

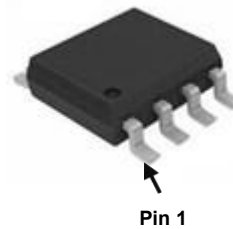
ATM9435PPA

Description

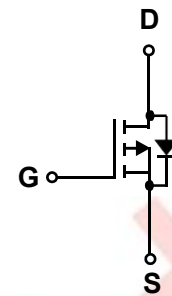
P-Channel Enhancement Mode Field Effect Transistor

The ATM9435PPA uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as $-4.5V$. This device is suitable for use as a load switch or in PWM applications. Standard Product ATM9435PPA is Pb-free.

SOP-8L



Top View

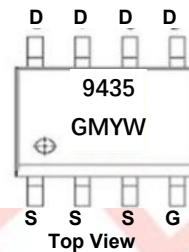


Schematic

Feature

- $V_{DS} (V) = -30V$
- $I_D = -6.0 A (V_{GS} = -10V)$
- $R_{DS(ON)} < 48m\Omega (V_{GS} = -10V)$
- $R_{DS(ON)} < 55m\Omega (V_{GS} = -6.0V)$
- $R_{DS(ON)} < 78m\Omega (V_{GS} = -4.5V)$

Marking



Top View

- **9435** : Device code
- **GM** : Special code
- **YW** : Date code

Order Information

| Device | Package | Shipping |
|------------|---------|----------------|
| ATM9435PPA | SOP-8L | 4000/Tape&Reel |

Absolute Maximum Ratings ($T_A=25^\circ C$, unless otherwise noted)

| Parameter | Symbol | Maximum | Units |
|--|----------------|------------------|------------|
| Drain-Source Voltage | V_{DS} | -30 | V |
| Gate-Source Voltage | V_{GS} | ± 20 | V |
| Continuous Drain Current ^{NOET 1} | I_D | $T_A=25^\circ C$ | -6.0 |
| | | $T_A=70^\circ C$ | -4.7 |
| Pulsed Drain Current ^{NOET 2} | I_{DM} | -50 | A |
| Power Dissipation ^{NOET 1} | P_D | $T_A=25^\circ C$ | 2.7 |
| | | $T_A=70^\circ C$ | 1.7 |
| Junction and Storage Temperature Range | T_J, T_{STG} | -55 to 150 | $^\circ C$ |

Thermal Characteristics

| Parameter | Symbol | Typ | Max | Units |
|---|-----------------|--------------|-----|--------------|
| Maximum Junction-to-Ambient ^{NOET 1} | $R_{\theta JA}$ | $t \leq 10s$ | 37 | $^\circ C/W$ |
| | | Steady-State | 62 | $^\circ C/W$ |
| Maximum Junction-to-Lead ^{NOET 3} | $R_{\theta JL}$ | 16.5 | 22 | $^\circ C/W$ |

