# NTLUD3C20CZ

*Product Preview*

# Small Signal MOSFET

## 12 V, Complementary, 2.0 x 2.0 mm UDFN Package

ON Semiconductor®

www.onsemi.com

### Features

- Advanced Trench Complementary MOSFET
- Low RDS(on)
- Low Profile UDFN 2.0x2.0x0.55mm for Board Space Saving
- These Devices are Pb−Free, Halogen Free/BFR Free and are RoHS Compliant

### Applications

- Power Load Switch
- Load Switch with Level Shift
- Optimized for Power Management in Ultra Portable Devices

| $V_{(BR)DSS}$ | $R_{DS(on)}$ Max | $I_D$ Max |
|---|---|---|
| N−Channel 12 V | 23 mΩ @ 4.5 V | 6.4 mA |
| | 26 mΩ @ 3.3 V | |
| | 31 mΩ @ 2.5 V | |
| | 59 mΩ @ 1.8 V | |
| P−Channel −12 V | 44 mΩ @ −4.5 V | −4.6 mA |
| | 55 mΩ @ −3.3 V | |
| | 75 mΩ @ −2.5 V | |
| | 175 mΩ @ −1.8 V | |

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

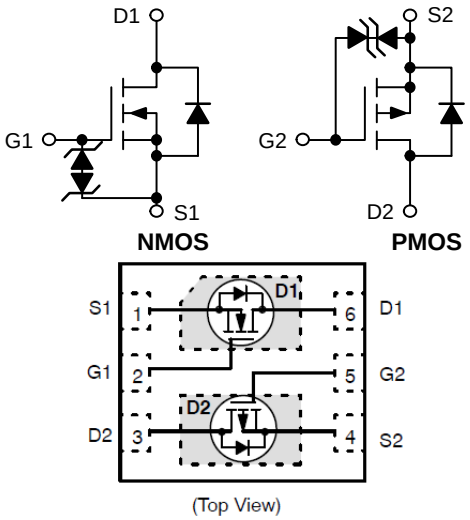
| Parameter | | | Symbol | Value | Unit |
|---|---|---|---|---|---|
| Drain−to−Source Voltage | | NMOS | $V_{DSS}$ | 12 | V |
| | | PMOS | | 12 | |
| Gate−to−Source Voltage | | NMOS | $V_{GS}$ | ±8.0 | V |
| | | PMOS | | ±8.0 | |
| N−Channel Continuous Drain Current (Note 1) | Steady State | $T_A$ = 25°C | $I_D$ | 6.4 | mA |
| | | $T_A$ = 85°C | | 4.6 | |
| | t ≤ 5 s | $T_A$ = 25°C | | 8.1 | |
| P−Channel Continuous Drain Current (Note 1) | Steady State | $T_A$ = 25°C | $I_D$ | −4.6 | mA |
| | | $T_A$ = 85°C | | −3.3 | |
| | t ≤ 5 s | $T_A$ = 25°C | | −5.9 | |
| Power Dissipation (Note 1) | Steady State | $T_A$ = 25°C | $P_D$ | 1.40 | mW |
| | t ≤ 5 s | $T_A$ = 25°C | | 2.29 | mW |
| Pulsed Drain Current | NMOS | $t_p$ = 10 μs | $I_{DM}$ | 21 | mA |
| | PMOS | | | 14 | |
| Source Current (Body Diode) | | | $I_S$ | 1.6 | A |
| | | | | −1.6 | |
| Operating Junction and Storage Temperature | | | $T_J$, $T_{STG}$ | −55 to 150 | °C |
| 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.

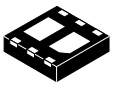
1. Surface−mounted on FR4 board using 1 in sq pad size (Cu area = 1.127 in sq), 1 oz. Cu.

This document contains information on a product under development. ON Semiconductor reserves the right to change or discontinue this product without notice.

**SYMBOLS AND PIN CONNECTIONS**




**MARKING DIAGRAM**



**UDFN6**
**CASE 527AD**


AA = Specific Device Code
M = Date Code
(Note: Microdot may be in either location)

**ORDERING INFORMATION**

| Device | Package | Shipping† |
|---|---|---|
| NTLUD3C20CZTAG | UDFN6 (Pb−Free) | 3000 / Tape & Reel |
| NTLUD3C20CZTBG | | |

†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.

