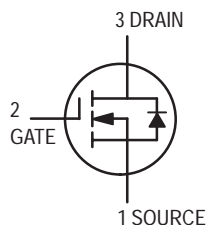


TMOS FET Transistor

N-Channel — Enhancement



VN0610LL



CASE 29-04, STYLE 22
TO-92 (TO-226AA)

MAXIMUM RATINGS

| Rating | Symbol | Value | Unit |
|---|----------------|-----------------|----------------------|
| Drain-Source Voltage | V_{DSS} | 60 | Vdc |
| Drain-Gate Voltage ($R_{GS} = 1 \text{ M}\Omega$) | V_{DGR} | 60 | Vdc |
| Gate-Source Voltage | V_{GS} | ± 20 | Vdc |
| — Continuous | V_{GSM} | ± 40 | Vpk |
| — Non-repetitive ($t_p \leq 50 \mu\text{s}$) | | | |
| Drain Current | I_D | 190 | mAdc |
| — Continuous | I_{DM} | 1000 | |
| — Pulsed | | | |
| Total Power Dissipation @ $T_A = 25^\circ\text{C}$ | P_D | 400 | mW |
| Derate above 25°C | | 3.2 | mW/ $^\circ\text{C}$ |
| Operating and Storage Temperature Range | T_J, T_{stg} | -55 to $+150$ | $^\circ\text{C}$ |

THERMAL CHARACTERISTICS

| Characteristics | Symbol | Max | Unit |
|---|-----------------|-------|--------------------|
| Thermal Resistance, Junction to Ambient | $R_{\theta JA}$ | 312.5 | $^\circ\text{C/W}$ |
| Maximum Lead Temperature for Soldering Purposes, 1/16" from case for 10 seconds | T_L | 300 | $^\circ\text{C}$ |

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

| Characteristic | Symbol | Min | Max | Unit |
|----------------|--------|-----|-----|------|
|----------------|--------|-----|-----|------|

OFF CHARACTERISTICS

| | | | | |
|--|---------------|----|-----------|-----------------|
| Drain-Source Breakdown Voltage ($V_{GS} = 0, I_D = 100 \mu\text{A}$) | $V_{(BR)DSS}$ | 60 | — | Vdc |
| Zero Gate Voltage Drain Current ($V_{DS} = 48 \text{ Vdc}, V_{GS} = 0$) ($V_{DS} = 48 \text{ Vdc}, V_{GS} = 0, T_J = 125^\circ\text{C}$) | I_{DSS} | — | 10 500 | μAdc |
| Gate-Body Leakage Current, Forward ($V_{GSF} = 30 \text{ V}, V_{DS} = 0$) | I_{GSSF} | — | -100 | nAdc |

ON CHARACTERISTICS(1)

| | | | | |
|--|--------------|--------|------------|------------------|
| Gate Threshold Voltage ($V_{DS} = V_{GS}, I_D = 1.0 \text{ mA}$) | $V_{GS(th)}$ | 0.8 | 2.5 | Vdc |
| Static Drain-Source On-Resistance ($V_{GS} = 10 \text{ V}, I_D = 500 \text{ mA}$) ($V_{GS} = 10 \text{ V}, I_D = 500 \text{ mA}, T_C = 125^\circ\text{C}$) | $r_{DS(on)}$ | — — | 5.0 9.0 | Ω |
| Drain-Source On-Voltage ($V_{GS} = 5.0 \text{ V}, I_D = 200 \text{ mA}$) ($V_{GS} = 10 \text{ V}, I_D = 500 \text{ mA}$) | $V_{DS(on)}$ | — — | 1.5 2.5 | Vdc |
| On-State Drain Current ($V_{GS} = 10 \text{ V}, V_{DS} \geq 2.0 V_{DS(on)}$) | $I_{D(on)}$ | 750 | — | mAdc |
| Forward Transconductance ($V_{DS} \geq 2.0 V_{DS(on)}, I_D = 500 \text{ mA}$) | g_{fs} | 100 | — | μmhos |

1. Pulse Test: Pulse Width $\leq 300 \mu\text{s}$, Duty Cycle $\leq 2.0\%$.

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VN0610LL**ELECTRICAL CHARACTERISTICS** ($T_A = 25^\circ\text{C}$ unless otherwise noted) (Continued)

| Characteristic | Symbol | Min | Max | Unit |
|----------------|--------|-----|-----|------|
|----------------|--------|-----|-----|------|

