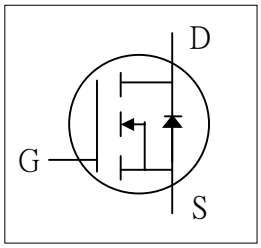
AP04N70BF-A

RoHS-compliant Product

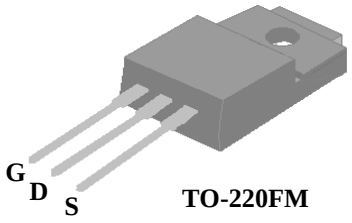
Advanced Power Electronics Corp.

N-CHANNEL ENHANCEMENT MODE POWER MOSFET

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



BV_{DSS}	650V
$R_{DS(ON)}$	2.4Ω
I_D	4A



TO-220FM

Description

AP04N70 series are specially designed as main switching devices for universal 90~265VAC off-line AC/DC converter applications. TO-220FM 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.

The TO-220FM package is widely preferred for all commercial-industrial applications. The device is suited for switch mode power supplies ,DC-AC converters and high current high speed switching circuits.

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℃	Continuous Drain Current, V_{GS} @ 10V	4	A
I_D@T_C=100℃	Continuous Drain Current, V_{GS} @ 10V	2.5	A
I_{DM}	Pulsed Drain Current[1]	15	A
P_D@T_C=25℃	Total Power Dissipation	33	W
	Linear Derating Factor	0.26	W/℃
E_{AS}	Single Pulse Avalanche Energy[2]	100	mJ
I_{AR}	Avalanche Current	4	A
E_{AR}	Repetitive Avalanche Energy	4	mJ
T_{STG}	Storage Temperature Range	-55 to 150	℃
T_J	Operating Junction Temperature Range	-55 to 150	℃

Thermal Data

Symbol	Parameter	Value	Units
Rthj-c	Maximum Thermal Resistance, Junction-case	3.8	℃/W
Rthj-a	Maximum Thermal Resistance, Junction-ambient	65	℃/W

Electrical Characteristics@T_j=25°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℃, I_D=1mA	-	0.6	-	V/℃
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS}=10V, I_D=2A	-	-	2.4	Ω
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_D=250uA	2	-	4	V
g_{fs}	Forward Transconductance	V_{DS}=10V, I_D=2A	-	2.5	-	S
I_{DSS}	Drain-Source Leakage Current	V_{DS}=600V, V_{GS}=0V	-	-	10	uA
	Drain-Source Leakage Current (T_j=150°C)	V_{DS}=480V, V_{GS}=0V	-	-	100	uA
I_{GSS}	Gate-Source Leakage	V_{GS}=±30V	-	-	±100	nA
Q_g	Total Gate Charge[3]	I_D=4A	-	16.7	-	nC
Q_{gs}	Gate-Source Charge	V_{DS}=480V	-	4.1	-	nC
Q_{gd}	Gate-Drain ("Miller") Charge	V_{GS}=10V	-	4.9	-	nC
$t_{d(on)}$	Turn-on Delay Time[3]	V_{DD}=300V	-	11	-	ns
t_r	Rise Time	I_D=4A	-	8.3	-	ns
$t_{d(off)}$	Turn-off Delay Time	R_G=10Ω,V_{GS}=10V	-	23.8	-	ns
t_f	Fall Time	R_D=75Ω	-	8.2	-	ns
C_{iss}	Input Capacitance	V_{GS}=0V	-	950	-	pF
C_{oss}	Output Capacitance	V_{DS}=25V	-	65	-	pF
C_{rss}	Reverse Transfer Capacitance	f=1.0MHz	-	6	-	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	-	-	4	A
I_{SM}	Pulsed Source Current (Body Diode)[1]		-	-	15	A
V_{SD}	Forward On Voltage[3]	T_j=25℃, I_S=4A, V_{GS}=0V	-	-	1.5	V

Notes:

1.Pulse width limited by max. junction temperature

2.Starting Tj=25°C , V_{DD}=50V , L=25mH , R_G=25Ω , I_{AS}=4A.

