

## P-Channel Enhancement-Mode MOSFET Transistors

| <b>PRODUCT SUMMARY</b> |                       |                               |                  |           |
|------------------------|-----------------------|-------------------------------|------------------|-----------|
| Part Number            | $V_{(BR)DSS}$ Min (V) | $r_{DS(on)}$ Max ( $\Omega$ ) | $V_{GS(th)}$ (V) | $I_D$ (A) |
| VP0300B                | -30                   | 2.5 @ $V_{GS} = -12$ V        | -2 to -4.5       | -1.25     |
| VP0300L                |                       | 2.5 @ $V_{GS} = -12$ V        | -2 to -4.5       | -0.32     |
| VP0300LS               |                       | 2.5 @ $V_{GS} = -12$ V        | -2 to -4.5       | -0.5      |
| VQ2001J                |                       | 2 @ $V_{GS} = -12$ V          | -2 to -4.5       | -0.6      |
| VQ2001P                |                       | 2 @ $V_{GS} = -12$ V          | -2 to -4.5       | -0.6      |

### FEATURES

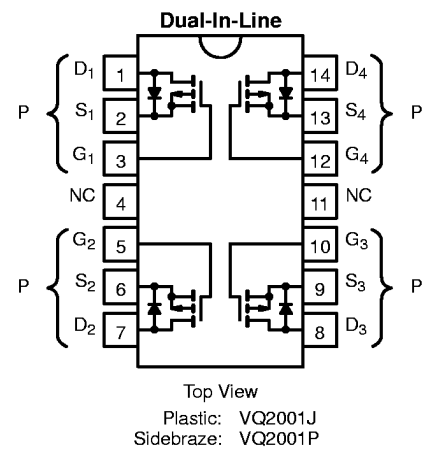
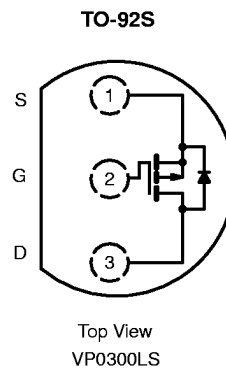
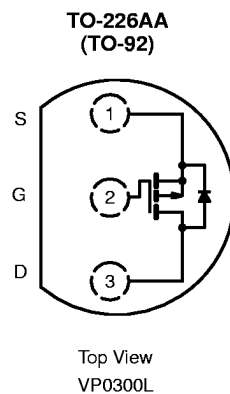
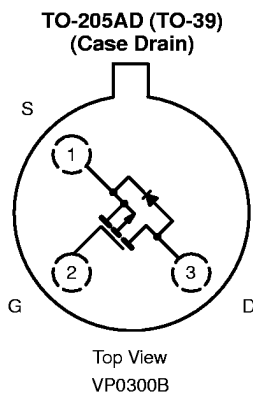
- High-Side Switching
- Low On-Resistance: 1.5  $\Omega$
- Moderate Threshold: -3.1 V
- Fast Switching Speed: 17 ns
- Low Input Capacitance: 60 pF

### BENEFITS

- Ease in Driving Switches
- Low Offset (Error) Voltage
- Low-Voltage Operation
- High-Speed Switching
- Easily Driven Without Buffer

### APPLICATIONS

- Drivers: Relays, Solenoids, Lamps, Hammers, Displays, Memories, Transistors, etc.
- Battery Operated Systems
- Power Supply, Converter Circuits
- Motor Control



| <b>ABSOLUTE MAXIMUM RATINGS (<math>T_A = 25^\circ\text{C}</math> UNLESS OTHERWISE NOTED)</b> |                |                           |                    |          |           |            |                    |                  |
|--|----------------|---------------------------|--------------------|----------|-----------|------------|--------------------|------------------|
| Parameter  | Symbol         | VP0300B                   | VP0300L            | VP0300LS | VQ2001J/P |            | Unit               |                  |
|  |                |                           |                    |          | Single    | Total Quad |                    |                  |
| Drain-Source Voltage   | $V_{DS}$       | -30                       | -30                | -30      | -30       | -30        | V                  |                  |
| Gate-Source Voltage  | $V_{GS}$       | $\pm 20$                  | $\pm 20$           | $\pm 20$ | $\pm 20$  | $\pm 20$   |                    |                  |
| Continuous Drain Current<br>( $T_J = 150^\circ\text{C}$ )                                    | $I_D$          | $T_A = 25^\circ\text{C}$  | -1.25 <sup>b</sup> | -0.32    | -0.5      | -0.6       | -0.6               | A                |
|  |                | $T_A = 100^\circ\text{C}$ | -0.79 <sup>b</sup> | -0.2     | -0.32     | -0.37      | -0.37              |                  |
| Pulsed Drain Current <sup>a</sup>  | $I_{DM}$       | -3                        | -2.4               | -3       | -2        | -2         |                    |                  |
| Power Dissipation  | $P_D$          | $T_A = 25^\circ\text{C}$  | 6.25 <sup>b</sup>  | 0.8      | 0.9       | 1.3        | 2                  | W                |
|  |                | $T_A = 100^\circ\text{C}$ | 2.5 <sup>b</sup>   | 0.32     | 0.4       | 0.52       | 0.8                |                  |
| Maximum Junction-to-Ambient  | $R_{thJA}$     | 20 <sup>b</sup>           | 156                | 139      | 96        | 62.5       | $^\circ\text{C/W}$ |                  |
| Operating Junction and Storage Temperature Range   | $T_J, T_{stg}$ | -55 to 150                |                    |          |           |            |                    | $^\circ\text{C}$ |

