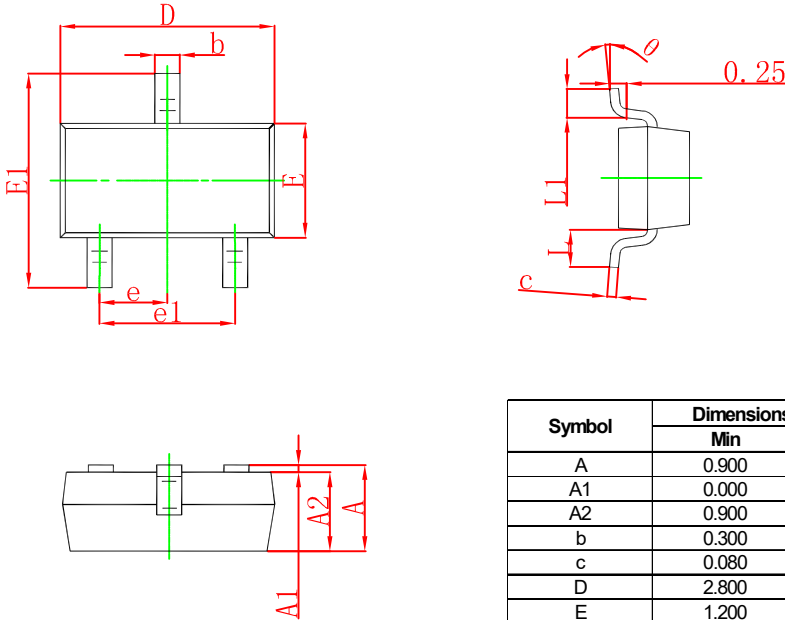


Figure 14 Normalized Maximum Transient Thermal Impedance

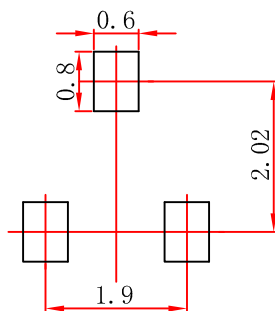


SOT-23 Package Outline Dimensions



| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|--------|---------------------------|-------|----------------------|-------|
| | Min | Max | Min | Max |
| A | 0.900 | 1.150 | 0.035 | 0.045 |
| A1 | 0.000 | 0.100 | 0.000 | 0.004 |
| A2 | 0.900 | 1.050 | 0.035 | 0.041 |
| b | 0.300 | 0.500 | 0.012 | 0.020 |
| c | 0.080 | 0.150 | 0.003 | 0.006 |
| D | 2.800 | 3.000 | 0.110 | 0.118 |
| E | 1.200 | 1.400 | 0.047 | 0.055 |
| E1 | 2.250 | 2.550 | 0.089 | 0.100 |
| e | 0.950 TYP | | 0.037 TYP | |
| e1 | 1.800 | 2.000 | 0.071 | 0.079 |
| L | 0.550 REF | | 0.022 REF | |
| L1 | 0.300 | 0.500 | 0.012 | 0.020 |
| θ | 0° | 8° | 0° | 8° |

SOT-23 Suggested Pad Layout



- Note:
1. Controlling dimension: in millimeters.
 2. General tolerance: ± 0.05 mm.
 3. The pad layout is for reference purposes only.



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