

# XP6NA1R4CXT

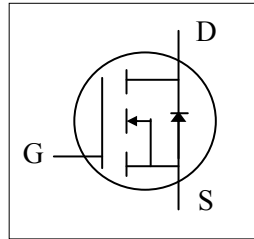
**Halogen-Free Product**

*N-CHANNEL ENHANCEMENT MODE*

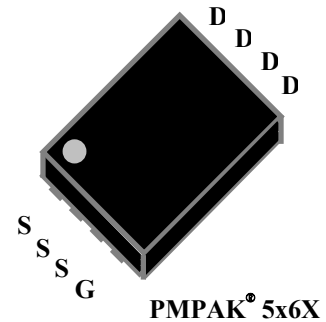
*POWER MOSFET*



- ▼ 100% R<sub>g</sub> & UIS Test
- ▼ Simple Drive Requirement
- ▼ Low On-resistance
- ▼ RoHS Compliant & Halogen-Free



BV <sub>DSS</sub>	60V
R <sub>DS(ON)</sub>	1.45mΩ



## Description

XP6NA1R4C series are innovative design and silicon process technology to achieve the lowest possible on-resistance and fast switching performance. It provides the designer with an extreme efficient device for use in a wide range of power applications.

The PMPAK<sup>®</sup> 5x6X package is special for DC-DC converters application and the foot print is compatible with SO-8 with backside heat sink and lower profile.

## Absolute Maximum Ratings@T<sub>j</sub>=25°C(unless otherwise specified)

Symbol	Parameter	Rating	Units
V <sub>DS</sub>	Drain-Source Voltage	60	V
V <sub>GS</sub>	Gate-Source Voltage	+20	V
I <sub>D</sub> @T <sub>C</sub> =25°C	Drain Current, V <sub>GS</sub> @ 10V <sup>4</sup> (Silicon Limited)	210	A
I <sub>D</sub> @T <sub>C</sub> =25°C	Drain Current, V <sub>GS</sub> @ 10V <sup>4</sup>	100	A
I <sub>D</sub> @T <sub>A</sub> =25°C	Drain Current, V <sub>GS</sub> @ 10V <sup>3</sup>	44.6	A
I <sub>D</sub> @T <sub>A</sub> =70°C	Drain Current, V <sub>GS</sub> @ 10V <sup>3</sup>	35.7	A
I <sub>DM</sub>	Pulsed Drain Current <sup>1</sup>	400	A
P <sub>D</sub> @T <sub>C</sub> =25°C	Total Power Dissipation	113.6	W
P <sub>D</sub> @T <sub>A</sub> =25°C	Total Power Dissipation <sup>3</sup>	5	W
E <sub>AS</sub>	Single Pulse Avalanche Energy <sup>5</sup>	180	mJ
T <sub>STG</sub>	Storage Temperature Range	-55 to 150	°C
T <sub>J</sub>	Operating Junction Temperature Range	-55 to 150	°C

## Thermal Data

Symbol	Parameter	Value	Unit
R <sub>thj-c</sub>	Maximum Thermal Resistance, Junction-case	1.1	°C/W
R <sub>thj-a</sub>	Maximum Thermal Resistance, Junction-ambient <sup>3</sup>	25	°C/W

