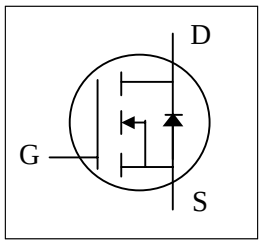
AP4N3R6P

Halogen-Free Product

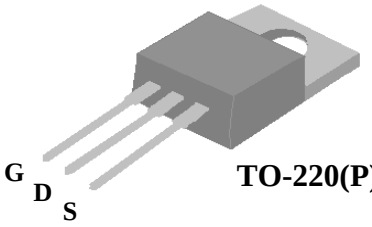
Advanced Power Electronics Corp.

N-CHANNEL ENHANCEMENT MODE POWER MOSFET

- **Simple Drive Requirement**
- **Ultra-low On-resistance**
- **Fast Switching Characteristic**
- **RoHS Compliant & Halogen-Free**



BV_{DSS}	40V
$R_{DS(ON)}$	3.6mΩ
I_D	125A



TO-220(P)

Description

AP4N3R6 series are from Advanced Power 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/-12	V
I_D@T_C=25℃	Drain Current, V_{GS} @ 10V	125	A
I_D@T_C=100℃	Drain Current, V_{GS} @ 10V	80	A
I_{DM}	Pulsed Drain Current[1]	400	A
P_D@T_C=25℃	Total Power Dissipation	104	W
P_D@T_A=25℃	Total Power Dissipation	2	W
E_{AS}	Single Pulse Avalanche Energy[3]	125	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	1.2	℃/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	40	-	-	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance[2]	V_{GS}=10V, I_D=40A	-	-	3.6	mΩ
		V_{GS}=4.5V, I_D=30A	-	-	5	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	-	180	-	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	-	-	100	nA
Q_g	Total Gate Charge	I_D=40A	-	120	192	nC
Q_{gs}	Gate-Source Charge	V_{DS}=20V	-	22	-	nC
Q_{gd}	Gate-Drain ("Miller") Charge	V_{GS}=10V	-	16	-	nC
$t_{d(on)}$	Turn-on Delay Time	V_{DS}=20V	-	13	-	ns
t_r	Rise Time	I_D=40A	-	60	-	ns
$t_{d(off)}$	Turn-off Delay Time	R_G=1.6Ω	-	76	-	ns
t_f	Fall Time	V_{GS}=10V	-	12	-	ns
C_{iss}	Input Capacitance	V_{GS}=0V	-	7600	12160	pF
C_{oss}	Output Capacitance	V_{DS}=20V	-	900	-	pF
C_{rss}	Reverse Transfer Capacitance	f=1.0MHz	-	23	-	pF
R_g	Gate Resistance	f=1.0MHz	-	2.4	4.8	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	I_S=40A, V_{GS}=0V	-	32	-	ns
Q_{rr}	Reverse Recovery Charge	dI/dt=100A/μs	-	30	-	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

THIS PRODUCT IS SENSITIVE TO ELECTROSTATIC DISCHARGE, PLEASE HANDLE WITH CAUTION.
USE OF THIS PRODUCT AS A CRITICAL COMPONENT IN LIFE SUPPORT OR OTHER SIMILAR SYSTEMS IS NOT AUTHORIZED.
APEC 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.
APEC RESERVES THE RIGHT TO MAKE CHANGES WITHOUT FURTHER NOTICE TO ANY PRODUCTS HEREIN TO IMPROVE RELIABILITY, FUNCTION OR DESIGN.

