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**Advanced Power
Electronics Corp.**

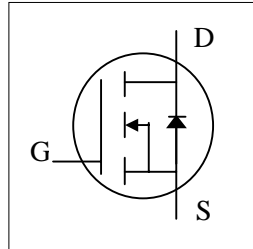
AP9T16GH/J

Pb Free Plating Product

N-CHANNEL ENHANCEMENT MODE

POWER MOSFET

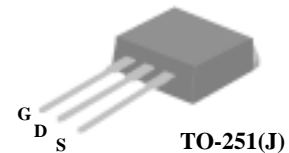
- ▼ Low Gate Charge
- ▼ Capable of 2.5V gate drive
- ▼ Single Drive Requirement
- ▼ RoHS Compliant



BV_{DSS}	20V
$R_{DS(ON)}$	25m Ω
I_D	25A

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	± 16	V
$I_D@T_C=25^\circ C$	Continuous Drain Current, V_{GS} @ 4.5V	25	A
$I_D@T_C=100^\circ C$	Continuous Drain Current, V_{GS} @ 4.5V	16	A
I_{DM}	Pulsed Drain Current ¹	90	A
$P_D@T_C=25^\circ C$	Total Power Dissipation	25	W
	Linear Derating Factor	0.2	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. 5	$^\circ C/W$
Rthj-a	Thermal Resistance Junction-ambient	Max. 110	$^\circ C/W$



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

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
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°C , $I_D=1\text{mA}$	-	0.01	-	$\text{V}/^{\circ}\text{C}$
$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS}=4.5V, I_D=6A$	-	-	25	$\text{m}\Omega$
		$V_{GS}=2.5V, I_D=5.2A$	-	-	40	$\text{m}\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	0.5	-	1.5	V
g_{fs}	Forward Transconductance	$V_{DS}=5V, I_D=18A$	-	19	-	S
I_{DSS}	Drain-Source Leakage Current ($T_j=25^{\circ}\text{C}$)	$V_{DS}=20V, V_{GS}=0V$	-	-	1	μA
	Drain-Source Leakage Current ($T_j=150^{\circ}\text{C}$)	$V_{DS}=16V, V_{GS}=0V$	-	-	25	μA
I_{GSS}	Gate-Source Leakage	$V_{GS}=\pm 16V$	-	-	± 100	nA
Q_g	Total Gate Charge ²	$I_D=18A$	-	10	16	nC
Q_{gs}	Gate-Source Charge	$V_{DS}=16V$	-	3	-	nC
Q_{gd}	Gate-Drain ("Miller") Charge	$V_{GS}=4.5V$	-	5	-	nC
$t_{d(on)}$	Turn-on Delay Time ²	$V_{DS}=10V$	-	10	-	ns
t_r	Rise Time	$I_D=18A$	-	98	-	ns
$t_{d(off)}$	Turn-off Delay Time	$R_G=3.3\Omega, V_{GS}=5V$	-	18	-	ns
t_f	Fall Time	$R_D=0.56\Omega$	-	6	-	ns
C_{iss}	Input Capacitance	$V_{GS}=0V$	-	870	1390	pF
C_{oss}	Output Capacitance	$V_{DS}=20V$	-	160	-	pF
C_{rss}	Reverse Transfer Capacitance	$f=1.0\text{MHz}$	-	120	-	pF
R_g	Gate Resistance	$f=1.0\text{MHz}$	-	1.38	-	Ω

Source-Drain Diode

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
V_{SD}	Forward On Voltage ²	$I_S=18A, V_{GS}=0V$	-	-	1.3	V
t_{rr}	Reverse Recovery Time ²	$I_S=18A, V_{GS}=0V,$	-	19	-	ns
Q_{rr}	Reverse Recovery Charge	$dI/dt=100A/\mu s$	-	10	-	nC

Notes:

1. Pulse width limited by safe operating area.

2. Pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.

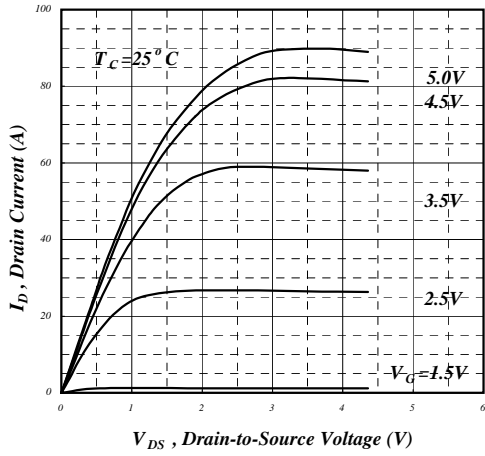


Fig 1. Typical Output Characteristics

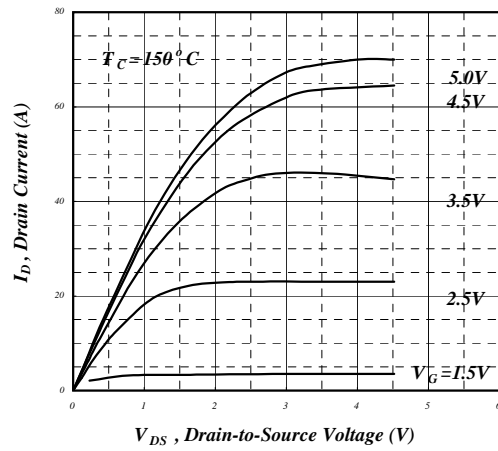


Fig 2. Typical Output Characteristics

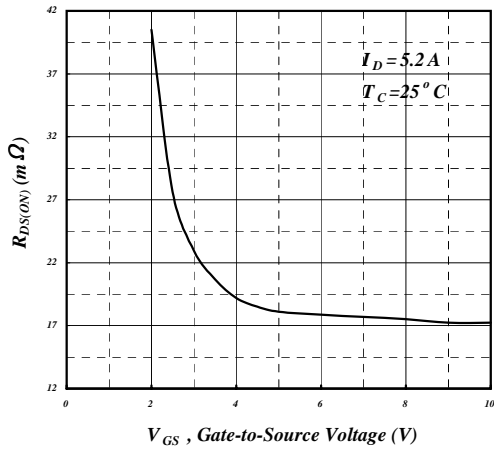


Fig 3. On-Resistance v.s. Gate Voltage

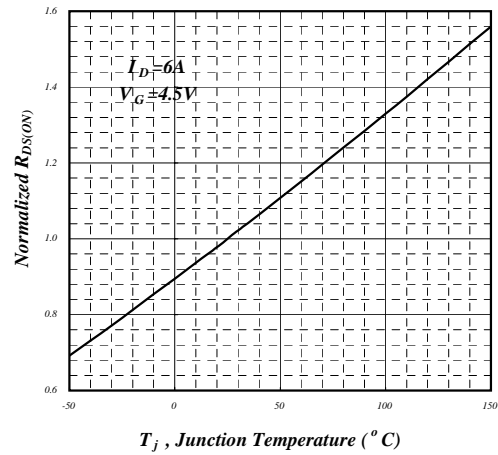


Fig 4. Normalized On-Resistance v.s. Junction Temperature

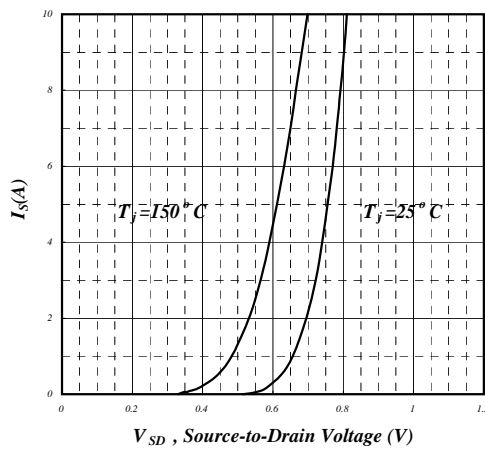


Fig 5. Forward Characteristic of Reverse Diode

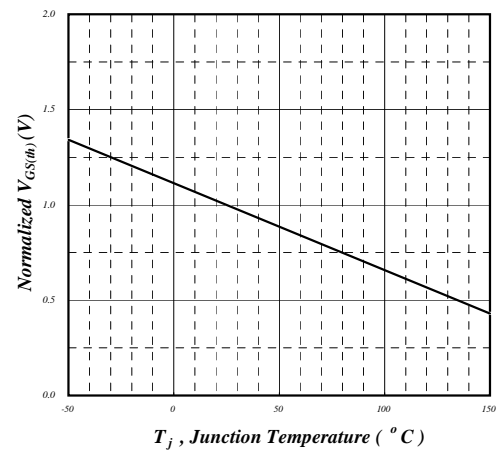


Fig 6. Gate Threshold Voltage v.s. Junction Temperature



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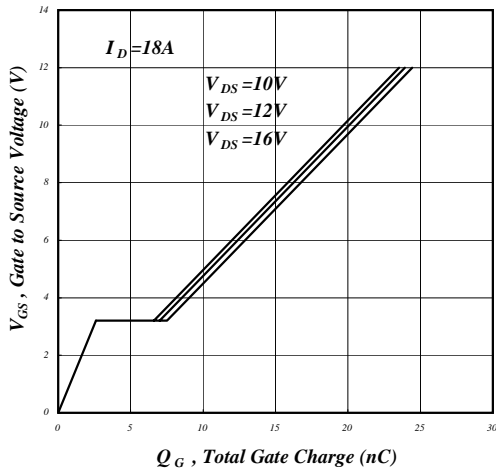