**Electrical Characteristics@T<sub>j</sub>=25°C(unless otherwise specified)**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>D</sub> =250uA	60	-	-	V
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance <sup>2</sup>	V <sub>GS</sub> =10V, I <sub>D</sub> =20A	-	-	1.45	mΩ
		V <sub>GS</sub> =6V, I <sub>D</sub> =20A	-	-	2.45	mΩ
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250uA	2	-	4	V
g <sub>fs</sub>	Forward Transconductance	V <sub>DS</sub> =5V, I <sub>D</sub> =20A	-	82	-	S
I <sub>DSS</sub>	Drain-Source Leakage Current	V <sub>DS</sub> =48V, V <sub>GS</sub> =0V	-	-	25	uA
I <sub>GSS</sub>	Gate-Source Leakage	V <sub>GS</sub> = +20V, V <sub>DS</sub> =0V	-	-	+0.1	uA
Q <sub>g</sub>	Total Gate Charge	I <sub>D</sub> =20A	-	122	195	nC
Q <sub>gs</sub>	Gate-Source Charge	V <sub>DS</sub> =30V	-	33	-	nC
Q <sub>gd</sub>	Gate-Drain ("Miller") Charge	V <sub>GS</sub> =10V	-	28	-	nC
t <sub>d(on)</sub>	Turn-on Delay Time	V <sub>DS</sub> =30V	-	29	-	ns
t <sub>r</sub>	Rise Time	I <sub>D</sub> =20A	-	62	-	ns
t <sub>d(off)</sub>	Turn-off Delay Time	R <sub>G</sub> =6Ω	-	93	-	ns
t <sub>f</sub>	Fall Time	V <sub>GS</sub> =10V	-	91	-	ns
C <sub>iss</sub>	Input Capacitance	V <sub>GS</sub> =0V	-	7200	11520	pF
C <sub>oss</sub>	Output Capacitance	V <sub>DS</sub> =50V	-	1160	-	pF
C <sub>rss</sub>	Reverse Transfer Capacitance	f=1.0MHz	-	15	-	pF
R <sub>g</sub>	Gate Resistance	f=1.0MHz	-	1	2	Ω

**Source-Drain Diode**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
V <sub>SD</sub>	Forward On Voltage <sup>2</sup>	I <sub>S</sub> =20A, V <sub>GS</sub> =0V	-	-	1.3	V
t <sub>rr</sub>	Reverse Recovery Time	I <sub>S</sub> =20A, V <sub>GS</sub> =0V,	-	70	-	ns
Q <sub>rr</sub>	Reverse Recovery Charge	di/dt=100A/μs	-	95	-	nC

**Notes:**

- 1.Pulse width limited by Max. junction temperature.
- 2.Pulse test
- 3.Surface mounted on 1 in<sup>2</sup> copper pad of FR4 board, t ≤10sec; 60°C/W at steady state.
- 4.Package limitation current is 100A .
- 5.Starting T<sub>j</sub>=25°C , V<sub>DD</sub>=50V , L=0.1mH , R<sub>G</sub>=25Ω , V<sub>GS</sub>=10V

THIS PRODUCT IS SENSITIVE TO ELECTROSTATIC DISCHARGE, PLEASE HANDLE WITH CAUTION.

USE OF THIS PRODUCT AS A CRITICAL COMPONENT IN LIFE SUPPORT, AUTOMOTIVE OR OTHER SIMILAR SYSTEMS IS NOT AUTHORIZED.

XSEMI DOES NOT ASSUME ANY LIABILITY ARISING OUT OF THE APPLICATION OR USE OF ANY PRODUCT OR CIRCUIT DESCRIBED HEREIN; NEITHER DOES IT CONVEY ANY LICENSE UNDER ITS PATENT RIGHTS, NOR THE RIGHTS OF OTHERS.

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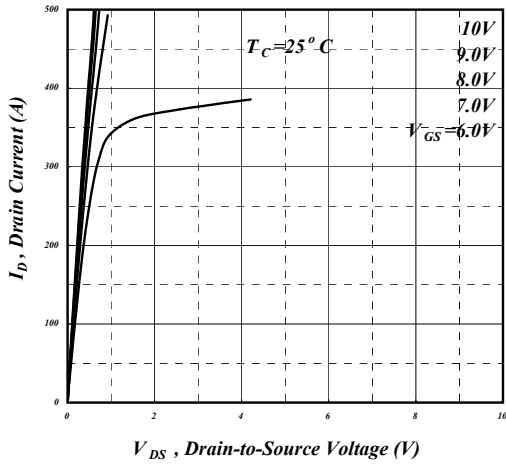