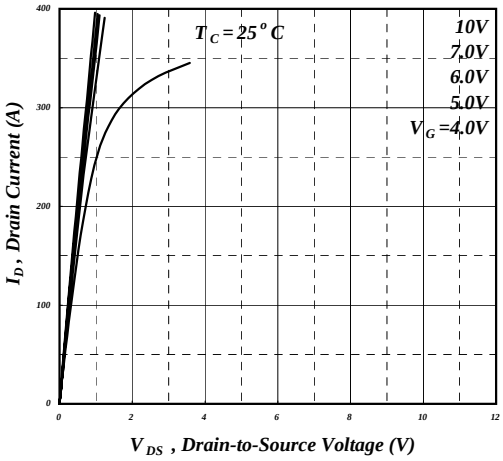


Fig 1. Typical Output Characteristics

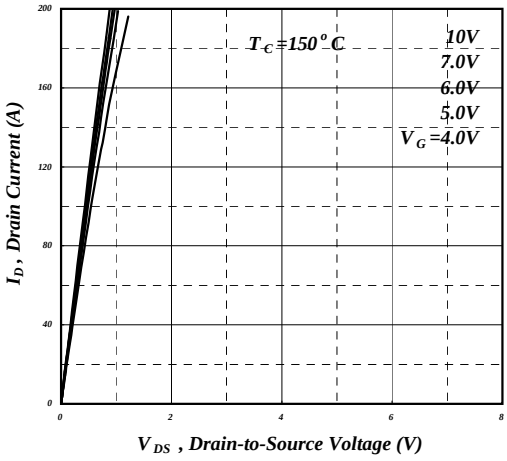


Fig 2. Typical Output Characteristics

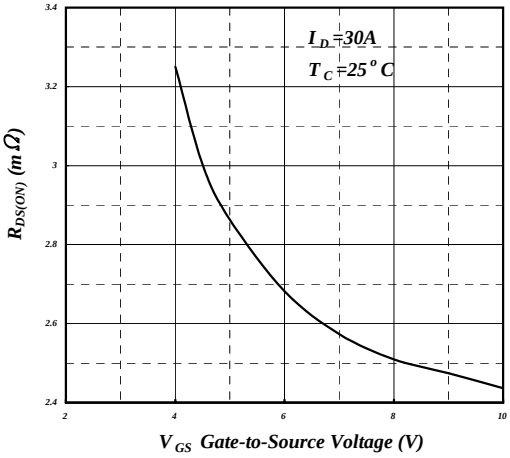


Fig 3. On-Resistance v.s. Gate Voltage

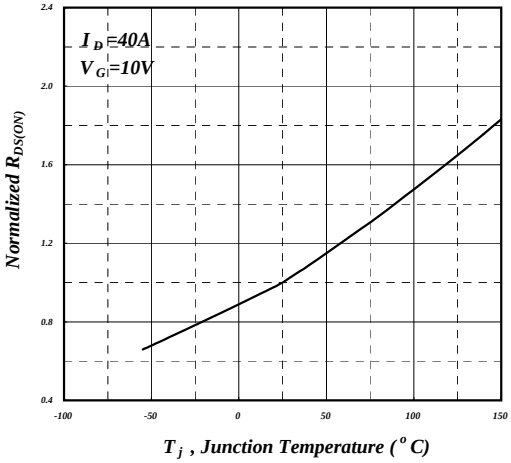


Fig 4. Normalized On-Resistance v.s. Junction Temperature

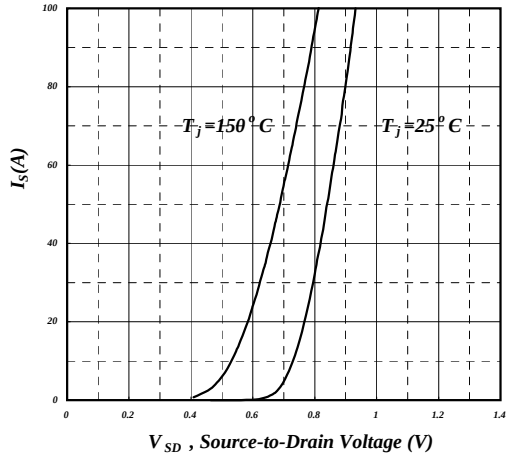


Fig 5. Forward Characteristic of Reverse Diode

