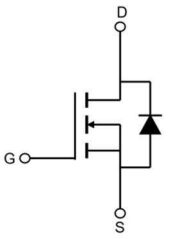
Features

- 500V,5A
  $R_{DS(ON)}$ <2.6Ω @V_{GS}=10V TYP:2.2Ω
- Fast switching
- Low On-Resistance
- High Input Resistance
- RoHS Compliant



Schematic Diagram

Marking and pin assignment

Applications

- MOTOR CONTROL
- UNINTERRUPTIBLE POWER SUPPLIES
- ZEROVOLTAGE SWITCHING SMPS

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity (PCS)
5N50KRD	AP5N50KRD	TO-252	-	-	2500

ABSOLUTE MAXIMUM RATINGS (T_J=25℃ unless otherwise noted)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	500	V
Gate-Source Voltage	V_{GS}	±30	V
Continuous Drain Current (T_C =25℃)	I_D	5	A
Continuous Drain Current (T_C =100℃)	I_D	3	A
Pulsed Drain Current	I_{DM}	20	A
Single Pulsed Avalanche Energy	E_{AS}	115	mJ
Power Dissipation	P_D	50	W
Thermal Resistance from Junction to Case	$R_{\theta JC}$	2.5	℃/W
Thermal Resistance from Junction to Ambient	$R_{\theta JA}$	110.0	℃/W
Junction Temperature	T_J	150	℃
Storage Temperature	T_{STG}	-55~ +150	℃

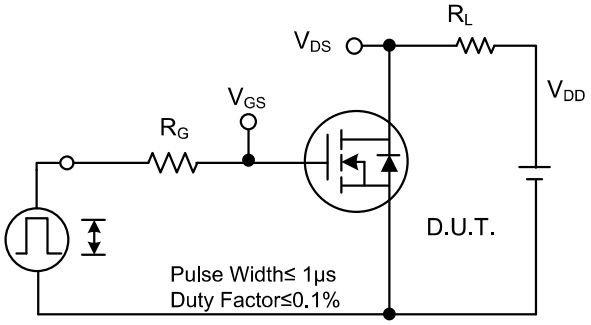
MOSFET ELECTRICAL CHARACTERISTICS(T_J=25℃ unless otherwise noted)

Parameter	Symbol	Test Condition	Min	Type	Max	Unit
Static Characteristics						
Drain-source breakdown voltage	$V_{(BR)DSS}$	V_{GS} = 0V, I_D =250μA	500	-	-	V
Breakdown Voltage Temperature	$\Delta BV_{DSS}/\Delta T_J$	I_D =250μA, T_J=25℃		0.6		V/℃
Zero gate voltage drain current	I_{DSS}	V_{DS} =500V, V_{GS} = 0V,T_J=25℃	-	-	1	μA
Gate-body leakage current	I_{GSS}	V_{GS} =±30V, V_{DS} = 0V	-	-	±100	nA
Gate threshold voltage	$V_{GS(th)}$	V_{DS} =V_{GS}, I_D =250μA	2.0	-	4.0	V
Drain-source on-resistance	$R_{DS(on)}$	V_{GS} =10V, I_D =2.0A	-	2.2	2.6	Ω
Forward Transconductance	G_{FS}	V_{GS} =10V, I_D =2.0A		2.2		S
Dynamic characteristics						
Input Capacitance	C_{iss}	V_{DS} =25V, V_{GS} =0V, f =1.0MHz	-	218	-	pF
Output Capacitance	C_{oss}		-	28	-	
Reverse Transfer Capacitance	C_{rss}		-	4	-	
Switching characteristics(1, 2)						
Turn-on delay time	$t_{d(on)}$	V_{DD}=300V, I_D=3A, R_G=25Ω	-	45	-	ns
Turn-on rise time	t_r		-	19	-	
Turn-off delay time	$t_{d(off)}$		-	13	-	
Turn-off fall time	t_f		-	130	-	
Total Gate Charge	Qg	V_{DS}=480V, I_D=1A, V_{GS}=10V	-	4.8	-	nC
Gate-Source Charge	Qgs		-	0.7	-	
Gate-Drain Charge	Qgd		-	2.7	-	
Source-Drain Diode characteristics						
Diode Forward voltage	V_{SD}	T_J=25℃, V_{GS} =0V, I_S=4A	-	-	1.4	V
Diode Forward current	I_S	T_C=25℃	-	-	5	A
Body Diode Reverse Recovery Time	trr	T_J=25℃， IF=4A,di/dt=100A/us		62		ns
Body Diode Reverse Recovery Charge(1)	Qrr	T_J=25℃， IF=4A,di/dt=100A/us		0.28		uc

