



**Advanced Power  
Electronics Corp.**

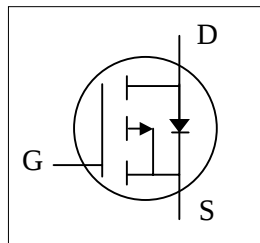
**AP9561AGJ-HF**

**Halogen-Free Product**

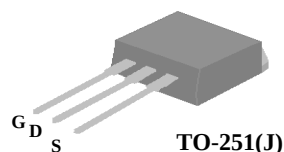
*P-CHANNEL ENHANCEMENT MODE*

*POWER MOSFET*

- ▼ Low On-resistance
- ▼ Simple Drive Requirement
- ▼ Fast Switching Characteristic
- ▼ RoHS Compliant & Halogen-Free



|              |              |
|--------------|--------------|
| $BV_{DSS}$   | -40V         |
| $R_{DS(ON)}$ | 18m $\Omega$ |
| $I_D$        | -39A         |



## Description

AP9561A series are from Advanced Power innovated design and silicon process technology to achieve the lowest possible on-resistance and fast switching performance. It provides the designer with an extreme efficient device for use in a wide range of power applications.

The straight lead version TO-251 package is widely preferred for all commercial-industrial through hole applications.

## Absolute Maximum Ratings

| Symbol                 | Parameter                                | Rating     | Units       |
|------------------------|------------------------------------------|------------|-------------|
| $V_{DS}$               | Drain-Source Voltage                     | -40        | V           |
| $V_{GS}$               | Gate-Source Voltage                      | +20        | V           |
| $I_D@T_C=25^{\circ}C$  | Continuous Drain Current, $V_{GS}$ @ 10V | -39        | A           |
| $I_D@T_C=100^{\circ}C$ | Continuous Drain Current, $V_{GS}$ @ 10V | -25        | A           |
| $I_{DM}$               | Pulsed Drain Current <sup>1</sup>        | -160       | A           |
| $P_D@T_C=25^{\circ}C$  | Total Power Dissipation                  | 50         | W           |
| $P_D@T_A=25^{\circ}C$  | Total Power Dissipation <sup>3</sup>     | 1.13       | W           |
| $T_{STG}$              | 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 | Maximum Thermal Resistance Junction-case     | 2.5   | $^{\circ}C/W$ |
| Rthj-a | Maximum Thermal Resistance, Junction-ambient | 110   | $^{\circ}C/W$ |



## AP9561AGJ-HF

### Electrical Characteristics@T<sub>j</sub>=25°C(unless otherwise specified)

| Symbol              | Parameter                                      | Test Conditions                                           | Min. | Typ. | Max. | Units |
|---------------------|------------------------------------------------|-----------------------------------------------------------|------|------|------|-------|
| BV <sub>DSS</sub>   | Drain-Source Breakdown Voltage                 | V <sub>GS</sub> =0V, I <sub>D</sub> =-250uA               | -40  | -    | -    | V     |
| R <sub>DS(ON)</sub> | Static Drain-Source On-Resistance <sup>2</sup> | V <sub>GS</sub> =-10V, I <sub>D</sub> =-24A               | -    | -    | 18   | mΩ    |
|                     |                                                | V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-20A              | -    | -    | 26   | mΩ    |
| V <sub>GS(th)</sub> | Gate Threshold Voltage                         | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =-250uA | -1   | -    | -3   | V     |
| g <sub>fs</sub>     | Forward Transconductance                       | V <sub>DS</sub> =-10V, I <sub>D</sub> =-20A               | -    | 31   | -    | S     |
| I <sub>DSS</sub>    | Drain-Source Leakage Current                   | V <sub>DS</sub> =-32V, V <sub>GS</sub> =0V                | -    | -    | -10  | uA    |
| I <sub>GSS</sub>    | Gate-Source Leakage                            | V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V                | -    | -    | ±100 | nA    |
| Q <sub>g</sub>      | Total Gate Charge                              | I <sub>D</sub> =-20A                                      | -    | 27   | 43   | nC    |
| Q <sub>gs</sub>     | Gate-Source Charge                             | V <sub>DS</sub> =-32V                                     | -    | 7    | -    | nC    |
| Q <sub>gd</sub>     | Gate-Drain ("Miller") Charge                   | V <sub>GS</sub> =-4.5V                                    | -    | 14   | -    | nC    |
| t <sub>d(on)</sub>  | Turn-on Delay Time                             | V <sub>DS</sub> =-20V                                     | -    | 10   | -    | ns    |
| t <sub>r</sub>      | Rise Time                                      | I <sub>D</sub> =-20A                                      | -    | 46   | -    | ns    |
| t <sub>d(off)</sub> | Turn-off Delay Time                            | R <sub>G</sub> =3.3Ω                                      | -    | 66   | -    | ns    |
| t <sub>f</sub>      | Fall Time                                      | V <sub>GS</sub> =-10V                                     | -    | 90   | -    | ns    |
| C <sub>iss</sub>    | Input Capacitance                              | V <sub>GS</sub> =0V                                       | -    | 3000 | 4800 | pF    |
| C <sub>oss</sub>    | Output Capacitance                             | V <sub>DS</sub> =-25V                                     | -    | 300  | -    | pF    |
| C <sub>rss</sub>    | Reverse Transfer Capacitance                   | f=1.0MHz                                                  | -    | 230  | -    | pF    |
| R <sub>g</sub>      | Gate Resistance                                | f=1.0MHz                                                  | -    | 5.5  | 11   | Ω     |

