

# AP09N70R-A-HF

**Halogen-Free Product**

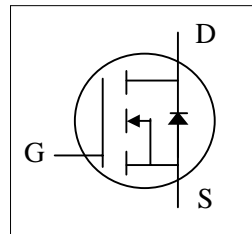


**Advanced Power  
Electronics Corp.**

*N-CHANNEL ENHANCEMENT MODE*

*POWER MOSFET*

- ▼ 100% Avalanche Test
- ▼ Fast Switching
- ▼ Simple Drive Requirement
- ▼ RoHS Compliant

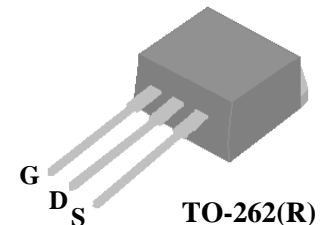


$BV_{DSS}$	650V
$R_{DS(ON)}$	0.75 $\Omega$
$I_D$	9A

## Description

AP09N70 series are from Advanced Power innovated design and silicon process technology to achieve the lowest possible on-resistance and fast switching performance. It provides the designer with an extreme efficient device for use in a wide range of power applications.

The TO-262 package is widely preferred for commercial-industrial through-hole applications and suited for low voltage applications such as DC/DC converters.



## Absolute Maximum Ratings @ $T_J=25^\circ\text{C}$ (unless otherwise specified)

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	650	V
$V_{GS}$	Gate-Source Voltage	+30	V
$I_D@T_C=25^\circ\text{C}$	Drain Current, $V_{GS}$ @ 10V	9	A
$I_D@T_C=100^\circ\text{C}$	Drain Current, $V_{GS}$ @ 10V	5	A
$I_{DM}$	Pulsed Drain Current <sup>1</sup>	40	A
$P_D@T_C=25^\circ\text{C}$	Total Power Dissipation	156	W
	Linear Derating Factor	1.25	W/ $^\circ\text{C}$
$E_{AS}$	Single Pulse Avalanche Energy <sup>2</sup>	305	mJ
$I_{AR}$	Avalanche Current	9	A
$E_{AR}$	Repetitive Avalanche Energy	9	mJ
$T_{STG}$	Storage Temperature Range	-55 to 150	$^\circ\text{C}$
$T_J$	Operating Junction Temperature Range	-55 to 150	$^\circ\text{C}$

## Thermal Data

Symbol	Parameter	Value	Unit
Rthj-c	Maximum Thermal Resistance, Junction-case	0.8	$^\circ\text{C}/\text{W}$
Rthj-a	Maximum Thermal Resistance, Junction-ambient	62	$^\circ\text{C}/\text{W}$



**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	$V_{GS}=0V, I_D=1mA$	650	-	-	V
$\Delta BV_{DSS}/\Delta T_j$	Breakdown Voltage Temperature Coefficient	Reference to $25^{\circ}\text{C}, I_D=1mA$	-	0.6	-	$V/^{\circ}\text{C}$
$R_{DS(ON)}$	Static Drain-Source On-Resistance <sup>3</sup>	$V_{GS}=10V, I_D=4.5A$	-	-	0.75	$\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	2	-	4	V
$g_{fs}$	Forward Transconductance	$V_{DS}=10V, I_D=4.5A$	-	4.5	-	S
$I_{DSS}$	Drain-Source Leakage Current	$V_{DS}=650V, V_{GS}=0V$	-	-	10	$\mu A$
	Drain-Source Leakage Current ( $T_j=125^{\circ}\text{C}$ )	$V_{DS}=520V, V_{GS}=0V$	-	-	500	$\mu A$
$I_{GSS}$	Gate-Source Leakage	$V_{GS}=\pm 30V, V_{DS}=0V$	-	-	$\pm 100$	nA
$Q_g$	Total Gate Charge <sup>3</sup>	$I_D=9A$	-	44	-	nC
$Q_{gs}$	Gate-Source Charge	$V_{DS}=480V$	-	11	-	nC
$Q_{gd}$	Gate-Drain ("Miller") Charge	$V_{GS}=10V$	-	12	-	nC
$t_{d(on)}$	Turn-on Delay Time <sup>3</sup>	$V_{DD}=300V$	-	19	-	ns
$t_r$	Rise Time	$I_D=9A$	-	21	-	ns
$t_{d(off)}$	Turn-off Delay Time	$R_G=10\Omega$	-	56	-	ns
$t_f$	Fall Time	$V_{GS}=10V$	-	24	-	ns
$C_{iss}$	Input Capacitance	$V_{GS}=0V$	-	2660	-	pF
$C_{oss}$	Output Capacitance	$V_{DS}=25V$	-	170	-	pF
$C_{rss}$	Reverse Transfer Capacitance	$f=1.0MHz$	-	10	-	pF

