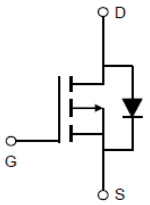
AP3P50

P-Channel Enhancement Mosfet

DATA SHEET

Features

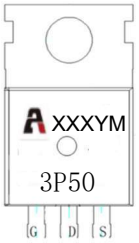
- -500V, -3A
  $R_{DS(ON)}$ <4.8Ω@V_{GS}=-10V TYP:4.0Ω
- Low Gate Charge (Typ. 18 nC)
- Low Crss (Typ. 9.5 pF)
- 100% Avalanche Tested



Schematic Diagram

Applications

- Load Switch
- PWM Application
- Power management



Marking and pin assignment

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity (PCS)
3P50	AP3P50	TO-220	-	-	1000

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	-3	A
Continuous Drain Current (T_C =100℃)	I_D	-1.83	A
Pulsed Drain Current (1)	I_{DM}	-11	A
Single Pulsed Avalanche Energy (2)	E_{AS}	250	mJ
Avalanche Current (1)	I_{AR}	-3	A
Repetitive Avalanche Energy (1)	E_{AR}	5.0	mJ
Peak Diode Recovery dv/dt (3)	dv/dt	-4.5	V/ns
Drain Power Dissipation	P_D	62.5	W
Thermal Resistance from Junction to Case(2)	$R_{\theta JC}$	2.0	℃/W
Thermal Resistance from Junction to Ambient	$R_{\theta JA}$	62.5	℃/W
Junction Temperature	T_J	150	℃
Storage Temperature	T_{STG}	-55~ +150	℃

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

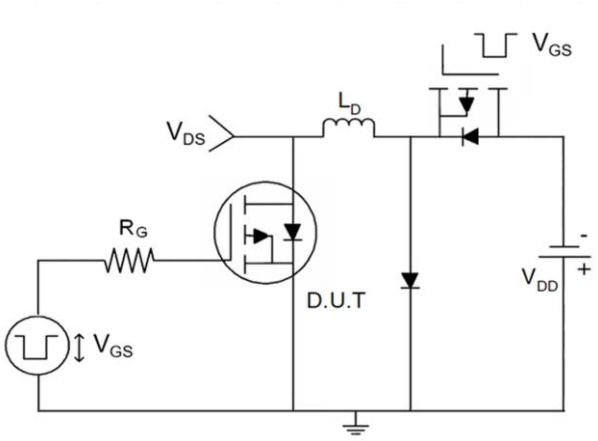
Parameter	Symbol	Test Condition	Min	Type	Max	Unit
Static Characteristics						
Drain-source breakdown voltage	BV_{DSS}	V_{GS} = 0V, I_D =-250μA	-500	-	-	V
Breakdown Voltage Temperature Coefficient	ΔBVDSS/ ΔTJ	I_D = -250 μA, Referenced to 25°C	-	0.42	-	V/°C
Zero gate voltage drain current	I_{DSS}	V_{DS} =-500V, V_{GS} = 0V	-	-	-1	μA
		V_{DS} =-400V, T_C=125℃			-10	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	-3.0	--	-5.0	V
Drain-source on-resistance	$R_{DS(on)}$	V_{GS} =-10V, I_D =-1.0A	-	4.0	4.8	Ω
Forward Transconductance	gFS	V_{DS} =-50V, I_D =-1.0A	-	2.1	-	S
Dynamic characteristics						
Input Capacitance	C_{iss}	V_{DS} =-25V, V_{GS} =0V, f =1.0MHz	-	510	660	pF
Output Capacitance	C_{oss}		-	70	90	
Reverse Transfer Capacitance	C_{rss}		-	9.5	12	
Switching characteristics(4)						
Turn-on delay time	$t_{d(on)}$	V_{DS}=-250V, I_D=-2.7A, R_G=25Ω, V_G=-10V	-	12	35	ns
Turn-on rise time	t_r		-	56	120	
Turn-off delay time	$t_{d(off)}$		-	35	80	
Turn-off fall time	t_f		-	45	100	
Total Gate Charge	Qg	V_{DS}=-400V, I_D=-2.7A, V_{GS}=-10V	-	18	23	nC
Gate-Source Charge	Qgs		-	3.6	-	
Gate-Drain Charge	Qgd		-	9.2	-	
Source-Drain Diode characteristics						
Diode Forward voltage	V_{SD}	T_J=25℃, V_{GS} =0V, I_S=-2.1A	-	-	-5.0	V
Diode Forward current	I_S	T_C=25℃	-	-	-3	A
Body Diode Reverse Recovery Time	trr	T_J=25℃，IF=-2.7A,di/dt=100A/us		270		ns
Body Diode Reverse Recovery Charge	Qrr	T_J=25℃，IF=-2.7A,di/dt=100A/us		1.5		uc

