

AP50N06

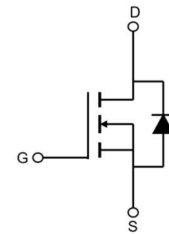
N-Channel Enhancement Mosfet

AIIPOWER

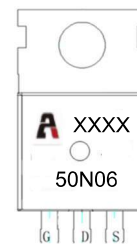
DATA SHEET

Feature

- 60V,50A
 $R_{DS(ON)} < 17m\Omega @ V_{GS}=10V$ TYP=14 m Ω
 $R_{DS(ON)} < 25m\Omega @ V_{GS}=4.5V$ TYP=18 m Ω
- Advanced Trench Technology
- Lead free product is acquired
- Excellent $R_{DS(ON)}$ and Low Gate Charge



Schematic Diagram



Marking and pin assignment

Application

- PWM applications
- Load Switch
- Power management

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity (PCS)
50N06	AP50N06	TO-220	-	-	1000

ABSOLUTE MAXIMUM RATINGS ($T_a=25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	60	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current ($T_a=25^\circ\text{C}$)	I_D	50	A
Continuous Drain Current ($T_a=100^\circ\text{C}$)	I_D	33	A
Pulsed Drain Current ⁽¹⁾	I_{DM}	200	A
Singel Pulsed Avalanche Energy ⁽²⁾	E_{AS}	64	mJ
Power Dissipation	P_D	120	W
Thermal Resistance from Junction to Case	$R_{\theta JC}$	1.65	$^\circ\text{C}/\text{W}$
Junction Temperature	T_J	150	$^\circ\text{C}$
Storage Temperature	T_{STG}	-55~ +150	$^\circ\text{C}$

MOSFET ELECTRICAL CHARACTERISTICS($T_a=25^{\circ}\text{C}$ unless otherwise noted)

Parameter	Symbol	Test Condition	Min	Type	Max	Unit
Static Characteristics						
Drain-source breakdown voltage	$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = -250\mu A$	60	-	-	V
Zero gate voltage drain current	I_{DSS}	$V_{DS} = 60V, V_{GS} = 0V$	-	-	1	μA
Gate-body leakage current	I_{GSS}	$V_{GS} = \pm 20V, V_{DS} = 0V$	-	-	± 100	nA
Gate threshold voltage ⁽³⁾	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\mu A$	1	1.6	2.5	V
Drain-source on-resistance ⁽³⁾	$R_{DS(on)}$	$V_{GS} = 10V, I_D = 20A$	-	14	17	m Ω
		$V_{GS} = 4.5V, I_D = 15A$	-	18	25	
Forward tranconductance ⁽³⁾	g_{FS}	$V_{DS} = 10V, I_D = 20A$	20	-	-	S
Dynamic characteristics						
Input Capacitance	C_{iss}	$V_{DS} = 25V, V_{GS} = 0V, f = 1MHz$	-	2900	-	pF
Output Capacitance	C_{oss}		-	140	-	
Reverse Transfer Capacitance	C_{rss}		-	120	-	
Switching characteristics						
Turn-on delay time	$t_{d(on)}$	$V_{DD} = 30V, I_D = 30A, R_L = 1\Omega$ $V_{GS} = 10V, R_G = 3\Omega$	-	7.3	-	ns
Turn-on rise time	t_r		-	5.1	-	
Turn-off delay time	$t_{d(off)}$		-	28.1	-	
Turn-off fall time	t_f		-	5.7	-	
Total Gate Charge	Q_g	$V_{DS} = 30V, I_D = 30A,$ $V_{GS} = 10V$	-	51	-	nC
Gate-Source Charge	Q_{gs}		-	6.2	-	
Gate-Drain Charge	Q_{gd}		-	15	-	
Source-Drain Diode characteristics						
Diode Forward voltage ⁽³⁾	V_{DS}	$V_{GS} = 0V, I_S = 30A$	-	-	1.2	V
Diode Forward current ⁽⁴⁾	I_S		-	-	50	A
Body Diode Reverse Recovery Time	t_{rr}	$T_J = 25^{\circ}, I_F = 30A, di/dt = 100A/us$		27		ns
Body Diode Reverse Recovery Charge	Q_{rr}	$T_J = 25^{\circ}, I_F = 30A, di/dt = 100A/us$		40		nc

