# XPX100P02RD

-20V P-Channe Enhancement Mode Power MOSFET

RoHS COMPLIANT

## General Description:

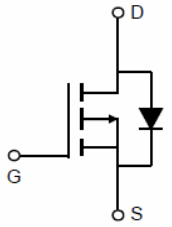
The XPX100P02RD uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. It can be used in a wide variety of applications. The package form is PDFN5*6-8L, which accords with the RoHS standard.

| | | |
|---|---|---|
| $V_{DSS}$ | -20 | V |
| $I_D$ | -100 | A |
| $P_D$ | 140 | W |
| $R_{DS(ON)type}$ | 2.1 | mΩ |

## Features:

- $R_{DS(ON)}$ <3mΩ @ $V_{GS}$=4.5V (Typ 2.1mΩ)
- High density cell design for ultra-low $R_{DS(on)}$
- Fully characterized avalanche voltage and current
- Excellent package for good heat dissipation

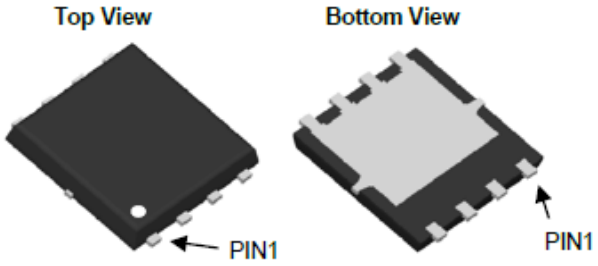

Pin Assignment




Schematic diagram

## Applications:

- Power switching application
- Hard switched and high frequency circuits
- Uninterruptible power supply




## Absolute Maximum Ratings (TA=25℃ unless otherwise specified):

| Symbol | Parameter | Rating | Units |
|---|---|---|---|
| $V_{DSS}$ | Drain-to-Source Voltage | -20 | V |
| $I_D$ | Continuous Drain Current | -100 | A |
| | Continuous Drain Current TA= 100℃ | -70 | A |
| $I_{DM}$ [a1] | Pulsed Drain Current | -400 | A |
| $E_{AS}$[a2] | Single pulse avalanche energy | 500 | mJ |
| $V_{GS}$ | Gate-to-Source Voltage | ±12 | V |
| $P_D$ | Power Dissipation | 140 | W |
| $T_J$, $T_{stg}$ | Operating Junction and Storage Temperature Range | 155, −55 to 175 | ℃ |

**Package Marking and Ordering Information**

| Device Marking | Device | Device Package | Reel Size | Tape width | Quantity |
|---|---|---|---|---|---|
| 100P02 | XPX100P02RD | DFN5X6-8L | - | - | 5000 |

**Electrical Characteristics** (Tc=25℃ unless otherwise specified):

| **OFF Characteristics** | | | | | | |
|---|---|---|---|---|---|---|
| Symbol | Parameter | Test Conditions | Rating | | | Units |
| | | | Min. | Typ. | Max. | |
| $V_{DSS}$ | Drain to Source Breakdown Voltage | $V_{GS}$=0V,$I_D$=250μA | -20 | -- | -- | V |
| $I_{DSS}$ | Drain to Source Leakage Current | $V_{DS}$=-20V,$V_{GS}$=0V,$T_a$=25℃ | -- | -- | -1.0 | μA |
| $I_{GSS(F)}$ | Gate to Source Forward Leakage | $V_{GS}$=+12V | -- | -- | 0.1 | μA |
| $I_{GSS(R)}$ | Gate to Source Reverse Leakage | $V_{GS}$=-12V | -- | -- | -0.1 | μA |