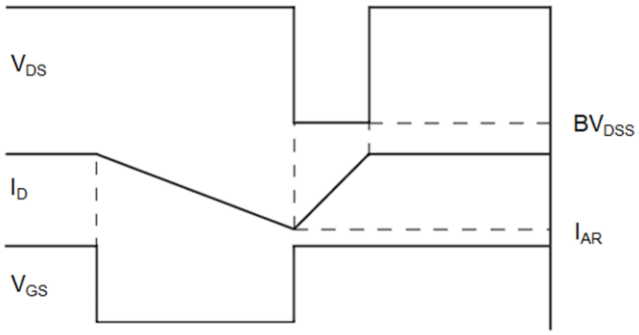
Notes:

1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature
2. L = 102mH, IAS = -2.1A, VDD = -50V, RG = 25 Ω, Starting TJ = 25°C
3. ISD ≤ -2.7A, di/dt ≤ 200A/μs, VDD ≤ BVDSS, Starting TJ = 25° C
4. Essentially independent of operating temperature

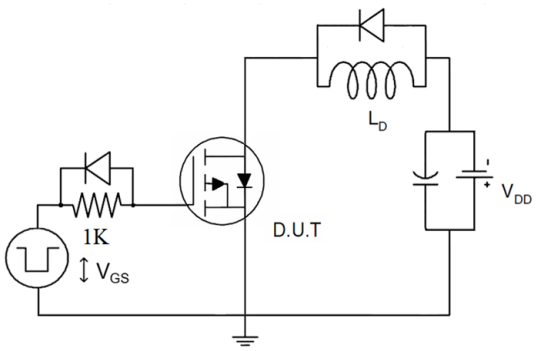
Test Circuit

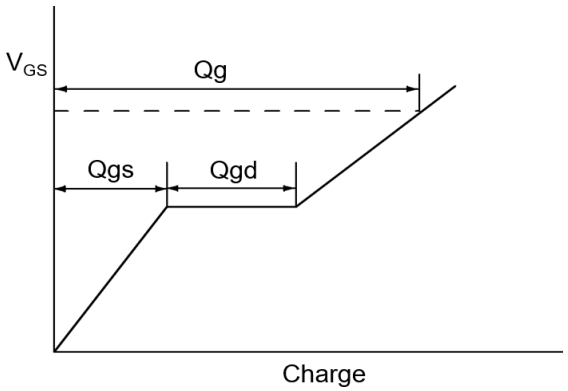
1) E_{AS} Test Circuits



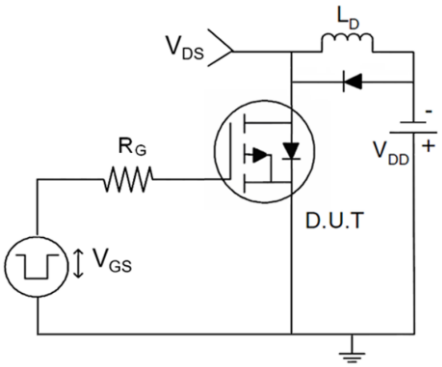


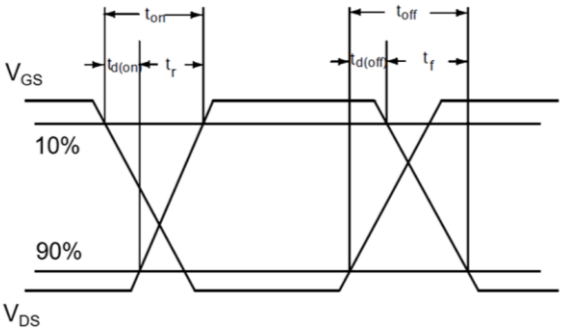
2) Gate Charge Test Circuit





3) Switch Time Test Circuit





Typical Characteristics (Cont.)

