



**Advanced Power
Electronics Corp.**

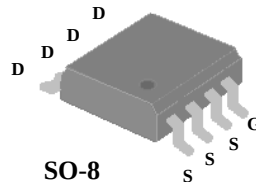
AP4412GM

Pb Free Plating Product

N-CHANNEL ENHANCEMENT MODE

POWER MOSFET

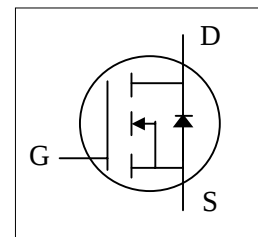
- ▼ Low Gate Charge
- ▼ Simple Drive Requirement
- ▼ Fast Switching
- ▼ RoHS Compliant



BV_{DSS}	25V
$R_{DS(ON)}$	33m Ω
I_D	7A

Description

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



Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	25	V
V_{GS}	Gate-Source Voltage	± 20	V
$I_D@T_A=25^\circ\text{C}$	Continuous Drain Current ³	7	A
$I_D@T_A=70^\circ\text{C}$	Continuous Drain Current ³	5.8	A
I_{DM}	Pulsed Drain Current ¹	30	A
$P_D@T_A=25^\circ\text{C}$	Total Power Dissipation	2.5	W
	Linear Derating Factor	0.02	W/ $^\circ\text{C}$
T_{STG}	Storage Temperature Range	-55 to 150	$^\circ\text{C}$
T_J	Operating Junction Temperature Range	-55 to 150	$^\circ\text{C}$

Thermal Data

Symbol	Parameter	Value	Unit
R_{thj-a}	Thermal Resistance Junction-ambient ³	Max. 50	$^\circ\text{C}/\text{W}$



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 =250uA	25	-	-	V
ΔBV _{DSS} /ΔT _j	Breakdown Voltage Temperature Coefficient	Reference to 25°C, I _D =1mA	-	0.03	-	V/°C
R _{DS(ON)}	Static Drain-Source On-Resistance ²	V _{GS} =10V, I _D =7A	-	-	33	mΩ
		V _{GS} =4.5V, I _D =3.5A	-	-	60	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} =25V, V _{GS} =0V	-	-	1	uA
	Drain-Source Leakage Current (T _j =70°C)	V _{DS} =20V, V _{GS} =0V	-	-	25	uA
I _{GSS}	Gate-Source Leakage	V _{GS} =±20V	-	-	±100	nA
Q _g	Total Gate Charge ²	I _D =7A	-	7	-	nC
Q _{gs}	Gate-Source Charge	V _{DS} =16V	-	1.5	-	nC
Q _{gd}	Gate-Drain ("Miller") Charge	V _{GS} =5V	-	5	-	nC
t _{d(on)}	Turn-on Delay Time ²	V _{DS} =16V	-	7	-	ns
t _r	Rise Time	I _D =7A	-	22	-	ns
t _{d(off)}	Turn-off Delay Time	R _G =3.3Ω, V _{GS} =10V	-	14.5	-	ns
t _f	Fall Time	R _D =2.3Ω	-	6	-	ns
C _{iss}	Input Capacitance	V _{GS} =0V	-	218	-	pF
C _{oss}	Output Capacitance	V _{DS} =25V	-	155	-	pF
C _{rss}	Reverse Transfer Capacitance	f=1.0MHz	-	63	-	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 =1.2V	-	-	2.08	A
V _{SD}	Forward On Voltage ²	T _j =25°C, I _S =2.3A, V _{GS} =0V	-	-	1.2	V

Notes:

- 1.Pulse width limited by Max. junction temperature.
- 2.Pulse width ≤300us, duty cycle ≤2%.
- 3.Surface mounted on 1 in² copper pad of FR4 board ; 125°C/W when mounted on Min. copper pad.

