

NTZD3154N

Small Signal MOSFET

20 V, 540 mA, Dual N-Channel



ON Semiconductor®

www.onsemi.com

Features

- Low $R_{DS(on)}$ Improving System Efficiency
- Low Threshold Voltage
- Small Footprint 1.6 x 1.6 mm
- ESD Protected Gate
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

Applications

- Load/Power Switches
- Power Supply Converter Circuits
- Battery Management
- Cell Phones, Digital Cameras, PDAs, Pagers, etc.

MAXIMUM RATINGS ($T_J = 25^\circ\text{C}$ unless otherwise noted.)

| Parameter | Symbol | Value | Unit | |
|---|-------------------------|--------------------------|------|------------------|
| Drain-to-Source Voltage | V_{DSS} | 20 | V | |
| Gate-to-Source Voltage | V_{GS} | ± 7.0 | V | |
| Continuous Drain Current (Note 1) | Steady State | $T_A = 25^\circ\text{C}$ | 540 | mA |
| | | $T_A = 85^\circ\text{C}$ | 390 | |
| Power Dissipation (Note 1) | Steady State | P_D | 250 | mW |
| Continuous Drain Current (Note 1) | $t \leq 5\text{ s}$ | $T_A = 25^\circ\text{C}$ | 570 | mA |
| | | $T_A = 85^\circ\text{C}$ | 410 | |
| Power Dissipation (Note 1) | $t \leq 5\text{ s}$ | P_D | 280 | mW |
| Pulsed Drain Current | $t_p = 10\ \mu\text{s}$ | I_{DM} | 1.5 | A |
| Operating Junction and Storage Temperature | T_J, T_{STG} | -55 to 150 | | $^\circ\text{C}$ |
| Source Current (Body Diode) | I_S | 350 | | mA |
| Lead Temperature for Soldering Purposes (1/8" from case for 10 s) | T_L | 260 | | $^\circ\text{C}$ |

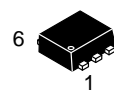
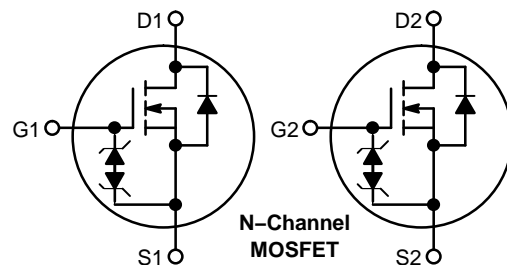
THERMAL RESISTANCE RATINGS

| Parameter | Symbol | Max | Unit |
|--|-----------------|-----|--------------------|
| Junction-to-Ambient – Steady State (Note 1) | $R_{\theta JA}$ | 500 | $^\circ\text{C/W}$ |
| Junction-to-Ambient – $t \leq 5\text{ s}$ (Note 1) | | 447 | |

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

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

| $V_{(BR)DSS}$ | $R_{DS(on)}$ Typ | I_D Max (Note 1) |
|---------------|------------------------|--------------------|
| 20 | 400 m Ω @ 4.5 V | 540 mA |
| | 500 m Ω @ 2.5 V | |
| | 700 m Ω @ 1.8 V | |

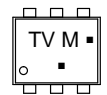


SOT-563-6
CASE 463A

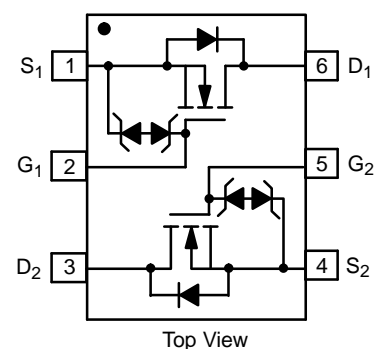
- TV = Specific Device Code
- M = Date Code
- = Pb-Free Package

(Note: Microdot may be in either location)

MARKING DIAGRAM



PINOUT: SOT-563



ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 4 of this data sheet.

