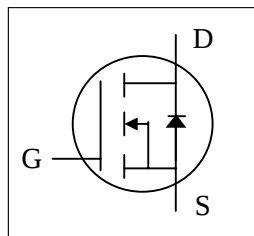


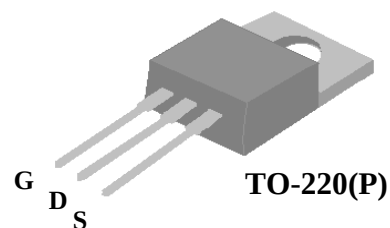
- ▼ 100% UIS Test
- ▼ Simple Drive Requirement
- ▼ Lower On-resistance
- ▼ RoHS Compliant & Halogen-Free



BV_{DSS}	120V
$R_{DS(ON)}$	7.6mΩ
I_D	88A

Description

XP12NB7R6 series are innovated 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 TO-220 package is widely preferred for all commercial-industrial through hole applications. The low thermal resistance and low package cost contribute to the worldwide popular package.

Absolute Maximum Ratings@ $T_j=25^{\circ}\text{C}$ (unless otherwise specified)

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	120	V
V_{GS}	Gate-Source Voltage	± 20	V
$I_D@T_C=25^{\circ}\text{C}$	Drain Current, $V_{GS} @ 10\text{V}$	88	A
$I_D@T_C=100^{\circ}\text{C}$	Drain Current, $V_{GS} @ 10\text{V}$	55.7	A
I_{DM}	Pulsed Drain Current ¹	320	A
$P_D@T_C=25^{\circ}\text{C}$	Total Power Dissipation	113.6	W
$P_D@T_A=25^{\circ}\text{C}$	Total Power Dissipation	2	W
E_{AS}	Single Pulse Avalanche Energy ³	200	mJ
T_{STG}	Storage Temperature Range	-55 to 150	$^{\circ}\text{C}$
T_J	Operating Junction Temperature Range	-55 to 150	$^{\circ}\text{C}$

Thermal Data

Symbol	Parameter	Value	Units
R_{thj-c}	Maximum Thermal Resistance, Junction-case	1.1	$^{\circ}\text{C}/\text{W}$
R_{thj-a}	Maximum Thermal Resistance, Junction-ambient	62	$^{\circ}\text{C}/\text{W}$

Electrical Characteristics@T_J=25°C(unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =250uA	120	-	-	V
R _{DS(ON)}	Static Drain-Source On-Resistance ²	V _{GS} =10V, I _D =50A	-	-	7.6	mΩ
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =250uA	2	-	4	V
g _{fs}	Forward Transconductance	V _{DS} =5V, I _D =50A	-	77	-	S
I _{DSS}	Drain-Source Leakage Current	V _{DS} =96V, V _{GS} =0V	-	-	25	uA
I _{GSS}	Gate-Source Leakage	V _{GS} =±20V, V _{DS} =0V	-	-	±0.1	uA
Q _g	Total Gate Charge ⁴	I _D =50A	-	68	108.8	nC
Q _{gs}	Gate-Source Charge ⁴	V _{DS} =60V	-	15	-	nC
Q _{gd}	Gate-Drain ("Miller") Charge ⁴	V _{GS} =10V	-	30	-	nC
t _{d(on)}	Turn-on Delay Time ⁴	V _{DS} =60V	-	15	-	ns
t _r	Rise Time ⁴	I _D =50A	-	93	-	ns
t _{d(off)}	Turn-off Delay Time ⁴	R _G =7.5Ω	-	57	-	ns
t _f	Fall Time ⁴	V _{GS} =10V	-	115	-	ns
C _{iss}	Input Capacitance ⁴	V _{GS} =0V	-	2550	4080	pF
C _{oss}	Output Capacitance ⁴	V _{DS} =100V	-	260	-	pF
C _{rss}	Reverse Transfer Capacitance ⁴	f=1.0MHz	-	20	-	pF
R _g	Gate Resistance ⁴		-	0.4	0.8	Ω

Source-Drain Diode

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
V _{SD}	Forward On Voltage ²	I _S =50A, V _{GS} =0V	-	-	1.3	V
t _{rr}	Reverse Recovery Time ⁴	I _S =50A, V _{GS} =0V	-	60	-	ns
Q _{rr}	Reverse Recovery Charge ⁴	dI/dt=100A/μs	-	90	-	nC

Notes:

- 1.Pulse width limited by Max. junction temperature.
- 2.Pulse test
- 3.Starting T_J=25°C , V_{DD}=50V , L=1mH , R_G=25Ω , V_{GS}=10V
- 4.Guaranteed by design.
- 5.These curves are based on the junction-to-case thermal impedance which is measured with the device mounted to a large heatsink, assuming a maximum junction temperature of T_{J(MAX)}=150°C.

