# VN0808L/M, VQ1006P

## N-Channel Enhancement-Mode MOS Transistors

## Product Summary

| Part Number | $V_{(BR)DSS}$ Min (V) | $r_{DS(on)}$ Max (Ω) | $V_{GS(th)}$ (V) | $I_D$ (A) |
|---|---|---|---|---|
| VN0808L | 80 | 4 @ $V_{GS}$ = 10 V | 0.8 to 2 | 0.3 |
| VN0808M | | 4 @ $V_{GS}$ = 10 V | 0.8 to 2 | 0.33 |
| VQ1006P | 90 | 4 @ $V_{GS}$ = 10 V | 0.8 to 2.5 | 0.4 |

## Features

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

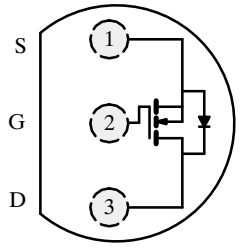
## Benefits

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

## Applications

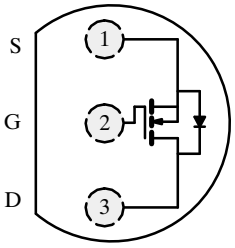
- Direct Logic-Level Interface: TTL/CMOS
- Drivers: Relays, Solenoids, Lamps, Hammers, Displays, Memories, Transistors, etc.
- Battery Operated Systems
- Solid-State Relays

TO-226AA
(TO-92)



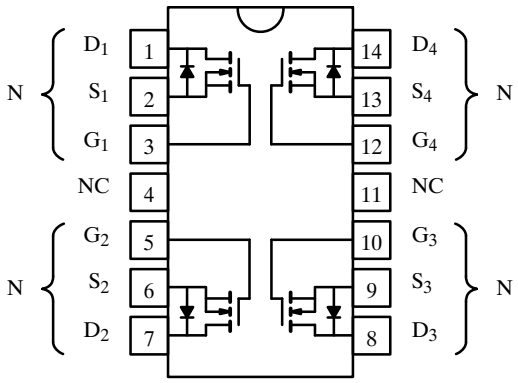

Top View
VN0808L

TO-237
(Tab Drain)




Top View
VN0808M

Dual-In-Line




Top View
Sidebraze: VQ1006P

## Absolute Maximum Ratings ($T_A$ = 25°C Unless Otherwise Noted)

| Parameter | | Symbol | VN0808L | VN0808M | VQ1006P Single | VQ1006P Total Quad | Unit |
|---|---|---|---|---|---|---|---|
| Drain-Source Voltage | | $V_{DS}$ | 80 | 80 | 90 | | V |
| Gate-Source Voltage | | $V_{GS}$ | ±30 | ±30 | ±20 | | V |
| Continuous Drain Current ($T_J$ = 150°C) | $T_A$= 25°C | $I_D$ | 0.3 | 0.33 | 0.4 | | A |
| | $T_A$= 100°C | | 0.19 | 0.21 | 0.23 | | A |
| Pulsed Drain Current[a] | | $I_{DM}$ | 1.9 | 1.9 | 2 | | A |
| Power Dissipation | $T_A$= 25°C | $P_D$ | 0.8 | 1 | 1.3 | 2 | W |
| | $T_A$= 100°C | | 0.32 | 0.4 | 0.52 | 0.8 | W |
| Maximum Junction-to-Ambient | | $R_{thJA}$ | 156 | 125 | 96 | 62.5 | °C/W |
| Operating Junction and Storage Temperature Range | | $T_J$, $T_{stg}$ | −55 to 150 | | | | °C |

Notes
a. Pulse width limited by maximum junction temperature.