| **ON Characteristics**[a3] | | | | | | |
|---|---|---|---|---|---|---|
| Symbol | Parameter | Test Conditions | Rating | | | Units |
| | | | Min. | Typ. | Max. | |
| $R_{DS(ON)1}$ | Drain-to-Source On-Resistance | $V_{GS}$=-4.5V,$I_D$=-20A | -- | 2.1 | 2.5 | mΩ |
| $R_{DS(ON)2}$ | Drain-to-Source On-Resistance | $V_{GS}$=-2.5V,$I_D$=-20A | -- | 2.6 | 3.5 | mΩ |
| $R_{DS(ON)3}$ | Drain-to-Source On-Resistance | $V_{GS}$=-1.8V,$I_D$=-20A | -- | 3.5 | 4.5 | mΩ |
| $V_{GS(TH)}$ | Gate Threshold Voltage | $V_{DS}$=$V_{GS}$,$I_D$=250μA | -0.45 | -0.62 | -1.0 | V |
| Pulse width tp≤380μs,δ≤2% | | | | | | |

| **Dynamic Characteristics**[a4] | | | | | | |
|---|---|---|---|---|---|---|
| Symbol | Parameter | Test Conditions | Rating | | | Units |
| | | | Min. | Typ. | Max. | |
| $g_{fs}$ | Forward Transconductance | $V_{DS}$=-5V, $I_D$=-20A | 100 | -- | -- | S |
| $C_{iss}$ | Input Capacitance | $V_{GS}$=0V | -- | 4900 | -- | pF |
| $C_{oss}$ | Output Capacitance | $V_{DS}$=-10V | -- | 410 | -- | |
| $C_{rss}$ | Reverse Transfer Capacitance | f=1.0MHz | -- | 290 | -- | |

| **Resistive Switching Characteristics**[a4] | | | | | | |
|---|---|---|---|---|---|---|
| Symbol | Parameter | Test Conditions | Rating | | | Units |
| | | | Min. | Typ. | Max. | |
| $t_{d(ON)}$ | Turn-on Delay Time | $V_{DD}$=-10V,$V_{GS}$=-4.5V<br>$R_G$=3.0Ω,$R_L$=0.5Ω | -- | 21 | -- | ns |
| $t_r$ | Rise Time | | -- | 48 | -- | |
| $t_{d(OFF)}$ | Turn-Off Delay Time | | -- | 100 | -- | |
| $t_f$ | Fall Time | | -- | 42 | -- | |
| $Q_g$ | Total Gate Charge | $V_{DD}$=-10V,$I_D$=-20A<br>$V_{GS}$=-4.5V | -- | 98 | -- | nC |
| $Q_{gs}$ | Gate to Source Charge | | -- | 29 | -- | |
| $Q_{gd}$ | Gate to Drain (“Miller”) Charge | | -- | 31 | -- | |

| Source-Drain Diode Characteristics | | | | | | |
|---|---|---|---|---|---|---|
| Symbol | Parameter | Test Conditions | Rating | | | Units |
| | | | Min. | Typ. | Max. | |
| $I_S$ | Continuous Source Current [a5](Body Diode) | | -- | -- | -75 | A |
| $V_{SD}$ | Diode Forward Voltage[a3] | $I_S$=-15A,$V_{GS}$=0V | -- | -- | -1.2 | V |

| Symbol | Parameter | Typ. | Units |
|---|---|---|---|
| $R_{\theta JC}$ | Junction-to-Case | 0.96 | ℃/W |

[a1]: Repetitive Rating: Pulse width limited by maximum junction temperature.
[a2]: TJ = 25°C, L=0.5mH,$R_G$=25Ω,$V_{DD}$=-15V, $V_{GS}$=-10V
[a3]: Pulse Test: Pulse Width≤300μs, Duty Cycle≤2%.
[a4]: Guaranteed by design, not subject to production
[a5]: Surface Mounted on FR4 Board, t≤10sec.

