



## N-Channel 80-V and 90-V (D-S) MOSFETS

## PRODUCT SUMMARY

| Part Number | $V_{(BR)DSS}$ Min (V) | $r_{DS(on)}$ Max ( $\Omega$ ) | $V_{GS(th)}$ (V) | $I_D$ (A) |
|-------------|-----------------------|-------------------------------|------------------|-----------|
| 2N6661      | 90                    | 4 @ $V_{GS} = 10$ V           | 0.8 to 2         | 0.9       |
| VN88AFD     | 80                    | 4 @ $V_{GS} = 10$ V           | 0.8 to 2.5       | 1.29      |

## FEATURES

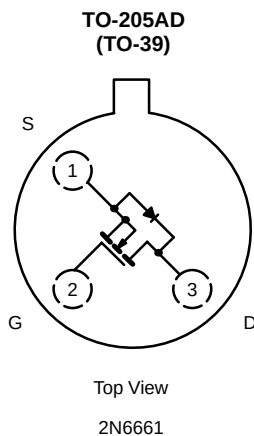
- Low On-Resistance: 3.6  $\Omega$
- Low Threshold: 1.6 V
- Low Input Capacitance: 35 pF
- Fast Switching Speed: 6 ns
- Low Input and Output Leakage

## BENEFITS

- Low Offset Voltage
- Low-Voltage Operation
- Easily Driven Without Buffer
- High-Speed Circuits
- Low Error Voltage

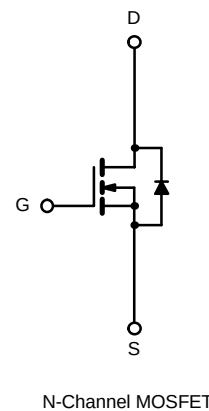
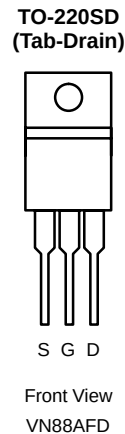
## APPLICATIONS

- Direct Logic-Level Interface: TTL/CMOS
- Drivers: Relays, Solenoids, Lamps, Hammers, Displays, Memories, Transistors, etc.
- Battery Operated Systems
- Solid-State Relays

Device Marking  
Side View

2N6661  
"S" flxxyy

"S" = Siliconix Logo  
f = Factory Code  
ll = Lot Traceability  
xyyy = Date Code

Device Marking  
Front View

VN88AFD  
"S" xxyy

"S" = Siliconix Logo  
xyyy = Date Code

ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$  UNLESS OTHERWISE NOTED)

| Parameter                                              |                           | Symbol         | 2N6661     | VN88AFD  | Unit               |
|--------------------------------------------------------|---------------------------|----------------|------------|----------|--------------------|
| Drain-Source Voltage                                   |                           | $V_{DS}$       | 90         | 80       | V                  |
| Gate-Source Voltage                                    |                           | $V_{GS}$       | $\pm 20$   | $\pm 30$ |                    |
| Continuous Drain Current ( $T_J = 150^\circ\text{C}$ ) | $T_C = 25^\circ\text{C}$  | $I_D$          | 0.9        | 1.29     | A                  |
|                                                        | $T_C = 100^\circ\text{C}$ |                | 0.7        | 0.81     |                    |
| Pulsed Drain Current <sup>a</sup>                      |                           | $I_{DM}$       | $\pm 3$    | $\pm 3$  |                    |
| Power Dissipation                                      | $T_C = 25^\circ\text{C}$  | $P_D$          | 6.25       | 15       | W                  |
|                                                        | $T_C = 100^\circ\text{C}$ |                | 2.5        | 6        |                    |
| Thermal Resistance, Junction-to-Ambient <sup>b</sup>   |                           | $R_{thJA}$     | 170        |          | $^\circ\text{C/W}$ |
| Thermal Resistance, Junction-to-Case                   |                           | $R_{thJC}$     |            | 8.3      |                    |
| Operating Junction and Storage Temperature Range       |                           | $T_J, T_{stg}$ | -55 to 150 |          | $^\circ\text{C}$   |

