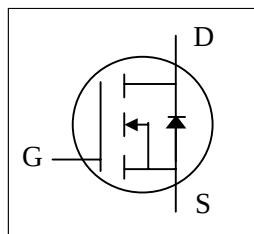


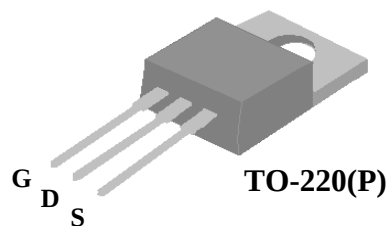
- ▼ 100% R_g & UIS Test
- ▼ Simple Drive Requirement
- ▼ Fast Switching Characteristic
- ▼ RoHS Compliant & Halogen-Free



BV_{DSS}	40V
$R_{DS(ON)}$	2.4m Ω

Description

XP4NA2R4 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	40	V
V_{GS}	Gate-Source Voltage	± 20	V
$I_D@T_C=25^\circ\text{C}$	Drain Current, V_{GS} @ 10V ⁴ (Silicon Limited)	150	A
$I_D@T_C=25^\circ\text{C}$	Drain Current, V_{GS} @ 10V ⁴ (Package Limited)	130	A
$I_D@T_C=100^\circ\text{C}$	Drain Current, V_{GS} @ 10V	95	A
I_{DM}	Pulsed Drain Current ¹	600	A
$P_D@T_C=25^\circ\text{C}$	Total Power Dissipation	89.2	W
$P_D@T_A=25^\circ\text{C}$	Total Power Dissipation ⁵	2	W
E_{AS}	Single Pulse Avalanche Energy ³	125	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	1.4	$^\circ\text{C}/\text{W}$
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	40	-	-	V
R _{DS(ON)}	Static Drain-Source On-Resistance ²	V _{GS} =10V, I _D =40A	-	-	2.4	mΩ
		V _{GS} =4.5V, I _D =30A	-	-	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	-	150	-	S
I _{DSS}	Drain-Source Leakage Current	V _{DS} =32V, V _{GS} =0V	-	-	10	uA
I _{GSS}	Gate-Source Leakage	V _{GS} = ±20V, V _{DS} =0V	-	-	±0.1	uA
Q _g	Total Gate Charge ⁵	I _D =40A	-	85	136	nC
Q _{gs}	Gate-Source Charge ⁵	V _{DS} =32V	-	15	-	nC
Q _{gd}	Gate-Drain ("Miller") Charge ⁵	V _{GS} =10V	-	15	-	nC
t _{d(on)}	Turn-on Delay Time ⁵	V _{DS} =20V	-	13	-	ns
t _r	Rise Time ⁵	I _D =40A	-	57	-	ns
t _{d(off)}	Turn-off Delay Time ⁵	R _G =6Ω	-	77	-	ns
t _f	Fall Time ⁵	V _{GS} =10V	-	115	-	ns
C _{iss}	Input Capacitance ⁵	V _{GS} =0V	-	4800	7680	pF
C _{oss}	Output Capacitance ⁵	V _{DS} =20V	-	1100	-	pF
C _{rss}	Reverse Transfer Capacitance ⁵	f=1.0MHz	-	72	-	pF
R _g	Gate Resistance	f=1.0MHz	-	1	2	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,	-	35	-	ns
Q _{rr}	Reverse Recovery Charge ⁵	dI/dt=100A/μs	-	25	-	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
- 4.Package limitation current is 130A .
- 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.

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.