# VN0808L/M, VQ1006P

## Specifications[a]

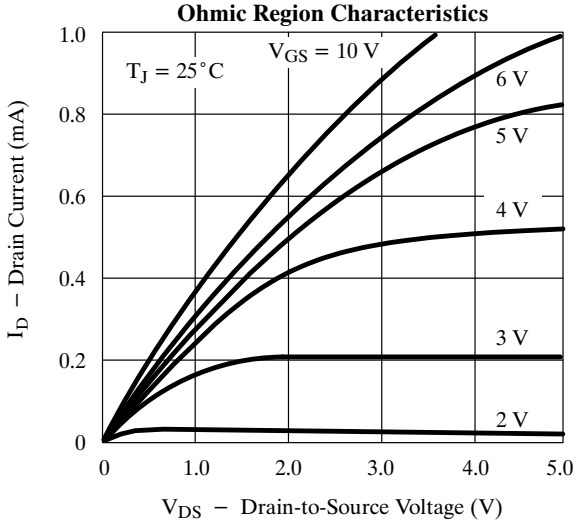
| Parameter | Symbol | Test Conditions | Typ[b] | Limits VN0808L/M Min | Limits VN0808L/M Max | Limits VQ1006P Min | Limits VQ1006P Max | Unit |
|---|---|---|---|---|---|---|---|---|
| **Static** | | | | | | | | |
| Drain-Source Breakdown Voltage | $V_{(BR)DSS}$ | $V_{GS}$ = 0 V, $I_D$ = 10 µA | 125 | 80 | | 90 | | V |
| Gate-Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$ = $V_{GS}$, $I_D$ = 1 mA | 1.6 | 0.8 | 2 | 0.8 | 2.5 | V |
| Gate-Body Leakage | $I_{GSS}$ | $V_{DS}$ = 0 V, $V_{GS}$ = ±15 V | | | ±100 | | ±100 | nA |
| | | $T_J$ = 125°C | | | | | ±500 | nA |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$ = 80 V, $V_{GS}$ = 0 V | | | 10 | | | µA |
| | | $T_J$ = 125°C | | | 500 | | | µA |
| | | $V_{DS}$ = 72 V, $V_{GS}$ = 0 V | | | | | 1 | µA |
| | | $T_J$ = 125°C | | | | | 500 | µA |
| On-State Drain Current[c] | $I_{D(on)}$ | $V_{DS}$ = 10 V, $V_{GS}$ = 10 V | 1.8 | 1.5 | | 1.5 | | A |
| Drain-Source On-Resistance[c] | $r_{DS(on)}$ | $V_{GS}$ = 5 V, $I_D$ = 0.3 A | 3.8 | | | | 5 | Ω |
| | | $V_{GS}$ = 10 V, $I_D$ = 1 A | 3.6 | | 4 | | 4.5 | Ω |
| | | $T_J$ = 125°C | 6.7 | | 8 | | 8.6 | Ω |
| Forward Transconductance[c] | $g_{fs}$ | $V_{DS}$ = 10 V, $I_D$ = 0.5 A | 350 | 170 | | 170 | | mS |
| Common Source Output Conductance[c] | $g_{os}$ | $V_{DS}$ = 10 V, $I_D$ = 0.1 A | 0.23 | | | | | mS |
| **Dynamic** | | | | | | | | |
| Input Capacitance | $C_{iss}$ | $V_{DS}$ = 25 V, $V_{GS}$ = 0 V, f = 1 MHz | 35 | | 50 | | 60 | pF |
| Output Capacitance | $C_{oss}$ | | 15 | | 40 | | 50 | pF |
| Reverse Transfer Capacitance | $C_{rss}$ | | 2 | | 10 | | 10 | pF |
| **Switching[d]** | | | | | | | | |
| Turn-On Time | $t_{ON}$ | $V_{DD}$ = 25 V, $R_L$ = 23 Ω<br>$I_D$ ≅ 1 A, $V_{GEN}$ = 10 V<br>$R_G$ = 25 Ω | 6 | | 1 0 | | 1 0 | ns |
| Turn-Off Time | $t_{OFF}$ | | 8 | | 10 | | 10 | ns |

Notes
a. $T_A$ = 25°C unless otherwise noted.
b. For DESIGN AID ONLY, not subject to production testing.
c. Pulse test: PW ≤ 300 µs duty cycle ≤ 2%.
d. Switching time is essentially independent of operating temperature.

