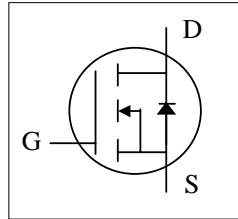




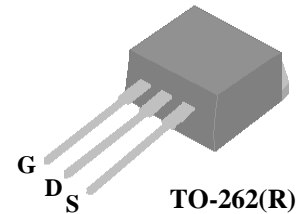
- ▼ 100% Avalanche Test
- ▼ Fast Switching
- ▼ Simple Drive Requirement



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

## Description

AP09N70 series are specially designed as main switching devices for universal 90~265VAC off-line AC/DC converter applications. TO-262 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	650	V
$V_{GS}$	Gate-Source Voltage	$\pm 30$	V
$I_D@T_C=25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$	9	A
$I_D@T_C=100^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$	5	A
$I_{DM}$	Pulsed Drain Current <sup>1</sup>	40	A
$P_D@T_C=25^\circ C$	Total Power Dissipation	156	W
	Linear Derating Factor	1.25	W/ $^\circ C$
$E_{AS}$	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	$^\circ C$
$T_J$	Operating Junction Temperature Range	-55 to 150	$^\circ C$

## Thermal Data

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



### 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	$V_{GS}=0V, I_D=1mA$	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	$R_G=10\Omega, V_{GS}=10V$	-	56	-	ns
$t_f$	Fall Time	$R_D=34\Omega$	-	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.

APEC DOES NOT ASSUME ANY LIABILITY ARISING OUT OF THE APPLICATION OR USE OF ANY PRODUCT OR CIRCUIT DESCRIBED HEREIN; NEITHER DOES IT CONVEY ANY LICENSE UNDER ITS PATENT RIGHTS, NOR THE RIGHTS OF OTHERS.

APEC RESERVES THE RIGHT TO MAKE CHANGES WITHOUT FURTHER NOTICE TO ANY PRODUCTS HEREIN TO IMPROVE RELIABILITY, FUNCTION OR DESIGN.