DYNAMIC CHARACTERISTICS

| | | | | | |
|------------------------------|--|-----------|---|-----|----|
| Input Capacitance | $(V_{DS} = 25\text{ Vdc}, V_{GS} = 0, f = 1.0\text{ MHz})$ | C_{iss} | — | 60 | pF |
| Output Capacitance | | C_{oss} | — | 25 | |
| Reverse Transfer Capacitance | | C_{rss} | — | 5.0 | |

SWITCHING CHARACTERISTICS(1)

| | | | | | |
|---------------------|---|-----------|---|----|----|
| Turn-On Delay Time | $(V_{DD} = 15\text{ Vdc}, I_D = 600\text{ mA}, R_{gen} = 25\ \Omega, R_L = 23\ \Omega)$ | t_{on} | — | 10 | ns |
| Turn-Off Delay Time | | t_{off} | — | 10 | |

1. Pulse Test: Pulse Width $\leq 300\text{ ms}$, Duty Cycle $\leq 10\%$.

RESISTIVE SWITCHING

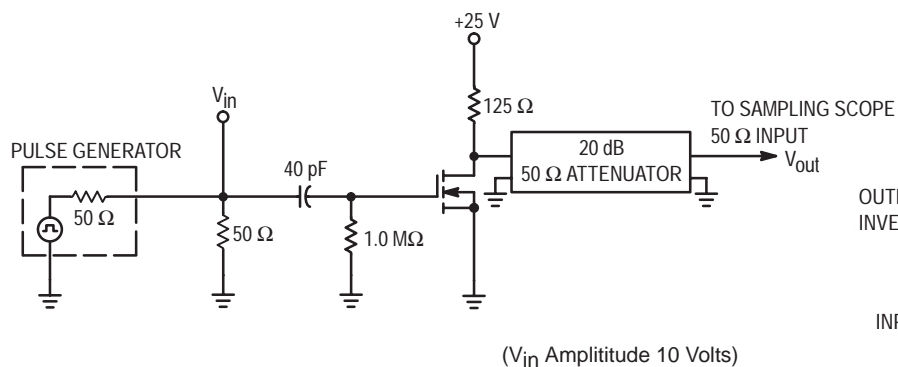


Figure 1. Switching Test Circuit

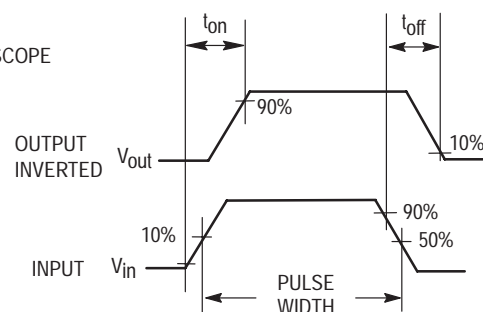


Figure 2. Switching Waveforms

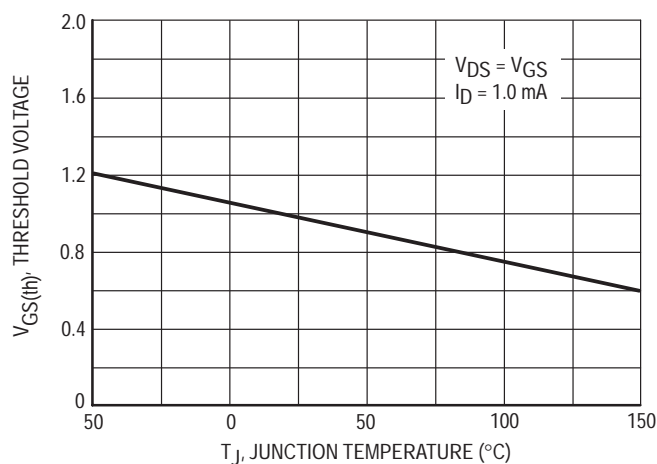
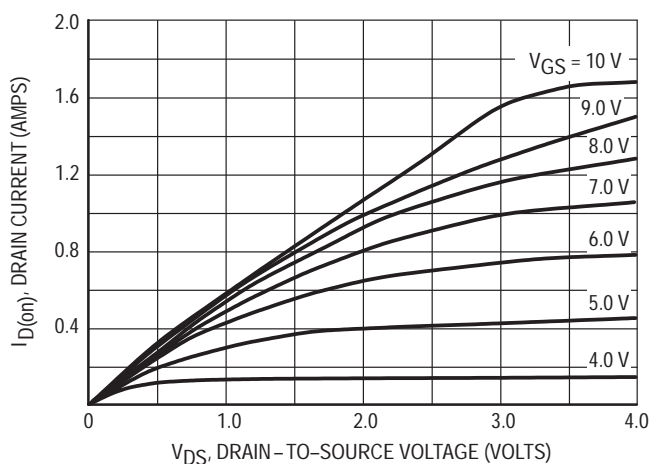
Figure 3. $V_{GS(th)}$ Normalized versus Temperature

