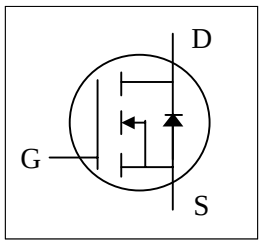
XP3N1R7P

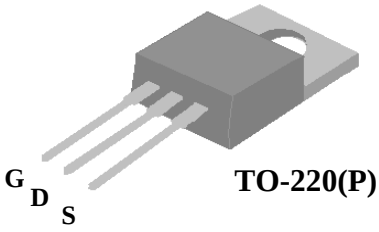
Halogen-Free Product

N-CHANNEL ENHANCEMENT MODE POWER MOSFET

- **100% R_g & UIS Test**
- **Simple Drive Requirement**
- **Fast Switching Characteristic**
- **RoHS Compliant & Halogen-Free**



BV_{DSS}	30V
$R_{DS(ON)}$	1.7mΩ
I_D[4]	120A



TO-220(P)

Description

XP3N1R7 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°C(unless otherwise specified)

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	30	V
V_{GS}	Gate-Source Voltage	±20	V
I_D@T_C=25℃	Drain Current, V_{GS} @ 10V[4](Silicon Limited)	189	A
I_D@T_C=100℃	Drain Current, V_{GS} @ 10V[4](Silicon Limited)	120	A
I_D@T_C=25℃	Drain Current, V_{GS} @ 10V[4](Package Limited)	120	A
I_{DM}	Pulsed Drain Current[1]	720	A
P_D@T_C=25℃	Total Power Dissipation	96.1	W
P_D@T_A=25℃	Total Power Dissipation	2	W
E_{AS}	Single Pulse Avalanche Energy[3]	245	mJ
T_{STG}	Storage Temperature Range	-55 to 150	℃
T_J	Operating Junction Temperature Range	-55 to 150	℃

Thermal Data

Symbol	Parameter	Value	Units
Rthj-c	Maximum Thermal Resistance, Junction-case	1.3	℃/W
Rthj-a	Maximum Thermal Resistance, Junction-ambient	62	℃/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	30	-	-	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance[2]	V_{GS}=10V, I_D=40A	-	-	1.7	mΩ
		V_{GS}=4.5V, I_D=30A	-	-	2.4	mΩ
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_D=250uA	1	-	3	V
g_{fs}	Forward Transconductance	V_{DS}=5V, I_D=40A	-	212	-	S
I_{DSS}	Drain-Source Leakage Current	V_{DS}=24V, V_{GS}=0V	-	-	10	uA
I_{GSS}	Gate-Source Leakage	V_{GS}= ±20V, V_{DS}=0V	-	-	±0.1	uA
Q_g(V_{GS}=10V)	Total Gate Charge[5]	I_D=40A	-	178	285	nC
Q_g(V_{GS}=4.5V)	Total Gate Charge[5]	V_{DS}=15V	-	90	144	nC
Q_{gs}	Gate-Source Charge[5]		-	24	-	nC
Q_{gd}	Gate-Drain ("Miller") Charge[5]		-	44	-	nC
$t_{d(on)}$	Turn-on Delay Time[5]	V_{DS}=15V	-	16	-	ns
t_r	Rise Time[5]	I_D=40A	-	67	-	ns
$t_{d(off)}$	Turn-off Delay Time[5]	R_G=3.3Ω	-	114	-	ns
t_f	Fall Time[5]	V_{GS}=10V	-	133	-	ns
C_{iss}	Input Capacitance[5]	V_{GS}=0V	-	7900	12640	pF
C_{oss}	Output Capacitance[5]	V_{DS}=15V	-	1340	-	pF
C_{rss}	Reverse Transfer Capacitance[5]	f=1.0MHz	-	780	-	pF
R_g	Gate Resistance	f=1.0MHz	-	1.2	2.4	Ω

Source-Drain Diode

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
V_{SD}	Forward On Voltage[2]	I_S=40A, V_{GS}=0V	-	-	1.2	V
t_{rr}	Reverse Recovery Time[5]	I_S=40A, V_{GS}=0V,	-	36	-	ns
Q_{rr}	Reverse Recovery Charge[5]	dI/dt=100A/μs	-	26	-	nC

Notes:

1.Pulse width limited by Max. junction temperature.

