AP04N70BI-A-HF

Advanced Power Electronics Corp.

N-CHANNEL ENHANCEMENT MODE

POWER MOSFET

▼ **100% Avalanche Test**

▼ **Fast Switching Characteristic**

▼ **Simple Drive Requirement**

▼ **RoHS Compliant & Halogen-Free**
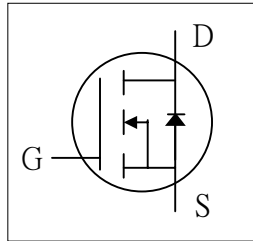
BV_{DSS}	650V
$R_{DS(ON)}$	2.4Ω
I_D	4A

Description

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 widely preferred for all commercial-industrial through hole applications.

G
D S
TO-220CFM(I)
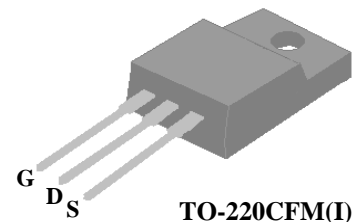
Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	650	V
V_{GS}	Gate-Source Voltage	$\pm$30	V
I_D@T_C=25℃	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]	8	mJ
I_{AR}	Avalanche Current	4	A
T_{STG}	Storage Temperature Range	-55 to 150	℃
T_J	Operating Junction Temperature Range	-55 to 150	℃

Thermal Data

Symbol	Parameter	Value	Unit
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
ΔBV$_{DSS}$/ΔT$_j$	Breakdown Voltage Temperature Coefficient	Reference to 25℃, I$_D$=1mA	-	0.6	-	V/℃
R$_{DS(ON)}$	Static Drain-Source On-Resistance[3]	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$_j$=125°C)	V$_{DS}$=480V,V$_{GS}$=0V	-	-	500	uA
I$_{GSS}$	Gate-Source Leakage	V$_{GS}$=$\pm$30V, V$_{DS}$=0V	-	-	$\pm$100	nA
Q$_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=1mH , R$_G$=25Ω , I$_{AS}$=4A.
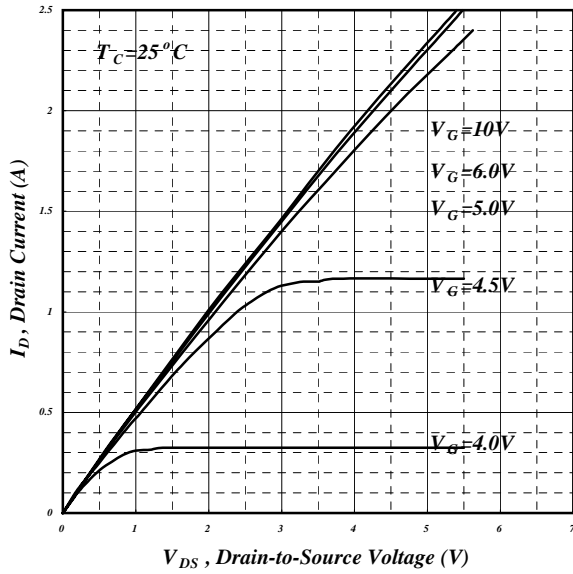
3.Pulse test

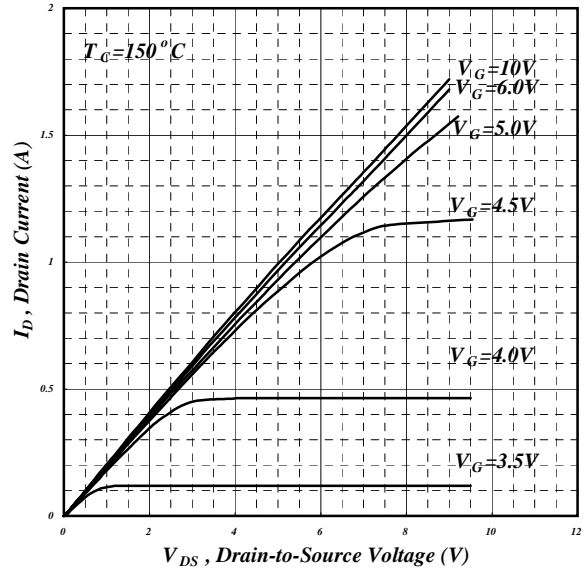**Fig 1. Typical Output Characteristics**

