# AAT9121
## 30V N-Channel Power MOSFET

PWMSwitch™

## General Description

The AAT9121 30V N-Channel Power MOSFET is a member of AnalogicTech's TrenchDMOS™ product family. Using the ultra-high density proprietary TrenchDMOS technology, this product demonstrates high power handling and small size.

## Features

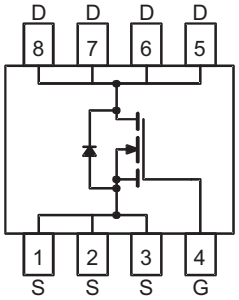
- $V_{DS(MAX)}$ = 30V
- $I_{D(MAX)}$ = 8A @ 25°C
- Low Gate Charge
- Low $R_{DS(ON)}$:
  - 24 mΩ @$V_{GS}$ = 10V
  - 35 mΩ @ $V_{GS}$ = 4.5V

## Applications

- DC-DC converters for mobile CPUs
- Battery-powered portable equipment
- High power density DC - DC supplies
- Power supplies

## SOP-8 Package

Top View




Preliminary Information

## Absolute Maximum Ratings ($T_A$=25°C unless otherwise noted)

| Symbol | Description | | Value | Units |
|---|---|---|---|---|
| $V_{DS}$ | Drain-Source Voltage | | 30 | V |
| $V_{GS}$ | Gate-Source Voltage | | ±20 | |
| $I_D$ | Continuous Drain Current @ $T_J$=150°C [1] | $T_A$ = 25°C | ±8.0 | A |
| | | $T_A$ = 70°C | ±6.4 | |
| $I_{DM}$ | Pulsed Drain Current | | ±24 | |
| $I_S$ | Continuous Source Current (Source-Drain Diode) [1] | | 2.25 | |
| $P_D$ | Maximum Power Dissipation [1] | $T_A$ = 25°C | 2.5 | W |
| | | $T_A$ = 70°C | 1.6 | |
| $T_J$, $T_{STG}$ | Operating Junction and Storage Temperature Range | | -55 to 150 | °C |

## Thermal Characteristics

| Symbol | Description | Value | Units |
|---|---|---|---|
| $R_{\theta JA}$ | Typical Junction-to-Ambient [1] | 50 | °C/W |
| $R_{\theta JC}$ | Typical Junction-to-Case | 28 | °C/W |

Note 1: Mounted on 1" x 1" FR4 Copper Board, 10 sec pulse width.