Notes:

1. Repetitive Rating: pulse width limited by maximum junction temperature
2. EAS Condition: $T_J = 25^{\circ}\text{C}, V_{DD} = 20V, R_G = 25\Omega, L = 0.5mH, I_{AS} = 16A$
3. Pulse Test: pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$
4. Surface Mounted on FR4 Board, $t \leq 10$ sec

Test Circuit

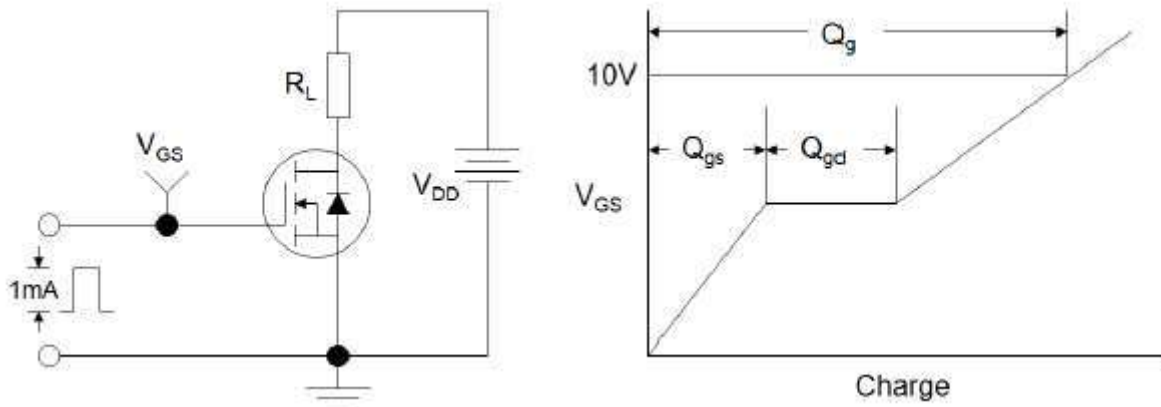


Figure1:Gate Charge Test Circuit & Waveform

