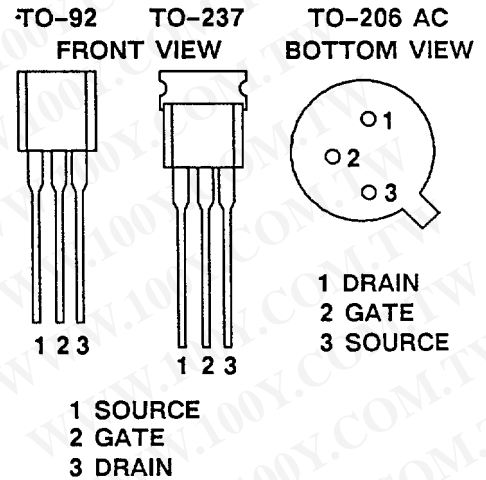


## MOSPOWER

N-Channel Enhancement Mode Transistors  
Zener Diode Protected Gate

### PRODUCT SUMMARY

| PART NUMBER | V <sub>(BR)DSS</sub><br>(VOLTS) | r <sub>DS(on)</sub><br>(OHMS) | I <sub>D</sub><br>(AMPS) | PACKAGE OPTION |
|-------------|---------------------------------|-------------------------------|--------------------------|----------------|
| VN10KM      | 60                              | 5                             | 0.31                     | TO-237         |
| VN0610L     | 60                              | 5                             | 0.27                     | TO-92          |
| VN10KE      | 60                              | 5                             | 0.17                     | TO-206 AC      |



### ABSOLUTE MAXIMUM RATINGS (T<sub>A</sub> = 25°C unless otherwise noted)

| PARAMETERS/TEST CONDITIONS                      | Symbol                            | VN10KM                 | VN0610L   | VN10KE    | Units |   |
|---|-----------------------------------|------------------------|-----------|-----------|-------|---|
| Drain-Source Voltage                            | V <sub>DS</sub>                   | 60                     | 60        | 60        | V     |   |
| Gate-Source Voltage                             | V <sub>GS</sub>                   | +15, -0.3              | +15, -0.3 | +15, -0.3 |       |   |
| Continuous Drain Current                        | I <sub>D</sub>                    | T <sub>A</sub> = 25°C  | 0.31      | 0.27      | 0.17  | A |
|   |                                   | T <sub>A</sub> = 100°C | 0.20      | 0.17      | 0.11  |   |
| Pulsed Drain Current <sup>1</sup>               | I <sub>DM</sub>                   | 1.0                    | 1.0       | 1.0       |       |   |
| Power Dissipation                               | P <sub>D</sub>                    | T <sub>A</sub> = 25°C  | 1.0       | 0.80      | 0.30  | W |
|   |                                   | T <sub>A</sub> = 100°C | 0.4       | 0.32      | 0.12  |   |
| Operating Junction & Storage Temperature Range  | T <sub>J</sub> , T <sub>stg</sub> | -55 to 150             |           |           | °C    |   |
| Lead Temperature (1/16" from case for 10 secs ) | T <sub>L</sub>                    | 300                    |           |           |       |   |

### THERMAL RESISTANCE RATINGS

| THERMAL RESISTANCE  | Symbol            | TO-237 | TO-92 | TO-206 | Units |
|---------------------|-------------------|--------|-------|--------|-------|
| Junction-to-Ambient | R <sub>thJA</sub> | 125    | 156   | 400    | °C/W  |

<sup>1</sup>Pulse width limited by maximum junction temperature (refer to transient thermal impedance data, figure 11)