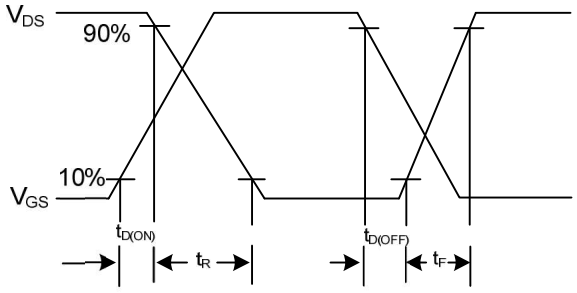
Notes:

1. Repetitive rating: Pulse width limited by maximum junction temperature
2. Starting Tj=25℃, VDD =50V, L=30mH, RG =25Ω, IAS=3.0A
3. Pulse Test : Pulse width ≤ 300μs, Duty cycle ≤ 2%

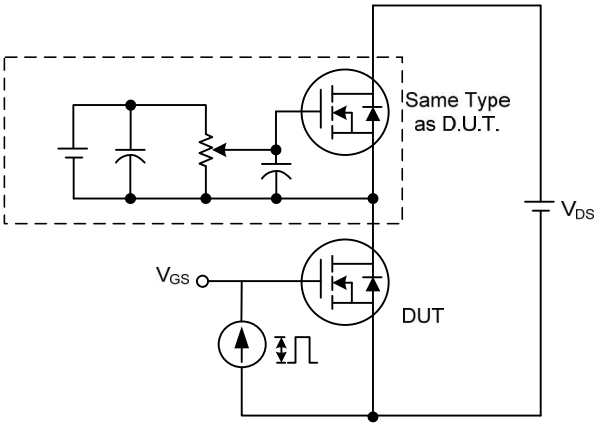
TEST CIRCUITS AND WAVEFORMS



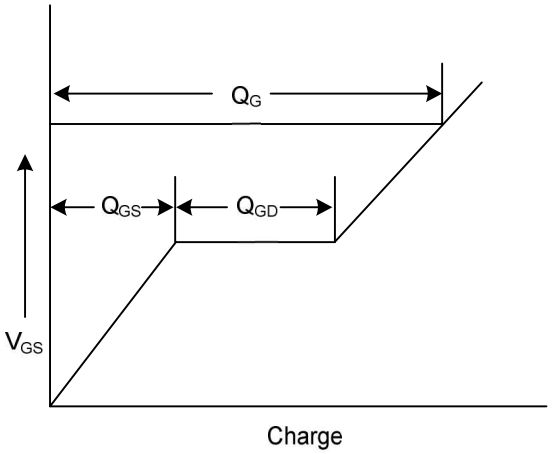
Switching Test Circuit



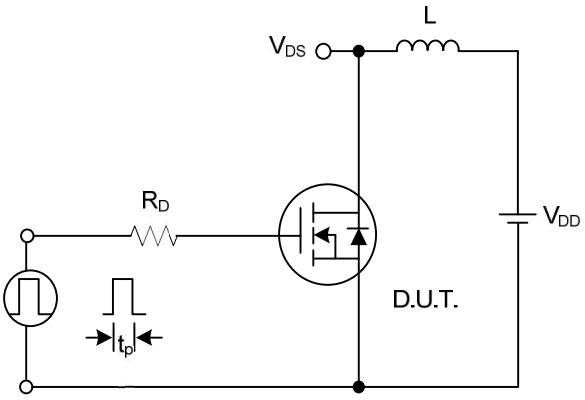
Switching Waveforms



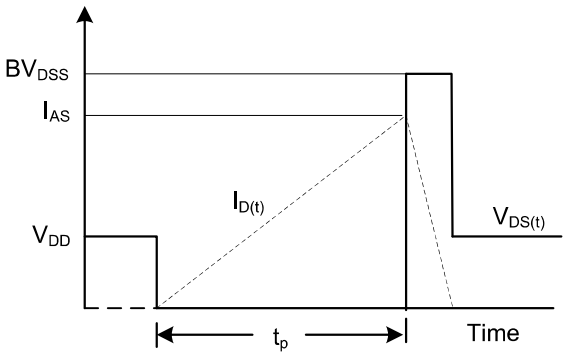
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