## Electrical Characteristics ($T_J$=25°C unless otherwise noted)

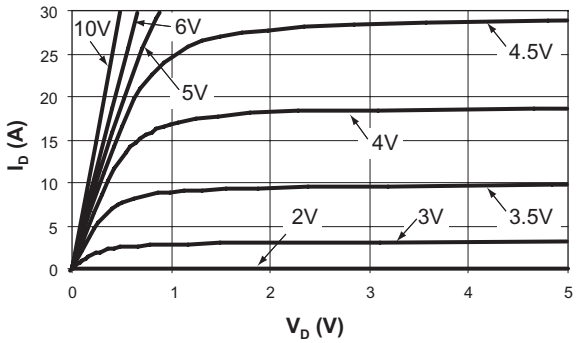
| Symbol | Description | Conditions | Min | Typ | Max | Units |
|---|---|---|---|---|---|---|
| **DC Characteristics** | | | | | | |
| $BV_{DSS}$ | Drain-Source Breakdown Voltage | $V_{GS}$=0V, $I_D$=250µA | 30 | | | V |
| $R_{DS(ON)}$ | Drain-Source ON-Resistance [2] | $V_{GS}$=10V, $I_D$=8A | | 16 | 24 | mΩ |
| | | $V_{GS}$=4.5V, $I_D$=6.6A | | 28 | 35 | |
| $I_{D(ON)}$ | On-State Drain Current [2] | $V_{GS}$=10V ,$V_{DS}$=5V (Pulsed) | 24 | | | A |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{GS}$=$V_{DS}$, $I_D$=250µA | 1.0 | | | V |
| $I_{GSS}$ | Gate-Body Leakage Current | $V_{GS}$=±20V, $V_{DS}$=0V | | | ±100 | nA |
| $I_{DSS}$ | Drain Source Leakage Current | $V_{GS}$=0V,$V_{DS}$=30V | | | 1 | µA |
| | | $V_{GS}$=0V,$V_{DS}$=30V, $T_J$=55°C | | | 5 | |
| $g_{fs}$ | Forward Transconductance [2] | $V_{DS}$=15V, $I_D$=8A | | 15 | | S |
| **Dynamic Characteristics** [3] | | | | | | |
| $Q_G$ | Total Gate Charge | $V_{DS}$=15V, $I_D$=8A, $V_{GS}$=5V | | 10.5 | 16 | nC |
| $Q_{GT}$ | Total Gate Charge | $V_{DS}$=15V, $I_D$=8A, $V_{GS}$=10V | | 20.5 | 28 | nC |
| $Q_{GS}$ | Gate-Source Charge | $V_{DS}$=15V, $I_D$=8A, $V_{GS}$=10V | | 3.8 | | nC |
| $Q_{GD}$ | Gate-Drain Charge | $V_{DS}$=15V, $I_D$=8A, $V_{GS}$=10V | | 2.9 | | nC |
| $t_{D(ON)}$ | Turn-ON Delay | $V_{DD}$=15V, $V_{GS}$=10V, $R_D$=1.8Ω , $R_G$=6Ω | | 9 | 15 | ns |
| $t_R$ | Turn-ON Rise Time | $V_{DD}$=15V, $V_{GS}$=10V, $R_D$=1.8Ω , $R_G$=6Ω | | 12 | 20 | ns |
| $t_{D(OFF)}$ | Turn-OFF Delay | $V_{DD}$=15V, $V_{GS}$=10V, $R_D$=1.8Ω , $R_G$=6Ω | | 38 | 55 | ns |
| $t_F$ | Turn-OFF Fall Time | $V_{DD}$=15V, $V_{GS}$=10V, $R_D$=1.8Ω , $R_G$=6Ω | | 19 | 28 | ns |
| **Source-Drain Diode Characteristics** | | | | | | |
| $V_{SD}$ | Source-Drain Forward Voltage [2] | $V_{GS}$=0, $I_S$=2.25A | | | 1.1 | V |
| $I_S$ | Continuous Diode Current [2] | $T_A$=25ºC | | | 2.25 | A |

Note 2: Pulse test: Pulse Width = 300µs
Note 3: Guaranteed by design. Not subjected to production testing.

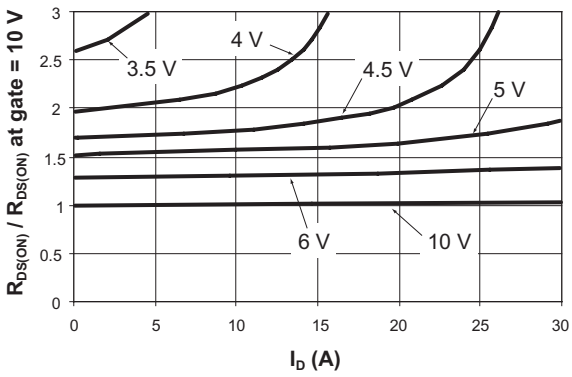
## Typical Characteristics

($T_J$ = 25ºC unless otherwise noted)

