Advanced Power Electronics Corp.

N AND P-CHANNEL ENHANCEMENT MODE POWER MOSFET

▼ **Simple Drive Requirement**

▼ **Low On-resistance**

▼ **Fast Switching Characteristic**

PDIP-8

N-CH	BV_{DSS}	30V
	$R_{DS(ON)}$	27mΩ
	I_D	7A
P-CH	BV_{DSS}	-30V
	$R_{DS(ON)}$	49mΩ
	I_D	-5A

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.

Absolute Maximum Ratings

Symbol	Parameter	Rating		Units
		N-channel	P-channel	
V_{DS}	Drain-Source Voltage	30	-30	V
V_{GS}	Gate-Source Voltage	±20	±20	V
I_D@T_A=25℃	Continuous Drain Current[3]	7	-5	A
I_D@T_A=70℃	Continuous Drain Current[3]	5.8	-4.2	A
I_{DM}	Pulsed Drain Current[1]	40	-30	A
P_D@T_A=25℃	Total Power Dissipation	2		W
	Linear Derating Factor	0.016		W/℃
T_{STG}	Storage Temperature Range	-55 to 150		℃
T_J	Operating Junction Temperature Range	-55 to 150		℃

Thermal Data

Symbol	Parameter	Value	Unit
Rthj-a	Maximum Thermal Resistance, Junction-ambient[3]	62.5	℃/W

N-CH 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$_D$=250uA	30	-	-	V
R$_{DS(ON)}$	Static Drain-Source On-Resistance[2]	V$_{GS}$=10V, I$_D$=7A	-	-	27	mΩ
		V$_{GS}$=4.5V, I$_D$=5A	-	-	50	mΩ
V$_{GS(th)}$	Gate Threshold Voltage	V$_{DS}$=V$_{GS}$, I$_D$=250uA	1	-	3	V
g$_{fs}$	Forward Transconductance	V$_{DS}$=10V, I$_D$=7A	-	12	-	S
I$_{DSS}$	Drain-Source Leakage Current (T$_j$=25°C)	V$_{DS}$=30V, V$_{GS}$=0V	-	-	1	uA
	Drain-Source Leakage Current (T$_j$=70°C)	V$_{DS}$=24V, V$_{GS}$=0V	-	-	25	uA
I$_{GSS}$	Gate-Source Leakage	V$_{GS}$=±20V	-	-	±100	nA
Q$_g$	Total Gate Charge[2]	I$_D$=7A	-	9	13	nC
Q$_{gs}$	Gate-Source Charge	V$_{DS}$=24V	-	2	-	nC
Q$_{gd}$	Gate-Drain ("Miller") Charge	V$_{GS}$=4.5V	-	5	-	nC
t$_{d(on)}$	Turn-on Delay Time[2]	V$_{DS}$=15V	-	6	-	ns
t$_r$	Rise Time	I$_D$=1A	-	5	-	ns
t$_{d(off)}$	Turn-off Delay Time	R$_G$=3.3Ω,V$_{GS}$=10V	-	19	-	ns
t$_f$	Fall Time	R$_D$=15Ω	-	4	-	ns
C$_{iss}$	Input Capacitance	V$_{GS}$=0V	-	645	800	pF
C$_{oss}$	Output Capacitance	V$_{DS}$=25V	-	150	-	pF
C$_{rss}$	Reverse Transfer Capacitance	f=1.0MHz	-	95	-	pF

Source-Drain Diode

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
V$_{SD}$	Forward On Voltage[2]	I$_S$=1.7A, V$_{GS}$=0V	-	-	1.2	V
t$_{rr}$	Reverse Recovery Time[2]	I$_S$=7A, V$_{GS}$=0V,	-	16	-	ns
Q$_{rr}$	Reverse Recovery Charge	dI/dt=100A/μs	-	10	-	nC