2.Pulse test

3.Starting T_j=25°C , V_{DD}=30V , L=0.1mH , R_G=25Ω , V_{GS}=10V , I_{AS}=70A

4.Package limitation current is 120A .

5.Guaranteed by design.

6.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.

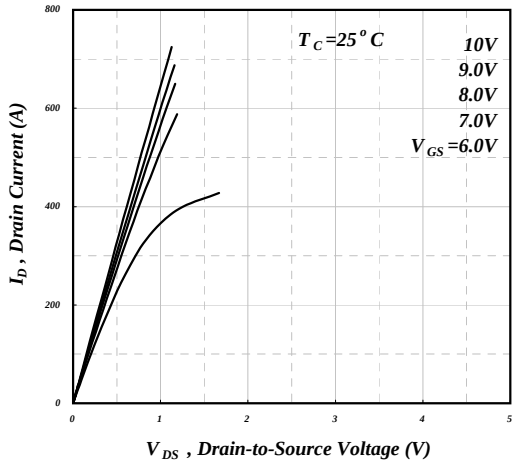


Fig 1. Typical Output Characteristics

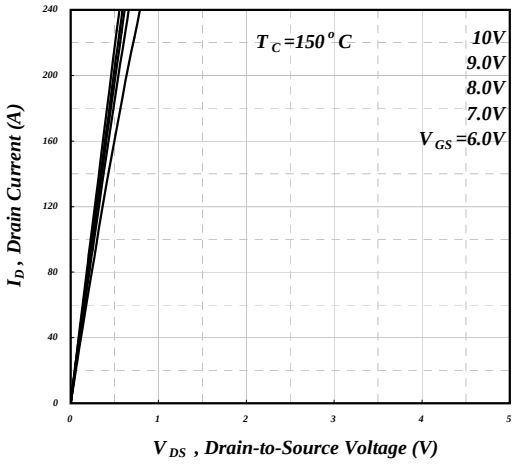


Fig 2. Typical Output Characteristics

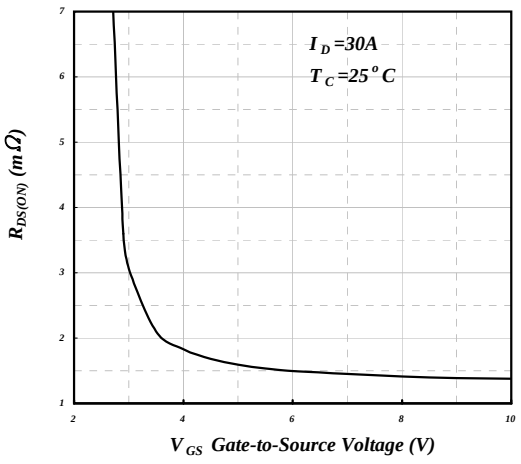


Fig 3. On-Resistance v.s. Gate Voltage

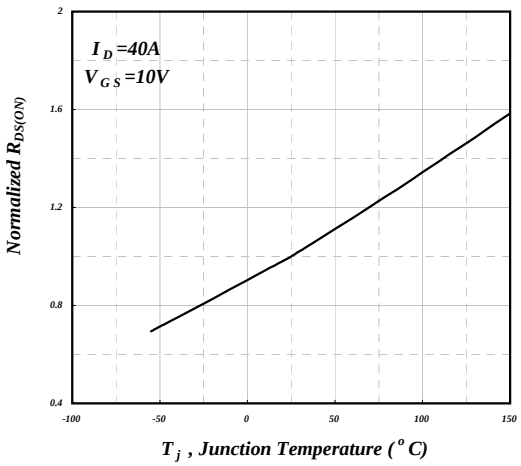