Fig 1. Typical Output Characteristics

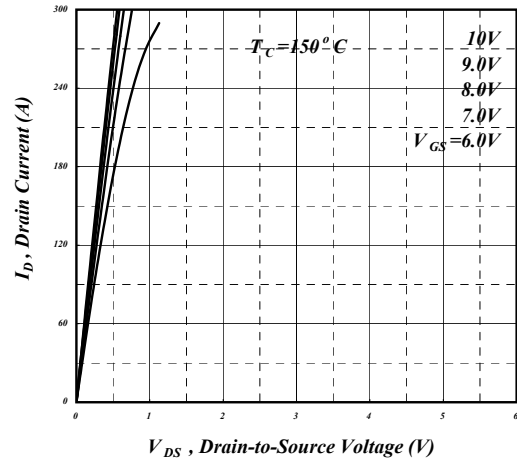


Fig 2. Typical Output Characteristics

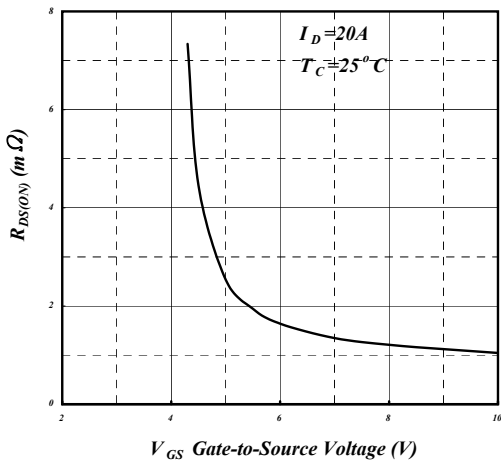


Fig 3. On-Resistance v.s. Gate Voltage

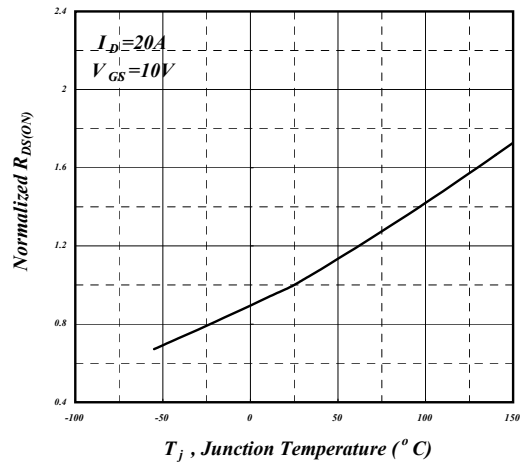


Fig 4. Normalized On-Resistance v.s. Junction Temperature

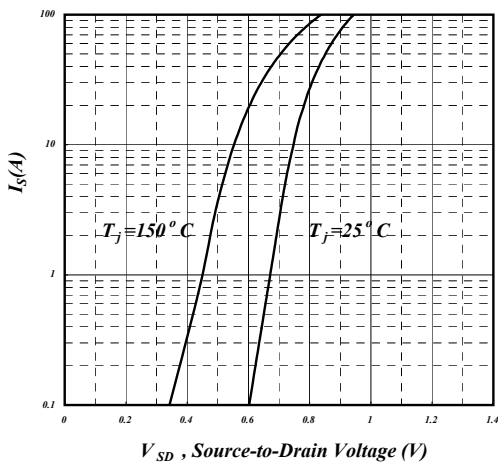


Fig 5. Forward Characteristic of Reverse Diode

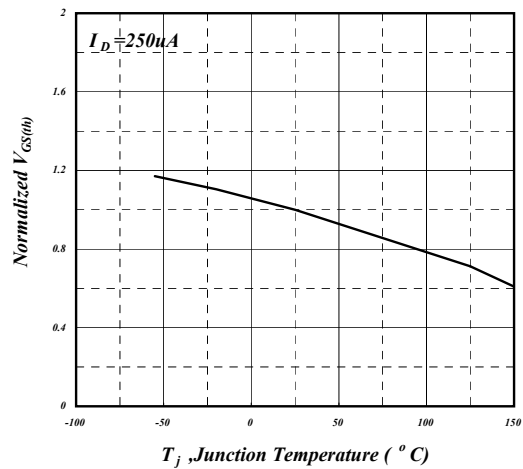