**Characteristics Curve:**

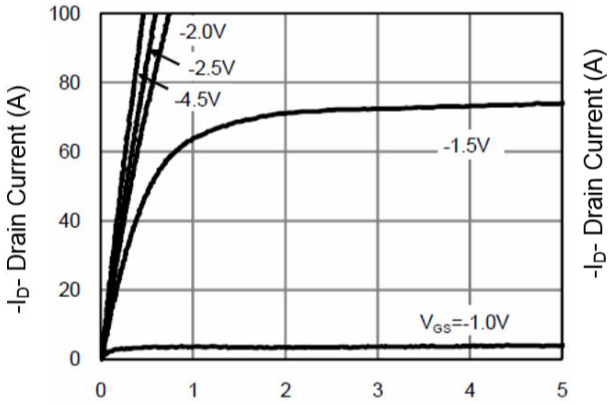



**Figure 1 Output Characteristics**

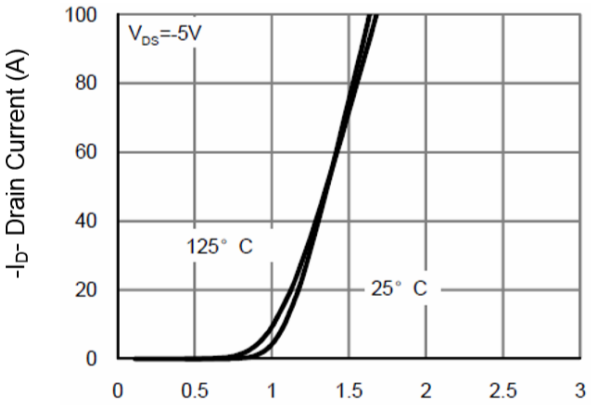



**Figure 2 Transfer Characteristics**

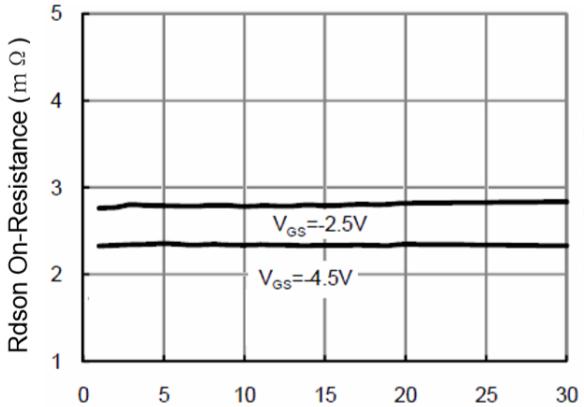



**Figure 3 Rdson- Drain Current**

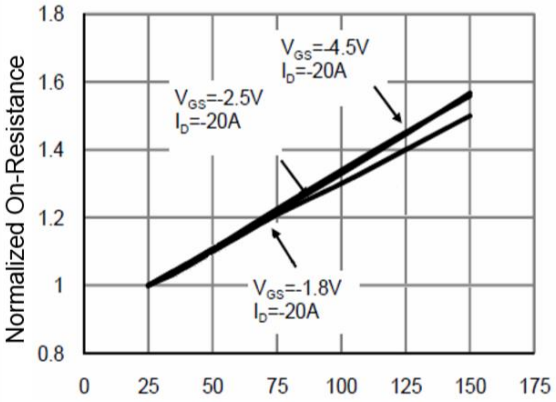



**Figure 4 Rdson-Junction Temperature**

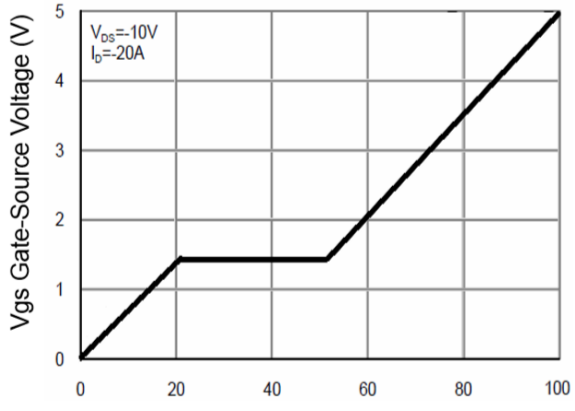



**Figure 5 Gate Charge**

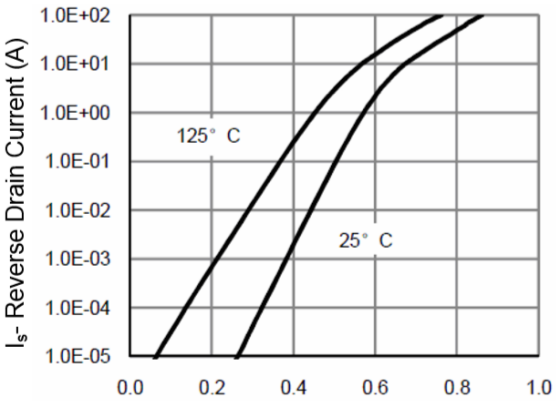



**Figure 6 Source- Drain Diode Forward**

*Silicon P-Channel Power MOSFET*

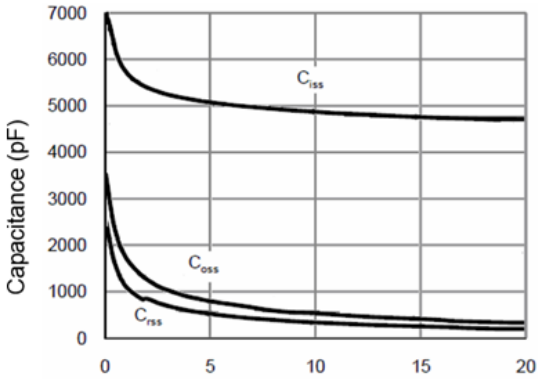



**Figure 7 Capacitance vs Vds**

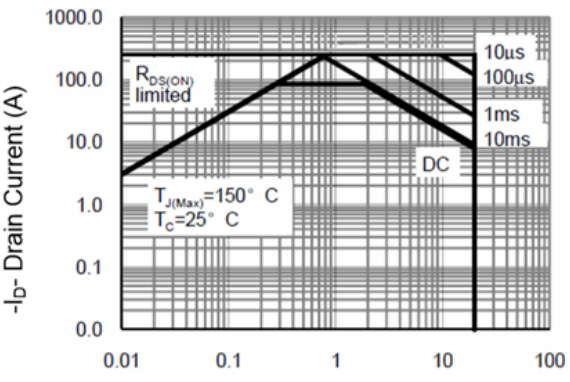



**Figure 8 Safe Operation Area**

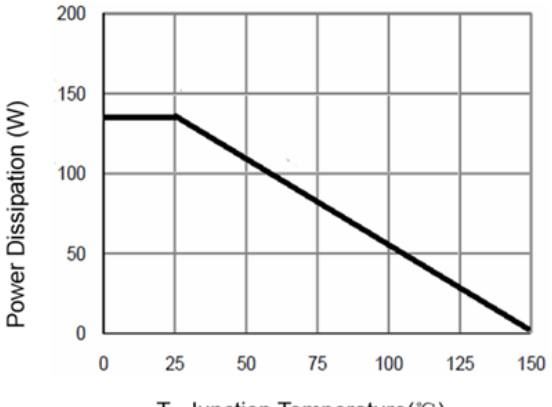



**Figure 9 Power De-rating**

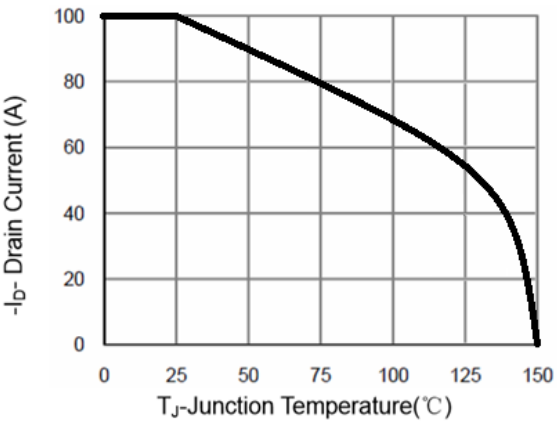



**Figure 10 -Current De-rating**

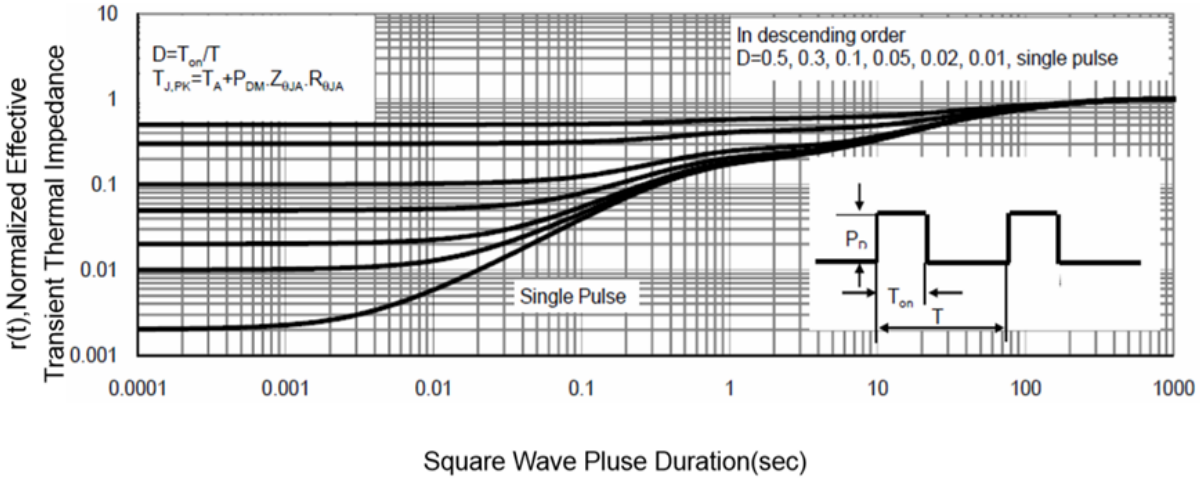



**Figure 11 Normalized Maximum Transient Thermal Impedance**

Flow (wave) soldering (solder dipping)

| Product | Peak Temperature | Dipping Time |
|---|---|---|
| Pb device | 245℃±5℃ | 5sec±1sec |
| Pb-Free device | 260℃+0/-5℃ | 5sec±1sec |

This integrated circuit can be damaged by ESD UniverChip Corporation recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedure can cause damage. ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications.