**Notes**

- a. Pulse width limited by maximum junction temperature.  
 b. Power dissipation and continuous drain current at  $T_C = 25^\circ\text{C}$ ;  $R_{thJC} = 20^\circ\text{C/W}$ .

Applications information may also be obtained via FaxBack, request document #70611.



| SPECIFICATIONS (T <sub>A</sub> = 25 °C UNLESS OTHERWISE NOTED) |                      |  |                  |              |      |           |      |      |
|--|----------------------|--|------------------|--------------|------|-----------|------|------|
| Parameter  | Symbol               | Test Conditions  | Typ <sup>a</sup> | Limits       |      |           |      | Unit |
|  |                      |  |                  | VP0300B/L/LS |      | VQ2001J/P |      |      |
|  |                      |  |                  | Min          | Max  | Min       | Max  |      |
| <b>Static</b>  |                      |  |                  |              |      |           |      |      |
| Drain-Source Breakdown Voltage                                 | V <sub>(BR)DSS</sub> | V <sub>GS</sub> = 0 V, I <sub>D</sub> = -10 μA   | -55              | -30          |      | -30       |      | V    |
| Gate-Threshold Voltage   | V <sub>GS(th)</sub>  | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -1 mA   | -3.1             | -2           | -4.5 | -2        | -4.5 |      |
| Gate-Body Leakage  | I <sub>GSS</sub>     | V <sub>DS</sub> = 0 V, V <sub>GS</sub> = ±16 V   |                  |              |      |           | ±100 | nA   |
|  |                      | T <sub>J</sub> = 125 °C  |                  |              |      |           | ±500 |      |
| Zero Gate Voltage Drain Current                                | I <sub>DSS</sub>     | V <sub>DS</sub> = -24 V, V <sub>GS</sub> = 0 V   |                  |              | -10  |           |      | μA   |
|  |                      | T <sub>J</sub> = 125 °C  |                  |              | -500 |           | -500 |      |
| On-State Drain Current <sup>b</sup>                            | I <sub>D(on)</sub>   | V <sub>DS</sub> = -10 V, V <sub>GS</sub> = -12 V   | -2.8             | -1.5         |      | -1.5      |      | A    |
|  |                      |  |                  |              |      |           |      |      |
| Drain-Source On-Resistance <sup>b</sup>                        | r <sub>DS(on)</sub>  | V <sub>GS</sub> = -12 V, I <sub>D</sub> = -1 A   | 1.5              |              | 2.5  |           | 2    | Ω    |
|  |                      | T <sub>J</sub> = 125 °C  | 2.6              |              | 3.6  |           | 3.6  |      |
| Forward Transconductance <sup>b</sup>                          | g <sub>fs</sub>      | V <sub>DS</sub> = -10 V, I <sub>D</sub> = -0.5 A   | 370              | 200          |      | 200       |      | mS   |
| Common Source Output Conductance <sup>b</sup>                  | g <sub>os</sub>      | V <sub>DS</sub> = -7.5 V, I <sub>D</sub> = -0.05 A   | 0.25             |              |      |           |      |      |
| <b>Dynamic</b>   |                      |  |                  |              |      |           |      |      |
| Input Capacitance  | C <sub>iss</sub>     | V <sub>DS</sub> = -15 V, V <sub>GS</sub> = 0 V<br>f = 1 MHz  | 60               |              | 150  |           | 150  | pF   |
| Output Capacitance   | C <sub>oss</sub>     |  | 40               |              | 100  |           | 100  |      |
| Reverse Transfer Capacitance                                   | C <sub>rss</sub>     |  | 10               |              | 60   |           | 60   |      |
| <b>Switching<sup>c</sup></b>                                   |                      |  |                  |              |      |           |      |      |
| Turn-On Time   | t <sub>ON</sub>      | V <sub>DD</sub> = -25 V, R <sub>L</sub> = 23 Ω<br>I <sub>D</sub> ≅ -1 A, V <sub>GEN</sub> = -10 V<br>R <sub>G</sub> = 25 Ω   | 19               |              | 30   |           |      | ns   |
| Turn-Off Time  | t <sub>OFF</sub>     |  | 17               |              | 30   |           |      |      |
| Turn-On Time   | t <sub>ON</sub>      | V <sub>DD</sub> = -15 V, R <sub>L</sub> = 23 Ω<br>I <sub>D</sub> ≅ -0.6 A, V <sub>GEN</sub> = -10 V<br>R <sub>G</sub> = 25 Ω | 19               |              |      |           | 30   |      |
| Turn-Off Time  | t <sub>OFF</sub>     |  | 16               |              |      |           | 30   |      |