### Source-Drain Diode

| Symbol          | Parameter                       | Test Conditions                            | Min. | Typ. | Max. | Units |
|-----------------|---------------------------------|--------------------------------------------|------|------|------|-------|
| V <sub>SD</sub> | Forward On Voltage <sup>2</sup> | I <sub>S</sub> =-20A, V <sub>GS</sub> =0V  | -    | -    | -1.2 | V     |
| t <sub>rr</sub> | Reverse Recovery Time           | I <sub>S</sub> =-10A, V <sub>GS</sub> =0V, | -    | 30   | -    | ns    |
| Q <sub>rr</sub> | Reverse Recovery Charge         | dI/dt=100A/μs                              | -    | 30   | -    | nC    |

#### Notes:

- 1.Pulse width limited by Max. junction temperature.
- 2.Pulse test

THIS PRODUCT IS SENSITIVE TO ELECTROSTATIC DISCHARGE, PLEASE HANDLE WITH CAUTION.

USE OF THIS PRODUCT AS A CRITICAL COMPONENT IN LIFE SUPPORT OR OTHER SIMILAR SYSTEMS IS NOT AUTHORIZED.

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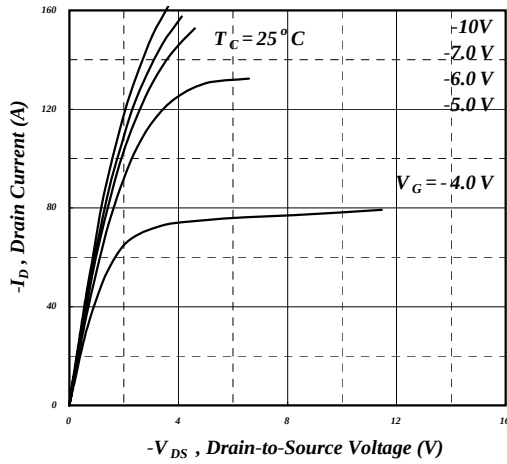