Figure 4. On-Region Characteristics

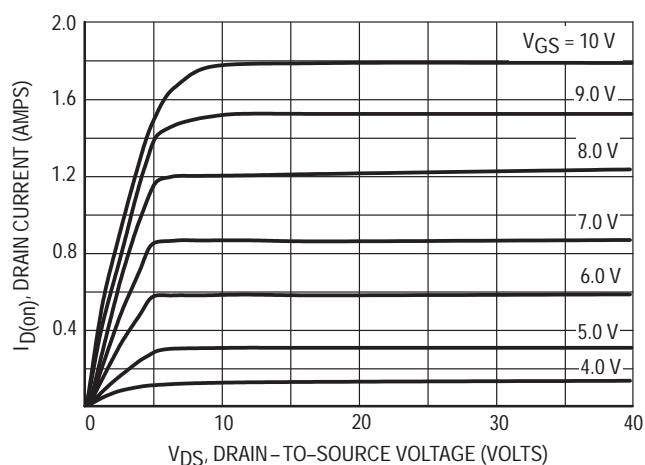


Figure 5. Output Characteristics

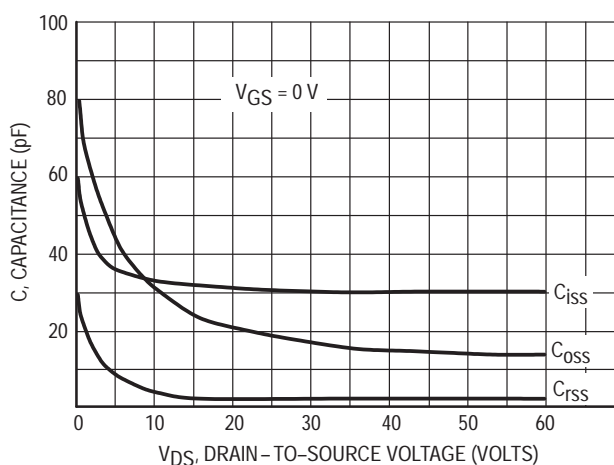
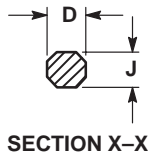
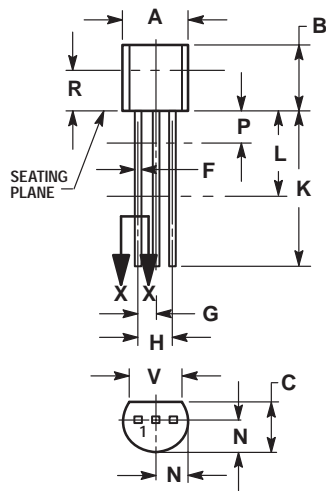


Figure 6. Capacitance versus Drain-To-Source Voltage

PACKAGE DIMENSIONS



NOTES:


1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. CONTOUR OF PACKAGE BEYOND DIMENSION R IS UNCONTROLLED.
4. DIMENSION F APPLIES BETWEEN P AND L. DIMENSION D AND J APPLY BETWEEN L AND K. MINIMUM LEAD DIMENSION IS UNCONTROLLED IN P AND BEYOND DIMENSION K MINIMUM.

| DIM | INCHES | | MILLIMETERS | |
|-----|--------|-------|-------------|------|
| | MIN | MAX | MIN | MAX |
| A | 0.175 | 0.205 | 4.45 | 5.20 |
| B | 0.170 | 0.210 | 4.32 | 5.33 |
| C | 0.125 | 0.165 | 3.18 | 4.19 |
| D | 0.016 | 0.022 | 0.41 | 0.55 |
| F | 0.016 | 0.019 | 0.41 | 0.48 |
| G | 0.045 | 0.055 | 1.15 | 1.39 |
| H | 0.095 | 0.105 | 2.42 | 2.66 |
| J | 0.015 | 0.020 | 0.39 | 0.50 |
| K | 0.500 | --- | 12.70 | --- |
| L | 0.250 | --- | 6.35 | --- |
| N | 0.080 | 0.105 | 2.04 | 2.66 |
| P | --- | 0.100 | --- | 2.54 |
| R | 0.115 | --- | 2.93 | --- |
| V | 0.135 | --- | 3.43 | --- |

**CASE 029-04
(TO-226AA)
ISSUE AD**

STYLE 22:

1. SOURCE
2. GATE
3. DRAIN

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