Fig 6. Gate Threshold Voltage v.s. Junction Temperature

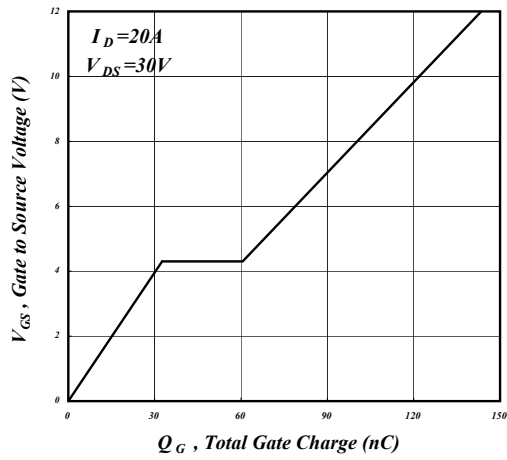


Fig 7. Gate Charge Characteristics

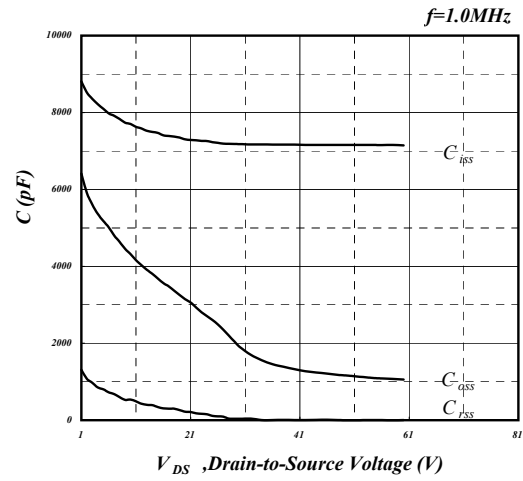


Fig 8. Typical Capacitance Characteristics

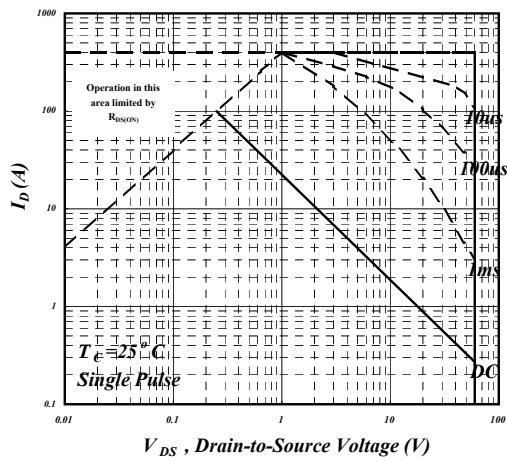


Fig 9. Maximum Safe Operating Area

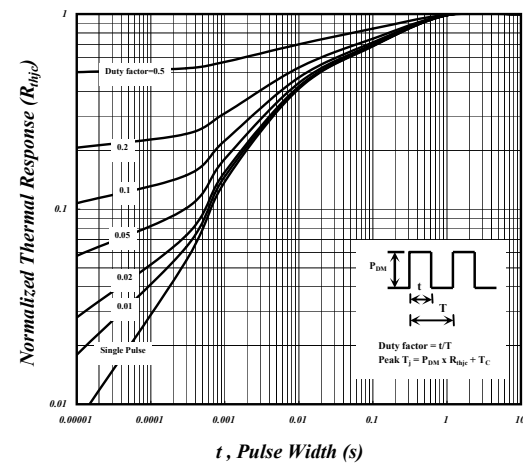


Fig 10. Effective Transient Thermal Impedance