**Source-Drain Diode**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$I_S$	Continuous Source Current ( Body Diode )	$V_D=V_G=0V, V_S=1.5V$	-	-	9	A
$I_{SM}$	Pulsed Source Current ( Body Diode ) <sup>1</sup>		-	-	40	A
$V_{SD}$	Forward On Voltage <sup>3</sup>	$T_j=25^{\circ}\text{C}, I_S=9A, V_{GS}=0V$	-	-	1.5	V

**Notes:**

- 1.Pulse width limited by Max. junction temperature
- 2.Starting  $T_j=25^{\circ}\text{C}, V_{DD}=50V, L=6.8mH, R_G=25\Omega, I_{AS}=9A$ .
- 3.Pulse test

THIS PRODUCT IS SENSITIVE TO ELECTROSTATIC DISCHARGE, PLEASE HANDLE WITH CAUTION.

USE OF THIS PRODUCT AS A CRITICAL COMPONENT IN LIFE SUPPORT OR OTHER SIMILAR SYSTEMS IS NOT AUTHORIZED.

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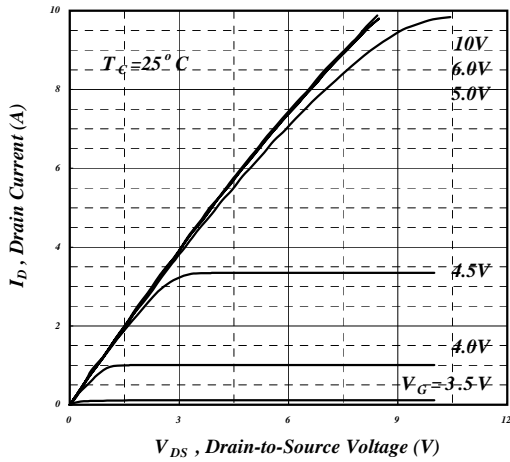