## Notes

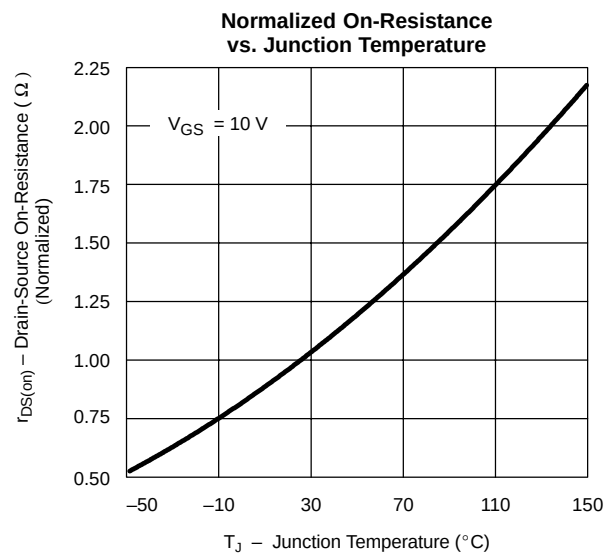
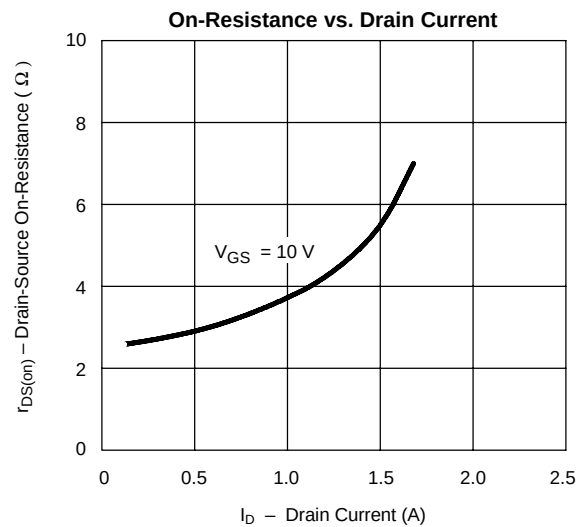
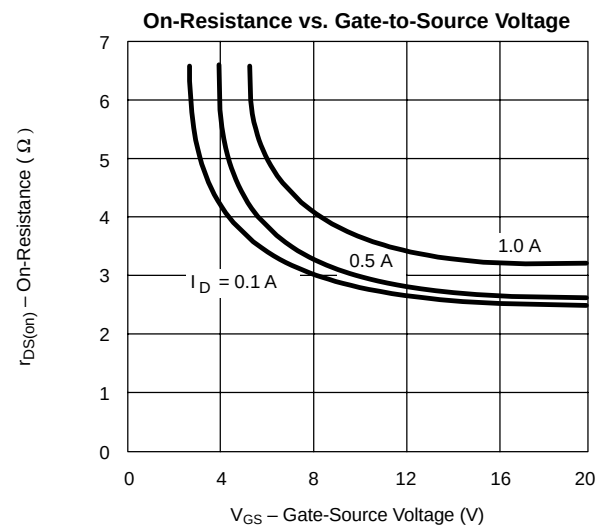
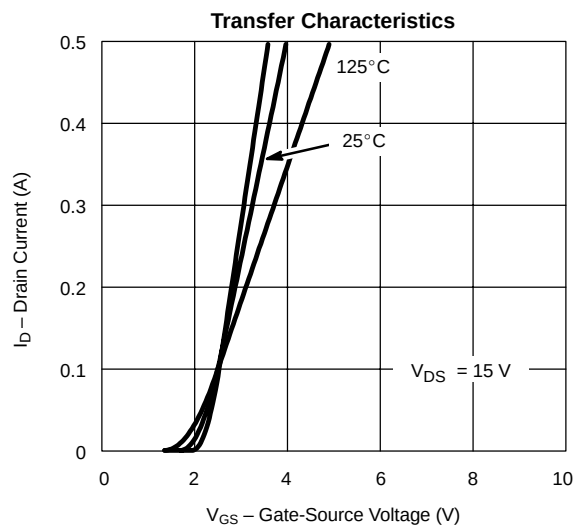
