-30V P-Channe Enhancement Mode Power MOSFET

RoHS COMPLIANT

Description

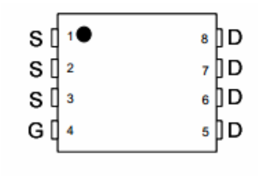
The XPX7401RX uses advanced trench technology to provide excellent $R_{DS(ON)}$, This device is suitable for use as a load switch or power management.

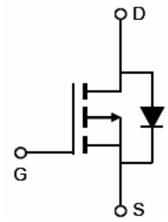
V_{DS} = -30V,I_D = -39A

$R_{DS(ON)}$ =11mΩ @ V_{GS}=-10V

$R_{DS(ON)}$ =18mΩ @ V_{GS}=-4.5V

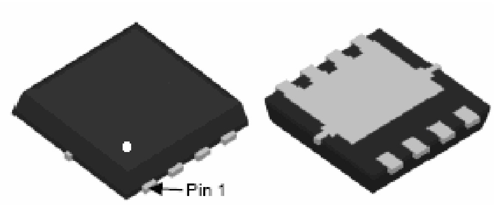
- High power and current handing capability
- Lead free product is acquired
- Surface mount package





Application

- Power management
- Load switch



Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
7401A	XPX7401RX	DFN3X3-8			

Absolute Maximum Ratings (T_A=25℃unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	-30	V
Gate-Source Voltage	V_{GS}	±25	V
Drain Current-Continuous	I_D	-39	A
Drain Current-Pulsed (Note 1)	I_{DM}	-70	A
Maximum Power Dissipation	P_D	40	W
Operating Junction and Storage Temperature Range	T_J,T_{STG}	-55 To 150	℃
Thermal Resistance,Junction-to-Case(Note 2)	$R_{θJC}$	2.8	℃/W

<table>
<tr><th>Symbol</th><th colspan="2">Parameter</th><th>Rating</th><th>Unit</th></tr>
<tr><td colspan="5">Common Ratings</td></tr>
<tr><td>V_{DSS}</td><td colspan="2">Drain-Source Voltage</td><td>-30</td><td rowspan="2">V</td></tr>
<tr><td>V_{GSS}</td><td colspan="2">Gate-Source Voltage</td><td>±25</td></tr>
<tr><td>T_J</td><td colspan="2">Maximum Junction Temperature</td><td>150</td><td rowspan="2">°C</td></tr>
<tr><td>T_{STG}</td><td colspan="2">Storage Temperature Range</td><td>-55 to 150</td></tr>
<tr><td>I_S</td><td>Diode Continuous Forward Current</td><td>T_C=25°C</td><td>-20</td><td rowspan="4">A</td></tr>
<tr><td rowspan="2">I_D</td><td rowspan="2">Continuous Drain Current</td><td>T_C=25°C</td><td>-39</td></tr>
<tr><td>T_C=100°C</td><td>-25</td></tr>
<tr><td>I_{DM}</td><td>Pulsed Drain Current</td><td>T_C=25°C</td><td>-70 *</td></tr>
<tr><td rowspan="2">P_D</td><td rowspan="2">Maximum Power Dissipation</td><td>T_C=25°C</td><td>32.9</td><td rowspan="2">W</td></tr>
<tr><td>T_C=100°C</td><td>13.2</td></tr>
<tr><td>$R_{\theta JC}$</td><td>Thermal Resistance-Junction to Case</td><td>Steady State</td><td>3.8</td><td>°C/W</td></tr>
<tr><td rowspan="2">I_D</td><td rowspan="2">Continuous Drain Current</td><td>T_A=25°C</td><td>-12 [b]</td><td rowspan="2">A</td></tr>
<tr><td>T_A=70°C</td><td>-9.8 [b]</td></tr>
<tr><td rowspan="2">P_D</td><td rowspan="2">Maximum Power Dissipation</td><td>T_A=25°C</td><td>3.1</td><td rowspan="2">W</td></tr>
<tr><td>T_A=70°C</td><td>2</td></tr>
<tr><td rowspan="2">$R_{\theta JA}$</td><td rowspan="2">Thermal Resistance-Junction to Ambient</td><td>$t \leq 10s$</td><td>40</td><td rowspan="2">°C/W</td></tr>
<tr><td>Steady State</td><td>75</td></tr>
<tr><td>I_{AS} [a]</td><td>Avalanche Current, Single pulse</td><td>L=0.5mH</td><td>18</td><td>A</td></tr>
<tr><td>E_{AS} [a]</td><td>Avalanche Energy, Single pulse</td><td>L=0.5mH</td><td>81</td><td>mJ</td></tr>
</table>