P-CH 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$_D$=-250uA	-30	-	-	V
R$_{DS(ON)}$	Static Drain-Source On-Resistance[2]	V$_{GS}$=-10V, I$_D$=-5A	-	-	49	mΩ
		V$_{GS}$=-4.5V, I$_D$=-3A	-	-	75	mΩ
V$_{GS(th)}$	Gate Threshold Voltage	V$_{DS}$=V$_{GS}$, I$_D$=-250uA	-1	-	-3	V
g$_{fs}$	Forward Transconductance	V$_{DS}$=-10V, I$_D$=-5A	-	5	-	S
I$_{DSS}$	Drain-Source Leakage Current (T=25°C)	V$_{DS}$=-30V, V$_{GS}$=0V	-	-	-1	uA
	Drain-Source Leakage Current (T=70°C)	V$_{DS}$=-24V, V$_{GS}$=0V	-	-	-25	uA
I$_{GSS}$	Gate-Source Leakage	V$_{GS}$=±20V	-	-	±100	nA
Q$_g$	Total Gate Charge[2]	I$_D$=-5A	-	8	15	nC
Q$_{gs}$	Gate-Source Charge	V$_{DS}$=-15V	-	1.7	-	nC
Q$_{gd}$	Gate-Drain ("Miller") Charge	V$_{GS}$=-4.5V	-	4.5	-	nC
t$_{d(on)}$	Turn-on Delay Time[2]	V$_{DS}$=-15V	-	6.7	-	ns
t$_r$	Rise Time	I$_D$=-1A	-	10	-	ns
t$_{d(off)}$	Turn-off Delay Time	R$_G$=3.3Ω,V$_{GS}$=-10V	-	21	-	ns
t$_f$	Fall Time	R$_D$=15Ω	-	10	-	ns
C$_{iss}$	Input Capacitance	V$_{GS}$=0V	-	595	730	pF
C$_{oss}$	Output Capacitance	V$_{DS}$=-25V	-	80	-	pF
C$_{rss}$	Reverse Transfer Capacitance	f=1.0MHz	-	75	-	pF

Source-Drain Diode

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
V$_{SD}$	Forward On Voltage[2]	I$_S$=-1.7A, V$_{GS}$=0V	-	-	-1.2	V
t$_{rr}$	Reverse Recovery Time[2]	I$_S$=-5A, V$_{GS}$=0V,	-	18	-	ns
Q$_{rr}$	Reverse Recovery Charge	dI/dt=100A/µs	-	11	-	nC

Notes:

1.Pulse width limited by Max. junction temperature.

2.Pulse test

3.Mounted on 1 in^2 copper pad of FR4 board ; 90℃/W when mounted on Min. copper pad.