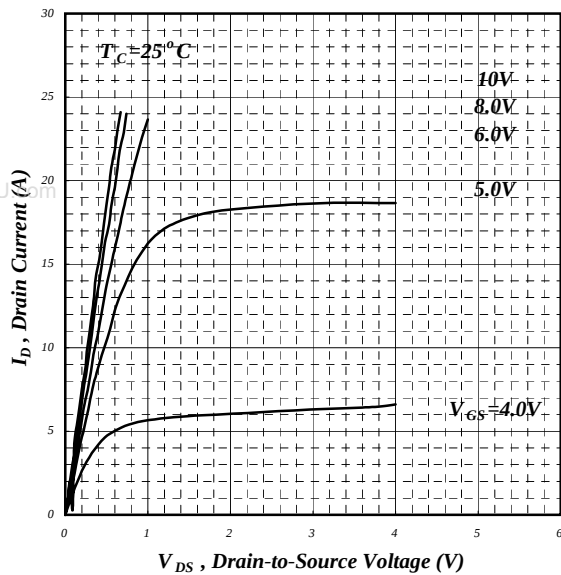


Fig 1. Typical Output Characteristics

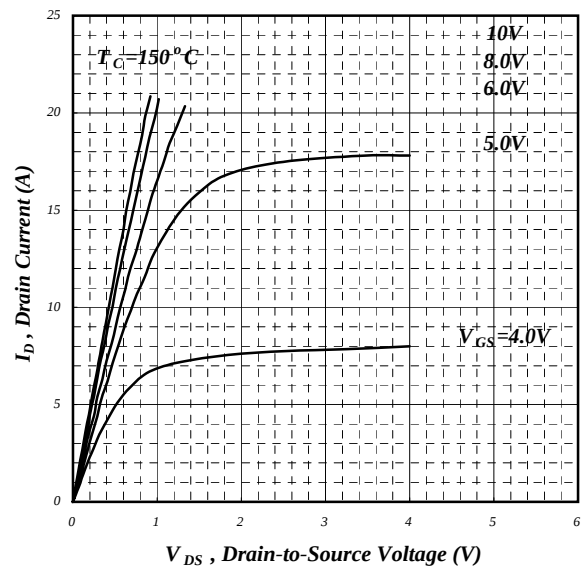


Fig 2. Typical Output Characteristics

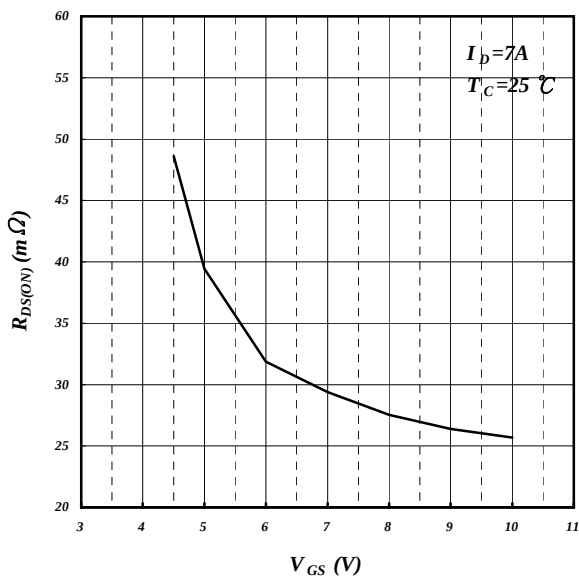


Fig 3. On-Resistance v.s. Gate Voltage

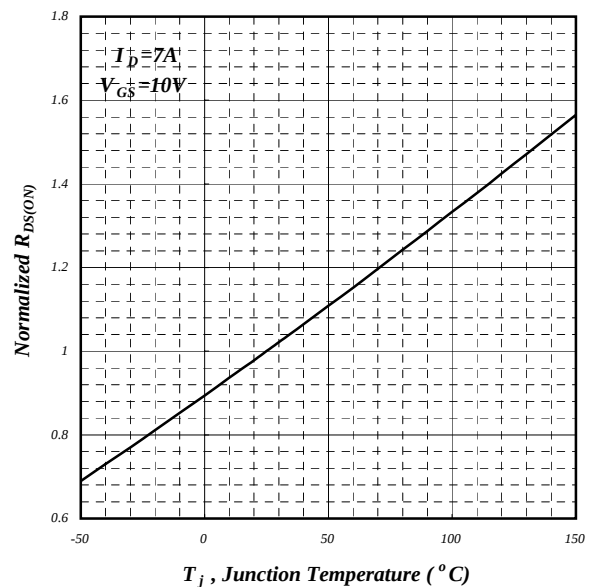


