

AP120N03

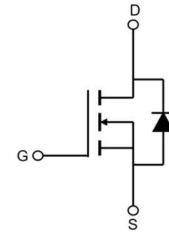
N-Channel Enhancement Mosfet

AIIPOWER

DATA SHEET

Feature

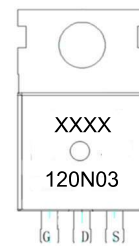
- 30V,120A
 $R_{DS(ON)} < 3.8m\Omega @ V_{GS}=10V$
- Advanced Trench Technology
- Lead free product is acquired
- Excellent $R_{DS(ON)}$ and Low Gate Charge



Schematic Diagram

Application

- PWM applications
- Load Switch
- Power management



Marking and pin assignment

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity (PCS)
120N03	AP120N03	TO-220C	13 inch	-	1000

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

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	30	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current ($T_a=25^\circ\text{C}$)	I_D	120	A
Continuous Drain Current ($T_a=100^\circ\text{C}$)	I_D	72	A
Pulsed Drain Current ⁽¹⁾	I_{DM}	400	A
Singel Pulsed Avalanche Energy ⁽²⁾	E_{AS}	121	mJ
Power Dissipation	P_D	108	W
Thermal Resistance from Junction to Case	$R_{\theta JC}$	1.4	$^\circ\text{C}/\text{W}$
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	$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = 250\mu A$	30	-	-	V
Zero gate voltage drain current	I_{DSS}	$V_{DS} = 30V, V_{GS} = 0V$	-	-	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	1.5	2.5	V
Drain-source on-resistance ⁽³⁾	$R_{DS(on)}$	$V_{GS} = 10V, I_D = 30A$	-	3.0	3.8	m Ω
Drain-source on-resistance ⁽³⁾	$R_{DS(on)}$	$V_{GS} = 4.5V, I_D = 20A$	-	4.9	6.0	m Ω
Dynamic characteristics						
Input Capacitance	C_{iss}	$V_{DS} = 15V, V_{GS} = 0V, f = 1MHz$	-	2680	-	pF
Output Capacitance	C_{oss}		-	393	-	
Reverse Transfer Capacitance	C_{rss}		-	330	-	
Switching characteristics						
Turn-on delay time	$t_{d(on)}$	$V_{DD} = 15V, I_D = 30A, R_L = 1\Omega$ $V_{GS} = 10V, R_G = 3\Omega$	-	23	-	ns
Turn-on rise time	t_r		-	28	-	
Turn-off delay time	$t_{d(off)}$		-	74	-	
Turn-off fall time	t_f		-	36	-	
Total Gate Charge	Q_g	$V_{DS} = 15V, I_D = 30A,$ $V_{GS} = 10V$	-	30	-	nC
Gate-Source Charge	Q_{gs}		-	7.2	-	
Gate-Drain Charge	Q_{gd}		-	10.4	-	
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		-	-	120	A
Body Diode Reverse Recovery Time	t_{rr}	$T_J = 25^{\circ}, I_F = 20A, di/dt = 100A/\mu s$		28		ns
Body Diode Reverse Recovery Charge	Q_{rr}	$T_J = 25^{\circ}, I_F = 20A, di/dt = 100A/\mu s$		21		nc

Notes:

1. Repetitive Rating: pulse width limited by maximum junction temperature
2. EAS Condition: $T_J = 25^{\circ}\text{C}, V_{DD} = 20V, R_G = 25\Omega, L = 0.5\text{mH}, I_{AS} = 22A$
3. Pulse Test: pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$
4. Surface Mounted on FR4 Board, $t \leq 10\text{ sec}$