Fig 2. Typical Output Characteristics
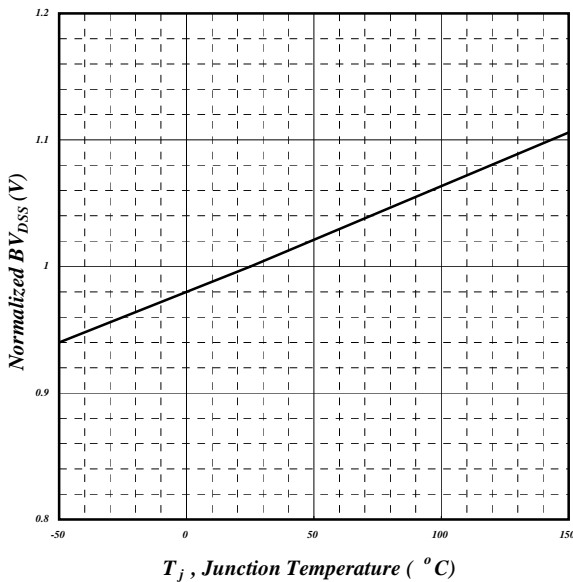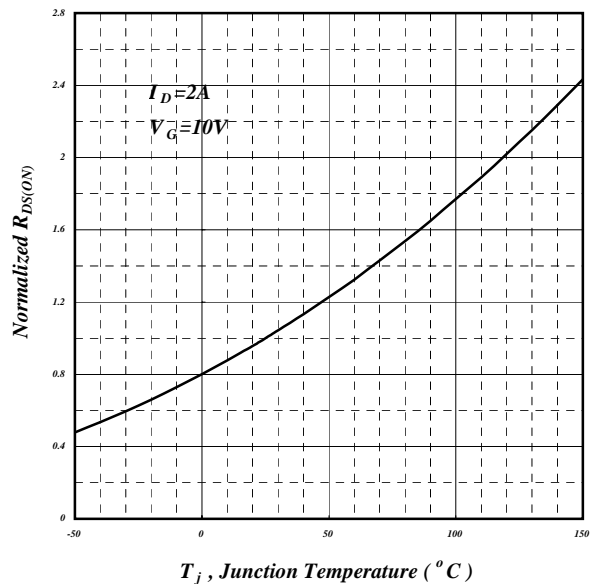