Note *：Current limited by bond wire.

Note a：UIS tested and pulse width are limited by maximum junction temperature 150°C (initial temperature T_J = 25°C).

Note b：t＜10s.

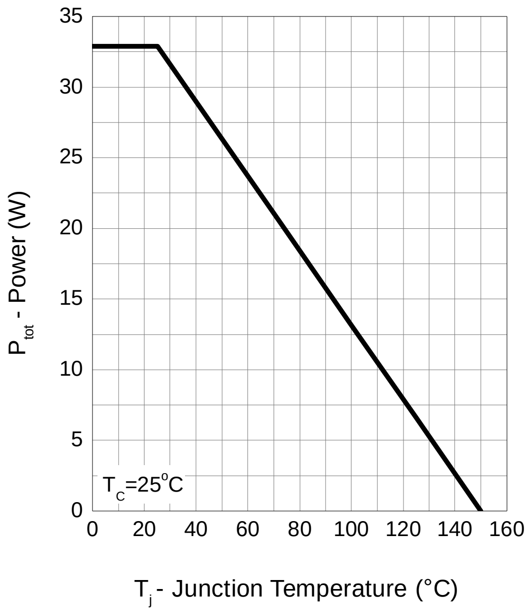
Electrical Characteristics (T_A = 25°C Unless Otherwise Noted)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
Static Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V, I_{DS}=-250μA	-30	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=-24V, V_{GS}=0V	-	-	-1	μA
		T_J=85°C	-	-	-30	
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_{DS}=-250μA	-1.3	-1.8	-2.3	V
I_{GSS}	Gate Leakage Current	V_{GS}=±25V, V_{DS}=0V	-	-	±10	μA
$R_{DS(ON)}$ [c]	Drain-Source On-state Resistance	V_{GS}=-10V, I_{DS}=-20A	-	11	14	mΩ
		V_{GS}=-4.5V, I_{DS}=-10A	-	18	24	
Diode Characteristics						
V_{SD} [c]	Diode Forward Voltage	I_{SD}=-1A, V_{GS}=0V	-	-0.7	-1	V
t_{rr} [d]	Reverse Recovery Time	I_{SD}=-20A, dI_{SD}/dt=100A/μs	-	20	-	ns
Q_{rr} [d]	Reverse Recovery Charge		-	8	-	nC
Dynamic Characteristics [d]						
R_g	Gate Resistance	V_{GS}=0V, V_{DS}=0V,F=1MHz	-	9	-	Ω
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=-15V, Frequency=1.0MHz	-	1380	-	pF
C_{oss}	Output Capacitance		-	280	-	
C_{rss}	Reverse Transfer Capacitance		-	217	-	
$t_{d(ON)}$	Turn-on Delay Time	V_{DD}=-15V, R_L=15Ω, I_{DS}=-1A, V_{GEN}=-10V, R_G=6Ω	-	11	-	ns
t_r	Turn-on Rise Time		-	11	-	
$t_{d(OFF)}$	Turn-off Delay Time		-	101	-	
t_f	Turn-off Fall Time		-	60	-	
Gate Charge Characteristics [d]						
Q_g	Total Gate Charge	V_{DS}=-15V, V_{GS}=-10V, I_{DS}=-20A	-	30	-	nC
Q_{gs}	Gate-Source Charge		-	1.2	-	
Q_{gd}	Gate-Drain Charge		-	11	-	