Test Circuit

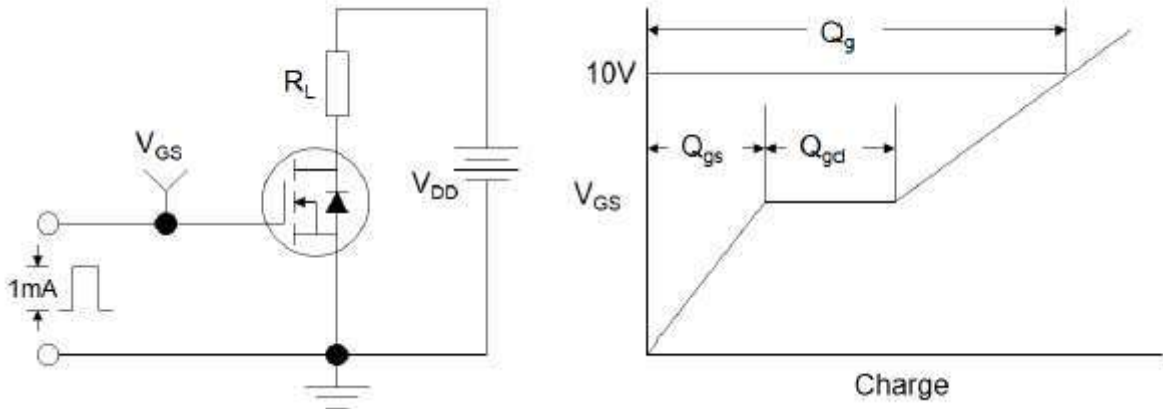


Figure1:Gate Charge Test Circuit & Waveform

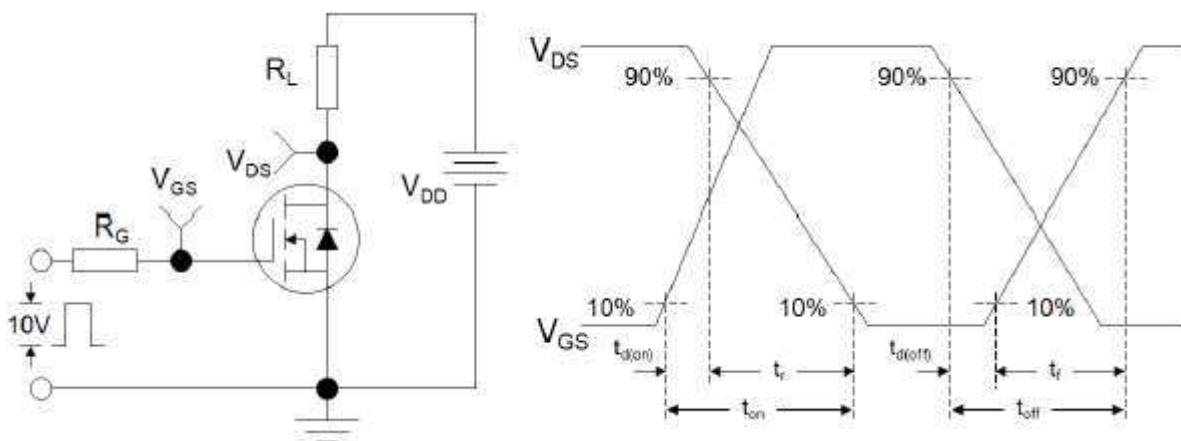


Figure 2: Resistive Switching Test Circuit & Waveforms

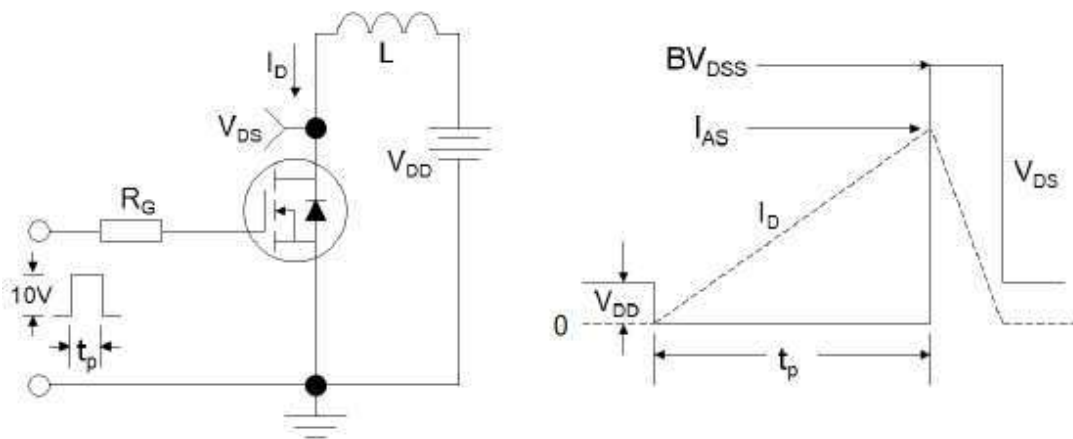


Figure 3:Unclamped Inductive Switching Test Circuit & Waveforms

Figure 1: Output Characteristics