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.

XSEMI RESERVES THE RIGHT TO MAKE CHANGES WITHOUT FURTHER NOTICE TO ANY PRODUCTS HEREIN TO IMPROVE RELIABILITY, FUNCTION OR DESIGN.

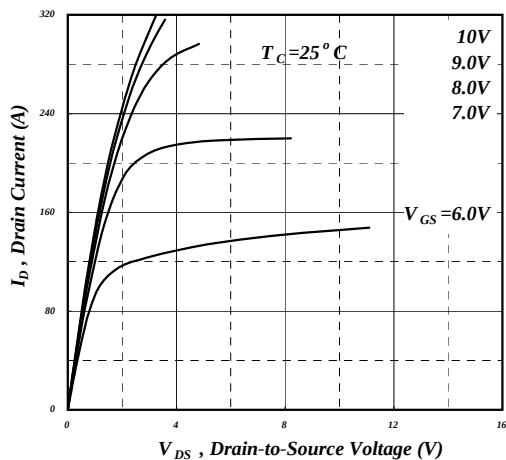


Fig 1. Typical Output Characteristics

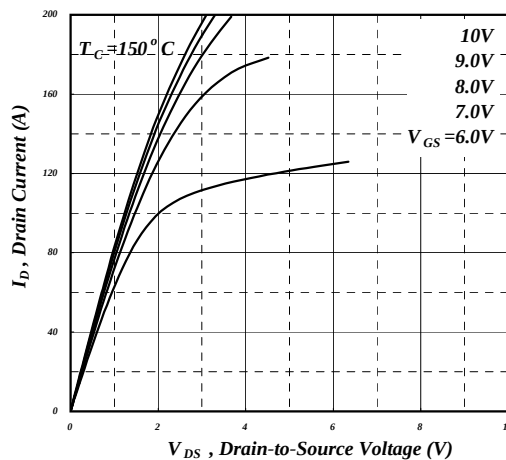


Fig 2. Typical Output Characteristics

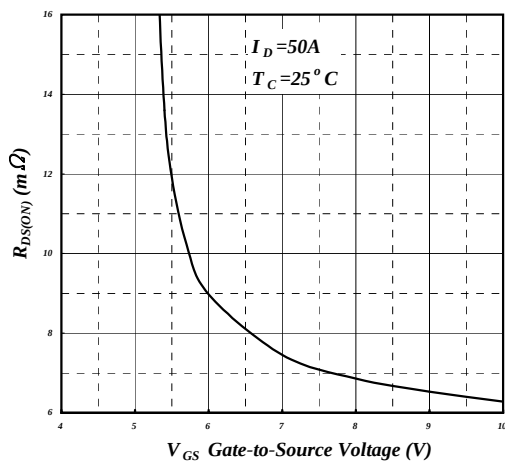
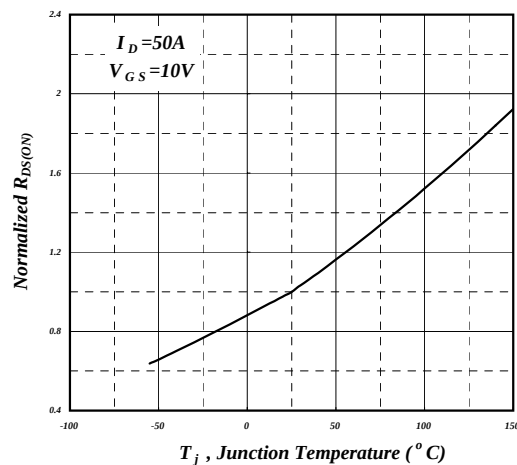
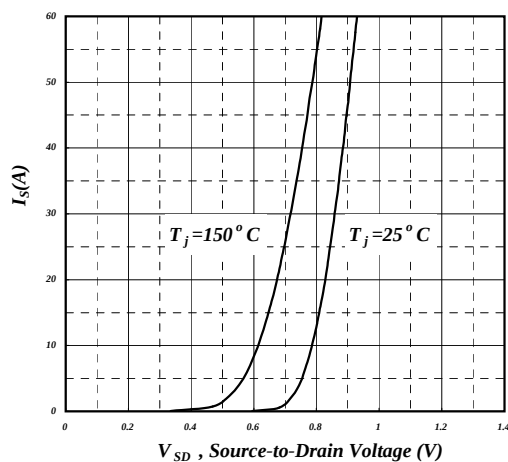


