



## P-Channel Enhancement-Mode MOSFET Transistors

| PRODUCT SUMMARY |                              |                               |                         |                    |
|-----------------|------------------------------|-------------------------------|-------------------------|--------------------|
| Part Number     | V <sub>(BR)DSS</sub> Min (V) | r <sub>DS(on)</sub> Max (Ω)   | V <sub>GS(th)</sub> (V) | I <sub>D</sub> (A) |
| VP0300L         | -30                          | 2.5 @ V <sub>GS</sub> = -12 V | -2 to -4.5              | -0.32              |
| VP0300LS        |                              | 2.5 @ V <sub>GS</sub> = -12 V | -2 to -4.5              | -0.5               |
| VQ2001J         |                              | 2 @ V <sub>GS</sub> = -12 V   | -2 to -4.5              | -0.6               |
| VQ2001P         |                              | 2 @ V <sub>GS</sub> = -12 V   | -2 to -4.5              | -0.6               |

### FEATURES

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

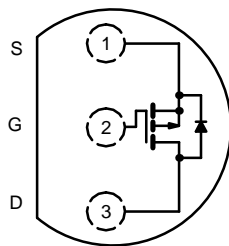
### BENEFITS

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

### APPLICATIONS

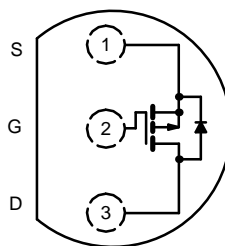
- Drivers: Relays, Solenoids, Lamps, Hammers, Displays, Memories, Transistors, etc.
- Battery Operated Systems
- Power Supply, Converter Circuits
- Motor Control

TO-226AA (TO-92)



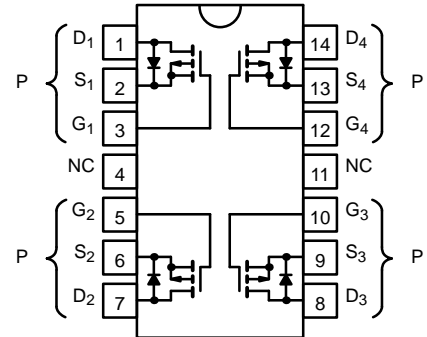
Top View  
VP0300L

TO-92S



Top View  
VP0300LS

Dual-In-Line



Top View  
Plastic: VQ2001J  
Sidebraze: VQ2001P

### ABSOLUTE MAXIMUM RATINGS (T<sub>A</sub> = 25°C UNLESS OTHERWISE NOTED)

| Parameter   | Symbol                            | VP0300L                | VP0300LS | VQ2001J/P |            | Unit  |   |
|---|-----------------------------------|------------------------|----------|-----------|------------|-------|---|
|   |                                   |                        |          | Single    | Total Quad |       |   |
| Drain-Source Voltage                              | V <sub>DS</sub>                   | -30                    | -30      | -30       | -30        | V     |   |
| Gate-Source Voltage                               | V <sub>GS</sub>                   | ± 20                   | ± 20     | ± 20      | ± 20       | V     |   |
| Continuous Drain Current (T <sub>J</sub> = 150°C) | I <sub>D</sub>                    | T <sub>A</sub> = 25°C  | -0.32    | -0.5      | -0.6       | -0.6  | A |
|   |                                   | T <sub>A</sub> = 100°C | -0.2     | -0.32     | -0.37      | -0.37 |   |
| Pulsed Drain Current <sup>a</sup>                 | I <sub>DM</sub>                   | -2.4                   | -3       | -2        | -2         | A     |   |
| Power Dissipation                                 | P <sub>D</sub>                    | T <sub>A</sub> = 25°C  | 0.8      | 0.9       | 1.3        | 2     | W |
|   |                                   | T <sub>A</sub> = 100°C | 0.32     | 0.4       | 0.52       | 0.8   |   |
| Maximum Junction-to-Ambient                       | R <sub>thJA</sub>                 | 156                    | 139      | 96        | 62.5       | °C/W  |   |
| Operating Junction and Storage Temperature Range  | T <sub>J</sub> , T <sub>stg</sub> | -55 to 150             |          |           |            | °C    |   |

Notes

a. Pulse width limited by maximum junction temperature.

