



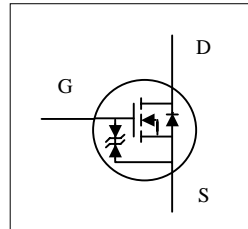
**Advanced Power  
Electronics Corp.**

**AP9T18GEH/J**

**Pb Free Plating Product**

*N-CHANNEL ENHANCEMENT MODE  
POWER MOSFET*

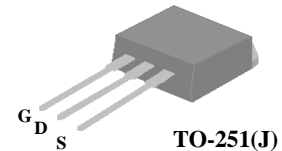
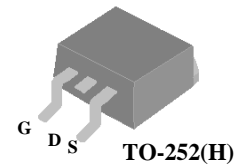
- ▼ G-S Diode embedded
- ▼ Capable of 2.5V gate drive
- ▼ Surface mount package
- ▼ RoHS Compliant



$BV_{DSS}$	20V
$R_{DS(ON)}$	14m $\Omega$
$I_D$	40A

## 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	20	V
$V_{GS}$	Gate-Source Voltage	$\pm 12$	V
$I_D@T_C=25^\circ C$	Continuous Drain Current, $V_{GS}$ @ 4.5V	40	A
$I_D@T_C=100^\circ C$	Continuous Drain Current, $V_{GS}$ @ 4.5V	25	A
$I_{DM}$	Pulsed Drain Current <sup>1</sup>	160	A
$P_D@T_C=25^\circ C$	Total Power Dissipation	31	W
	Linear Derating Factor	0.25	W/ $^\circ C$
$T_{STG}$	Storage Temperature Range	-55 to 150	$^\circ C$
$T_J$	Operating Junction Temperature Range	-55 to 150	$^\circ C$

## Thermal Data

Symbol	Parameter	Value	Units
Rthj-c	Thermal Resistance Junction-case	Max. 4	$^\circ C/W$
Rthj-a	Thermal Resistance Junction-ambient	Max. 110	$^\circ C/W$



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

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	20	-	-	V
$\Delta BV_{DSS}/\Delta T_j$	Breakdown Voltage Temperature Coefficient	Reference to $25^{\circ}\text{C}, I_D=1\text{mA}$	-	0.02	-	V/ $^{\circ}\text{C}$
$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS}=4.5V, I_D=20A$	-	-	14	m $\Omega$
		$V_{GS}=2.5V, I_D=10A$	-	-	28	m $\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	0.4	-	1.5	V
$g_{fs}$	Forward Transconductance	$V_{DS}=5V, I_D=20A$	-	20	-	S
$I_{DSS}$	Drain-Source Leakage Current ( $T_j=25^{\circ}\text{C}$ )	$V_{DS}=20V, V_{GS}=0V$	-	-	1	$\mu A$
	Drain-Source Leakage Current ( $T_j=150^{\circ}\text{C}$ )	$V_{DS}=16V, V_{GS}=0V$	-	-	25	$\mu A$
$I_{GSS}$	Gate-Source Leakage	$V_{GS}=\pm 12V$	-	-	$\pm 30$	$\mu A$
$Q_g$	Total Gate Charge <sup>2</sup>	$I_D=20A$	-	16	26	nC
$Q_{gs}$	Gate-Source Charge	$V_{DS}=16V$	-	2	-	nC
$Q_{gd}$	Gate-Drain ("Miller") Charge	$V_{GS}=4.5V$	-	6	-	nC
$t_{d(on)}$	Turn-on Delay Time <sup>2</sup>	$V_{DS}=10V$	-	8	-	ns
$t_r$	Rise Time	$I_D=20A$	-	84	-	ns
$t_{d(off)}$	Turn-off Delay Time	$R_G=1.0\Omega, V_{GS}=5V$	-	19	-	ns
$t_f$	Fall Time	$R_D=0.5\Omega$	-	14	-	ns
$C_{iss}$	Input Capacitance	$V_{GS}=0V$	-	1080	1730	pF
$C_{oss}$	Output Capacitance	$V_{DS}=20V$	-	205	-	pF
$C_{rss}$	Reverse Transfer Capacitance	$f=1.0\text{MHz}$	-	145	-	pF
$R_g$	Gate Resistance	$f=1.0\text{MHz}$	-	3.6	5.4	$\Omega$

**Source-Drain Diode**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$V_{SD}$	Forward On Voltage <sup>2</sup>	$I_S=20A, V_{GS}=0V$	-	-	1.2	V
$t_{rr}$	Reverse Recovery Time <sup>2</sup>	$I_S=20A, V_{GS}=0V,$	-	26	-	ns
$Q_{rr}$	Reverse Recovery Charge	$dI/dt=100A/\mu s$	-	19	-	nC