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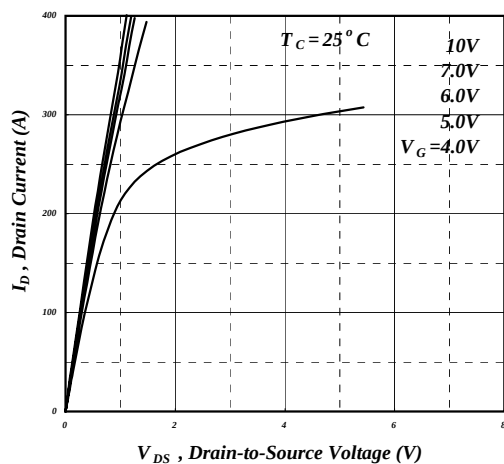


Fig 1. Typical Output Characteristics

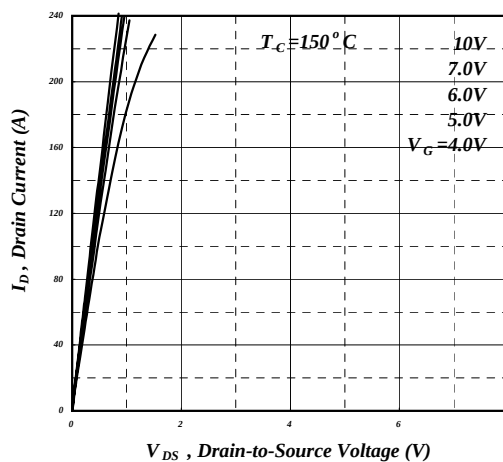


Fig 2. Typical Output Characteristics

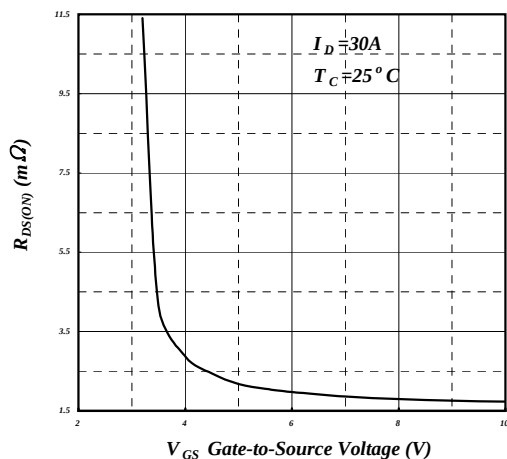


Fig 3. On-Resistance v.s. Gate Voltage

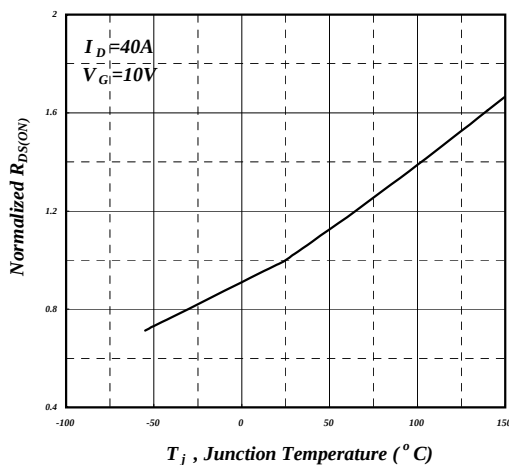


