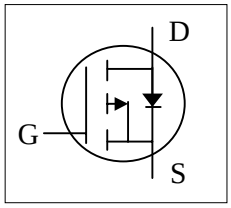
# AP9451GG

**RoHS-compliant Product**

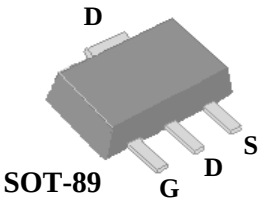
**Advanced Power Electronics Corp.**

*P-CHANNEL ENHANCEMENT MODE POWER MOSFET*

- **Simple Drive Requirement**
- **Small Package Outline**
- **Capable of 2.5V Gate Drive**
- **RoHS Compliant**




| | |
|---|---|
| $BV_{DSS}$ | -20V |
| $R_{DS(ON)}$ | 135mΩ |
| $I_D$ | - 2.3A |




SOT-89

## Description

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 | ±12 | V |
| $I_D$@$T_A$=25℃ | Continuous Drain Current[3] | -2.3 | A |
| $I_D$@$T_A$=70℃ | Continuous Drain Current[3] | -1.9 | A |
| $I_{DM}$ | Pulsed Drain Current[1] | -12 | A |
| $P_D$@$T_A$=25℃ | Total Power Dissipation | 1.25 | W |
| | Linear Derating Factor | 0.01 | W/℃ |
| $T_{STG}$ | Storage Temperature Range | -55 to 150 | ℃ |
| $T_J$ | Operating Junction Temperature Range | -55 to 150 | ℃ |

## Thermal Data

| Symbol | Parameter | Value | Unit |
|---|---|---|---|
| Rthj-a | Maximum Thermal Resistance, Junction-ambient[3] | 100 | ℃/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 | -20 | - | - | V |
| $\Delta BV_{DSS}/\Delta T_j$ | Breakdown Voltage Temperature Coefficient | Reference to 25℃, $I_D$=-1mA | - | -0.02 | - | V/℃ |
| $R_{DS(ON)}$ | Static Drain-Source On-Resistance[2] | $V_{GS}$=-4.5V, $I_D$=-2.3A | - | - | 135 | mΩ |
| | | $V_{GS}$=-2.5V, $I_D$=-1.0A | - | - | 240 | mΩ |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS}$=$V_{GS}$, $I_D$=-250uA | -0.5 | - | -1.5 | V |
| $g_{fs}$ | Forward Transconductance | $V_{DS}$=-5V, $I_D$=-2.3A | - | 2.3 | - | S |
| $I_{DSS}$ | Drain-Source Leakage Current | $V_{DS}$=-20V, $V_{GS}$=0V | - | - | -1 | uA |
| | Drain-Source Leakage Current ($T_j$=70°C) | $V_{DS}$=-16V, $V_{GS}$=0V | - | - | -25 | uA |
| $I_{GSS}$ | Gate-Source Leakage | $V_{GS}$=±12V, $V_{DS}$=0V | - | - | ±100 | nA |
| $Q_g$ | Total Gate Charge[2] | $I_D$= -2.3A | - | 5.5 | 9 | nC |
| $Q_{gs}$ | Gate-Source Charge | $V_{DS}$= -15V | - | 1 | - | nC |
| $Q_{gd}$ | Gate-Drain ("Miller") Charge | $V_{GS}$= -4.5V | - | 2.5 | - | nC |
| $t_{d(on)}$ | Turn-on Delay Time[2] | $V_{DS}$=-10V | - | 9 | - | ns |
| $t_r$ | Rise Time | $I_D$=-1A | - | 25 | - | ns |
| $t_{d(off)}$ | Turn-off Delay Time | $R_G$=3.3Ω,$V_{GS}$=-5V | - | 20 | - | ns |
| $t_f$ | Fall Time | $R_D$=10Ω | - | 10 | - | ns |
| $C_{iss}$ | Input Capacitance | $V_{GS}$=0V | - | 270 | 430 | pF |
| $C_{oss}$ | Output Capacitance | $V_{DS}$= -20V | - | 100 | - | pF |
| $C_{rss}$ | Reverse Transfer Capacitance | f=1.0MHz | - | 35 | - | pF |
| $R_g$ | Gate Resistance | f=1.0MHz | - | 8 | 12 | Ω |

## Source-Drain Diode

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Units |
|---|---|---|---|---|---|---|
| $V_{SD}$ | Forward On Voltage[2] | $T_j$=25℃, $I_S$=-1A, $V_{GS}$=0V | - | - | -1.6 | V |
| $t_{rr}$ | Reverse Recovery Time[2] | $I_S$= -2.5A, $V_{GS}$=0V, | - | 27 | - | ns |
| $Q_{rr}$ | Reverse Recovery Charge | dI/dt=100A/μs | - | 27 | - | nC |

### Notes:

1.Pulse width limited by Max. junction temperature.

2.Pulse test

3.Surface mount on FR4 board, t ≦ 10s.