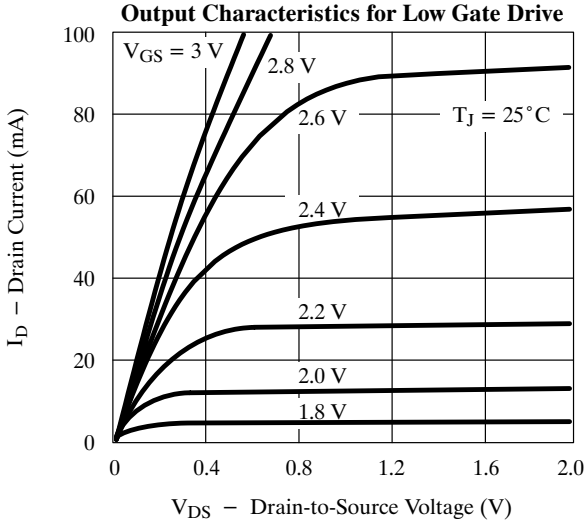
VNDQ09

## Typical Characteristics (25°C Unless Otherwise Noted)

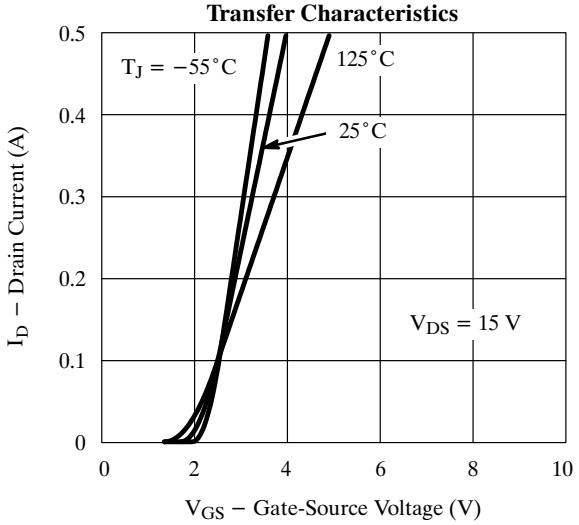
**Ohmic Region Characteristics**



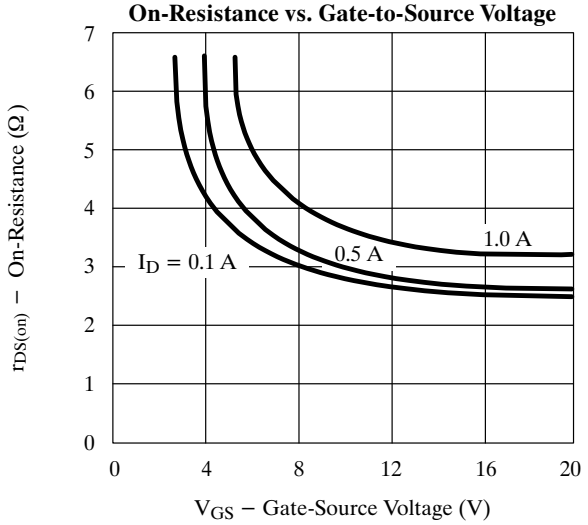

**Output Characteristics for Low Gate Drive**



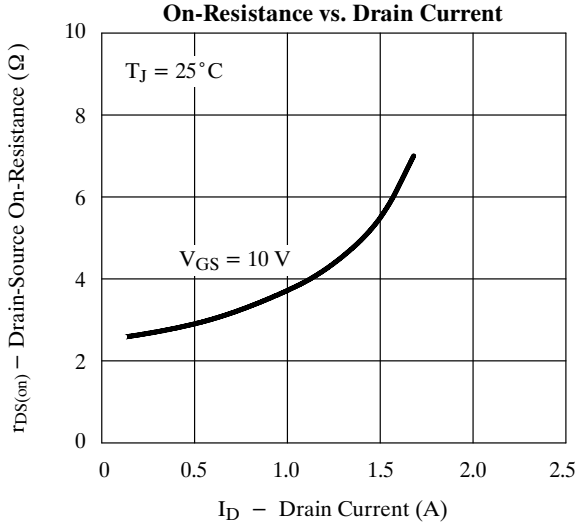