Fig 1. Typical Output Characteristics

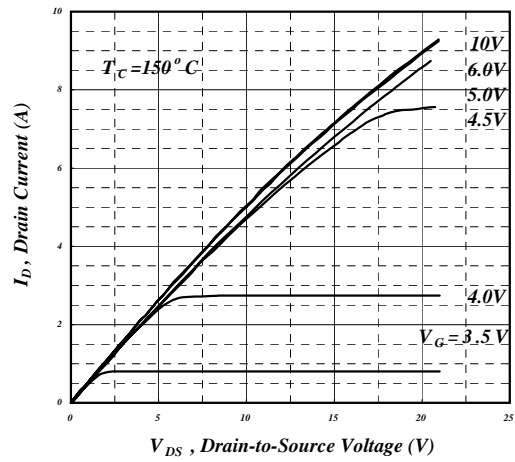


Fig 2. Typical Output Characteristics

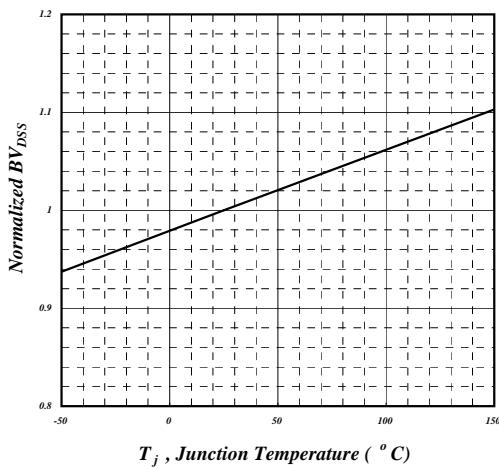


Fig 3. Normalized  $BV_{DSS}$  v.s. Junction Temperature

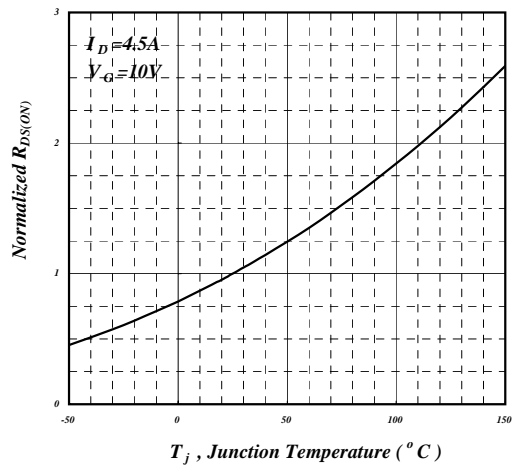


Fig 4. Normalized On-Resistance v.s. Junction Temperature

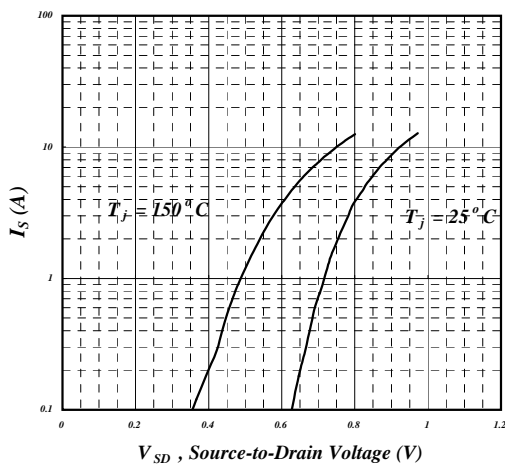


Fig 5. Forward Characteristic of Reverse Diode

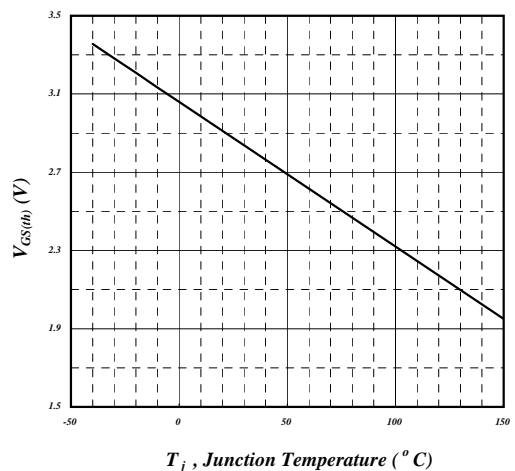


Fig 6. Gate Threshold Voltage v.s. Junction Temperature



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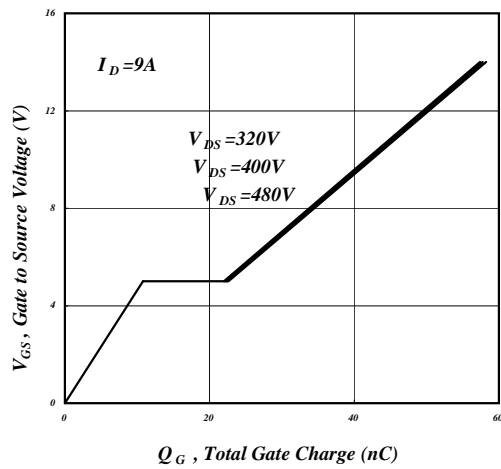