Fig 4. Normalized On-Resistance
v.s. Junction Temperature

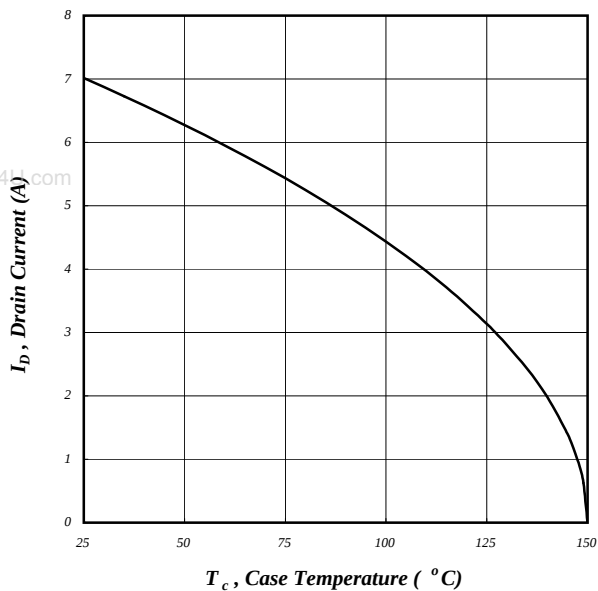


Fig 5. Maximum Drain Current v.s. Case Temperature

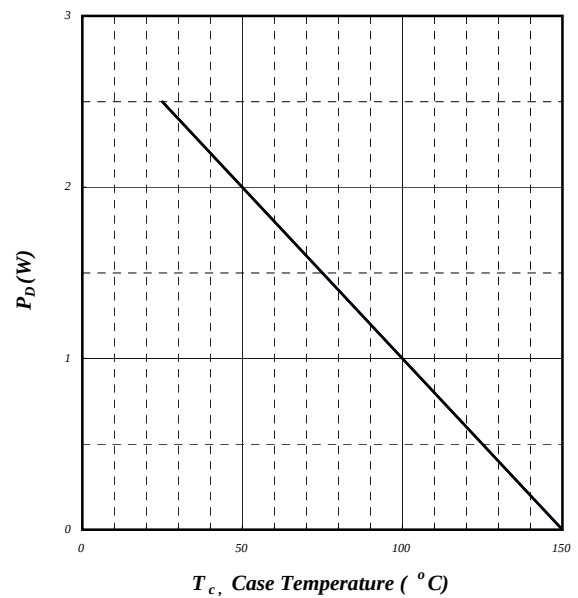


Fig 6. Typical Power Dissipation