**Notes:**

1. Pulse width limited by safe operating area.
2. Pulse width  $\leq 300\mu s$ , duty cycle  $\leq 2\%$ .

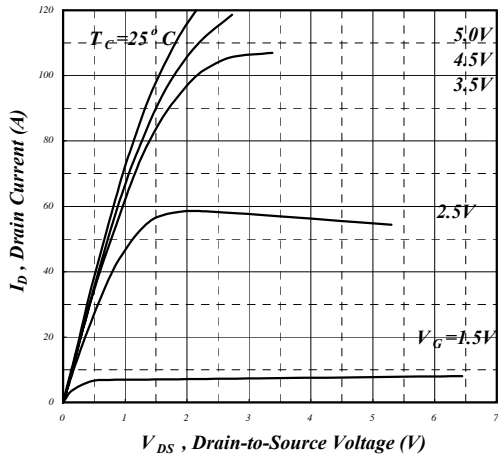


Fig 1. Typical Output Characteristics

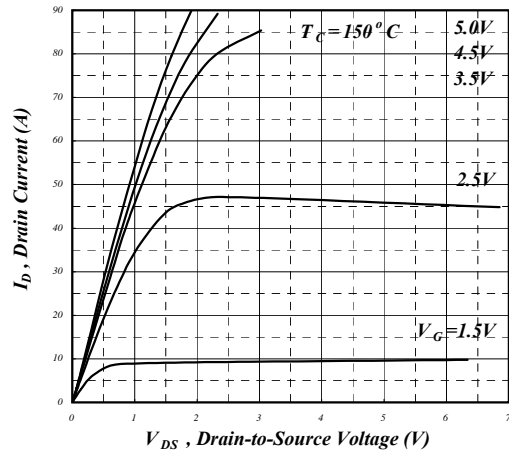


Fig 2. Typical Output Characteristics

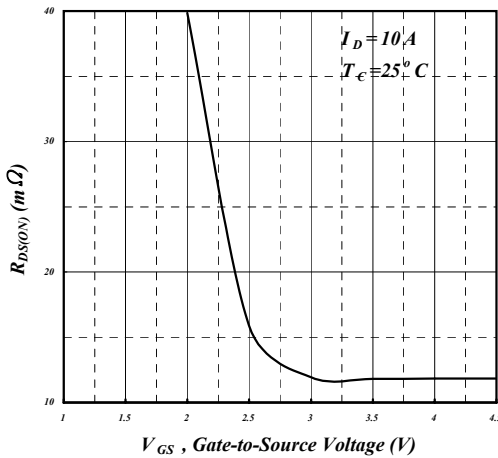


Fig 3. On-Resistance v.s. Gate Voltage

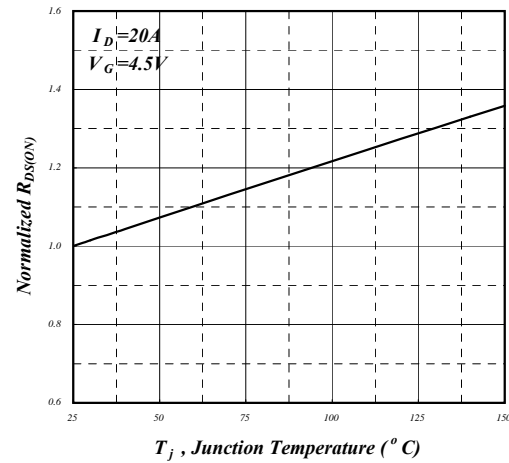


Fig 4. Normalized On-Resistance v.s. Junction Temperature

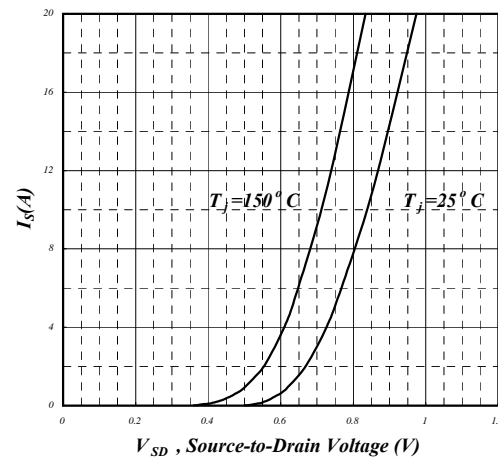


Fig 5. Forward Characteristic of Reverse Diode