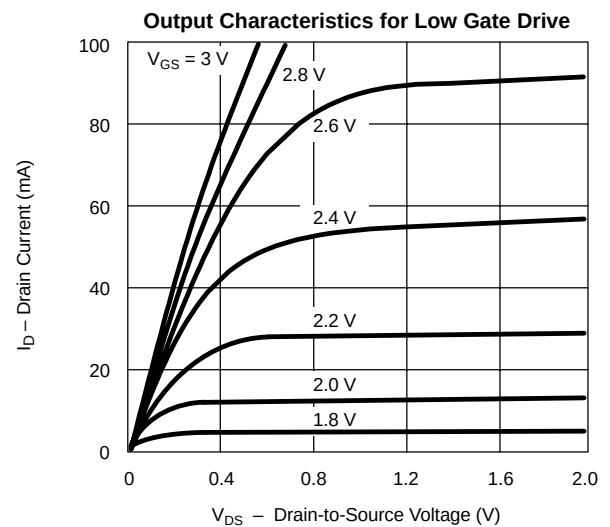
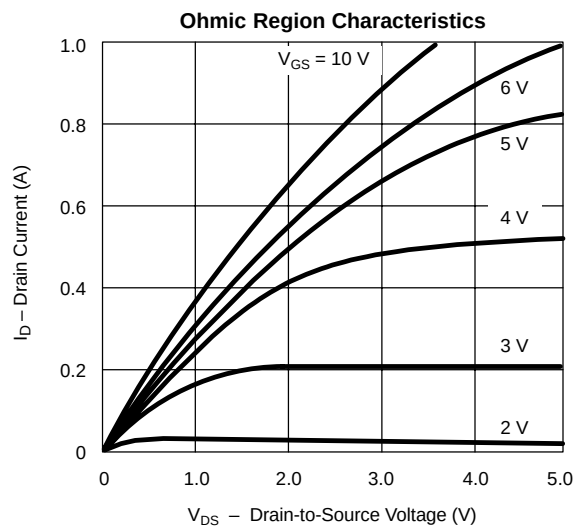
- a. Pulse width limited by maximum junction temperature.  
b. This parameter not registered with JEDEC.