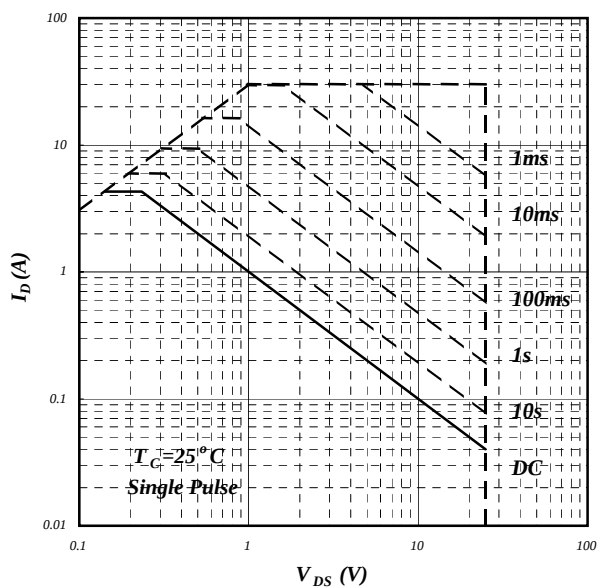


Fig 7. Maximum Safe Operating Area

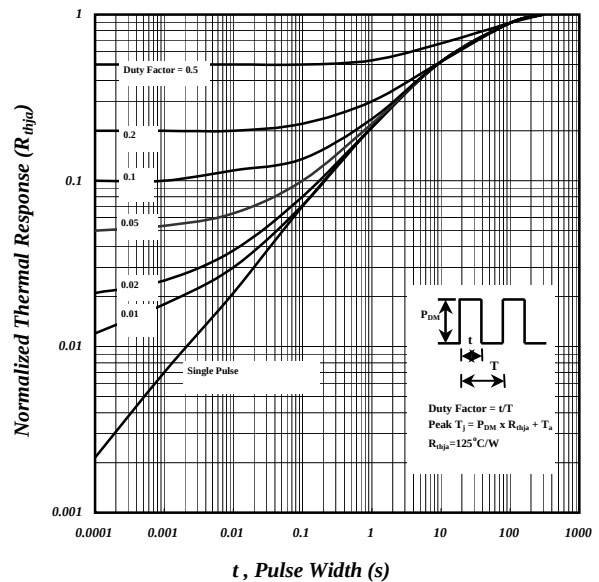
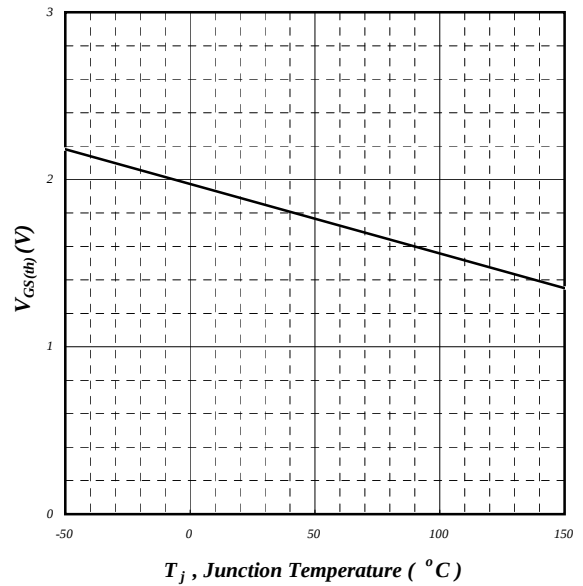
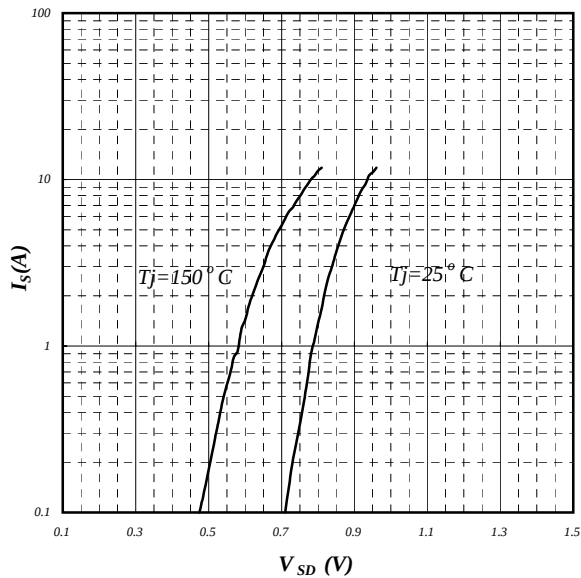
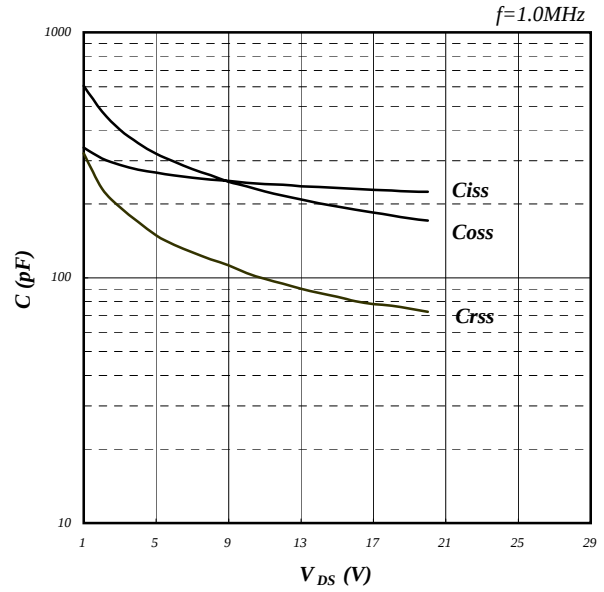
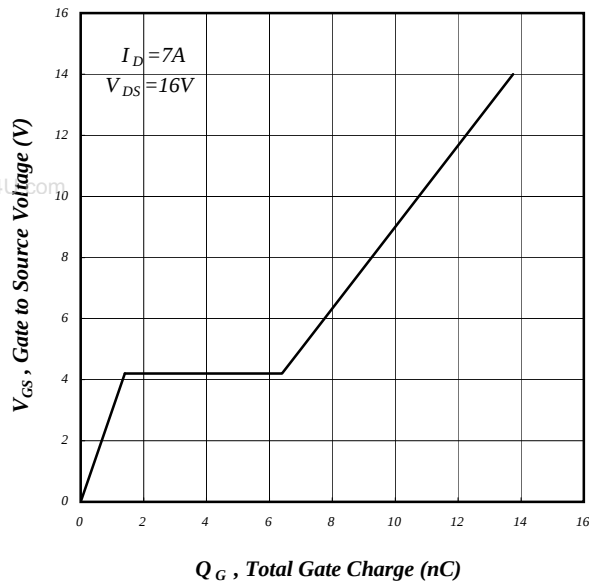