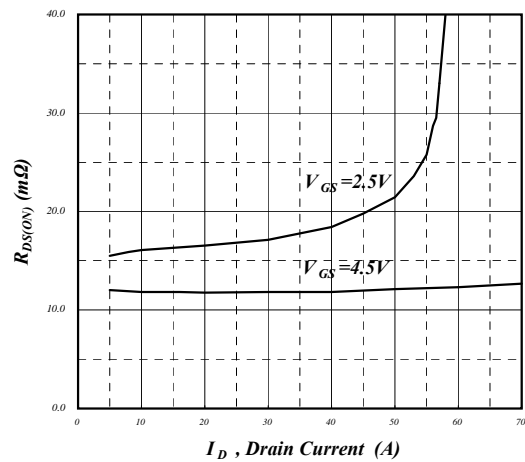


Fig 6. On-Resistance vs. Drain Current

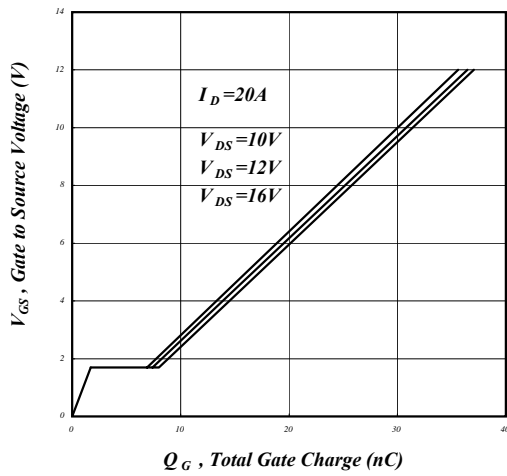


Fig 7. Gate Charge Characteristics

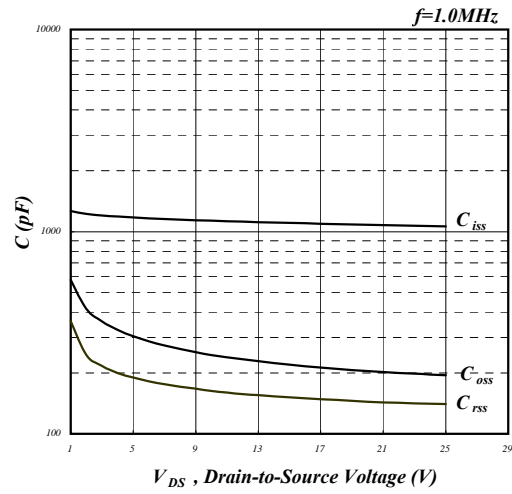


Fig 8. Typical Capacitance Characteristics

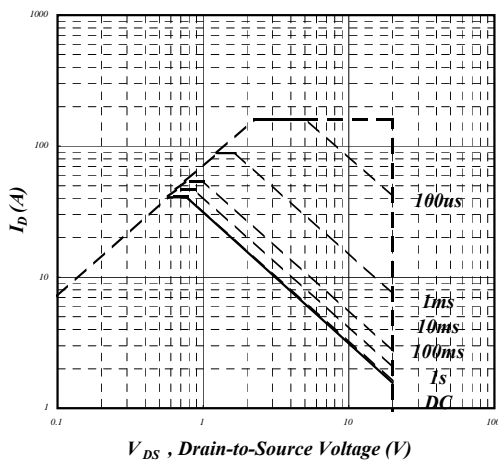


Fig 9. Maximum Safe Operating Area

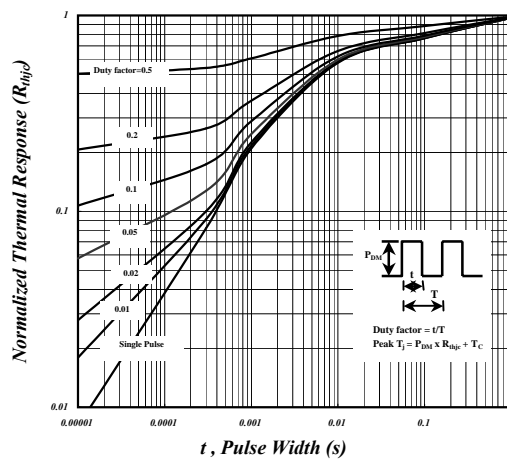


Fig 10. Effective Transient Thermal Impedance

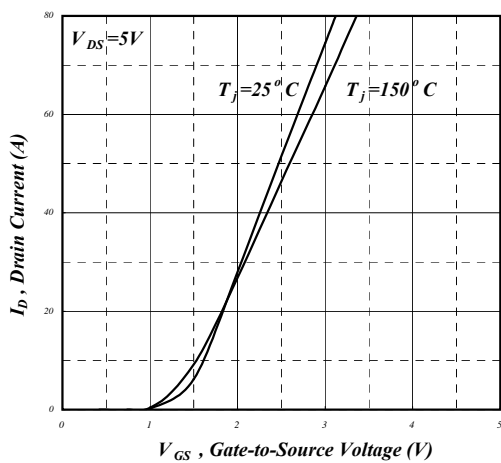


Fig 11. Transfer Characteristics

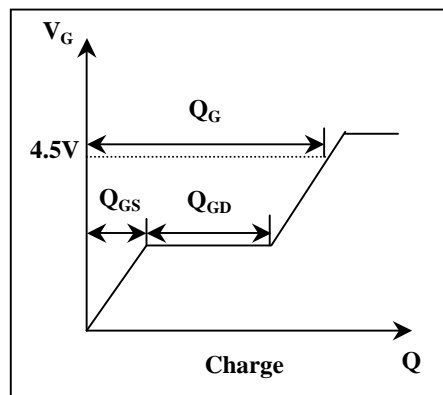


Fig 12. Gate Charge Waveform