Fig 1. Typical Output Characteristics

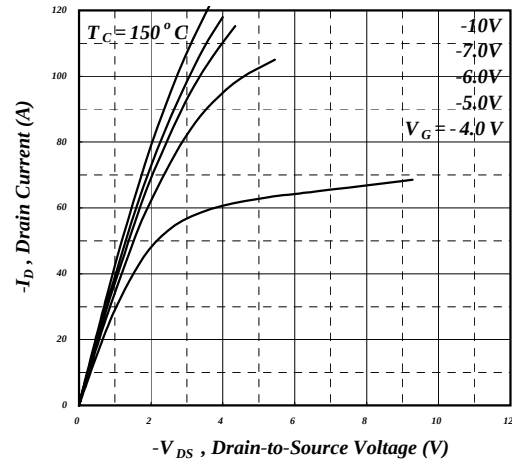


Fig 2. Typical Output Characteristics

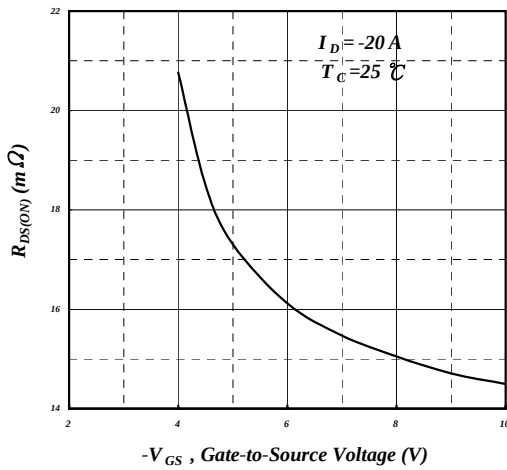


Fig 3. On-Resistance v.s. Gate Voltage

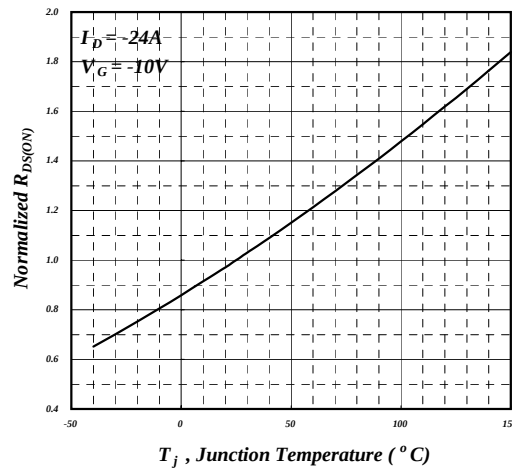


Fig 4. Normalized On-Resistance v.s. Junction Temperature

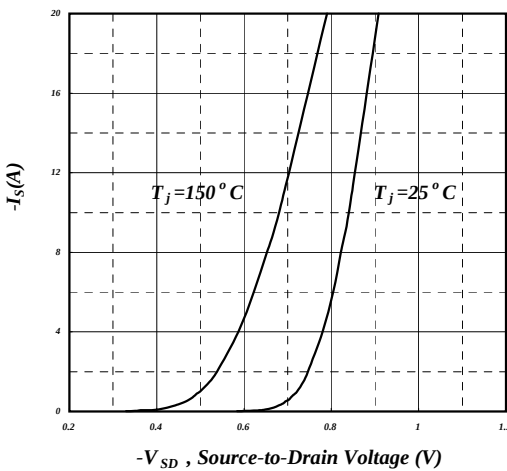


Fig 5. Forward Characteristic of Reverse Diode

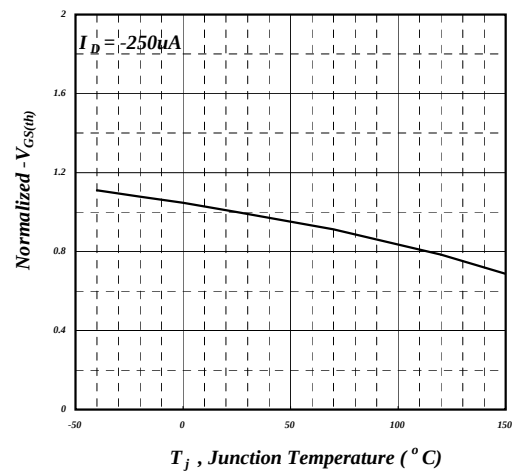


Fig 6. Gate Threshold Voltage v.s. Junction Temperature