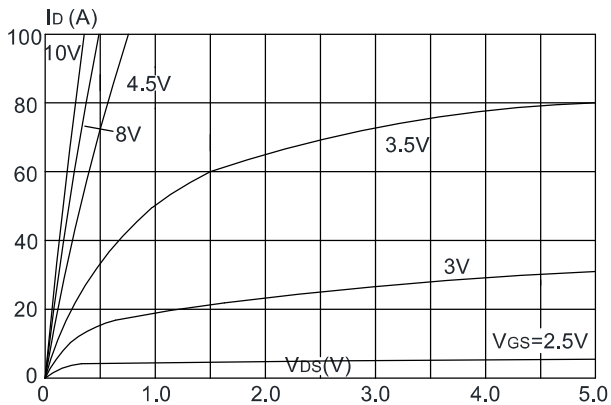


Figure 2: Typical Transfer Characteristics

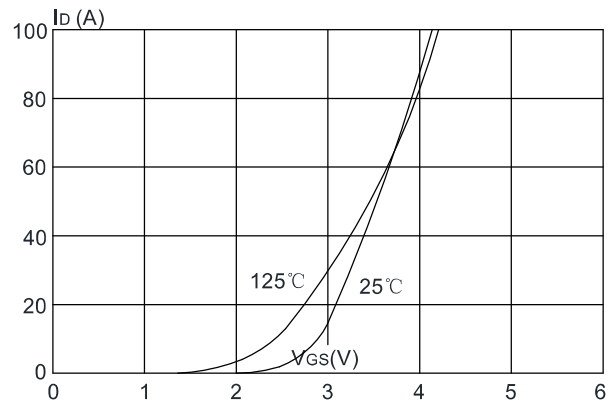


Figure 3: On-resistance vs. Drain Current

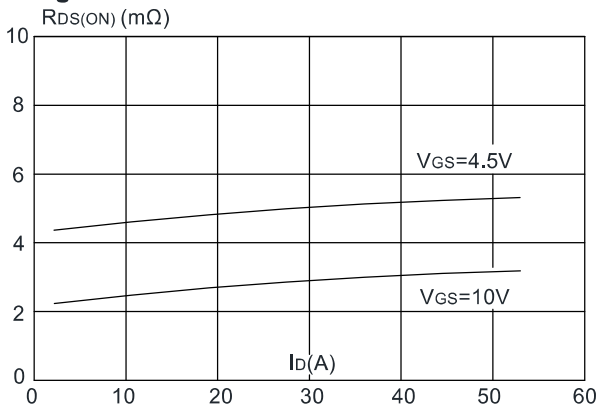


Figure 4: Body Diode Characteristics

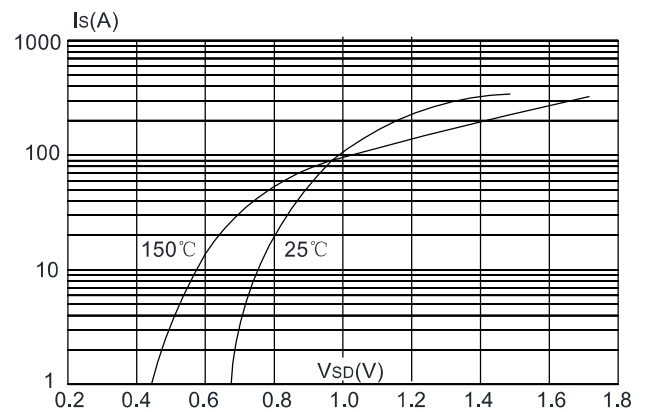


Figure 5: Gate Charge Characteristics

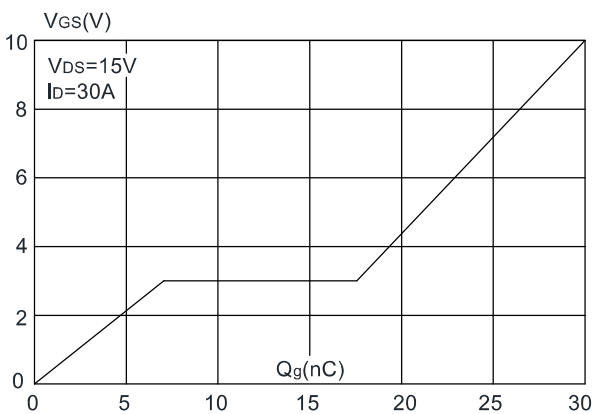