TYPICAL CHARACTERISTICS

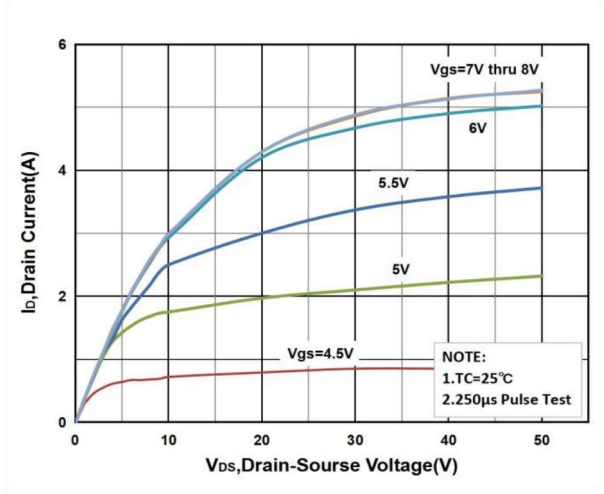


Fig1 Typical Output Characteristics, Tc=25℃

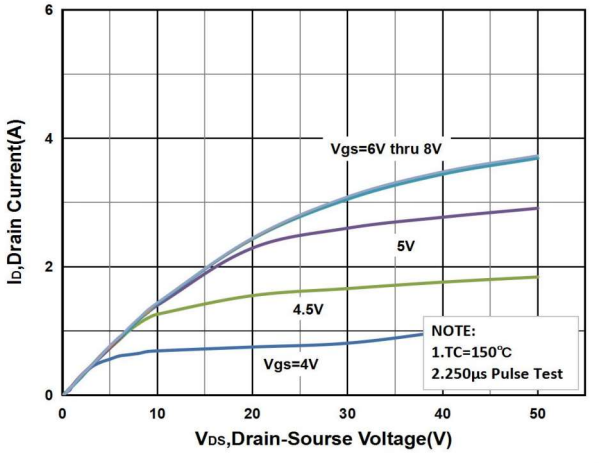


Fig2 Typical Output Characteristics, Tc=150℃

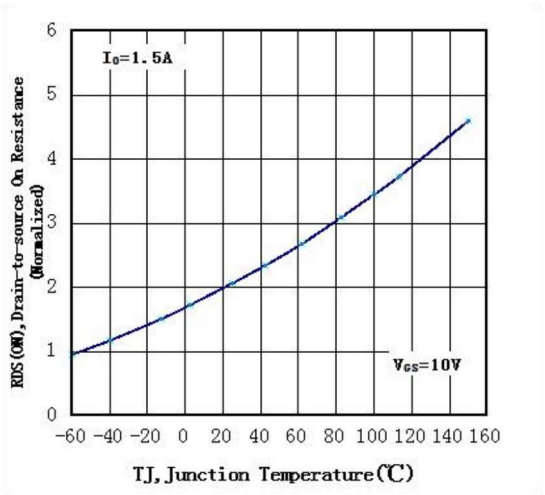


Fig3 On-Resistance Vs.Temperature

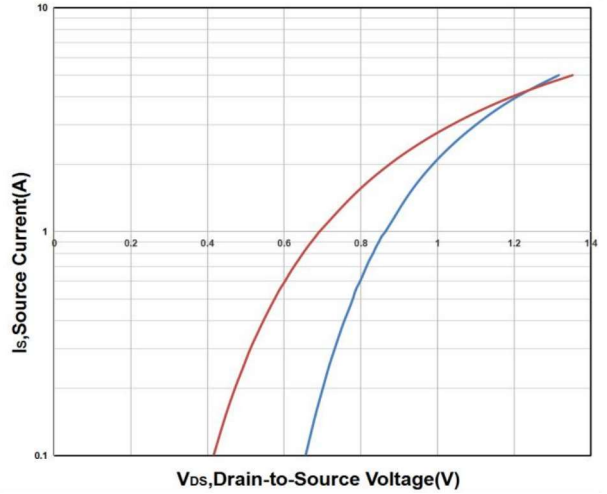


Fig4 Typical Source-Drain Diode Forward Voltage

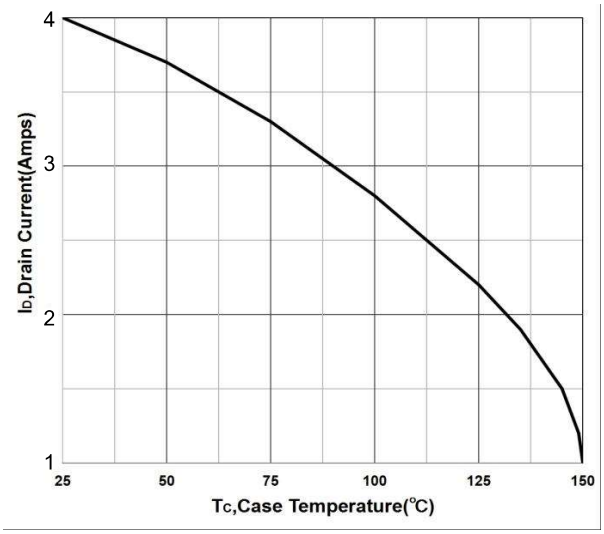


Fig5 Maximum Drain Current Vs.Case Temperature

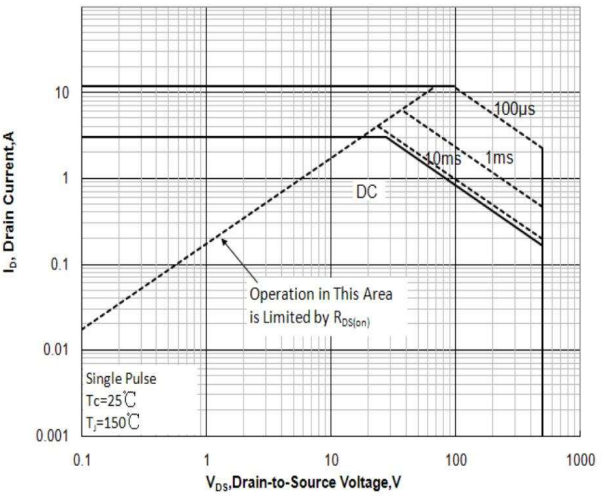


Fig6 Maximum Safe Operating Area

TYPICAL CHARACTERISTICS

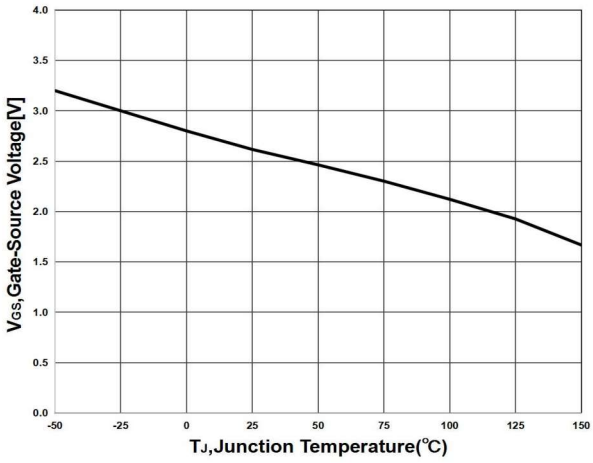


Fig7 Gate Threshold Voltage Variation vs.Temperature

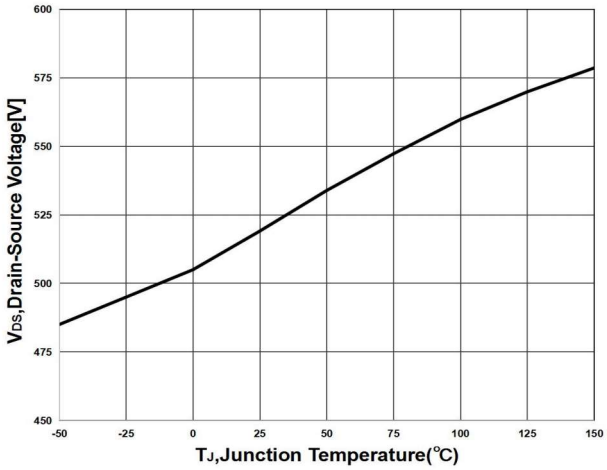


Fig8 Breakdown Voltage Variation vs.Temperature

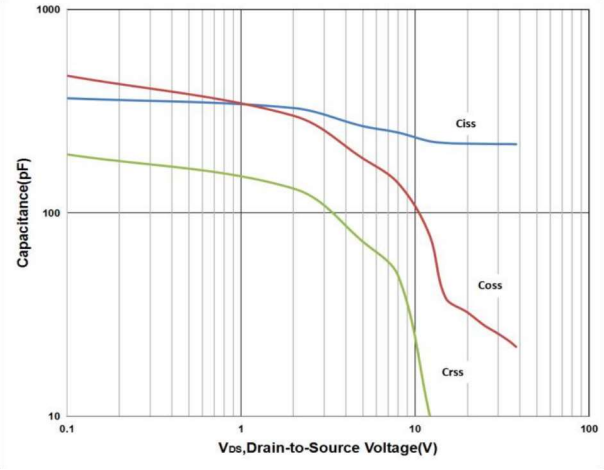


Fig9 Capacitance Characteristics

