



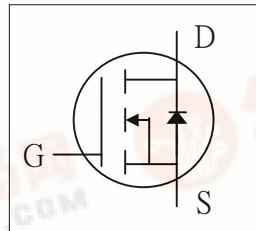
**Advanced Power
Electronics Corp.**

AP09N70I-A

Pb Free Plating Product

**N-CHANNEL ENHANCEMENT MODE
POWER MOSFET**

- ▼ Dynamic dv/dt Rating
- ▼ Repetitive Avalanche Rated
- ▼ Fast Switching
- ▼ Simple Drive Requirement
- ▼ RoHS Compliant

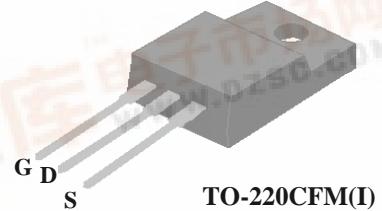


BV_{DSS}	650V
$R_{DS(ON)}$	0.75Ω
I_D	9A

Description

The Advanced Power MOSFETs from APEC provide the designer with the best combination of fast switching, ruggedized device design, low on-resistance and cost-effectiveness.

The TO-220CFM isolation package is universally preferred for all commercial-industrial through hole applications.



TO-220CFM(I)

Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	650	V
V_{GS}	Gate-Source Voltage	±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 ¹	40	A
$P_D @ T_C = 25^\circ C$	Total Power Dissipation	42	W
	Linear Derating Factor	0.34	W/°C
E_{AS}	Single Pulse Avalanche Energy ²	305	mJ
I_{AR}	Avalanche Current	9	A
E_{AR}	Repetitive Avalanche Energy	9	mJ
T_{STG}	Storage Temperature Range	-55 to 150	°C
T_J	Operating Junction Temperature Range	-55 to 150	°C

Thermal Data

Symbol	Parameter	Value	Units
R_{thj-c}	Thermal Resistance Junction-case	Max. 3	°C/W
R_{thj-a}	Thermal Resistance Junction-ambient	Max. 65	°C/W



AP09N70I-A

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	$V_{\text{GS}}=0\text{V}$, $I_D=1\text{mA}$	650	-	-	V
$\Delta \text{BV}_{\text{DSS}}/\Delta T_j$	Breakdown Voltage Temperature Coefficient	Reference to 25°C , $I_D=1\text{mA}$	-	0.6	-	$\text{V}/^\circ\text{C}$
$R_{\text{DS}(\text{ON})}$	Static Drain-Source On-Resistance	$V_{\text{GS}}=10\text{V}$, $I_D=4.5\text{A}$	-	-	0.75	Ω
$V_{\text{GS}(\text{th})}$	Gate Threshold Voltage	$V_{\text{DS}}=V_{\text{GS}}$, $I_D=250\mu\text{A}$	2	-	4	V
g_{fs}	Forward Transconductance	$V_{\text{DS}}=50\text{V}$, $I_D=4.5\text{A}$	-	4.5	-	S
I_{DSS}	Drain-Source Leakage Current ($T_j=25^\circ\text{C}$)	$V_{\text{DS}}=600\text{V}$, $V_{\text{GS}}=0\text{V}$	-	-	10	μA
	Drain-Source Leakage Current ($T_j=150^\circ\text{C}$)	$V_{\text{DS}}=480\text{V}$, $V_{\text{GS}}=0\text{V}$	-	-	100	μA
I_{GSS}	Gate-Source Leakage	$V_{\text{GS}}=\pm 30\text{V}$	-	-	± 100	nA
Q_g	Total Gate Charge ³	$I_D=9\text{A}$	-	44	-	nC
Q_{gs}	Gate-Source Charge	$V_{\text{DS}}=480\text{V}$	-	11	-	nC
Q_{gd}	Gate-Drain ("Miller") Charge	$V_{\text{GS}}=10\text{V}$	-	12	-	nC
$t_{\text{d}(\text{on})}$	Turn-on Delay Time ³	$V_{\text{DD}}=300\text{V}$	-	19	-	ns
t_r	Rise Time	$I_D=9\text{A}$	-	21	-	ns
$t_{\text{d}(\text{off})}$	Turn-off Delay Time	$R_G=10\Omega$, $V_{\text{GS}}=10\text{V}$	-	56	-	ns
t_f	Fall Time	$R_D=34\Omega$	-	24	-	ns
C_{iss}	Input Capacitance	$V_{\text{GS}}=0\text{V}$	-	2660	-	pF
C_{oss}	Output Capacitance	$V_{\text{DS}}=25\text{V}$	-	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)	$V_D=V_G=0\text{V}$, $V_S=1.5\text{V}$	-	-	9	A
I_{SM}	Pulsed Source Current (Body Diode) ¹		-	-	40	A
V_{SD}	Forward On Voltage ³	$T_j=25^\circ\text{C}$, $I_s=9\text{A}$, $V_{\text{GS}}=0\text{V}$	-	-	1.5	V

Notes:

1. Pulse width limited by safe operating area.
2. Starting $T_j=25^\circ\text{C}$, $V_{\text{DD}}=50\text{V}$, $L=6.8\text{mH}$, $R_G=25\Omega$, $I_{\text{AS}}=9\text{A}$.
3. Pulse width $\leq 300\text{us}$, duty cycle $\leq 2\%$.

