



**Advanced Power
Electronics Corp.**

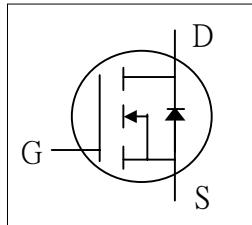
AP09N90W

Pb Free Plating Product

N-CHANNEL ENHANCEMENT MODE

POWER MOSFET

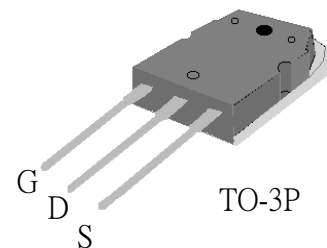
- ▼ Repetitive Avalanche Rated
- ▼ Fast Switching
- ▼ Simple Drive Requirement
- ▼ RoHS Compliant



BV_{DSS}	900V
$R_{DS(ON)}$	1.2 Ω
I_D	8.6A

Description

AP09N90 series are specially designed as main switching devices for universal 90~265VAC off-line AC/DC converter applications. TO-3P type provide high blocking voltage to overcome voltage surge and sag in the toughest power system with the best combination of fast switching, ruggedized design and cost-effectiveness.



Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	900	V
V_{GS}	Gate-Source Voltage	± 30	V
$I_D @ T_C = 25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$	8.6	A
$I_D @ T_C = 100^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$	5	A
I_{DM}	Pulsed Drain Current ¹	30	A
$P_D @ T_C = 25^\circ C$	Total Power Dissipation	240	W
	Linear Derating Factor	1.92	W/ $^\circ C$
E_{AS}	Single Pulse Avalanche Energy ²	92	mJ
I_{AR}	Avalanche Current	5.2	A
E_{AR}	Repetitive Avalanche Energy	8.6	mJ
T_{STG}	Storage Temperature Range	-55 to 150	$^\circ C$
T_J	Operating Junction Temperature Range	-55 to 150	$^\circ C$

Thermal Data

Symbol	Parameter	Value	Units
Rthj-c	Thermal Resistance Junction-case	Max. 0.52	$^\circ C/W$
Rthj-a	Thermal Resistance Junction-ambient	Max. 40	$^\circ C/W$


Electrical Characteristics @ $T_j=25^\circ\text{C}$ (unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=1mA$	900	-	-	V
$\Delta BV_{DSS}/\Delta T_j$	Breakdown Voltage Temperature Coefficient	Reference to $25^\circ\text{C}, I_D=1mA$	-	0.67	-	$V/^\circ\text{C}$
$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS}=10V, I_D=4.5A$	-	-	1.2	Ω
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	2	-	4	V
g_{fs}	Forward Transconductance	$V_{DS}=10V, I_D=4.5A$	-	11.5	-	S
I_{DSS}	Drain-Source Leakage Current ($T_j=25^\circ\text{C}$)	$V_{DS}=900V, V_{GS}=0V$	-	-	10	μA
	Drain-Source Leakage Current ($T_j=150^\circ\text{C}$)	$V_{DS}=720V, V_{GS}=0V$	-	-	100	μA
I_{GSS}	Gate-Source Leakage	$V_{GS}=\pm 30V$	-	-	± 100	nA
Q_g	Total Gate Charge ³	$I_D=8.6A$	-	67.1	120	nC
Q_{gs}	Gate-Source Charge	$V_{DS}=540V$	-	17	-	nC
Q_{gd}	Gate-Drain ("Miller") Charge	$V_{GS}=10V$	-	19.9	-	nC
$t_{d(on)}$	Turn-on Delay Time ³	$V_{DD}=450V$	-	25.8	-	ns
t_r	Rise Time	$I_D=5A$	-	10.3	-	ns
$t_{d(off)}$	Turn-off Delay Time	$R_G=10\Omega, V_{GS}=10V$	-	305.2	-	ns
t_f	Fall Time	$R_D=90\Omega$	-	536	-	ns
C_{iss}	Input Capacitance	$V_{GS}=0V$	-	4087	6000	pF
C_{oss}	Output Capacitance	$V_{DS}=25V$	-	221	-	pF
C_{rss}	Reverse Transfer Capacitance	$f=1.0MHz$	-	51	-	pF

Source-Drain Diode

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
I_S	Continuous Source Current (Body Diode)	$V_D=V_G=0V, V_S=1.5V$		-	8.6	A
I_{SM}	Pulsed Source Current (Body Diode) ¹		-	-	30	A
V_{SD}	Forward On Voltage ³	$T_j=25^\circ\text{C}, I_S=8.6A, V_{GS}=0V$	-	-	1.5	V

Notes:

- 1.Pulse width limited by safe operating area.
- 2.Starting $T_j=25^\circ\text{C}$, $V_{DD}=50V$, $L=6.8mH$, $R_G=25\Omega$, $I_{AS}=5.2A$.
- 3.Pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.

