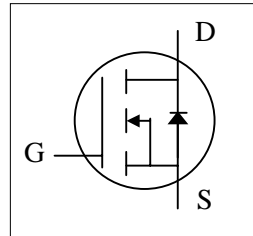




- ▼ Simple Drive Requirement
- ▼ Low On-resistance
- ▼ Fast Switching Characteristics
- ▼ RoHS Compliant & Halogen-Free

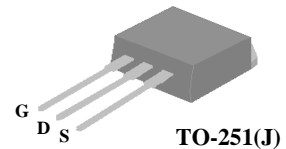
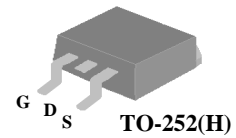


|              |               |
|--------------|---------------|
| $BV_{DSS}$   | 200V          |
| $R_{DS(ON)}$ | 170m $\Omega$ |
| $I_D$        | 18A           |

## Description

AP18N20 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 TO-252 package is widely preferred for all commercial-industrial surface mount applications using infrared reflow technique and suited for high current application due to the low connection resistance. The through-hole version (AP18N20GJ) are available for low-profile applications.



## Absolute Maximum Ratings @ $T_j=25^\circ\text{C}$ (unless otherwise specified)

| Symbol                      | Parameter                            | Rating     | Units               |
|-----------------------------|--------------------------------------|------------|---------------------|
| $V_{DS}$                    | Drain-Source Voltage                 | 200        | V                   |
| $V_{GS}$                    | Gate-Source Voltage                  | $\pm 20$   | V                   |
| $I_D@T_C=25^\circ\text{C}$  | Drain Current, $V_{GS}$ @ 10V        | 18         | A                   |
| $I_D@T_C=100^\circ\text{C}$ | Drain Current, $V_{GS}$ @ 10V        | 9.5        | A                   |
| $I_{DM}$                    | Pulsed Drain Current <sup>1</sup>    | 60         | A                   |
| $P_D@T_C=25^\circ\text{C}$  | Total Power Dissipation              | 89         | W                   |
|                             | Linear Derating Factor               | 0.7        | W/ $^\circ\text{C}$ |
| $P_D@T_A=25^\circ\text{C}$  | Total Power Dissipation <sup>3</sup> | 2          | W                   |
| $T_{STG}$                   | 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                      |
|--------|---|-------|---------------------------|
| Rthj-c | Maximum Thermal Resistance, Junction-case                             | 1.4   | $^\circ\text{C}/\text{W}$ |
| Rthj-a | Maximum Thermal Resistance, Junction-ambient (PCB mount) <sup>3</sup> | 62.5  | $^\circ\text{C}/\text{W}$ |
| Rthj-a | Maximum Thermal Resistance, Junction-ambient                          | 110   | $^\circ\text{C}/\text{W}$ |



# AP18N20GH/J-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               | 200  | -    | -    | V     |
| ΔBV <sub>DSS</sub> /ΔT <sub>j</sub> | Breakdown Voltage Temperature Coefficient      | Reference to 25°C, I <sub>D</sub> =1mA                   | -    | 0.25 | -    | V/°C  |
| R <sub>DS(ON)</sub>                 | Static Drain-Source On-Resistance <sup>2</sup> | V <sub>GS</sub> =10V, I <sub>D</sub> =8A                 | -    | -    | 170  | mΩ    |
| V <sub>GS(th)</sub>                 | Gate Threshold Voltage                         | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250uA | 2    | -    | 4    | V     |
| g <sub>fs</sub>                     | Forward Transconductance                       | V <sub>DS</sub> =10V, I <sub>D</sub> =10A                | -    | 9.5  | -    | S     |
| I <sub>DSS</sub>                    | Drain-Source Leakage Current                   | V <sub>DS</sub> =200V, 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 <sup>2</sup>                 | I <sub>D</sub> =10A                                      | -    | 19   | 30   | nC    |
| Q <sub>gs</sub>                     | Gate-Source Charge                             | V <sub>DS</sub> =160V                                    | -    | 5    | -    | nC    |
| Q <sub>gd</sub>                     | Gate-Drain ("Miller") Charge                   | V <sub>GS</sub> =10V                                     | -    | 6    | -    | nC    |
| t <sub>d(on)</sub>                  | Turn-on Delay Time <sup>2</sup>                | V <sub>DD</sub> =100V                                    | -    | 9    | -    | ns    |
| t <sub>r</sub>                      | Rise Time                                      | I <sub>D</sub> =11A                                      | -    | 21   | -    | ns    |
| t <sub>d(off)</sub>                 | Turn-off Delay Time                            | R <sub>G</sub> =9.1 Ω                                    | -    | 25   | -    | ns    |
| t <sub>f</sub>                      | Fall Time                                      | V <sub>GS</sub> =10V                                     | -    | 19   | -    | ns    |
| C <sub>iss</sub>                    | Input Capacitance                              | V <sub>GS</sub> =0V                                      | -    | 1065 | 1700 | pF    |
| C <sub>oss</sub>                    | Output Capacitance                             | V <sub>DS</sub> =25V                                     | -    | 185  | -    | pF    |
| C <sub>rss</sub>                    | Reverse Transfer Capacitance                   | f=1.0MHz   | -    | 3    | -    | pF    |
| R <sub>g</sub>                      | Gate Resistance                                | f=1.0MHz   | -    | 1.6  | 2.4  | 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> =10A, V <sub>GS</sub> =0V  | -    | -    | 1.3  | V     |
| t <sub>rr</sub> | Reverse Recovery Time <sup>2</sup> | I <sub>S</sub> =10A, V <sub>GS</sub> =0V, | -    | 180  | -    | ns    |
| Q <sub>rr</sub> | Reverse Recovery Charge            | di/dt=100A/μs                             | -    | 1150 | -    | nC    |