ATM9435PPA

| Electrical Characteristics ($T_A=25^\circ\text{C}$ unless otherwise noted) | | | | | | |
|---|--------------|--|------|------|-----------|---------------|
| Parameter | Symbol | Conditions | Min | Typ | Max | Units |
| Static Characteristics | | | | | | |
| Drain-Source Breakdown Voltage | BV_{DSS} | $I_D=-250\mu\text{A}$, $V_{GS}=0\text{V}$ | -30 | | | V |
| Zero Gate Voltage Drain Current | I_{DSS} | $V_{DS}=-24\text{V}$, $V_{GS}=0\text{V}$ | | | -1 | μA |
| Gate-Body leakage current | I_{GSS} | $V_{DS}=0\text{V}$, $V_{GS}=\pm 20\text{V}$ | | | ± 100 | nA |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}=V_{GS}$, $I_D=-250\mu\text{A}$ | -1.0 | -1.5 | -2.0 | V |
| Static Drain-Source On-Resistance | $R_{DS(on)}$ | $V_{GS}=-10\text{V}$, $I_D=-4.6\text{A}$ | | 35 | 48 | m Ω |
| | | $V_{GS}=-6.0\text{V}$, $I_D=-4.1\text{A}$ | | 45 | 55 | m Ω |
| | | $V_{GS}=-4.5\text{V}$, $I_D=-3.7\text{A}$ | | 56 | 78 | m Ω |
| Forward Transconductance | g_{FS} | $V_{DS}=-5.0\text{V}$, $I_D=-3.7\text{A}$ | | 6.7 | | S |
| Diode Forward Voltage | V_{SD} | $I_S=-1.0\text{A}$, $V_{GS}=0\text{V}$ | | -0.8 | -1.2 | V |
| Dynamic Characteristics | | | | | | |
| Input Capacitance | C_{iss} | $V_{GS}=0\text{V}$, $V_{DS}=-15\text{V}$, $f=1\text{MHz}$ | | 800 | | pF |
| Output Capacitance | C_{oss} | | | 88 | | pF |
| Reverse Transfer Capacitance | C_{rss} | | | 70 | | pF |
| Gate resistance | R_g | $V_{GS}=0\text{V}$, $V_{DS}=0\text{V}$, $f=1\text{MHz}$ | | 6.0 | | Ω |
| Switching Characteristics | | | | | | |
| Total Gate Charge | Q_{gtot} | $V_{GS}=-10\text{V}$, $V_{DS}=-10\text{V}$, $I_D=-3.7\text{A}$ | | 15.0 | | nC |
| Gate Source Charge | Q_{gs} | | | 2.9 | | nC |
| Gate Drain Charge | Q_{gd} | | | 1.7 | | nC |
| Turn-On Delay Time | $t_{d(on)}$ | $V_{GS}=-10\text{V}$, $V_{DS}=-15\text{V}$, $R_L=4\Omega$, $R_{GEN}=6\Omega$ | | 27 | | ns |
| Turn-On Rise Time | t_r | | | 18 | | ns |
| Turn-Off Delay Time | $t_{d(off)}$ | | | 77 | | ns |
| Turn-Off Fall Time | t_f | | | 13 | | ns |

Note:

1. The value of $R_{\theta JA}$ is measured with the device mounted on 1in^2 FR-4 board with 2oz. Copper, in a still air environment with $T_A=25^\circ\text{C}$. The value in any given application depends on the user's specific board design. The current rating is based on the $t \leq 10\text{s}$ thermal resistance rating.
2. Repetitive rating, pulse width limited by junction temperature.
3. The $R_{\theta JA}$ is the sum of the thermal impedance from junction to lead $R_{\theta JL}$ and lead to ambient.
4. The static characteristics in Figures 1 to 6 are obtained using $80\mu\text{s}$ pulses, duty cycle 0.5% max.
5. These tests are performed with the device mounted on 1in^2 FR-4 board with 2oz. Copper, in a still air environment with $T_A=25^\circ\text{C}$. The SOA curve provides a single pulserating.