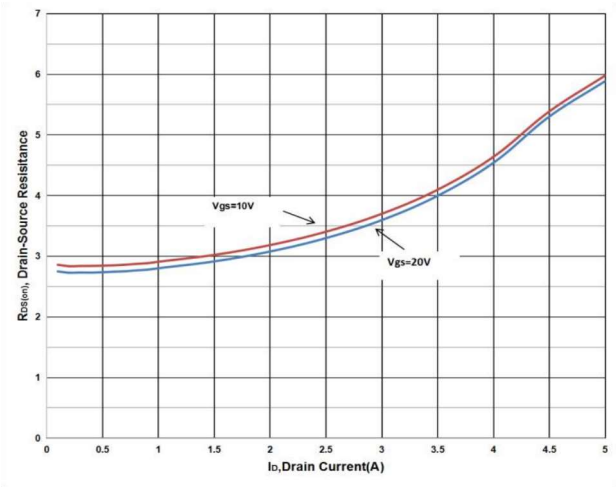


Fig10 On-Resistance Variation VS. Drain Current and Gate Voltage

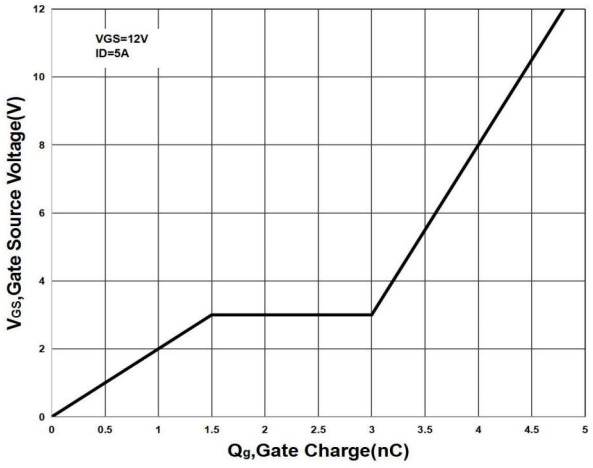
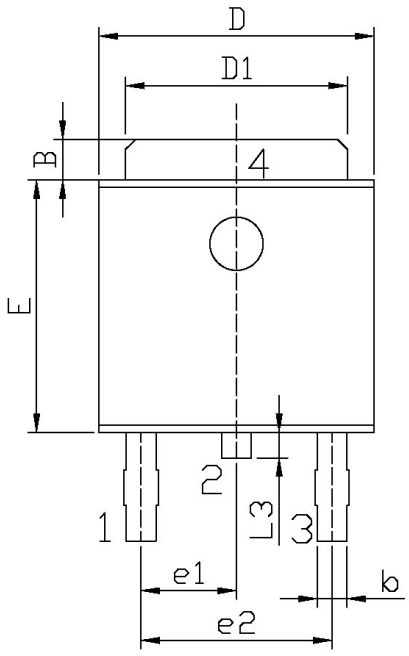
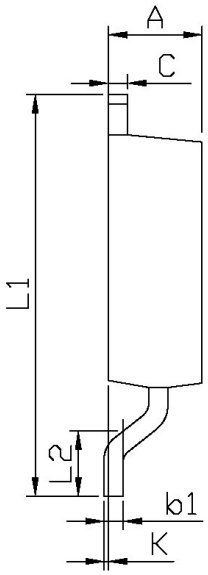


Fig11 Gate Charge VS Gate to Source Volitage

TO-252 Package Information





单位：mm

Symbol	Dimensions In Millimeters		Symbol	Dimensions In Millimeters	
	Min	Max		Min	Max
A	2.20	2.40	E	5.95	6.25
B	0.95	1.25	e1	2.24	2.34
b	0.50	0.90	e2	4.43	4.73
b1	0.45	0.55	L1	9.45	9.95
C	0.45	0.55	L2	1.25	1.75
D	6.45	6.75	L3	0.60	0.90
D1	5.10	5.50	K	0.00	0.10

TO-252

Revision History

Revision	Release	Remark
V1.0	2023/03/01	Initial Release

Disclaimer

The information given in this document describes the independent performance of the product,but similar performance is not guaranteed under other working conditions,and cannot be guaranteed when installed with other products or equipment.To achieve the required performance of the product in actual scenarios,the customer should conduct a complete application test to assess the functionality of the product.

Allpower assumes no responsibility for equipment failures result from using products at values that exceed the ratings,operating conditions,or other parameters listed in the product specifications.

The product described in this specification is not applicable for aerospace or other applications which requires high reliability.Customers using or selling these products for use in medical,life-saving,or life-sustaining applications do so at their own risk and agree to fully indemnify.

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