Fig 3. Normalized BV$_{DSS}$ v.s. Junction Temperature

Fig 4. Normalized On-Resistance v.s. Junction Temperature
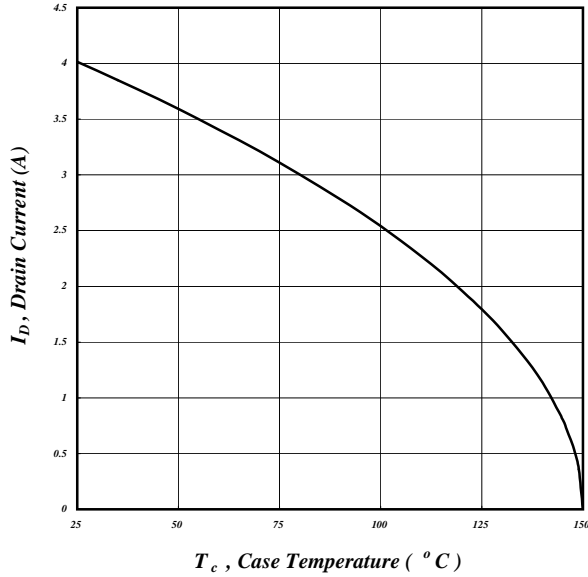
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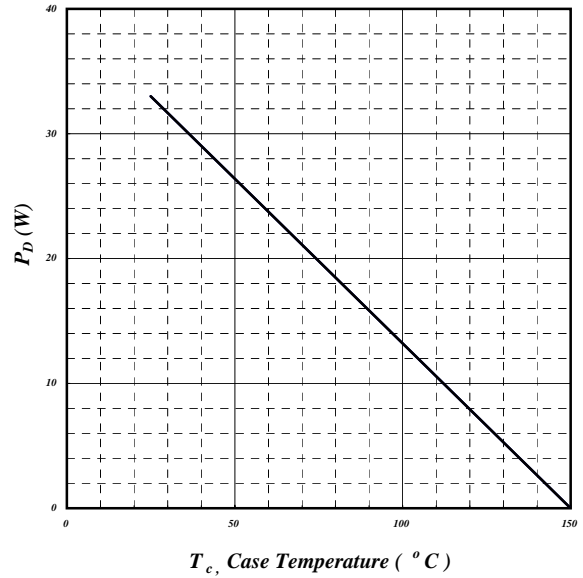Fig 5. Maximum Drain Current v.s. Case Temperature
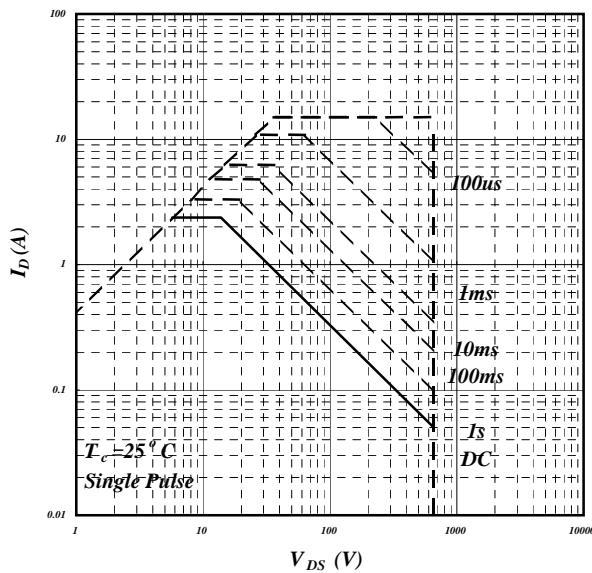