**Transfer Characteristics**



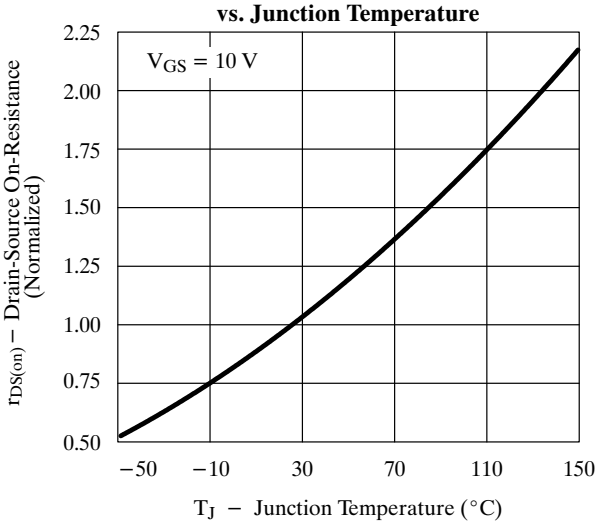

**On-Resistance vs. Gate-to-Source Voltage**




**On-Resistance vs. Drain Current**



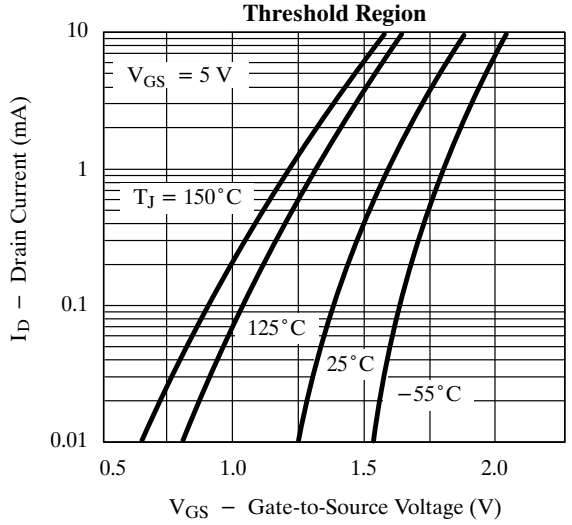

**Normalized On-Resistance vs. Junction Temperature**



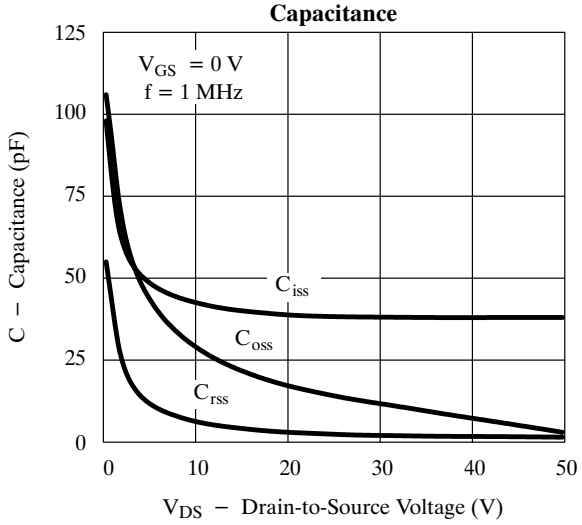
# VN0808L/M, VQ1006P

## Typical Characteristics (25°C Unless