Fig 8. Effective Transient Thermal Impedance



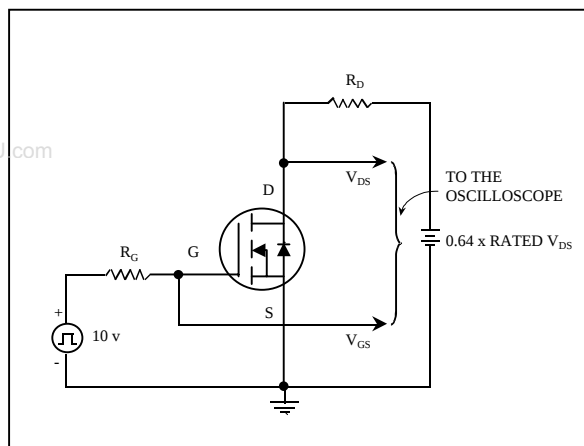


Fig 13. Switching Time Circuit

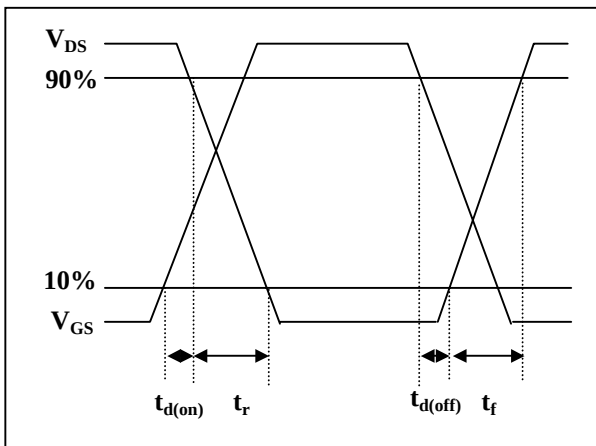


Fig 14. Switching Time Waveform

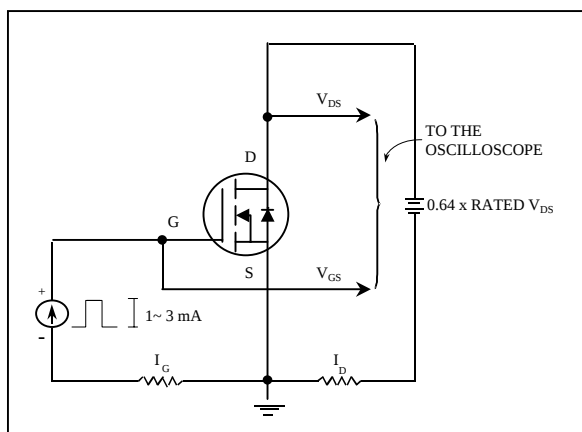


Fig 15. Gate Charge Circuit

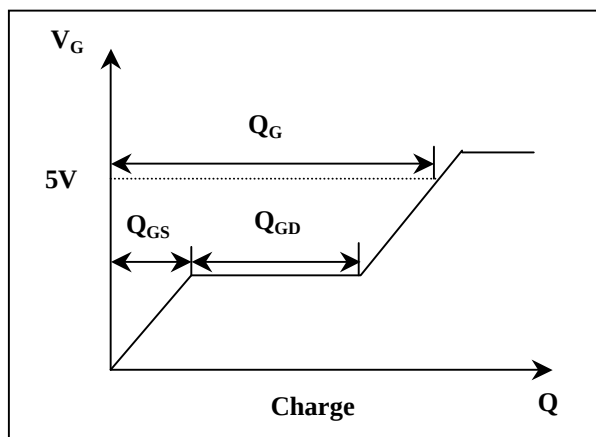


Fig 16. Gate Charge Waveform