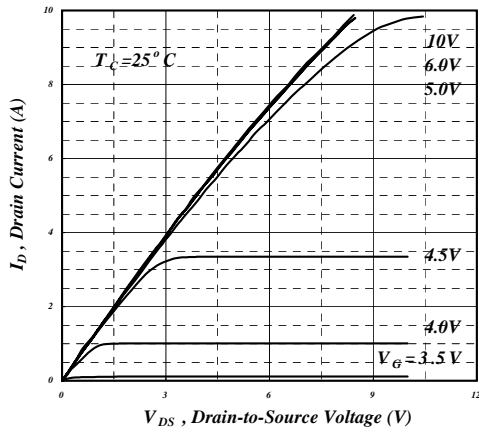


Fig 1. Typical Output Characteristics

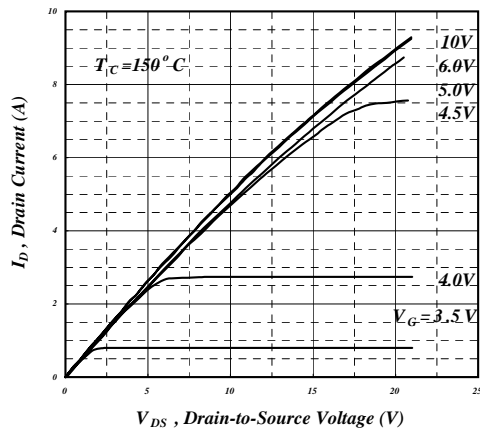


Fig 2. Typical Output Characteristics

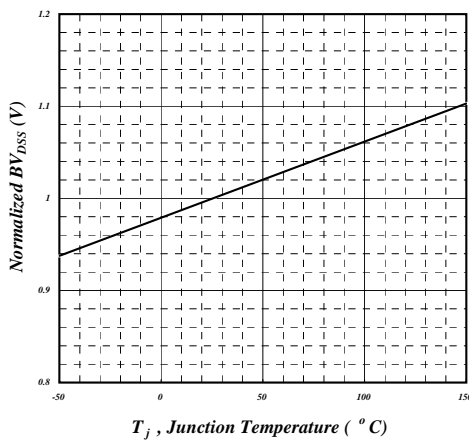


Fig 3. Normalized  $BV_{DSS}$  v.s. Junction Temperature

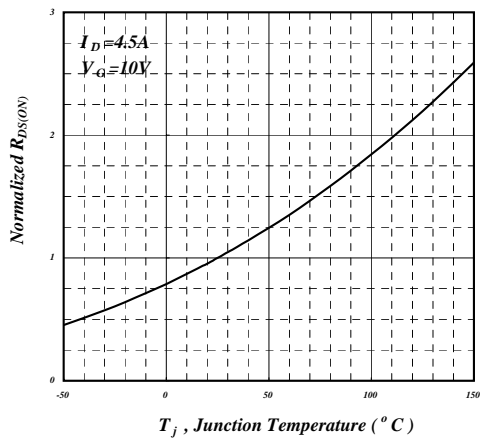


Fig 4. Normalized On-Resistance v.s. Junction Temperature

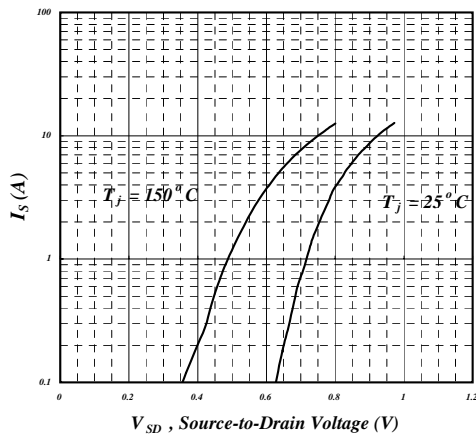


Fig 5. Forward Characteristic of Reverse Diode

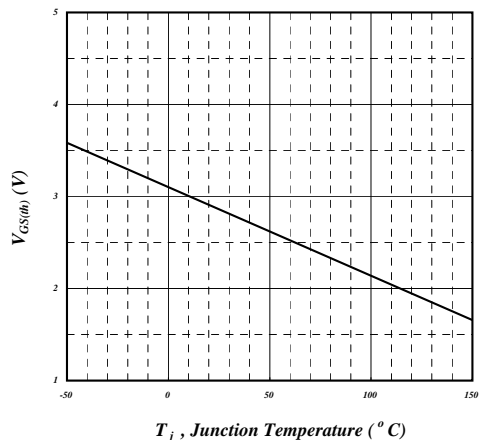


Fig 6. Gate Threshold Voltage v.s. Junction Temperature



# AP09N70R-A

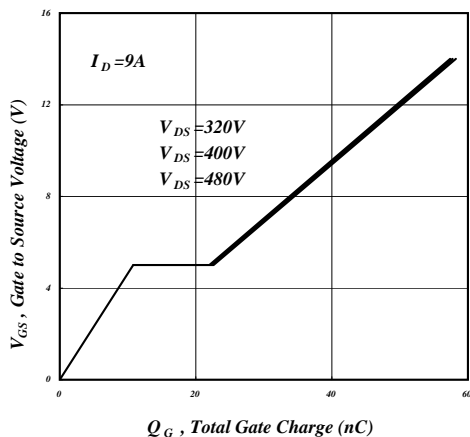


Fig 7. Gate Charge Characteristics

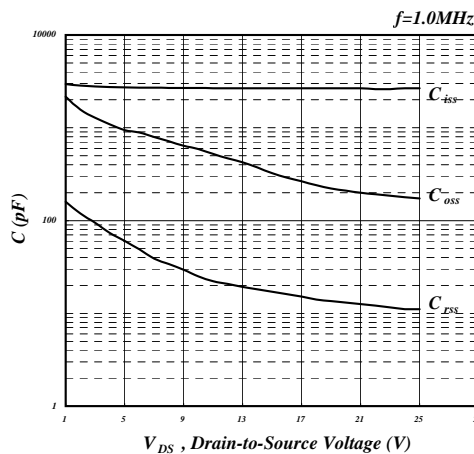


Fig 8. Typical Capacitance Characteristics

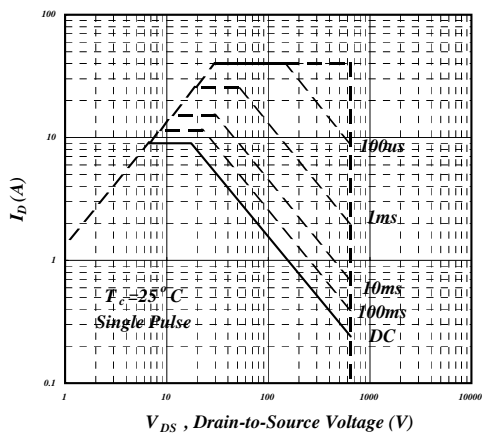


Fig 9. Maximum Safe Operating Area

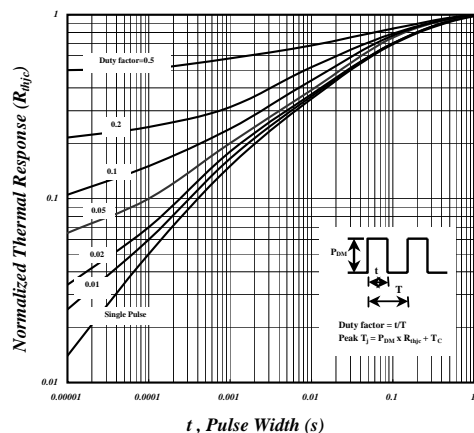


Fig 10. Effective Transient Thermal Impedance

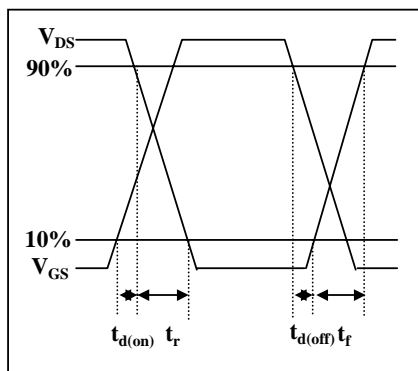


Fig 11. Switching Time Waveform

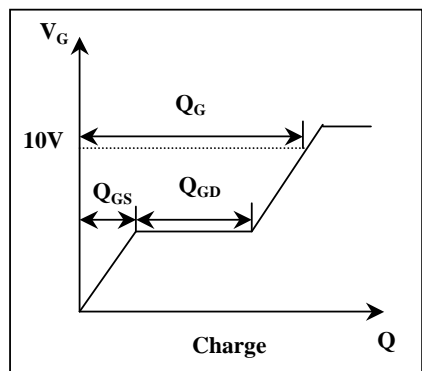


Fig 12. Gate Charge Waveform