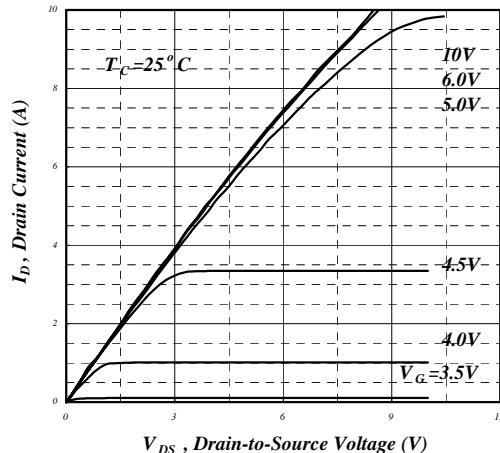


Fig 1. Typical Output Characteristics

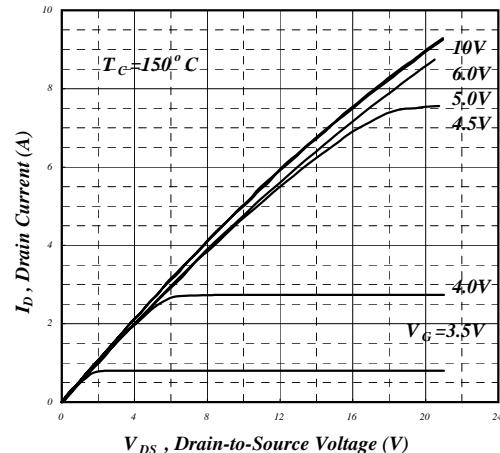


Fig 2. Typical Output Characteristics

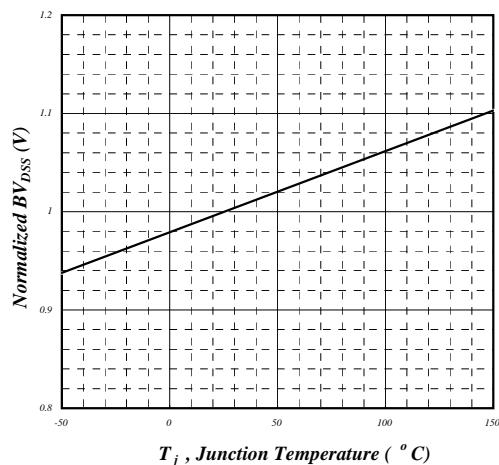
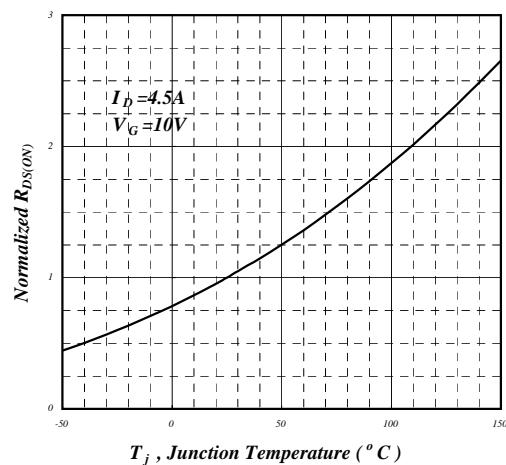
Fig 3. Normalized BV_{DSS} v.s. Junction Temperature