## THERMAL RESISTANCE RATINGS

| Parameter | Symbol | Value | Unit |
|---|---|---|---|
| Junction−to−Ambient – Steady State, Minimum Pad (Note 1) | $R_{\theta JA}$ | 89.3 | °C/W |
| Junction−to−Ambient – t ≤ 5 s (Note 1) | | 54.6 | |

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

| Parameter | Symbol | FET | Test Condition | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|---|
| **OFF CHARACTERISTICS** | | | | | | | | |
| Drain−to−Source Breakdown Voltage | $V_{(BR)DSS}$ | N | $V_{GS}$ = 0 V | $I_D$ = 250 μA | 12 | | | V |
| | | P | | $I_D$ = −250 μA | −12 | | | |
| Drain−to−Source Breakdown Voltage Temperature Coefficient | $V_{(BR)DSS}$ / $T_J$ | N | | | | TBD | | mV/°C |
| | | P | | | | TBD | | |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | N | $V_{GS}$ = 0 V, $V_{DS}$ = 9.6 V | $T_J$ = 25°C | | | 1 | μA |
| | | | | $T_J$ = 125°C | | | 10 | |
| | | P | $V_{GS}$ = 0 V, $V_{DS}$ = −9.6 V | $T_J$ = 25°C | | | −1 | μA |
| | | | | $T_J$ = 125°C | | | −10 | |
| Gate−to−Source Leakage Current | $I_{GSS}$ | N | $V_{DS}$ = 0 V, $V_{GS}$ = ±8.0 V | | | | ±100 | nA |
| | | P | | | | | ±100 | |
| **ON CHARACTERISTICS** (Note 2) | | | | | | | | |
| Gate Threshold Voltage | $V_{GS(TH)}$ | N | $V_{GS}$ = $V_{DS}$ | $I_D$ = 250 μA | 0.4 | | 1.0 | V |
| | | P | | $I_D$ = −250 μA | −0.4 | | −1.0 | |
| Negative Threshold Temperature Coefficient | $V_{GS(TH)}$ / $T_J$ | N | | | | TBD | | mV/°C |
| | | P | | | | TBD | | |
| Drain−to−Source On Resistance | $R_{DS(on)}$ | N | $V_{GS}$ = 4.5 V | $I_D$ = 5 A | | 18 | 23 | mΩ |
| | | | $V_{GS}$ = 3.3 V | $I_D$ = 5 A | | 21 | 26 | |
| | | | $V_{GS}$ = 2.5 V | $I_D$ = 4.6 A | | 25 | 31 | |
| | | | $V_{GS}$ = 1.8 V | $I_D$ = 4 A | | 47 | 59 | |
| | | P | $V_{GS}$ = −4.5 V, | $I_D$ = −4 A | | 35 | 44 | |
| | | | $V_{GS}$ = −3.3 V | $I_D$ = −4 A | | 44 | 55 | |
| | | | $V_{GS}$ = −2.5 V, | $I_D$ = −3 A | | 60 | 75 | |
| | | | $V_{GS}$ = −1.8 V | $I_D$ = −1 A | | 140 | 175 | |
| Forward Transconductance | $g_{FS}$ | N | $V_{DS}$ = 5 V | $I_D$ = 5 A | | TBD | | S |
| | | P | $V_{DS}$ = −5 V | $I_D$ = −4 A | | TBD | | |
| **CAPACITANCES** | | | | | | | | |
| Input Capacitance | $C_{ISS}$ | N | f = 1 MHz, $V_{GS}$ = 0 V $V_{DS}$ = 9.6 V | | | 1074 | | pF |
| Output Capacitance | $C_{OSS}$ | | | | | 147 | | |
| Reverse Capacitance | $C_{RSS}$ | | | | | 139 | | |
| Input Capacitance | $C_{ISS}$ | P | f = 1 MHz, $V_{GS}$ = 0 V $V_{DS}$ = −9.6 V | | | 1201 | | |
| Output Capacitance | $C_{OSS}$ | | | | | 150 | | |
| Reverse Capacitance | $C_{RSS}$ | | | | | 145 | | |

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.

2. Switching characteristics are independent of operating junction temperatures

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

| Parameter | Symbol | FET | Test Condition | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|---|
| **CHARGES** | | | | | | | | |
| Total Gate Charge | $Q_{G(TOT)}$ | N | $V_{GS}$ = 4.5 V, $V_{DS}$ = 9.6 V, $I_D$ = 5 A | | | 10.8 | | nC |
| Threshold Gate Charge | $Q_{G(TH)}$ | | | | | 0.8 | | |
| Gate−to−Source Charge | $Q_{GS}$ | | | | | 1.9 | | |
| Gate−to−Drain Charge | $Q_{GD}$ | | | | | 2.4 | | |
| Total Gate Charge | $Q_{G(TOT)}$ | P | $V_{GS}$ = −4.5 V, $V_{DS}$ = −9.6 V, $I_D$ = −4 A | | | 12.6 | | |
| Threshold Gate Charge | $Q_{G(TH)}$ | | | | | 0.9 | | |
| Gate−to−Source Charge | $Q_{GS}$ | | | | | 1.7 | | |
| Gate−to−Drain Charge | $Q_{GD}$ | | | | | 2.8 | | |
| **SWITCHING CHARACTERISTICS** (Note 2) | | | | | | | | |
| Turn−On Delay Time | $t_{d(ON)}$ | N | $V_{GS}$ = 4.5 V, $V_{DS}$ = 9.6 V, $R_G$ = 1.0 Ω | | | 7.6 | | ns |
| Rise Time | $t_r$ | | | | | 22 | | |
| Turn−Off Delay Time | $t_{d(OFF)}$ | | | | | 22 | | |
| Fall Time | $t_f$ | | | | | 4.0 | | |
| Turn−On Delay Time | $t_{d(ON)}$ | P | $V_{GS}$ = −4.5 V, $V_{DD}$ = −9.6 V, $R_G$ = 1.0 Ω | | | 6.8 | | |
| Rise Time | $t_r$ | | | | | 18 | | |
| Turn−Off Delay Time | $t_{d(OFF)}$ | | | | | 33 | | |
| Fall Time | $t_f$ | | | | | 9.9 | | |
| **DRAIN−SOURCE DIODE CHARACTERISTICS** | | | | | | | | |
| Forward Diode Voltage | $V_{SD}$ | N | $V_{GS}$ = 0 V, $I_S$ = 1.0 mA | $T_J$ = 25°C | | 0.8 | 1.1 | V |
| | | | | $T_J$ = 125°C | | TBD | | |
| | | P | $V_{GS}$ = 0 V, $I_S$ = −1.0 mA | $T_J$ = 25°C | | −0.8 | −1.1 | |
| | | | | $T_J$ = 125°C | | TBD | | |