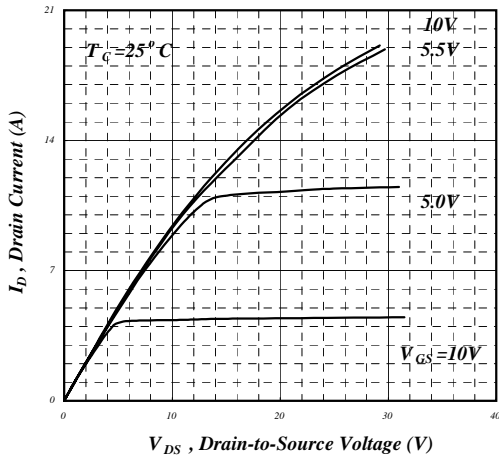


Fig 1. Typical Output Characteristics

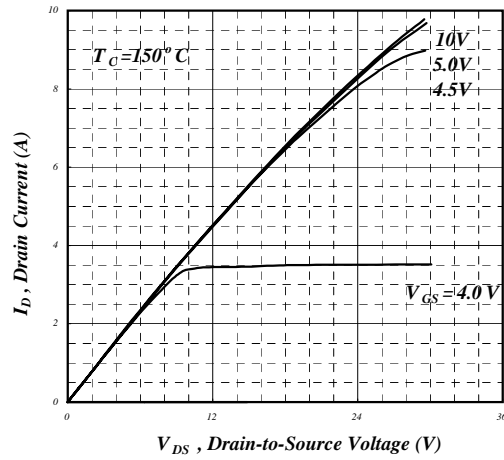


Fig 2. Typical Output Characteristics

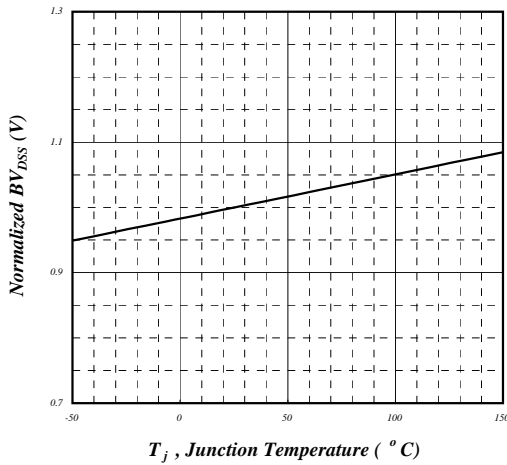


Fig 3. Normalized BV_{DSS} v.s. Junction

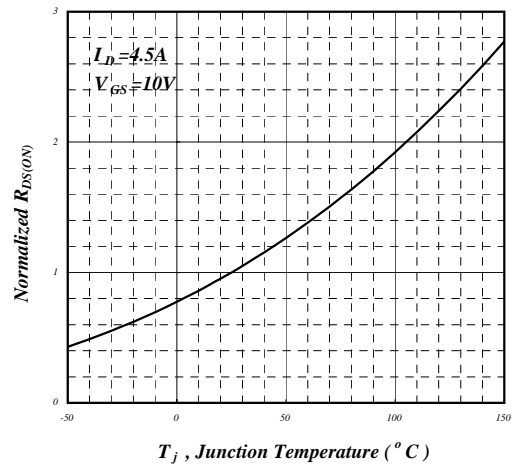


Fig 4. Normalized On-Resistance

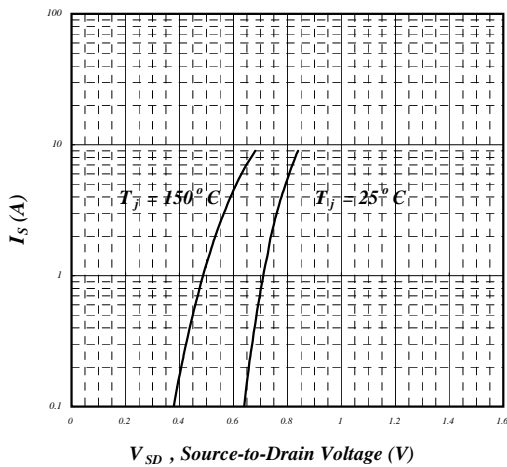


Fig 5. Forward Characteristic of Reverse Diode

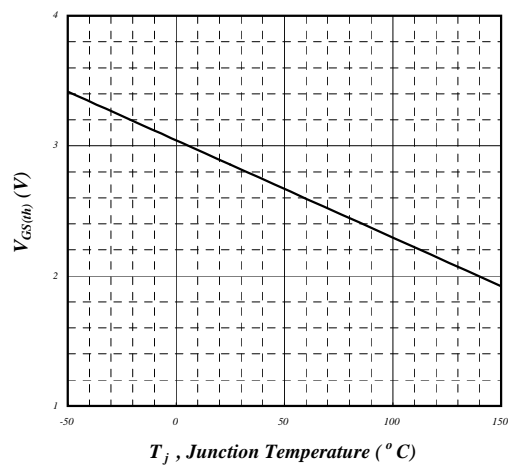


Fig 6. Gate Threshold Voltage v.s. Junction Temperature