Fig 4. Normalized On-Resistance v.s. Junction Temperature

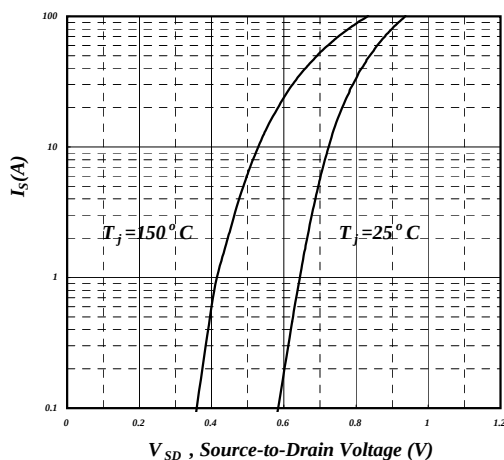


Fig 5. Forward Characteristic of Reverse Diode

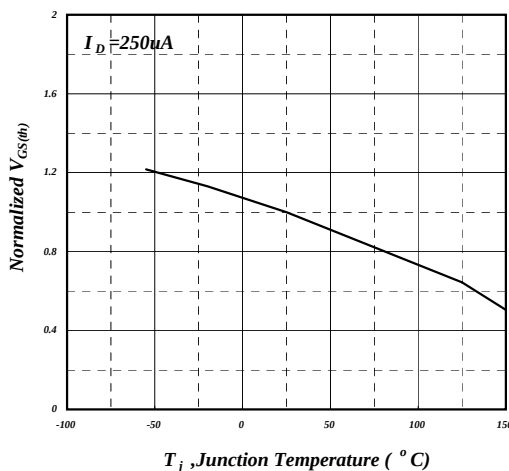


Fig 6. Gate Threshold Voltage v.s. Junction Temperature

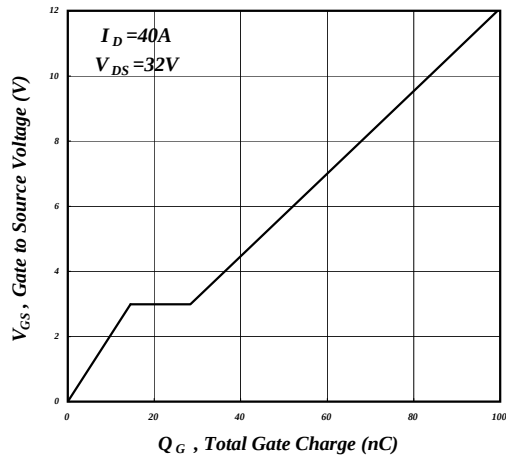


Fig 7. Gate Charge Characteristics

