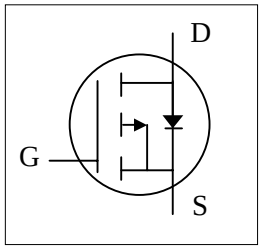
# AP9578GH-HF

**Halogen-Free Product**

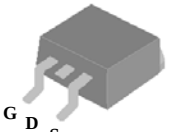
**Advanced Power Electronics Corp.**

*P-CHANNEL ENHANCEMENT MODE POWER MOSFET*

- ▼ **Lower On-resistance**
- ▼ **Simple Drive Requirement**
- ▼ **Fast Switching Characteristic**




| | |
|---|---|
| $BV_{DSS}$ | -60V |
| $R_{DS(ON)}$ | 160mΩ |
| $I_D$ | -10A |




TO-252(H)

## Description

AP9578 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.

## Absolute Maximum Ratings@$T_j$=25°C(unless otherwise specified)

| Symbol | Parameter | Rating | Units |
|---|---|---|---|
| $V_{DS}$ | Drain-Source Voltage | -60 | V |
| $V_{GS}$ | Gate-Source Voltage | ±25 | V |
| $I_D$@$T_C$=25℃ | Drain Current, $V_{GS}$ @ 10V | -10 | A |
| $I_D$@$T_C$=100℃ | Drain Current, $V_{GS}$ @ 10V | -6 | A |
| $I_{DM}$ | Pulsed Drain Current[1] | -45 | A |
| $P_D$@$T_C$=25℃ | Total Power Dissipation | 28 | W |
| | Linear Derating Factor | 0.23 | W/℃ |
| $T_{STG}$ | Storage Temperature Range | -55 to 150 | ℃ |
| $T_J$ | Operating Junction Temperature Range | -55 to 150 | ℃ |

## Thermal Data

| Symbol | Parameter | Value | Units |
|---|---|---|---|
| Rthj-c | Maximum Thermal Resistance, Junction-case | 4.5 | ℃/W |
| Rthj-a | Maximum Thermal Resistance, Junction-ambient (PCB mount)[3] | 62.5 | ℃/W |

## Electrical Characteristics@$T_j$=25°C(unless otherwise specified)

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Units |
|---|---|---|---|---|---|---|
| $BV_{DSS}$ | Drain-Source Breakdown Voltage | $V_{GS}$=0V, $I_D$=-250uA | -60 | - | - | V |
| $R_{DS(ON)}$ | Static Drain-Source On-Resistance[2] | $V_{GS}$=-10V, $I_D$=-5A | - | - | 160 | mΩ |
| | | $V_{GS}$=-4.5V, $I_D$=-3A | - | - | 200 | mΩ |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS}$=$V_{GS}$, $I_D$=-250uA | -1 | - | -3 | V |
| $g_{fs}$ | Forward Transconductance | $V_{DS}$=-10V, $I_D$=-5A | - | 8 | - | S |
| $I_{DSS}$ | Drain-Source Leakage Current | $V_{DS}$=-60V, $V_{GS}$=0V | - | - | -10 | uA |
| | Drain-Source Leakage Current ($T_j$=125°C) | $V_{DS}$=-48V, $V_{GS}$=0V | - | - | -250 | uA |
| $I_{GSS}$ | Gate-Source Leakage | $V_{GS}$=±25V, $V_{DS}$=0V | - | - | ±100 | nA |
| $Q_g$ | Total Gate Charge[2] | $I_D$=-5A | - | 9 | 16 | nC |
| $Q_{gs}$ | Gate-Source Charge | $V_{DS}$=-48V | - | 2 | - | nC |
| $Q_{gd}$ | Gate-Drain ("Miller") Charge | $V_{GS}$=-4.5V | - | 5 | - | nC |
| $t_{d(on)}$ | Turn-on Delay Time[2] | $V_{DS}$=-30V | - | 9 | - | ns |
| $t_r$ | Rise Time | $I_D$=-5A | - | 12 | - | ns |
| $t_{d(off)}$ | Turn-off Delay Time | $R_G$=3.3Ω | - | 32 | - | ns |
| $t_f$ | Fall Time | $V_{GS}$=-10V | - | 27 | - | ns |
| $C_{iss}$ | Input Capacitance | $V_{GS}$=0V | - | 760 | 1220 | pF |
| $C_{oss}$ | Output Capacitance | $V_{DS}$=-25V | - | 80 | - | pF |
| $C_{rss}$ | Reverse Transfer Capacitance | f=1.0MHz | - | 60 | - | pF |

## Source-Drain Diode

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Units |
|---|---|---|---|---|---|---|
| $V_{SD}$ | Forward On Voltage[2] | $I_S$=-5A, $V_{GS}$=0V | - | - | -1.2 | V |
| $t_{rr}$ | Reverse Recovery Time[2] | $I_S$=-5A, $V_{GS}$=0V, | - | 41 | - | ns |
| $Q_{rr}$ | Reverse Recovery Charge | dI/dt=-100A/μs | - | 83 | - | nC |

### Notes:

1.Pulse width limited by safe operating area.