### Notes:

1. Pulse width limited by Max junction temperature.
2. Pulse test
3. Surface mounted on 1 in<sup>2</sup> copper pad of FR4 board

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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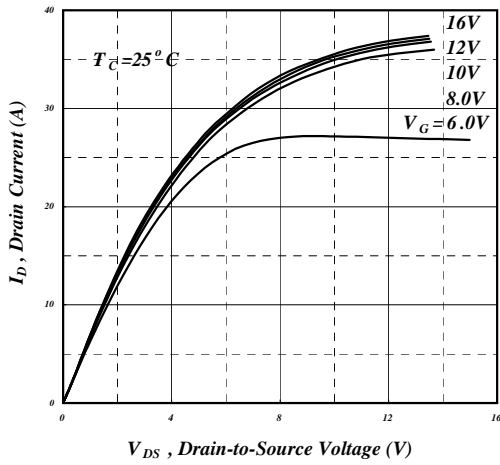


Fig 1. Typical Output Characteristics

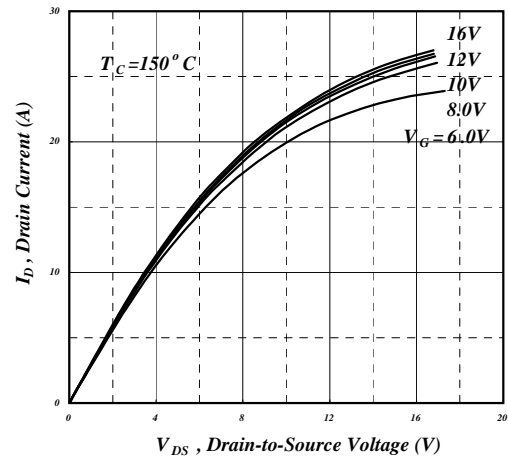


Fig 2. Typical Output Characteristics

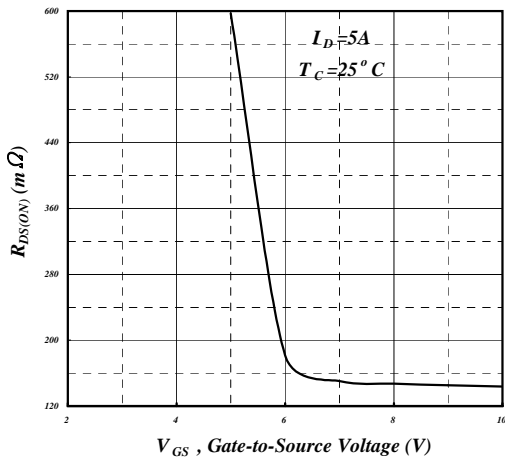