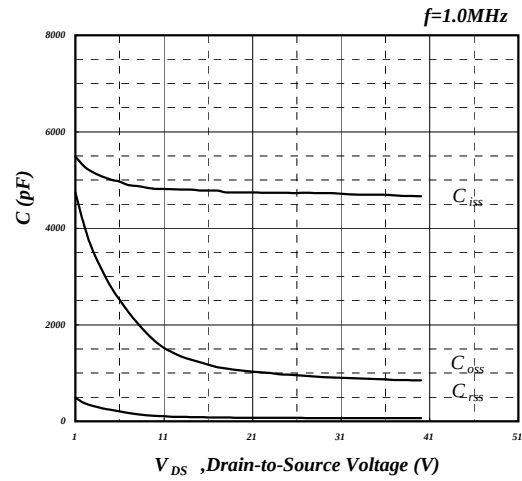


Fig 8. Typical Capacitance Characteristics

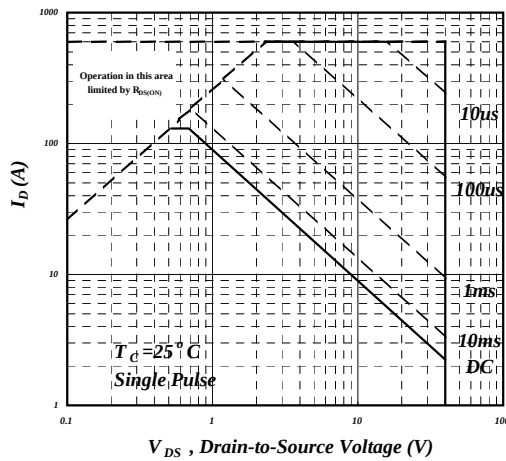


Fig 9. Maximum Safe Operating Area⁶

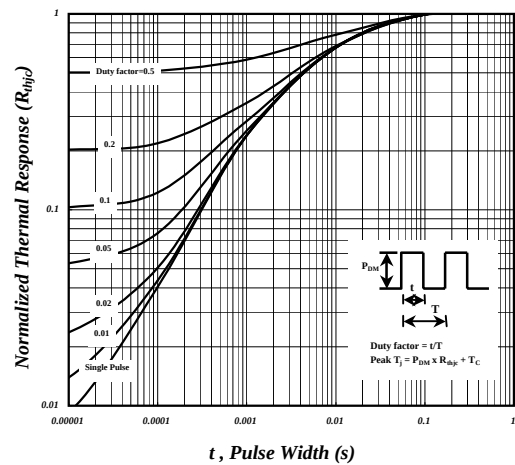


Fig 10. Effective Transient Thermal Impedance

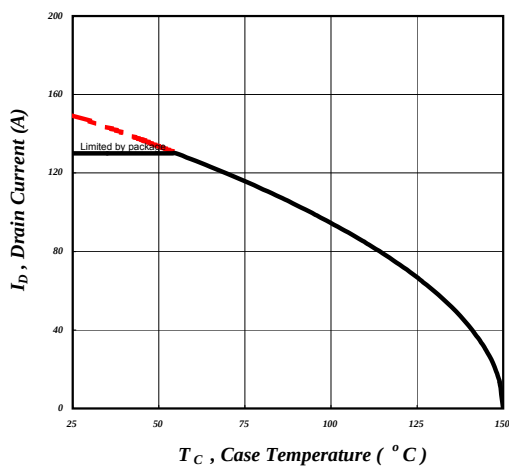


Fig 11. Drain Current v.s. Case Temperature

