



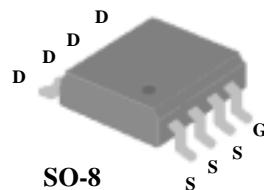
**Advanced Power  
Electronics Corp.**

**AP9620GM**

**Pb Free Plating Product**

**P-CHANNEL ENHANCEMENT MODE  
POWER MOSFET**

- ▼ Low On Resistance
- ▼ Capable of 2.5V Drive
- ▼ Fast Switching
- ▼ Simple Drive Requirement

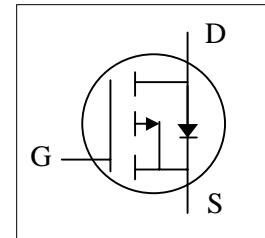


$BV_{DSS}$	-20V
$R_{DS(ON)}$	20mΩ
$I_D$	-9.5A

## 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 SO-8 package is universally preferred for all commercial-industrial surface mount applications and suited for low voltage applications such as DC/DC converters.



## Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	-20	V
$V_{GS}$	Gate-Source Voltage	$\pm 8$	V
$I_D @ T_A=25^\circ C$	Continuous Drain Current <sup>3</sup>	-9.5	A
$I_D @ T_A=70^\circ C$	Continuous Drain Current <sup>3</sup>	-7.6	A
$I_{DM}$	Pulsed Drain Current <sup>1</sup>	-76	A
$P_D @ T_A=25^\circ C$	Total Power Dissipation	2.5	W
	Linear Derating Factor	0.02	W/°C
$T_{STG}$	Storage Temperature Range	-55 to 150	°C
$T_J$	Operating Junction Temperature Range	-55 to 150	°C

## Thermal Data

Symbol	Parameter	Value	Unit
$R_{thj-amb}$	Thermal Resistance Junction-ambient <sup>3</sup>	Max. 50	°C/W



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## Electrical Characteristics@ $T_j=25^\circ\text{C}$ (unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$\text{BV}_{\text{DSS}}$	Drain-Source Breakdown Voltage	$V_{\text{GS}}=0\text{V}, I_{\text{D}}=-250\mu\text{A}$	-20	-	-	V
$\Delta \text{BV}_{\text{DSS}}/\Delta T_j$	Breakdown Voltage Temperature Coefficient	Reference to $25^\circ\text{C}$ , $I_{\text{D}}=-1\text{mA}$	-	-0.037	-	$\text{V}/^\circ\text{C}$
$R_{\text{DS}(\text{ON})}$	Static Drain-Source On-Resistance <sup>2</sup>	$V_{\text{GS}}=-4.5\text{V}, I_{\text{D}}=-9.5\text{A}$	-	-	20	$\text{m}\Omega$
		$V_{\text{GS}}=-2.5\text{V}, I_{\text{D}}=-6.0\text{A}$	-	-	35	$\text{m}\Omega$
$V_{\text{GS}(\text{th})}$	Gate Threshold Voltage	$V_{\text{DS}}=V_{\text{GS}}, I_{\text{D}}=-250\mu\text{A}$	-	-	-1	V
$g_{\text{fs}}$	Forward Transconductance	$V_{\text{DS}}=-10\text{V}, I_{\text{D}}=-9.5\text{A}$	-	28	-	S
$I_{\text{DSS}}$	Drain-Source Leakage Current ( $T_j=25^\circ\text{C}$ )	$V_{\text{DS}}=-20\text{V}, V_{\text{GS}}=0\text{V}$	-	-	-1	$\text{uA}$
	Drain-Source Leakage Current ( $T_j=70^\circ\text{C}$ )	$V_{\text{DS}}=-16\text{V}, V_{\text{GS}}=0\text{V}$	-	-	-25	$\text{uA}$
$I_{\text{GSS}}$	Gate-Source Leakage	$V_{\text{GS}}= \pm 8\text{V}$	-	-	$\pm 100$	$\text{nA}$
$Q_g$	Total Gate Charge <sup>2</sup>	$I_{\text{D}}=-9.5\text{A}$	-	30	-	nC
$Q_{\text{gs}}$	Gate-Source Charge	$V_{\text{DS}}=-10\text{V}$	-	6	-	nC
$Q_{\text{gd}}$	Gate-Drain ("Miller") Charge	$V_{\text{GS}}=-5\text{V}$	-	3.5	-	nC
$t_{\text{d}(\text{on})}$	Turn-on Delay Time <sup>2</sup>	$V_{\text{DS}}=-10\text{V}$	-	26	-	ns
$t_r$	Rise Time	$I_{\text{D}}=-9.5\text{A}$	-	500	-	ns
$t_{\text{d}(\text{off})}$	Turn-off Delay Time	$R_G=6\Omega, V_{\text{GS}}=-4.5\text{V}$	-	70	-	ns
$t_f$	Fall Time	$R_D=1.05\Omega$	-	300	-	ns
$C_{\text{iss}}$	Input Capacitance	$V_{\text{GS}}=0\text{V}$	-	2158	-	pF
$C_{\text{oss}}$	Output Capacitance	$V_{\text{DS}}=-15\text{V}$	-	845	-	pF
$C_{\text{rss}}$	Reverse Transfer Capacitance	f=1.0MHz	-	230	-	pF