AP4501GSD

N-Channel

Fig 1. Typical Output Characteristics

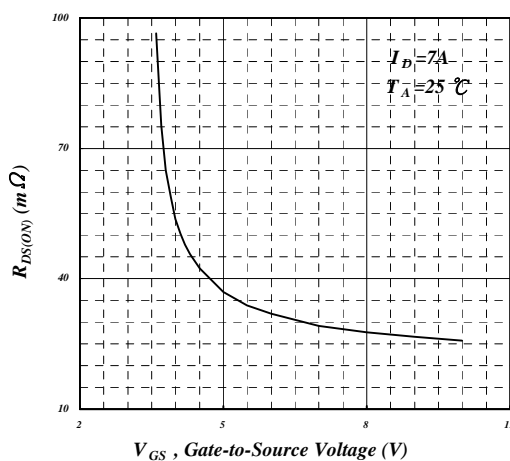Fig 2. Typical Output Characteristics

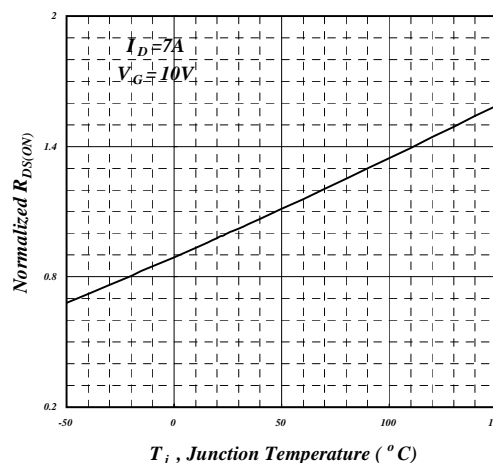Fig 3. On-Resistance v.s. Gate Voltage

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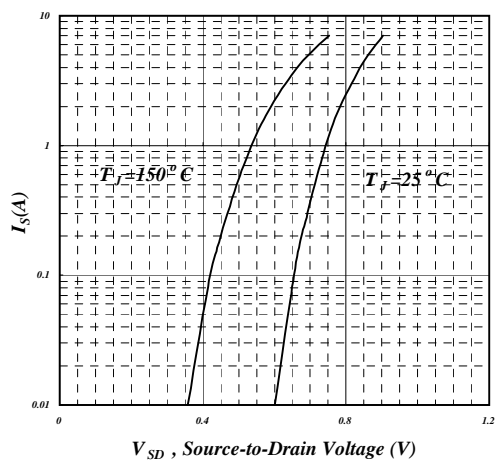v.s. Junction Temperature
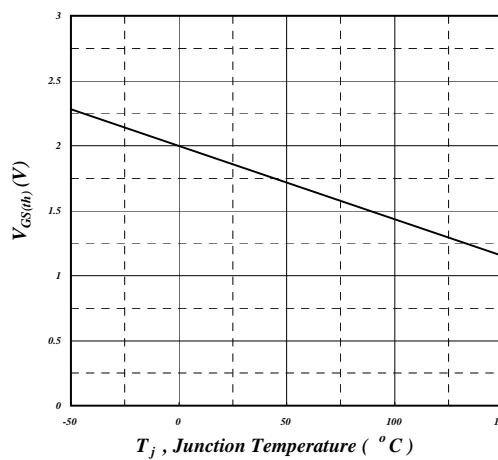

Fig 5. Forward Characteristic of
Reverse Diode

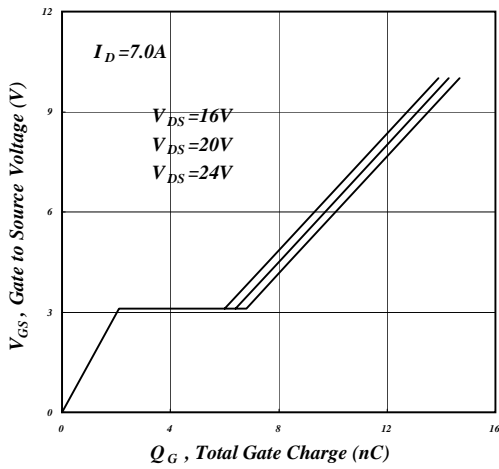Fig 6. Gate Threshold Voltage v.s.
Junction Temperature