Figure 6: Capacitance Characteristics

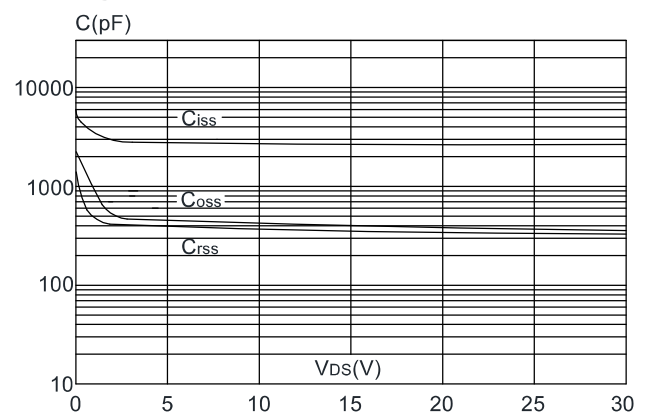


Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

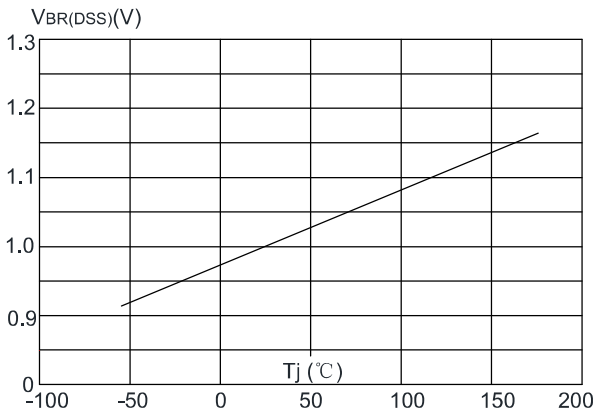


Figure 8: Normalized on Resistance vs. Junction Temperature

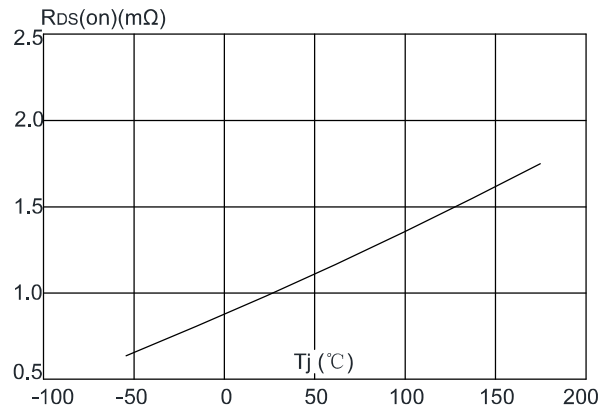


Figure 9: Maximum Safe Operating Area

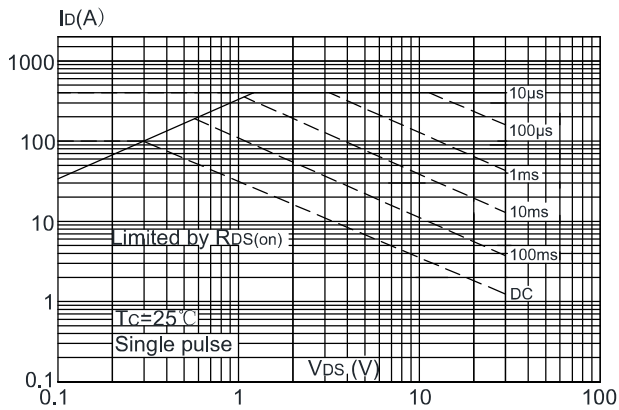