## Source-Drain Diode

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$I_S$	Continuous Source Current ( Body Diode )	$V_D=V_G=0\text{V}, V_S=-1.2\text{V}$	-	-	-2.08	A
$V_{\text{SD}}$	Forward On Voltage <sup>2</sup>	$T_j=25^\circ\text{C}, I_S=-2.5\text{A}, V_{\text{GS}}=0\text{V}$	-	-	-1.2	V

## Notes:

- 1.Pulse width limited by Max. junction temperature.
- 2.Pulse width  $\leq 300\text{us}$  , duty cycle  $\leq 2\%$ .
- 3.Surface mounted on 1 in<sup>2</sup> copper pad of FR4 board ;  $125^\circ\text{C}/\text{W}$  when mounted on Min. copper pad.

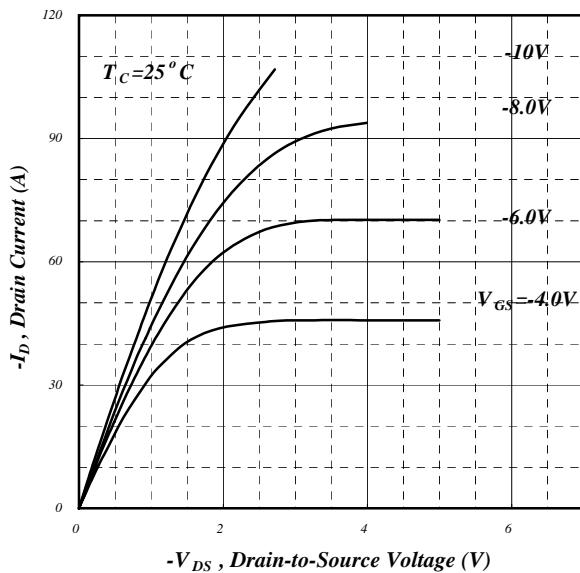


Fig 1. Typical Output Characteristics

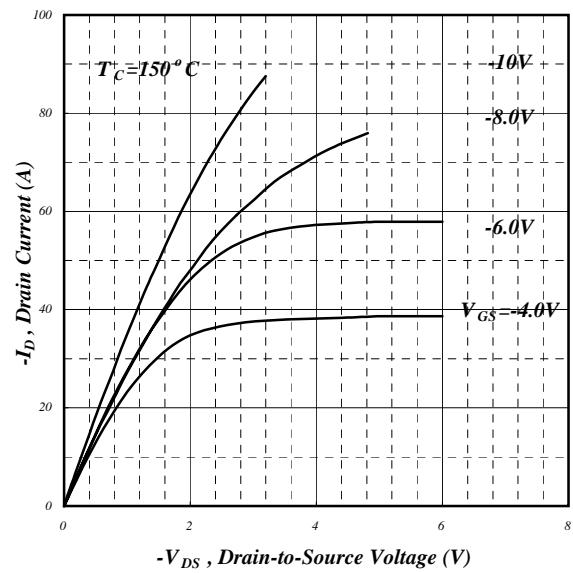


Fig 2. Typical Output Characteristics

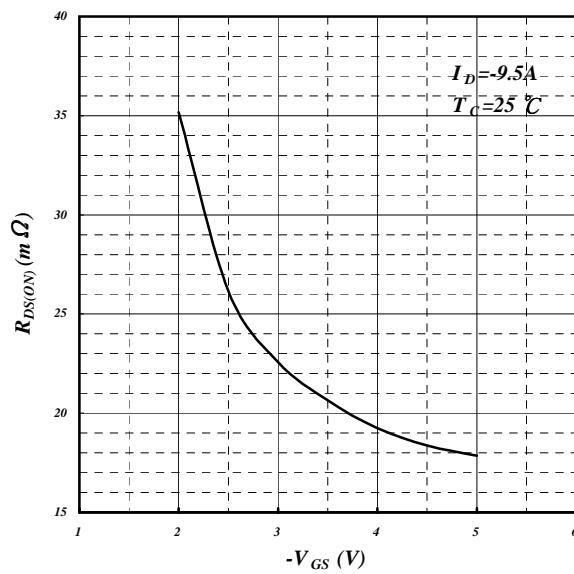


Fig 3. On-Resistance v.s. Gate Voltage

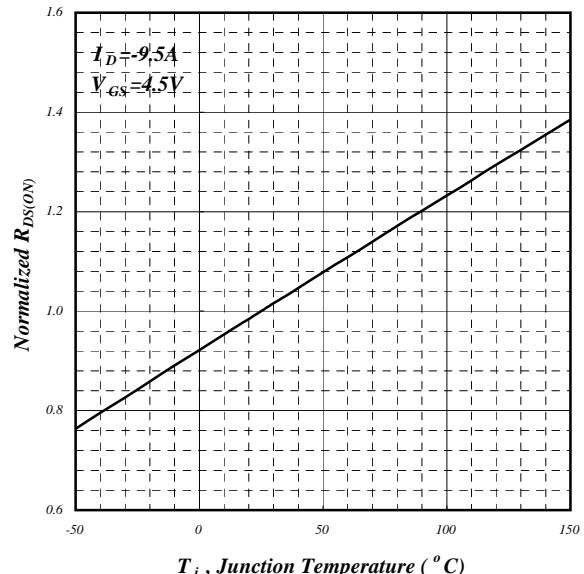
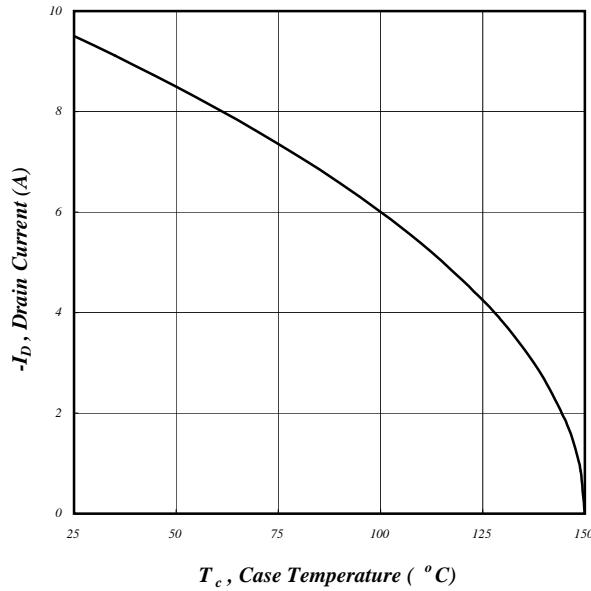
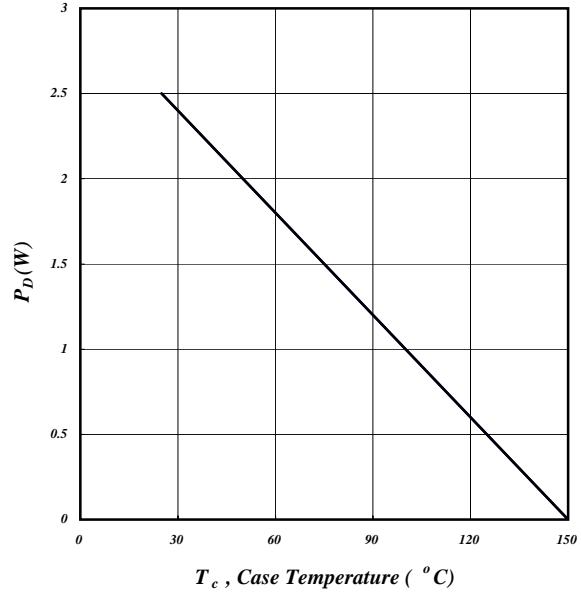