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

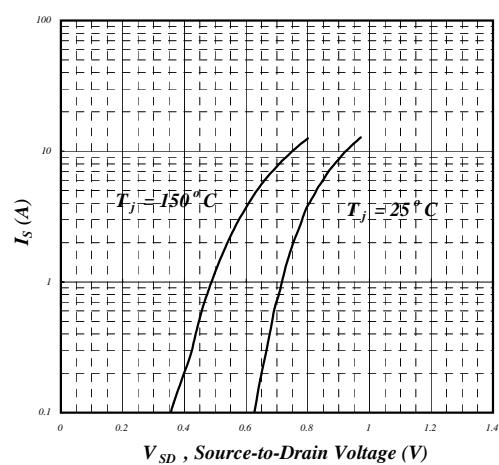


Fig 5. Forward Characteristic of Reverse Diode

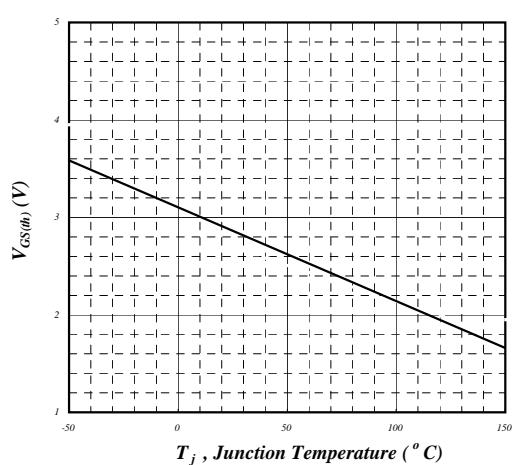


Fig 6. Gate Threshold Voltage v.s. Junction Temperature



AP09N70I-A

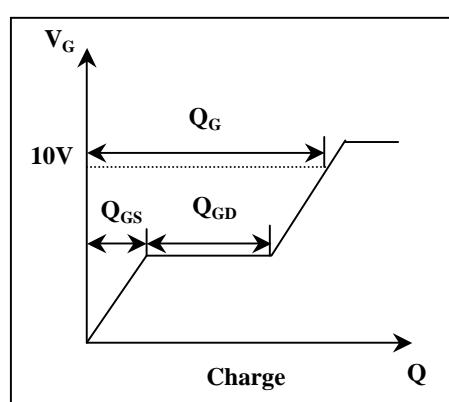
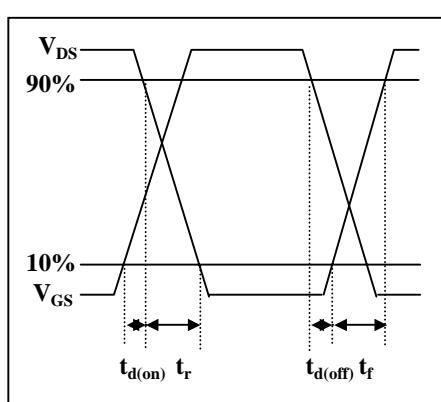
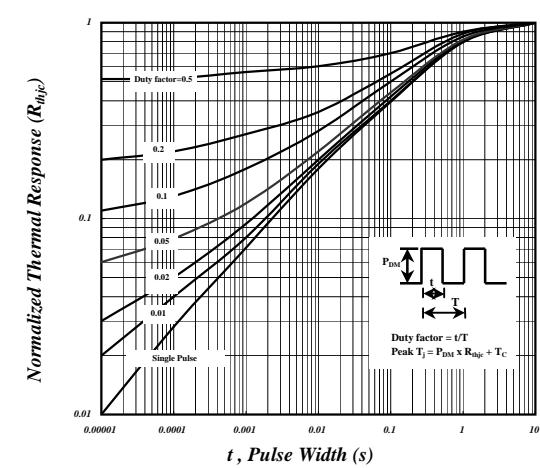
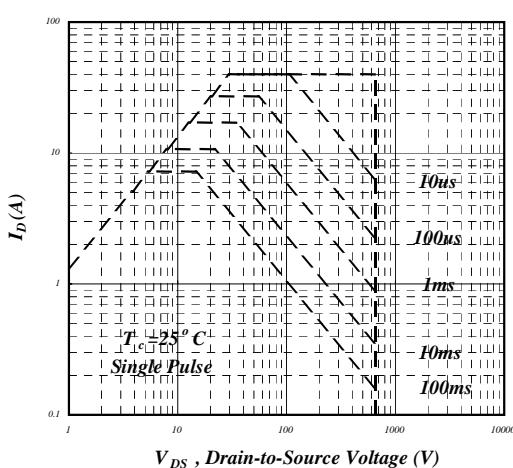
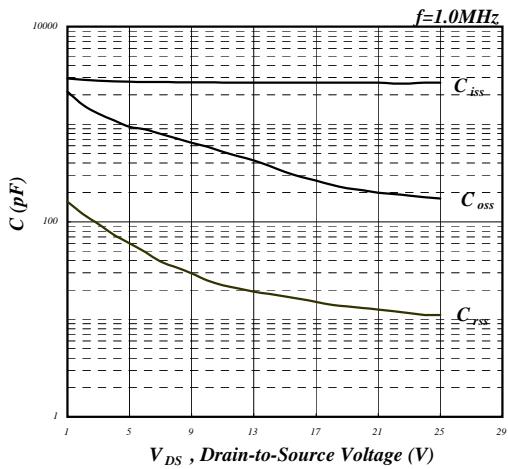
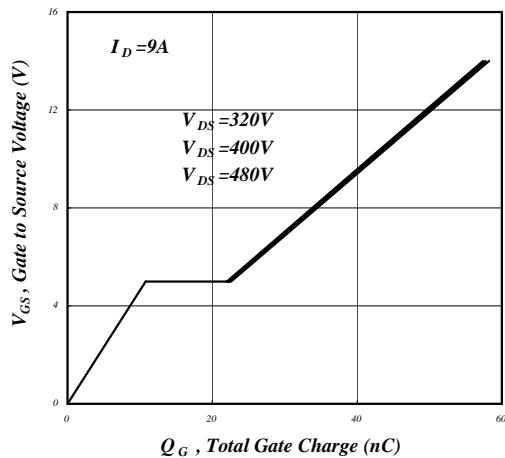


Fig 11. Switching Time Waveform

Fig 12. Gate Charge Waveform