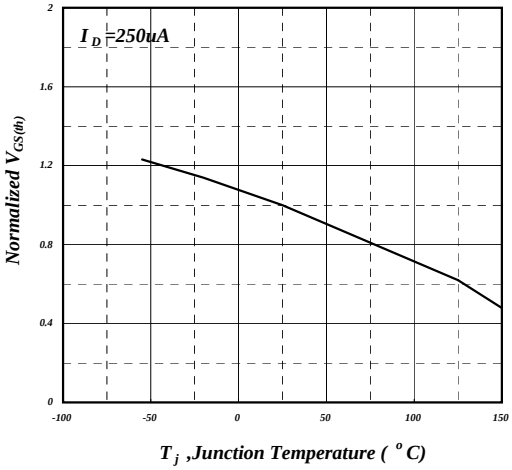


Fig 6. Gate Threshold Voltage v.s. Junction Temperature

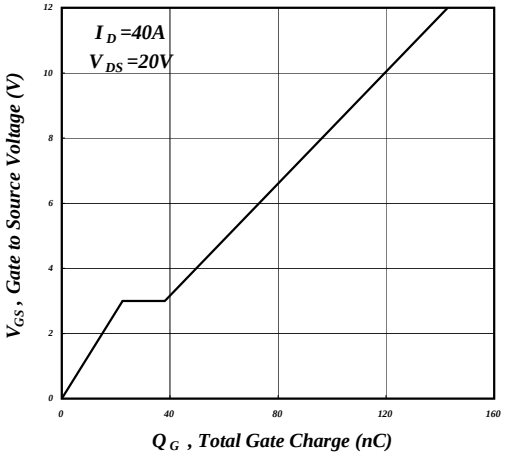


Fig 7. Gate Charge Characteristics

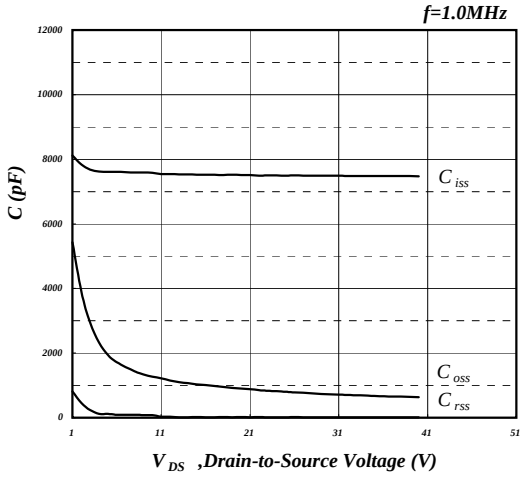


Fig 8. Typical Capacitance Characteristics

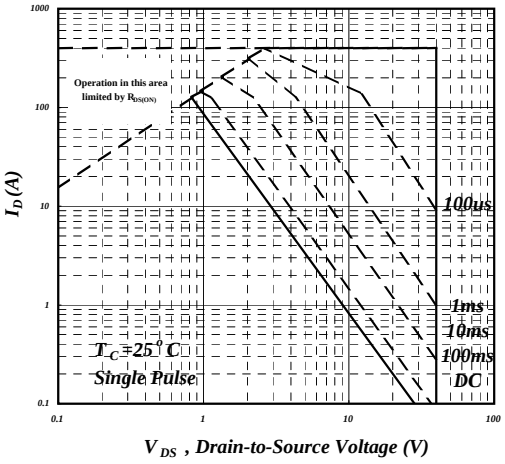


Fig 9. Maximum Safe Operating Area

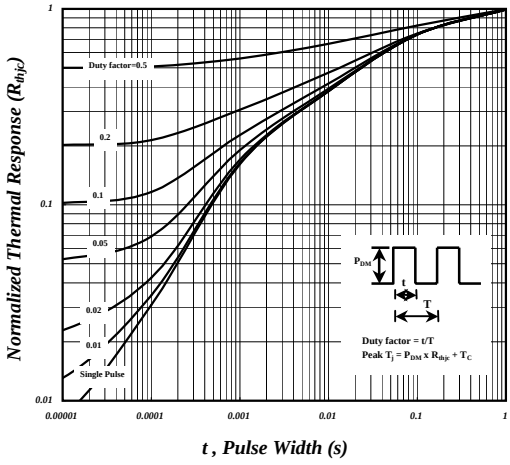


Fig 10. Effective Transient Thermal Impedance