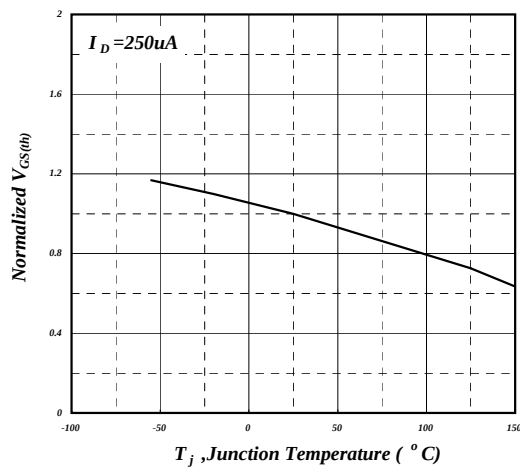
Fig 3. On-Resistance v.s. Gate Voltage



**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**

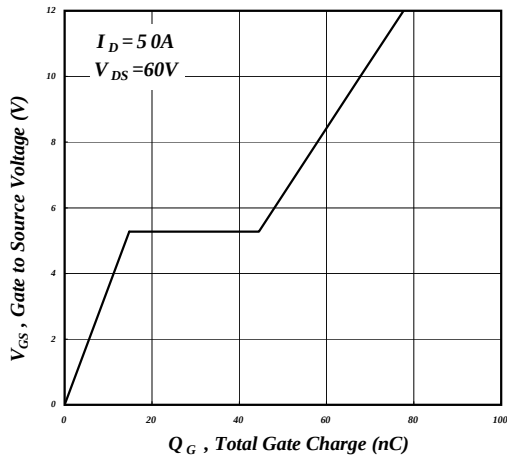


Fig 7. Gate Charge Characteristics

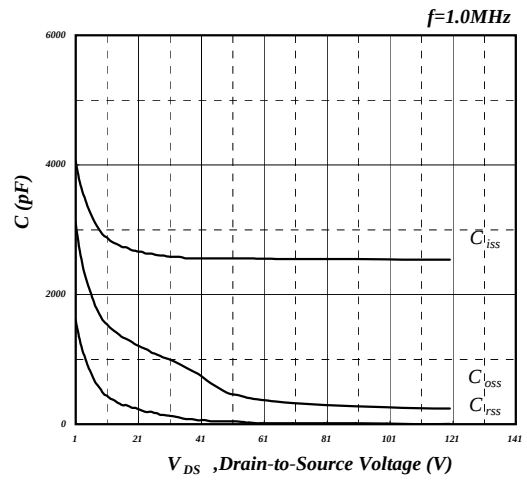


Fig 8. Typical Capacitance Characteristics

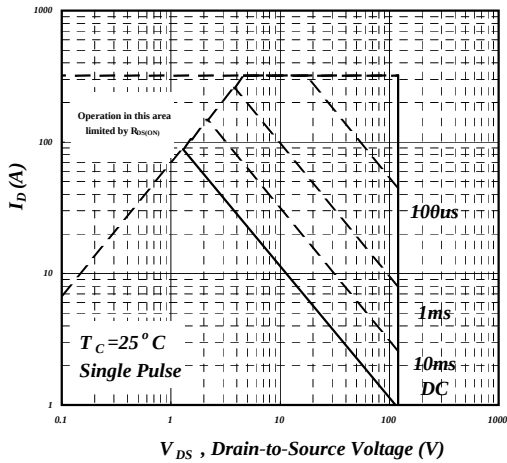


Fig 9. Maximum Safe Operating Area⁵

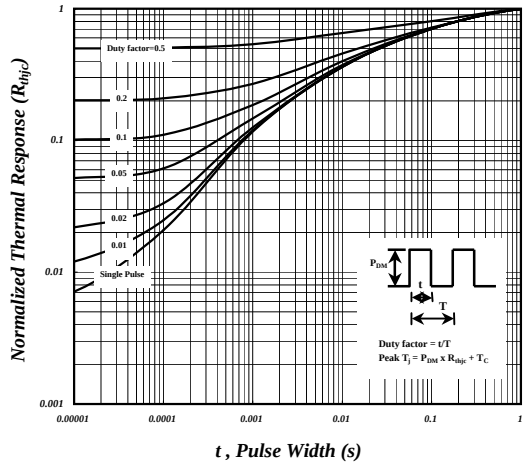


Fig 10. Effective Transient Thermal Impedance

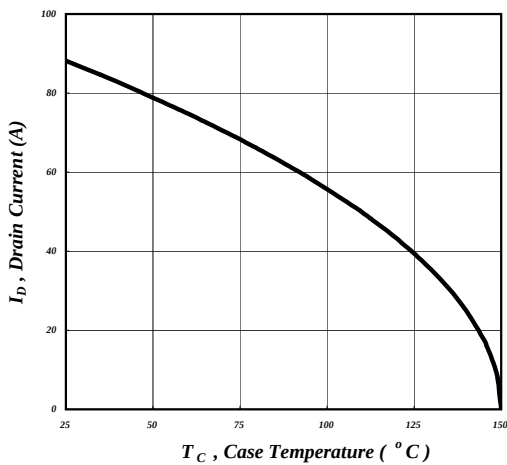