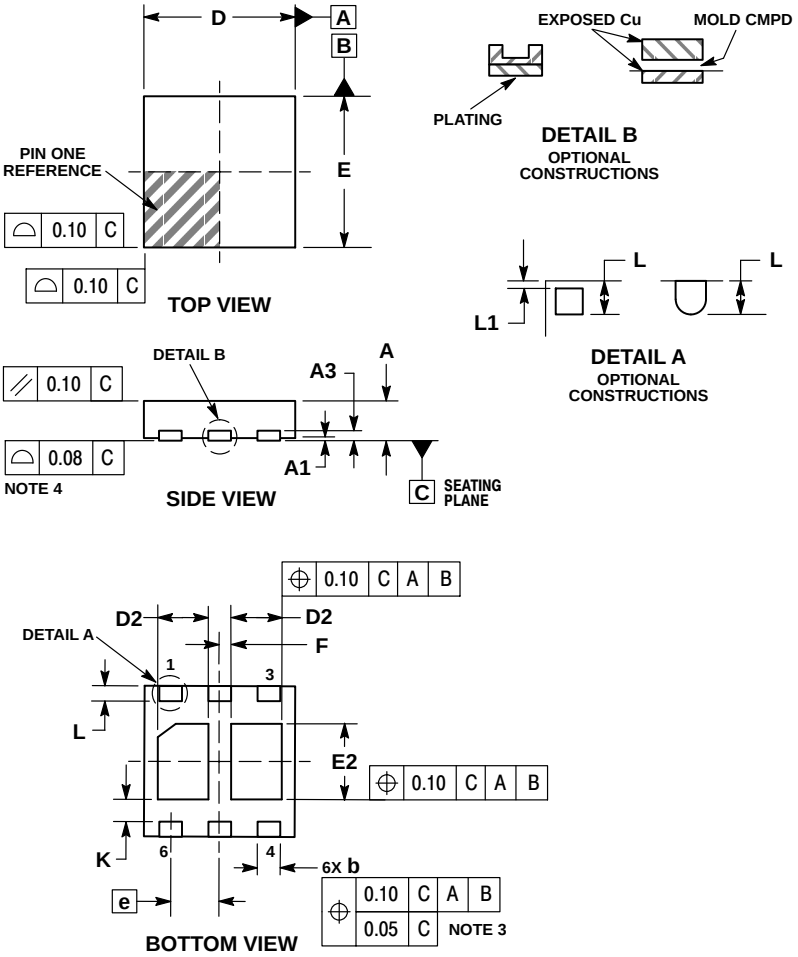
Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

2. Switching characteristics are independent of operating junction temperatures

# NTLUD3C20CZ

## PACKAGE DIMENSIONS

**UDFN6 2x2, 0.65P**
CASE 517BF
ISSUE B




NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. DIMENSION b APPLIES TO PLATED TERMINAL AND IS MEASURED BETWEEN 0.15 AND 0.30 mm FROM THE TERMINAL TIP.
4. COPLANARITY APPLIES TO THE EXPOSED PAD AS WELL AS THE TERMINALS.

| | MILLIMETERS | |
|---|---|---|
| DIM | MIN | MAX |
| A | 0.45 | 0.55 |
| A1 | 0.00 | 0.05 |
| A3 | 0.13 REF | |
| b | 0.25 | 0.35 |
| D | 2.00 BSC | |
| D2 | 0.57 | 0.77 |
| E | 2.00 BSC | |
| E2 | 0.90 | 1.10 |
| e | 0.65 BSC | |
| F | 0.15 BSC | |
| K | 0.25 REF | |
| L | 0.20 | 0.30 |
| L1 | --- | 0.10 |



### PUBLICATION ORDERING INFORMATION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