ATM9435PPA

RATINGS AND CHARACTERISTIC CURVES

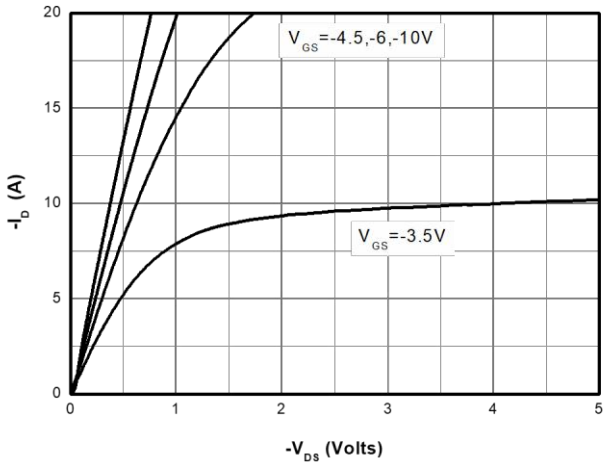


Fig 1: On-Region Characteristics

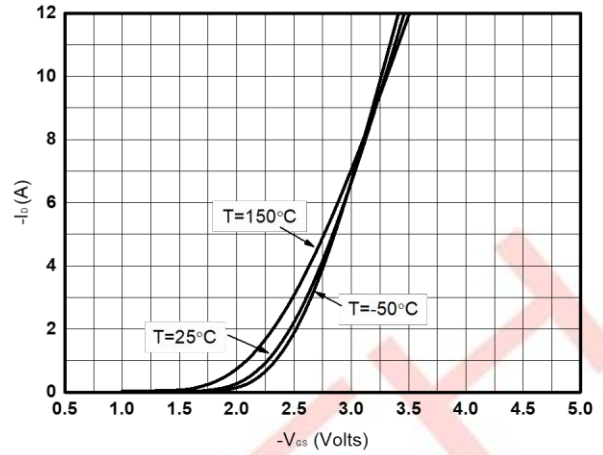


Figure 2: Transfer Characteristics

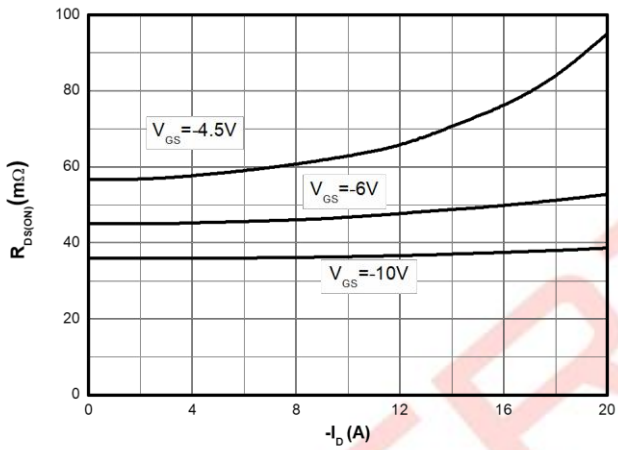


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

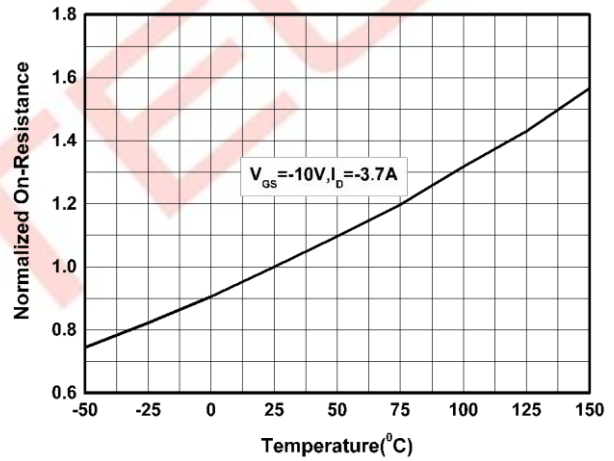


Figure 4: On-Resistance vs. Junction Temperature

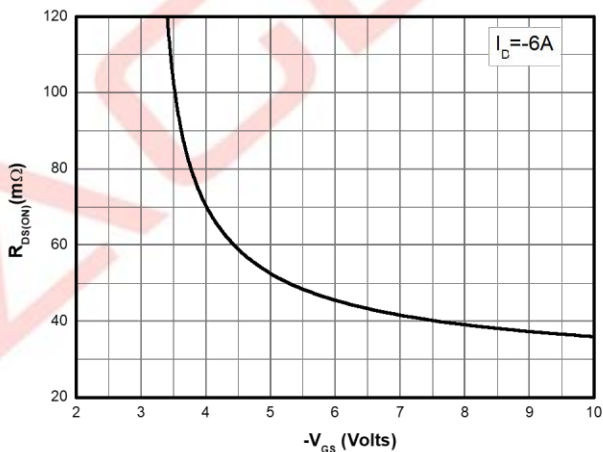


Figure 5: On-Resistance vs Gate-Source