**ELECTRICAL CHARACTERISTICS** ( $T_A = 25^\circ\text{C}$  unless otherwise noted)

| PARAMETERS/TEST CONDITIONS   |   | Symbol        | Min. | Typ. | Max. | Units         |
|--|---|---------------|------|------|------|---------------|
| Drain-Source Breakdown Voltage<br>$V_{GS} = 0, I_D = 100 \mu\text{A}$  |   | $V_{(BR)DSS}$ | 60   | 120  | -    | V             |
| Gate Threshold Voltage<br>$V_{DS} = V_{GS}, I_D = 1 \text{ mA}$  |   | $V_{GS(th)}$  | 0.8  | 1.5  | 2.5  |               |
| Gate-Body Leakage<br>$V_{DS} = 0, V_{GS} = 15 \text{ V}$   |   | $I_{GSS}$     | -    | 1    | 100  | nA            |
| Zero Gate Voltage Drain Current<br>$V_{DS} = 45 \text{ V}, V_{GS} = 0$   |   | $I_{DSS}$     | -    | 1.0  | 10   | $\mu\text{A}$ |
| On-State Drain Current <sup>2</sup><br>$V_{DS} = 10 \text{ V}, V_{GS} = 10 \text{ V}$                                  |   | $I_{D(on)}$   | 0.75 | 1.5  | -    | A             |
| Drain-Source On-State Resistance <sup>2</sup><br>$V_{GS} = 5 \text{ V}, I_D = 0.2 \text{ A}$                           |   | $r_{DS(on)}$  | -    | 3.8  | 7.5  | $\Omega$      |
| Drain-Source On-State Resistance <sup>2</sup><br>$V_{GS} = 10 \text{ V}, I_D = 0.5 \text{ A}$                          |   | $r_{DS(on)}$  | -    | 3.0  | 5.0  |               |
| Drain-Source On-State Resistance <sup>2</sup><br>$V_{GS} = 10 \text{ V}, I_D = 0.5 \text{ A}, T_J = 125^\circ\text{C}$ |   | $r_{DS(on)}$  | -    | 7.0  | 12   |               |
| Forward Transconductance <sup>2</sup><br>$V_{DS} = 10 \text{ V}, I_D = 0.5 \text{ A}$                                  |   | $g_{fs}$      | 100  | 300  | -    | mS            |
| Common Source Output Conductance<br>$V_{DS} = 10 \text{ V}, I_D = 0.5 \text{ A}$                                       |   | $g_{os}$      | -    | 950  | -    | $\mu\text{S}$ |
| Input Capacitance  | $V_{GS} = 0$<br>$V_{DS} = 25 \text{ V}$<br>$f = 1 \text{ MHz}$  | $C_{iss}$     | -    | 35   | 60   | pF            |
| Output Capacitance   |   | $C_{oss}$     | -    | 15   | 25   |               |
| Reverse Transfer Capacitance   |   | $C_{rss}$     | -    | 1.5  | 5    |               |
| Turn-On Time   | $V_{DD} = 15 \text{ V}, R_L = 23 \Omega$<br>$I_D = 0.6 \text{ A},$<br>$V_{GEN} = 10 \text{ V}$<br>$R_G = 25 \Omega$<br>(Switching time is essentially independent of operating temperature) | $t_{(on)}$    | -    | 7    | 10   | ns            |
| Turn-Off Time  |   | $t_{(off)}$   | -    | 7    | 10   |               |