NTZD3154N

ELECTRICAL CHARACTERISTICS ($T_J = 25^\circ\text{C}$ unless otherwise noted.)

| Parameter | Symbol | Test Condition | Min | Typ | Max | Unit | |
|---|-------------------|--|---------------------------|-----|-----------|---------------|---------------|
| OFF CHARACTERISTICS | | | | | | | |
| Drain-to-Source Breakdown Voltage | $V_{(BR)DSS}$ | $V_{GS} = 0\text{ V}, I_D = 250\ \mu\text{A}$ | 20 | - | - | V | |
| Drain-to-Source Breakdown Voltage Temperature Coefficient | $V_{(BR)DSS}/T_J$ | - | - | 14 | - | mV/°C | |
| Zero Gate Voltage Drain Current | I_{DSS} | $V_{GS} = 0\text{ V}$ $V_{DS} = 16\text{ V}$ | $T_J = 25^\circ\text{C}$ | - | - | 1.0 | μA |
| | | | $T_J = 125^\circ\text{C}$ | - | - | 5.0 | |
| Gate-to-Source Leakage Current | I_{GSS} | $V_{DS} = 0\text{ V}, V_{GS} = \pm 4.5\text{ V}$ | - | - | ± 5.0 | μA | |

ON CHARACTERISTICS (Note 3)

| | | | | | | |
|--|------------------|--|------|-----|------|----------|
| Gate Threshold Voltage | $V_{GS(TH)}$ | $V_{GS} = V_{DS}, I_D = 250\ \mu\text{A}$ | 0.45 | - | 1.0 | V |
| Negative Threshold Temperature Coefficient | $V_{GS(TH)}/T_J$ | - | - | 2.0 | - | mV/°C |
| Drain-to-Source On Resistance | $R_{DS(on)}$ | $V_{GS} = 4.5\text{ V}, I_D = 540\text{ mA}$ | - | 0.4 | 0.55 | Ω |
| | | $V_{GS} = 2.5\text{ V}, I_D = 500\text{ mA}$ | - | 0.5 | 0.7 | |
| | | $V_{GS} = 1.8\text{ V}, I_D = 350\text{ mA}$ | - | 0.7 | 0.9 | |
| Forward Transconductance | g_{FS} | $V_{DS} = 10\text{ V}, I_D = 540\text{ mA}$ | - | 1.0 | - | S |

CHARGES AND CAPACITANCES

| | | | | | | |
|------------------------------|--------------|--|---|------|-----|-------------|
| Input Capacitance | C_{ISS} | $V_{GS} = 0\text{ V}, f = 1.0\text{ MHz}, V_{DS} = 16\text{ V}$ | - | 80 | 150 | pF |
| Output Capacitance | C_{OSS} | | - | 13 | 25 | |
| Reverse Transfer Capacitance | C_{RSS} | | - | 10 | 20 | |
| Total Gate Charge | $Q_{G(TOT)}$ | $V_{GS} = 4.5\text{ V}, V_{DS} = 10\text{ V}; I_D = 540\text{ mA}$ | - | 1.5 | 2.5 | nC |
| Threshold Gate Charge | $Q_{G(TH)}$ | | - | 0.1 | - | |
| Gate-to-Source Charge | Q_{GS} | | - | 0.2 | - | |
| Gate-to-Drain Charge | Q_{GD} | | - | 0.35 | - | |

SWITCHING CHARACTERISTICS, $V_{GS} = V$ (Note 4)

| | | | | | | |
|---------------------|--------------|---|---|-----|---|-------------|
| Turn-On Delay Time | $t_{d(ON)}$ | $V_{GS} = 4.5\text{ V}, V_{DD} = 10\text{ V}, I_D = 540\text{ mA},$ $R_G = 10\ \Omega$ | - | 6.0 | - | ns |
| Rise Time | t_r | | - | 4.0 | - | |
| Turn-Off Delay Time | $t_{d(OFF)}$ | | - | 16 | - | |
| Fall Time | t_f | | - | 8.0 | - | |