Fig 4. Normalized On-Resistance v.s. Junction Temperature

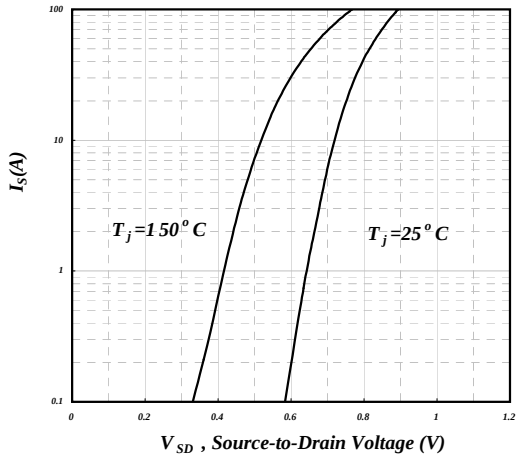


Fig 5. Forward Characteristic of Reverse Diode

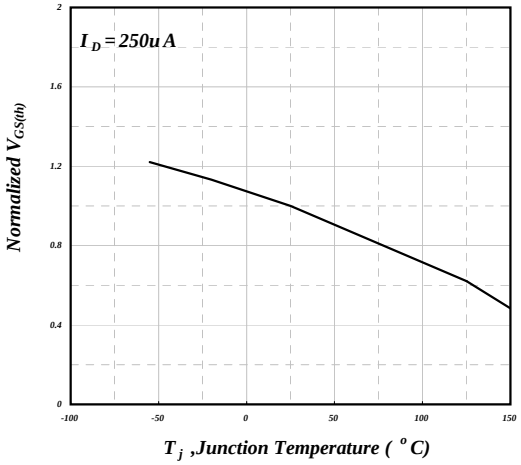


Fig 6. Gate Threshold Voltage v.s. Junction Temperature

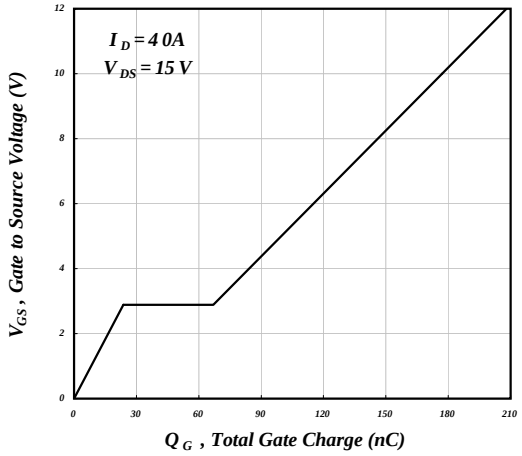


Fig 7. Gate Charge Characteristics

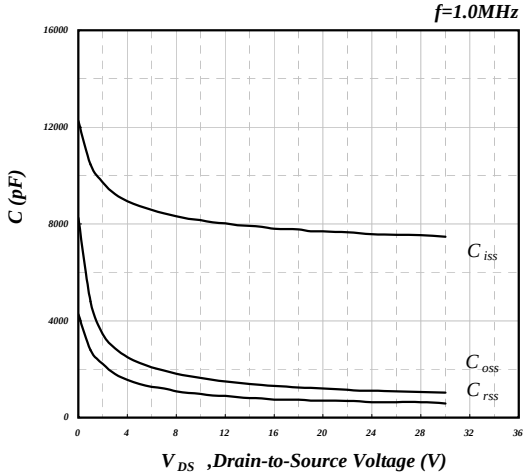


Fig 8. Typical Capacitance Characteristics

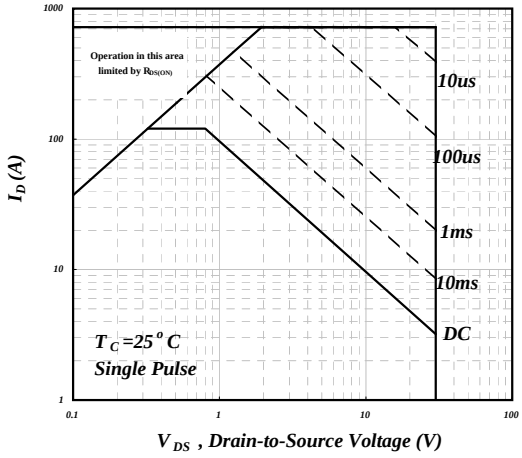


Fig 9. Maximum Safe Operating Area[6]