Fig 7. Gate Charge Characteristics

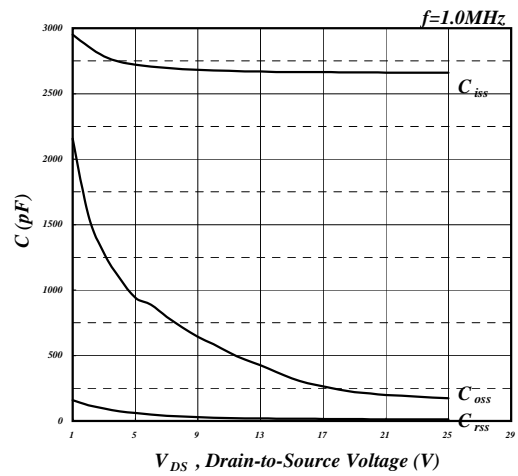


Fig 8. Typical Capacitance Characteristics

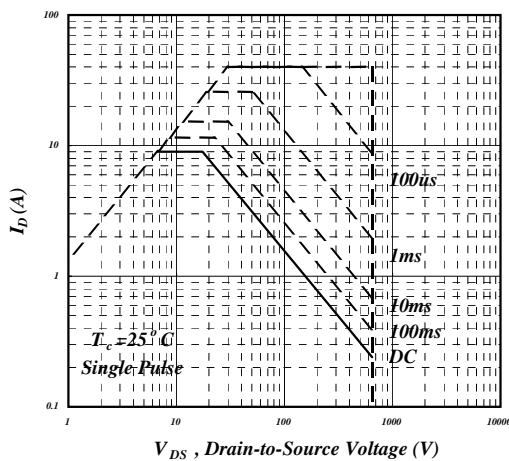


Fig 9. Maximum Safe Operating Area

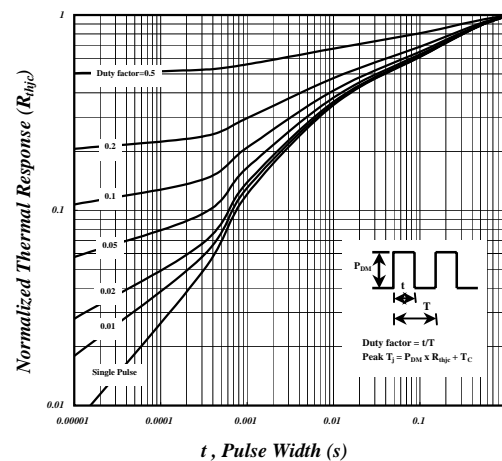


Fig 10. Effective Transient Thermal Impedance

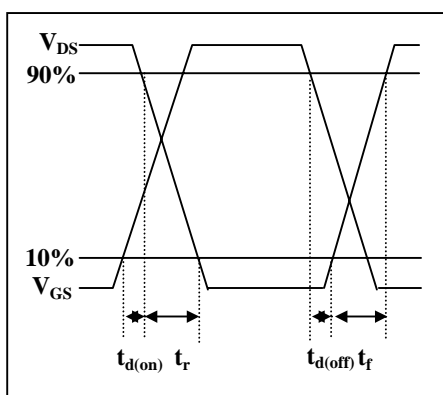


Fig 11. Switching Time Waveform

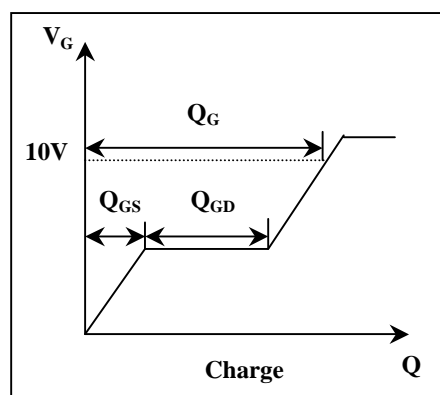


Fig 12. Gate Charge Waveform



## MARKING INFORMATION