DRAIN-SOURCE DIODE CHARACTERISTICS

| | | | | | | | |
|-----------------------|----------|--|---------------------------|-----|-----|-----|---|
| Forward Diode Voltage | V_{SD} | $V_{GS} = 0\text{ V},$ $I_S = 350\text{ mA}$ | $T_J = 25^\circ\text{C}$ | - | 0.7 | 1.2 | V |
| | | | $T_J = 125^\circ\text{C}$ | - | 0.6 | - | |
| Reverse Recovery Time | t_{RR} | $V_{GS} = 0\text{ V}, d_{ISD}/d_t = 100\text{ A}/\mu\text{s}, I_S = 350\text{ mA}$ | - | 6.5 | - | ns | |

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

- Surface-mounted on FR4 board using 1 in. sq. pad size (Cu. area = 1.127 in sq [1 oz] including traces).
- Pulse Test: pulse width $\leq 300\ \mu\text{s}$, duty cycle $\leq 2\%$.
- Switching characteristics are independent of operating junction temperatures.

TYPICAL PERFORMANCE CURVES ($T_J = 25^\circ\text{C}$ unless otherwise noted)

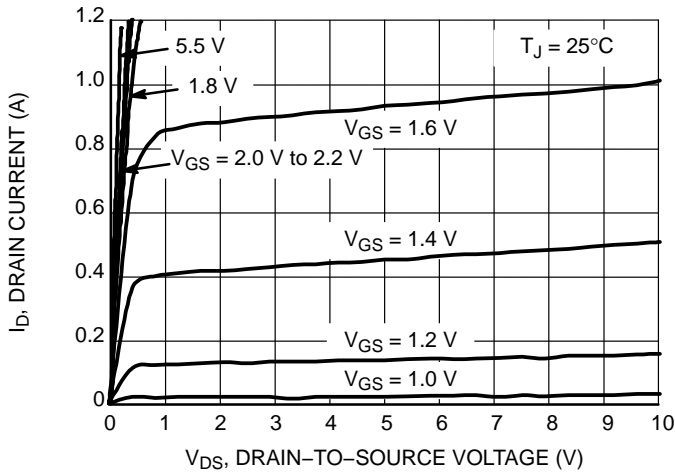


Figure 1. On-Region Characteristics

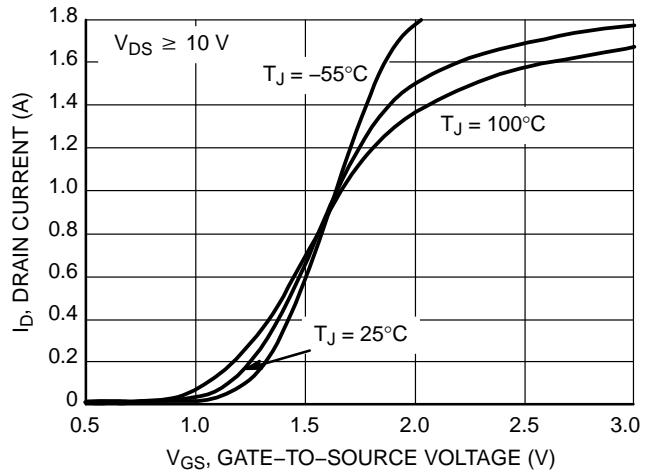


Figure 2. Transfer Characteristics

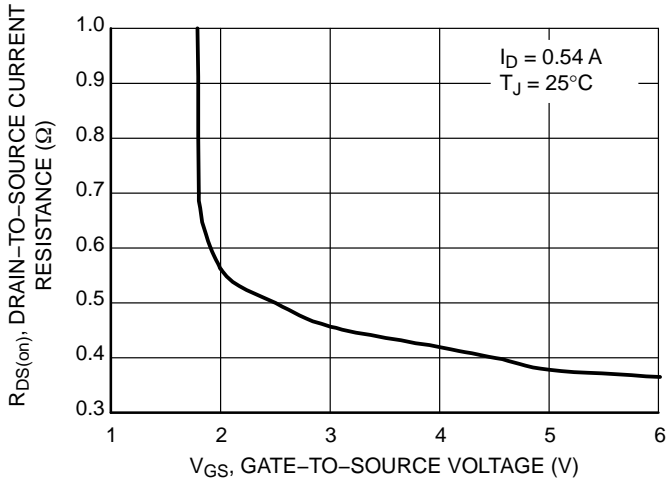


Figure 3. On-Resistance versus Gate-to-Source Voltage

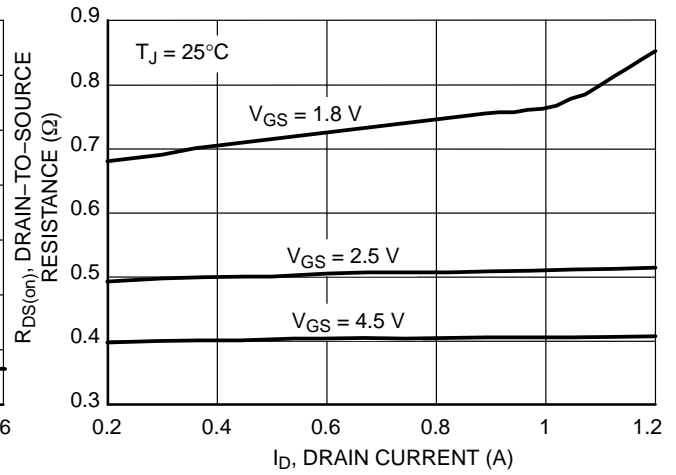


Figure 4. On-Resistance versus Drain Current and Gate Voltage

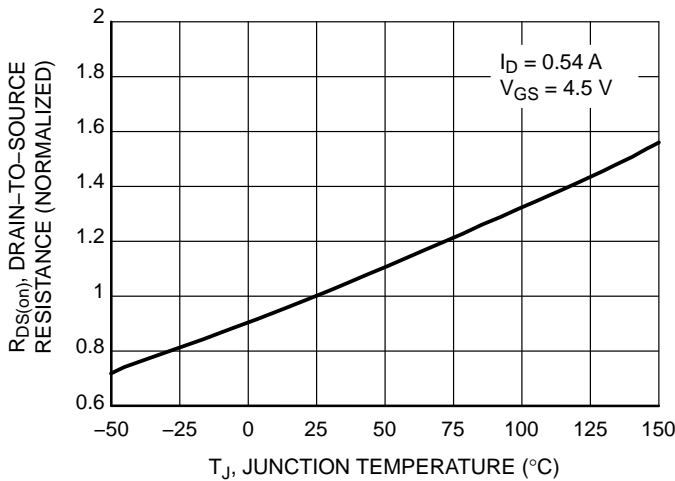


Figure 5. On-Resistance Variation with Temperature

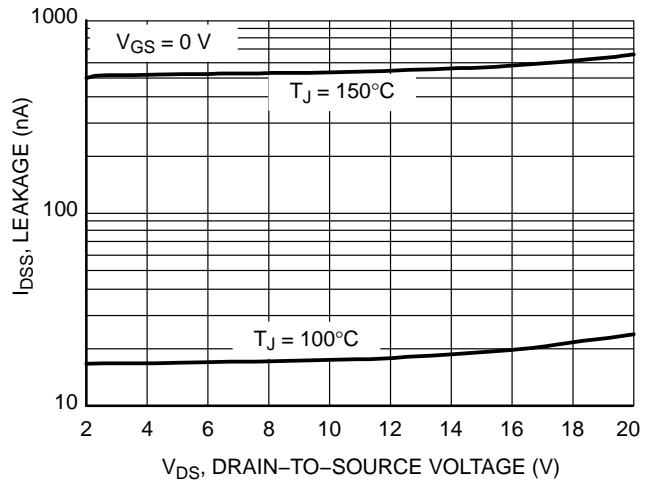


Figure 6. Drain-to-Source Leakage Current versus Voltage

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TYPICAL PERFORMANCE CURVES ($T_J = 25^\circ\text{C}$ unless otherwise noted)