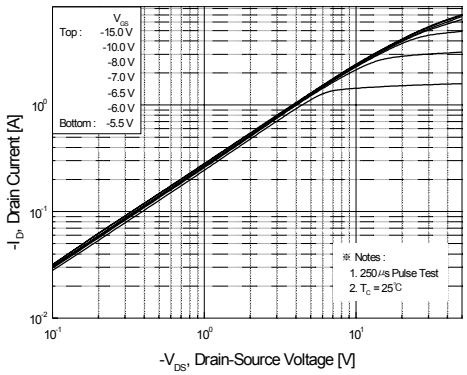


Figure 1. On-Region Characteristics

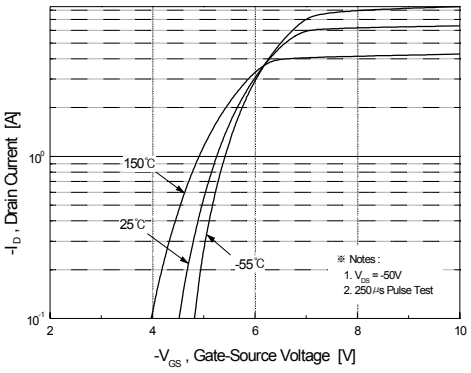


Figure 2. Transfer Characteristics

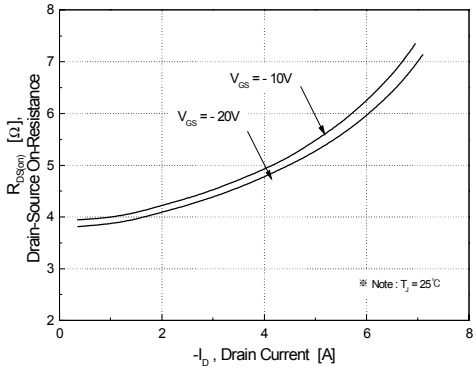


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

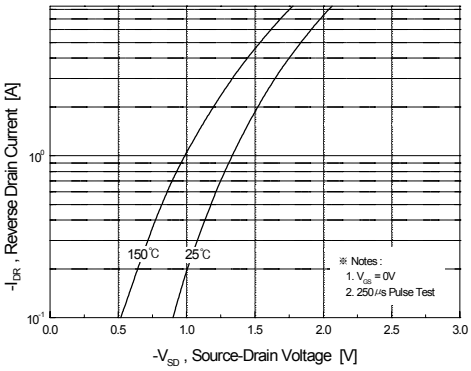


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

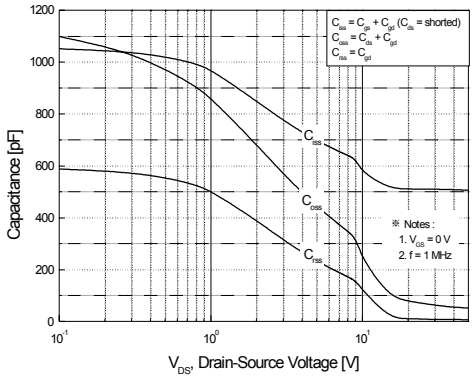


Figure 5. Capacitance Characteristics

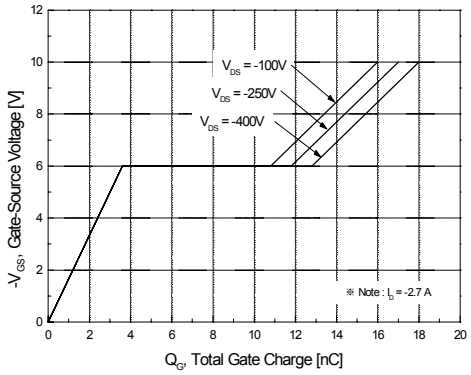


Figure 6. Gate Charge Characteristics

Typical Characteristics (Cont.)

