Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of “Quality Parts,Customers Priority,Honest Operation,and Considerate Service”,our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!


## Contact us

Tel: +86-755-8981 8866 Fax: +86-755-8427 6832
Email & Skype: info@chipsmall.com Web: www.chipsmall.com
Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China

# NTUD3170NZ

# Small Signal MOSFET

## 20 V, 220 mA, Dual N−Channel, 1.0 mm x 1.0 mm SOT−963 Package

ON Semiconductor®

www.onsemi.com

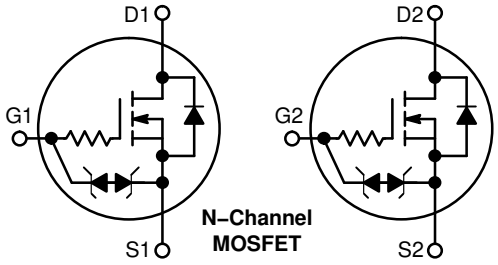
### Features

- Dual N−Channel MOSFET
- Offers a Low $R_{DS(ON)}$ Solution in the Ultra Small 1.0 x 1.0 mm Package
- 1.5 V Gate Voltage Rating
- Ultra Thin Profile (< 0.5 mm) Allows It to Fit Easily into Extremely Thin Environments such as Portable Electronics
- This is a Pb−Free Device

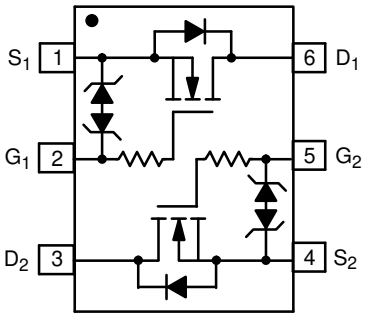
### Applications

- General Purpose Interfacing Switch
- Optimized for Power Management in Ultra Portable Equipment
- Analog Switch

| $V_{(BR)DSS}$ | $R_{DS(ON)}$ MAX | $I_D$ Max |
|---|---|---|
| 20 V | 1.5 Ω @ 4.5 V | 0.22 A |
| | 2.0 Ω @ 2.5 V | |
| | 3.0 Ω @ 1.8 V | |
| | 4.5 Ω @ 1.5 V | |




**PINOUT: SOT−963**




Top View

**MAXIMUM RATINGS** ($T_J$ = 25°C unless otherwise specified)

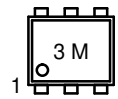
| Parameter | | | Symbol | Value | Unit |
|---|---|---|---|---|---|
| Drain−to−Source Voltage | | | $V_{DSS}$ | 20 | V |
| Gate−to−Source Voltage | | | $V_{GS}$ | ±8 | V |
| Continuous Drain Current (Note 1) | Steady State | $T_A$ = 25°C | $I_D$ | 220 | mA |
| | | $T_A$ = 85°C | | 160 | |
| | t ≤ 5 s | $T_A$ = 25°C | | 280 | |
| Power Dissipation (Note 1) | Steady State | $T_A$ = 25°C | $P_D$ | 125 | mW |
| | t ≤ 5 s | | | 200 | |
| Pulsed Drain Current | | $t_p$ = 10 μs | $I_{DM}$ | 800 | mA |
| Operating Junction and Storage Temperature | | | $T_J$, $T_{STG}$ | −55 to 150 | °C |
| Source Current (Body Diode) (Note 2) | | | $I_S$ | 200 | mA |
| Lead Temperature for Soldering Purposes (1/8" from case for 10 s) | | | $T_L$ | 260 | °C |

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 the minimum recommended pad size, 1 oz Cu.
2. Pulse Test: pulse width ≤300 μs, duty cycle ≤2%

**SOT−963**
**CASE 527AD**

**MARKING DIAGRAM**




3 = Specific Device Code
M = Date Code

### ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 2 of this data sheet.

## THERMAL RESISTANCE RATINGS

| Parameter | Symbol | Max | Unit |
|---|---|---|---|
| Junction−to−Ambient − Steady State (Note 3) | $R_{\theta JA}$ | 1000 | °C/W |
| Junction−to−Ambient − t = 5 s (Note 3) | | 600 | |