2.Pulse test

3.Surface mounted on 1 $in^2$ copper pad of FR4 board

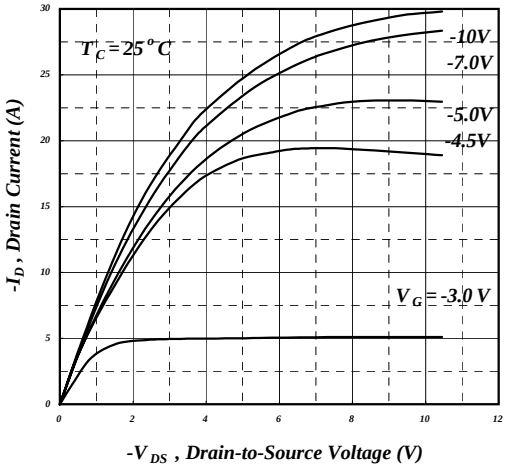



**Fig 1. Typical Output Characteristics**

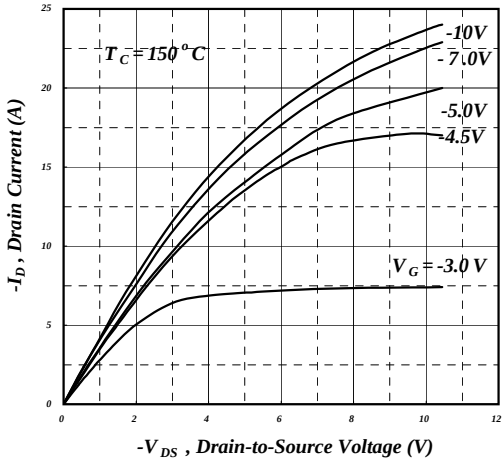



**Fig 2. Typical Output Characteristics**

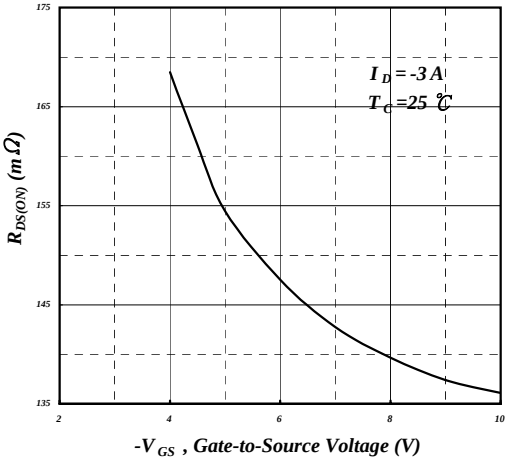



**Fig 3. On-Resistance v.s. Gate Voltage**

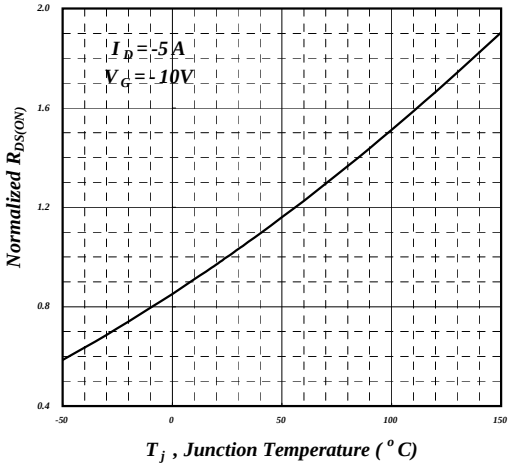



**Fig 4. Normalized On-Resistance v.s. Junction Temperature**

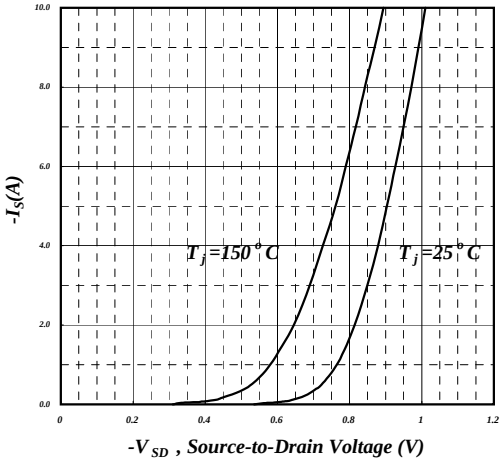



**Fig 5. Forward Characteristic of Reverse Diode**

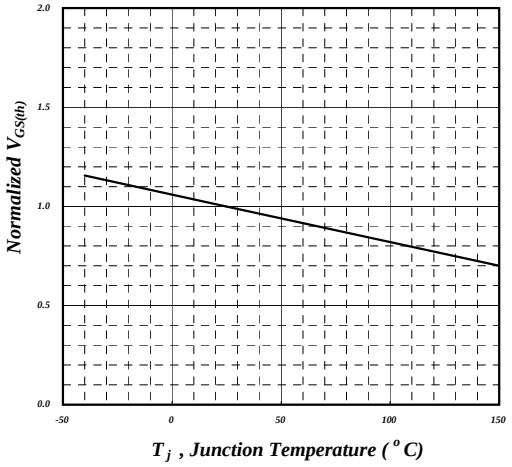