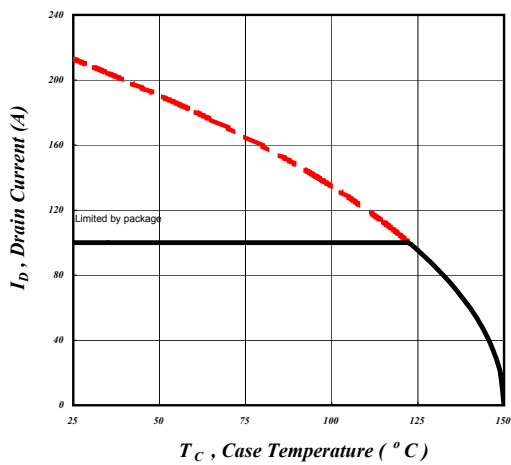


Fig 11. Drain Current v.s. Case Temperature

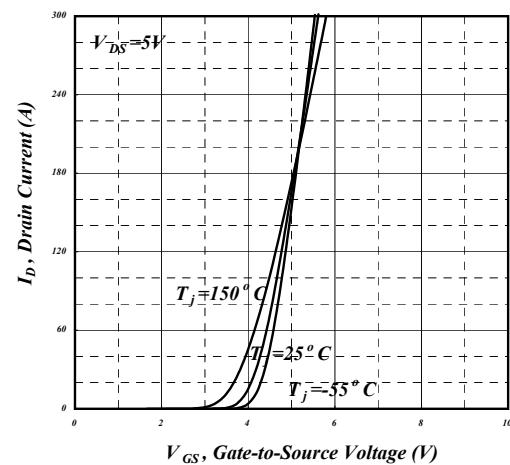
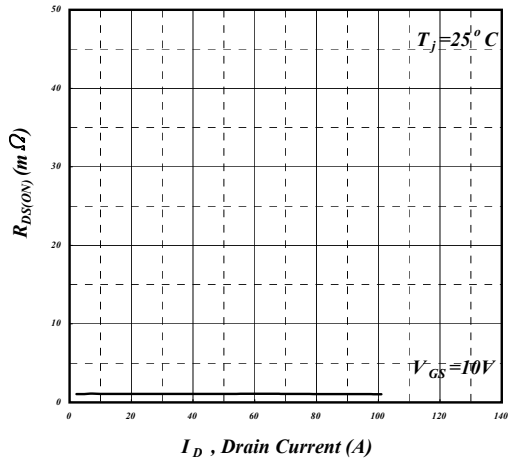
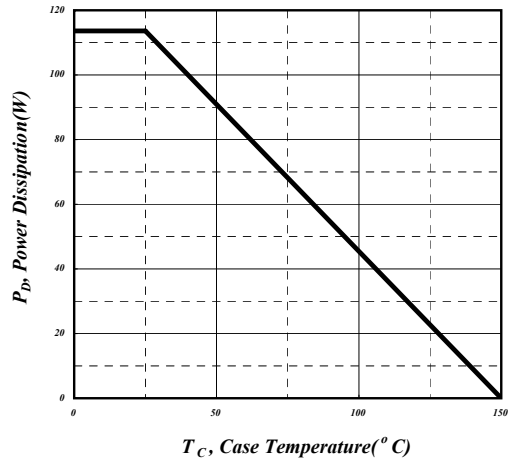


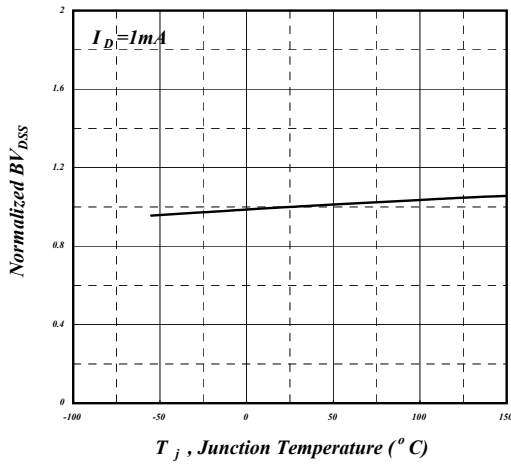
Fig 12. Transfer Characteristics



**Fig 13. Typ. Drain-Source on State Resistance**



**Fig 14. Total Power Dissipation**



**Fig 15. Normalized  $BV_{DSS}$  v.s. Junction Temperature**