3. Surface−mounted on FR4 board using the minimum recommended pad size, 1 oz Cu.

## ELECTRICAL CHARACTERISTICS ($T_J$ = 25°C unless otherwise specified)

| 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 | | 20 | | | V |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{GS}$ = 0 V, $V_{DS}$ = 5 V | $T_J$ = 25°C | | | 50 | nA |
| | | | $T_J$ = 85°C | | | 200 | nA |
| | | $V_{GS}$ = 0 V, $V_{DS}$ = 16 V | $T_J$ = 25°C | | | 100 | |
| Gate−to−Source Leakage Current | $I_{GSS}$ | $V_{DS}$ = 0 V, $V_{GS}$ = ±5.0 V | | | | ±100 | nA |
| **ON CHARACTERISTICS** (Note 4) | | | | | | | |
| Gate Threshold Voltage | $V_{GS(TH)}$ | $V_{GS}$ = $V_{DS}$, $I_D$ = 250 μA | | 0.4 | | 1.0 | V |
| Drain−to−Source On Resistance | $R_{DS(ON)}$ | $V_{GS}$ = 4.5 V, $I_D$ = 100 mA | | | 0.75 | 1.5 | Ω |
| | | $V_{GS}$ = 2.5 V, $I_D$ = 50 mA | | | 1.0 | 2.0 | |
| | | $V_{GS}$ = 1.8 V, $I_D$ = 20 mA | | | 1.4 | 3.0 | |
| | | $V_{GS}$ = 1.5 V, $I_D$ = 10 mA | | | 1.8 | 4.5 | |
| | | $V_{GS}$ = 1.2 V, $I_D$ = 1.0 mA | | | 2.8 | | |
| Forward Transconductance | $g_{FS}$ | $V_{DS}$ = 5.0 V, $I_D$ = 125 mA | | | 0.48 | | S |
| Source−Drain Diode Voltage | $V_{SD}$ | $V_{GS}$ = 0 V, $I_S$ = 10 mA | | | 0.6 | 1.0 | V |
| **CAPACITANCES** | | | | | | | |
| Input Capacitance | $C_{ISS}$ | f = 1.0 MHz, $V_{GS}$ = 0 V<br>$V_{DS}$ = 15 V | | | 12.5 | | pF |
| Output Capacitance | $C_{OSS}$ | | | | 3.6 | | |
| Reverse Transfer Capacitance | $C_{RSS}$ | | | | 2.6 | | |
| **SWITCHING CHARACTERISTICS, $V_{GS}$ = 4.5 V** (Note 4) | | | | | | | |
| Turn−On Delay Time | $t_{d(ON)}$ | $V_{GS}$ = 4.5 V, $V_{DD}$ = 10 V, $I_D$ = 200 mA,<br>$R_G$ = 2.0 Ω | | | 16.5 | | ns |
| Rise Time | $t_r$ | | | | 25.5 | | |
| Turn−Off Delay Time | $t_{d(OFF)}$ | | | | 142 | | |
| Fall Time | $t_f$ | | | | 80 | | |

4. Switching characteristics are independent of operating junction temperatures.

## ORDERING INFORMATION

| Device | Package | Shipping† |
|---|---|---|
| NTUD3170NZT5G | SOT−963<br>(Pb−Free) | 8000 / Tape & Reel |

†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.