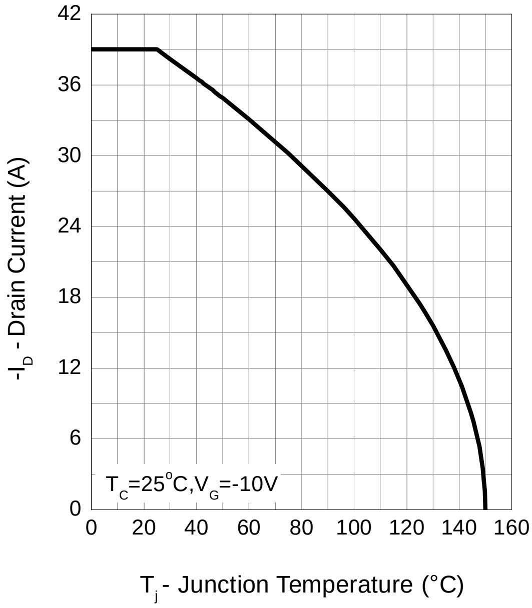
Note c：Pulse test ; pulse width≤300μs, duty cycle≤2%.
Note d：Guaranteed by design, not subject to production testing.

Typical Operating Characteristics

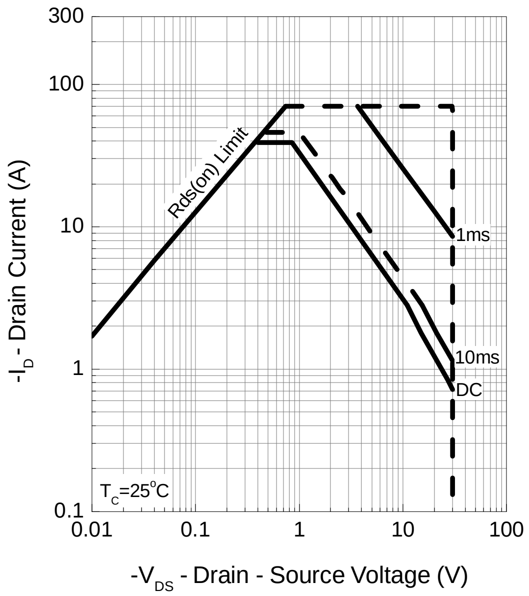
Power Dissipation



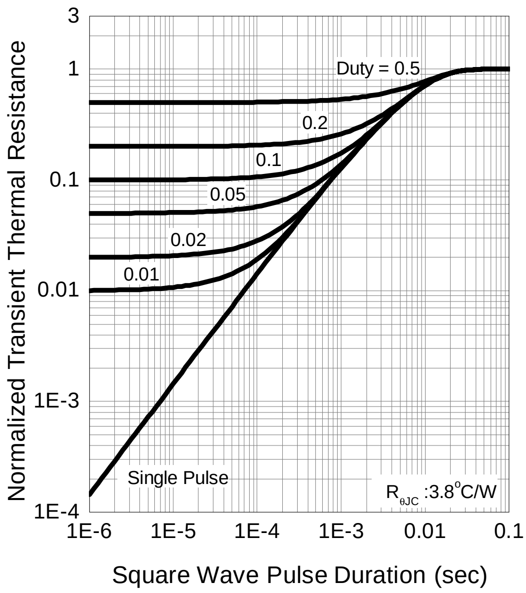
Drain Current



Safe Operation Area

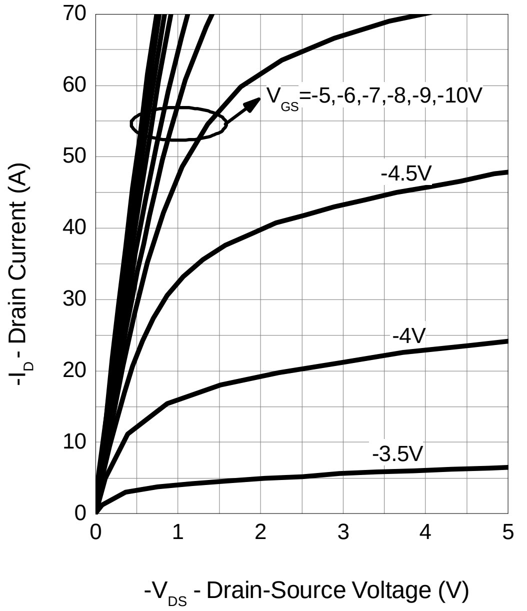


Thermal Transient Impedance

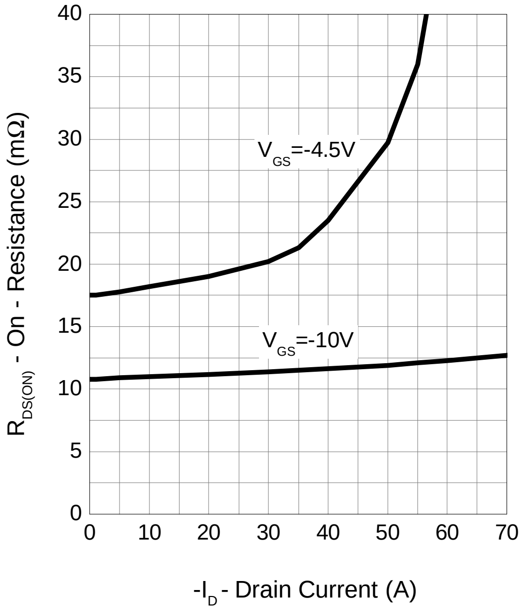


Typical Operating Characteristics (Cont.)