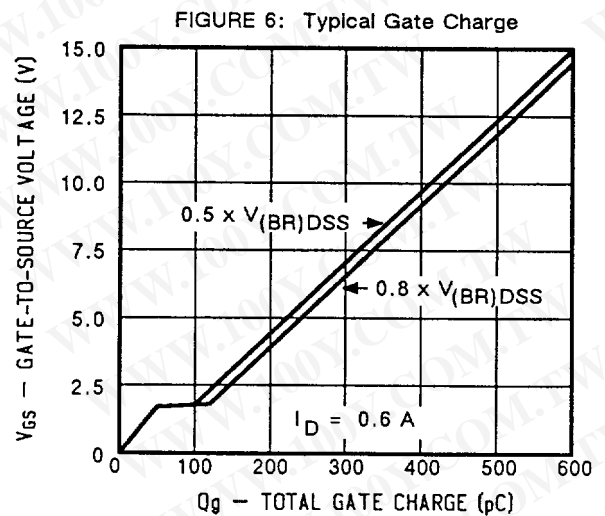
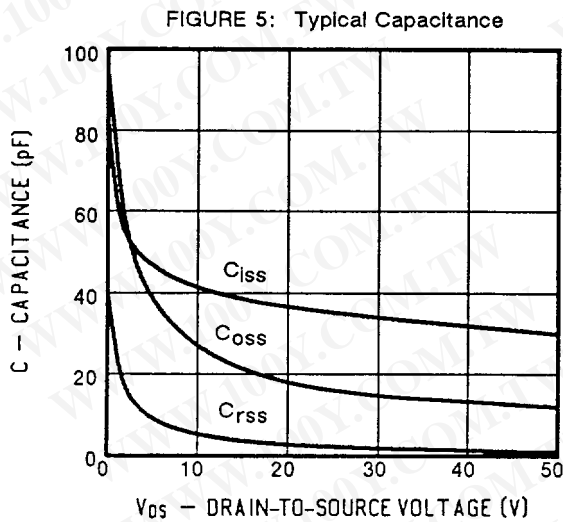
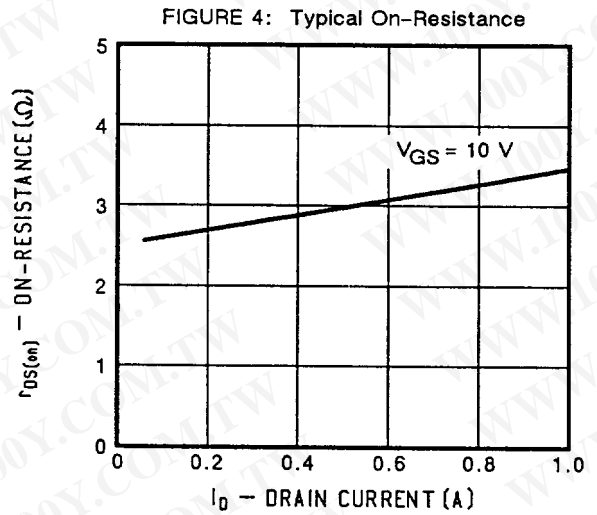
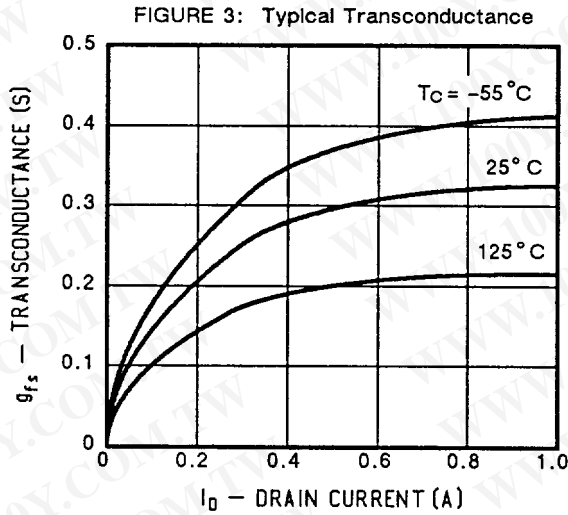
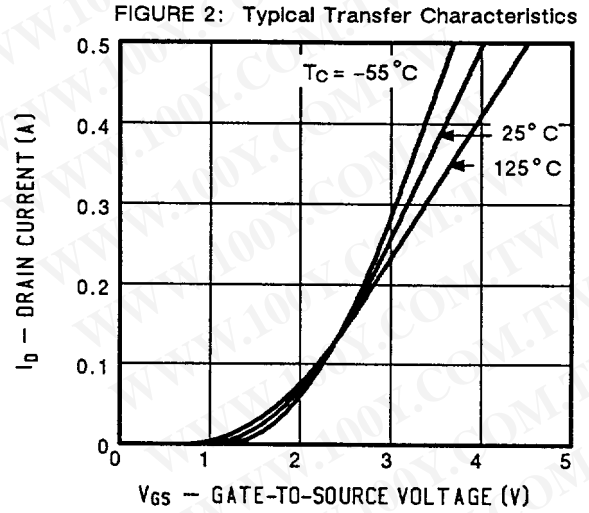
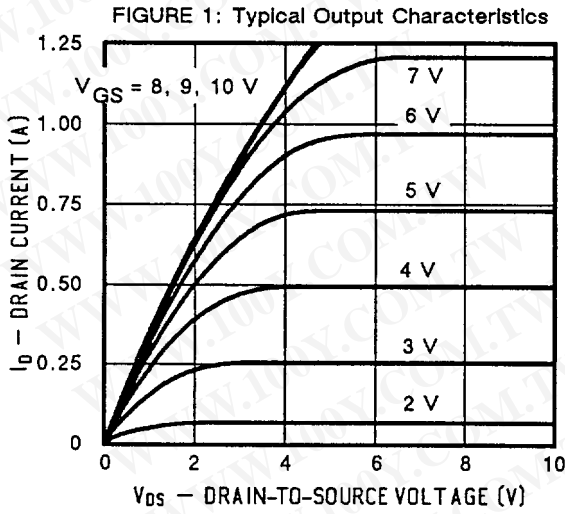
**TO-92 Only**
**SOURCE-DRAIN DIODE RATINGS & CHARACTERISTICS** ( $T_A = 25^\circ\text{C}$  unless otherwise noted)