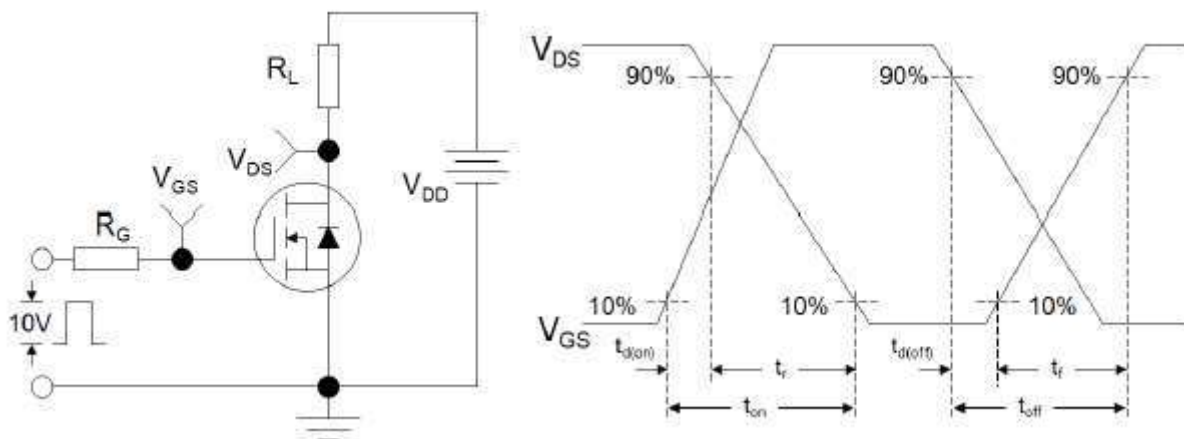


Figure 2: Resistive Switching Test Circuit & Waveforms

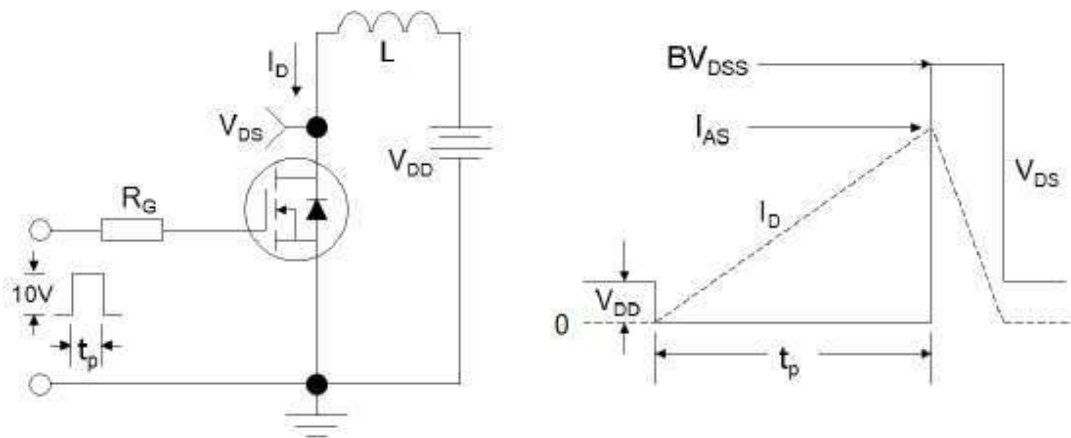


Figure 3:Unclamped Inductive Switching Test Circuit & Waveforms

Typical Performance Characteristics

Figure 1: Output Characteristics

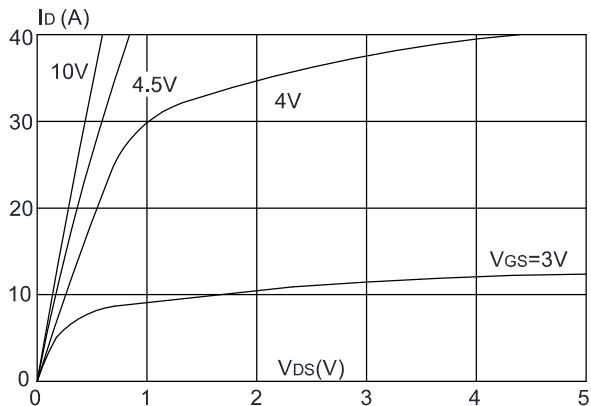


Figure 2: Typical Transfer Characteristics

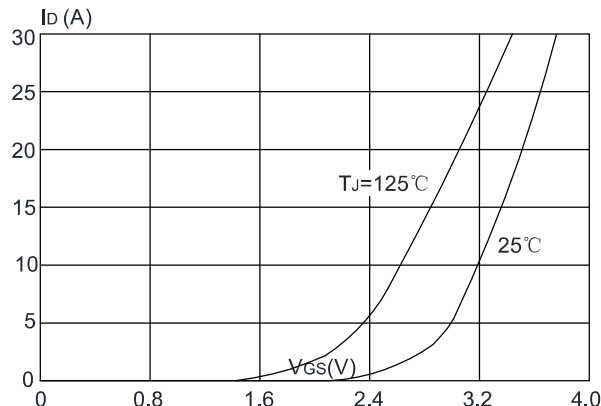


Figure 3: On-resistance vs. Drain Current