**Attention:**

- Any and all XPX power products described or contained herein do not have specifications that can handle applications that require extremely high levels of reliability, such as life-support systems, aircraft's control systems, or other applications whose failure can be reasonably expected to result in serious physical and/or material damage. Consult with your XPX power representative nearest you before using any XPX power products described or contained herein in such applications.

- XPX power assumes no responsibility for equipment failures that result from using products at values that exceed, even momentarily, rated values (such as maximum ratings, operating condition ranges, or other parameters) listed in products specifications of any and all XPX power products described or contained herein.

- Specifications of any and all XPX power products described or contained herein stipulate the performance, characteristics, and functions of the described products in the independent state, and are not guarantees of the performance, characteristics, and functions of the described products as mounted in the customer's products or equipment. To verify symptoms and states that cannot be evaluated in an independent device, the customer should always evaluate and test devices mounted in the customer's products or equipment.

- XPX power Semiconductor CO.,LTD. strives to supply high-quality high-reliability products. However, any and all semiconductor products fail with some probability. It is possible that these probabilistic failures could give rise to accidents or events that could endanger human lives, that could give rise to smoke or fire, or that could cause damage to other property. When designing equipment, adopt safety measures so that these kinds of accidents or events cannot occur. Such measures include but are not limited to protective circuits and error prevention circuits for safe design, redundant design, and structural design.

- In the event that any or all XPX power products(including technical data, services) described or contained herein are controlled under any of applicable local export control laws and regulations, such products must not be exported without obtaining the export license from the authorities concerned in accordance with the above law.

- No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying and recording, or any information storage or retrieval system, or otherwise, without the prior written permission of XPX power Semiconductor CO.,LTD.

- Information (including circuit diagrams and circuit parameters) herein is for example only ; it is not guaranteed for volume production. XPX power believes information herein is accurate and reliable, but no guarantees are made or implied regarding its use or any infringements of intellectual property rights or other rights of third parties.

- Any and all information described or contained herein are subject to change without notice due to product/technology improvement, etc. When designing equipment, refer to the "Delivery Specification" for the XPX power product that you intend to use.

- This catalog provides information as of Sep.2019. Specifications and information herein are subject to change without notice.