3.Pulse test

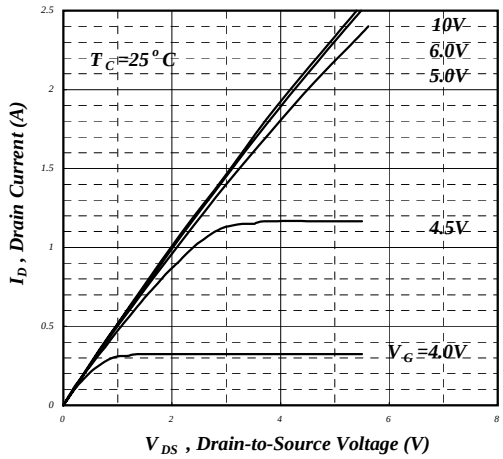


Fig 1. Typical Output Characteristics

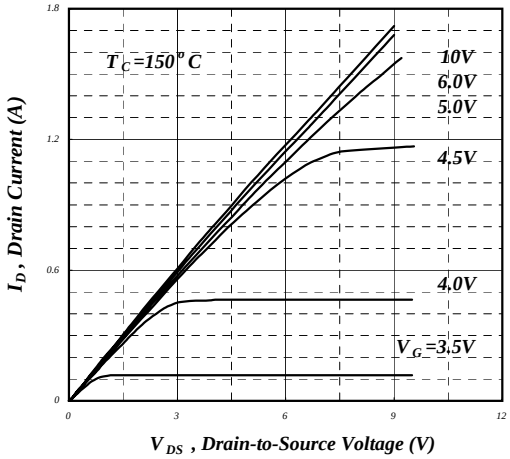


Fig 2. Typical Output Characteristics

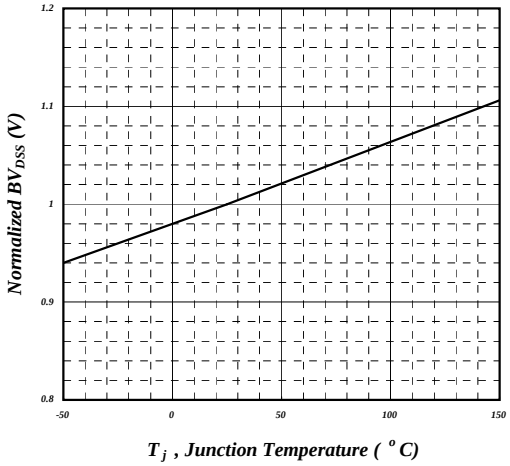


Fig 3. Normalized BV_{DSS} v.s. Junction Temperature

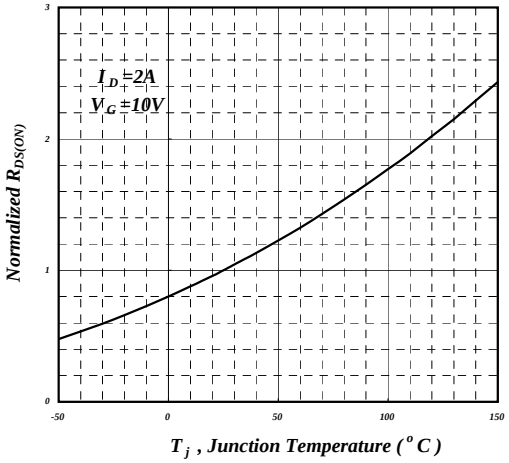


Fig 4. Normalized On-Resistance v.s. Junction Temperature

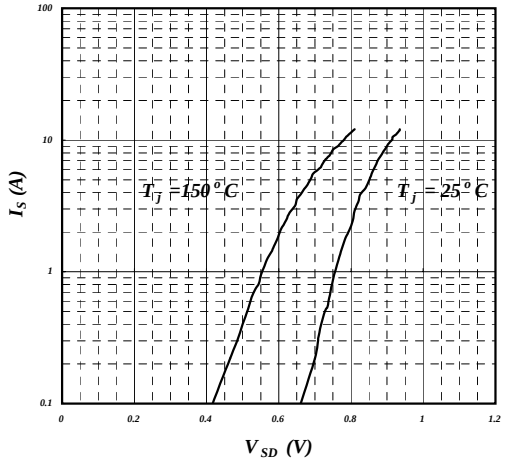


Fig 5. Forward Characteristic of Reverse Diode

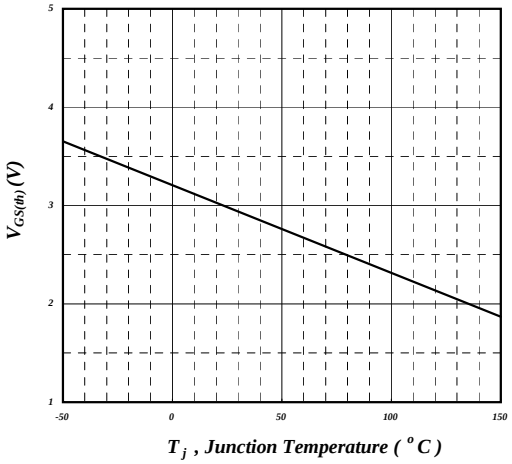


Fig 6. Gate Threshold Voltage v.s. Junction Temperature