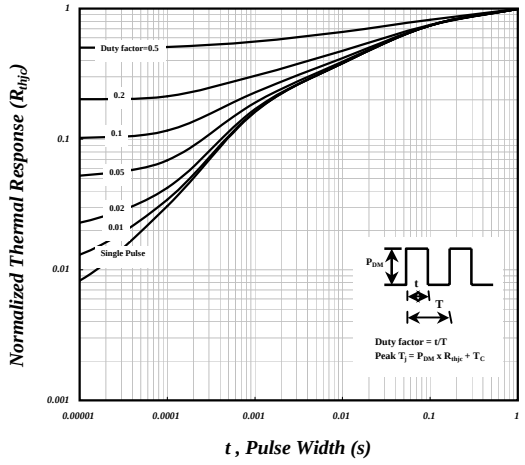


Fig 10. Effective Transient Thermal Impedance

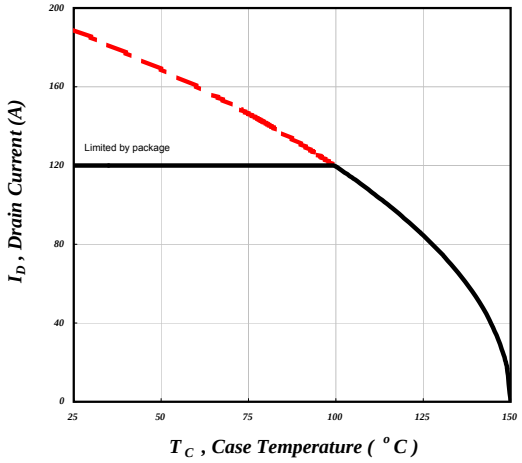


Fig 11. Drain Current v.s. Case Temperature

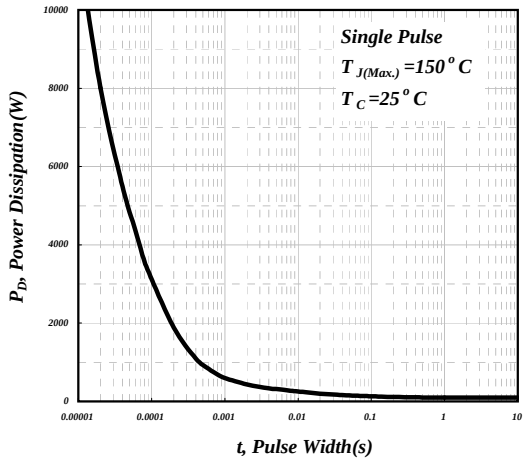


Fig 12. Single Pulse Power Dissipation

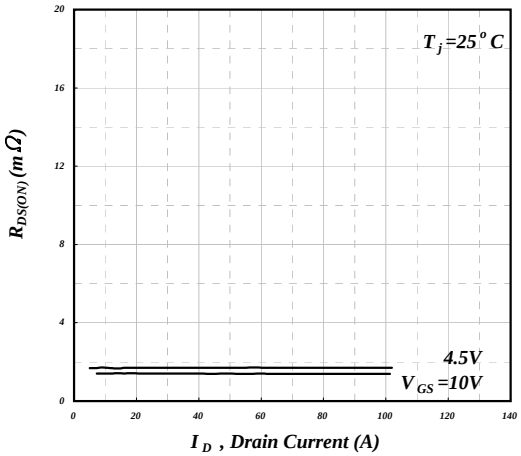


Fig 13. Typ. Drain-Source on State Resistance