## TYPICAL CHARACTERISTICS

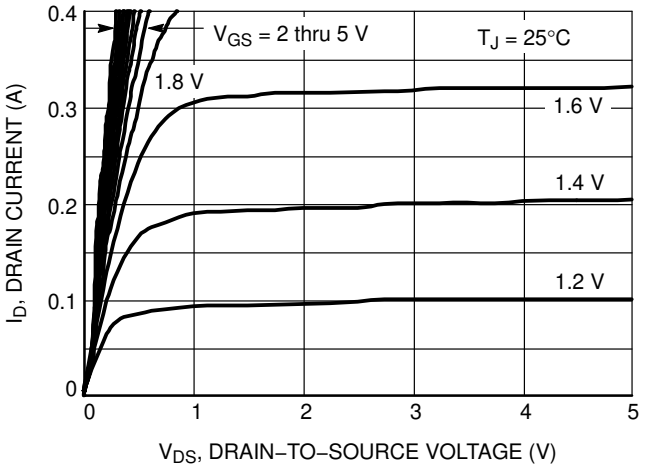



**Figure 1. On−Region Characteristics**

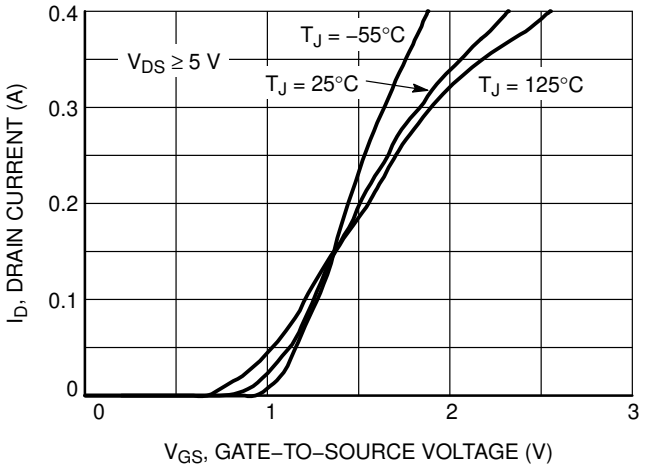



**Figure 2. Transfer Characteristics**

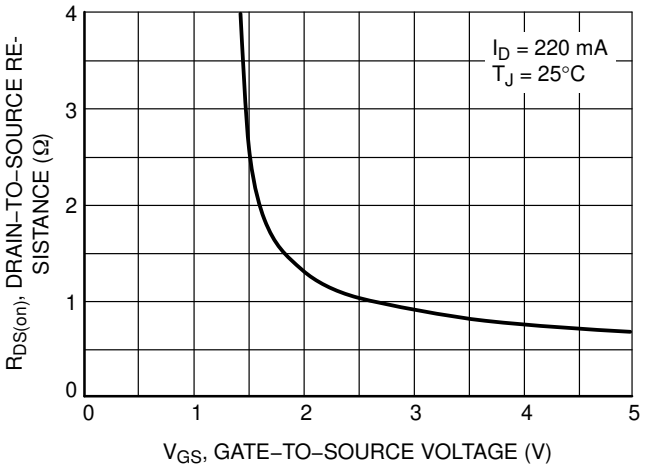



**Figure 3. On−Resistance vs. Gate Voltage**

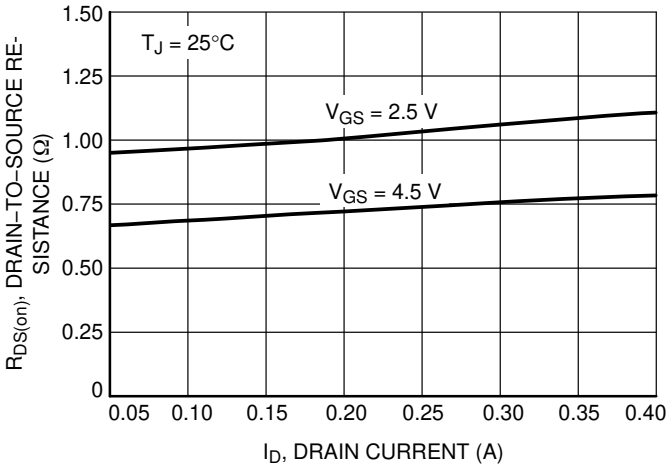



**Figure 4. On−Resistance vs. Drain Current and Gate Voltage**

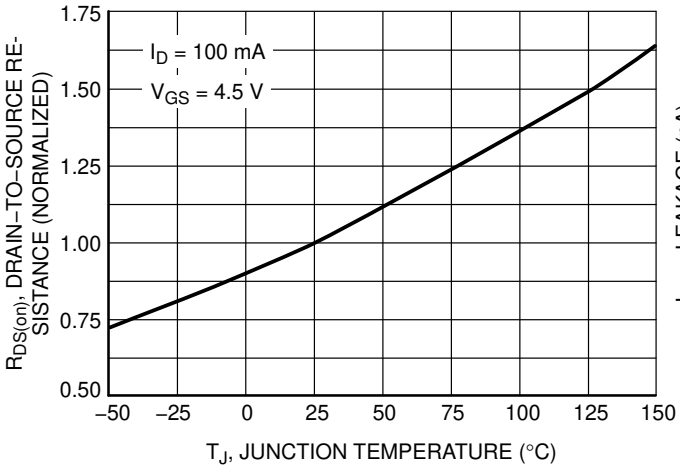



**Figure 5. On−Resistance Variation with Temperature**

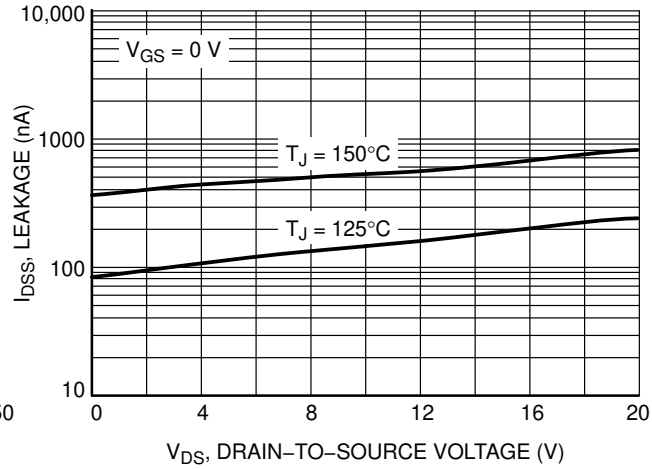



**Figure 6. Drain−to−Source Leakage Current vs. Voltage**

## TYPICAL CHARACTERISTICS

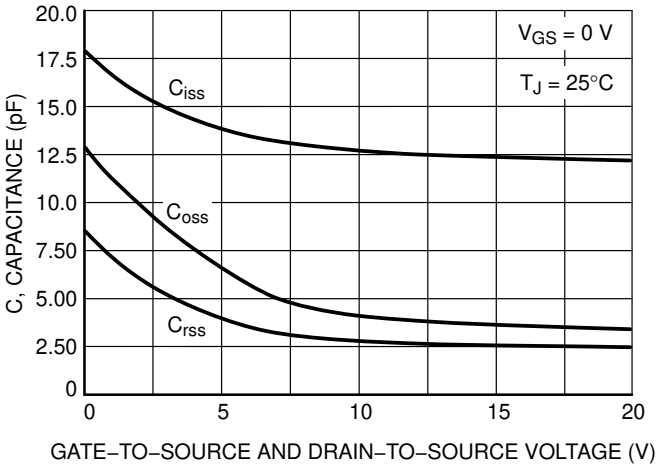



**Figure 7. Capacitance Variation**

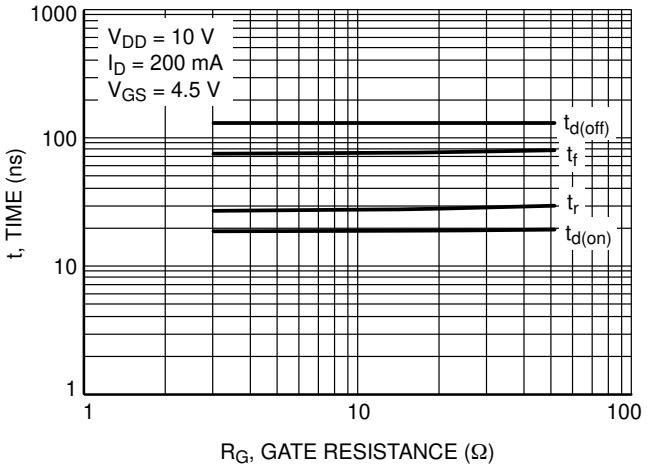