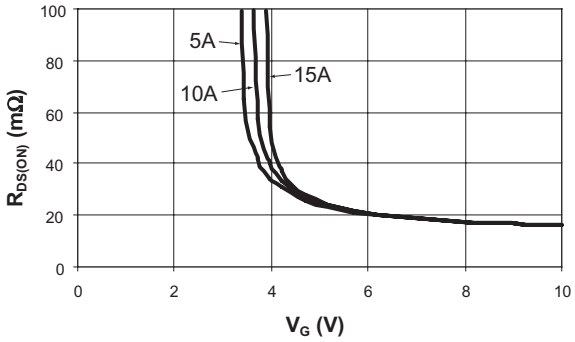
### Forward Characteristics



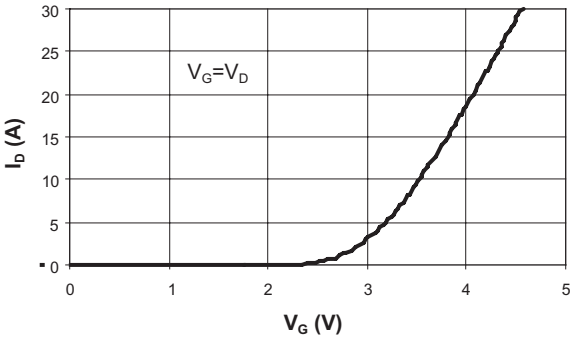

### Normalized $R_{DS(ON)}$



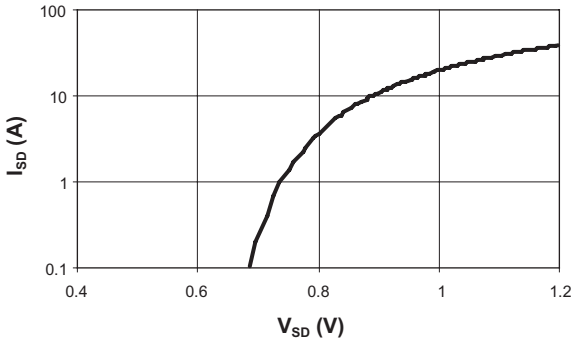

### $R_{DS(ON)}$ vs. $V_G$



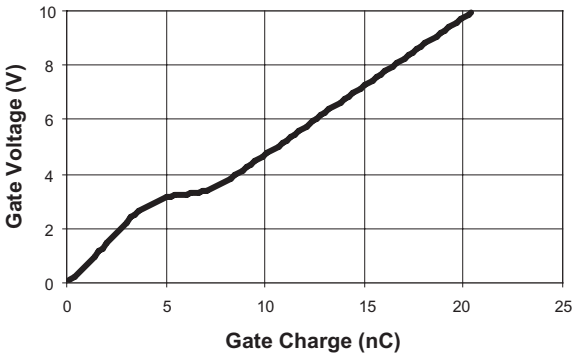

### Transfer




### Source to Drain Voltage




### Gate Charge Characteristics

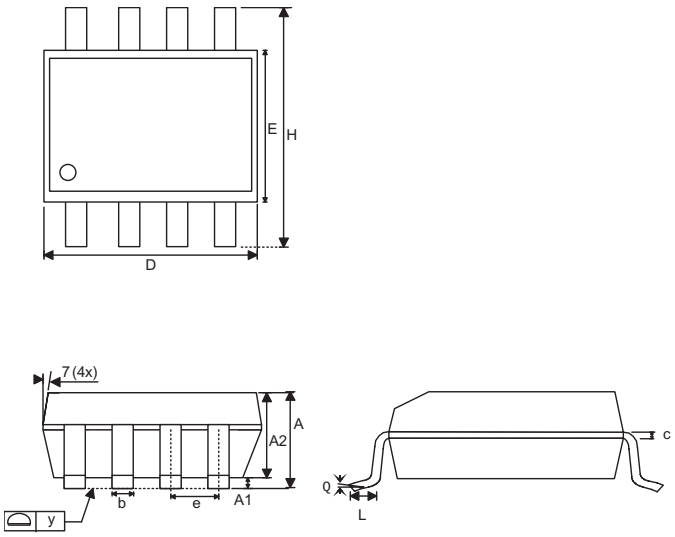


## Ordering Information

| Package | Marking | Part Number | |
|---|---|---|---|
| | | Bulk | Tape and Reel |
| SOP-8 | | AAT9121IAS-B1 | AAT9121IAS-T1 |

## Package Information

**SOP-8**




| Dim | Millimeters | | Inches | |
|---|---|---|---|---|
| | Min | Max | Min | Max |
| A | 1.35 | 1.75 | 0.053 | 0.069 |
| A1 | 0.10 | 0.25 | 0.004 | 0.010 |
| A2 | 1.45 | | 0.057 | |
| B | 0.33 | 0.51 | 0.013 | 0.020 |
| C | 0.19 | 0.25 | 0.007 | 0.010 |
| D | 4.80 | 5.00 | 0.189 | 0.197 |
| E | 3.80 | 4.00 | 0.150 | 0.157 |
| e | 1.27 | | 0.050 | |
| H | 5.80 | 6.20 | 0.228 | 0.244 |
| L | 0.40 | 1.27 | 0.016 | 0.050 |
| Y | 0.00 | 0.10 | 0.000 | 0.004 |
| θ1 | 0° | 8° | 0° | 8° |

Note:
1. PACKAGE BODY SIZES EXCLUDE MOLD FLASH PROTRUSIONS OR GATE BURRS.
2. TOLERANCE 0.1000mm (4mil) UNLESS OTHERWISE SPECIFIED
3. COPLANARITY: 0.1000mm
4. DIMENSION L IS MEASURED IN GAGE PLANE.
5. CONTROLLING DIMENSION IS MILLIMETER; CONVERTED INCH DIMENSIONS ARE NOT NECESSARILY EXACT.

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