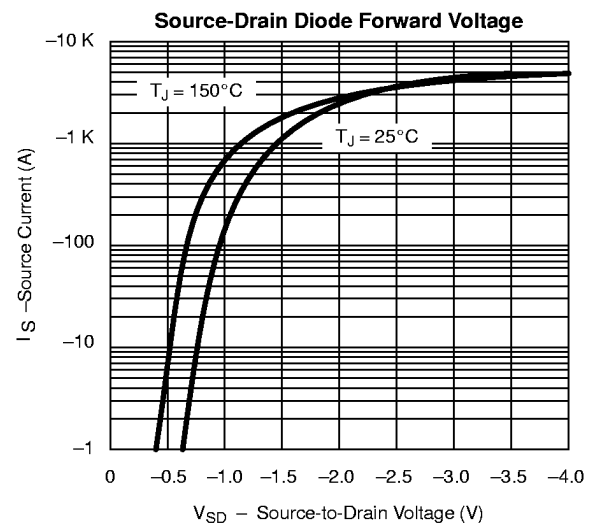
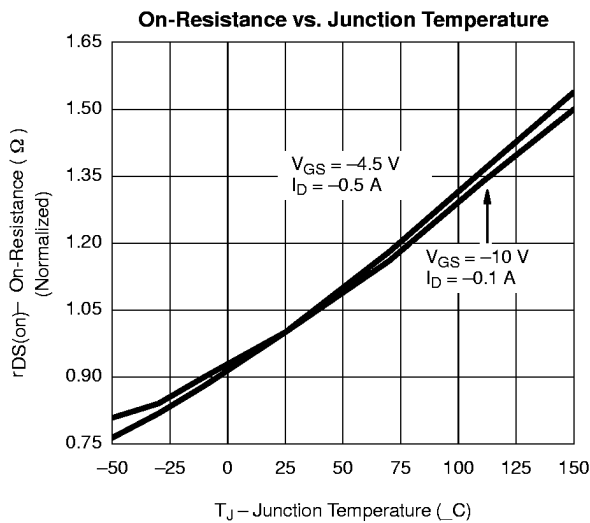
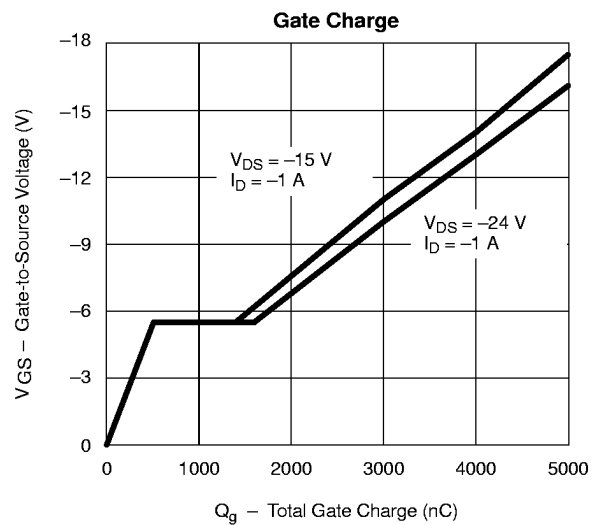
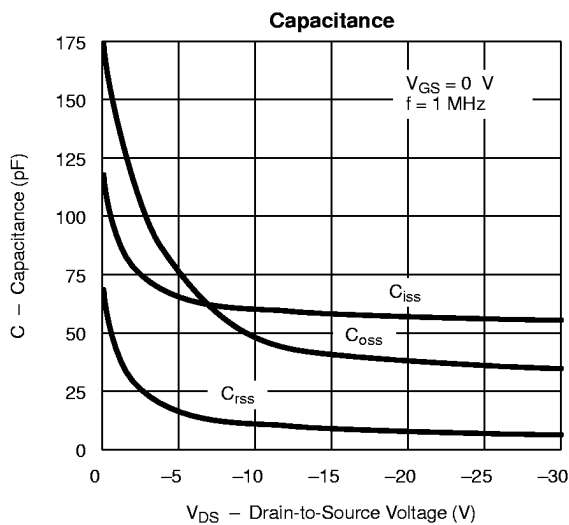
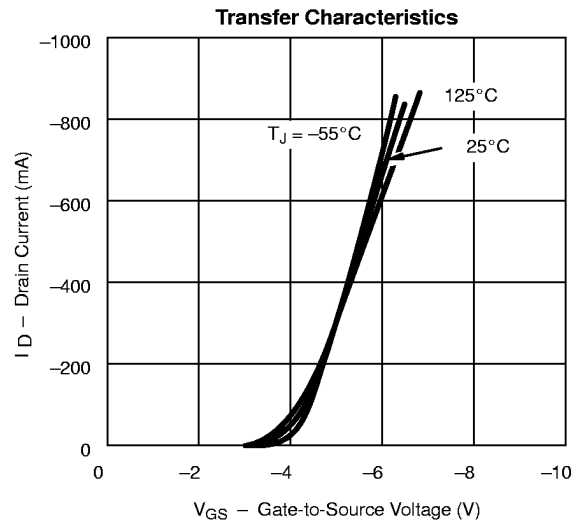
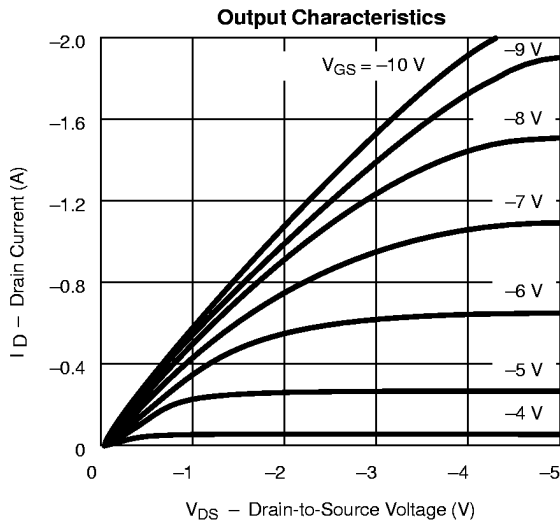
Notes

