



N-Channel 60-V (D-S) MOSFET

Zener Gate Protected

| PRODUCT SUMMARY | | | |
|-----------------------|-------------------------------|------------------|-----------|
| $V_{(BR)DSS}$ Min (V) | $r_{DS(on)}$ Max (Ω) | $V_{GS(th)}$ (V) | I_D (A) |
| 60 | 5 @ $V_{GS} = 10$ V | 0.8 to 2.5 | 0.31 |

FEATURES

- Zener Diode Input Protected
- Low On-Resistance: 3 Ω
- Ultralow Threshold: 1.2 V
- Low Input Capacitance: 38 pF
- Low Input and Output Leakage

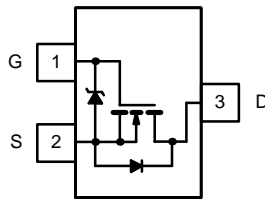
BENEFITS

- Extra ESD Protection
- Low Offset Voltage
- Low-Voltage Operation
- High-Speed, Easily Driven
- Low Error Voltage

APPLICATIONS

- Drivers: Relays, Solenoids, Lamps, Hammers, Displays, Memories, Transistors, etc.
- Battery Operated Systems
- Solid-State Relays
- Inductive Load Drivers

SC-59



Top View

VN10KC

Marking Code: F1 w//

F1 = Part Number Code for VN10KC

w = Week Code

// = Lot Traceability

| ABSOLUTE MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED) | | | | |
|---|----------------|---------------------------|--------------------|---|
| Parameter | Symbol | Limits | Unit | |
| Drain-Source Voltage | V_{DS} | 60 | V | |
| Gate-Source Voltage | V_{GS} | 15/-0.3 | | |
| Continuous Drain Current ($T_J = 150^\circ\text{C}$) | I_D | $T_A = 25^\circ\text{C}$ | 0.31 | A |
| | | $T_A = 100^\circ\text{C}$ | 0.20 | |
| Pulsed Drain Current ^a | I_{DM} | 0.6 | | |
| Power Dissipation | P_D | $T_A = 25^\circ\text{C}$ | 0.6 | W |
| | | $T_A = 100^\circ\text{C}$ | 0.24 | |
| Maximum Junction-to-Ambient | R_{thJA} | 208 | $^\circ\text{C/W}$ | |
| 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.



| SPECIFICATIONS ($T_A = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED) | | | | | | |
|---|---------------|--|------------------|--------|-----|---------------|
| Parameter | Symbol | Test Conditions | Typ ^a | Limits | | Unit |
| | | | | Min | Max | |
| Static | | | | | | |
| Drain-Source Breakdown Voltage | $V_{(BR)DSS}$ | $V_{GS} = 0\text{ V}, I_D = 100\ \mu\text{A}$ | 120 | 60 | | V |
| Gate-Threshold Voltage | $V_{GS(th)}$ | $V_{DS} = V_{GS}, I_D = 1\ \text{mA}$ | 1.2 | 0.8 | 2.5 | |
| Gate-Body Leakage | I_{GSS} | $V_{DS} = 0\ \text{V}, V_{GS} = 15\ \text{V}$ | 1 | | 100 | nA |
| Zero Gate Voltage Drain Current | I_{DSS} | $V_{DS} = 48\ \text{V}, V_{GS} = 0\ \text{V}$ $T_A = 125^\circ\text{C}$ | | | 10 | μA |
| | | | | | 500 | |
| On-State Drain Current ^b | $I_{D(on)}$ | $V_{DS} = 10\ \text{V}, V_{GS} = 10\ \text{V}$ | 1 | 0.75 | | A |
| Drain-Source On-Resistance ^b | $r_{DS(on)}$ | $V_{GS} = 5\ \text{V}, I_D = 0.2\ \text{A}$ $V_{GS} = 10\ \text{V}, I_D = 0.5\ \text{A}$ $T_A = 125^\circ\text{C}$ | 4 | | 7.5 | Ω |
| | | | 3 | | 5 | |
| | | | 5.6 | | 9 | |
| Forward Transconductance ^b | g_{fs} | $V_{DS} = 10\ \text{V}, I_D = 0.5\ \text{A}$ | 300 | 100 | | mS |
| Common Source Output Conductance ^b | g_{os} | $V_{DS} = 7.5\ \text{V}, I_D = 0.05\ \text{A}$ | 0.2 | | | |
| Dynamic | | | | | | |
| Input Capacitance | C_{iss} | $V_{DS} = 25\ \text{V}, V_{GS} = 0\ \text{V}, f = 1\ \text{MHz}$ | 38 | | 60 | pF |
| Output Capacitance | C_{oss} | | 16 | | 25 | |
| Reverse Transfer Capacitance | C_{rss} | | 2 | | 5 | |
| Switching^c | | | | | | |
| Turn-On Time | t_{ON} | $V_{DD} = 15\ \text{V}, R_L = 23\ \Omega$ $I_D \cong 0.6\ \text{A}, V_{GEN} = 10\ \text{V}$ $R_G = 25\ \Omega$ | 7 | | 10 | ns |
| Turn-Off Time | t_{OFF} | | 9 | | 10 | |