Fig 11. Drain Current v.s. Case Temperature

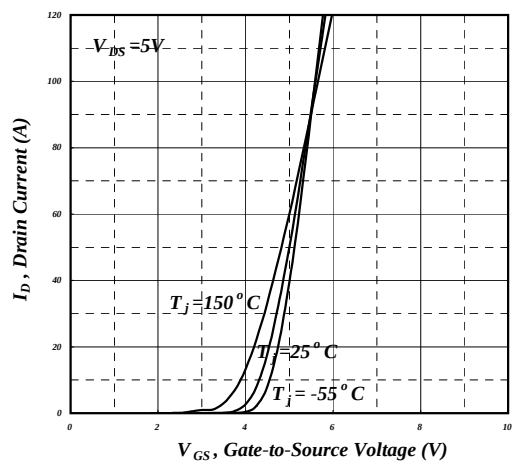


Fig 12. Transfer Characteristics

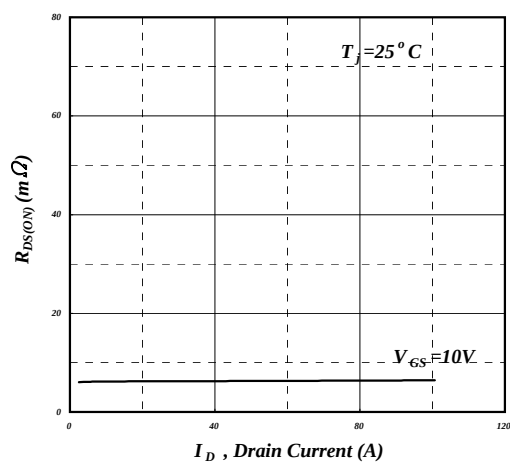


Fig 13. Typ. Drain-Source on State Resistance

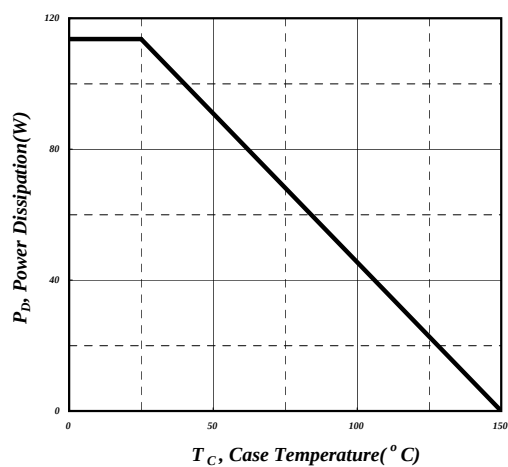
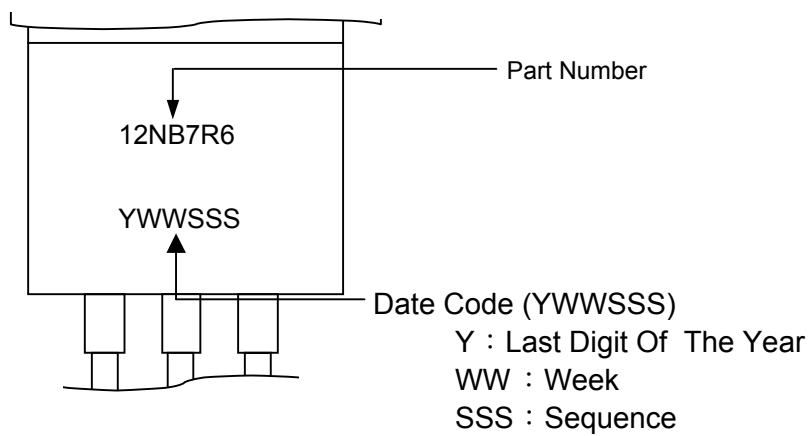
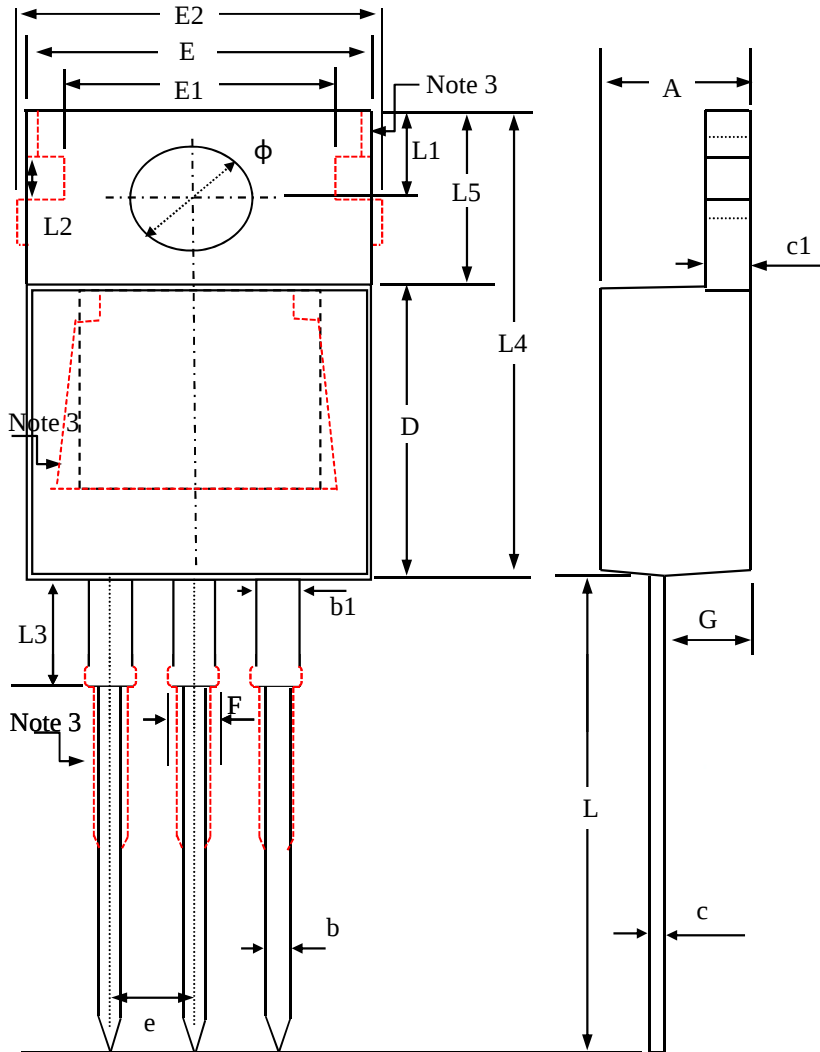


Fig 14. Total Power Dissipation

MARKING INFORMATION

Package Outline : TO-220



SYMBOLS	Millimeters		
	MIN	NOM	MAX
A	4.20	4.50	4.80
b	0.60	0.80	1.00
b1	1.10	1.38	1.80
c	0.30	0.48	0.65
c1	1.10	1.30	1.50
E	9.70	10.00	10.40
E1	7.40	8.30	9.20
e	2.54 (ref.)		
L	12.70	13.60	14.50
L1	2.50	2.75	3.00
L2	1.00	1.40	1.80
L3	2.60	3.35	4.10
L4	14.30	15.15	16.00
L5	6.00	6.40	6.80
ϕ	3.40	3.70	4.00
D	8.30	8.85	9.40
F	1.20	1.41	1.85
G	2.20	2.60	3.00
E2	—	—	11.50

Note:

- 1.All Dimensions Are in Millimeters.
- 2.Dimension Does Not Include Mold Protrusions.
3. Thermal PAD and Pin contour is for reference, it may has little difference by option.

TO-220 FOOTPRINT :