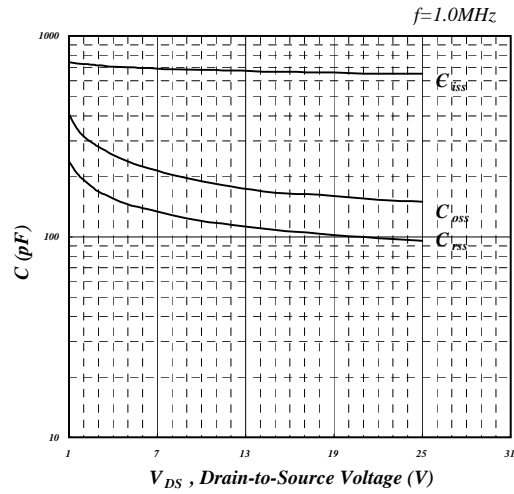**N-Channel**

Fig 7. Gate Charge Characteristics
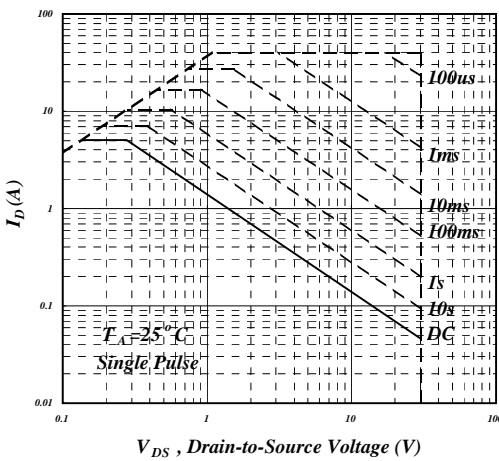
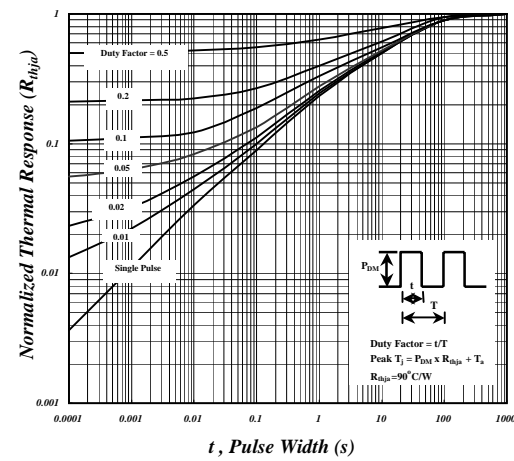Fig 8. Typical Capacitance Characteristics
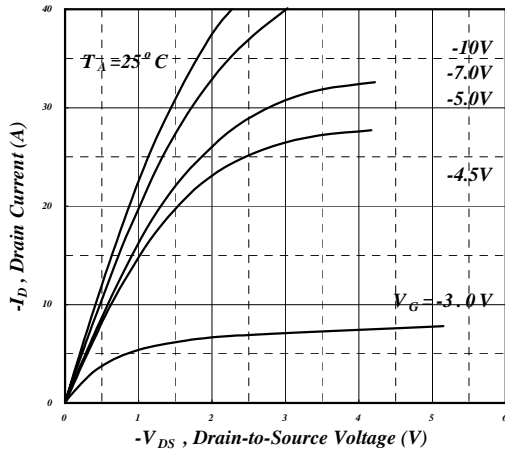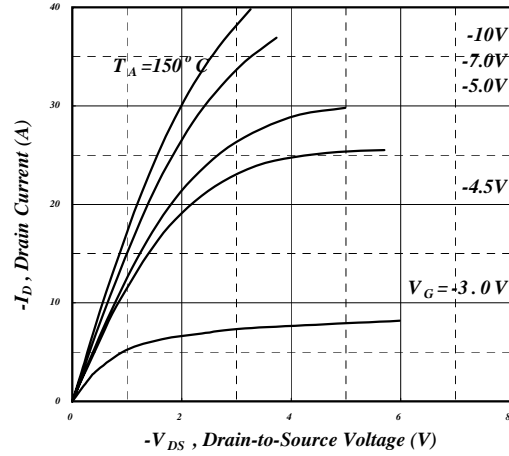