| PARAMETERS/TEST CONDITIONS   | Symbol   | Min. | Typ. | Max. | Units |
|--|----------|------|------|------|-------|
| Continuous Current   | $I_S$    | -    | -    | 0.31 | A     |
| Pulsed Current <sup>1</sup>  | $I_{SM}$ | -    | -    | 1.0  |       |
| Forward Voltage <sup>2</sup><br>$I_F = I_S = 0.31 \text{ A}, V_{GS} = 0$ | $V_{SD}$ | -    | 0.85 | 1.5  | V     |

<sup>1</sup> Pulse width limited by maximum junction temperature (refer to transient thermal impedance data, figure 11)

<sup>2</sup> Pulse test. Pulse width  $\leq 300 \mu\text{sec}$ , Duty Cycle  $\leq 2\%$

**PERFORMANCE CURVES (25°C Unless otherwise noted)**



**PERFORMANCE CURVES (25°C Unless otherwise noted)**

FIGURE 7: On-Resistance vs. Junction Temperature

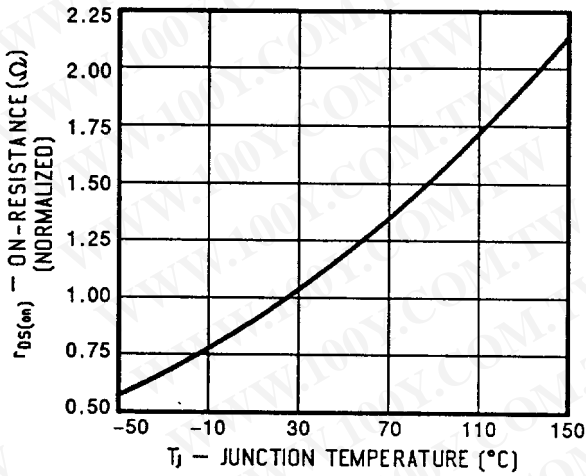


FIGURE 8: Typical Source-Drain Diode Forward Voltage

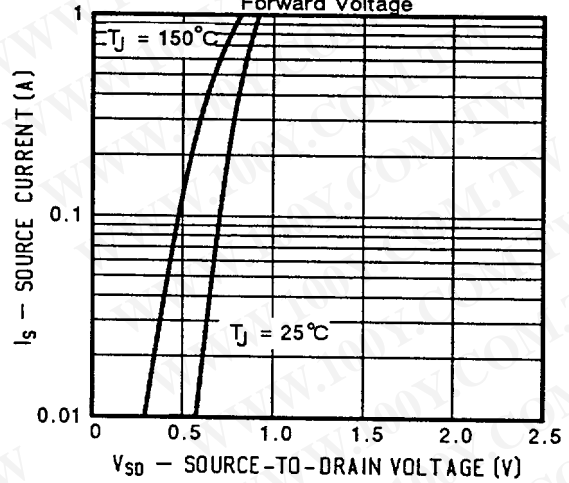


FIGURE 9: Maximum Avalanche and Drain Current vs. Ambient Temperature

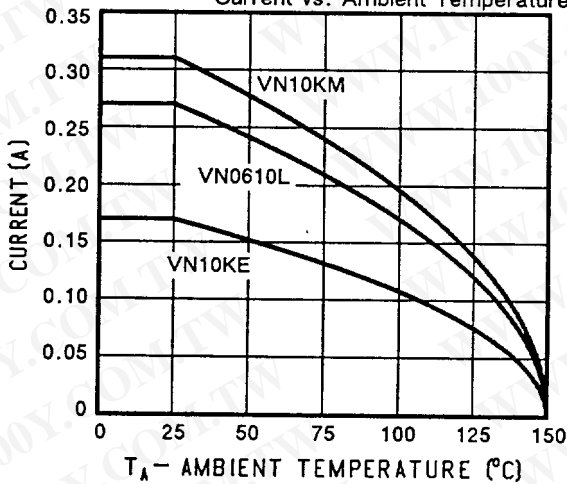


FIGURE 10: Safe Operating Area

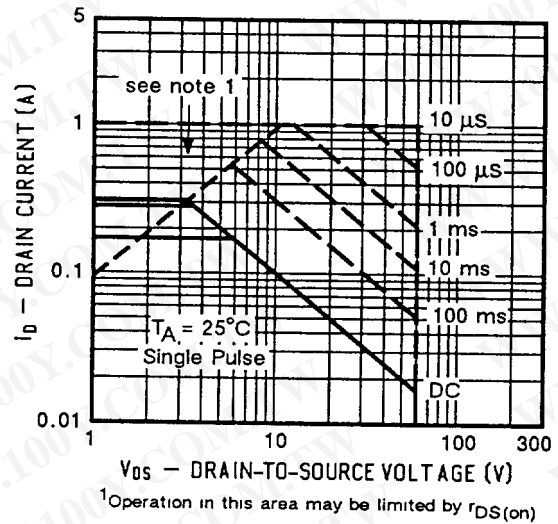
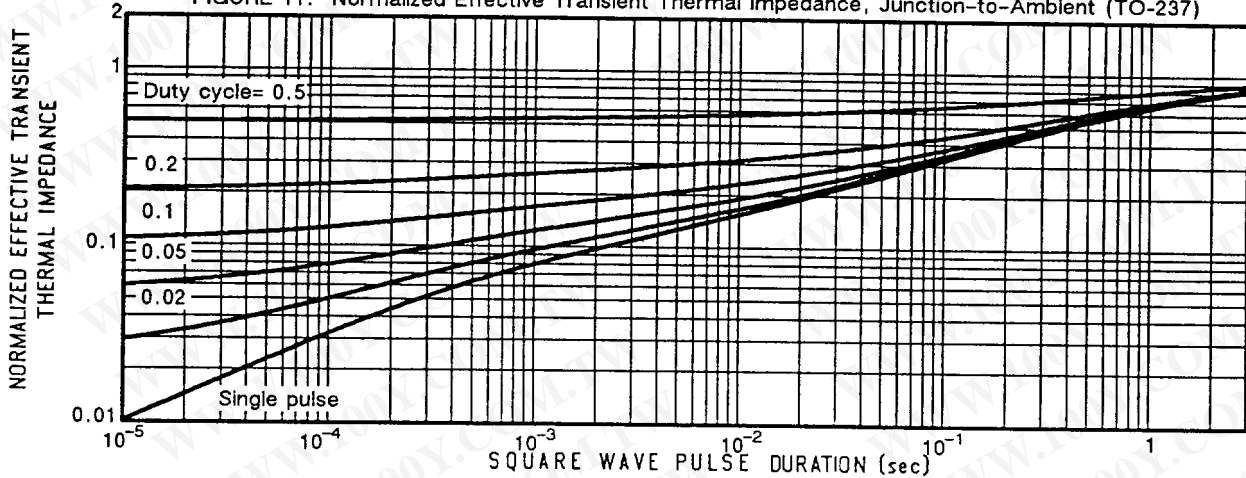


FIGURE 11: Normalized Effective Transient Thermal Impedance, Junction-to-Ambient (TO-237)