**Fig 6. Gate Threshold Voltage v.s. Junction Temperature**

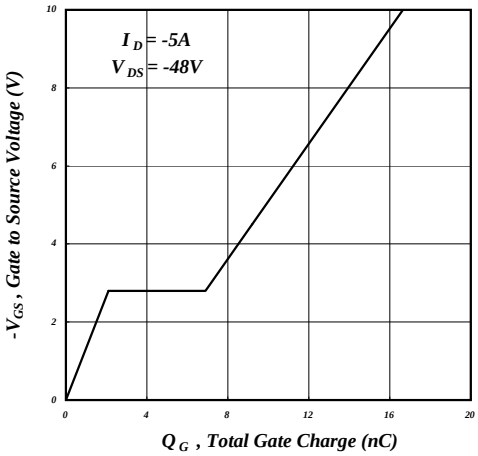



Fig 7. Gate Charge Characteristics

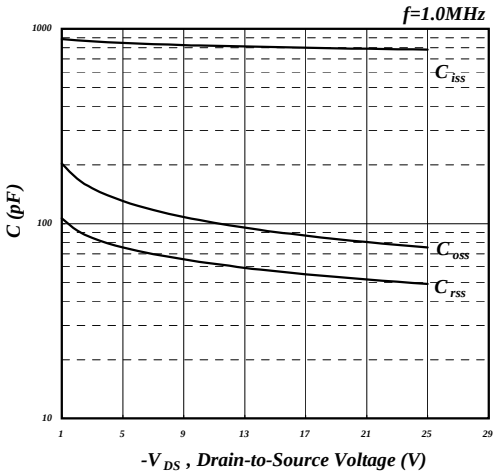



Fig 8. Typical Capacitance Characteristics

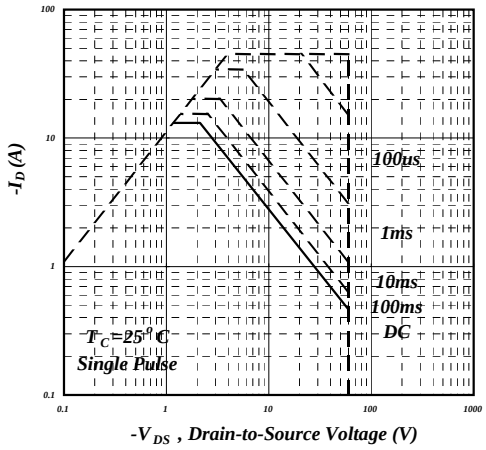



Fig 9. Maximum Safe Operating Area

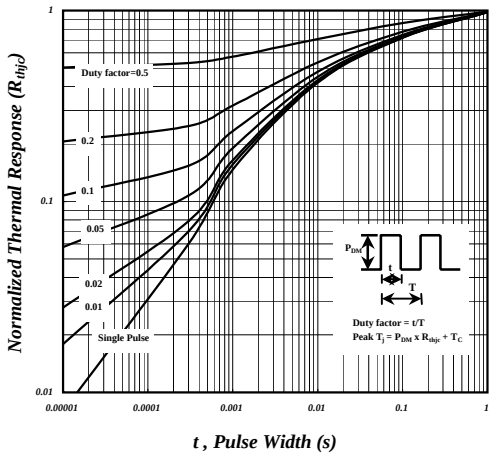



Fig 10. Effective Transient Thermal Impedance

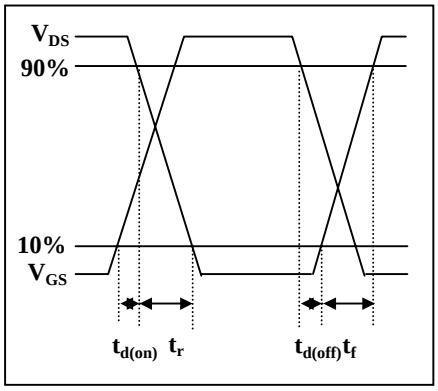



Fig 11. Switching Time Waveform

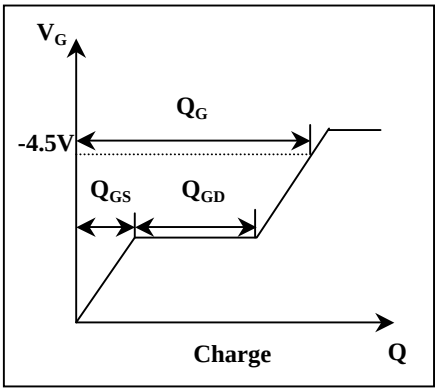



Fig 12. Gate Charge Waveform

## MARKING INFORMATION