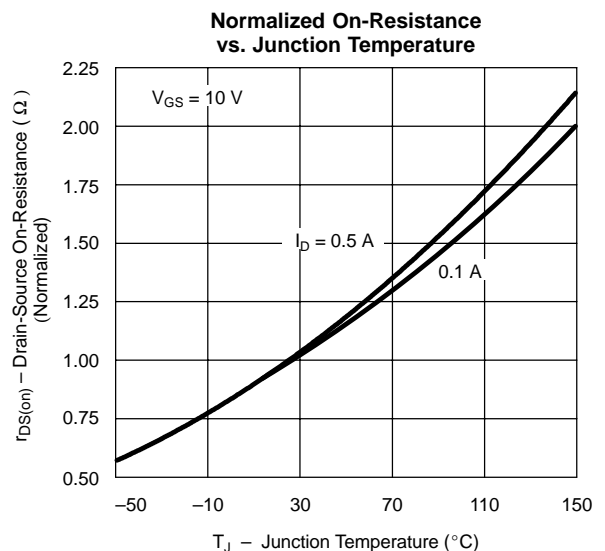
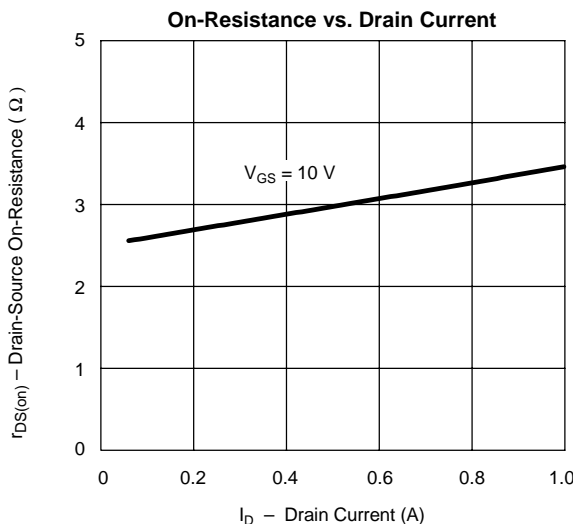
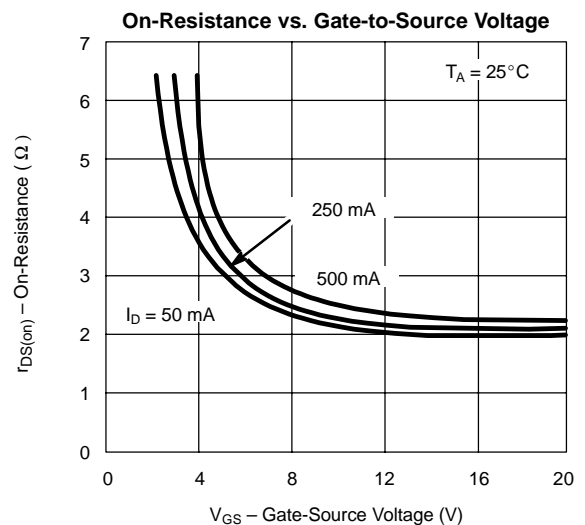