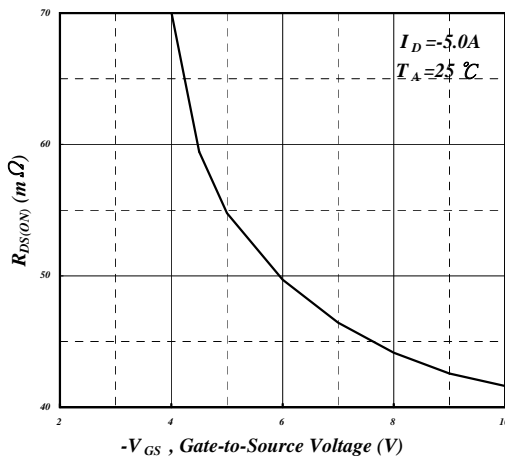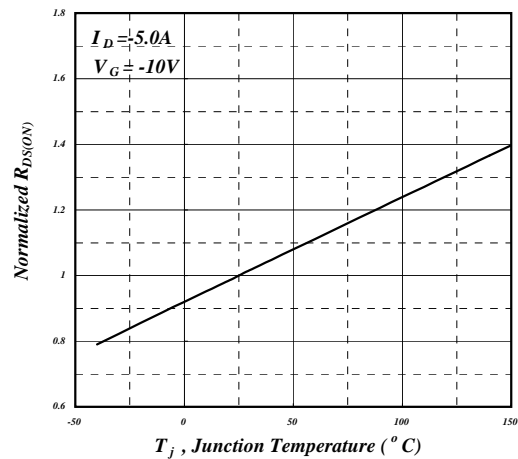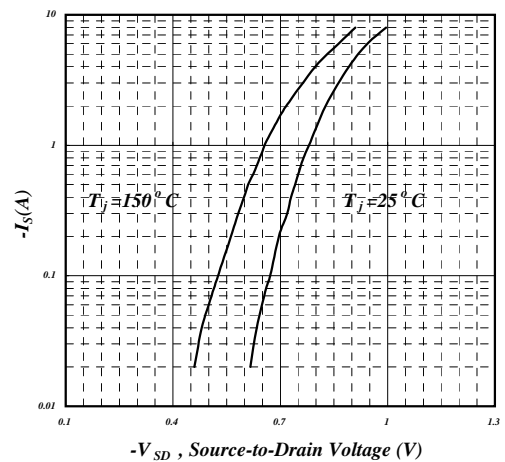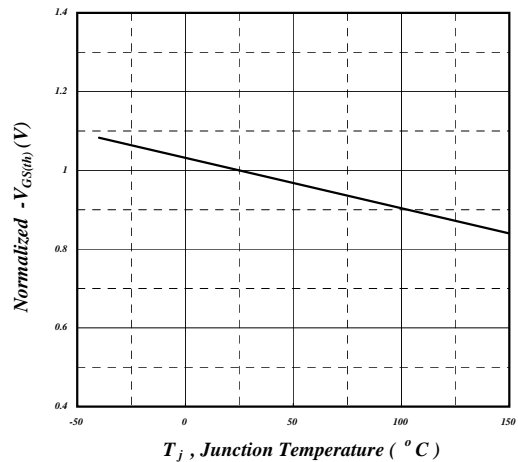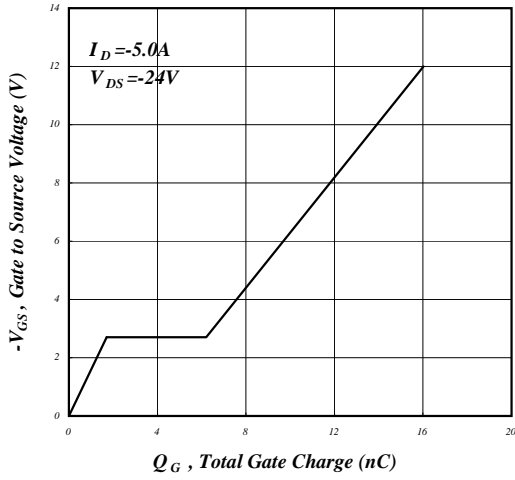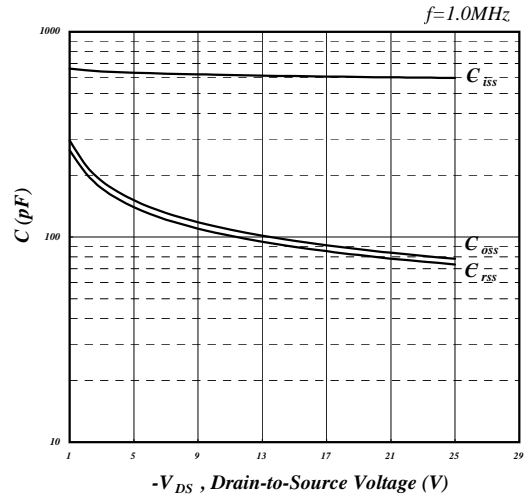
Fig 9. Maximum Safe Operating Area