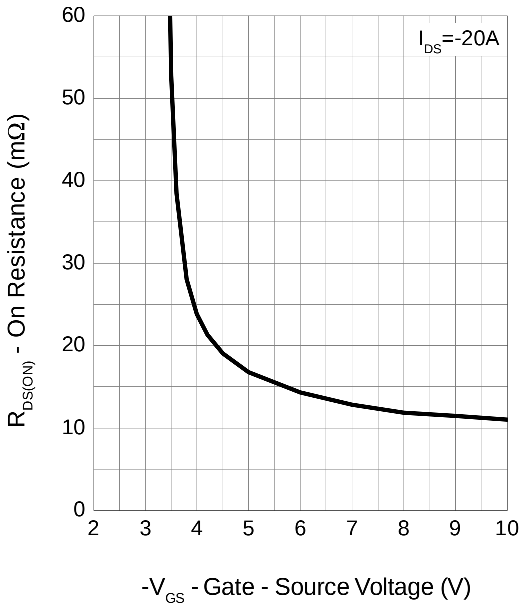
Output Characteristics



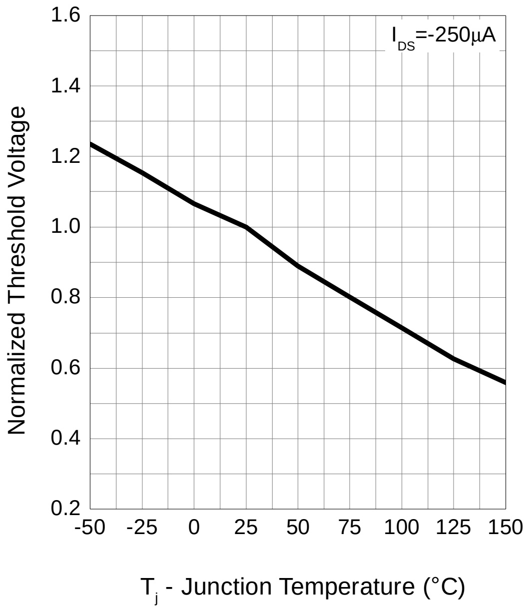
Drain-Source On Resistance



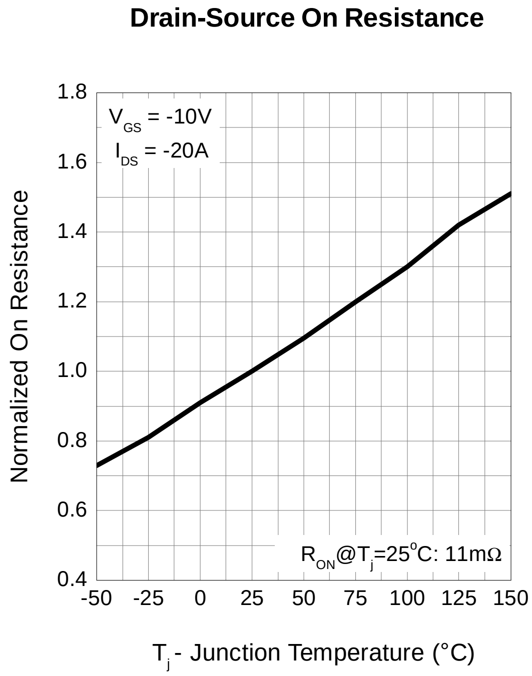
Gate-Source On Resistance