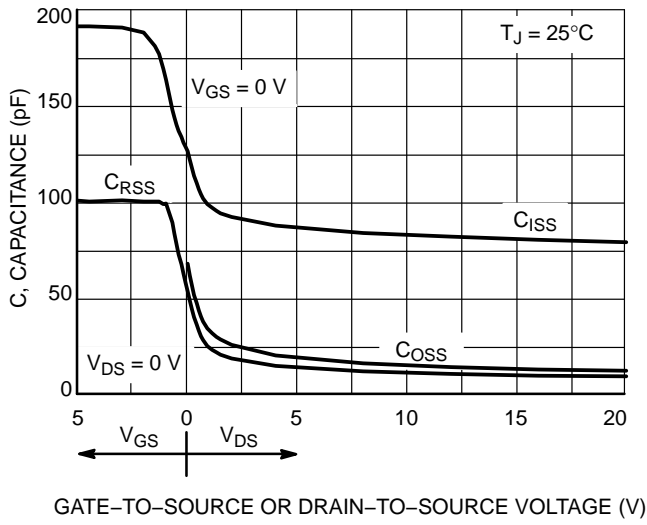


Figure 7. Capacitance Variation

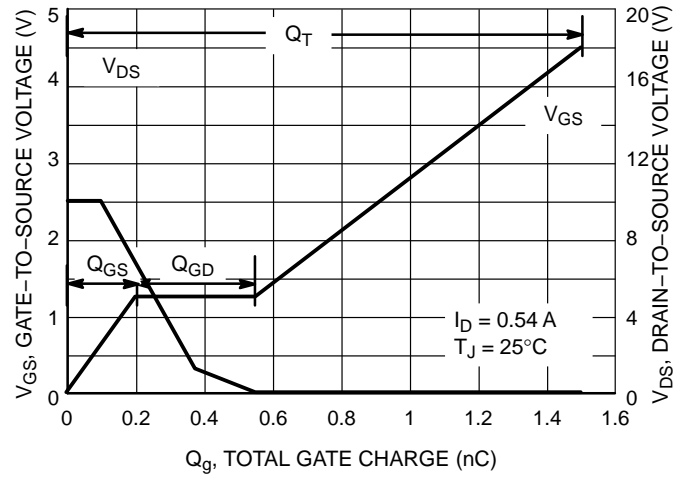


Figure 8. Gate-to-Source and Drain-to-Source Voltage versus Total Charge

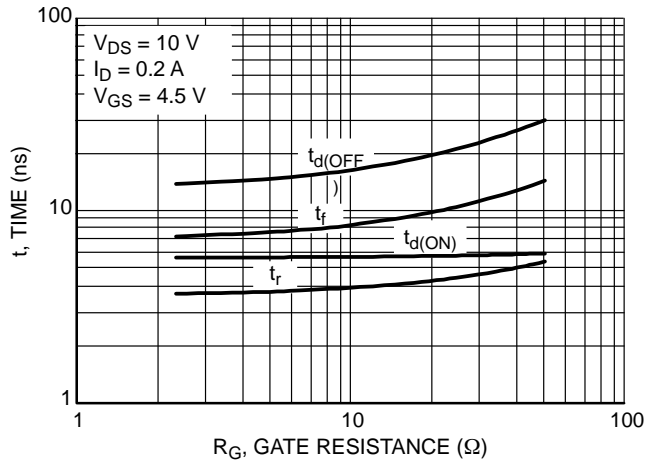


Figure 9. Resistive Switching Time Variation versus Gate Resistance

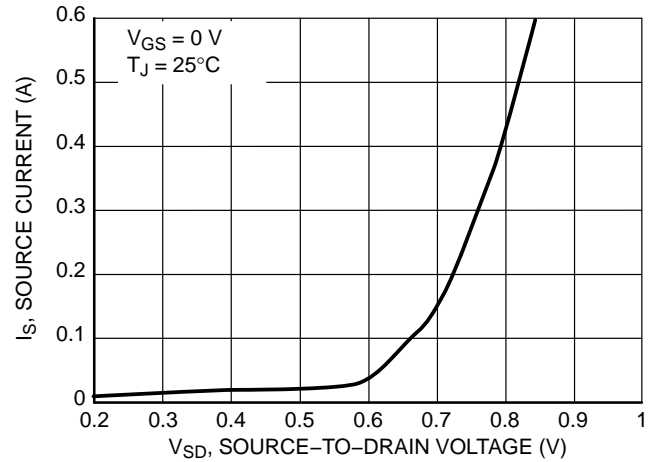


Figure 10. Diode Forward Voltage versus Current

ORDERING INFORMATION

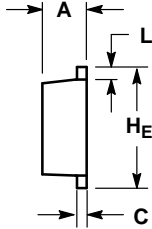
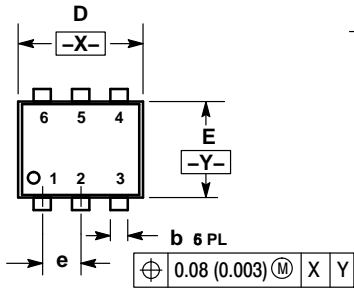
| Device | Package | Shipping |
|--------------|----------------------|--------------------|
| NTZD3154NT1G | SOT-563 (Pb-Free) | 4000 / Tape & Reel |
| NTZD3154NT1H | | |
| NTZD3154NT2G | | |
| NTZD3154NT2H | | |
| NTZD3154NT5G | | 8000 / Tape & Reel |
| NTZD3154NT5H | | |

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

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PACKAGE DIMENSIONS

