

# VP0610 SERIES

## P-Channel Enhancement-Mode MOS Transistors



### PRODUCT SUMMARY

| PART NUMBER | $V_{(BR)DSS}$ (V) | $r_{DS(ON)}$ ( $\Omega$ ) | $I_D$ (A) | PACKAGE |
|-------------|-------------------|---------------------------|-----------|---------|
| VP0610L     | -60               | 10                        | -0.18     | TO-92   |
| VP0610T     | -60               | 10                        | -0.12     | SOT-23  |

TO-92 (TO-226AA)



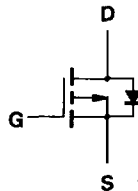
BOTTOM VIEW



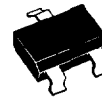
- 1 SOURCE
- 2 GATE
- 3 DRAIN

Performance Curves: VPDS06

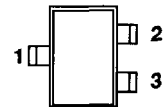
| PRODUCT MARKING |     |
|-----------------|-----|
| VP0610T         | V50 |



SOT-23



TOP VIEW



- 1 DRAIN
- 2 SOURCE
- 3 GATE

### ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ Unless Otherwise Noted)

| PARAMETERS/TEST CONDITIONS                        | SYMBOL         | LIMITS                    |          | UNITS            |   |
|---|----------------|---------------------------|----------|------------------|---|
|   |                | VP0610L                   | VP0610T  |                  |   |
| Drain-Source Voltage                              | $V_{DS}$       | -60                       | -60      | V                |   |
| Gate-Source Voltage                               | $V_{GS}$       | $\pm 30$                  | $\pm 30$ |                  |   |
| Continuous Drain Current                          | $I_D$          | $T_A = 25^\circ\text{C}$  | -0.18    | -0.12            | A |
|   |                | $T_A = 100^\circ\text{C}$ | -0.11    | -0.07            |   |
| Pulsed Drain Current <sup>1</sup>                 | $I_{DM}$       | -0.8                      | -0.4     |                  |   |
| Maximum Power Dissipation                         | $P_D$          | $T_A = 25^\circ\text{C}$  | 0.80     | 0.36             | W |
|   |                | $T_A = 100^\circ\text{C}$ | 0.32     | 0.14             |   |
| Operating Junction & Storage Temperature Range    | $T_J, T_{stg}$ | -55 to 150                |          | $^\circ\text{C}$ |   |
| Lead Temperature ( $1/16"$ from case for 10 sec.) | $T_L$          | 300                       |          |                  |   |

### THERMAL RESISTANCE RATINGS

| THERMAL RESISTANCE  | SYMBOL     | LIMITS  |         | UNITS |
|---------------------|------------|---------|---------|-------|
|                     |            | VP0610L | VP0610T |       |
| Junction-to-Ambient | $R_{thJA}$ | 156     | 350     | K/W   |

<sup>1</sup>Pulse width limited by maximum junction temperature.

| SPECIFICATIONS <sup>a</sup>                   |               |   | LIMITS           |         |          |               |
|---|---------------|---|------------------|---------|----------|---------------|
| PARAMETER                                     | SYMBOL        | TEST CONDITIONS   | TYP <sup>b</sup> | VP0610L |          | UNIT          |
|   |               |   |                  | MIN     | MAX      |               |
| <b>STATIC</b>                                 |               |   |                  |         |          |               |
| Drain-Source Breakdown Voltage                | $V_{(BR)DSS}$ | $V_{GS} = 0\text{ V}, I_D = -10\ \mu\text{A}$   | -70              | -60     |          | V             |
| Gate Threshold Voltage                        | $V_{GS(th)}$  | $V_{DS} = V_{GS}, I_D = -1\ \text{mA}$  | -2               | -1      | -3.5     |               |
| Gate-Body Leakage                             | $I_{GSS}$     | $V_{DS} = 0\ \text{V}, V_{GS} = \pm 20\ \text{V}$<br>$T_J = 125^\circ\text{C}$                                    |                  |         | $\pm 10$ | nA            |
| Zero Gate Voltage Drain Current               | $I_{DSS}$     | $V_{DS} = -48\ \text{V}, V_{GS} = 0\ \text{V}$<br>$T_J = 125^\circ\text{C}$                                       |                  |         | -1       | $\mu\text{A}$ |
| On-State Drain Current <sup>c</sup>           | $I_{D(ON)}$   | $V_{DS} = -10\ \text{V}, V_{GS} = -10\ \text{V}$  | -700             | -600    |          | mA            |
| Drain-Source ON-Resistance <sup>c</sup>       | $r_{DS(ON)}$  | $V_{GS} = -10\ \text{V}, I_D = -0.5\ \text{A}$<br>$T_J = 125^\circ\text{C}$                                       | 8                |         | 10       | $\Omega$      |
| Forward Transconductance <sup>c</sup>         | $g_{FS}$      | $V_{DS} = -10\ \text{V}, I_D = -0.5\ \text{A}$  | 135              | 80      |          | mS            |
| Common Source Output Conductance <sup>c</sup> | $g_{OS}$      | $V_{DS} = -10\ \text{V}, I_D = -0.2\ \text{A}$  | 400              |         |          | $\mu\text{S}$ |
| <b>DYNAMIC</b>                                |               |   |                  |         |          |               |
| Input Capacitance                             | $C_{iss}$     | $V_{GS} = 0\ \text{V}, V_{DS} = -25\ \text{V}, f = 1\ \text{MHz}$   | 15               |         | 60       | pF            |
| Output Capacitance                            | $C_{oss}$     |   | 10               |         | 25       |               |
| Reverse Transfer Capacitance                  | $C_{rss}$     |   | 3                |         | 5        |               |
| <b>SWITCHING</b>                              |               |   |                  |         |          |               |
| Turn-On Time                                  | $t_{d(ON)}$   | $V_{DD} = -25\ \text{V}, R_L = 133\ \Omega, I_D = -0.18\ \text{A}$<br>$V_{GEN} = -10\ \text{V}, R_G = 25\ \Omega$ | 6                |         | 10       | ns            |
|   | $t_r$         |   | 10               |         | 15       |               |
| Turn-Off Time                                 | $t_{d(OFF)}$  | (Switching time is essentially independent of operating temperature)  | 7                |         | 15       |               |
|   | $t_f$         |   | 8                |         | 20       |               |