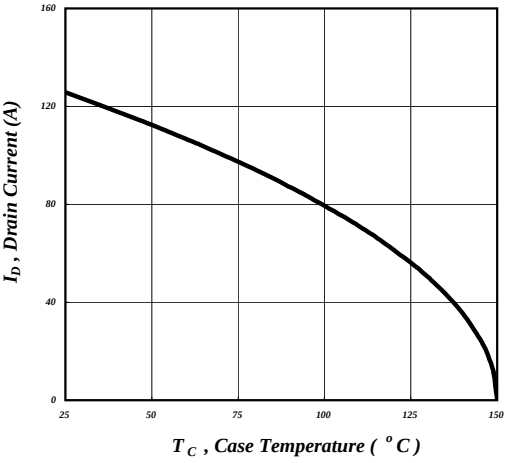


Fig 11. Drain Current v.s. Case Temperature

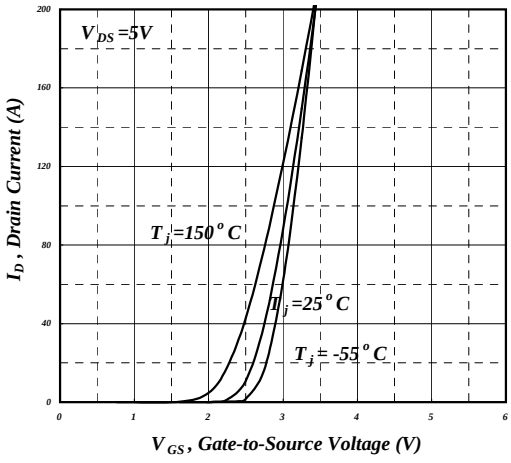


Fig 12. Transfer Characteristics

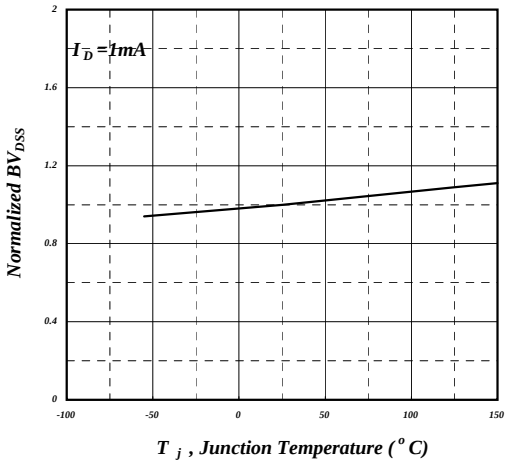


Fig 13. Normalized BV_{DSS} v.s. Junction

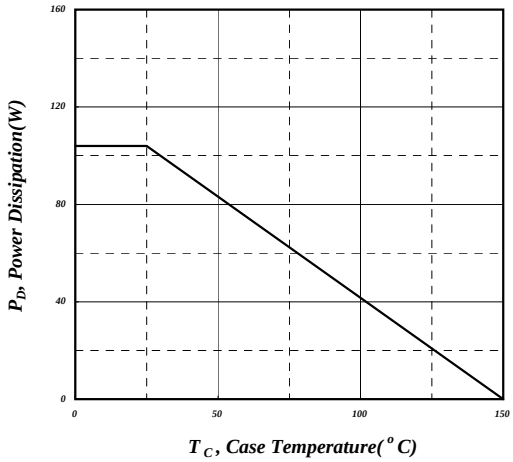


Fig 14. Total Power Dissipation

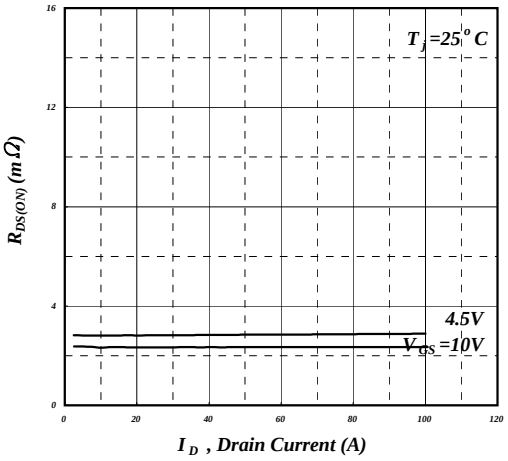


Fig 15. Typ. Drain-Source on State Resistance

MARKING INFORMATION