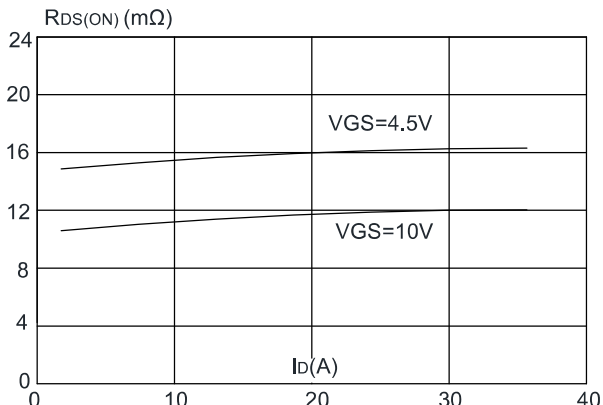


Figure 4: Body Diode Characteristics

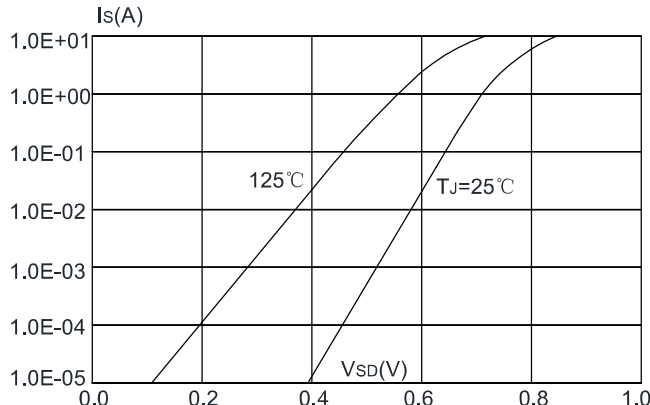


Figure 5: Gate Charge Characteristics

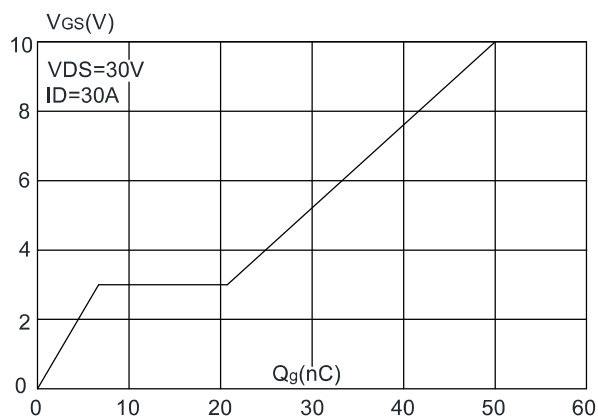
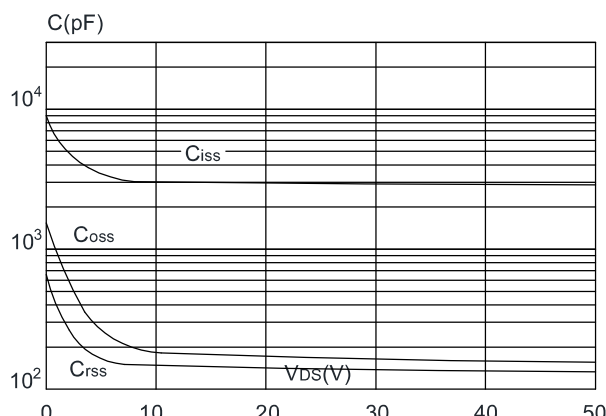


Figure 6: Capacitance Characteristics



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Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