Fig 3. On-Resistance v.s. Gate Voltage

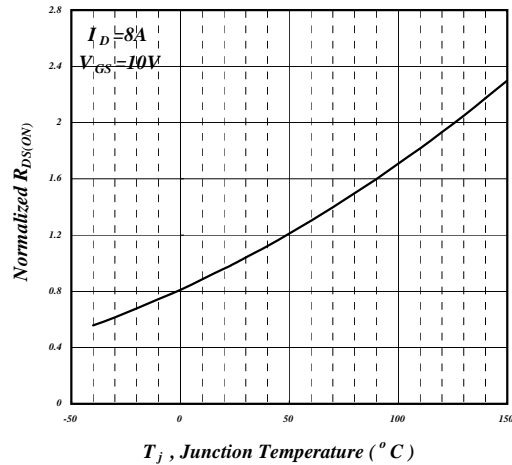


Fig 4. Normalized On-Resistance v.s. Junction Temperature

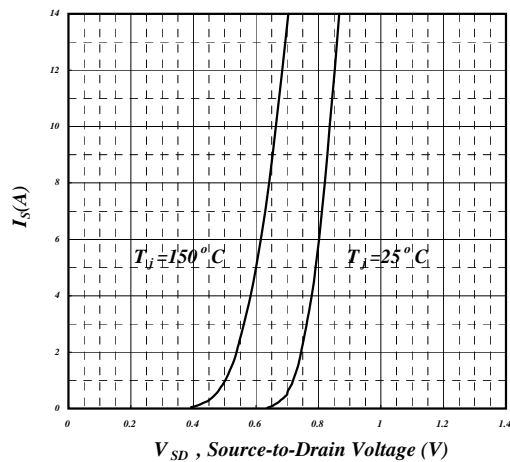


Fig 5. Forward Characteristic of Reverse Diode

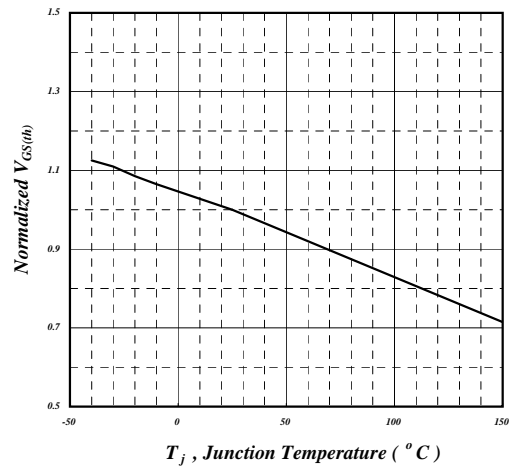


Fig 6. Gate Threshold Voltage v.s. Junction Temperature



# AP18N20GH/J-HF

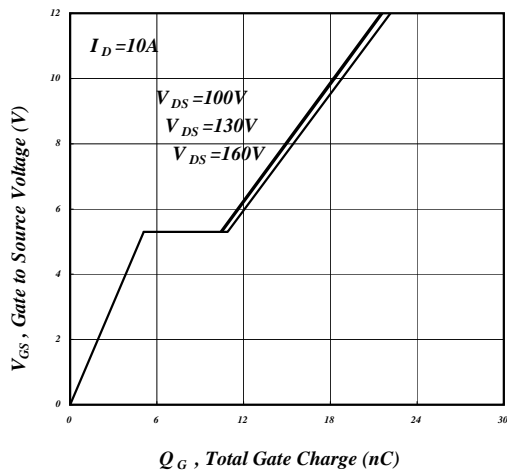


Fig 7. Gate Charge Characteristics

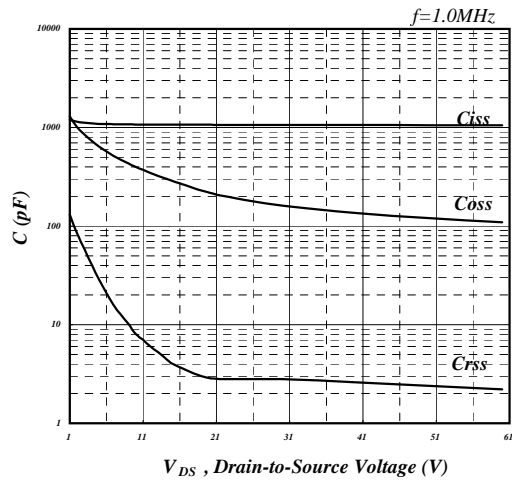