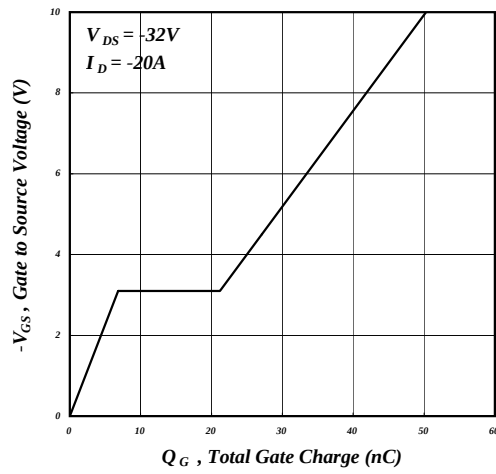


Fig 7. Gate Charge Characteristics

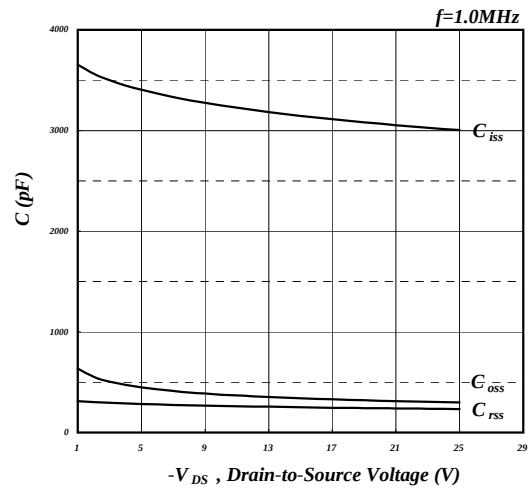


Fig 8. Typical Capacitance Characteristics

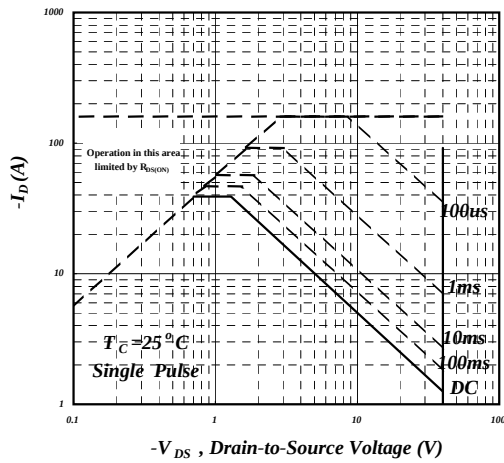


Fig 9. Maximum Safe Operating Area

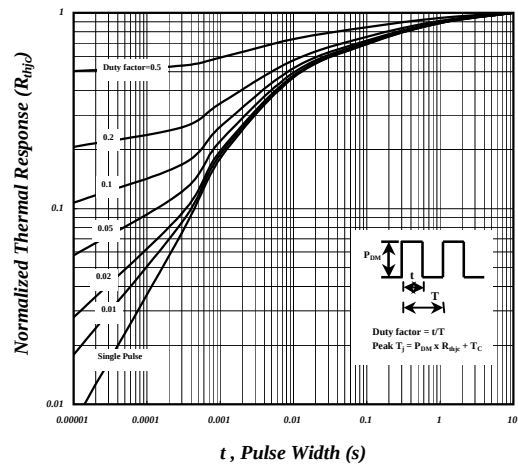


Fig 10. Effective Transient Thermal Impedance

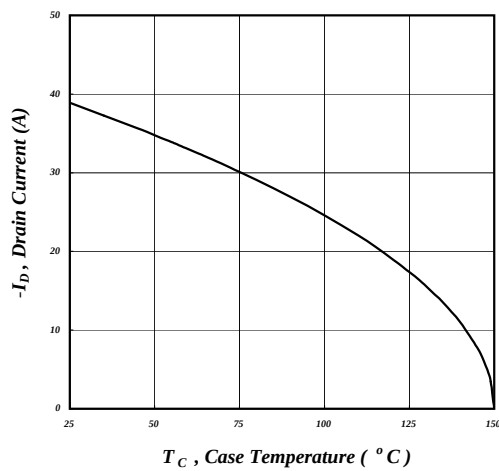


Fig 11. Maximum Continuous Drain Current v.s. Case Temperature

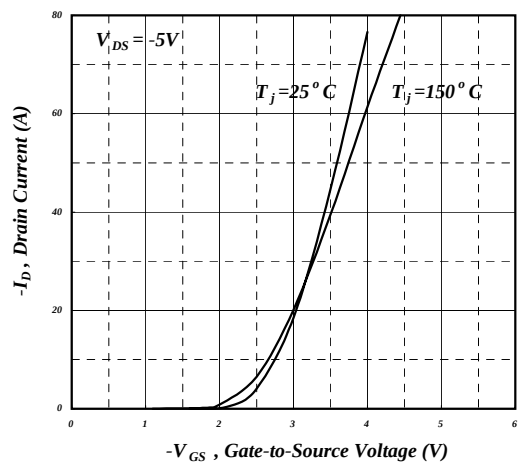


Fig 12. Transfer Characteristics