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 |
|  |                      |  |                  | VP0300L/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   |      |

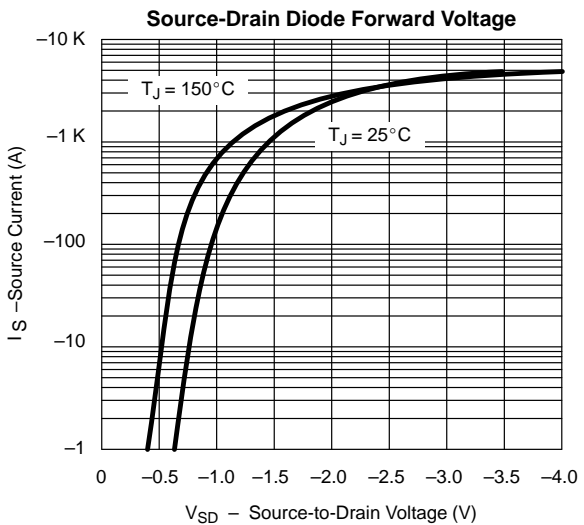
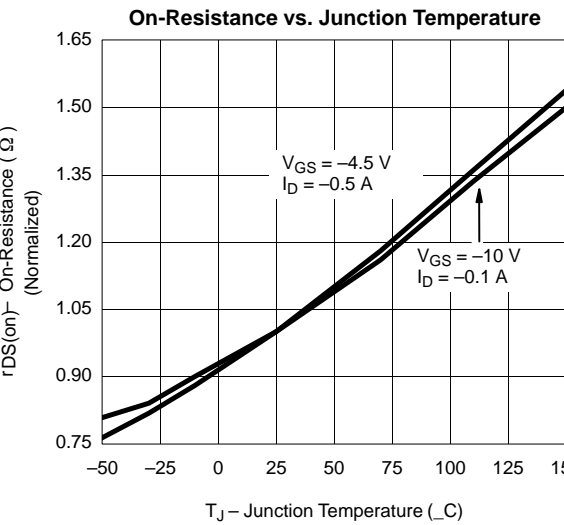
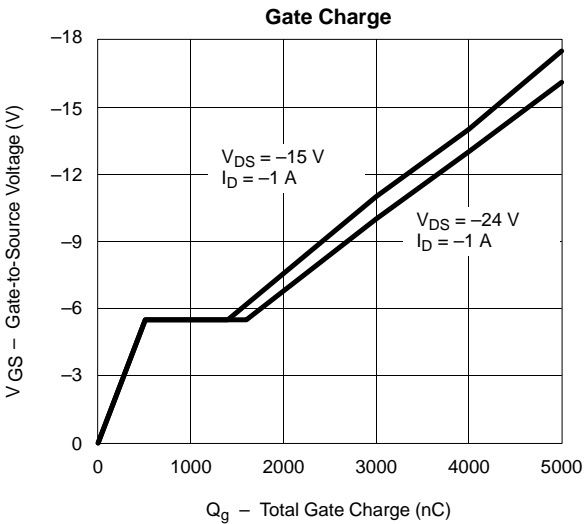
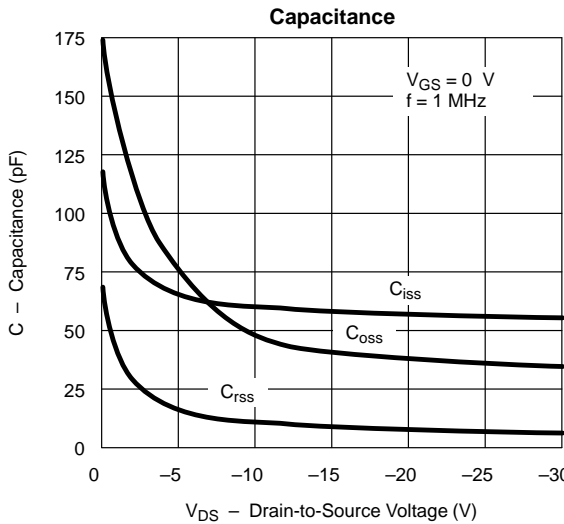
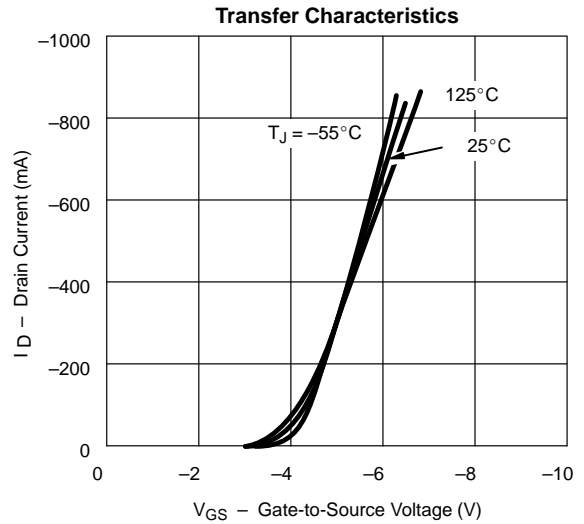
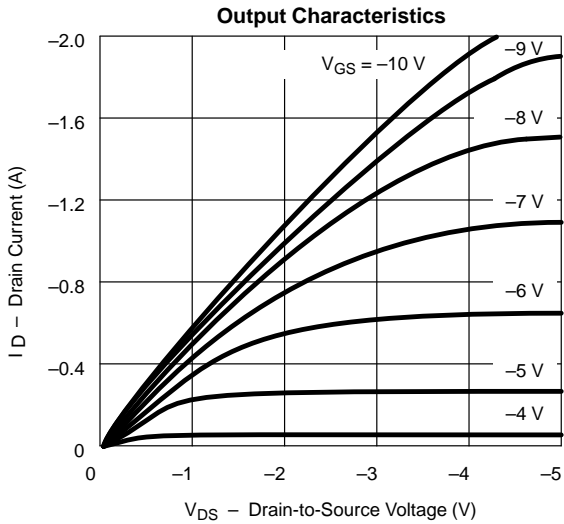
Notes