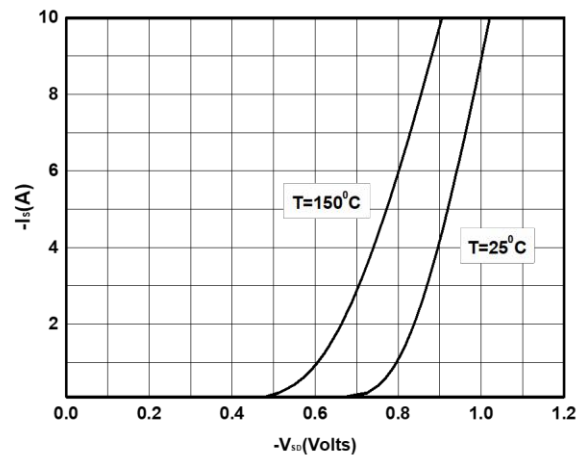


Figure 6: Body-Diode Characteristics

ATM9435PPA

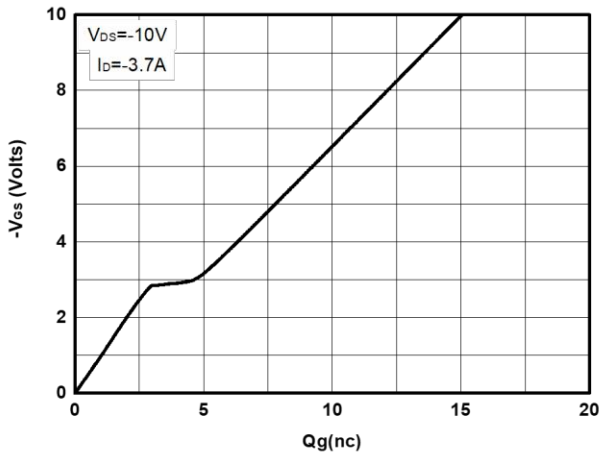


Figure 7: Gate-Charge Characteristics

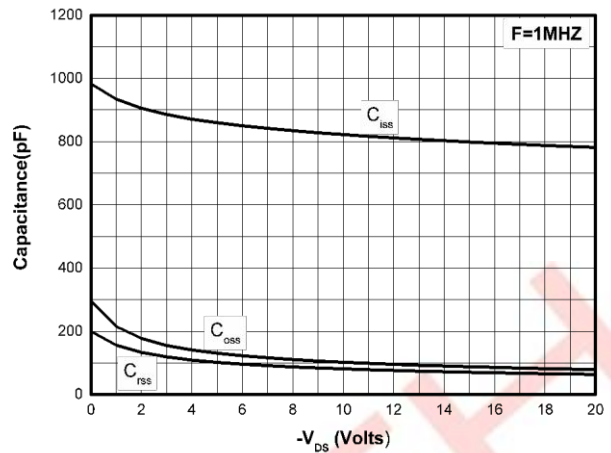


Figure 8: Capacitance Characteristics

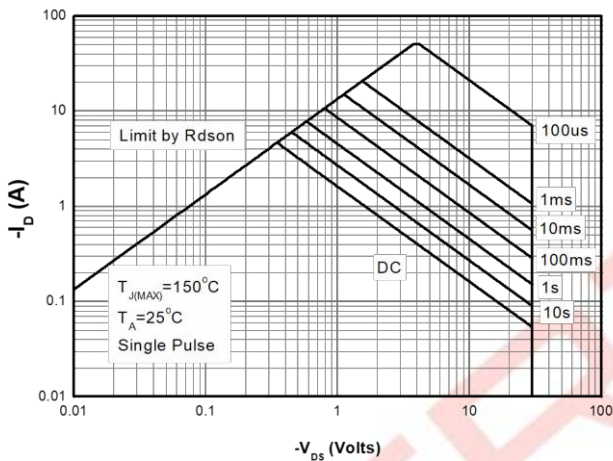


Figure 9: Maximum Forward Biased Safe Operating Area (Note 5)

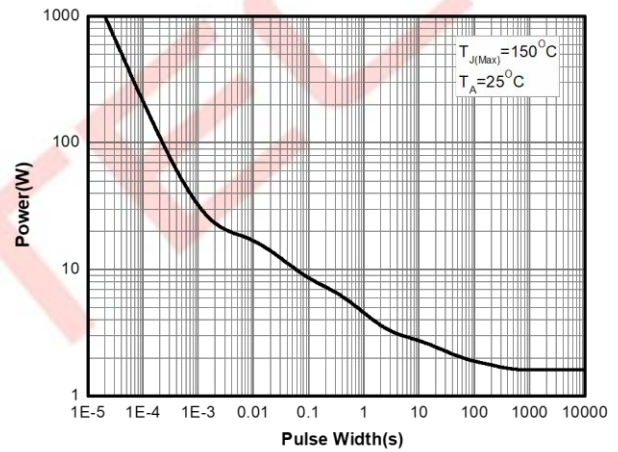


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note 5)