- a. For DESIGN AID ONLY, not subject to production testing.
- b. Pulse test: PW ≤ 300 μs duty cycle ≤ 2%.
- c. Switching time is essentially independent of operating temperature.

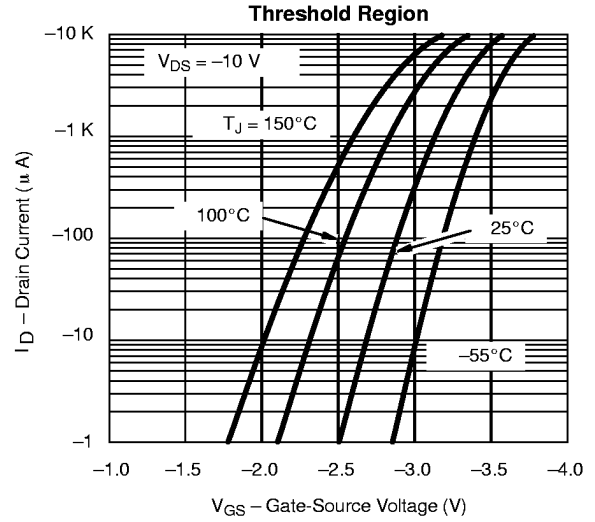
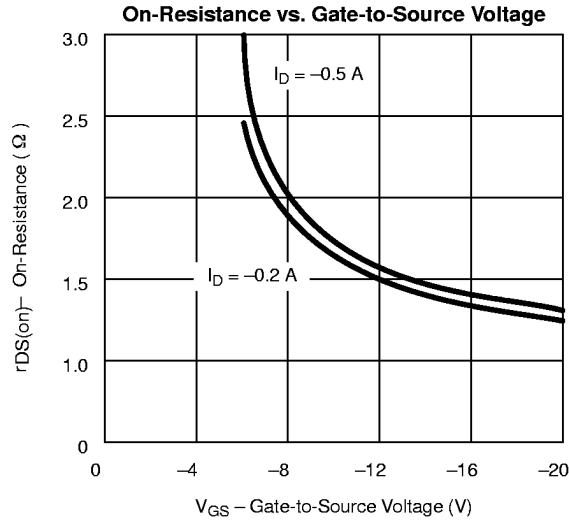
VPEA03



**TYPICAL CHARACTERISTICS (25 °C UNLESS NOTED)**



**TYPICAL CHARACTERISTICS (25 °C UNLESS NOTED)**



**THERMAL RATINGS**