**NOTES:**

- a.  $T_A = 25^\circ\text{C}$  unless otherwise noted.
- b. For design aid only, not subject to production testing.
- c. Pulse test: Pulse Width  $\leq 300\ \mu\text{sec}$ , Duty Cycle  $\leq 2\%$ .

# VP0610 SERIES



| SPECIFICATIONS <sup>a</sup>                   |               |   |                  | LIMITS  |            |               |
|---|---------------|---|------------------|---------|------------|---------------|
| PARAMETER                                     | SYMBOL        | TEST CONDITIONS   | TYP <sup>b</sup> | VP0610T |            | UNIT          |
|   |               |   |                  | MIN     | MAX        |               |
| <b>STATIC</b>                                 |               |   |                  |         |            |               |
| Drain-Source Breakdown Voltage                | $V_{(BR)DSS}$ | $V_{GS} = 0\text{ V}, I_D = -10\ \mu\text{A}$   | -70              | -60     |            | V             |
| Gate Threshold Voltage                        | $V_{GS(th)}$  | $V_{DS} = V_{GS}, I_D = -1\ \text{mA}$  | -2               | -1      | -3.5       |               |
| Gate-Body Leakage                             | $I_{GSS}$     | $V_{DS} = 0\ \text{V}, V_{GS} = \pm 20\ \text{V}$<br>$T_J = 125^\circ\text{C}$  |                  |         | $\pm 10$   | nA            |
| Zero Gate Voltage Drain Current               | $I_{DSS}$     | $V_{DS} = -48\ \text{V}, V_{GS} = 0\ \text{V}$<br>$T_J = 125^\circ\text{C}$   |                  |         | -1<br>-200 | $\mu\text{A}$ |
| On-State Drain Current <sup>c</sup>           | $I_{D(ON)}$   | $V_{DS} = -10\ \text{V}, V_{GS} = -10\ \text{V}$  | -300             | -220    |            | mA            |
| Drain-Source ON-Resistance <sup>c</sup>       | $r_{DS(ON)}$  | $V_{GS} = -10\ \text{V}, I_D = -0.2\ \text{A}$<br>$T_J = 125^\circ\text{C}$   | 6<br>12          |         | 10<br>20   | $\Omega$      |
| Forward Transconductance <sup>c</sup>         | $g_{FS}$      | $V_{DS} = -10\ \text{V}, I_D = -0.1\ \text{A}$  | 90               | 70      |            | mS            |
| Common Source Output Conductance <sup>c</sup> | $g_{OS}$      | $V_{DS} = -10\ \text{V}, I_D = -0.2\ \text{A}$  | 400              |         |            | $\mu\text{S}$ |
| <b>DYNAMIC</b>                                |               |   |                  |         |            |               |
| Input Capacitance                             | $C_{iss}$     | $V_{GS} = 0\ \text{V}, V_{DS} = -25\ \text{V}, f = 1\ \text{MHz}$   | 15               |         | 60         | $\mu\text{F}$ |
| Output Capacitance                            | $C_{oss}$     |   | 10               |         | 25         |               |
| Reverse Transfer Capacitance                  | $C_{rss}$     |   | 3                |         | 5          |               |
| <b>SWITCHING</b>                              |               |   |                  |         |            |               |
| Turn-On Time                                  | $t_{d(ON)}$   | $V_{DD} = -25\ \text{V}, R_L = 133\ \Omega, I_D = -0.18\ \text{A}$<br>$V_{GEN} = -10\ \text{V}, R_G = 25\ \Omega$<br><br>(Switching time is essentially independent of operating temperature) | 6                |         | 10         | ns            |
|   | $t_r$         |   | 10               |         | 15         |               |
| Turn-Off Time                                 | $t_{d(OFF)}$  |   | 7                |         | 15         |               |
|   | $t_f$         |   | 8                |         | 20         |               |

**NOTES:**

- a.  $T_A = 25^\circ\text{C}$  unless otherwise noted.
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