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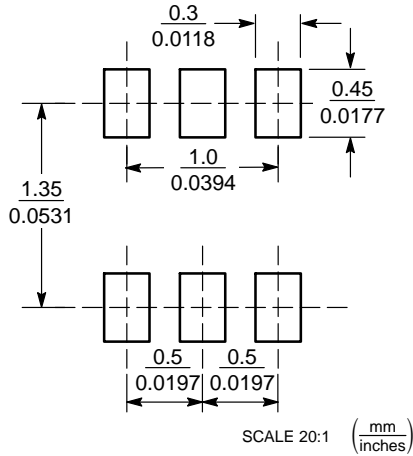


NOTES:


1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETERS
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.

| DIM | MILLIMETERS | | | INCHES | | |
|----------------|-------------|------|------|----------|-------|-------|
| | MIN | NOM | MAX | MIN | NOM | MAX |
| A | 0.50 | 0.55 | 0.60 | 0.020 | 0.021 | 0.023 |
| b | 0.17 | 0.22 | 0.27 | 0.007 | 0.009 | 0.011 |
| C | 0.08 | 0.12 | 0.18 | 0.003 | 0.005 | 0.007 |
| D | 1.50 | 1.60 | 1.70 | 0.059 | 0.062 | 0.066 |
| E | 1.10 | 1.20 | 1.30 | 0.043 | 0.047 | 0.051 |
| e | 0.5 BSC | | | 0.02 BSC | | |
| L | 0.10 | 0.20 | 0.30 | 0.004 | 0.008 | 0.012 |
| H _E | 1.50 | 1.60 | 1.70 | 0.059 | 0.062 | 0.066 |

SOLDERING FOOTPRINT*



*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

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