# VN1706B, VN1706D

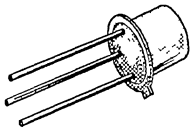
N-Channel Enhancement-Mode MOS Transistors

## PRODUCT SUMMARY

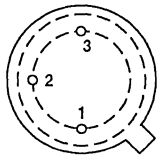
| PART NUMBER | $V_{(BR)DSS}$ (V) | $r_{DS(ON)}$ (Ω) | $I_D$ (A) | PACKAGE |
|---|---|---|---|---|
| VN1706B | 170 | 6 | 0.63 | TO-205AD |
| VN1706D | 170 | 6 | 1.12 | TO-220 |

Performance Curves: **VNDB24** (See Section 7)

TO-205AD (TO-39)

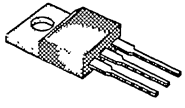


BOTTOM VIEW

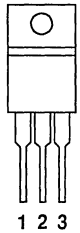



1 SOURCE
2 GATE
3 DRAIN & CASE

TO-220



TOP VIEW



1 2 3

1 GATE
2 & TAB – DRAIN
3 SOURCE

## ABSOLUTE MAXIMUM RATINGS ($T_C$ = 25°C unless otherwise noted)

| PARAMETERS/TEST CONDITIONS | | SYMBOL | VN1706B | VN1706D | UNITS |
|---|---|---|---|---|---|
| Drain-Source Voltage | | $V_{DS}$ | 170 | 170 | V |
| Gate-Source Voltage | | $V_{GS}$ | ±20 | ±30 | |
| Continuous Drain Current | $T_C$ = 25°C | $I_D$ | 0.63 | 1.12 | A |
| | $T_C$ = 100°C | | 0.4 | 0.7 | |
| Pulsed Drain Current[1] | | $I_{DM}$ | 3 | 3 | |
| Power Dissipation | $T_C$ = 25°C | $P_D$ | 6.25 | 20 | W |
| | $T_C$ = 100°C | | 2.5 | 8 | |
| Operating Junction and Storage Temperature | | $T_j$, $T_{stg}$ | –55 to 150 | | °C |
| Lead Temperature (1/16" from case for 10 seconds) | | $T_L$ | 300 | | |

## THERMAL RESISTANCE

| THERMAL RESISTANCE | SYMBOL | VN1706B | VN1706D | UNITS |
|---|---|---|---|---|
| Junction-to-Ambient | $R_{thJA}$ | 170 | 80 | °C/W |

[1]Pulse width limited by maximum junction temperature

| ELECTRICAL CHARACTERISTICS[1] | | | LIMITS | | | |
|---|---|---|---|---|---|---|
| | | | | VN1706 | | |
| PARAMETER | SYMBOL | TEST CONDITIONS | TYP[2] | MIN | MAX | UNIT |
| **STATIC** | | | | | | |
| Drain-Source Breakdown Voltage | $V_{(BR)DSS}$ | $V_{GS}$ = 0 V, $I_D$ = 100 µA | 230 | 170 | | V |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$ = $V_{GS}$, $I_D$ = 1 mA | 1.4 | 0.8 | 2.0 | V |
| Gate-Body Leakage | $I_{GSS}$ | $V_{DS}$ = 0 V, $V_{GS}$ = ±15 V | ±1 | | ±100 | nA |
| | | $T_C$ = 125°C | ±5 | | ±500 | nA |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$ = 120 V, $V_{GS}$ = 0 V | 0.01 | | 10 | µA |
| | | $T_C$ = 125°C | 1 | | 500 | µA |
| On-State Drain Current[3] | $I_{D(ON)}$ | $V_{DS}$ = 10 V, $V_{GS}$ = 10 V | 1.5 | 1 | | A |
| Drain-Source On-Resistance[3] | $r_{DS(ON)}$ | $V_{GS}$ = 2.5 V, $I_D$ = 0.1 A | 7.5 | | 10 | Ω |
| | | $V_{GS}$ = 10 V, $I_D$ = 0.5 V | 5 | | 6 | Ω |
| | | $T_C$ = 125°C | 10.8 | | 14.8 | Ω |
| Forward Transconductance[3] | $g_{FS}$ | $V_{DS}$ = 10 V, $I_D$ = 0.5 A | 530 | 300 | | mS |
| Common Source Output Conductance[3] | $g_{OS}$ | $V_{DS}$ = 7.5 V, $I_D$ = 0.5 A | 475 | | | µS |
| **DYNAMIC** | | | | | | |
| Input Capacitance | $C_{iss}$ | $V_{DS}$ = 25 V, $V_{GS}$ = 0 V, f = 1 MHz | 105 | | 125 | pF |
| Output Capacitance | $C_{oss}$ | | 25 | | 50 | pF |
| Reverse Transfer Capacitance | $C_{rss}$ | | 5 | | 20 | pF |
| **SWITCHING** | | | | | | |
| Turn-On Time | $t_{d(ON)}$ | $V_{DD}$ = 60 V, $R_L$ = 150 Ω, $I_D$ = 0.4 A, $V_{GEN}$ = 10 V, $R_G$ = 25 Ω (Switching time is essentially independent of operating temperature) | 3 | | 8 | ns |
| | $t_r$ | | 2 | | 8 | ns |
| Turn-Off Time | $t_{d(OFF)}$ | | 13 | | 18 | ns |
| | $t_f$ | | 9 | | 12 | ns |

NOTES: 1. $T_C$ = 25 °C unless otherwise noted.
2. For design aid only, not subject to production testing.
3. Pulse test; PW = 300 µs, duty cycle ≤ 2%.