**PERFORMANCE CURVES** (25°C Unless otherwise noted)

FIGURE 12: Low Voltage Output Characteristics

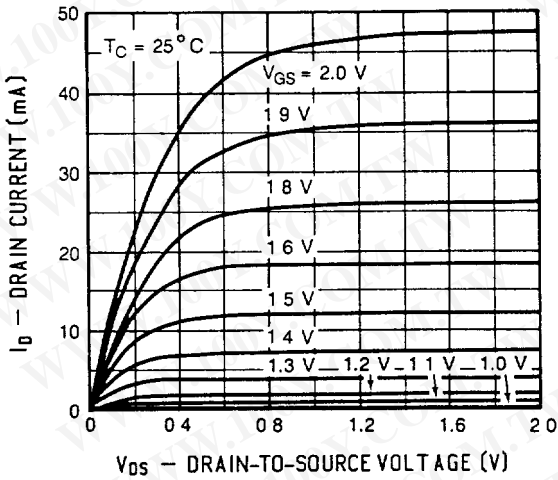


FIGURE 13: Ohmic Region Characteristics

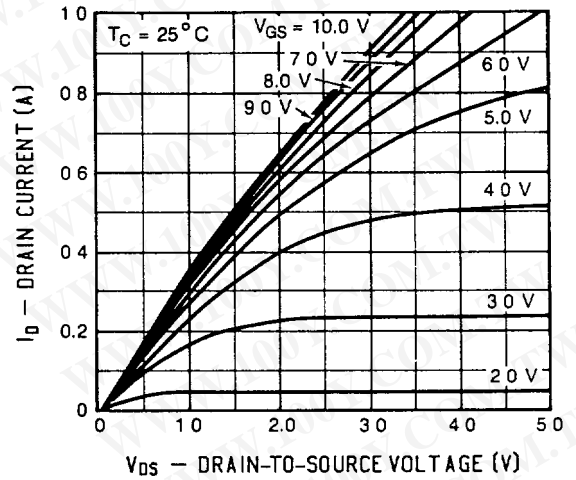


FIGURE 14: On-Resistance vs. Gate to Source Voltage

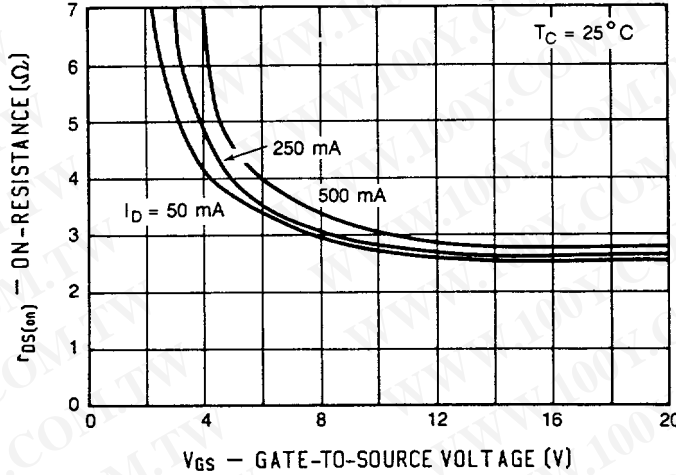


FIGURE 15: Off State Current

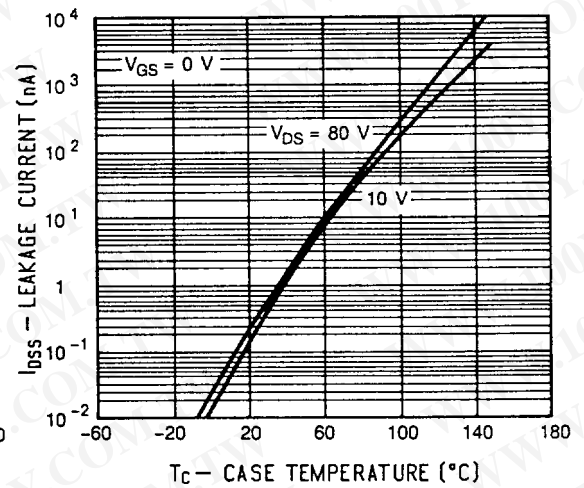


FIGURE 16: Switching Effects on Drive Resistance

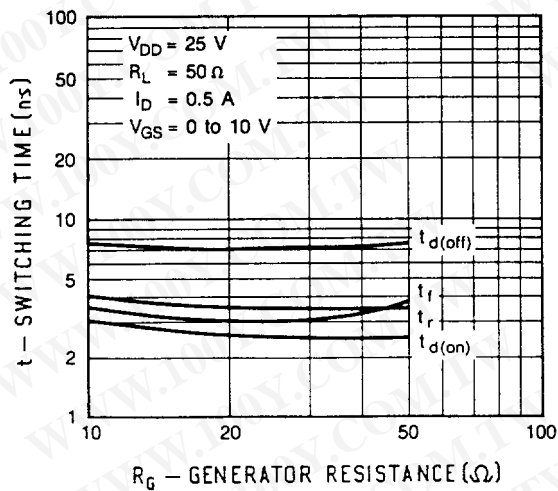