Otherwise Noted) (Cont'd)

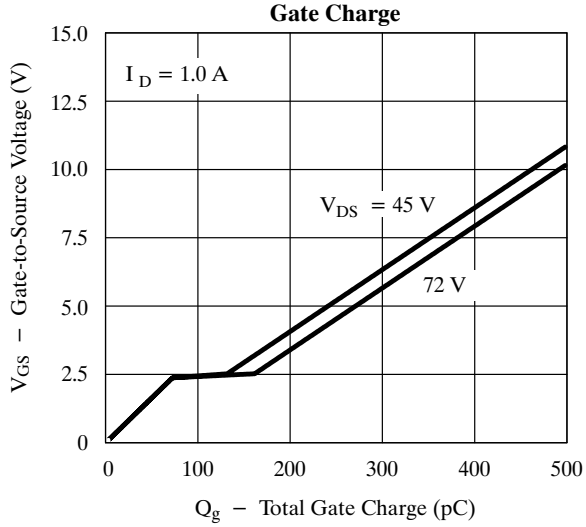
**Threshold Region**



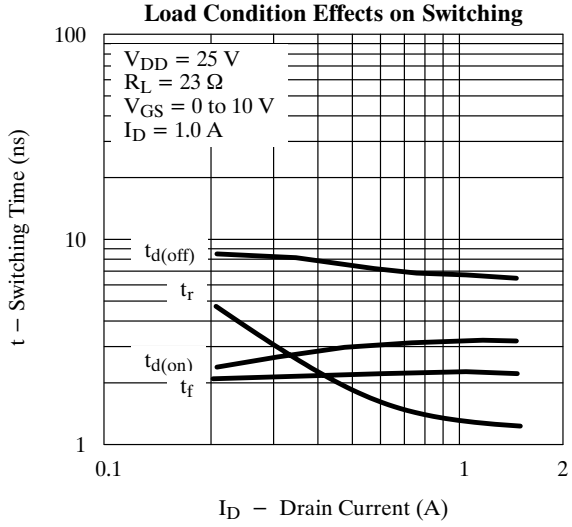

**Capacitance**

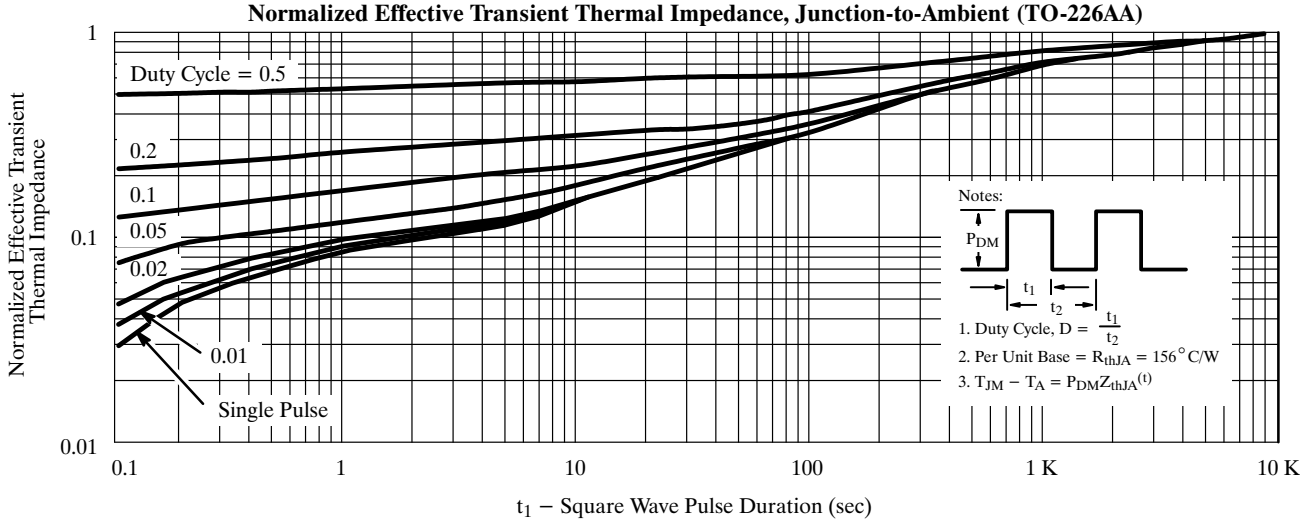



**Gate Charge**




**Load Condition Effects on Switching**




**Normalized Effective Transient Thermal Impedance, Junction-to-Ambient (TO-226AA)**