Fig 4. Normalized On-Resistance v.s. Junction Temperature

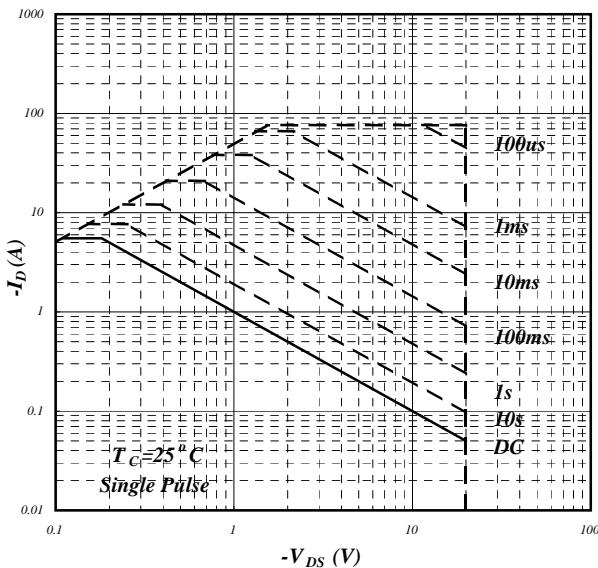
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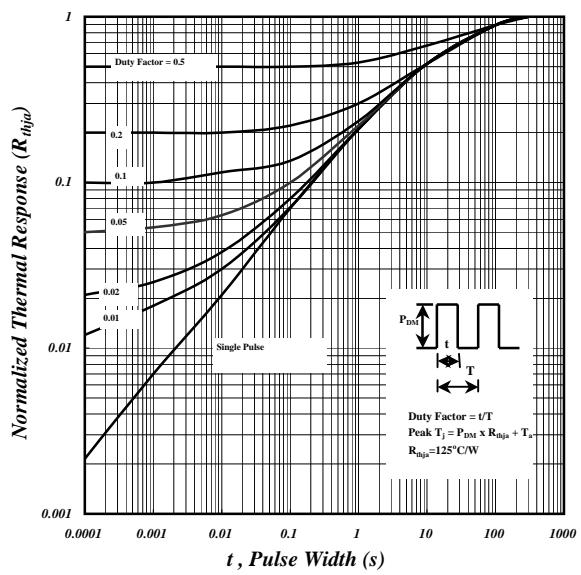
**Fig 5. Maximum Drain Current v.s.  
Case Temperature**



