POWERX

# X2P044SS1

## 20V P-Channel MOSFETs

### General Description

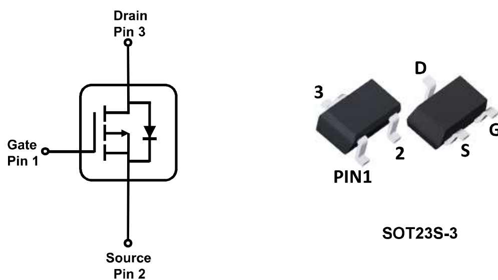
These P-Channel enhancement mode power field effect transistors are using trench - technology. This advanced technology is designed to minimize on-state resistance, provide superior switching performance. This devices are well suited for high efficiency fast switching applications.

| $V_{(BR)DSS}$ | $R_{DS(ON)}$ | $I_D$ |
|---|---|---|
| -20V | 44mΩ | -4.8A |

### Features

- Fast Switching
- Low Gate Drive
- Low Gate Charge

### Pin Configuration




### Applications

- PWM
- Load Switch

### Absolute Maximum Ratings ($T_J$=25°C, unless otherwise noted)

| Symbol | Parameter | | Value | Unit |
|---|---|---|---|---|
| $V_{DS}$ | Drain-Source Voltage | | -20 | V |
| $V_{GS}$ | Gate-Source Voltage | | ±10 | V |
| $I_D$ | Drain Current-Continuous [A] | $T_A$ = 25°C | -4.8 | A |
| | | $T_A$ = 70°C | -3.2 | A |
| $I_{DM}$ | Drain Current-Pulsed [A, B] | $T_A$ = 25°C | -16 | A |
| $I_{AS}$ | Non-repetitive Avalanche Current [E] | | -14 | A |
| $E_{AS}$ | Single Pulse Drain-to-Source Avalanche Energy [E] | | 9.8 | mJ |
| $P_D$ | Maximum Power Dissipation | $T_A$ = 25°C | 1.6 | W |
| $T_J$, $T_{STG}$ | Operating and Storage Temperature Range | | -55 to +150 | °C |

### Thermal Characteristics

| Symbol | Parameter | Conditions | Value | Unit |
|---|---|---|---|---|
| $R_{θJA}$ | Junction-to-Ambient [C] | Steady State | 80 | °C/W |

## Electrical Characteristics ($T_J$=25°C, unless otherwise noted)

### Static State Characteristics

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $V_{(BR)DSS}$ | Drain-Source Breakdown Voltage | $V_{GS}$ = 0V, $I_{DS}$ = -250μA | -20 | - | - | V |
| $I_{DSS}$ | Zero Gate Voltage Drain Current | $V_{DS}$ = -20V, $V_{GS}$ = 0V | - | - | -1 | μA |
| | | $V_{DS}$ = -16V, $V_{GS}$ = 0V, $T_J$ = 125°C | - | - | -10 | μA |
| $I_{GSS}$ | Gate-Source Leakage Current | $V_{GS}$ = ±10V, $V_{DS}$ = 0V | - | - | ±100 | nA |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS}$ = $V_{GS}$, $I_{DS}$ = -250μA | -0.3 | -0.6 | -0.8 | V |
| $R_{DS(ON)}$ | Drain-Source On-State Resistance | $V_{GS}$ = -4.5V, $I_{DS}$ = -3A | - | 36 | 44 | mΩ |
| | | $V_{GS}$ = -2.5V, $I_{DS}$ = -2A | - | 45 | 56 | mΩ |
| | | $V_{GS}$ = -1.8V, $I_{DS}$ = -1A | - | 55 | 72 | mΩ |
| $g_{fs}$ | Forward Transconductance | $V_{DS}$ = -10V, $I_{DS}$ = -3A | - | 7.5 | - | S |

### Dynamic Characteristics Note D

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $C_{iss}$ | Input Capacitance | $V_{DS}$ = -10V, $V_{GS}$ = 0V, f = 1MHz | - | 760 | - | pF |
| $C_{oss}$ | Output Capacitance | | - | 100 | - | pF |
| $C_{rss}$ | Reverse Transfer Capacitance | | - | 80 | - | pF |
| $R_g$ | Gate Resistance | $V_{DS}$ = 0V, f = 1MHz | - | 10.5 | - | Ω |
| $Q_g$ | Total Gate charge, $V_{GS}$ = -4.5V | $V_{DD}$ = -10V, $I_{DS}$ = -3A | - | 7.8 | - | nC |
| | Total Gate charge, $V_{GS}$ = -2.5V | | - | 4.5 | - | nC |
| | Total Gate charge, $V_{GS}$ = -1.8V | | - | 3.1 | - | nC |
| $Q_{gs}$ | Gate to Source Charge | | - | 1.6 | - | nC |
| $Q_{gd}$ | Gate to Drain Charge | | - | 1.5 | - | nC |
| $T_{d(on)}$ | Turn-On Delay Time | $V_{DD}$ = -10V, $V_{GS}$ = -4.5V, $I_{DS}$ = -3A, $R_{G,ext}$ = 3Ω | - | 8.2 | - | ns |
| $t_r$ | Rise Time | | - | 32.3 | - | ns |
| $T_{d(off)}$ | Turn-Off Delay Time | | - | 29.5 | - | ns |
| $t_f$ | Fall Time | | - | 38 | - | ns |

### Drain-Source Diode Characteristics

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $I_S$ | Diode continuous forward current | - | - | - | -4.8 | A |
| $I_{SM}$ | Diode pulse current [B] | - | - | - | -16 | A |
| $V_{SD}$ | Diode Forward Voltage [B] | $V_{GS}$ = 0V, $I_S$ = 1A | - | - | -1 | V |

Note A, The maximum current rating is package limited.
Note B, The test condition is pulse width ≤ 300us, duty cycle ≤ 2%.
Note C, The $R_{\theta JA}$ is measured with the device mounted on 1 $in^2$ FR-4 board with 2oz. copper, determined by the PCB design, in a still air environment with $T_A$=25°C.
Note D, The switching characteristics are independent of operating junction temperatures. Not subject to product testing.
Note E, Maximum UIS current limited by test equipment. The test condition is L=0.1mH, Starting $T_J$=25°C.