Figure 10: Maximum Continuous Drain Current vs. Case Temperature

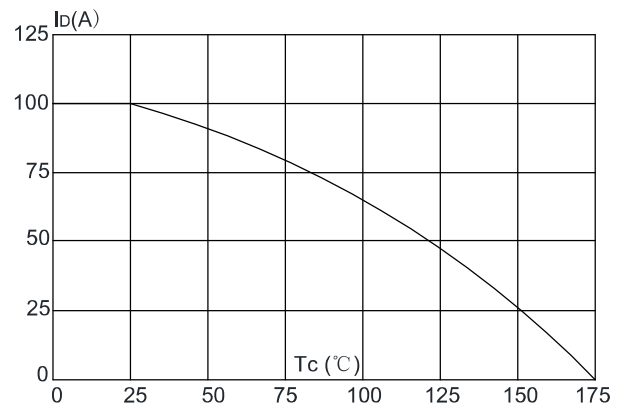
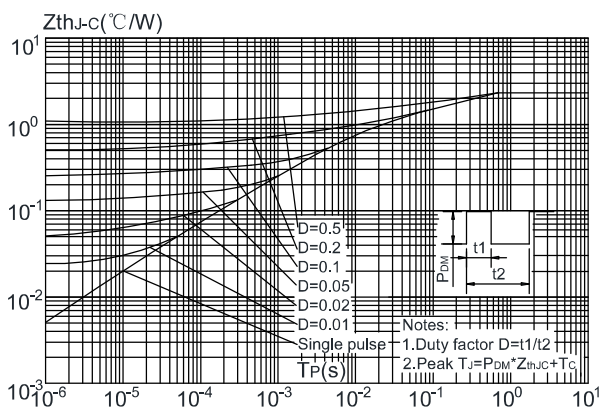


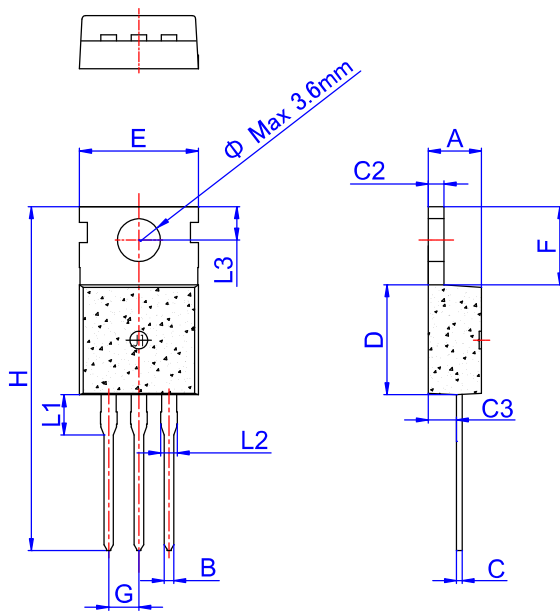
Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Case



AP120N03

N-Channel Enhancement Mosfet

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	