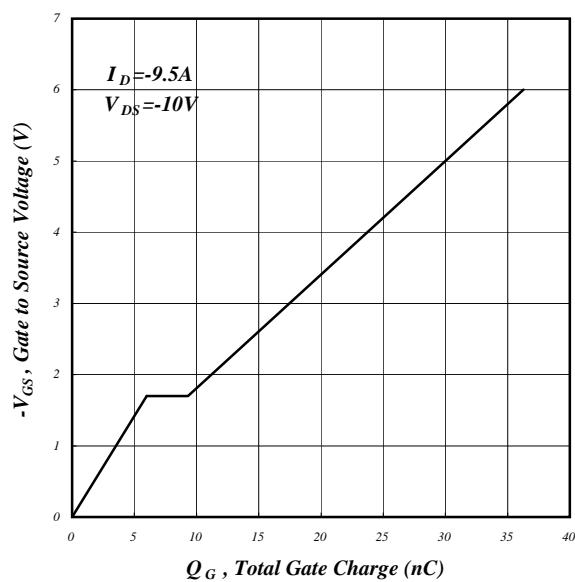
**Fig 6. Typical Power Dissipation**



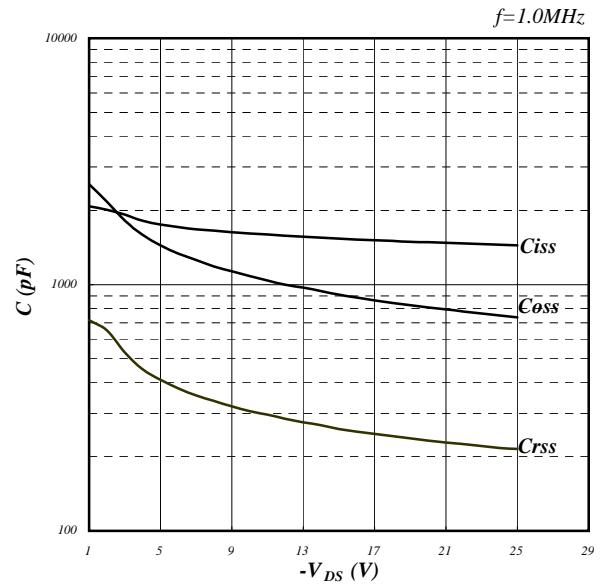
**Fig 7. Maximum Safe Operating Area**



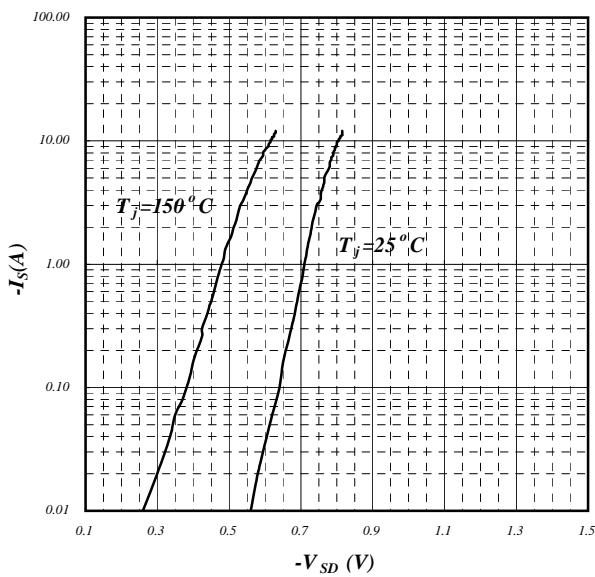
**Fig 8. Effective Transient Thermal Impedance**