Fig 6. Typical Power Dissipation

Fig 7. Maximum Safe Operating Area

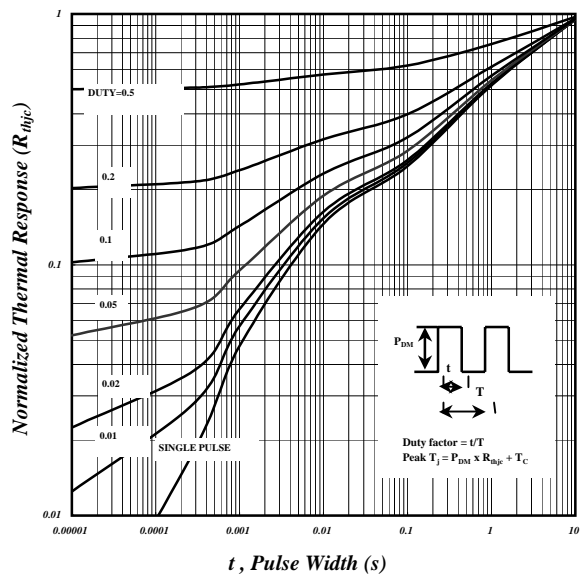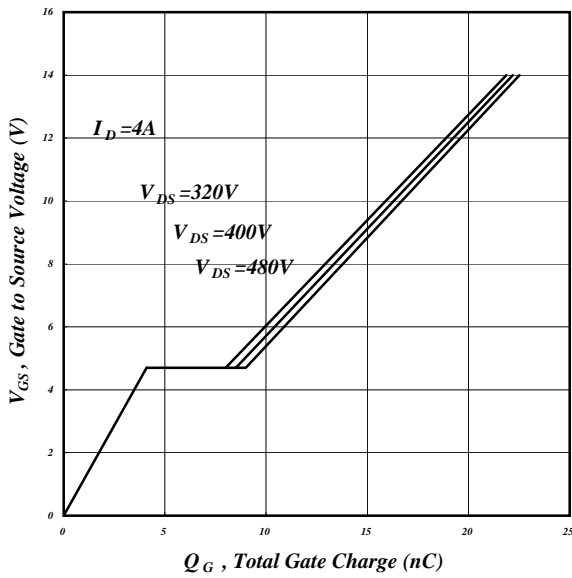Fig 8. Effective Transient Thermal Impedance
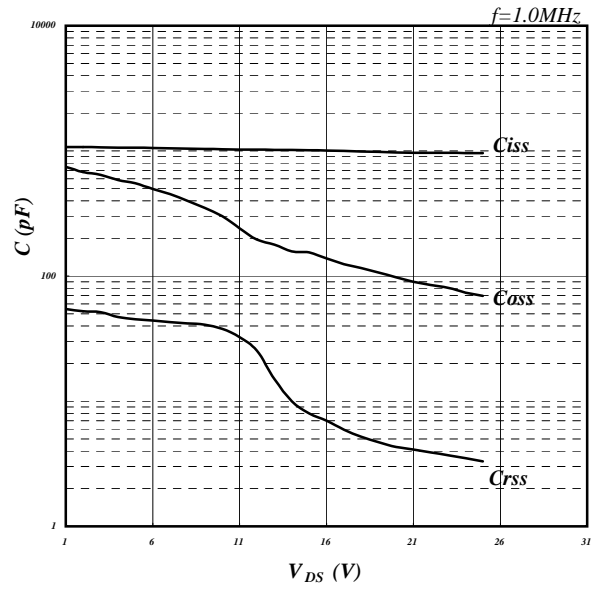
Fig 9. Gate Charge Characteristics

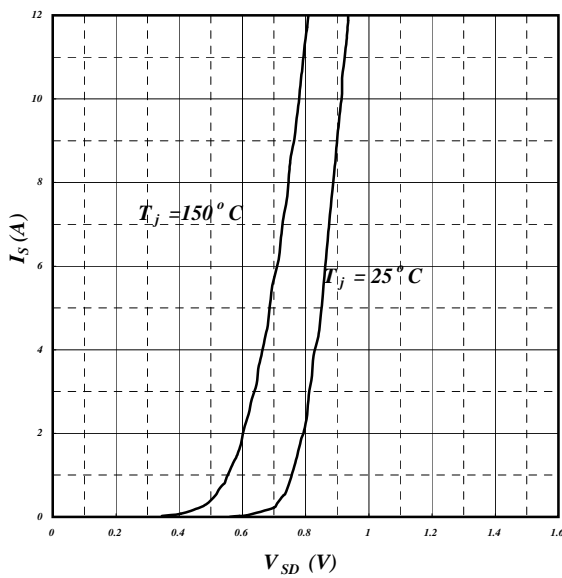**Fig 10. Typical Capacitance Characteristics**
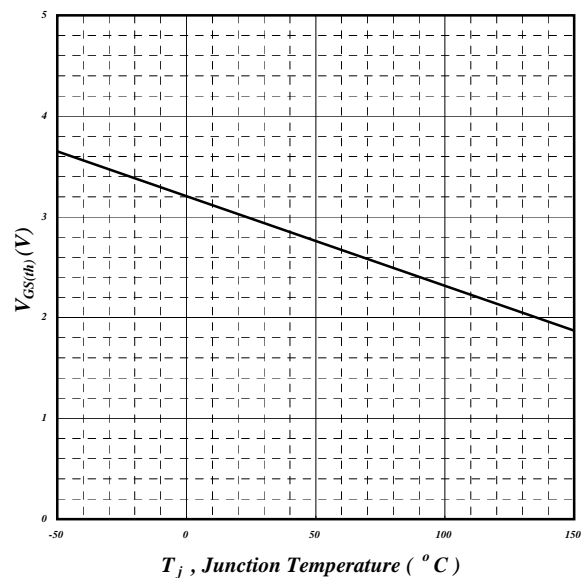