AP09N90W

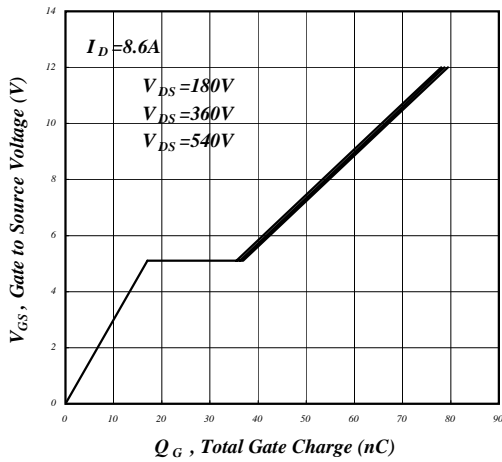


Fig 7. Gate Charge Characteristics

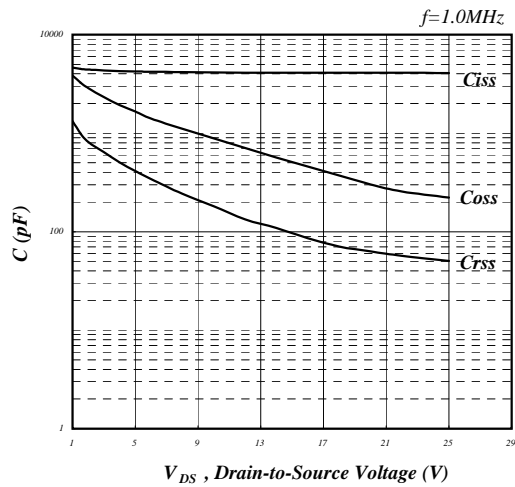


Fig 8. Typical Capacitance Characteristics

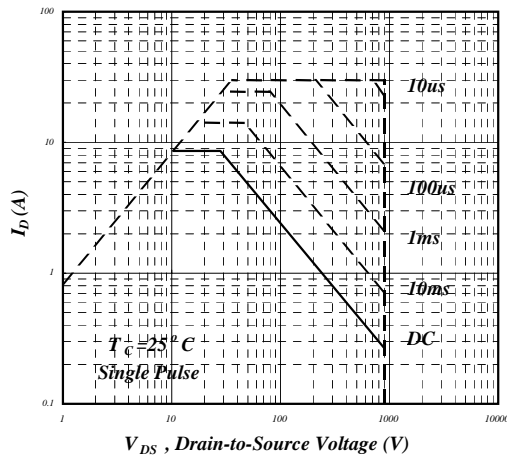


Fig 9. Maximum Safe Operating Area

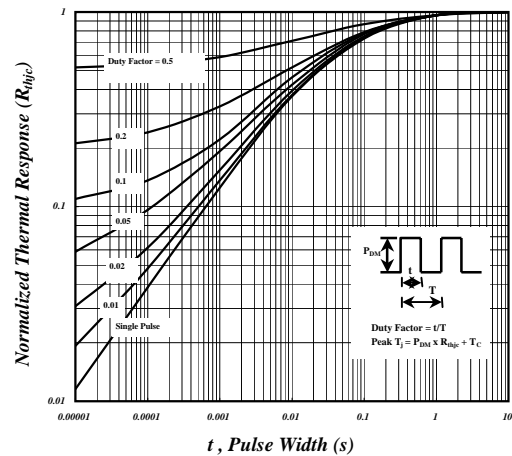


Fig 10. Effective Transient Thermal Impedance

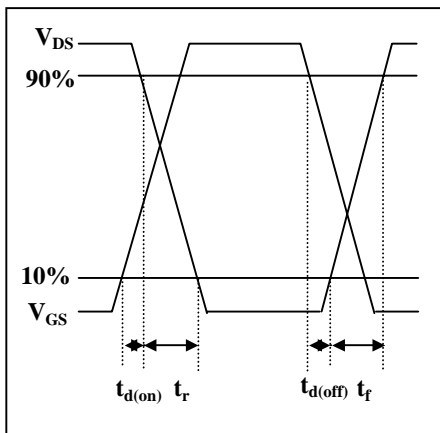


Fig 11. Switching Time Waveform

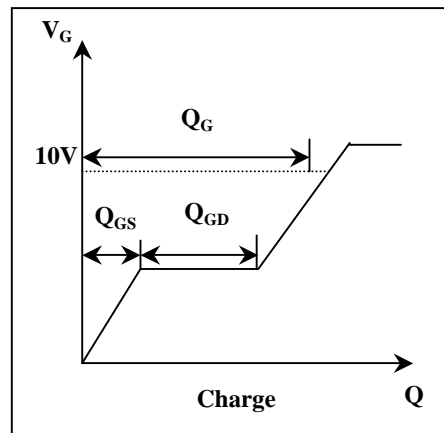


Fig 12. Gate Charge Waveform