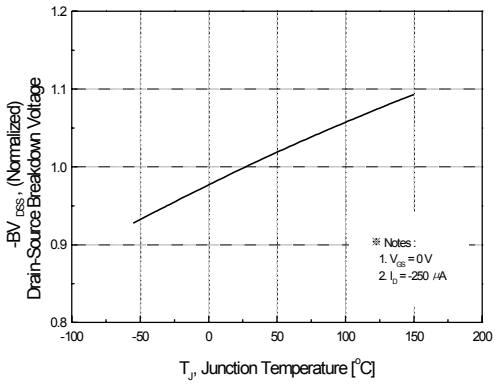


Figure 7. Breakdown Voltage Variation vs. Temperature

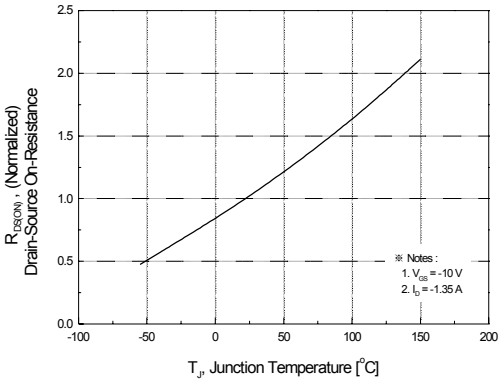


Figure 8. On-Resistance Variation vs. Temperature

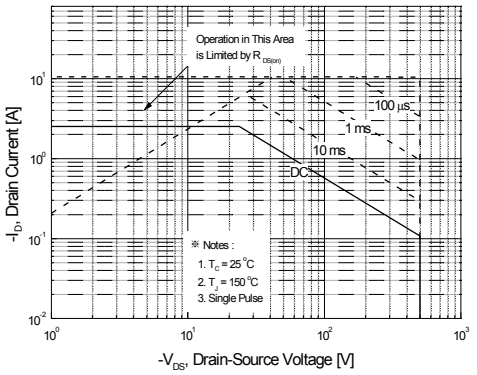


Figure 9. Maximum Safe Operating Area

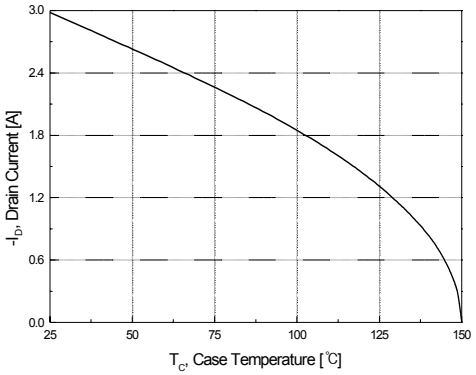


Figure 10. Maximum Drain Current vs. Case Temperature

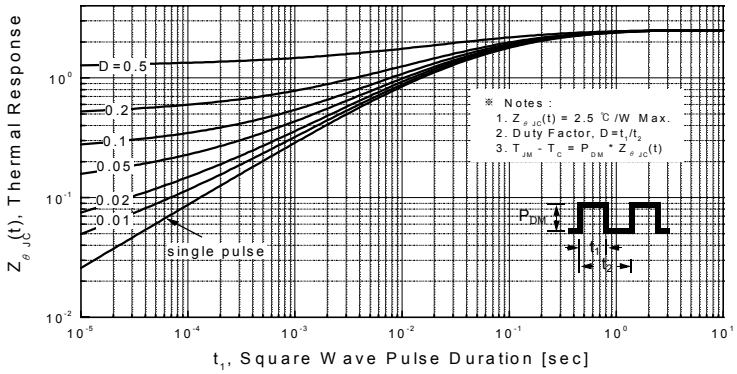
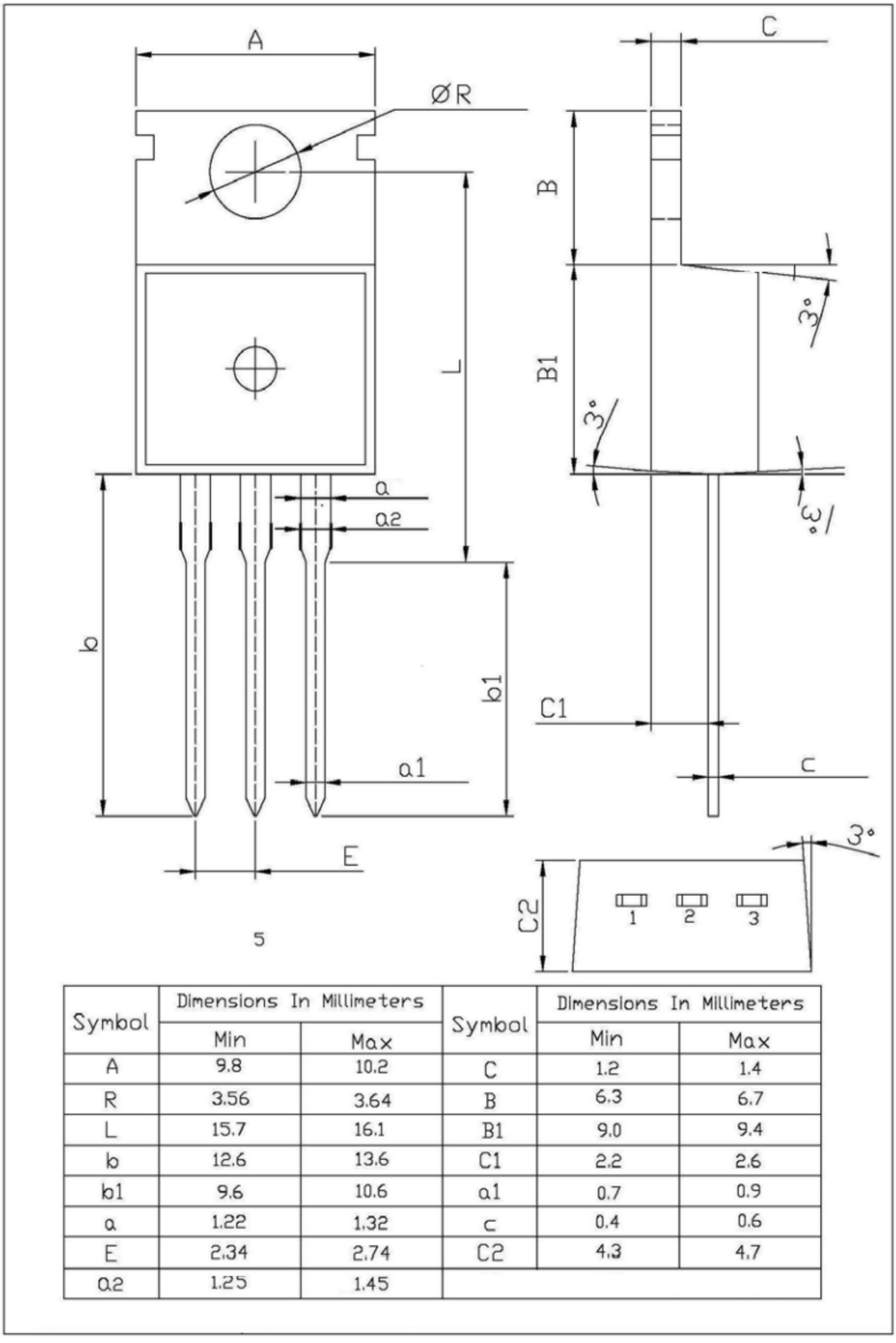


Figure 11. Transient Thermal Response Curve

Package Dimensions

TO-220



Symbol	Dimensions In Millimeters		Symbol	Dimensions In Millimeters	
	Min	Max		Min	Max
A	9.8	10.2	C	1.2	1.4
R	3.56	3.64	B	6.3	6.7
L	15.7	16.1	B1	9.0	9.4
b	12.6	13.6	C1	2.2	2.6
b1	9.6	10.6	a1	0.7	0.9
a	1.22	1.32	c	0.4	0.6
E	2.34	2.74	C2	4.3	4.7
a2	1.25	1.45			

Revision History

Revision	Release	Remark
V1.0	2023/11/06	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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