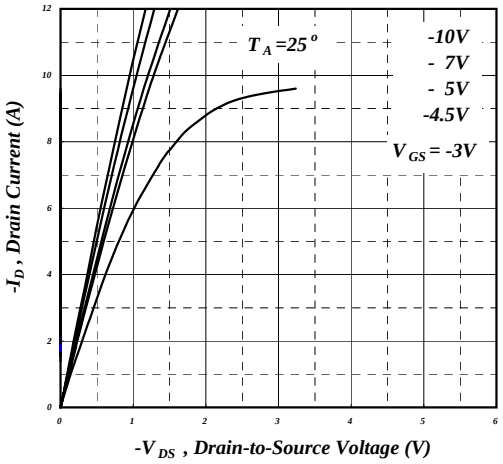



**Fig 1. Typical Output Characteristics**

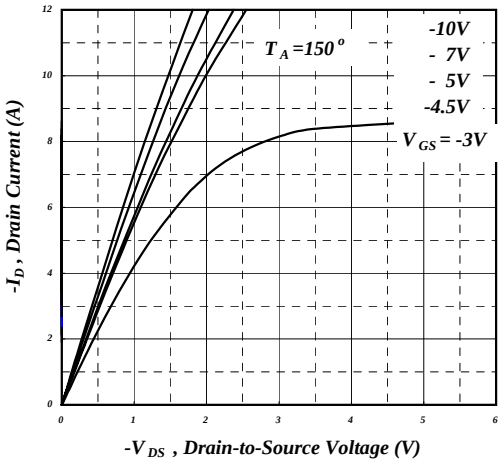



**Fig 2. Typical Output Characteristics**

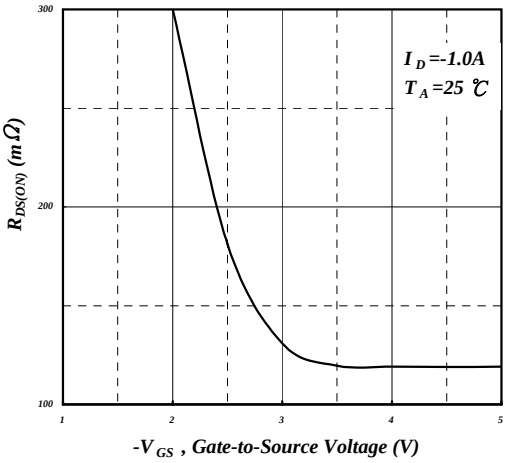



**Fig 3. On-Resistance v.s. Gate Voltage**

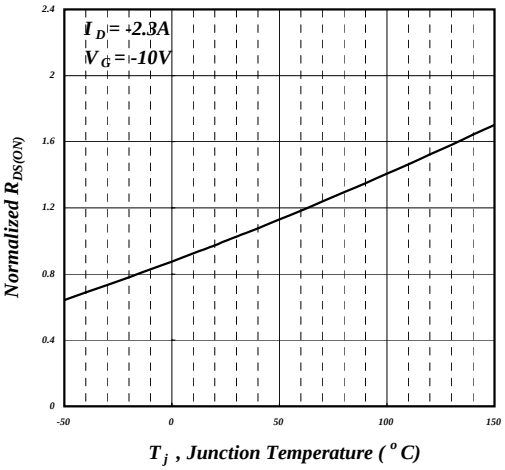



**Fig 4. Normalized On-Resistance**

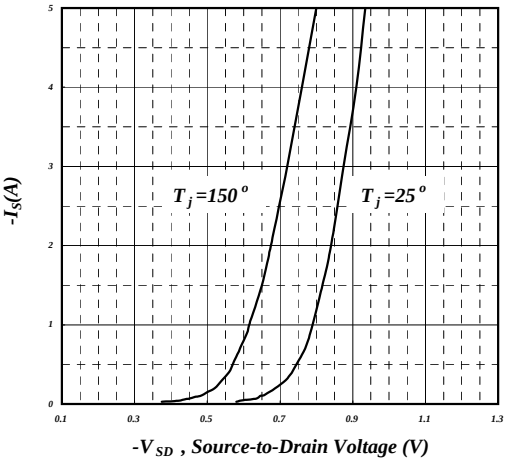



**Fig 5. Forward Characteristic of Reverse Diode**

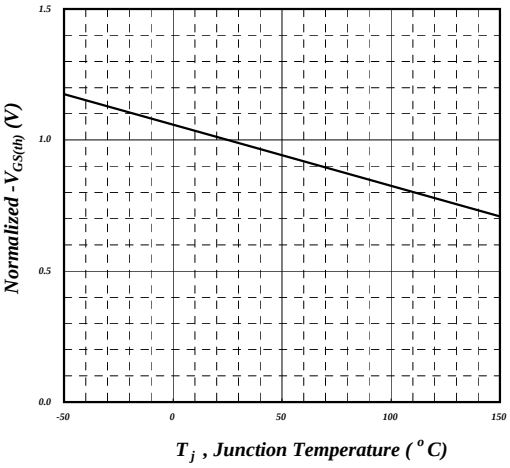