**Figure 8. Resistive Switching Time Variation vs. Gate Resistance**

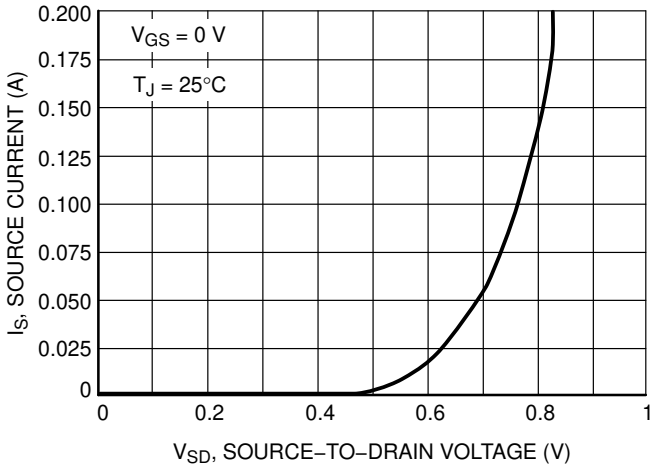
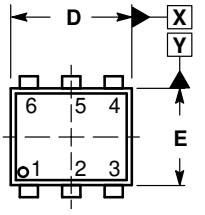


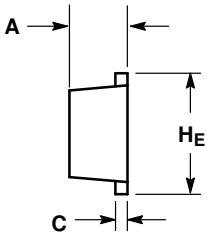

**Figure 9. Diode Forward Voltage vs. Current**

## PACKAGE DIMENSIONS

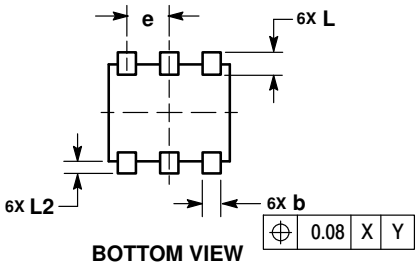
**SOT−963**
CASE 527AD
ISSUE E




TOP VIEW




SIDE VIEW

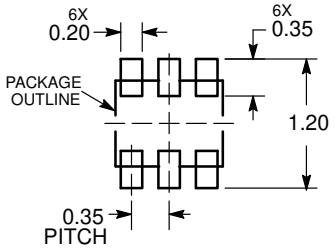



BOTTOM VIEW

NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.

| | MILLIMETERS | | |
|---|---|---|---|
| DIM | MIN | NOM | MAX |
| A | 0.34 | 0.37 | 0.40 |
| b | 0.10 | 0.15 | 0.20 |
| C | 0.07 | 0.12 | 0.17 |
| D | 0.95 | 1.00 | 1.05 |
| E | 0.75 | 0.80 | 0.85 |
| e | 0.35 BSC | | |
| $H_E$ | 0.95 | 1.00 | 1.05 |
| L | 0.19 REF | | |
| L2 | 0.05 | 0.10 | 0.15 |

### RECOMMENDED MOUNTING FOOTPRINT




DIMENSIONS: MILLIMETERS



### PUBLICATION ORDERING INFORMATION

**LITERATURE FULFILLMENT**:
Literature Distribution Center for ON Semiconductor
19521 E. 32nd Pkwy, Aurora, Colorado 80011 USA
**Phone**: 303−675−2175 or 800−344−3860 Toll Free USA/Canada
**Fax**: 303−675−2176 or 800−344−3867 Toll Free USA/Canada
**Email**: orderlit@onsemi.com

**N. American Technical Support**: 800−282−9855 Toll Free USA/Canada
**Europe, Middle East and Africa Technical Support:**
Phone: 421 33 790 2910
**Japan Customer Focus Center**
Phone: 81−3−5817−1050

**ON Semiconductor Website**: **www.onsemi.com**

**Order Literature**: http://www.onsemi.com/orderlit

For additional information, please contact your local Sales Representative