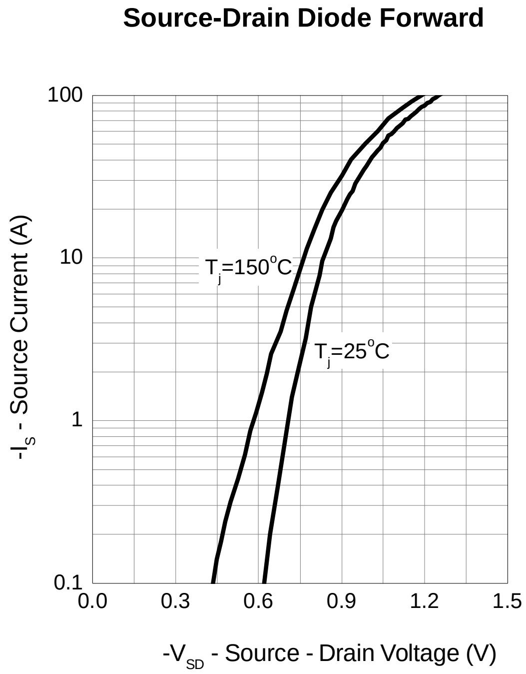


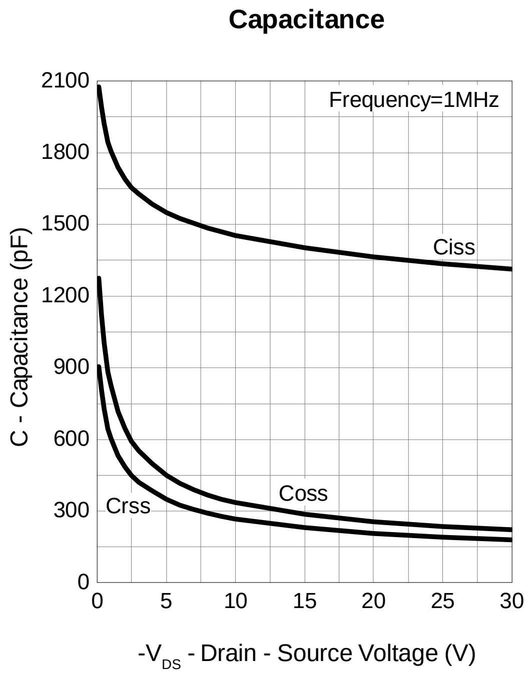
Gate Threshold Voltage

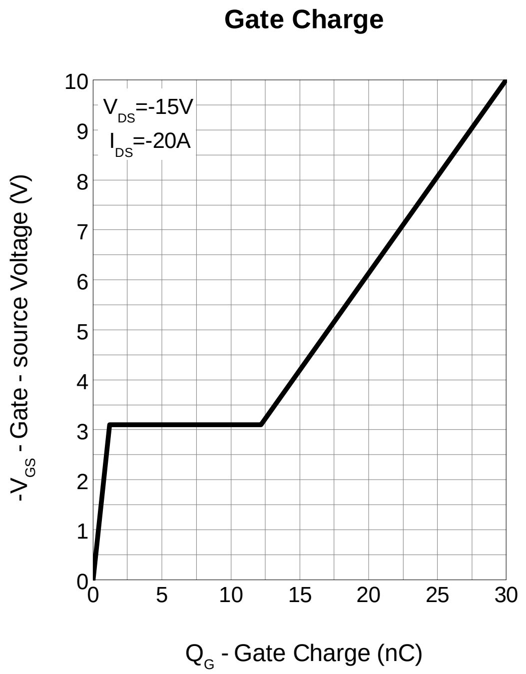


Typical Operating Characteristics (Cont.)