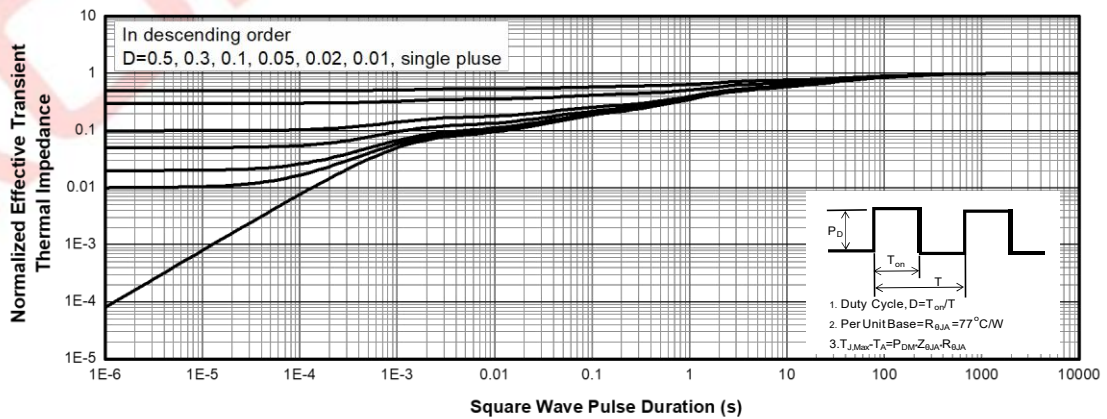
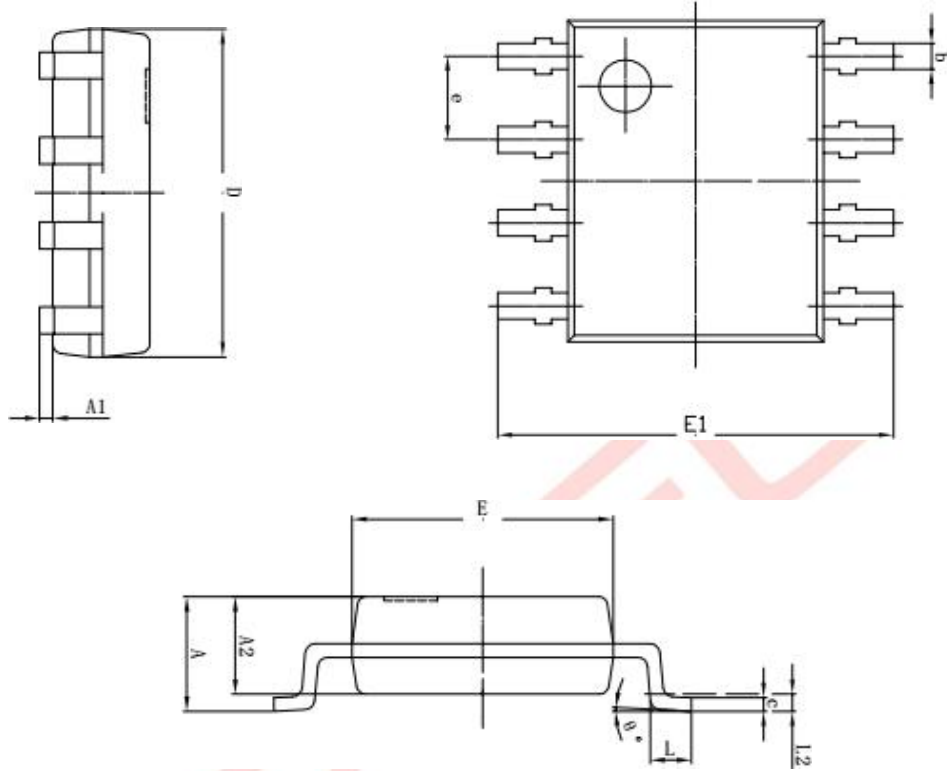


Figure 11: Normalized Maximum Transient Thermal Impedance

ATM9435PPA

Package Outline Dimension (Units: mm)



| Symbol | Dimensions in millimeter | |
|--------|--------------------------|-------|
| | Min | Max |
| A | 1.600 | 1.700 |
| A1 | 0.150 | 0.250 |
| A2 | 1.425 | 1.475 |
| b | 0.400 | |
| c | 0.203 | 0.241 |
| D | 4.850 | 4.950 |
| e | 1.270 | |
| E | 3.870 | 3.930 |
| E1 | 5.990 | 6.090 |
| L | 0.500 | 0.700 |
| θ | 0° | 8° |
| L2 | 0.25BSC | |

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