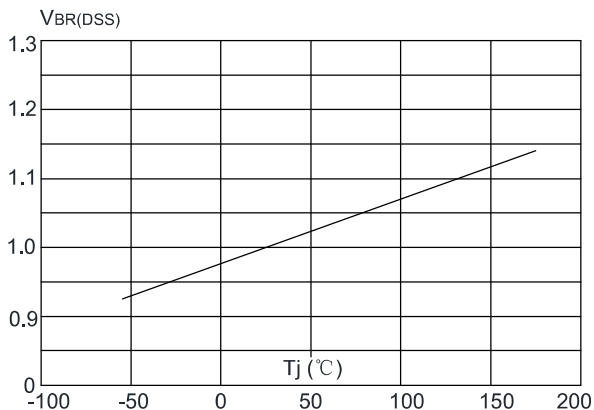


Figure 8: Normalized on Resistance vs. Junction Temperature

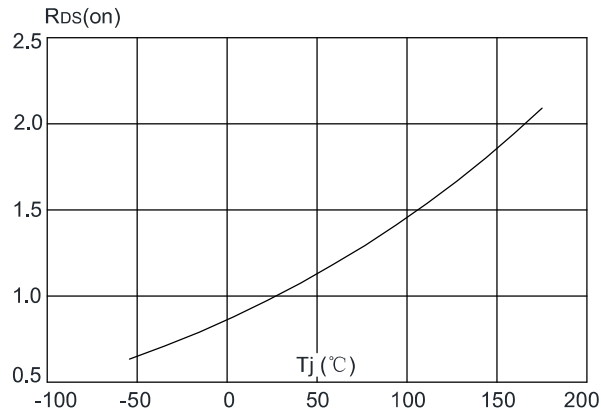


Figure 9: Maximum Safe Operating Area

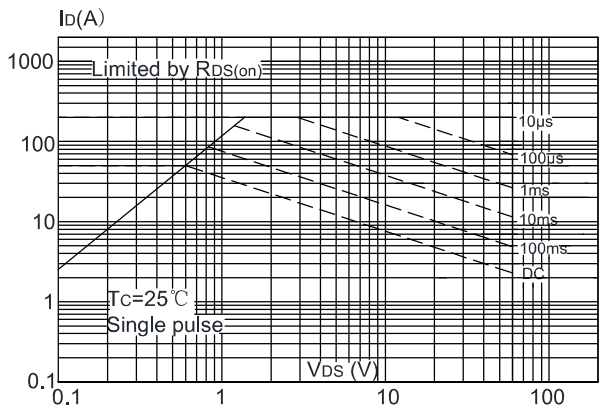


Figure 10: Maximum Continuous Drain Current vs. Case Temperature

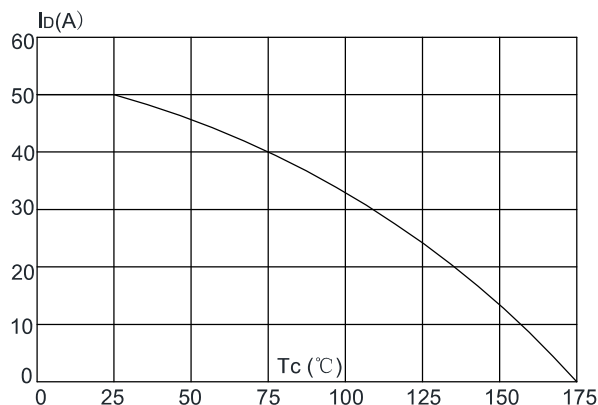
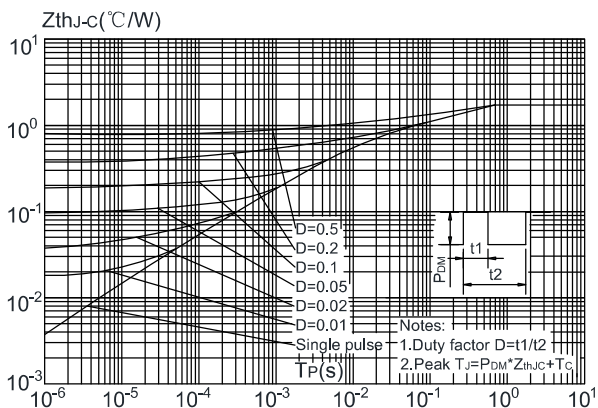


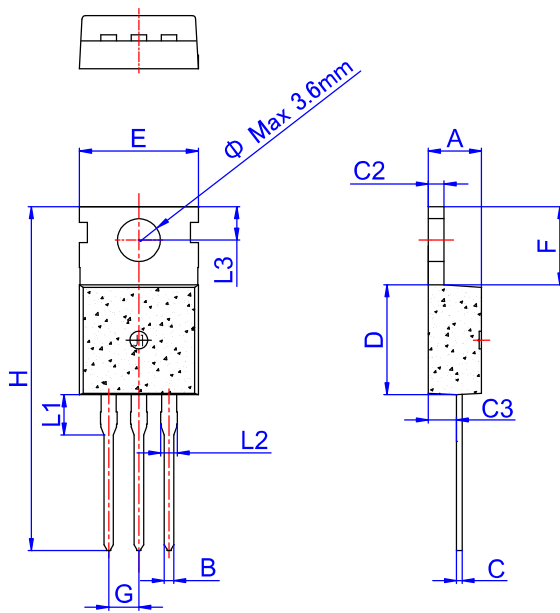
Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Case



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TO-220C Package Information



TO-220C

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.40		4.60	0.173		0.181
B	0.70		0.90	0.028		0.035
C	0.45		0.60	0.018		0.024
C2	1.23		1.32	0.048		0.052
C3	2.20		2.60	0.087		0.102
D	8.90		9.90	0.350		0.390
E	9.90		10.3	0.390		0.406
F	6.30		6.90	0.248		0.272
G		2.54			0.1	
H	28.0		29.8	1.102		1.173
L1		3.39			0.133	
L2	1.14		1.70	0.045		0.067
L3	2.65		2.95	0.104		0.116
Φ		3.6			0.142	