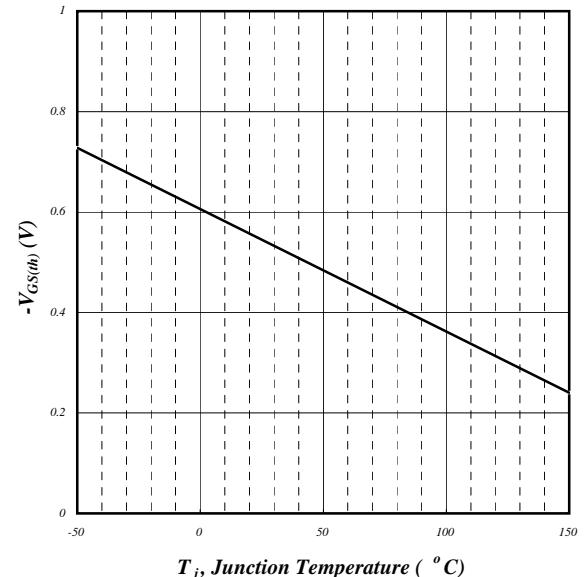
**Fig 9. Gate Charge Characteristics**



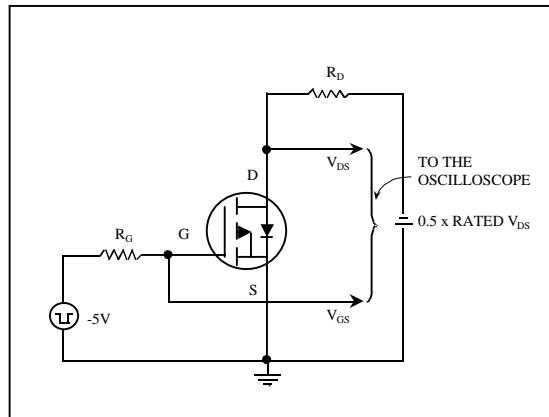
**Fig 10. Typical Capacitance Characteristics**



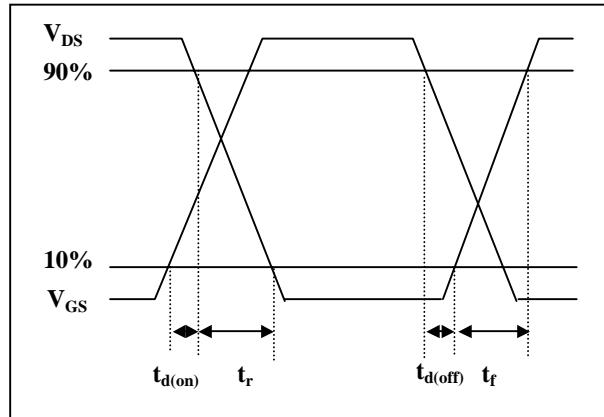
**Fig 11. Forward Characteristic of Reverse Diode**



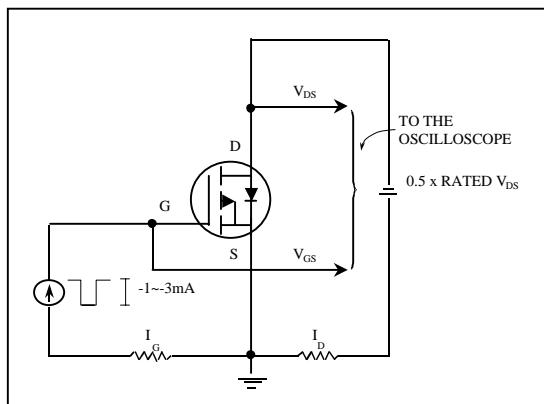
**Fig 12. Gate Threshold Voltage v.s. Junction Temperature**



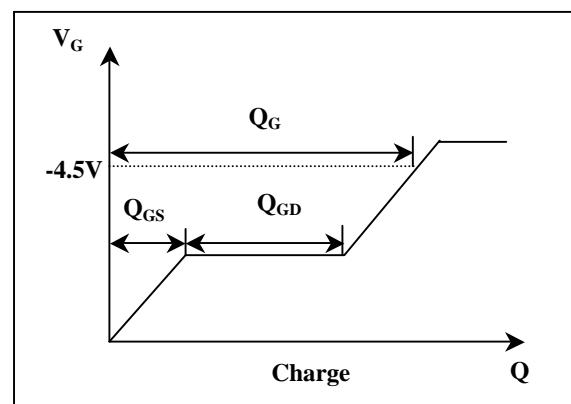
**Fig 13. Switching Time Circuit**



**Fig 14. Switching Time Waveform**



**Fig 15. Gate Charge Circuit**



**Fig 16. Gate Charge Waveform**