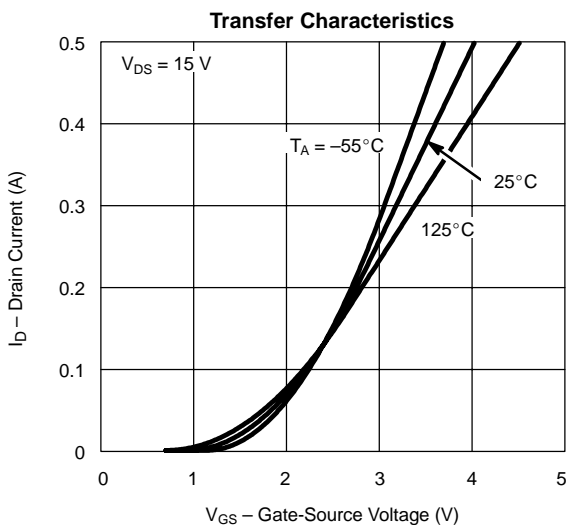
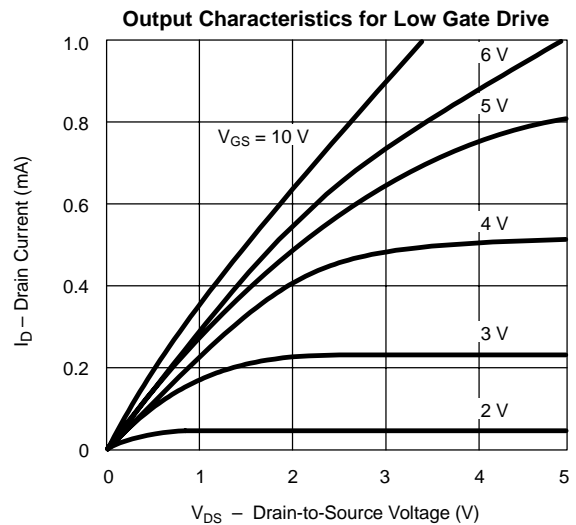
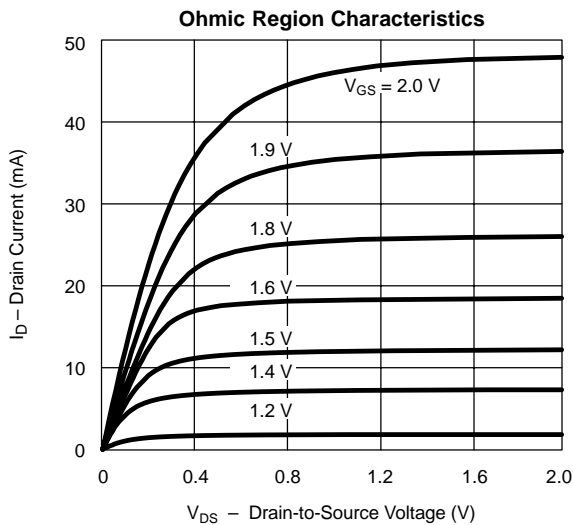
Notes