Fig 8. Typical Capacitance Characteristics

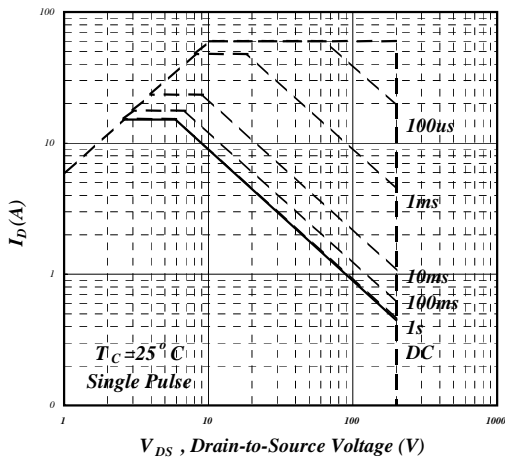


Fig 9. Maximum Safe Operating Area

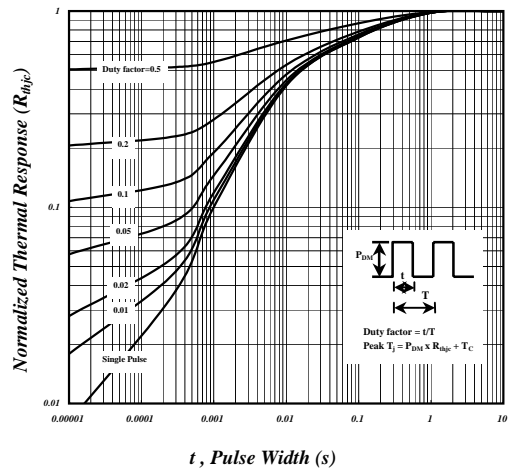


Fig 10. Effective Transient Thermal Impedance

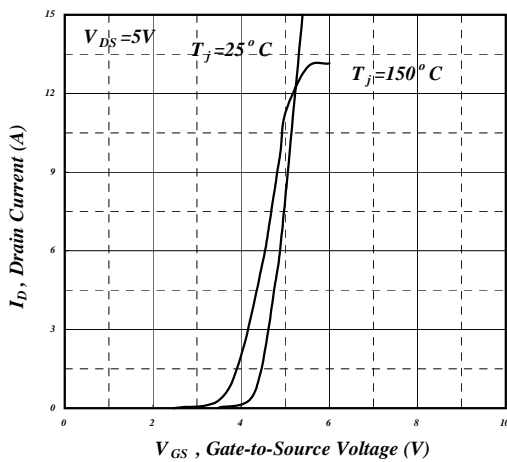


Fig 11. Transfer Characteristics

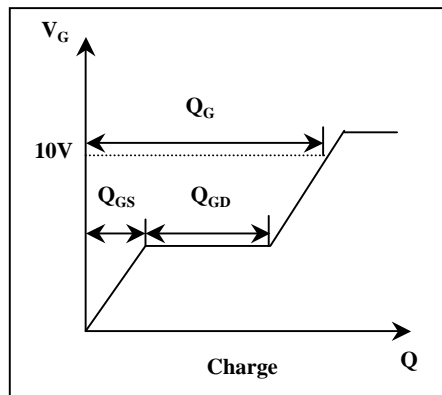
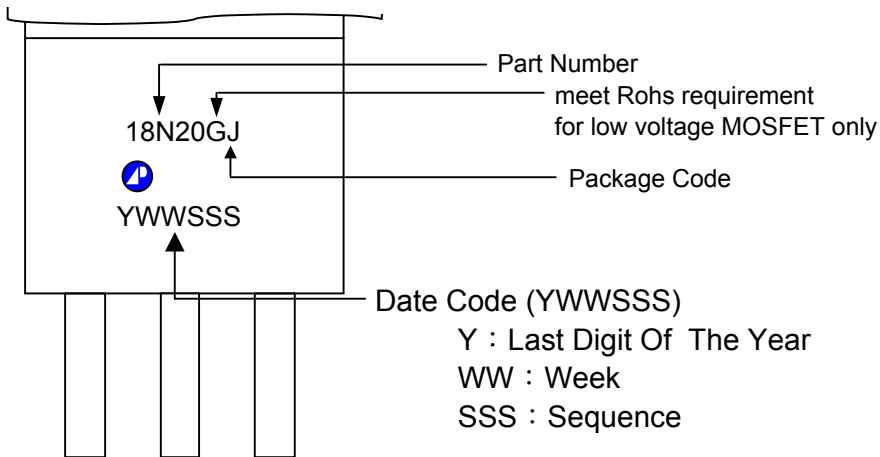


Fig 12. Gate Charge Waveform



# MARKING INFORMATION

## TO-251



## TO-252