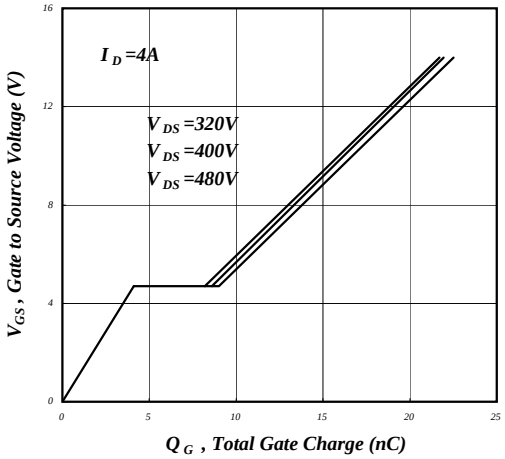


Fig 7. Gate Charge Characteristics

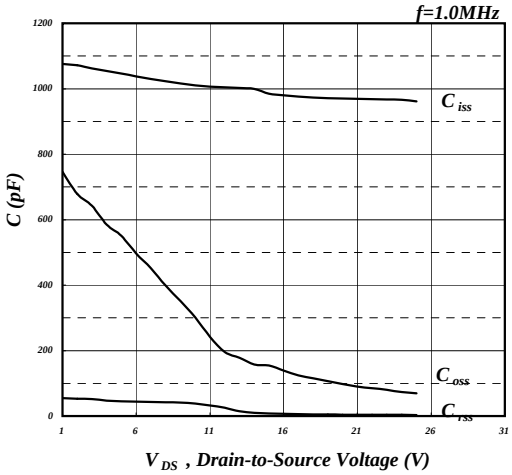


Fig 8. Typical Capacitance Characteristics

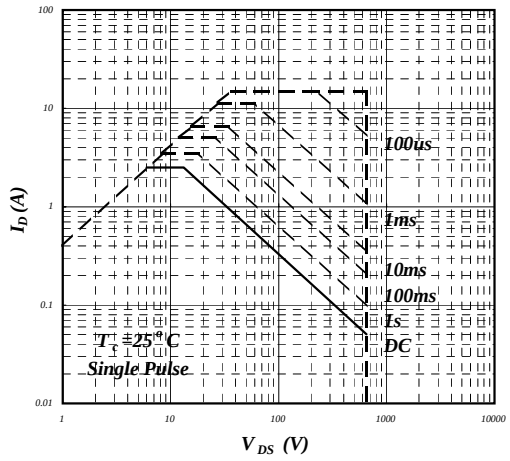


Fig 9. Maximum Safe Operating Area

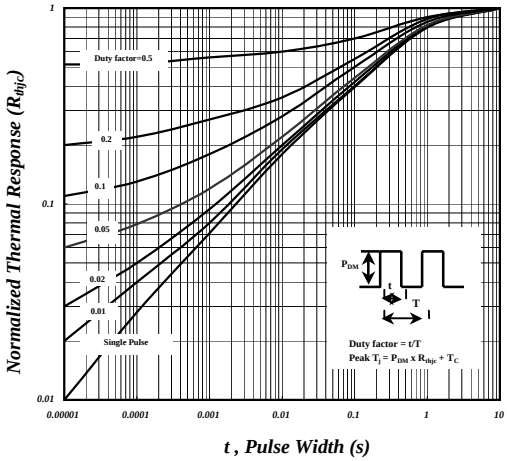


Fig 10. Effective Transient Thermal Impedance

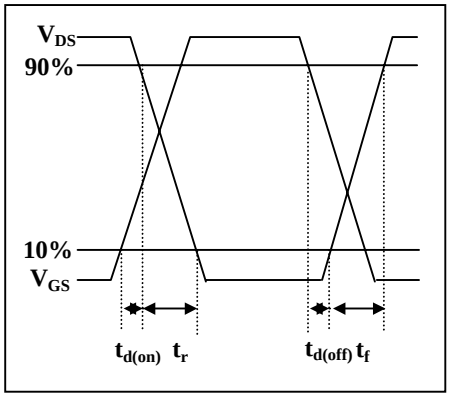


Fig 11. Switching Time Waveform

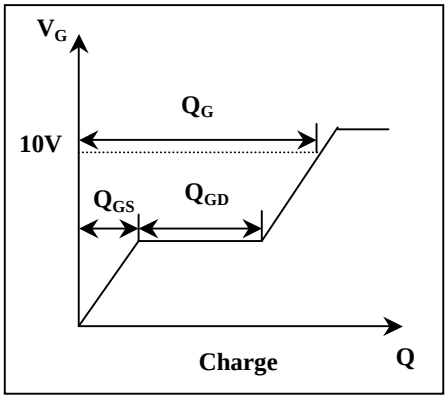
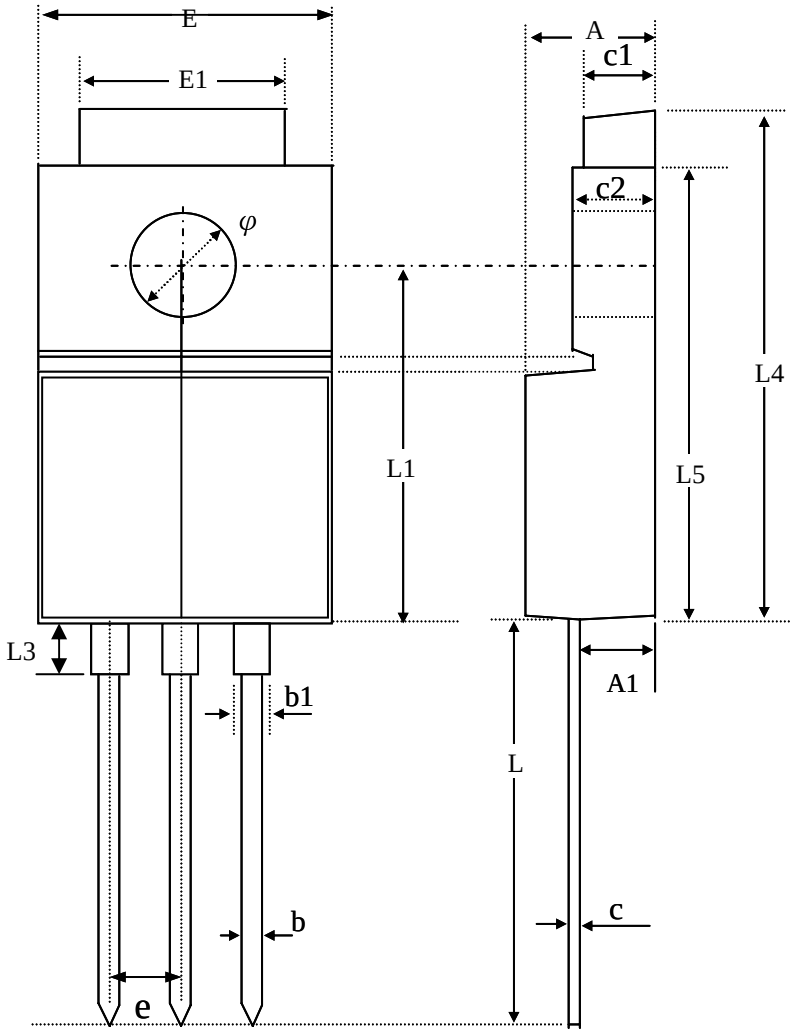


Fig 12. Gate Charge Waveform

Package Outline : TO-220FM

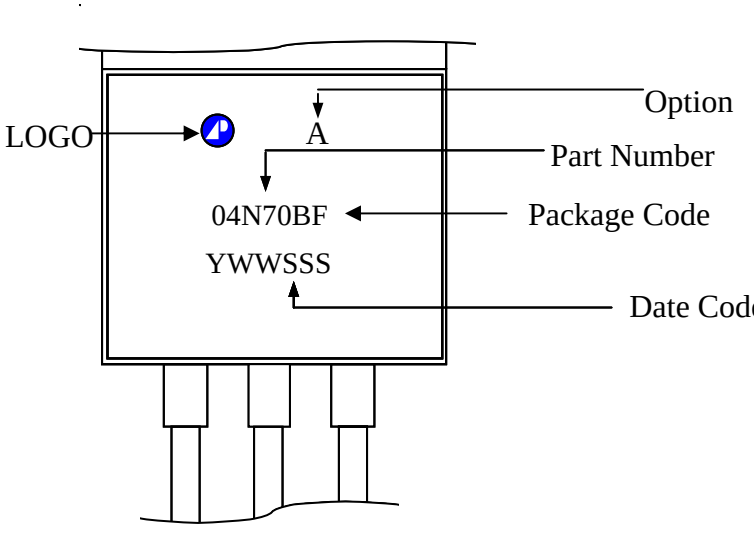


SYMBOLS	Millimeters		
	MIN	NOM	MAX
A	4.25	4.45	4.65
A1	2.30	2.50	2.70
b	0.60	0.70	0.80
b1	1.00	1.20	1.40
c	0.40	0.50	0.60
c1	2.30	2.50	2.70
c2	2.60	2.80	3.00
E	9.70	10.00	10.30
E1	6.70	7.00	7.30
e	----	2.54	----
L	13.00	14.00	15.00
L1	11.70	12.00	12.30
L3	1.65	1.70	1.75
L4	16.70	17.00	17.30
L5	14.90	15.20	15.50
φ	----	3.20	----

1.All Dimensions Are in Millimeters.

2.Dimension Does Not Include Mold Protrusions.

Part Marking Information & Packing : TO-220FM



Option

Part Number

Package Code

Date Code (YWWSSS)

Y：Last Digit Of The Year

WW：Week

SSS：Sequence