Fig 7. Gate Charge Characteristics

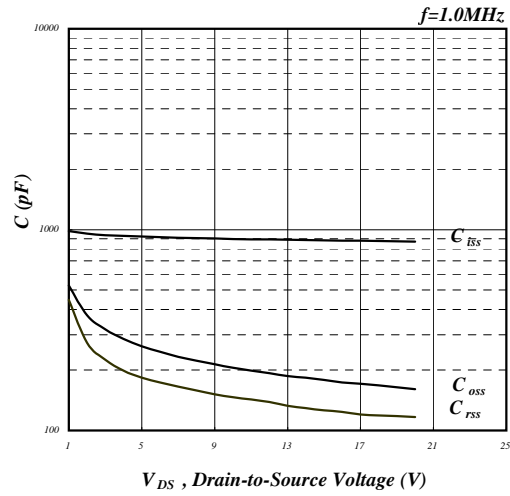


Fig 8. Typical Capacitance Characteristics

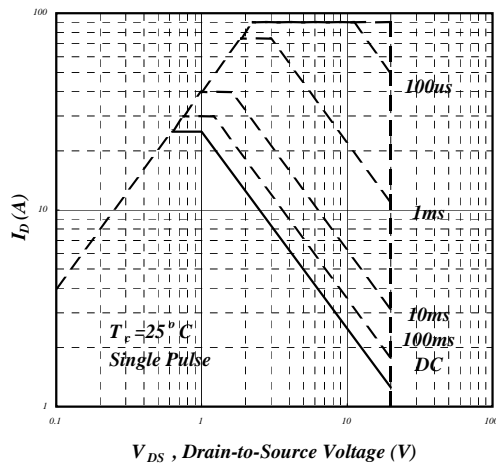


Fig 9. Maximum Safe Operating Area

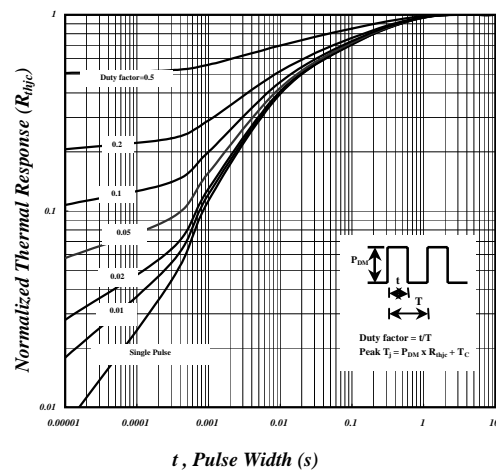


Fig 10. Effective Transient Thermal Impedance

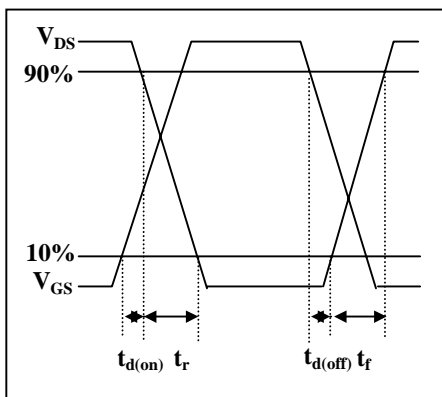


Fig 11. Switching Time Waveform

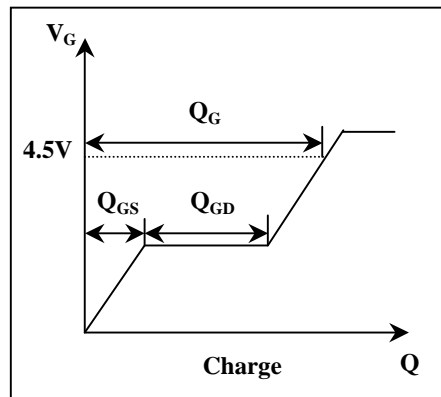


Fig 12. Gate Charge Waveform