| SPECIFICATIONS (T <sub>A</sub> = 25 °C UNLESS OTHERWISE NOTED) |                      |                                                                                                                         |                  |        |       |         |       |      |
|----------------------------------------------------------------|----------------------|-------------------------------------------------------------------------------------------------------------------------|------------------|--------|-------|---------|-------|------|
| Parameter                                                      | Symbol               | Test Conditions                                                                                                         | Typ <sup>a</sup> | Limits |       |         |       | Unit |
|                                                                |                      |                                                                                                                         |                  | 2N6661 |       | VN88AFD |       |      |
|                                                                |                      |                                                                                                                         |                  | Min    | Max   | Min     | Max   |      |
| Static                                                         |                      |                                                                                                                         |                  |        |       |         |       |      |
| Drain-Source Breakdown Voltage                                 | V <sub>(BR)DSS</sub> | V <sub>GS</sub> = 0 V, I <sub>D</sub> = 10 μA                                                                           | 125              | 90     |       | 80      |       | V    |
| Gate-Threshold Voltage                                         | V <sub>GS(th)</sub>  | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 1 mA                                                               | 1.6              | 0.8    | 2     | 0.8     | 2.5   |      |
|                                                                |                      | T <sub>J</sub> = -55 °C                                                                                                 | 1.8              |        |       |         |       |      |
| Gate-Body Leakage                                              | I <sub>GSS</sub>     | V <sub>DS</sub> = 0 V, V <sub>GS</sub> = ± 15 V                                                                         |                  |        | ± 100 |         | ± 100 | nA   |
|                                                                |                      | T <sub>J</sub> = 125 °C                                                                                                 |                  |        | ± 500 |         | ± 500 |      |
| Zero Gate Voltage Drain Current                                | I <sub>DSS</sub>     | V <sub>DS</sub> = 90 V, V <sub>GS</sub> = 0 V                                                                           |                  |        | 10    |         |       | μA   |
|                                                                |                      | V <sub>DS</sub> = 80 V, V <sub>GS</sub> = 0 V                                                                           |                  |        |       |         | 10    |      |
|                                                                |                      | V <sub>DS</sub> = 0.8 x V <sub>(BR)DSS</sub> , V <sub>GS</sub> = 0 V                                                    |                  |        |       |         | 1     |      |
|                                                                |                      | T <sub>J</sub> = 125 °C                                                                                                 |                  |        | 500   |         | 500   |      |
| On-State Drain Current <sup>b</sup>                            | I <sub>D(on)</sub>   | V <sub>DS</sub> = 15 V, V <sub>GS</sub> = 10 V                                                                          | 1.8              | 1.5    |       |         |       | A    |
|                                                                |                      | V <sub>DS</sub> = 10 V, V <sub>GS</sub> = 10 V                                                                          | 1.8              |        |       | 1.5     |       |      |
| Drain-Source On-Resistance <sup>b</sup>                        | r <sub>DS(on)</sub>  | V <sub>GS</sub> = 5 V, I <sub>D</sub> = 0.3 A                                                                           | 3.8              |        | 5.3   |         | 5.6   | Ω    |
|                                                                |                      | V <sub>GS</sub> = 10 V, I <sub>D</sub> = 1 A                                                                            | 3.6              |        | 4     |         | 4     |      |
|                                                                |                      | T <sub>J</sub> = 125 °C <sup>d</sup>                                                                                    | 6.7              |        | 9     |         | 8     |      |
| Forward Transconductance <sup>b</sup>                          | g <sub>fs</sub>      | V <sub>DS</sub> = 10 V, I <sub>D</sub> = 0.5 A                                                                          | 350              | 170    |       | 170     |       | mS   |
| Diode Forward Voltage                                          | V <sub>SD</sub>      | I <sub>S</sub> = 0.86 A, V <sub>GS</sub> = 0 V                                                                          | 0.9              |        |       |         |       | V    |
| Dynamic                                                        |                      |                                                                                                                         |                  |        |       |         |       |      |
| Input Capacitance                                              | C <sub>iss</sub>     | V <sub>DS</sub> = 24 V, V <sub>GS</sub> = 0 V<br>f = 1 MHz                                                              | 35               |        | 50    |         | 50    | pF   |
| Output Capacitance                                             | C <sub>oss</sub>     |                                                                                                                         | 15               |        | 40    |         | 40    |      |
| Reverse Transfer Capacitance                                   | C <sub>rss</sub>     |                                                                                                                         | 2                |        | 10    |         | 10    |      |
| Drain-Source Capacitance                                       | C <sub>ds</sub>      |                                                                                                                         | 30               |        | 40    |         |       |      |
| Switching <sup>c</sup>                                         |                      |                                                                                                                         |                  |        |       |         |       |      |
| Turn-On Time                                                   | t <sub>ON</sub>      | V <sub>DD</sub> = 25 V, R <sub>L</sub> = 23 Ω<br>I <sub>D</sub> ≅ 1 A, V <sub>GEN</sub> = 10 V<br>R <sub>G</sub> = 25 Ω | 6                |        | 10    |         | 15    | ns   |
| Turn-Off Time                                                  | t <sub>OFF</sub>     |                                                                                                                         | 8                |        | 10    |         | 15    |      |

## Notes

- a. For DESIGN AID ONLY, not subject to production testing.  
b. Pulse test:  $PW \leq 300\text{ }\mu\text{s}$  duty cycle  $\leq 2\%$ .  
c. Switching time is essentially independent of operating temperature.  
d. This parameter not registered with JEDEC.

VNDQ09

**TYPICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$  UNLESS OTHERWISE NOTED)**

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