- 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.

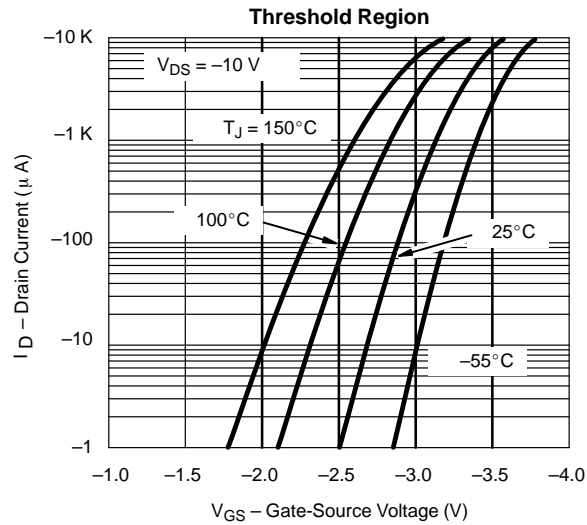
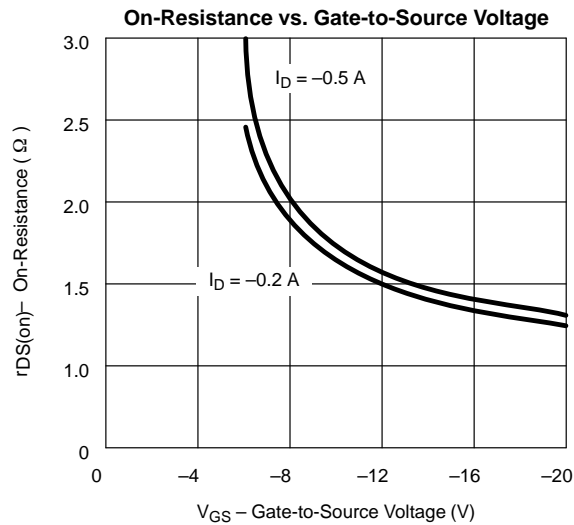
VPEA03



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



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



**THERMAL RATINGS**