Fig 10. Effective Transient Thermal Impedance

Fig 11. Switching Time Waveform

Fig 12. Gate Charge Waveform

Fig 1. Typical Output Characteristics

Fig 2. Typical Output Characteristics

Fig 3. On-Resistance v.s. Gate Voltage

**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**

P-Channel

Fig 7. Gate Charge Characteristics

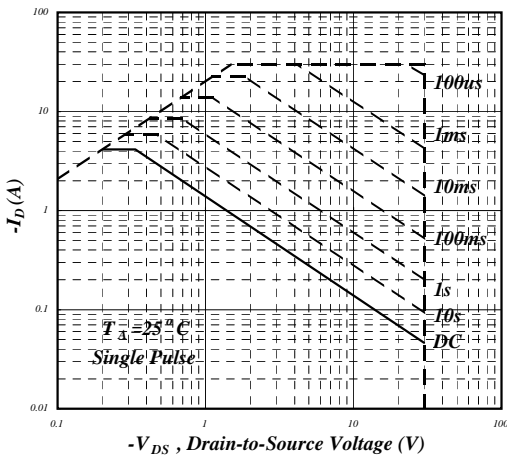**Fig 8. Typical Capacitance Characteristics**

Fig 9. Gate Charge Characteristics

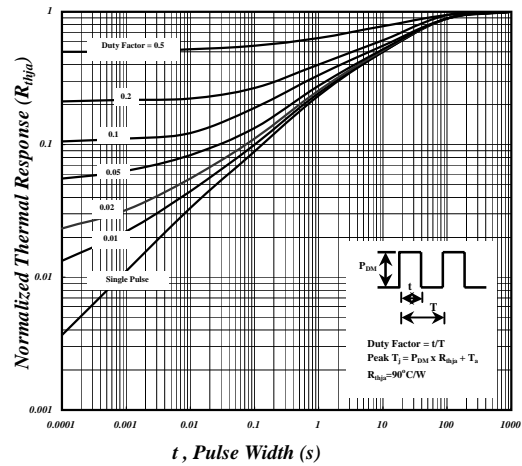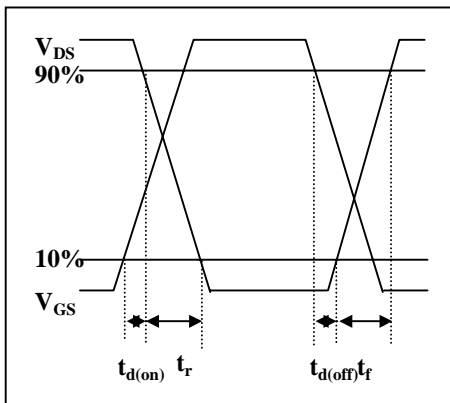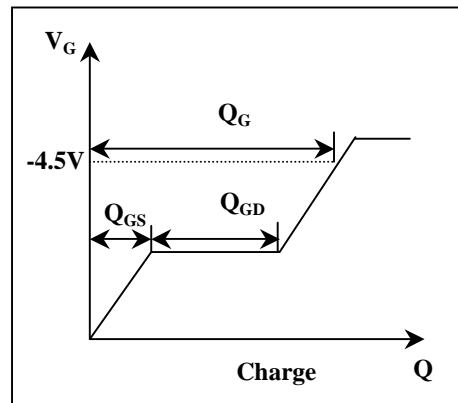**Fig 10. Typical Capacitance Characteristics**

Fig 11. Switching Time Waveform

Fig 12. Gate Charge Waveform