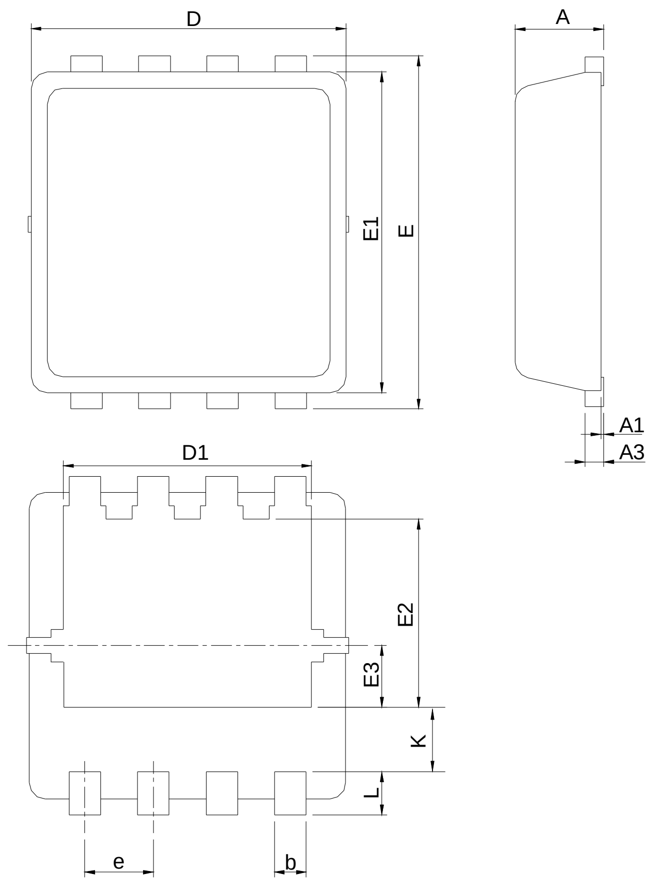






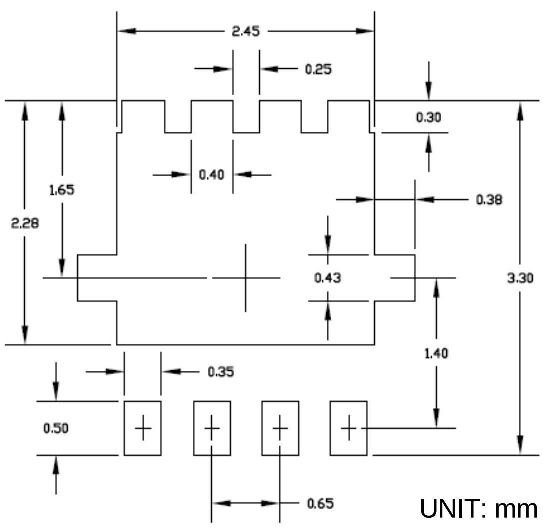
Package Information

DFN3x3-8



SYMBOL	DFN3x3-8			
	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	0.80	1.00	0.031	0.039
A1	0.00	0.05	0.000	0.002
A3	0.10	0.25	0.004	0.010
b	0.24	0.35	0.009	0.014
D	2.90	3.10	0.114	0.122
D1	2.25	2.45	0.089	0.096
E	3.10	3.30	0.122	0.130
E1	2.90	3.10	0.114	0.122
E2	1.65	1.85	0.065	0.073
E3	0.56	0.58	0.022	0.023
e	0.65 BSC		0.026 BSC	
K	0.475	0.775	0.019	0.031
L	0.30	0.50	0.012	0.020

RECOMMENDED LAND PATTERN



UNIT: mm

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.