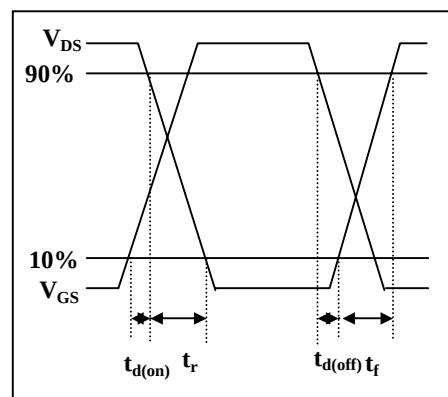
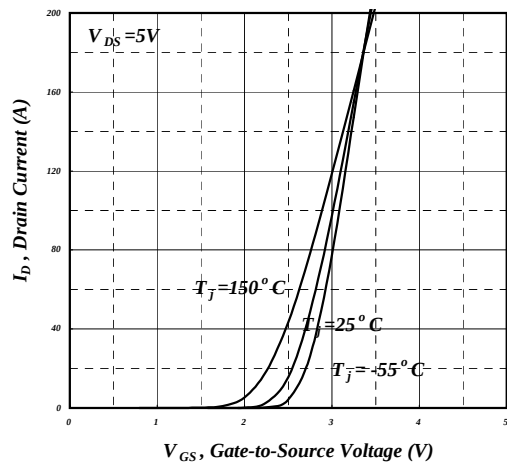
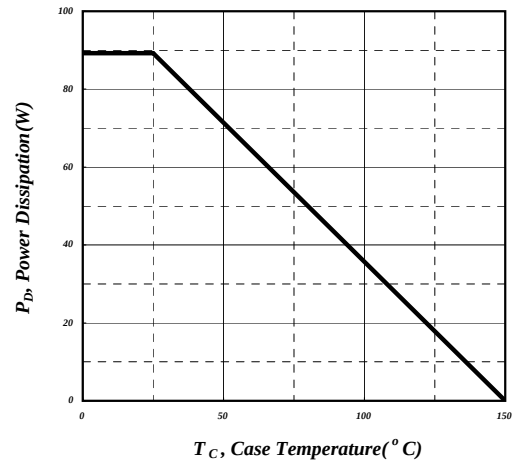
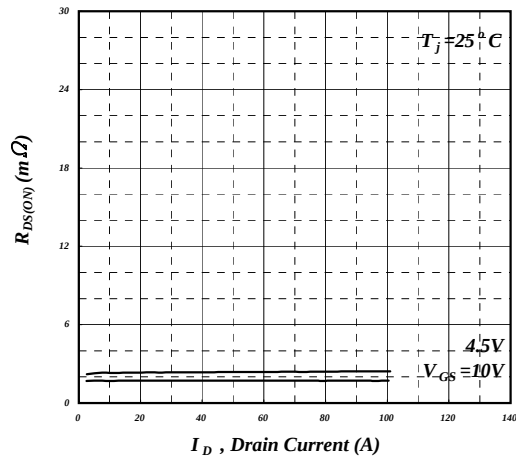
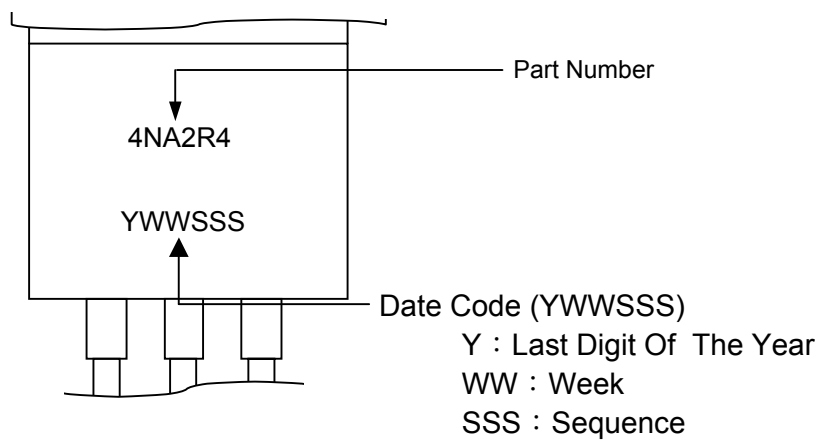
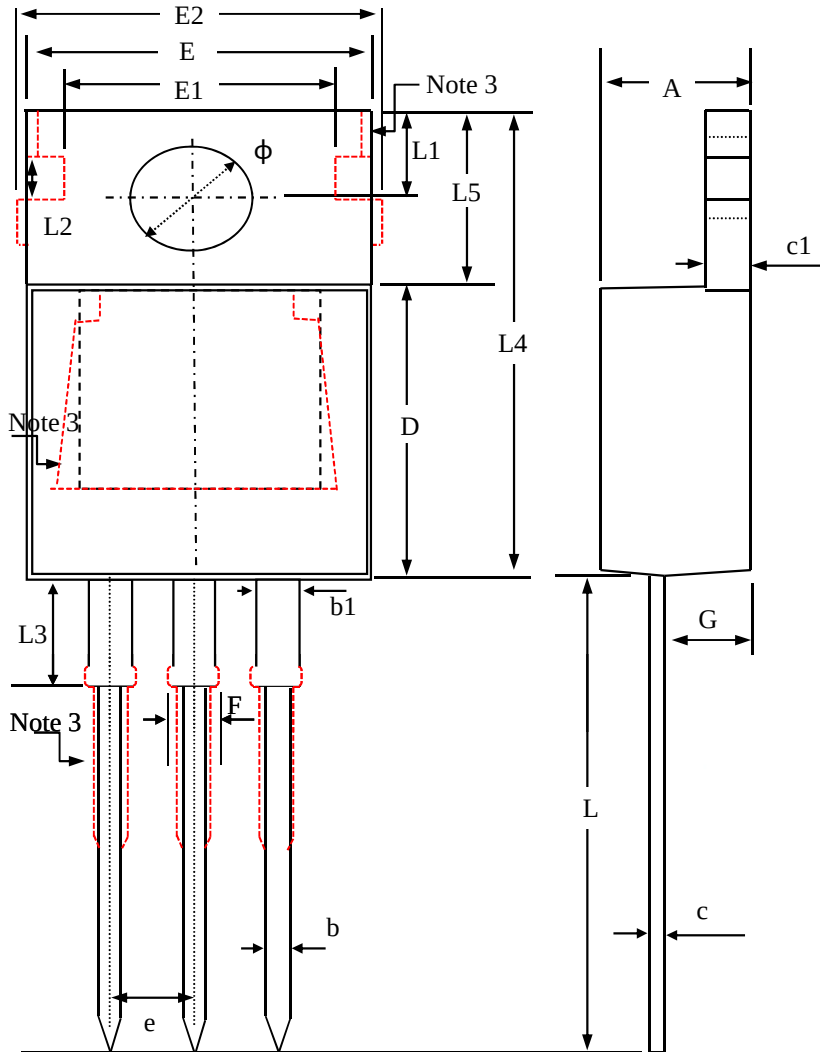


Fig 12. Switching Time Waveform



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 :