**Fig 6. Gate Threshold Voltage v.s. Junction Temperature**

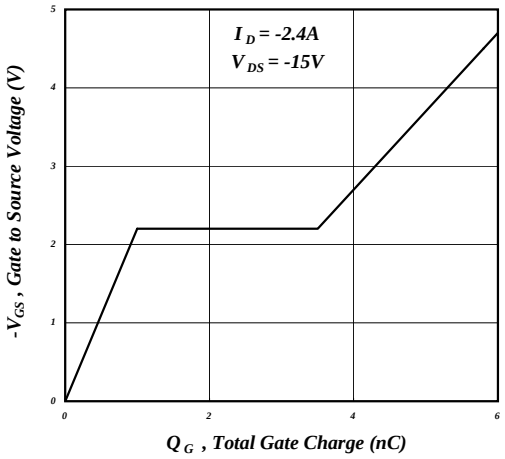



Fig 7. Gate Charge Characteristics

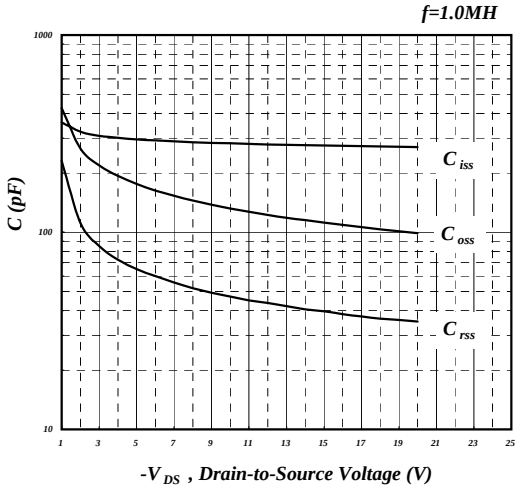



Fig 8. Typical Capacitance Characteristics

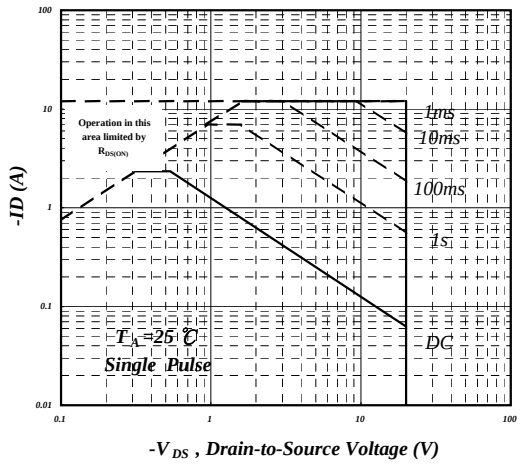



Fig 9. Maximum Safe Operating Area

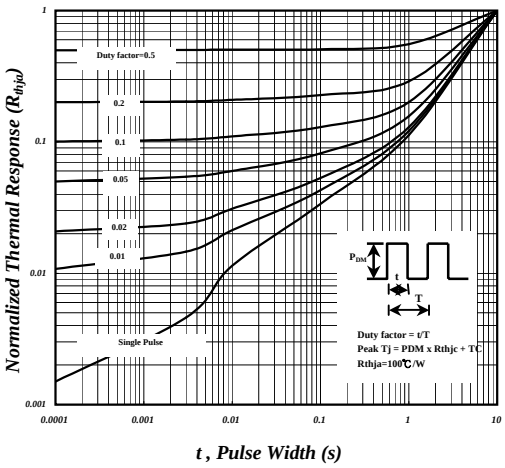



Fig 10. Effective Transient Thermal Impedance

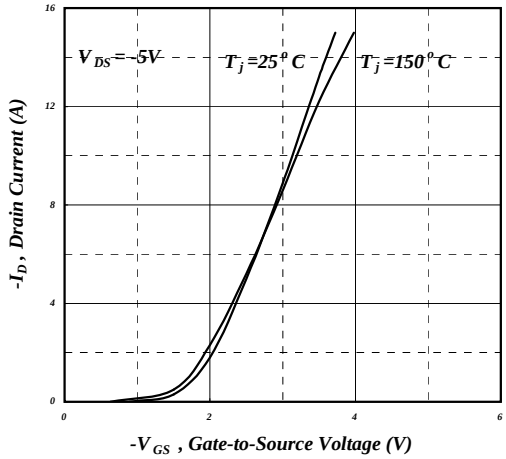



Fig 11. Transfer Characteristics

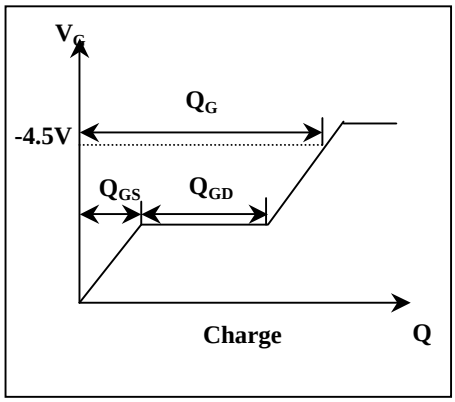



Fig 12. Gate Charge Waveform