Fig 11. Forward Characteristic of Reverse Diode

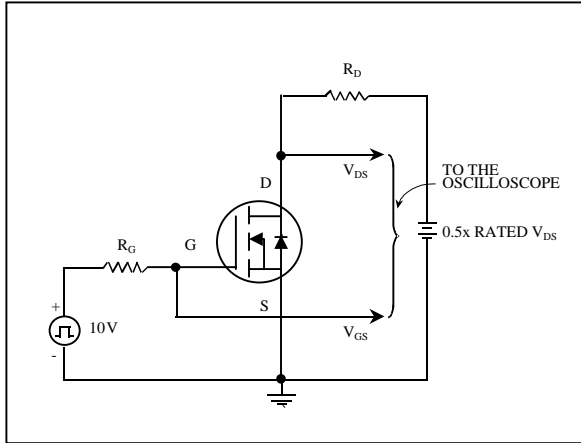**Fig 12. Gate Threshold Voltage v.s. Junction Temperature**
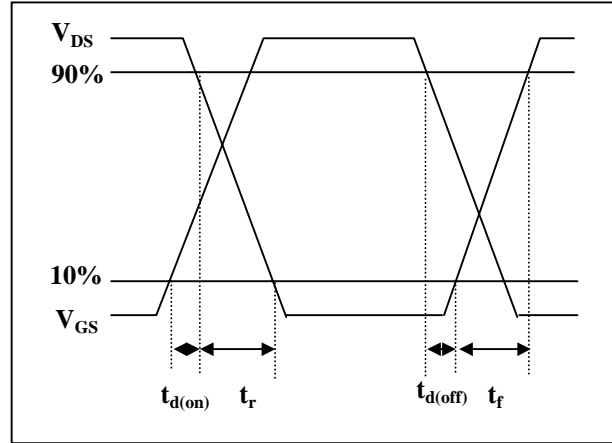
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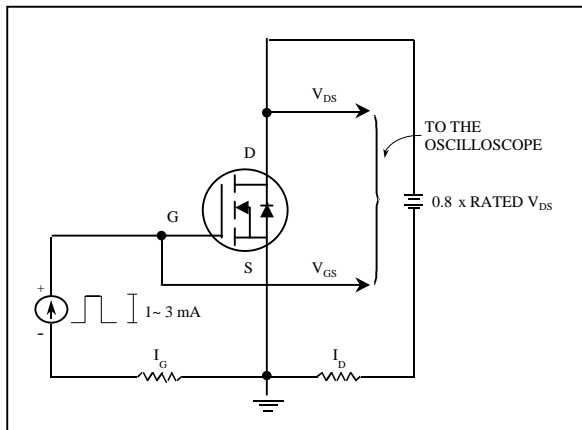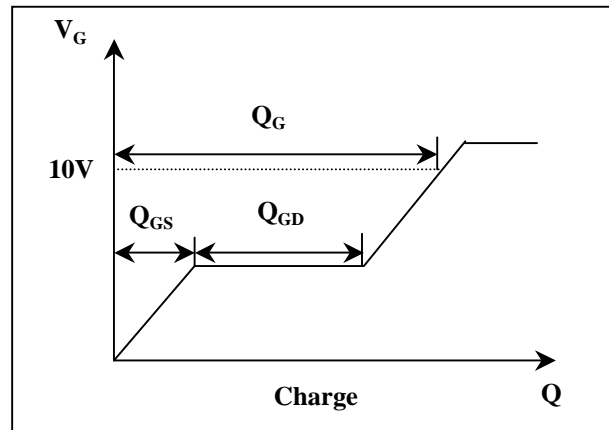**Fig 13. Switching Time Circuit**

Fig 14. Switching Time Waveform

Fig 15. Gate Charge Circuit

Fig 16. Gate Charge Waveform