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

VNNDP06

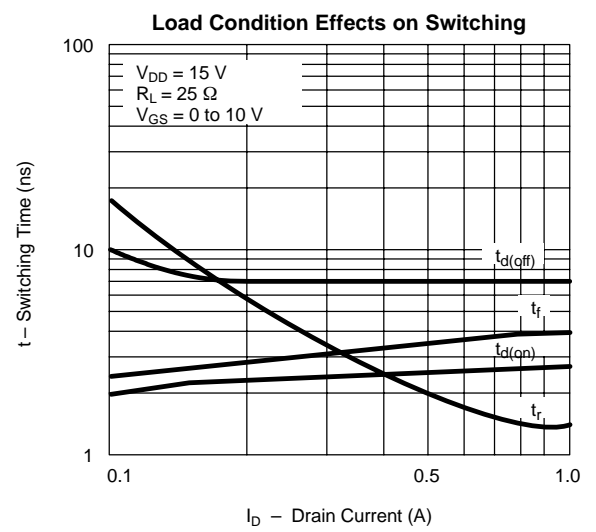
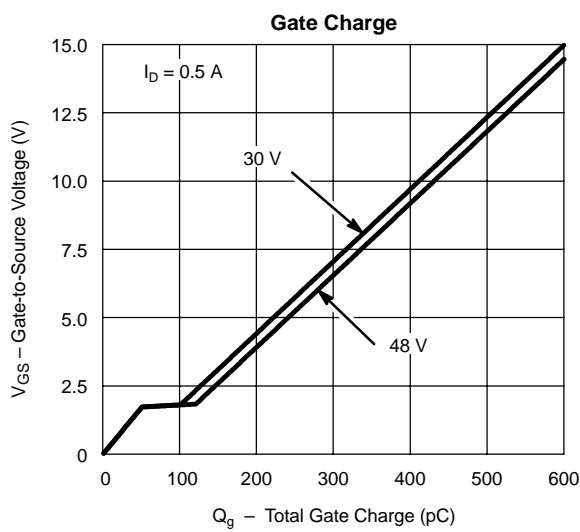
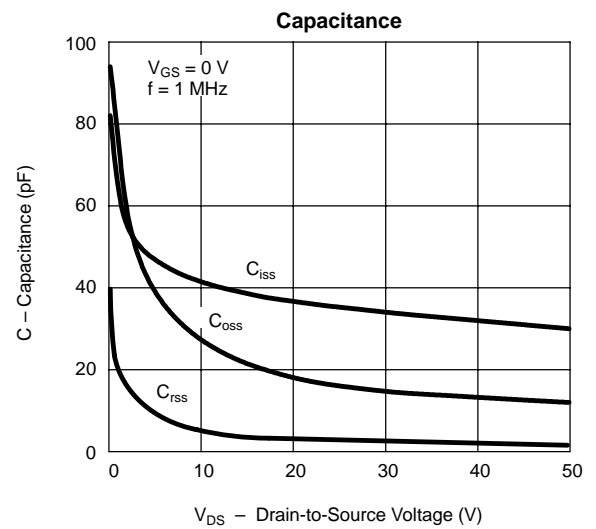
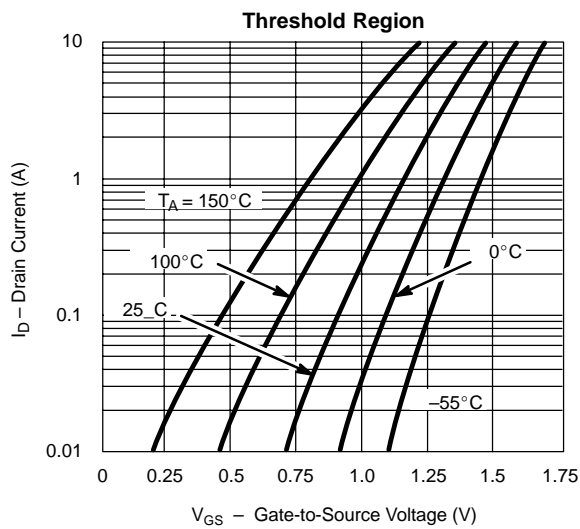


TYPICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED)





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





Disclaimer

All product specifications and data are subject to change without notice.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "Vishay"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained herein or in any other disclosure relating to any product.

Vishay disclaims any and all liability arising out of the use or application of any product described herein or of any information provided herein to the maximum extent permitted by law. The product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed therein, which apply to these products.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay.

The products shown herein are not designed for use in medical, life-saving, or life-sustaining applications unless otherwise expressly indicated. Customers using or selling Vishay products not expressly indicated for use in such applications do so entirely at their own risk and agree to fully indemnify Vishay for any damages arising or resulting from such use or sale. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

Product names and markings noted herein may be trademarks of their respective owners.