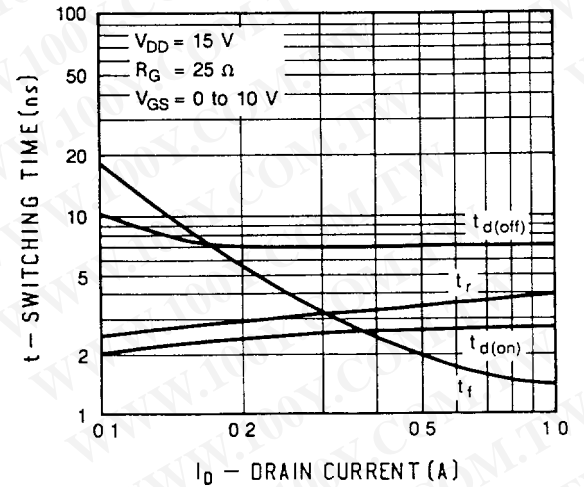


FIGURE 17: Effects on Load Conditions



**PERFORMANCE CURVES** (25°C Unless otherwise noted)

FIGURE 18: Equivalent Input Noise Voltage vs. Frequency

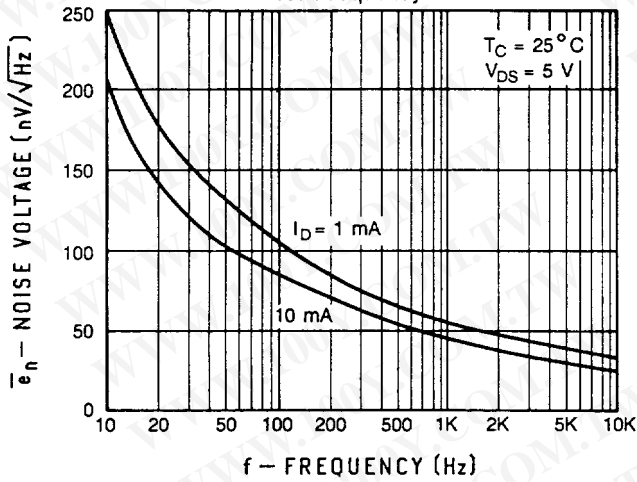


FIGURE 19: Threshold Region

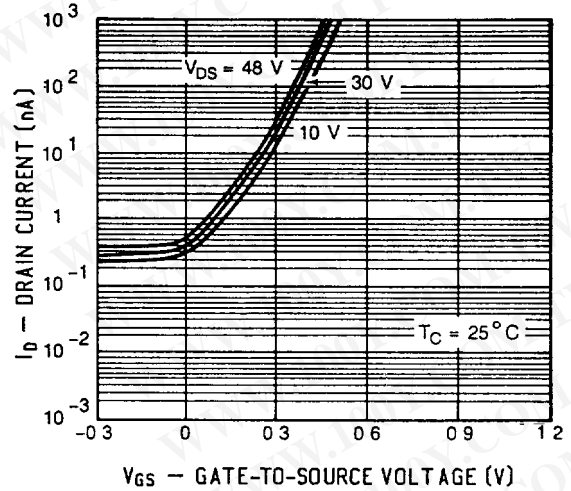


FIGURE 20. Output Conductance vs. Drain Current

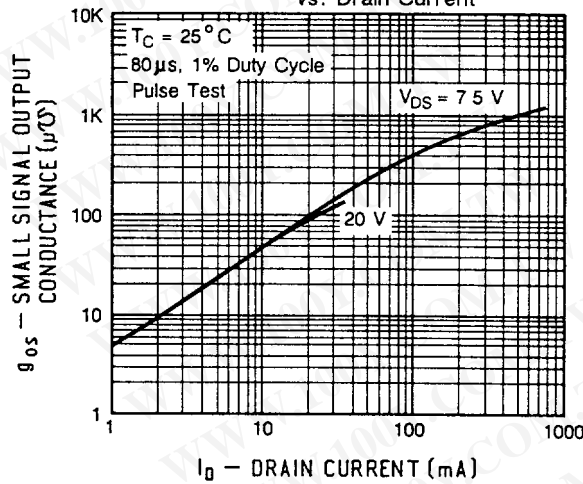


FIGURE 21: Transient Thermal Response (TO-206AC)