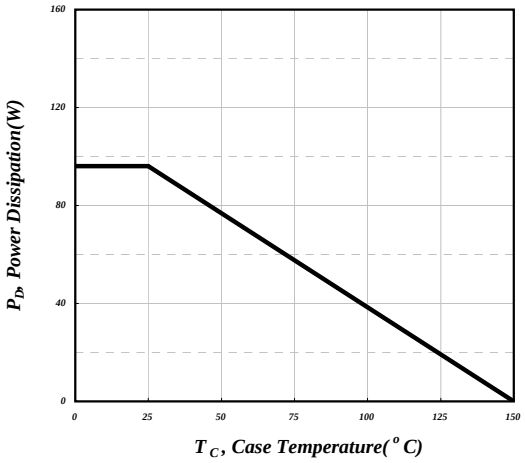


Fig 14. Total Power Dissipation

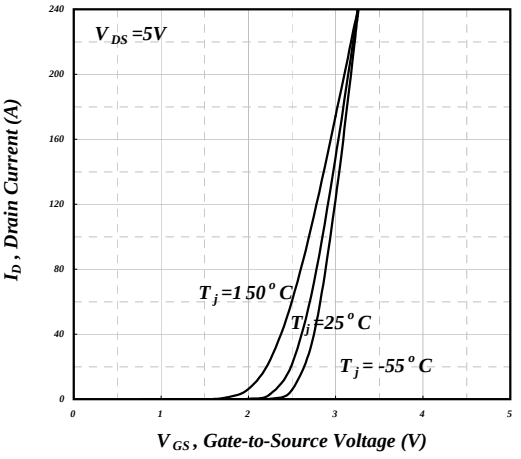


Fig 15. Transfer Characteristics

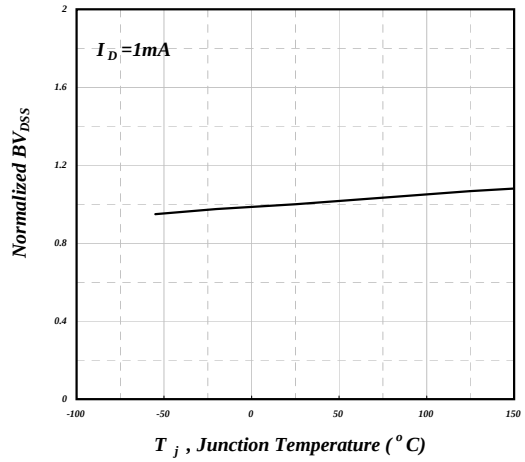
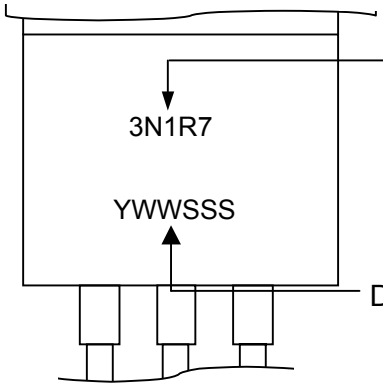
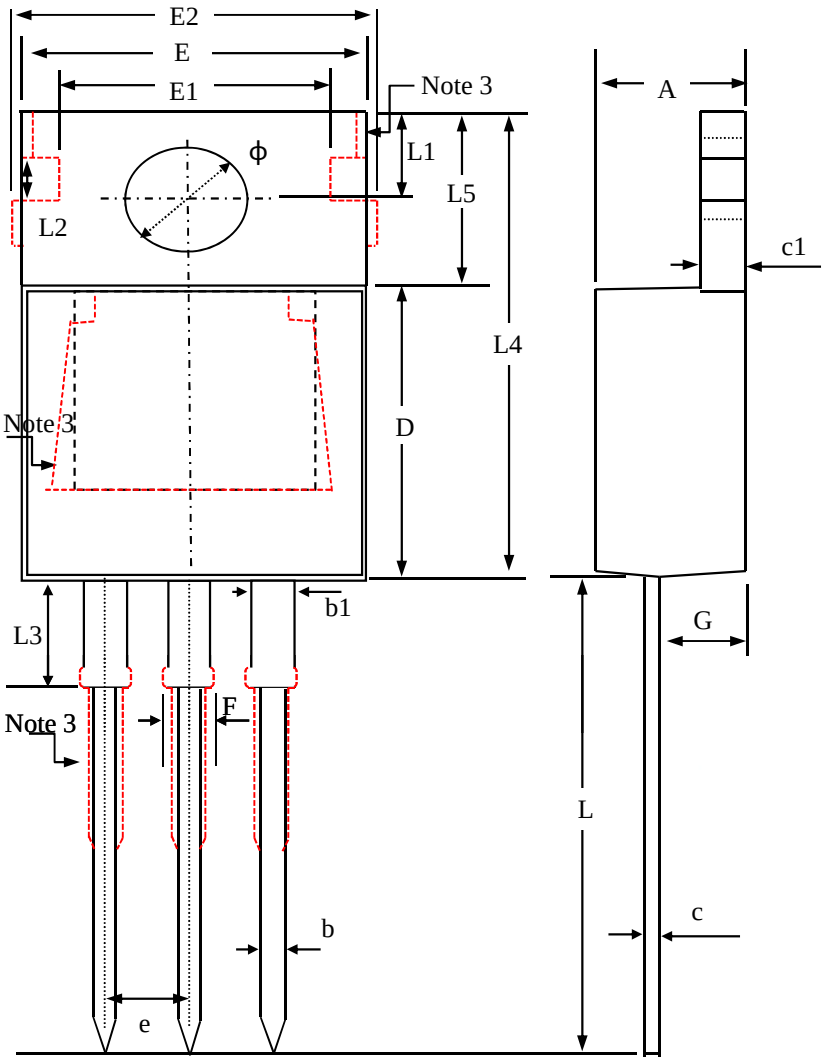


Fig 16. Normalized BV_{DSS} v.s. Junction Temperature

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：